AD-773 475

QUENCHING (COOLING)

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FEBRUARY 1974

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UNCLASSIFIED

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Supersedes AD-704 400

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

*Bibliographies	Aluminum Alloys	Heat Treatment
*Quenching	Titanium Alloys	Iron Alloys
Heat Transfer	Steel	Martensite
Crystal Lattice Defects	Submarine Hulls	(See Reverse)
Nickel Alloys	Iron	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This bibliography is a collection of references relating to the various techniques of quenching metals and alloys to optimize their properties.

Corporate Author-Monitoring Agency, Subject, Title, and Personal Author Indexes are included.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

(Item 19, cont'd) KEYWORDS

Phase Studies
Powder Metallurgy
Stress Corrosion

F O R E W O R D

This bibliography is a compilation of 208 references on *Quenching(Cooling)* and supersedes AD-704 400.

Entries were selected from reports processed into the Defense Documentation Center's AD collection from January 1960 to December 1973.

Corporate Author-Monitoring Agency, Subject, Title, and Personal Author Indexes are provided.

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OFFICIAL

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HUBERT E. SAUTER
Administrator
Defense Documentation Center

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TITLE..... T-1

PERSONAL AUTHOR..... P-1

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-281 854
COLUMBIA UNIV NEW YORK

RESEARCH AND DEVELOPMENT WITH RESPECT TO HEAT TRANSFER IN QUENCHING. (U)

DESCRIPTIVE NOTE: FINAL REPT., 16 DEC 55-15 DEC 61, JUL 62 53P PASCHKIS ,V. ;STOLZ,GEORGE , JR.;
REPT. NO. 1540 6
CONTRACT: DA30 069ORD1621
PROJ: 599-1-004
MONITOR: AROD 1540 6

UNCLASSIFIED REPORT

DESCRIPTORS: *COOLING, *HEAT TRANSFER, *SILVER, *STEEL, BOILING, FILM BOILING, NUCLEATE BOILING, OSCILLOGRAPHS, PLATING, PROCESSING, SURFACES, TEMPERATURE, TEST EQUIPMENT, THERMOCOUPLES, THERMODYNAMICS (U)

THE DETERMINATION OF HEAT TRANSFER COEFFICIENTS OF STEEL AND AG FROM EXPERIMENTS UNDER CONTROLLED CONDITIONS AND THE CORRELATION AND GENERALIZATION OF THE EXPERIMENTAL RESULTS ARE DISCUSSED. SAMPLES WERE HEATED AND QUENCHED UNDER CONTROLLED CONDITIONS. THERMOCOUPLES WERE USED TO RECORD THE TEMPERATURES AT SEVERAL POINTS IN THE SAMPLE ON AN OSCILLOGRAPH. THE GALVANOMETER TRACES WERE READ OUT ON A SPECIALLY CONSTRUCTED OSCILLOGRAM READER. FROM THESE COOLING CURVES, SURFACE HEAT FLUX AND SURFACE TEMPERATURE WERE COMPUTED AS FUNCTION OF TIME. NUMERICAL TECHNIQUES DEVELOPED FOR THIS PURPOSE AND PROGRAMMED FOR A DIGITAL COMPUTER WERE EMPLOYED. RESULTS ARE REPORTED AS HEAT FLUX OR HEAT TRANSFER COEFFICIENT VS. SURFACE TEMPERATURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-282 362
CALIFORNIA INST OF TECH PASADENA W M KECK LAB OF ENGINEERING MATERIALS

RAPID QUENCHING OF LIQUID ALLOYS (U)

JUL 62 1V DUWEZ,POL;WILLENS,R.H.;
REPT. NO. TR7
CONTRACT: NONR22030

UNCLASSIFIED REPORT

DESCRIPTORS: *ALLOYS, *LIQUID METALS, CHROMIUM, COOLING, CRYSTAL STRUCTURE, DESIGN, EJECTION, FOILS, MELTING, PHASE STUDIES, PRESSURE, SHOCK TUBES (U)

A TECHNIQUE IS DESCRIBED BY WHICH METASTABLE ALLOY PHASES CAN BE OBTAINED BY VERY RAPID COOLING FROM THE LIQUID STATE. THE RESULTS OBTAINED SO FAR HAVE LEAD TO EXTENSION OF SOLUBILITY LIMITS BEYOND THEIR EQUILIBRIUM VALUES, NEW PHASES NOT FOUND UNDER EQUILIBRIUM CONDITIONS, AND AMORPHOUS ALLOYS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-282 836
AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO

A STUDY OF QUENCH HARDENING IN PLATINUM AND GOLD (U)

MAY 62 1V GEGEL,HAROLD LOUIS!
REPT. NO. TDR62 329
MONITOR: ASD TDR62 329

UNCLASSIFIED REPORT

DESCRIPTORS: *GOLD, *PLATINUM, AGING (PHYSIOLOGY), COOLING, CRYSTAL STRUCTURE, CRYSTALS, DEFORMATION, HARDENING, HEAT TREATMENT, MECHANICAL PROPERTIES, PROCESSING, RECOVERY, TEMPERATURE, TENSILE PROPERTIES(U)

VACANCY COMPLEXES WERE FORMED DURING THE QUENCHING PERIOD WHEN THE AVERAGE QUENCHING SPEED WAS LESS THAN 10 TO THE 5TH POWER DEGREE C/SEC. THE BINDING ENERGY FOR DIVACANCIES IN AU WAS ESTIMATED TO BE APPROXIMATELY 0.28 EV. THE INFLUENCE OF INCREASED QUENCHING SPEEDS IS TO INCREASE THE TEMPERATURE RECOVERY RANGE FOR ISOCHRONAL RECOVERY. SIMILARLY, FAST QUENCHING RATES CAUSED AN INCUBATION PERIOD IN THE ISOTHERMAL AGING EXPERIMENTS FOR AU. NO INCUBATION PERIOD WAS OBSERVED FOR PT. THE INCUBATION PERIOD IS ATTRIBUTED TO THE TIME NECESSARY TO DEVELOP VACANCY COMPLEXES WHICH HAVE THE APPROPRIATE GEOMETRY TO INFLUENCE THE YIELD STRENGTH. THE ACTIVATION ENERGY FOR RECOVERY IN THE QUENCH-HARDENED PT WAS DETERMINED TO BE 1.43 EV, WHICH IS LESS THAN THE ACTIVA ION ENERGY FOR SELF-DIFFUSION. IT WAS OBSERVED TO BE APPROXIMATELY EQUAL TO THE SUM OF THE CONSTRICTION ENERGIES FOR SCREW AND EDGE DISLOCATIONS. THE ACTIVATION ENERGY FOR AU IS GREATER THAN THAT FOR SELF-DIFFUSION. TWO DISTINCT HARDENING MECHANISMS EXIST FOR PT AND AU WHEN THE VALUES OF THE ACTIVATION ENERGY FOR RECOVERY ARE TAKEN INTO ACCOUNT. THE HARDENING MECHANISM FOR AU IS THOUGHT TO BE DUE TO THE INTER CTION OF DISLOCATIONS WITH EXTENDED SESSILE DISLOCATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-284 409
ELECTRO-OPTICAL SYSTEMS INC PASADENA CALIF

INVESTIGATION OF THE EFFECT OF ULTRA-RAPID QUENCHING ON METALLIC SYSTEMS, INCLUDING BERYLLIUM ALLOYS (U)

JUN 62 1V JORDAN,C.;
REPT. NO. TDR62 1811650
CONTRACT: AF33 616 8011
MONITOR: ASD TDR62 181

UNCLASSIFIED REPORT

DESCRIPTORS: *ALLOYS, *BERYLLIUM ALLOYS, ALUMINUM ALLOYS, COOLING, COPPER ALLOYS, HYDRIDES, MATERIALS, NICKEL ALLOYS, OXIDES, PHASE STUDIES, SCANDIUM, SILICON ALLOYS, TEST EQUIPMENT, TESTS, ZINC ALLOYS (U)

INVESTIGATION OF THE EFFECT OF ULTRA-RAPID QUENCHING ON 8 BERYLLIUM ALLOY SYSTEMS.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-289 325
ILLINOIS UNIV URBANA

THE DIFFUSION OF SINGLE AND DIVACANCIES IN QUENCHED GOLD (U)

JUL 62 1V DE JONG,M.;KOEHLER,J.S.;
REPT. NO. TR3
CONTRACT: NONR183426

UNCLASSIFIED REPORT

DESCRIPTORS: *GOLD, COOLING, CRYSTAL LATTICES, CRYSTAL STRUCTURE, DEFORMATION, DIFFUSION, ELECTRICAL PROPERTIES, ENERGY, HEAT TREATMENT, MATHEMATICAL ANALYSIS, THEORY (U)

ENERGIES OF FORMATION AND MOTION OF VACANCIES AND DIVACANCIES IN QUENCHED GOLD.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-400 501
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

KINETIC AND GEOMETRIC CHARACTERISTICS OF MARTENSITE CONVERSION IN AN IRON-NICKEL-MANGANIC ALLOY (U)

FEB 63 1V BLANTER,M.YE.;NOVICHKOV,P.V.;
REPT. NO. TT 62 1760

UNCLASSIFIED REPORT

DESCRIPTORS: *PHOTOGRAPHIC PROCESSORS, *MARTENSITE, *PHASE STUDIES, CRYSTAL GROWTH, CRYSTALS, EXPERIMENTAL DATA, GRAIN STRUCTURES(METALLURGY), HEAT TREATMENT, IRON ALLOYS, MANGANESE ALLOYS, MATHEMATICAL ANALYSIS, MATHEMATICAL MODELS, NICKEL ALLOYS, NUCLEATION, QUENCHING(COOLING), TEMPERATURE, THEORY, TIME, TRANSFORMATIONS, TRANSITION TEMPERATURE (U)
IDENTIFIERS: *TERNARY SYSTEMS (U)

TRANSLATION OF FOREIGN RESEARCH: KINETIC AND GEOMETRIC CHARACTERISTICS OF MARTENSITE CONVERSION IN AN IRON-NICKEL-MANGANESE ALLOY. (M)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-400 505
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

TO DETERMINE THE ENERGY OF FORMATION OF VACANCIES IN SILVER (U)

FEB 63 1V OVCHARENKO,O.M.;
REPT. NO. TT 63 124

UNCLASSIFIED REPORT

DESCRIPTORS: *SILVER, ALUMINUM, COPPER, DIFFUSION, GOLD, HEAT OF FORMATION, HEAT TREATMENT, OXYGEN, PLATINUM, QUENCHING (COOLING), RESISTANCE (ELECTRICAL), THERMAL DIFFUSION (U)

TRANSLATION OF FOREIGN RESEARCH: ENERGY OF FORMATION AND ENERGY OF ACTIVATION IN DISLOCATION OF VACANCIES IN SILVER.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-404 466
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

BERYLLIUM: AN ANNOTATED BIBLIOGRAPHY, JULY - SEPTEMBER 1962. SUPPLEMENT II, (U)

DESCRIPTIVE NOTE: OMP. BY JACK B.
APR 63 59P

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: *BERYLLIUM, WELDING, INTERMETALLIC COMPOUNDS, BERYLLIUM ALLOYS, ABSTRACTS, ZIRCONIUM ALLOYS, TITANIUM ALLOYS, SOLDERING ALLOYS, PATENTS, QUENCHING (COOLING), TELLURIUM ALLOYS, ANTIMONY ALLOYS, TEST METHODS, MAGNESIUM ALLOYS, GAMMA RAYS, SPECTROSCOPY, CHEMISTRY, MECHANICAL PROPERTIES, SANDWICH PANELS, ANALYSIS, CHEMICAL ANALYSIS, OXIDES, SULPHUR, BERYLLIUM COMPOUNDS, CRYSTAL STRUCTURE, EXTRUSIONS, MANUFACTURING METHODS, MECHANICAL WORKING, POWDER METALLURGY, PROCESSING, CORROSION, BONDING, SHEETS, BIBLIOGRAPHIES (U)

THE ANNOTATED BIBLIOGRAPHY COVERS PUBLICATIONS RELEASED DURING THE THIRD QUARTER OF 1962. CITATIONS ARE ARRANGED ALPHABETICALLY BY AUTHOR UNDER THE BROAD SUBJECT HEADINGS OF ALLOYS; ANALYSIS; APPLICATIONS; BIBLIOGRAPHIES; COMPOUNDS; CORROSION; FABRICATION TECHNIQUES; JOINING; MINERALOGY; OXIDES; POWDER METALLURGY AND CASTING; PROCESSING; PROPERTIES; AND MISCELLANEOUS. REFERENCE TO THE USE OF BERYLLIUM IN FUELS, NUCLEAR REACTOR APPLICATIONS, EFFECTS OF RADIATION, AND CU-BE ALLOYS HAVE BEEN OMITTED. THE RESOURCES OF LOCKHEED MISSILES AND SPACE COMPANY TECHNICAL INFORMATION CENTER WERE UTILIZED IN THE PREPARATION OF THE BIBLIOGRAPHY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-405 821
GENERAL ELECTRIC CO SCHENECTADY N Y

PEST REACTIONS IN INTERMETALLIC COMPOUNDS. I. GRAIN BOUNDARY HARDENING IN NIGA. (U)

DESCRIPTIVE NOTE: FINAL REPT. FEB 62-FEB 63,
APR 63 37P SEYBOLT,A.U.;WESTBROOK,J.H.;
MONITOR: ASD TDR63 309 P1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON REFRACTORY INORGANIC NONMETALLIC MATERIALS.

DESCRIPTORS: *INTERMETALLIC COMPOUNDS, *NICKEL ALLOYS, *GALLIUM ALLOYS, HIGH TEMPERATURE RESEARCH, OXYGEN, NITROGEN, IMPURITIES, HARDNESS, CONTROLLED ATMOSPHERES, COOLING, QUENCHING (COOLING), AGING (MATERIALS), HEAT TREATMENT, PENETRATION, MICROSTRUCTURE, CRYSTAL LATTICES, DENSITY, HEAT OF FORMATION, HEAT OF REACTION. DIFFUSION, MATHEMATICAL ANALYSIS, CRYSTAL LATTICE DEFECTS, OXIDATION, BRITTLENESS. (U)
IDENTIFIERS: PEST REACTIONS, CSCL STRUCTURE COMPOUNDS, MICROHARDNESS. (U)

THE PHENOMENON OF GRAIN BOUNDARY HARDENING HAS BEEN EXPLORED FOR THE CSCL STRUCTURE INTERMETAL LIC COMPOUND NIGA. NIGA HAS A HOMOGENEITY RANGE OF A FEW PERCENT AND IT WAS POSSIBLE TO EXAMINE THE EFFECT OF STOICHIOMETRY UPON THE GRAIN BOUND ARY HARDENING DUE TO PREFERENTIAL OXYGEN DIF FUSION DOWN GRAIN BOUNDARIES. WHILE SOME GRAIN HARDENING WAS NOTICEABLE JUST BELOW 50% GA, THE EFFECT WAS MUCH LESS PRONOUNCED THAN AT 52% GA. IT WAS POSSIBLE TO ESTIMATE BOTH BULK -ISION AND GRAIN BOUNDARY DIFFUSION RATES FOR OXYGEN. THE RESULTS SUGGEST THAT HARDENING IS DUE TO LATTICE DISTORTIONS WHICH ARISE FROM THE FORMA TION OF A GA-O COMPLEX. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-405 898
AEROJET-GENERAL CORP AZUSA CALIF

STRESS-CORROSION CRACKIG OF HIGH-STRENGTH ALLOYS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 9, 1 JAN-31 MAR 63,
MAY 63 1V SETTERLUND,R.B.;
REPT. NO. 0414 01 9
CONTRACT: DA04 4950RD3069

UNCLASSIFIED REPORT

DESCRIPTORS: *TITANIUM ALLOYS, *STEEL, *CORROSION, *HEAT RESISTANT METALS AND ALLOYS, ALUMINUM ALLOYS, VANADIUM ALLOYS, NICKEL ALLOYS, COBALT ALLOYS, HEAT TREATMENT, QUENCHING (COOLING), AGING (MATERIALS), WELDING, COLD WORKING, ROCKET CASES, TESTS, TEST METHODS, CONTROLLED ATMOSPHERES, PROTECTIVE TREATMENTS, COATINGS, HARDNESS, TENSILE PROPERTIES, FRACTOGRAPHY, FRACTURE (MECHANICS), FATIGUE (MECHANICS), EXPERIMENTAL DATA, STRESSES. (U)
IDENTIFIERS: 20% NICKEL MARAGING STEEL, 18% NICKEL MARAGING STEEL, VASCOJET 1000 STEEL. (U)

TEST RESULTS SHOWED THAT, UNDER ALL THE TEST CONDITIONS OF THIS PROGRAM, THE 6A1-4V TITANIUM ALLOY IS IMMUNE TO STRESS-CORROSION CRACKING IN THE ANNEALED, QUENCHED-AND-AGED, AND AS-WELDED CONDITIONS. THE 20%-NICKEL GRADE OF MARAGING STEEL WAS FOUND TO BE HIGHLY SUSCEPTIBLE TO STRESS-CORROSION CRACKING IN THE ANNEALED-AND AGED CONDITION. THIS SAME ALLOY, WHEN COLD WORKED 50 TO 75% BEFORE AGING, WAS FOUND TO BE ONLY MILDLY SUSCEPTIBLE TO STRESS-CORROSION CRACKING. THE MOST FAVORABLE MECHANICAL PROPER TIES WERE ATTAINED AFTER 50% COLD REDUCTION AND SUBSEQUENT AGING. THE WELDED-AND-AGED ALLOY WAS FOUND TO BE EXTREMELY SUSCEPTIBLE TO STRESS CORROSION CRACKING IN THE WELD-HEAT-AFFECTED ZONE. THE 18%-NICKEL GRADE OF MARAGING STEEL WAS ALSO FOUND TO BE SUSCEPTIBLE TO STRESS-CORROSION CRACKING, WHICH WAS FOUND TO OCCUR MORE RAPIDLY IN THE ANNEALED-AND-AGED MATERIAL THAN IN THE 50% COLD-WORKED-AND-AGED MATERIAL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-407 363
WATERTOWN ARSENAL LABS MASS

AUSTENITIC DECOMPOSITION IN WELDING STEEL. (U)

MAR 63 33P D'ANDREA,MARK M. ,JR.;
MONITOR: WAL TR320

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: MASTER'S THESIS. REPORT ON MATERIALS FOR ARMY WEAPONS AND COMBAT MOBILITY.

DESCRIPTORS: *WELDING, *STEEL, *METALLOGRAPHY, MICROSTRUCTURE, HARDNESS, GRAIN STRUCTURES (METALLURGY), HEAT TREATMENT, EXPERIMENTAL DATA, COOLING, TOUGHNESS, LOW TEMPERATURE RESEARCH, IMPACT SHOCK, BAINITE, THERMAL EXPANSION, AUSTENITE, WELDING (U)
IDENTIFIERS: AISI 4340 STEEL (U)

A TIME-TEMPERATURE CONTROLLER WAS USED IN CONJUNCTION WITH A DILATOMETER TO STUDY THE TRANSFORMATIONAL BEHAVIOR OF WELD HEAT-AFFECTED ZONE AUSTENITE UPON COOLING FROM A 1700 F PEAK TEM PERATURE. CONTINUOUS-COOLING TRANSFORMATION DIAGRAMS WERE MADE IN THIS WAY OF AISI 4340 STEEL INITIALLY QUENCHED-AND-TEMPERED TO 54 AND 44 RC HARDNESS LEVELS. A CHARACTERISTIC GROWTH CURVE FOR AN ISOTHERMAL BAINITE TRANSFORMATION WAS DETERMINED DILATOMETRICALLY. THE AMOUNT OF AUSTENITE RETAINED AT ROOM TEMPERATURE WAS FOUND TO INCREASE AND THEN DECREASE DURING THE BAINITE RAPID-REACTION PERIOD. IMPACT TESTS INDICATED THAT RETAINED AUSTENITE IN THE AMOUNTS PRESENT WAS NOT NECESSARILY DELETERIOUS TO NOTCH TOUGHNESS. A LIMITED ARC-WELDING STUDY WAS MADE AND COMPARED WITH THE TIME-TEMPERATURE CONTROLLER WORK. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-408 483
ARIZONA UNIV TUCSON

IMPERFECTIONS IN METALS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JAN 60-31 DEC 62,
JAN 63 13P TOMIZUKA,C.T.;
CONTRACT: AF49 638 790
MONITOR: AFOSR 4642

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALLOYS, CRYSTAL LATTICE DE
FECTS), (*METALS, CRYSTAL LATTICE DEFECTS),
HIGH PRESSURE RESEARCH, DIFFUSION, HYDRO STATIC
PRESSURE, HEAT OF ACTIVATION, INTERNAL FRICTION,
MEASUREMENT, TRACER STUDIES, QUENCH ING
(COOLING), COPPER, SINGLE CRYSTALS, IMPURI
TIES, MERCURY, SELENIUM, BRASS, COPPER ALLOYS,
ZINC ALLOYS, SILLOYS, ZINC, GOLD, PLATI NUM,
HIGH TEMPERATURE RESEARCH, MAGNETIC PROPERTIES.
(U)

IDENTIFIERS: 1963, VACANCIES. (U)

DIFFUSION IN PURE NOBLE METALS UNDER HYDROSTATIC PRESSURE; DIFFUSION AS A FUNCTION OF TEMPERATURE; INTERNAL FRICTION IN ALPHA BRASS; TRACER DIFFUSION STUDIES; ACTIVATION VOLUME OF A VACANCY.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-409 729
CALIFORNIA INST OF TECH PASADENA W M KECK LAB OF ENGINEERING MATERIALS

DEFECTS IN ALUMINUM QUENCHED FROM THE LIQUID STATE, (U)

MAY 63 14P THOMAS,G.;WILLENS,AND R.H.;
CONTRACT: NONR22030

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM, QUENCHING (COOLING)), (*CRYSTAL LATTICE DEFECTS, ALUMINUM), (*QUENCHING (COOLING), ALUMINUM), LIQUID METALS, LIQUIDS, STRESSES, ENTROPY, EQUATIONS, ELECTRON MICROSCOPY, CRYSTAL LATTICES. (U)
IDENTIFIERS: 1963. (U)

HIGH PURITY ALUMINUM WAS QUENCHED FROM THE LIQUID STATE AND SPECIMENS WERE EXAMINED BY TRANSMISSION ELECTRON MICROSCOPY. VERY HIGH DEN SITIES OF DEFECTS IN THE FORM OF PERFECT LOOPS, IMPERFECT LOOPS, AND SMALL BLACK SPOTS WERE OB SERVED. THE VACANCY CONCENTRATION, AS DEDUCED FROM THE NUMBER AND SIZE OF DEFECTS, INCREASE WITH INCREASING TEMPERATURE AT A MUCH SLOWER RATE IN THE LIQUID THAN IN THE SOLID. BOTH THE VACANCY FORMATION ENERGY AND THE ENTROPY FACTOR APPEAR TO BE CONSIDERABLY REDUCED ABOVE THE MELTING POINT. ALSO, A DISCONTINUITY IN THE VACANCY CONCENTRATION IS OBSERVED AT THE MELTING POINT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-410 100
MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INSULATION RESEARCH

IONIC CONDUCTIVITY IN KCL-KBR MIXED SINGLE CRYSTALS, (U)

MAY 63 24P
REPT. NO. TR180
CONTRACT: AF19 604 8483

UNCLASSIFIED REPORT

DESCRIPTORS: (*IONS, ELECTRICAL CONDUCTANCE), (*SINGLE CRYSTALS, MIXTURES), (*CHLORIDES, BROMIDES), CHEMICAL PROPERTIES, HEATING, HEAT OF ACTIVATION, QUENCHING (COOLING), CRYSTAL LATTICE DEFECTS, IMPURITIES, SYMMETRY (CRYSTAL LOGRAPHY), THEORY, MEASUREMENT, TABLES, PREP ARATION, EXPERIMENTAL DATA. (U)
IDENTIFIERS: 1963, CHEMICAL COMPOSITION, IONIC CONDUCTIVITY. (U)

THE IONIC CONDUCTIVITY OF KCL-KBR MIXED SINGLE CRYSTALS AS A FUNCTION OF THE COMPOSITION AND THERMAL TREATMENT OF THE SAMPLES HAS BEEN STUDIED. THE INTRINSIC ACTIVATION ENERGY MINIMIZED AT THE COMPOSITION 50/50 MOLE % KCL-KBR, WHILE THE INTRINSIC CONDUCTIVITY REACHED A MAXIMUM AT 67/33 MOLE % KBR-KCL. QUENCHING INCREASED EXTRINSIC CONDUCTIVITY OVER THAT OF ANNEALED SAMPLES EXCEPT IN COMPOSITIONS NEAR 50/50 MOLE % KCL-KBR, WHERE IT DECREASED EXTRINSIC CONDUCTIVITY. IT ALSO SLIGHTLY INCREASED INTRINSIC CONDUCTIVITY IN ALL COMPOSITIONS. THESE EFFECTS ARE EXPLAINED IN TERMS OF STRUCTURAL DEFECTS AND IMPURITIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-410 593
IIT RESEARCH INST CHICAGO ILL

A STUDY OF THE TI-ZR-O SYSTEM. (U)

DESCRIPTIVE NOTE: REPT. FOR 15 MAR 60-30 APR 62,
JUN 63 38P DOMAGALA,BY R.F.;
REPT. NO. 2194 11
CONTRACT: AF33 616 7074
PROJ: 7022
TASK: 7022 02
MONITOR: ARL 63 104

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALLOYS, PHASE STUDIES), (*TITANIUM ALLOYS, PHASE STUDIES), (*ZIRCONIUM COMPOUNDS, DIOXIDES), (*TITANIUM COMPOUNDS, OXIDES), OXYGEN, TITANIUM, ZIRCONIUM, MELTING, HEAT TREATMENT, METALLY, QUENCHING (COOLING), HIGH TEMPERATURE RESEARCH, X-RAY DIFFRACTION ANALYSIS, HARDNESS, CHEMICAL ANALYSIS, MICROSTRUCTURE. (U)
IDENTIFIERS: 1963. (U)

PHASE RELATIONSHIPS ALONG THE VERTICAL SECTION FROM TI TO ZRO2 AND FROM TIO TO ZRO2 WERE INVESTIGATED IN THE TI-ZR-O SYSTEM. ARC MELTED ALLOYS WERE PREPARED USING HIGH-PURITY INGREDI ENTS. SAMPLES WERE ANNEALED, QUENCHED AND SUBJECTED TO METALLOGRAPHIC PREPARATION AND STUDY. A CURSORY MELTING POINT-COMPOSITION STUDY WAS CONDUCTED. APPROXIMATELY 390 DUPLICATE HEAAT-TREATED SPECIMENS WERE FORWARDED TO ARL FOR CORRELATIVE WORK. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-411 781
AUBURN RESEARCH FOUNDATION ALA

THE EFFECT OF THICKNESS AND TEMPERING TEMPERA TURE ON FRACTURE APPEARANCE TRANSITION TEMPERA TURE AND CRITICAL FRACTURE TOUGHNESS OF HIGH STRENGTH SHEET STEEL-PART I. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. NO. 2, MAY 63 12P MAYNOR,HAL W.;MUELLER, RICHARD E.;
CONTRACT: DA-01-009-ORD-889

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, FRACTURE (MECHANICS)), (*FRACTOGRAPHY, STEEL), THICKNESS, HEAT TREATMENT, TEMPERATURE, TRANSITION TEMPERATURE, TOUGHNESS, SHEETS, BRITTLENESS, QUENCHING (COOLING), DUCTILITY. (U)
IDENTIFIERS: 1963, H11 STEEL. (U)

FRACTURE APPEARANCE TRANSITION TEMPERATURE, OF H-11 STEEL WAS OBSERVED TO DECREASE NON LINEARLY WITH DECREASING SHEET THICKNESS FOR YIELD STRENGTHS OF APPROXIMATELY 160, 200 AND 240 KSI. THE EFFECT OF DECREASING SHEET THICKNESS WAS RELATIVELY MORE PRONOUNCED IN DEPRESSING FATT THAN WAS THE EFFECT OF INCREASING TEMPERING TEMPERATURE. PHENOMENA CONSISTING OF GROSS PIN-HOLE DEFORMATION OR BEARING FAILURE, RUPTURE THROUGH THE PIN-HOLE AREA, FORMATION OF STEPS OF FLAT FRACTURE AND ASYMMETRICAL FRACTURE TOPOGRAPHY, FREQUENTLY WERE OBSERVED FOR FRACTURE TOUGHNESS SPECIMENS OF 160-KSI YIELD STRENGTH. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-422 662
CONNECTICUT UNIV STORRS

METALLURGICAL FACTORS INFLUENCING THE MAGNETIC ANALYSIS OF SURFACE HARDENED AND TEMPERED STEEL. (U)

DESCRIPTIVE NOTE: FINAL PROGRESS REPT.,
OCT 63 14P BARTHOLOMEW,EDWARD L. ,JR.)
CONTRACT: DA19 020AMC0233

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, MAGNETIC PROPERTIES), (*AUSTENITE, MAGNETIC PROPERTIES), (*MARTENSITE, MAGNETIC PROPERTIES), STRESSES, SURFACES, HARDENING, CARBON, CARBIDES, IRON COMPOUNDS, DISTRIBUTION, QUENCHING (COOLING), HEAT TREATMENT, MICROSTRUCTURE, ELECTRON MICROSCOPY, SURFACE PROPERTIES (U)
IDENTIFIERS: 1963, H-8620 STEEL, RESIDUAL STRESSES, CASE HARDENING, TEMPERING (U)

AN ELECTRON MICROSCOPE STUDY OF MICROSTRUCTURAL CHANGES INDUCED BY PROGRESSIVE TEMPERING OF CARBURIZED, OIL QUENCHED, REFRIGERATED (-100 F) AND UNREFRIGERATED 1/8 - X 3/4 - X 3/4 -IN. SPECIMENS OF H-8620 STEEL SHOWED A SIGNIFICANT MAGNETIC CHANGE TO ACCOMPANY THE APPEARANCE OF PERCARBIDES IN MARTENSITE PLATES WHILE RETAINED AUSTENITE AND RESIDUAL STRESS HAVE REMAINED UNCHANGED. RETAINED AUSTENITE WAS FOUND TO INFLUENCE MAGNETIC MEASUREMENTS. DISTRIBUTIONS FROM SURFACE INTO CORE WERE DETERMINED FOR RETAINED AUSTENITE AND RESIDUAL STRESS RESULTING FROM 1650 F, 1 1/2 HOUR CARBURIZING (SOILD) FOLLOWED BY OIL QUENCHING, BRINE QUENCHING, OIL QUENCHING AND REFRIGERATING AT -100 F, AND LIQUID NITROGEN QUENCHING FOR BOTH 1/8 - AND 1/4 - IN. THICK SPECIMENS. ALL ATTEMPTS TO EFFECT RESIDUAL STRESS RELAXATION BY EXPOSURE TO A MAGNETIC FIELD WERE UNSUCCESSFUL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-423 251
ROCK ISLAND ARSENAL ILL

EXPERIMENTAL HEAT TREATMENT OF M-60 MACHINE GUN BOLTS, (U)

AUG 63 21P GOETTSCH,P. E. ;
REPT. NO. RIA-63-2761

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GUN COMPONENTS, STEEL), (*STEEL, PHYSICAL PROPERTIES), HEAT TREATMENT, ALLOYS, QUENCHING (COOLING), OILS, SALTS (U)
IDENTIFIERS: 1963, MACHINE GUN BOLTS, M-60 GUNS (U)

PRESENTED IS THE DEVELOPMENT AND TESTING OF CARBURIZING AND HEAT TREATING PROCEDURES FOR A SERIES OF EXPERIMENTAL M-60 MACHINE GUN BOLTS MANUFACTURED OF 9310 ALLOY STEEL. ACCEPTABLE CASE AND CORE PROPERTIES WERE OBTAINED WITH MINIMUM HEAT TREAT DISTORTION BY QUENCHING THE SUBJECT BOLTS DIRECT FROM A 1700 F GAS CARBURIZING TREATMENT INTO A STILL SALT BATH AT 400 F, FOLLOWED BY -100 F REFRIGERATING AND 350 F TEMPERING TREATMENTS. COMPARATIVE LOW TEMPERATURE IMPACT DATA WERE OBTAINED ON CARBURIZED 8620 AND 9310 MATERIAL IN OIL QUENCHED AND 400 F SALT QUENCHED CONDITIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-423 736
BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH

THE MARTENSITIC TRANSFORMATION IN AN IRON : 16.5 PERCENT CHROMIUM : 4.5 PERCENT NICKEL ALLOY, (U)

AUG 63 27P BLACKBURN,MARTIN J. ;
REPT. NO. 1 82 0281
PROJ: 1 82 0281

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ALSO AVAILABLE FROM THE AUTHOR.

DESCRIPTORS: (*MARTENSITE, TRANSFORMATIONS), (*IRON ALLOYS, PHASE KTUDIES), CHROMIUM ALLOYS, NICKEL ALLOYS, MICROSTRUCTURE, ELECTRON MICROSCOPY, HEAT TREATMENT, QUENCHING (COOLING), COLD WORKING, DEFORMATION, AUSTENITE, CRYSTAL LATTICES, SHEAR STRESSES, SYMMETRY (CRYSTALLOGRAPHY), CRYSTAL LATTICE DEFECTS (U)
IDENTIFIERS: (*MARTENSITE, TRANSFORMATIONS), (*IRON ALLOYS, PHASE STUDIES), CHROMIUM ALLOYS, NICKEL ALLOYS, MICROSTRUCTURE, ELECTRON MICROSCOPY, HEAT TREATMENT, QUENCHING + COOLING, COLD WORKING, DEFORMATION, AUSTENITE, CRYSTAL LATTICES, SHEAR STRESSES, SYMMETRY(CRYSTALLOGRAPHY), CRYSTAL LATTICE DEFECTS (U)

TRANSMISSION ELECTRON MICROSCOPY WAS USED TO STUDY THE PHASES AND MICROSTRUCTURAL CBANGES PRODUCED BY VARIOUS HEAT TREATMENTS IN AN FE : CR : NI ALLOY. TWO TYPES OF MA9TENSITE WERE IDENTIFIED IN THIS SYSTEM. NEEDLES OF B.C.C. ALPHA - MARTENSITE ARE FORMED IN SLOWLY COOLED OR QUENCHED SPECIMENS. A SMALL NUMBER OF PLATES OF EPISLON - MARTENSITE ARE PRODUCED BY DEFORMATION AT ROOM TEMPERATURE. TEMPERING AT TEMPERATURES UP TO 600 C PRODUCES A DISPERSION OF THE CARBIDE M23C6 IN THE B.C.C. MATRIX. SOME FA3TORS CONTROLLING THE MARTENSITE AND AUSTENITE IN THE MICROSTRUCTURE ARE DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-423 807
UNITED STATES STEEL CORP PITTSBURGH PA

EVALUATION OF THE HARDENABILITY, TEMPERABILITY, AND MECHANICAL PROPERTIES OF TEN 5NI-CR-MO STEELS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT.,
SEP 63 1V MANGANELLO,S. J. ;PORTER,L. F. ;
REPT. NO. S11109 1
CONTRACT: NOBS88540
PROJ: 40 18 001 9,SR007 01 01
TASK: 853

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, MECHANICAL PROPERTIES), (*METAL PLATES, STEEL), HARDENING, SUBMARINE HULLS, MANGANESE, CHROMIUM, MOLYBDENUM, VANADIUM, HEAT TREATMENT, QUENCHING (COOLING), MARTENSITE, MICROSTRUCTURE, BRITTLENESS, TOUGHNESS, AUSTENITE, CHEMICAL ANALYSIS, FRACTURE (MECHANICS), NICKEL ALLOYS, CHROMIUM ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, TEMPERATURE, BAINITE, EXPERIMENTAL DATA (U)
IDENTIFIERS: 1963, HY-130/150 STEEL, 5NI-CR-MO STEEL, CHARPY V-NOTCH (U)

PREVIOUS STUDIES TO DEVELOP AN HY-130/150 SUBMARINE-HULL STEEL INDICATED THAT A QUENCHED AND TEMPERED NI-CR-MO OR NI-CR-MO-V STEEL CONTAINING ABOUT 5% NI APPEARED VERY PROMISING FOR THIS APPLICATION. HOWEVER, THE HARDENABILITY OF THE STEELS STUDIED WAS TOO LOW FOR 4-IN. THICK PLATES, AND THE TEMPERABILITY OF THE STEELS WITHOUT VANADIUM WAS UNSATISFACTORY. THEREFORE, THE EFFECTS OF VARIATIONS IN MANGANESE, CHROMIUM, MOLYBDENUM, AND VANADIUM ON THE HARDENABILITY, MECHANICAL PROPERTIES, AND TEMPERABILITY OF TEN VACUUM-MELTED, VACUUM-CARBON-DEOXIDIZED 5NI-CR-MO STEELS WERE DETERMINED ON 1/2-IN. THICK PLATES THAT WERE WATER-QUENCHED FROM 1500 F AND TEMPERED TO SIMULATE LIGHT-GAGE PLATES AND THAT WERE BLOWER-COOLED FROM 1500 F AND TEMPERED TO SIMULATE THE HEAT TREATMENT AT THE MIDTHICKNESS OF A WATER-QUENCHED 4-IN. THICK PLATE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-423 811
UNITED STATES STEEL CORP PITTSBURGH PA

SIMULATION OF THE COOLING OF A WATER-QUENCHED 4-INCH-THICK PLATE. (U)

DESCRIPTIVE NOTE: PROGRESS REPT.,
SEP 63 1V MANGANELLO,S. J. !PORTER,L. F. !SITKO,R. J. !
REPT. NO. S11105
CONTRACT: NOBS88540
PROJ: 40 18 001 8,SR007 01 01
TASK: 853

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, QUENCHING (COOLING)), (*SUBMARINE HULLS, METAL PLATES), (*QUENCHING (COOLING), METAL PLATES), SIMULATION, MECHANICAL PROPERTIES, MICROSTRUCTURE, THICKNESS, HEAT TREATMENT, HARDNESS, COOLING, AIR COOLED, BLOWERS (U)
IDENTIFIERS: 1963, HY-80 STEEL (U)

BECAUSE THE PROPERTIES OF SUBMARINE-HULL STEELS MUST BE DETERMINED IN PLATE THICKNESSES THROUGH 4 IN., AND BECAUSE 4-IN. THICK PLATES CANNOT BE SATISFACTORILY PRODUCED FROM SMALL-SIZE LABORATORY HEATS OF STEEL, A TECHNIQUE WAS REQUIRED THAT WOULD PERMIT SIMULATION OF THE COOLING AT THE MIDTHICKNESS OF WATER-QUENCHED 4-IN. THICK PLATES IN A LIGHT-GAGE PLATE, PERFERABLY 1/2 IN. THICK. A CENTRIFUGAL-BLOWER AND WIND-CHANNEL ARRANGEMENT WAS DEVISED THAT COOLED 1/2-IN. THICK PLATES FROM 1500 TO 400 F IN 7 TO 8-1/2 MINUTES FOR THE EXTREMES OF THE POSSIBILE EXPERIMENTAL COOLING CONDITIONS. WHEN THE MECHANICAL PROPERTIES AND MICROSTRUCTURE OF 1/2-IN. THICK PLATES OF HY-80 STEEL, CUT FROM THE CENTER OF A 4-IN. THICK PLATE AND BLOWER-COOLED AFTER AUSTENITIZING, WERE COMPARED WITH THOSE AT THE MIDTHICKNESS OF THE 4-IN. THICK WATER-QUENCHED PLATE, THE RESULTS INDICATED THAT THE BLOWER-COOLED PLATE HAD COOLED ONLY SLIGHTLY SLOWER THAN THE MIDTHICKNESS OF THE 4-INCH-THICK PLATE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-423 812
UNITED STATES STEEL CORP PITTSBURGH PA

FEASIBILITY OF DEVELOPING AN HY-180/210 WELDMENT. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 1 JUNE-30 SEP 63,
SEP 63 1V PORTER,L. F. ;RATHBONE,A. M. ;ROLFE,S. T. ;LESNEWICH,A. ;
REPT. NO. S20000 1
CONTRACT: NOBS88540
PROJ: 40 18 002 8,SS050 000
TASK: 1567

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, WELDING), (*SUBMARINE HULLS, METAL PLATES), (*WELDING, METAL PLATES), WELDS, MARTENSITE (MATERIALS), AGING (MECHANICS), TOUGHNESS, WELDING RODS, BRITTLENESS, HOT WORKING, HEAT TREATMENT, QUENCHING (COOLING), FEASIBILITY STUDIES, METALLOGRAPHY, ELECTRON MICROSCOPY, MICROSCOPY, ELECTRON DIFFRACTION ANALYSIS, X-RAY DIFFRACTION ANALYSIS, NICKEL ALLOYS, COBALT ALLOYS, MOLYBDENUM ALLOYS, TITANIUM, ALUMINUM, MOLYBDENUM, FRACTOGRAPHY, CHEMICAL ANALYSIS, HARDENING, MECHANICAL PROPERTIES, EXPERIMENTAL DATA (U)
IDENTIFIERS: 1963, HY-180/200 STEEL, MARAGING STEEL, CHARPY V-NOTCH, 18NI-8CO-MO STEEL, 12NI5G-3MO STEEL, HY-80 STEEL (U)

BASE-METAL STUDIES WERE CONCENTRATED ON AN EVALUATION OF THE POTENTIAL OF MARAGING STEELS AS HY180/210 BAASE METALS. THE RESULTS OBTAINED TO DATE INDICATE THAT THE MARAGING STEELS, PARTICULARLY IN 1- TO 4-IN. THICK PLATES, EXHIBIT POORER NOTCH TOUGHNESS THAN QUENCHED AND TEMPERED STEELS AT YIELD STRENGTHS IN THE RANGE 150 TO 200 KSI. THE EMBRITTLEMENT CAUSING THE REDUCED NOTCH TOUGHNESS IS BEING INTENSIVELY INVESTIGATED. ALTHOUGH STUDIES TO DETERMINE THE CAUSE AND ELIMINATION OF EMBRITTLEMENT WILL BE CONTINUED, STUDIES ON QUENCHED AND TEMPERED STEELS, ON STEELS STRENGTHENED BY A COMBINATION OF CARBON MARTENSITE AND AGE HARDENING, AND ON SPEDIAL PROCESSING TECHNIQUES SUCH AS AUSFORMING AND RAPID HEAT TREATMENT WILL BE ACCELERATED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-423 813
UNITED STATES STEEL CORP PITTSBURGH PA

DEVELOPMENT OF AN HY-130/150 WELDMENT. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 1 JUNE-30 SEP 63,
SEP 63 1V PORTER,L. F. ;RATHBONE,A. M. ;ROLFE,S. T. ;LESNEWICH,A. ;
REPT. NO. CONTRACT
PROJ: 40 18 001 12,SR007 01 01
TASK: 853

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, WELDING), (*SUBMARINE HULLS, METAL PLATES), (*WELDING, METAL PLATES), WELDS, WELDING RODS, TOUGHNESS, FRACTURE (MECHANICS), COLD WORKING, MATERIAL FORMING, MECHANICAL PROPERTIES, HARDENING, QUENCHING (COOLING), HEAT TREATMENT, CHEMICAL ANALYSIS, BLOWERS, AIR COOLED, EXPERIMENTAL DATA, NICKEL ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, VANADIUM ALLOYS, MANGANESE, SILICON, ALUMINUM, CARBON (U)
IDENTIFIERS: 1963, HY-130/150 STEEL, HY-80 STEEL, CHARPY V-NOTCH, 5NI-CR-MO STEEL (U)

BASE-METAL STUDIES OF A SERIES OF 5NI-CR-MO LABORATORY STEELS INDICATED THAT A 5NI-0.75MN-0.5CR0.5MO-0.07V STEEL EXHIBITED AN EXCELLENT COMBINATION OF STRENGTH AND TOUGHNESS, EXCELLENT TEMPERING CHARACTERISTICS, AND ADEQUATE HARDENABILITY FOR A 4-IN. THICK WATER-QUENCHED PLATE. THE RESULTS OF THESE LABORATORY STUDIES ARE SO PROMISING THAT AN 80-TON HEAT OF THE AFOREMENTIONED STEEL WILL BE PRODUCED DURING THE WEEK OF OCTOBER 7, 1963, FOR EXTENSIVE EVALUATION, INCLUDING AN EVALUATION OF ITS COMPATIBILITY WITH THE MOST PROMISING HY-130/150 FILLER METAL. STUDIES OF OTHER TYPES OF HY-130/150 STEELS AND OF THE EFFECT OF MINOR ELEMENTS ON THE PROPERTIES OF HY-130/150 STEELS WILL BE CONTINUED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-429 142
UNITED STATES STEEL CORP MONROEVILLE PA

FEASIBILITY OF DEVELOPING AN HY-180/210
WELDMENT. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2, 1 OCT-
31 DEC 63,
JAN 64 23P PORTER,L. F. ;RATHBONE,A. M.
;ROLFE,S. T. ;DORSCHU,K. E. ;
REPT. NO. AAS NP48
CONTRACT: NOBS88540
PROJ: 40 18 002 11,SS050 000
TASK: 1567

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SUBMARINE HULLS, METAL PLATES), (*STEEL,
WELDS), MATERIAL FORMING, TOUGHNESS, QUENCHING
(COOLING), HEAT TREATMENT, AGING (MATERIALS), HARDENING,
MARTENSITE, MICROSTRUCTURE, MECHANICAL PROPERTIES,
FEASIBILITY STUDIES, NICKEL ALLOYS, CHROMIUM ALLOYS,
MOLYBDENUM ALLOYS, VANADIUM ALLOYS (U)
IDENTIFIERS: 1964, HY-180/210 STEEL, MARAGING
STEEL (U)

PRELIMINARY STUDIES ON LABORATORY AND PRODUCTION
EXPERIMENTAL MARAGING STEELS BEING CONSIDERED AS
HY-180/210 STEELS HAVE DEFINED A NUMBER OF FAC TORS
THAT CAUSED LOW NOTCH TOUGHNESS, AND SEVERAL
LABORATORY AND PRODUCTION MARAGING STEELS HAVE
RECENTLY BEEN PRODUCED THAT HAVE SIGNIFICANTLY
IMPROVED NOTCH TOUGHNESS. FURTHER MODIFICATIONS IN
COMPOSITION AND PROCESSING PRACTICES ARE BEING
INVESTIGATED THAT SHOULD LEAD TO THE DEVELOPMENT OF
MARAGING STEELS WITH EVEN BETTER NOTCH TOUGHNESS.
SEVERAL QUENCHED AND TEMPERED STEELS AND A STEEL
STRENGTHENED BY A COMBINATION OF CARBON MARTENSITE
AND AGE HARDENING APPEAR PROMISING. SEVERAL
NONCONVENTIONAL PROCESSING PROCEDURES ALSO APPEAR
PROMISING AS METHODS FOR INCREASING STRENGTH WITH
LITTLE OR NO LOSS IN NOTCH TOUGHNESS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-429 143
UNITED STATES STEEL CORP MONROEVILLE PA

SUBSTITUTION OF MANGANESE FOR NICKEL IN NI-CR-MO STEELS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT.,
JAN 64 22P DABKOWSKI,D. S. (MANGANELLO, S. J. (PORTER,L. F.)
REPT. NO. AAS NP36
CONTRACT: NOBS88540
PROJ: 40 18 001 14 ,SR00701 01
TASK: 853

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SUBMARINE HULLS, METAL PLATES), (*STEEL, HARDENING), NICKEL ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, MANGANESE, MECHANICAL PROPERTIES, QUENCHING (COOLING), HEAT TREATMENT (U)
IDENTIFIERS: 1964, HY-130/150 STEEL (U)

A LABORATORY STUDY WAS INITIATED IN WHICH THE MANGANESE CONTENT OF SIX NI-CR-MO STEELS WAS INCREASED FROM 0.5 TO 3.0% AND THE NICKEL CONTENT WAS DECREASED FROM 4.5 TO 0.5% TO MAINTAIN A CALCULATED HARDENABILITY INDEX OF 15 TO 20. THE EVALUATION CONSISTED OF HARDENABILITY, MECHANICAL-PROPERTY, AND TEMPERABILITY STUDIES ON WATER-QUENCHED AND ON BLOWER-COOLED 1/2-IN.-THICK PLATES OF THE SIX VACUUM-MELTED, VACUUM-CARBONDEOXIDIZED MN-NI-CR-MO STEELS. THE RESULTS SHOWED THAT THE HARDENABILITY OF THE HIGHERMANGANESE STEELS (1.0 TO 3.0% MN) WAS LESS THAN THAT PREDICTED FROM THE CALCULATIONS, AND THE NOTCH TOUGHNESS OF THE WATER-QUENCHED AND OF THE BLOWER-COOLED PLATES DECREASED CONTINUOUSLY AS THE MANGANESE CONTENT INCREASED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-429 447
UNITED STATES STEEL CORP MONROEVILLE PA

PRODUCTION AND PROPERTIES OF 5NI-CR-MO-V STEEL PLATES, (U)

JAN 64 1V MANGANELLO,S. J. (PORTER,L. F. (LOVEDAY,G. E.)
CONTRACT: NOBS88540
PROJ: 40 18 001 16,SR007 01 01
TASK: 853

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SUBMARINE HULLS, STEEL), (*STEEL, MATERIAL FORMING), MELTING, CASTING, RARE EARTHS, ROLLING (METALLURGY), MECHANICAL PROPERTIES, NICKEL ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, VANADIUM ALLOYS, HEAT TREATMENT, QUENCHING (COOLING), TENSILE PROPERTIES, TOUGHNES, MICROSTRUCTURE, CHEMICAL ANALYS(U)
IDENTIFIERS: 1964, 5NI-CR-MO-V STEEL, HY-130/150 STEEL (U)

AN 80-T05, BASIC-ELECTRIC-FURNACE, FIVE-INGOT HEAT OF A 5NI-CR-MO-V STEEL CONSIDERED PROMISING AS AN HY-130/150 STEEL WAS PRODUCED TO PROVIDE MATERIAL FOR EVALUATION OF ITS SUITABILITY AS AN HY-130/150 WELDMENT AND TO PROVIDE MATERIAL TO THE MARINE ENGINEERING LABORATORY FOR AN EVALUATION OF THE EFFECT OF THE ADDITION OF RARE EARTHS ON THE PROPERTIES OF A BUBMARINE-HULL-TYPE STEEL HAVING A MINIMUM YIELD STRENGTH OF 140 KSI. THE RESULTS OF CHE PRODUCTION AND PROPERTIES OF THE 5NI-CR-MO-V STEEL ARE SUMMARIZED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-430 353
GENERAL DYNAMICS/FORT WORTH TEX

SURFACE TRANSFORMATIONS IN AN IMPACTED STEEL ROD. (U)

JUL 63 20P POTTER,R. D. ;
REPT. NO. ERR FW213
CONTRACT: AF33 657 11214

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, TRANSFORMATIONS), (*IMPACT SHOCK, STEEL), MICROSTRUCTURE, MARTENSITE, ABLATION, SURFACES, RODS, PLASTICITY, HARDNESS, HEATING, QUENCHING (COOLING), TIME (U)
IDENTIFIERS: 1964, 1035 STEELL, FERRITE (IRON) (U)

A SAE 1035 STEL WAS IMPACTED ON ITS END, RESULTING IN ABLATION OF THE STEEL SURFACE BY A HIGHLY PLASTIC MATERIAL FLOWING UNDER THE IMPACT EFFECT AND CAUSING HIGH RATE TRANSFORMATIONS OF THE STEEL'S MICROSTRUCTURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-430 911
MANLABS INC CAMBRIDGE MASS

THERMOMECHANICAL TREATMENTS APPLIED TO ULTRAHIGH-STRENGTH BAINITES. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 5, 15 OCT-15 DEC 63.
DEC 63 28P
CONTRACT: N600 19 59811

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, TRANSFORMATIONS), (*TOOL STEEL, HARDENING), CHROMIUM ALLOYS, IRON ALLOYS, AUSTENITE, BAINITE, MARTENSITE, HEAT TREATMENT, DEFORMATION, MECHANICAL WORKING, TEMPERATURE, COLD WORKING, HOT WORKING, QUENCHING (COOLING), CRYSTAL STRUCTURE, MICROSTRUCTURE, CRYOGENICS, ELECTRON MICROSCOPY, MICROSCOPY, X-RAY DIFFRACTION ANALYSIS, METALLOGRAPHY, MECHANICAL PROPERTIES (U)
IDENTIFIERS: 1963, H11 STEEL, 4350 STEEL (U)

RETAINED AUSTENITE DETERMINATIONS WERE MADE IN H11 WHICH HAD BEEN SUBJECTED TO VARIOUS THERMAL AND THERMOMECHANICAL TREATMENTS. IT WAS FOUND THAT UP TO 35% AUSTENITE IS RETAINED WHEN BAINITE IS FORMED AT 550 F FROM EITHER DEFORMED OR UNDEFORMED AUSTENITE. FOR TEMPERING TEMPERATURES BELOW 1000 F, RETAINED AUSTENITE HAS A CONSIDERABLE EFFECT ON THE YIELD STRENGTH OF THE MIXED STRUCTURE. THE INFLUENCE OF RETAINED AUSTENITE ON THE YIELD STRENGTH IS NOT DIRECTLY PROPORTIONAL TO ITS VOLUME PERCENT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-432 999
MASSACHUSETTS INST OF TECH CAMBRIDGE

INVESTIGATION OF SOLIDIFICATION OF HIGH STRENGTH STEEL CASTINGS. (U)

DESCRIPTIVE NOTE: INTERIM SUMMARY REPT., 9 DEC 61-8 DEC 62.
DEC 63 51P
CONTRACT: DA-19-020-ORD-5443
PROJ: 1A024401A110
MONITOR: AMRA CR63 04 1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, CASTINGS), (*CRYSTALLIZATION, STEEL), IRON ALLOYS, NICKEL ALLOYS, MELTING, COOLING, QUENCHING (COOLING), CRYSTAL STRUCTURE, GRAIN STRUCTURE (METALLURGY), METALLOGRAPHY, CRYSTAL GROWTH, MICROSTRUCTURE, POROSITY, ETCHED CRYSTALS, SOLIDS, FREEZING, DIFFUSION, NICKEL, DISTRIBUTION, TEMPERATURE, TIME, HIGH TEMPERATURE RESEARCH (U)
IDENTIFIERS: 1963, ELECTRON MICROPROBE, MICROPOROSITY (U)

A FURNACE WITH RELATED APPARATUS FOR FULLY CONTROLLING SOLIDIFICATION IN SMALL SAMPLES OF IRON-BASE ALLOYS WAS COMPLETED AND INSTALLED. STUDIES WERE CONDUCTED USING THE EQUIPMENT TO STUDY SOLIDIFICATION OF AN IRON-NICKEL ALLOY. EMPHASIS OF THE WORK WAS ON EFFECT COOLING RATE ON DETAILS OF DENDRITE MORPHOLOGY AND ON MICROSEGREGATION IN A SOLUTE-RICH SYSTEM. AT HIGHER COOLING RATES, THERE IS A TENDENCY FOR FORMATION OF ''PRIMARY PLATES'' (FILLING IN OF INTERSTICES BETWEEN PRIMARY AND SECONDARY ARMS DURING THE EARLY STAGES OF SOLIDIFICATION). AT LOWER COOLING RATES, THERE IS A TENDENCY FOR FORMATION OF SECONDARY PLATES (FILLING IN OF INTERSTICES BETWEEN SECONDARY AND TERTIARY DENDRITE ARMS). DENDRITE ARM SPACING INCREASES LINEARLY WITH THE RECIPROCAL OF THE SQUARE ROOT OF THE COOLING RATE. SECONDARY AND TERTIARY ARM SPACINGS ARE ROUGHLY EQUIVALENT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-435 779
COLUMBIA UNIV NEW YORK SCHOOL OF ENGINEERING AND APPLIED SCIENCE

STUDY ON YIELDING OF IRON, (U)

FEB 64 122P LEE,EUN U. 1
REPT. NO. TR4
CONTRACT: NONR2666(

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS.

DESCRIPTORS: (*IRON, MECHANICAL PROPERTIES), (*QUENCHING (COOLING), TEMPERATURE), CARBON, TENSILE PROPERTIES, GRAIN STRUCTURES (METALLURGY), INTERNAL FRICTION, GRAIN BOUNDARIES, THEORY, AGING (MATERIALS), STRAIN (MECHANICS), SOLUBILITY, SOLID SOLUTIONS, CRYSTAL LATTICE DEFECTS, HEAT TREATMENT (U)
IDENTIFIERS: 1964, PEIERLS-NABARRO STRESS (U)

THE EFFECT OF QUENCHING ON THE YIELD STRESS OF IRON WAS STUDIED AT EXTREMELY SMALL CARBON CONCENTRATIONS. SWEDISH IRON WIRE SPECIMENS OF VARIOUS GRAIN SIZES WERE DECARBURIZED UNTIL THEY SHOWED NO YIELD POINT OR STRAIN-AGING (70 HOURS OF WET-HYDROGEN TREATMENT AT 716 C). AFTERWARDS THEY WERE RECARBURIZED IN AN ATMOSPHERE OF NORMAL HEPTANE AND DRY-HYDROGEN AT 716 C AND QUENCHED FROM VARIOUS TEMPERATURES, RANGING FROM 130 TO 730 C, INTO ROOM-TEMPERATURE WATER, AND TENSILE TESTED. CARBON CONTENTS WERE MEASURED BY THE INTERNAL FRICTION TECHNIQUE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-456 330
UNITED STATES STEEL CORP MONROEVILLE PA APPLIED RESEARCH LAB

RAPID HEAT TREATMENT OF 5NI-CR-MO-V STEEL. (U)

DEC 64 1V HAAK,R. P. ;KRAMER,K. H. ;
PORTER,L. F. ;ZABELSKY,R. W. ;
CONTRACT: NOBS88540
PROJ: SS050 000 ,USS PROJ.40 018 002 24
TASK: 1567

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, HEAT TREATMENT), MECHANICAL PROPERTIES, TENSILE PROPERTIES, TEMPERATURE, QUENCHING (COOLING), EXPERIMENTAL DATA (U)
IDENTIFIERS: CHARPY IMPACT TEST, STEEL CR-MO5NI-V, STEEL HY-130/150 (U)

BECAUSE A PREVIOUS STUDY SHOWED THAT THE YIELD STRENGTH AND TOUGHNESS OF CONVENTIONALLY QUENCHED AND TEMPERED STEELS WOULD BE SIGNIFICANTLY IMPROVED BY RAPID AUSTENITIZING, A STATISTICALLY DESIGNED PROGRAM WAS INITIATED TO EVALUATE RAPIDHEAT-TREATMENT VARIABLES. THE EFFECT OF PRIOR MICROSTRUCTURE (AS-ROLLED AND AS-QUENCHED), HEATING RATE (2, 10, AND 200 F PER SECOND), NUMBER OF AUSTENITIZING PASSES (1 AND 5), PEAK AUSTENITIZING TEMPERATURE (1400, 1550, AND 1700 F), HOLDING TIME AT PEAK TEMPERATURE (10 TO 15 AND 50 TO 70 SECONDS), AND TEMPERING TEMPERATURE (UNTEMPERED, 400, 700, AND 1000 F) ON THE MECHANICAL PROPERTIES OF THE 5NI-CR-MO-V EXPERIMENTAL HY130/150 STEEL WERE DETERMINED AND COMPARED WITH THOSE OF CONVENTIONALLY HEAT-TREATED 5NI-CR-MO-V STEEL. THE STATISTICAL ANALYSIS OF THE DATA PREDICTED THAT THE 5NI-CR-MO-V STEEL WILL EXHIBIT A YIELD STRENGTH OF 185 KSI, A TENSILE STRENGTH OF 204 KSI, AN ELONGATION OF 17%, A REDUCTION OF AREA OF 68 PERCENT, AND A CHARPY ENERGY ABSORPTION AT 80 F OF 70 FT-LB WHEN AS-ROLLED MATERIAL IS RAPIDLY AUSTENITIZED 5 TIMES AT 200 F PER SECOND TO A PEAK TEMPERATURE OF 1400 F, WATER-QUENCHED, AND CONVENTIONALLY TEMPERED AT 360 F. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-459 672
UNITED STATES STEEL CORP MONROEVILLE PA APPLIED RESEARCH LAB

EFFECT OF COMPOSITION AND HEAT TREATMENT ON THE MECHANICAL PROPERTIES OF NI-CR-MO SUBMARINE-HULL STEELS - I. (U)

DESCRIPTIVE NOTE: TECHNICAL PROGRESS REPT.,
MAY 63 30P MANGANELLO,S. J. ;PORTER,L. F. ;
REPT. NO. S-11109
CONTRACT: NOBS88540
PROJ: 40 18 001 4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SUBMARINE HULLS, STEEL), (*STEEL, MECHANICAL PROPERTIES), CHEMICAL ANALYSIS, HEAT TREATMENT, HARDNESS, TOUGHNESS, MICROSTRUCTURE, QUENCHING (COOLING), SHIP PLATES (U)
IDENTIFIERS: STEEL HY-130/150, CHEMICAL COMPOSITION, NOTCH TOUGHNESS, TEMPERING (U)

PREVIOUS STUDIES TO DEVELOP A SUBMARINE-HULL STEEL THAT WOULD MEET THE U. S. NAVY REQUIREMENTS FOR AN HY-130/150 STEEL INDICATED THAT A 5 1/4NI-CR-MO-V STEEL APPEARED PROMISING EXCEPT THAT THE HARDENABILITY OF THIS STEEL WAS TOO LOW FOR USE AS 4-IN.-THICK PLATES. THEREFORE, A PRELIMINARY STUDY WAS INITIATED ON 5NI-CR-MO STEELS TO ESTABLISH THE RANGE OF HARDENABILITIES REQUIRED TO OBTAIN THE DESIRED MICROSTRUCTURE AND MECHANICAL PROPERTIES IN 1/2-IN.-THICK PLATES AIR-COOLED TO SIMULATE THE COOLING AT THE CENTER OF A WATER-QUENCHED PLATE ABOUT 6 INCHES THICK. THE RESULTS SHOWED THAT TYE YIELD STRENGTHS OF 1/2-IN.-THICK AIR-COOLED PLATES WERE SIGNIFICANTLY LOWER THAN THOSE OF 1/2-IN.THICK WATER-QUENCHED PLATES WHEN THE HARDENABILITY INDEX WAS ABOUT 15, BUT THAT THE YIELD STRENGTHS OF THE AIR-COOLED PLATES WERE ONLY SLIGHTLY LOWER THAN THOSE OF THE WATER-QUENCHED PLATES AT HARDENABILITY INDICES OF 29 AND HIGHER. HOWEVER, EVEN AT THE HIGHER HARDENABILITY VALUES, THE NOTCH TOUGHNESS OF THE AIRCOOLED PLATES WAS SIGNIFICANTLY LOWER THAN THAT OF THE WATER-QUENCHED PLATES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-466 276
PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL SCIENCES

SOLID PROPELLANT COMBUSTION MECHANISM STUDIES. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 18, 1 OCT-31 DEC 64,
JUN 65 14P STEINZ,JOHAN A. ;
SUMMERFIELD,MARTIN ;
REPT. NO. 446Q
CONTRACT: NONR1858 32
PROJ: NR092 516

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SOLID ROCKET PROPELLANTS, BURNING RATE), LOW-PRESSURE RESEARCH, COMBUSTION PRODUCTS, QUENCHING(COOLING), THERMAL CONDUCTIVITY, KINETIC THEORY, SURFACE PROPERTIES, PHASE STUDIES, SOLIDS, GASES, PYROLYSIS, MATHEMATICAL ANALYSIS (U)

IN GENERAL, AT SUFFICIENTLY LOW PRESSURE, QUENCHING TAKES PLACE. HOWEVER, IT HAS BEEN OBSERVED THAT AP POLYSULFIDE PROPELLANTS DO NOT QUENCH BUT DISPLAY INSTEAD A TRANSITION, AS THE PRESSURE IS LOWERED, FROM THE 'NORMAL' MODE OF COMBUSTION EXHIBITING A VISIBLE FLAME TO ONE WHERE NO FLAME IS VISIBLE AND A POROUS ASH REMAINS AS A COMBUSTION PRODUCT. QUENCHING IS ORDINARILY EXPLAINED BY A HEAT LOSS EFFECT, BUT THE OCCURRENCE OF THIS UNQUENCHED, FLAMELESS BURNING SEEMED TO REQUIRE SOME DEEPER EXPLANATION. IT IS SUGGESTED THAT THE CONTINUATION OF BURNING AT LOW PRESSURES IS DUE TO THE INHIBITION OF THE LOSS OF HEAT TO THE SURROUNDINGS BY THE RETAINED ASH. AN ANALYSIS BASED ON THIS HYPOTHESIS SHOWS THAT, EVEN WITHOUT THE INSULATING EFFECT OF THE ASH, STEADY BURNING IS POSSIBLE ALL THE WAY DOWN TO ZERO PRESSURE, PROVIDED THE GASIFICATION PROCESS AT THE SOLID SURFACE IS EXOTHERMIC, AND PROVIDED THE ACITIVATION ENERGY FOR THIS PROCESS IS SMALL. CONVERSELY, FOR ENDOTHERMIC PROCESSES OR FOR LARGE ACTIVATION ENERGIES, QUENCHING WILL OCCUR WHEN THERE IS NO INSULATING ASH. THUS, THE STUDY OF LOW PRESSURE BURNING OPENS UP THE POSSIBILITY OF MEASURING THE HEAT OF GASIFICATION AT THE SURFACE AND THE ACTIVATION ENERGY FOR THE GASIFICATION PROCESS. ON THE EXPERIMENTAL SIDE, BEFORE SUCH DEDUCTIONS ARE POSSIBLE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-470 827
AEROJET-GENERAL CORP SACRAMENTO CALIF

TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. ART II. TERNARY SYSTEMS. VOL. I. TA-HF-C SYSTEM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUN 65 84P RUDY,E.;
CONTRACT: AF33 615 1249
PROJ: AF7350
TASK: 735001
MONITOR: AFML TR-65-2-PT-2-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PHASE STUDIES, TRANSITION METALS), (*TRANSITION METALS, PHASE STUDIES), TANTALUM, HAFNIUM, CARBON, TANTALUM ALLOYS, HAFNIUM ALLOYS, CARBON ALLOYS, CHEMICAL ANALYSIS, HEAT, X-RAY DIFFRACTION ANALYSIS, METALLOGRAPHY, MELTING, HEAT TREATMENT, HIGH-TEMPERATURE RESEARCH, QUENCHING(COOLING), CARBIDES, SILVER, IMPURITIES, CRYSTAL LATTICES (U)
IDENTIFIERS: DIFFERENTIAL THERMAL ANALYSIS (U)

THE TERNARY ALLOY SYSTEM TANTALUM-HAFNIUM-CARBON WAS INVESTIGATED BY MEANS OF X-RAY, DTA, MELTING POINT, AND METALLOGRAPHIC TECHNIQUES ON CHEMICALLY ANALYZED ALLOYS, AND A COMPLETE PHASE DIAGRAM FOR TEMPERATURE ABOVE 1000 C WAS ESTABLISHED. THE SYSTEM IS CHARACTERIZED BY A VERY HIGH MELTING SOLID SOLUTION OF THE REFRACTORY MONOCARBIDES IN BOTH BINARY SYSTEMS, AND A LIMITED EXCHANGE OF HAFNIUM IN THE LOW- AND HIGH-TEMPERATURE MODIFICATION OF TA2C. FOUR CLASS II FOUR-PHASE REACTION PLANES AS WELL AS THREE LIMITING TIE LINES OCCUR IN THE CONCENTRATION AREA METAL-MONOCARBIDE SOLUTION. THE RESULTS OF THIS INVESTIGATION ARE DISCUSSED AND COMPARED WITH PREVIOUS, PARTIAL INVESTIGATIONS OF THIS SYSTEM. FIELDS OF APPLICATION ARE OUTLINED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-476 857 11/6
NAVAL AIR ENGINEERING CENTER PHILADELPHIA PA AERONAUTICAL MATERIALS LAB

APPLICATION OF POTENTIOSTATIC AND GALVANOSTATIC TECHNIQUES TO THE STUDY OF INTERGRANULAR CORROSION IN HIGH STRENGTH ALUMINUM ALLOYS. (U)

DESCRIPTIVE NOTE: FINAL REPT. JAN 64-JUN 65,
OCT 65 29P KETCHAM,SARA J. !
PROJ: NAEC-AML(18)-R360FR10!

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *CORROSION), GRAIN STRUCTURES(METALLURGY), HEAT TREATMENT, QUENCHING(COOLING), ELECTROCHEMISTRY, STRESSES, STRESS CORROSION, POLARIZATION, COPPER ALLOYS, MAGNESIUM ALLOYS, ANODES(ELECTROLYTIC CELL), CATHODES(ELECTROLYTIC CELL), MICROSTRUCTURE (U)
IDENTIFIERS: ALUMINUM ALLOY 2024 (U)

THE EFFECT OF SLOW QUENCHING FOLLOWING SOLUTION HEAT TREATMENT ON NATURALLY AGED AL-CU-MG ALLOY CAN BE DETECTED BY CORROSION POTENTIALS AND ACCELERATED CORROSION TESTS FOR INTERGRANULAR CORROSION AND STRESS CORROSION SUSCEPTIBILITY. FASTER QUENCHING RATES GIVE NO INDICATION OF THE EXISTENCE OF ANY CONTINUOUS ANODIC PATHS UNTIL A STRESS IS APPLIED. A POSSIBLE MECHANISM FOR THIS IS PROPOSED BASED ON THE ELECTROCHEMICAL EFFECT OF STRESS WHICH IS BELIEVED TO BE THE RESULT OF STRAIN INDUCED DEPOLARIZATION OF THE ANODIC PHASE OR PHASES AND STRESS INDUCED INCREASE IN THE SURFACE ACTIVITY OF HYDROGEN IONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-479 783 11/6 13/8
ALCOA RESEARCH LABS ALUMINUM CO OF AMERICA NEW KENSINGTON PA

DEVELOPMENT OF ALUMINUM-BASE ALLOYS-SECTION II. (U)

DESCRIPTIVE NOTE: FINAL REPT. 29 SEP 61-30 SEP 65, DEC 65 105P HAARR,A. P. ;
REPT. NO. 13-65-AP59-S-SECT-2
CONTRACT: DA-36-034-ORD-3559RD
PROJ: DA-593-32-004

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, OPTIMIZATION), (*POWDER METALLURGY, MATERIAL FORMING), OXIDES, ALUMINUM COMPOUNDS, TENSILE PROPERTIES, EXTRUSION, COLD WORKING, DENSITY, SINTERING, CONTROLLED ATMOSPHERES, ARGON, HOT WORKING, FORGING, QUENCHING(COOLING), ROLLING(METALLURGY), CONFIGURATION, WELDABILITY, POROSITY, SHEETS, TEMPERATURE, PARTICLE SIZE, HEAT TREATMENT, DIES, QUANTITATIVE ANALYSIS, METALS, AGING(MATERIALS), RODS (U)
IDENTIFIERS: HOT PRESSING, HOT COINING, IMPACT EXTRUSION, COMPACTS, ALUMINUM OXIDE (U)

THE DEVELOPMENT OF PROCESSES FOR MAKING HIGH-STRENGTH, HIGH QUALITY PRODUCTS FROM PREALLOYED ATOMIZED AL POWDERS IS DESCRIBED. HIGH QUALITY, HIGH-STRENGTH 2 IN. DIA. HEAT TREATABLE EXTRUSIONS HAVE BEEN PRODUCED BY ALUMINUM POWDER METALLURGY METHODS. COMPACTS WERE PRODUCED EITHER BY COLD COMPACTING-HOT COINING OR BY HOT PRESSING OF PREHEATED POWDERS. THE TENSILE PROPERTIES OF THE COMPACTS AFTER HEAT TREATING WERE LOWER THAN THE HEAT TREATED 2 IN. DIA. EXTRUSIONS. THE PROPERTIES OF DUPLICATE SPECIMENS ALSO LACKED THE UNIFORMITY WHICH WAS PRESENT FOR THE EXTRUSIONS. COLD COMPACTED AND SINTERED MATERIAL HAD EXTREMELY LOW TENSILE PROPERTIES. FORGING AND HOT UPSETTING IN A CLOSED DIE HAVE RESULTED IN THE TENSILE STRENGTHS BEING INCREASED TO APPROXIMATELY THE LEVEL OF EXTRUDED STOCK. SHEET PRODUCED FROM FORGED MATERIAL ALSO HAD HIGH PROPERTIES. THE WORKING TEMPERATURE OF THESE ALLOYS IS EXTREMELY IMPORTANT. ALTHOUGH THE WELDABILITY OF THESE ALLOYS IS BETTER THAN THE AL-AL2O3 ALLOYS, THE POROSITY IS STILL TOO HIGH FOR COMMERCIAL USE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-480 949 11/6
AEROJET-GENERAL CORP SACRAMENTO CALIF MATERIALS RESEARCH LAB

TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART I. RELATED BINARY SYSTEMS. VOLUME VIII. ZR-B SYSTEM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JAN 66 34P RUDY ,E. ;
CONTRACT: AF 33(615)-1249
PROJ: AF-7350
TASK: 735001
MONITOR: AFML TR-65-2-PT-1-VOL-8

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ZIRCONIUM ALLOYS, PHASE STUDIES), (*BORON ALLOYS, PHASE STUDIES), (*PHASE STUDIES, REFRACTORY METAL ALLOYS), BORIDES, HIGH-TEMPERATURE RESEARCH, TRANSITION ELEMENTS, REVIEWS, DIFFERENTIAL THERMAL ANALYSIS, POWDER METALS, X-RAY DIFFRACTION ANALYSIS, CHEMICAL ANALYSIS, CARBON ALLOYS, METALLOGRAPHY, MELTING POINT, HEAT TREATMENT, QUENCHING(COOLING), MICROSTRUCTURE, MELTING, ELECTRIC ARCS, ELECTRON BEAMS, GRAIN STRUCTURES(METALLURGY), GRAIN BOUNDARIES, SILICON ALLOYS (U)
IDENTIFIERS: ZIRCONIUM DIBORIDE (U)

THE BINARY ALLOY SYSTEM ZIRCONIUM-BORON HAS BEEN INVESTIGATED BY MEANS OF X-RAY, METALLOGRAPHIC, MELTING POINT, AND DIFFERENTIAL-THERMOANALYTICAL TECHNIQUES. THE EXPERIMENTAL ALLOY MATERIAL COMPRISED OF HOT-PRESSED AND HEAT-TREATED, ARC- AND ELECTRON-BEAM MELTED, AS WELL AS EQUILIBRATED AND QUENCHED ALLOY MATERIAL. ALL PHASES OF THE EXPERIMENTAL INVESTIGATIONS WERE SUPPORTED BY CHEMICAL ANALYSIS. THE RESULTS OF THE PRESENT INVESTIGATION, WHICH RESULTED IN THE ESTABLISHMENT OF A COMPLETE PHASE DIAGRAM FOR THE SYSTEM, ARE DISCUSSED AND COMPARED WITH PREVIOUSLY ESTABLISHED SYSTEM DATA. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-489 752 11/6
AEROJET-GENERAL CORP SACRAMENTO CALIF MATERIALS RESEARCH LAB

TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART II. TERNARY SYSTEMS. VOLUME X. THE ZR-SI-C, HF-SI-C, ZR-SI-B, AND HF-SI-B SYSTEMS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
SEP 66 95P BRUKL,C. E. ;
CONTRACT: AF 33(615)-1249
PROJ: AF-7350
TASK: 735001
MONITOR: AFML TR-65-2-PT-2-VOL-10

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TRANSITION ELEMENTS, *PHASE STUDIES), (*ZIRCONIUM, *HAFNIUM), (*CARBON, *BORON), (*SILICON, PHASE STUDIES), POWDER METALS, HIGH-TEMPERATURE RESEARCH, MELTING POINT, QUENCHING(COOLING), FEASIBILITY STUDIES, HEAT TREATMENT, METALLOGRAPHY, X-RAY DIFFRACTION ANALYSIS, CHEMICAL ANALYSIS, ARC MELTING (U)

PHASE EQUILIBRIA AND MUTUAL SOLUBILITIES IN THE ZR-SI-C, HF-SI-C, AND HF-SI-B TERNARY SYSTEMS HAVE BEEN DETERMINED AT 1300 C. THE GENERAL MELTING BEHAVIOR AND HIGH TEMPERATURE MUTUAL SOLUBILITIES IN THE ZR-SI-C, HF-SI-C, ZR-SI-B, AND HF-SI-B SYSTEMS HAVE BEEN STUDIED; MINIMUM MELTING TEMPERATURES ALONG VARIOUS PSEUDO-BINARY SECTIONS ARE GIVEN. ALL FOUR SYSTEMS ARE CHARACTERIZED BY THE FORMATION OF A TERNARY D8(8)-NOWOTNY PHASE. MOST MELTING TEMPERATURES IN THE TERNARY SYSTEMS ARE GOVERNED BY THE LOWER MELTING BINARY SILICIDE COMPOUNDS. GUIDELINES FOR FEASIBLE HIGH TEMPERATURE APPLICATIONS ARE GIVEN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-600 790
UNITED STATES STEEL CORP MONROEVILLE PA

THE EFFECT OF COBALT ON THE STRENGTH AND TOUGHNESS OF NI-CR-MO HIGH-YIELD-STRENGTH STEELS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 64 33P BIRKLE,A. J. !PORTER,L. F. !
CONTRACT: NOBS88540
PROJ: SS050 000
TASK: 1567

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, STRENGTH), (*TOUGHNESS, STEEL), (*COBALT, METALLURGY), QUENCHING (COOLING), HEAT TREATMENT, NICKEL, CHROMIUM, MOLYBDENUM, MECHANICAL PROPERTIES, METALLOGRAPHY, WELDING, FEASIBILITY STUDI(U)
IDENTIFIERS: TEMPERING, HY-180/210 WELDMENT, MARAGING STEEL (U)

QUENCHED AND TEMPERED STEELS ALSO HOLD PROMISE AS BASE METALS FOR AN HY-180/210 WELDMENT. THEREFORE, A PROGRAM WAS INITIATED TO EVALUATE QUENCHED AND TEMPERED STEELS FOR THIS APPLICATION. THE EFFECT OF VARYING COBALT CONTENT FROM 0 TO 8 PERCENT ON THE STRENGTH AND TOUGHNESS OF 5NI-1.5CR-0.5MO STEELS CONTAINING EITHER 0.18 OR 0.25 PERCENT CARBON WAS DETERMINED. STUDIES ON 1/2-INCH-THICK WATER-QUENCHED PLATES SHOWED THAT ALL THE STEELS EXHIBITED OPTIMUM TOUGHNESS AT HIGH YIELD STRENGTHS WHEN TEMPERED AT 400 F. STEELS WITHOUT COBALT AND A STEEL CONTAINING 0.23 PERCENT CARBON AND 8.04 PERCENT COBALT HAD THE BEST NOTCH TOUGHNESS AT YIELD STRENGTHS IN THE RANGE 170 TO 210 KSI. THE TOUGHNESS OF THESE STEELS APPROACHED THAT OBTAINED IN 1/2-INCHTHICK PLATES FROM PRODUCTION HEATS OF 12NI-5CR3MO MARAGING STEEL. EXCEPT FOR THE STEELS CONTAINING 8 PERCENT COBALT, INCREASING COBALT CONTENT GENERALLY LOWERED TOUGHNESS WITHOUT MARKEDLY INCREASING STRENGTH. RAISING THE CARBON CONTENT OF THE BASE STEEL FROM 0.19 TO 0.26 PERCENT RESULTED IN AN INCREASE IN YIELD STRENGTH FROM 170 TO 189 KSI WHEN THE STEEL WAS TEMPERED AT 400 F. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-600 793
UNITED STATES STEEL CORP MONROEVILLE PA

BASE-METAL EVALUATION OF A PRODUCTION ELECTRICFURNACE HEAT OF 5NI-CR-MO-V STEEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 64 41P MANGANELLO,S. J. ;PORTER,L. F. ;
CONTRACT: NOBS88540
PROJ: SR007 01 01
TASK: 853

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, HEAT TREATMENT), (*SUBMARINE HULLS, STEEL), (*METAL PLATES, MECHANICAL PROPERTIES), ROLLING (METALLURGY), QUENCHING (COOLING), AUSTENITE, PRODUCTION, TESTS, TOUGHNESS, STRENGTH, NICKEL, CHROMIUM, MOLYBDENUM, VANADIUM (U)
IDENTIFIERS: HY-130/150 STEEL, TEMPERING (U)

AN 80-TON ELECTRIC-FURNACE HEAT OF THE 5NI-CRMO-V STEEL WAS MELTED, ROLLED TO 1/2-, 1-, 2-, AND 4-INCH-THICK PLATES, AND THE PLATES WERE QUENCHED AND TEMPERED. AN INITIAL EVALUATION OF THE PRODUCTION AND PROPERTIES OF THE PLATES INDICATED THAT THE 5NI-CR-MO-V STEEL WAS SATISFACTORY IN ALL RESPECTS. THEREFORE, THE PRODUCTION PLATES WERE MORE COMPLETELY EVALUATED TO DETERMINE THE EFFECT OF VARIOUS AUSTENITIZING AND TEMPERING TREATMENTS ON THEIR MECHANICAL PROPERTIES AND TO DETERMINE THE UNIFORMITY OF THEIR MECHANICAL PROPERTIES. THE HEAT-TREATING STUDIES SHOWED THAT THE TEMPERING CHARACTERISTICS OF THE PRODUCTION PLATES WERE SIMILAR TO THOSE OF THE LABORATORY 5NI-CR-MO-V STEEL, THAT BLOWER-COOLING 1/2-INCH-THICK PLATES TO SIMULATE THE COOLING AT THE MIDTHICKNESS OF A 4-INCH-THICK WATER-QUENCHED PLATE WAS A CONSERVATIVE SIMULATION AS PREVIOUSLY REPORTED, THAT THE 5NI-CR-MO-V STEEL HAS ADEQUATE HARDENABILITY FOR 4-INCH-THICK PLATES, AND THAT THE TENSILE AND IMPACT PROPERTIES OF HEAVY-GAGE 5NI-CR-MO-V STEEL PLATES ARE SLIGHTLY IMPROVED BY A DOUBLE- VERSUS A SINGLE-AUSTENITIZING TREATMENT. THE STUDIES OF THE UNIFORMITY OF THE PRODUCTION PLATES SHOWED THAT THE LONGITUDINAL AND TRANSVERSE TENSILE AND IMPACT PROPERTIES OF THE 1/2- THROUGH 4-INCH-THICK PRODUCTION PLATES OF THE 5NI-CR-MO-V STEEL WERE GENERALLY UNIFORM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-601 825
TITANIUM METALS CORP OF AMERICA NEW YORK

DEVELOPMENT OF A STABLE-BETA TITANIUM ALLOY. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 6, 1 OCT-31 DEC 63
DEC 63 36P HUNTER,D. B. ;
CONTRACT: DA30 069ORD3743
PROJ: DA-59332008
MONITOR: WAL CR-405.2/5

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TITANIUM ALLOYS, DISPERSION HARDENING), (*DISPERSION HARDENING, TITANIUM ALLOYS), AGING (MATERIALS), VANADIUM ALLOYS, CHROMIUM ALLOYS, ALUMINUM ALLOYS, MOLYBDENUM ALLOYS, IRON ALLOYS, COPPER ALLOYS, NICKEL ALLOYS, ROLLING (METALLURGY), EUTECTICS, QUENCHING (COOLING), TENSILE PROPERTIES, DUCTILITY, COLD WORKING, HOT WORKING, PHASE STUDIES, MICROSTRUCTURE (U)
IDENTIFIERS: TITANIUM ALLOY 3AL 4FE 17V, TITANIUM ALLOY 3AL 2FE 8MO 8V, TITANIUM ALLOY 3AL 10MN 17V, TITANIUM ALLOY 3AL 6FE 8MO 8V (U)

AN ATTEMPT TO INDUCE COMPOUND PRECIPITATION HARDENING IN TI-17V-10CR-3AL, TI-8MO-8V-7.5FE-3AL, TI-8MO-8V7.5FE-3AL-1CO AND TI-15MO-5FE-3AL ALLOYS BY COLD REDUCTION AND SUBSEQUENT AGING RESULTED IN HARDENING BY ALPHA PRECIPITATION INSTEAD. SIMILAR WORK ON TI-17V-8CR-3AL-3NI INDICATED THAT THIS ALPHA HARDENING WAS INDUCED BY EITHER HOT OR COLD ROLLING AND SUPPRESSED BY SOLUTION TREATMENT. SOLUTION TREATING, QUENCHING AND AGING TI-17V-10CR-3AL, CONTAINING 0.5 AND 1% SI, AT 1250F RESULTED IN RAPID HARDNESS INCREASES OF UP TO 100 VICKERS POINTS WITHOUT ANY CLEAR ACCOMPANYING MICROSTRUCTURAL CHANGE: SLOW COOLING SUPPRESSED THIS AGING RESPONSE. AGING RESPONSES WERE DETERMINED FOR THE METASTABLE ALLOYS TI-17V(1.5 TO 4)FE-3AL AND TI-8MO-8V-(1 TO 3) FE-3AL, OVER A RANGE OF TIMES AND TEMPERATURES. A STATISTICAL CORRELATION BETWEEN VICKERS HARDNESS AND ULTIMATE TENSILE STRENGTH ON STABLE-BETA ALLOYS INDICATED THAT 25 VICKERS POINTS CORRESPONDED TO ABOUT 10,000 PSI. TWO METASTABLE AND TWO STABLE-BETA ALLOYS WERE SELECTED FOR FURTHER EVALUATION AS LARGER INGOTS: METASTABLE TI-17V-4FE-3AL AND TI-8MO-8V2FE-3AL. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-602 075
DAVID TAYLOR MODEL BASIN WASHINGTON D C

FACTORS INFLUENCING THE FATIGUE LIFE OF AN HY-80 COMPOSITION STEEL FULLY QUENCHED AND TEMPERED TO VARIOUS STRENGTH LEVELS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT.,
JUN 64 31P WILLNER,A. R. ;SALIVE,M. L.
;
REPT. NO. DTMB-1807
PROJ: S F013 03 02
TASK: 2018

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, FATIGUE (MECHANICS)), TENSILE PROPERTIES, LIFE EXPECTANCY, AUSTENITE, GRAIN STRUCTURES (METALLURGY), QUENCHING (COOLING), HEAT TREATMENT (U)

THE REPORT EVALUATES THE EFFECTS OF STRENGTH LEVEL, CHARPY V-NOTCH ENERGY, PRESTRAINING, PRESTRAINING AND STRESS RELIEVING, AND AUSTENITIZING TEMPERATURE ON THE FATIGUE LIFE OF A FULLY QUENCHED HY-80 STEEL COMPOSITION. THE FATIGUE DATA DEVELOPED INDICATE THAT THE DESIGNER WOULD HAVE TO BE CAUTIOUS WHEN GOING TO HIGHER STRENGTH STEEL WHEN USING A SAFETY FACTOR WHICH IS CONSIDERED SATISFACTORY FOR LOWER STRENGTH STEELS, I.E., IF HIGHER STRENGTH STEELS ARE TO BE USED, LARGER SAFETY FACTORS ARE NECESSARY TO OBTAIN A COMPARABLE FATIGUE LIFE. THE LIMITED DATA PRESENTED ON EXPERIMENTAL HY-150 STEELS INDICATE THAT CAUTION WILL HAVE TO BE EXERCISED IN EVALUATING LARGE-SPECIMEN FATIGUE DATA. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-602 103
ISTITUTO SPERIMENTALE DEI METALLI LEGGERI MILAN (ITALY)

RESISTOMETRIC INVESTIGATION OF PRE-PRECIPITATION IN THE Al-MG 5% ALLOY. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JAN-31 DEC 63.,
JAN 64 43P FEDERIGHI,T. ;CERESARA,S. ;
REPT. NO. 13 177 6401 104
CONTRACT: DA91 591EUC2767

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MAGNESIUM ALLOYS, AGING (MATERIALS), (*ALUMINUM ALLOYS, AGING (MATERIALS), QUENCHING (COOLING), HEAT TREATMENT, CRYSTAL LATTICE DEFECTS, RESISTANCE (ELECTRICAL), NITROGEN, LIQUEFIED GASES, ITALY, DIFFUSION, CHEMICAL PRECIPITATION (U)
IDENTIFIERS: SUPERSATURATION (U)

THE PRE-PRECIPITATION PROCESS IN THE SUPERSATURATED AL-5.1% AT.% MG ALLOY HAS BEEN EXTENSIVELY INVESTIGATED BY MEANS OF ELECTRICAL RESISTIVITY MEASUREMENTS PERFORMED AT LIQUID NITROGEN TEMPERATURE (-195C). AS KNOWN, WHERE AS THE PROCESS CANNOT BE DISCOVERED IN AL-MG ALLOYS BY THE USUAL X-RAY LOW ANGLE METHOD IT IS POSSIBLE TO DETECT IT BY RESISTIVITY MEASUREMENTS, SINCE DURING THE BEGINNING OF THE PROCESS RESISTIVITY UNDERGOES AN INCREASE WHICH CAN BE EASILY SEPARATED FROM OTHER RECOVERY PROCESSES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-602 801
STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

DEFECT STRUCTURES IN QUENCHED AND ANNEALED GAAS CRYSTALS, (U)

JUN 64 18P PEARSON,G. L. ;POTTS,H. R. ;
MACRES,V. G. ;
REPT. NO. 64 069 ,TR5106 1
CONTRACT: DA31 124ARO D155
PROJ: 20010501B700

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CRYSTAL LATTICE DEFECTS, MEASUREMENT), (*GALLIUM ALLOYS, ARSENIC ALLOYS), SINGLE CRYSTALS, HEAT TREATMENT, QUENCHING (COOLING), DIFFRACTION ANALYSIS, CRYSTAL LATTICES, ENTHALPY (U)
IDENTIFIERS: GALLIUM ARSENIDE (U)

LATTICE PARAMETER MEASUREMENTS HAVE BEEN MADE BY THE KOSSEL-LINE TECHNIQUE ON QUENCHED GALLIUM ARSENIDE CRYSTALS. SAMPLES QUENCHED FROM TEMPERATURES ABOVE 1000C SHOWED AN INCREASE IN LATTICE PARAMETER. THE CHANGE WITH TEMPERATURE HAS AN ENTHALPY OF 2.0 EV AND IS ATTRIBUTED TO THE FORMATION OF VACANCIES. ROOM-TEMPERA TURE ANNEALING OF THE DEFECTS IS ALSO SHOWN, AND IS SEEN TO PROCEED IN SEVERAL STAGES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-602 829
ILLINOIS UNIV URBANA

EQUILIBRIUM SOLUTIONS OF NITROGEN IN COLUMBIUM-BASE ALLOYS. (U)

DESCRIPTIVE NOTE: REPT. FOR 15 MAR 63-15 MAR 64, JUN 64 28P DELAMOTTE,E. !HUANG,Y. C. ! ALTSTETTER,C. J. !
CONTRACT: AF33 657 10626
PROJ: AF-7351
TASK: 735106
MONITOR: AFML TDR64 134

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NIOBIUM ALLOYS, IMPURITIES), (*NITROGEN, SOLID SOLUTIONS), ZIRCONIUM ALLOYS, NIOBIUM COMPOUNDS, NITRIDES, THERMODYNAMICS, HEAT OF FORMATION, HEAT OF SOLUTION, PHASE STUDIES, MECHANICAL PROPERTIES, INTERNAL FRICTION, HARDNESS, QUENCHING (COOLING), GRAIN STRUCTURES (METALLURGY) (U)
IDENTIFIERS: NIOBIUM NITRIDES (U)

THERMODYNAMIC AND MECHANICAL PROPERTIES OF COLUMBIUMNITROGEN AND COLUMBIUM-ZIRCONIUM-NITROGEN ALLOYS WERE DETERMINED. THE PARTIAL PRESSURE OF NITROGEN IN EQUILIBRIUM WITH SINGLE-PHASE AND TWO-PHASE ALLOYS OF VARIOUS BINARY AND TERNARY COMPOSITIONS WAS DETERMINED AS A FUNCTION OF TEMPERATURE FOR TEMPERATURES BETWEEN 1500C AND 2100C. HEAT OF SOLUTION OF NITROGEN, HEAT OF FORMATION OF CB2N, AND HEAT OF SOLUTION OF CB2N VALUES WER DE DETERMINED FOR PURE COLUMBIUM AND COLUMBIUM WITH 0.86 WT % ZR. INTERNAL FRICTION AND HARDNESS WERE MEASURED FOR SEVERAL ALLOYS WHICH HAD BEEN QUENCHED FROM ABOVE 1500C. FOR THE RADIATION QUENCH USED, SOLID SOLUTIONS WITH 0.075 WT % NITROGEN AND OVER COULD NOT BE RETAINED WITHOUT PRECIPITATION. FOR THE COARSE-GRAINED SPECIMENS HARDNESS INCREASED FROM 107 KHN FOR THE PURE COLUMBIUM TO 178 KHN FOR A TWO-PHASE ALLOY CONTAINING 0.68 WT % NITROGEN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-603 551
FRANKFORD ARSENAL PHILADELPHIA PA

STRESS CORROSION TESTS OF SOME WROUGHT MG-LI BASE ALLOYS. (U)

JUL 64 22P KISZKA,J. C. 1
REPT. NO. FA-M65-1-1
PROJ: DA-59332007

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MAGNESIUM ALLOYS, CORROSION), (*LITHIUM ALLOYS, CORROSION), (*CORROSION, STRESSES), (*WELDS, MAGNESIUM ALLOYS), ALUMINUM ALLOYS, ZINC ALLOYS, SILVER ALLOYS, SILICON ALLOYS, HUMIDITY, AIR, ENVIRONMENTAL TESTS, ARMOR PLATE, CREEP, QUENCHING (COOLING), TENSILE PROPERTIES, HARDNESS (U)
IDENTIFIERS: MAGNESIUM ALLOY 14LI, STRESS CORROSION (U)

SEVEN EXPERIMENTAL WROUGHT MG-LI BASE ALLOYS (MG-14LI WITH VARIOUS ADDITIONS OF AL, ZN, AG, AND/OR SI) WERE TESTED FOR STRESS CORROSION SUSCEPTIBILITY IN HUMID AIR, FOLLOWING MECHANICAL AND THERMAL PROCESSING TO APPROX IMATE CONDITIONS IN THE HEAT-AFFECTED ZONE OF A WELD. STRESS LEVELS DURING EXPOSURE WERE UNCERTAIN BECAUSE OF CREEP EFFECTS. RAPID COOLING FROM 700F RENDERED SUSCEPTIBLE THOSE ALLOYS CONTAINING ALUMINUM, REGARDLESS OF OTHER ALLOY CONTENT. HOWEVER, HEATING FOR 24 HOURS AT 300F FOLLOWING SUCH RAPID COOLING RESTORED THEIR RESISTANCE TO STRESS CORROSION. ALLOYS STRENGTHENED BY ADDITIONS OF ZINC, SILICON, AND/OR SILVER, BUT WITH ALUMINUM EXCLUDED, DID NOT FAIL IN STRESS CORROSION UNDER THE CONDITIONS OF TEST USED IN THIS STUDY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-608 281
TITANIUM METALS CORP OF AMERICA NEW YORK

DEVELOPMENT OF A STABLE-BETA TITANIUM ALLOY. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 7, 1 JAN-31 MAR 64,
MAR 64 42P HUNTER,D. B. ;
CONTRACT: DA30 069ORD3743
PROJ: 59332008
MONITOR: WAL , TR405 2 6

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM BEST AVAILABLE COPY.

DESCRIPTORS: (*TITANIUM ALLOYS, DISPERSION HARDENING), (*DISPERSION HARDENING, TITANIUM ALLOYS), VANADIUM ALLOYS, CHROMIUM ALLOYS, ALUMINUM ALLOYS, SILICON ALLOYS, NICKEL ALLOYS, IRON ALLOYS, MANGANESE ALLOYS, COBALT ALLOYS, MOLYBDENUM ALLOYS, HEAT TREATMENT, AGING (MATERIALS), EUTECTICS, HARDNESS, MICROSTRUCTURE, ROLLING (METALLURGY), DUCTILITY, TENSILE PROPERTIES, HOT WORKING, QUENCHING (COOLING) (U)

SAMPLES OF TI-17V-10CR-3AL-1SI, QUENCHED FROM 2050F AND AGED AT TEMPERATURES OF 950-1150F, SHOWED VICKERS' HARDNESS INCREASES RANGING UP TO 100 POINTS AFTER AGING FOR 1 HOUR OR MORE AT 1150F. LESSER HARDNESS INCREASES WERE PRODUCED BY AGING AT EITHER 950 OR 1050F. TI-17V10CR-3AL-0:5SI SHOWED A SIMILAR, ALTHOUGH SMALLER AGING RESPONSE. SUCH HARDNESS INCREASES WERE NOT ACCOMPANIED BY ANY CLEAR MICROSTRUCTURAL CHANGE. SUBSTITUTION OF 0.2% BE FOR SI RESULTED IN NO AGING RESPONSE. HYPEREUTECTOID ALLOYS TI-(8-10)NI-5FE, TI-(8-10)NI-5MN, TI-(11-13)CO5FE, AND TI-(11-13)CO-5MN WERE QUENCHED FROM 1750 AND 1850F AND AGED AT 900F. A MARKED AGING RESPONSE WAS ONLY FOUND IN THOSE ALLOYS CONTAINING NI. METALLOGRAPHIC EXAMINATION SHOWED THAT MELTING OCCURRED IN THESE ALLOYS DURING SOLUTION TREATMENT. HOT ROLLING PRESSURE DETERMINATIONS ON STABLE-BETA ALLOYS TI-17V-10MN-3AL AND TI-8MO-8V-6FE-3AL SHOWED THAT THESE ALLOYS WERE NO MORE DIFFICULT TO HOT ROLL THAN THE COMMERCIAL BETA ALLOY TI-13V-11CR-3AL. COMPLETE SUBSTITUTION OF CO FOR FE IN A STABLE-BETA ALLOY TI-8MO-8V-5FE-3AL DID NOT IMPROVE UNIFORM ELONGATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-608 445
MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

DEVELOPMENT OF A LARGE-VOLUME SUPERCONDUCTING SOLENOID. (U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,
OCT 64 131P DONADIEU,LUCIEN J. ;
REPT. NO. RLE-427

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SUPERCONDUCTORS, SOLENOIDS), (*SOLENOIDS, SUPERCONDUCTORS), COILS, SUPERCONDUCTIVITY, NIOBIUM ALLOYS, MOLYBDENUM ALLOYS, RHENIUM ALLOYS, ZIRCONIUM ALLOYS, MAGNETIC PROPERTIES, ELECTRICAL PROPERTIES, CRYOGENICS, QUENCHING (COOLING), HEAT TRANSFER, THERMAL RADIATION, FEASIBILITY STUDIES, EXPERIMENTAL DATA (U)

PROBLEMS ENCOUNTERED IN THE DEVELOPMENT OF LARGEVOLUME SUPERCONDUCTING SOLENOIDS HAVE BEEN INVESTIGATED IN THE LIGHT OF THE EXPERIENCE INDUCED BY THE REALIZATION OF A PARTICULAR PROTOTYPE (8.0 INCHES IN DIAMETER, 4 FT LONG, 20 KILOGAUSS AT ROOM TEMPERATURE). THE CURRENT-FIELD CHARACTERISTICS OF SOME USEFUL SUPERCONDUCTING MATERIALS (NB, MO-RE, NB-ZR) HAVE BEEN MEASURED; THE RESULTS ARE DISCUSSED IN TERMS OF RECENT THEORIES OF SUPERCONDUCTORS. THE SPURIOUS LOSS OF THE RESISTANCELESS STATE OF A SUPERCONDUCTING SOLENOID, WHICH IS PARTICULARLY DANGEROUS FOR LARGE-VOLUME DEVICES, BECAUSE OF THE LARGE MAGNETIC ENERGY INVOLVED, WAS THOROUGHLY INVESTIGATED. STARTING FROM THE STEADY-STATE MECHANISMS OF THE QUENCHING PROPAGATION IN WIRE, THE EQUATIONS FOR CURRENT DECAY, VOLTAGE SURGE, WIRE-TEMPERATURE RISE, AND ENERGY TRANSFER ARE DERIVED; RESULTS OF CALCULATIONS FOR THE PROTOTYPE SOLENOID ARE PRESENTED. THE DESIGN OF THE PROTOTYPE SOLENOID, WHICH CAN BE DIVIDED SOMEWHAT ARBITRARILY INTO THE MAGNETIC-FIELD GENERATING SYSTEM AND THE CRYOGENIC SYSTEM, IS THOROUGHLY DETAILED. THE MOST IMPORTANT TOPICS COVERED ARE: FIELD CALCULATION FOR MULTICOIL SOLENOIDS (A MACHINE PROGRAM TO CALCULATE THE FIELD ON- AND OFF-AXIS IS PRESENTED); MAGNETIC STRESSES AND MAGNETIC ENERGY; QUENCHING PROCESS FOR MULTICOIL SOLENOIDS; STEADY-STATE HEAT TRANSFER CAUSED BY RESIDUAL GAS, THERMAL RADIATION AND CONDUCTION (A DERIVATION OF THE CONDUCTION LOSS WITH COUNTERFLOW GAS COOLING. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-611 092
CASE INST OF TECH CLEVELAND OHIO

INTERFACE MOTION IN PHASE TRANSFORMATIONS. BAINITE TRANSFORMATIONS IN HYPOEUTECTOID STEELS, (U)

FEB 65 34P GOODENOW,R. H. ;BARKALOW,R. H. ; HEHEMANN,R. F.;
REPT. NO. TR-2
CONTRACT: NONR114115

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, GRAIN STRUCTURES (METALLURGY)), (*BAINITE, TRANSFORMATIONS), PHASE STUDIES, CRYSTAL GROWTH, HEAT TREATMENT, QUENCHING (COOLING), NUCLEATION, THERMODYNAMICS, METALLOGRAPHY (U)
IDENTIFIERS: HYPOEUTECTOID STEEL (U)

KINETIC AND STRUCTURAL ASPECTS OF BAINITE FORMATION WERE STUDIED BY STEPPED TRANSFORMATION EXPERIMENTS. GROWTH OF LOWER BAINITE STOPS IF THE TEMPERATURE IS RAISED TO THE UPPER RANGE AND UPPER BAINITE EITHER STOPS GROWING OR GROWS AT A RATE SUBSTANTIALLY BELOW THAT OF LOWER BAINITE WHEN THE TEMPERATURE IS REDUCED SUDDENLY TO THE LOWER RANGE. IT IS CONCLUDED THAT THE INTERNAL STRUCTURAL DIFFERENCES WHICH CHARACTERIZE UPPER AND LOWER BAINITE EXERT A SIGNIFICANT INFLUENCE ON THE RATE AT WHICH THESE PRODUCTS DEVELOP. IN THE STEELS STUDIED IN THIS INVESTIGATION, LOWER BAINITE PLATES THICKEN FROM ONE SIDE ONLY. THESE PLATES EXHIBIT A SUBSTRUCTURAL UNIT ORIENTED AT AN ANGLE TO THE GROWTH DIRECTION AND THESE UNITS APPEAR TO NUCLEATE AT THE IMMOBILE SIDE OF THE PLATES. EDGEWISE GROWTH RATES MEASURED ON THE HOT STAGE THUS MAY REFLECT PRIMARILY THE RATE OF NUCLEATION OF THESE SUBSTRUCTURAL UNITS. A SIMILAR SITUATION MAY PREVAIL IN THE GROWTH OF UPPER BAINITE NEEDLES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-612 477
TITANIUM METALS CORP OF AMERICA NEW YORK

DEVELOPMENT OF A STABLE-BETA TITANIUM ALLOY. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 8, 1 APR-30 JUN 64,
JUN 64 35P HUNTER,D. B. 1
CONTRACT: DA30 069ORD3743
PROJ: DA-59332008
MONITOR: WAL CR-405.2/7

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-608 281

DESCRIPTORS: (*TITANIUM ALLOYS, DISPERSION HARDENING), (*DISPERSION HARDENING, TITANIUM ALLOYS), VANADIUM ALLOYS, CHROMIUM ALLOYS, ALUMINUM ALLOYS, SILICON ALLOYS, MANGANESE ALLOYS, MOLYBDENUM ALLOYS, IRON ALLOYS, COBALT ALLOYS, AGING (MATERIALS), HEAT TREATMENT, MICROSTRUCTURE, BRITTLENESS, HARDNESS, ROLLING (METALLURGY), TENSILE PROPERTIES, CREEP, DUCTILITY, QUENCHING (COOLING) (U)
IDENTIFIERS: TITANIUM ALLOY 3AL 10CR 1SI 17V, TITANIUM ALLOY 3AL 10MN 17V, TITANIUM ALLOY 3AL 6FE 8MO 8V, TITANIUM ALLOY 3AL 4FE 17V, TITANIUM ALLOY 3AL 2FE 8MO 8V (U)

THE UPPER TEMPERATURE LIMIT FOR OBTAINING A HARDNESS RESPONSE FROM TI-17V-10CR-3AL-1SI, QUENCHED FROM THE BETA FIELD, WAS 1300-1350F. BRITTLENESS IN SUCH ALLOYS IS PARTLY ASCRIBED TO THE LARGE GRAIN SIZE, PRODUCED BY THE HIGH TEMPERATURES NECESSARY FOR SILICIDE SOLUTION. COLD ROLLING PRESSURE DETERMINATIONS WERE MADE ON STABLE-BETA ALLOYS TI-8MO-8V-6FE-3AL AND TI-17V-10MN3AL. TENSILE TESTS ON MINOR COMPOSITIONAL VARIATIONS OF TI-17V-4FE-3AL AND TI-8MO-8V-2FE-3AL INDICATED THAT T A HIGH PROPORTION OF ALPHA STABILIZING ELEMENTS RESULTED IN A FASTER AGING RESPONSE. STATISTICAL DETERMINATION OF THE VICKERS HARDNESS/UTS RELATIONSHIP SHOWED THAT IN BOTH ALLOYS 17 VICKERS POINTS EQUALED 10,000 PSI. COMPLETE SUBSTITUTION OF CO FOR FE IN TWO STABLE-BETA ALLOYS RESULTED IN SUCH ALLOYS BECOMING AGEABLE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-614 839
BRIGHAM YOUNG UNIV PROVO UTAH DEPT OF PHYSICS

DIFFUSION IN METALS AT ULTRA-HIGH PRESSURES. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
MAR 65 56P DECKER,D. L. ;VANFLEET,H. B.
;
CONTRACT: AF AFOSR201 63
MONITOR: AFOSR , 65-0580

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*METALS, DIFFUSION), (*DIFFUSION, METALS), HIGH-PRESSURE RESEARCH, SILVER, WIRE, HEAT TREATMENT, QUENCHING (COOLING), GOLD, LEAD, RESISTENCE (ELECTRICAL), HEAT OF ACTIVIATION, CRYSTAL LATTICE DEFECTS, HEAT OF FORMATION (U)

SILVER WIRES 3 MIL IN DIAMETER HAVE BEEN QUENCHED FROM TEMPERATURES BETWEEN 500 AND 1000 C TO ROOM TEMPERATURES FOR PRESSURES UP TO 30 KBAR. UPON QUENCHING, AN INCREASE IN ROOM TEMPERATURE RESISTANCE WAS MEASURED, BUT 90% OF THIS INCREASE WAS PERMANENT AND REMAINED EVEN AFTER HIGH TEMPERATURE ANNEALS. THE INCREASE IN RESISTANCE COULD THEREFORE NOT BE CORRELATED DIRECTLY WITH VACANCY FORMATION. BECAUSE OF THE UNCERTAINTY IN EXPLAINING THE RESULTS IT WAS NOT POSSIBLE TO OBTAIN MEANINGFUL ACTIVATION ENERGIES OR VOLUMES FROM THE MEASUREMENTS. THE DIFFUSION OF SILVER INTO LEAD HAS BEEN INVESTIGATED USING RADIOACTIVE TRACER TECHNIQUES IN A TEMPERATURE RANGE WITHIN 200 C OF THE MELTING POINT OF LEAD FOR SIX PRESSURES BETWEEN ZERO AND 40 KBAR. THE ACTIVATION ENERGY WAS FOUND TO INCREASE FROM 15.2 TO 21.9 = .3 KCAL/MOLE AS THE PRESSURE INCREASED FROM ATMOSPHERIC TO 39.2 KBAR. THE ACTIVATION VOLUME FOR PRESSURES BELOW 11.9 KBAR RANGED FROM .54 = .06 TO .48 = .05 ATOMIC VOLUMES AS THE TEMPERATURE DECREASED FROM 769 TO 556 K. ABOVE 11.9 KBAR THE ACTIVATION VOLUME WAS NEARLY CONSTANT AT .38 = .03 ATOMIC VOLUMES OVER THE SAME TEMPERATURE INTERVAL. AS A RESULT OF THE LARGE DECREASE IN THE ACTIVATION VOLUME THAT OCCURS BETWEEN ZERO AND 11.9 KBAR IT IS SUGGESTED THAT THE DIFFUSION PROCESS FOR SILVER INTO LEAD CHANGES FROM A COMPOSITE OF INTERSTITIAL PLUS VACANCY TO AN INTERSTITIAL MECHANISM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-615 974
NORTH AMERICAN AVIATION SCIENCE CENTER THOUSAND OAKS CALIF

A FUNDAMENTAL STUDY OF DEFECT-DISLOCATION INTERACTION IN NACL TYPE LATTICES. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 MAR 63-28 FEB 65, FEB 65 68P CHANG,R. I
CONTRACT: NONR406300
PROJ: NR032 479

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CRYSTAL LATTICE DEFECTS, HALIDES), (*HALIDES, CRYSTAL LATTICE DEFECTS), SODIUM COMPOUNDS, CHLORIDES, FLUORIDES, DEFORMATION, STRESSES, CRYSTAL LATTICES, DIPOLE MOMENTS, STRAIN(MECHANICS), CREEP, QUENCHING(COOLING), HEAT TREATMENT, POTASSIUM COMPOUNDS, CALCIUM, IMPURITIES, LITHIUM COMPOUNDS (U)
IDENTIFIERS: LITHIUM CHLORIDE, SODIUM CHLORIDE, POTASSIUM CHLORIDE (U)

CONTENTS: EFFECT OF DIVALENT METAL IMPURITY DISTRIBUTION, QUENCHING RATE, AND ANNEALING TEMPERATURE ON FLOW STRESS IN IONIC CRYSTALS (NACL, LIF) THE ELASTIC INTERACTION BETWEEN DISLOCATIONS AND DEFECTS ASSOCIATED WITH CALCIUM IMPURITIES IN SODIUM CHLORIDE PERTURBATION OF THE V2-BAND IN CA-DOPED KCI FROM ELASTIC AND PLASTIC DEFORMATION OPTICAL PROBING OF THE ENVIRONMENT OF F CENTERS IN DE FORMED ALKALI HALIDES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-617 399
BOEING SCIENTIFIC RESEARCH LABS SEATTLE WASH

PHASE TRANSFORMATIONS IN THE ALLOY, TI : 8%AI : 1%MO : 1%V. (U)

JAN 65 84P BLACKBURN,MARTIN J. ;
REPT. NO. D1-82-0402
MONITOR: IDEP 502.30.80.00-C6-06

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON SOLID STATE PHYSICS. ALSO AVAILABLE FROM THE AUTHOR.

DESCRIPTORS: (*TITANIUM ALLOYS, PHASE STUDIES), (*PHASE STUDIES, TITANIUM ALLOYS), ALUMINUM ALLOYS, MOLYBDENUM ALLOYS, VANADIUM ALLOYS, MICROSTRUCTURE, HEAT TREATMENT, TRANSITION TEMPERATURE, ELECTRON DIFFRACTION ANALYSIS, CRYSTAL LATTICES, TRANSFORMATIONS, MARTENSITE, QUENCHING(COOLING), AGING(MATERIALS), CRYSTAL LATTICE DEFECTS, MECHANICAL PROPERTIES, DEFORMATION (U)
IDENTIFIERS: TITANIUM ALLOY 8AL1MO1V (U)

THE MICRO-STRUCTURES OF THE ALLOY TI : 8%AI : 1%MO : 1%V AFTER VARIOUS HEAT TREATMENTS HAVE BEEN STUDIED BY TRANSMISSION ELECTRON MICROSCOPY. AN ORDERING REACTION OCCURS IN THE ALPHA PHASE, THE CRITICAL TEMPERATURE FOR THE REACTION BEING APPROXIMATELY 525 C, ELECTRON DIFFRACTION RESULTS ARE CONSISTENT WITH THE FORMATION OF A DO SUB 19 TYPE SUPERLATTICE. THE BETA-PHASE TRANSFORMS MARTENSITICALLY WHEN QUENCHED FROM TEMPERATURES ABOVE APPROXIMATELY 875 C. TWO FORMS OF MARTENSITE HAVE BEEN FOUND, A HEAVILY FAULTED HEXAGONAL OR FACE CENTERED CUBIC STRUCTURE ALPHA' FORMED AT LOW TEMPERATURES AND A HEXAGONAL STRUCTURE ALPHA DOUBLE' FORMED AT HIGHER TEMPERATURES. AGING OF A SUPERSATURATED BETA-PHASE OR THE MARTENSITIC STRUCTURES ALPHA' OR ALPHA DOUBLE' RESULT IN THE FORMATION OF MIXTURES OF THE ALPHA AND BETA-PHASES, HOWEVER, THE REACTION MECHANISMS ARE SHOWN TO BE DEPENDENT ON THE INITIAL STRUCTURES. THE RESULTS ARE RELATED TO SOME OF THE MECHANICAL PROPERTIES OF THE ALLOY AND AN ATTEMPT IS MADE TO ACCOUNT FOR THE DIFFERENCES IN PROPERTIES OF DUPLEX AND MILL ANNEALED MATERIAL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-617 785
BATTELLE MEMORIAL INST COLUMBUS OHIO

STRUCTURAL CHANGES IN HIGH-STRENGTH STEEL ASSOCIATED WITH STRESS CORROSION AND ITS RELATIONSHIP TO DELAYED FAILURE. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 29 JUN-28 SEP 64,
SEP 64 11P VAUGHAN,D. A. ;PHALEN,D. I. ;
TRIPLER,A. B. ;SCHWARTZ,C. M. ;
CONTRACT: NOW-64-0267
PROJ: WR007 05 01

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, CORROSION), (*CORROSION, STEEL), (*STRESSES, CORROSION), MICROSTRUCTURE, ELECTRON DIFFRACTION ANALYSIS, X-RAY DIFFRACTION ANALYSIS, FRACTURE(MECHANICS), HEAT TREATMENT, QUENCHING(COOLING), METALLOGRAPHY (U)
IDENTIFIERS: STRESS CORROSION, STEEL 4340 (U)

THE INVESTIGATION OF STRUCTURAL CHARACTERISTICS OF AISI 4340 STEEL QUENCHED AND TEMPERED TO PRODUCE THREE STRENGTH LEVELS HAS BEEN INITIATED AS A BASIS FOR THE PLANNED STUDIES OF THESE MATERIALS UNDER CONDITIONS OF STRESSCORROSION ATTACK. DUE TO PROBLEMS IN CONTRACT NEGOTIATION, THIS PROGRAM WAS DELAYED IN STARTING. HOWEVER, THE EXPERIMENTAL WORK, PLUS A LITERATURE STUDY, HAS BEEN INITIATED. PRELIMINARY ELECTRON METALLOGRAPHIC STUDIES OF THE STEEL HAVE BEEN CARRIED OUT IN THE PROCESS OF DEVELOPING TECHNIQUES. ELECTRON DIFFRACTION AND X-RAY DIFFRACTION RESULTS ARE BEING CORRELATED WITH THE MICROSTRUCTURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-618 484
PICATINNY ARSENAL DOVER N J ARMY EXPLOSIVE ORDNANCE DISPOSAL CENTER

FEASIBILITY STUDY ON EOD APPLICATIONS FOR LIQUID NITROGEN. (U)

DESCRIPTIVE NOTE: TECHNICAL MEMO.,
JUN 65 40P VENNELL,ROBERT R. !
REPT. NO. TM-1667
PROJ: 1W523801A583 ,404C

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*FUZES(ORDINANCE), QUENCHING(INHIBITION)), (*AMMUNITION COMPONENTS, DISPOSAL), (*NITROGEN, LIQUEFIED GASES), (*DETONATORS, QUENCHING(INHIBITION)), QUENCHING(COOLING), FAILURE(MECHANICS), EFFECTIVENESS, CRYOGENICS, DEGRADATION (U)
IDENTIFIERS: DEACTIVATION (U)

A TEST PROGRAM WAS CONDUCTED TO DEVELOP A NEW MEANS OF INACTIVATION OF MUNITION COMPONENTS BY MEANS OF COOLING TO CRYOGENIC TEMPERATURES. THE COOLING MEDIUM USED WAS LIQUID NITROGEN AT A TEMPERATURE OF -320F. THREE FUZE ASSEMBLIES: THE M562, THE M524, THE M509 AND THEIR ELEMENTS WERE TESTED. WHILE SOME SUCCESS WAS ACHIEVED WITH THE MECHANICAL ELEMENTS OF TIMING FUZES (M562 AND M524), WHERE ALMOST 90% WERE RENDERED IMMOBILIZED, LIQUID NITROGEN HAD LITTLE EFFECT ON DETONATOR SENSITIVITY, PIEZO ELECTRIC CRYSTALS, AND CARBON BRIDGE TYPE ELECTRIC DETONATORS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-619 399
TITANIUM METALS CORP OF AMERICA NEW YORK

DEVELOPMENT OF A STABLE-BETA TITANIUM ALLOY. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 9, 1 JUL-30 SEP 64,
SEP 64 41P HUNTER,D. B. ;
CONTRACT: DA30 069ORD3743
PROJ: 5933 2008
MONITOR: WAL , TR-405/2-8

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-612 477.

DESCRIPTORS: (*TITANIUM ALLOYS, DISPERSION HARDENING), (*DISPERSION HARDENING, TITANIUM ALLOYS), VANADIUM ALLOYS, CHRONIUM ALLOYS, ALUMINUM ALLOYS, SILICON ALLOYS, GERMANIUM ALLOYS, IRON ALLOYS, COBALT ALLOYS, MOLYBDENUM ALLOYS, MANGANESE ALLOYS, HEAT TREATMENT, QUENCHING(COOLING), AGING(MATERIALS), TENSILE PROPERTIES, CREEP, HARDNESS, WELDS, OXIDATION, CORROSION, STRESSES (U)
IDENTIFIERS: TITANIUM ALLOY 3AL 10CR 1SI 17V, TITANIUM ALLOY 3AL 10CR 2GE 17V, TITANIUM ALLOY 3AL 2CO 2FE 17V, TITANIUM ALLOY 3AL 2FE 8MO 8V, TITANIUM ALLOY 3AL 4FE 17V (U)

AN X-RAY EXAMINATION OF TI-17V-10CR-3AL-1SI REVEALED THE PRESENCE OF ALPHA AND TI5SI3 LINES IN A SAMPLE QUENCHED FROM 2050F AND AGED AT 1250F. NO HARDENING RESPONSE UPON AGING AT 1250F WAS FOUND IN TI-17V-10CR-3AL-2GE. ROOM TEMPERATURE TENSILE TESTS UPON AGEABLE BETA ALLOY TI-17V-2FE-2CO-3AL INDICATED THAT A YIELD STRENGTH OF 180,000 PSI WAS REACHED AFTER AGING FOR 8 HOURS AT 900F! AGING FOR 24 HOURS AT 800-900F PRODUCED YIELD STRENGTHS EXCEEDING 200,000 PSI. CREEP TESTS ON TI-8MO-8V-2FE3AL SHOWED THAT, WHEN AGED AT 900F FOR 8 HOURS, AFTER 500 HOURS EXPOSURE AT 600F, UNDER A LOAD OF 128,000 PSI, DEFORMATIONS DID NOT EXCEED 0.43%. TI-17V-4FE-3AL, EXPOSED UNDER SIMILAR CONDITIONS, SHOWED CREEP DEFORMATIONS OF 2%. OXIDATION AND STRESS CORROSION TESTS ON THE ABOVE ALLOYS INDICATED THAT TI-8MO-8V-2FE-3AL WAS THE SUPERIOR ALLOY. WELDABILITY TESTS ON AGEABLE BETA ALLOYS SUGGESTED THEIR PERFORMANCE WAS SIMILAR TO THE COMMERICAL ALLOY TI-13V-11CR-3AL, WHEREAS THE TWO STABLE-BETA ALLOYS TI-17V-10MN-3AL . (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-623 019
WATERVLIET ARSENAL N Y BENET LABS

THE HEATING OF METALS IN AN ELECTROLYTE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
SEP 65 28P FRANKEL,HERBERT ;
REPT. NO. WVT-6528
PROJ: DA M1 3 23041 01M7M7

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*HEAT TREATMENT; METALS),
(*ELECTROLYTES, HEATING), QUENCHING(COOLING),
STEEL, HARDENING, ELECTRIC ARCS,
TANKS(CONTAINERS) (U)

STEEL CAN BE HEAT TREATED ELECTRICALLY WHILE SUBMERGED IN AN ELECTROLYTE. THE ADVANTAGES OF THIS PROCESS ARE: (1) RAPID HEATING, (2) PREVENTION OF SCALE BY THE AUTOMATIC GENERATION OF HYDROGEN WHICH SURROUNDS THE WORK, (3) AUTOMATIC QUENCH IN THE SAME TANK WHEN THE CURRENT IS INTERRUPTED. ON SMALL SAMPLES, HEATING RATES AS HIGH AS 350F PER SECOND AND AS LOW AS 6.6F PER SECOND HAVE BEEN ACHIEVED WITH THE LIKLIHOOD OF BEING ABLE TO INCREASE SUBSTANTIALLY THE RATE WITH HIGHER VOLTAGE. IN A 10% SOLUTION OF SODIUM CARBONATE, WHICH IS INEXPENSIVE AND CAN BE USED INDEFINITELY, CURRENT DENSITIES OF 21 TO 27 AMPERES PER SQUARE INCH AT 200 VOLTS WERE RECORDED DURING HEATING. DISADVANTAGES OF THE PROCESS INCLUDE: (1) A LARGE D. C. GENERATOR IS REQUIRED FOR MODERATELY LARGE PIECES, (2) THE PROCESS IS LESS THAN 12% EFFICIENT, (3) PROTECTED THERMOCOUPLES MUST BE ATTACHED TO THE WORK, (4) ALTHOUGH NOT REQUIRED FOR SMALL SAMPLES, AN EXHAUST SYSTEM WOULD BE REQUIRED TO REMOVE THE LIBERATED HYDROGEN WHEN HEATING LARGE PIECES, (5) TEMPERATURES INDUCED ARE NOT UNIFORM THROUGHOUT THE SPECIMEN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-625 475 11/6 18/8 18/10
COMISION NACIONAL DE ENERGIA ATOMICA BUENOS AIRES (ARGENTINA) DEPARTAMENTO DE METALURGIA

POINT DEFECTS AND MECHANICAL PROPERTIES OF COLUMBIUM. (U)

DESCRIPTIVE NOTE: FINAL REPT. 15 FEB 62-30 NOV 65, NOV 65 39P COLL,JORGE A. ;DI PRIMIO, JUAN C. ;BISOGNI,EDGARDO ;
CONTRACT: DA-ARO-49-092-63-G20 ,DA-ARO-49-092-64-G44
PROJ: DA-2001450183 2D-00-003-LA

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NIOBIUM, RADIATION DAMAGE), (*RADIATION DAMAGE, NIOBIUM), ARGENTINA, HIGH-TEMPERATURE RESEARCH, REACTOR MATERIALS, HARDNESS, QUENCHING(COOLING), IMPURITIES, CRYSTAL LATTICE DEFECTS, DEFORMATION, RESISTANCE(ELECTRICAL), MECHANICAL PROPERTIES, EXPERIMENTAL DATA (U)

THE RESULTS OF TWO AND A HALF YEARS OF EXPERIMENTAL WORK ARE PRESENTED IN THE FORM OF CONCLUSIONS, FIVE TABLES AND NINE GRAPHS. ALSO INCLUDED ARE PHOTOGRAPHS AND DIAGRAMS OF THE EXPERIMENTAL SET UP. RESULTS OF R VS T FOR CB SHOW AGREEMENT WITH OTHERS UP TO 1000C RESULTS CAN BE EXPRESSED BY RSUBT = R (0C) (1 - AT - BT SQUARED) WHICH DIFFERS FROM LINEAR RELATIONSHIP OBTAINED ELSEWHERE. BECAUSE OF QUENCHING SOME KIND OF DEFECTS CAN BE RETAINED IN CB CONTAINING CERTAIN AMOUNT OF INTERSTITIAL IMPURITIES. A MINIMUM DOSE OF 1.10 TO THE 17TH POWER NEUTRONS/SQ CM IS NECESSARY TO PRODUCE A MEASURABLE INCREASE IN THE HARDNESS OF POLYCRYSTALLINE CB. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-625 591 20/9 7/2
RESEARCH INST TEMPLE UNIV PHILADELPHIA PA

PLASMA JET CHEMISTRY. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
DEC 64 37P STOKES,C. S. ;CAHILL,J. A. ;
CORREA,J. J. ;GROSSE,A. V. ;
CONTRACT: AF-AFOSR-62-196
PROJ: AF-9750
TASK: 975001
MONITOR: AFOSR , 65-1802

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PLASMA JETS, SYNTHESIS(CHEMISTRY)), (*SYNTHESIS(CHEMISTRY), PLASMA JETS), HELIUM GROUP GASES, CATHODES, POWDERS, NITROGEN, TUNGSTEN, ANODES, HELIUM, ARGON, RELEASE MECHANISMS, METALS, CHEMICAL COMPOUNDS, OXIDES, REDUCTION(CHEMISTRY), REFRACTORY METALS, NITRIDES, CARBIDES, RINGS, QUENCHING(COOLING), HIGH-TEMPERATURE RESEARCH (U)

THREE TYPES OF PLASMA JETS ARE DESCRIBED: A NOBLE GASES PLASMA JET, A NITROGEN PLASMA JET, AND A PLASMA JET CATHODE AS CHEMICAL FEEDER. POWDER FEEDING DEVICES AND QUENCHING DEVICES ARE CONSIDERED. THE USE OF THE PLASMA JET IS DESCRIBED FOR SEVERAL CHEMICAL REACTIONS: METAL OXIDES REDUCTION, REFRACTORY METALS NITRIDES FORMATION, AND REFRACTORY METALS CARBIDES FORMATION. THE TEMPERATURES ATTAINABLE WITH PLASMA JETS ARE IN THE RANGE OF 5000K TO 50,000K. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-628 979 13/8 11/6
DAVID TAYLOR MODEL BASIN WASHINGTON D C STRUCTURAL MECHANICS LAB

EFFECTS OF TEMPERING ABOVE THE LOWER CRITICAL TEMPERATURE A SUB C1 ON THE PROPERTIES OF AN HY-80 STEEL. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 6,
JAN 66 29P WILLNER,ABNER R. ;SALIVE, MARCEL L. ;
REPT. NO. DTMB-2140
PROJ: S-R001-01-01,
TASK: 0401,

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, TEMPERING), MECHANICAL PROPERTIES, TEMPERATURES, MICROSTRUCTURE, NOTCH TOUGHNESS, METAL PLATES, TRANSITION TEMPERATURE, QUENCHING(COOLING), TENSILE PROPERTIES, WELDS, FRACTURE(MECHANICS), METALLOGRAPHY, TRANSFORMATIONS (U)
IDENTIFIERS: STEEL HY-80 (U)

THE EFFECTS OF TEMPERING ABOVE THE CRITICAL TRANSFORMATION TEMPERATURE ON THE MICROSTRUCTURE, NOTCH-TOUGHNESS AND MECHANICAL PROPERTIES OF HY-80 STEEL WAS INVESTIGATED. THE FORMATION OF ALPHA FERRITE AND PRIME MARTENSITE AFTER TEMPERING ABOVE THE LOWER CRITICAL TEMPERATURE AND QUENCHING WILL RESULT IN MECHANICAL PROPERTIES THAT FALL BELOW THE REQUIREMENTS OF THE HY-80 SPECIFICATION. RETEMPERING TO ACHIEVE MINIMUM YIELD STRENGTHS MAY RESULT IN NONUNIFORM YIELD STRENGTH DISTRIBUTION. THE POSSIBILITY OF UNDERBEAD CRACKING DUE TO ALLOY SEGREGATION IS ALSO DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-634 220 11/6
ALBERTA UNIV EDMONTON

TRANSFORMATIONS IN FE-CR ALLOYS, (U)

JUN 65 4P WALLBRIDGE, J. N. ;PARR,J. GORDON ;

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN JOURNAL OF THE IRON AND STEEL INSTITUTE, V204 P119-21 FEB 1966.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH THE UNIVERSITY OF WINDSOR, ONTARIO.

DESCRIPTORS: (*IRON ALLOYS, *CHROMIUM ALLOYS), (*TRANSFORMATIONS, IRON ALLOYS), CANADA, CHROMIUM ALLOYS, MARTENSITE, TRANSITION TEMPERATURE, QUENCHING(COOLING), SURFACE PROPERTIES, DEFORMATION (U)

COOLING CURVES FOR FE-CR ALLOYS (0.5 TO 10 AT-% CR) AT RATES TO 114000 DEGC/S HAVE BEEN OBTAINED. ALLOYS CONTAINING 0.5-2 AT-% CR SHOWED NO SURFACE RUMPLING; IN THE OTHER ALLOYS BOTH MASSIVE AND MARTENSITIC TRANSFORMATION (ACCORDING TO THE CONVENTIONAL CRITERION) WERE OBSERVED. THE WORK SHOWS THE UNRELIABILITY OF THE SURFACE RUMPLING CRITERION AS AN INDICATION OF MARTENSITIC TRANSFORMATION; AND THERE APPEARS TO BE A PARALLEL BEHAVIOUR BETWEEN THE BINARY ALLOYS OF FE-MN AND FE-CR. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-634 960 14/2
NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF APPLIED PHYSICS

PLATINUM RESISTANCE THERMOMETRY IN THE RANGE 630-900C. (U)

DEC 65 12P BERRY, R. J. ;
MONITOR: NRC 8973

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN METROLOGIA V2 P92-3 APR 1966.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*RESISTANCE THERMOMETERS, PLATINUM), CANADA, RESISTANCE(ELECTRICAL), ELECTRIC INSULATION, LEAKAGE(ELECTRICAL), STABILITY, HIGH-TEMPERATURE RESEARCH, QUENCHING(COOLING), PERFORMANCE(ENGINEERING) (U)

THE PERFORMANCE OF COMMERCIALLY PRODUCED, STANDARD PLATINUM RESISTANCE THERMOMETERS HAS BEEN INVESTIGATED IN THE REGION 630 - 900C. PARTICULAR ATTENTION WAS PAID TO RESISTANCE STABILITY, QUENCHING EFFECTS, AND ELECTRICAL INSULATION LEAKAGE. THE LIMIT OF 900C WAS DICTATED BY THE USE OF MICA INSULATION IN THESE INSTRUMENTS. THE MOST SERIOUS PROBLEM ENCOUNTERED WAS THAT OF INSULATION LEAKAGE AT BOTH HIGH AND LOW TEMPERATURES. THE LOW TEMPERATURE LEAKAGE WAS DUE TO WATER THAT HAD BEEN RELEASED FROM MICA INSULATION WHEN THE THERMOMETERS WERE USED AT HIGH TEMPERATURES, AND THIS PROBLEM IS STUDIED IN SOME DETAIL HERE. A RELATIONSHIP BETWEEN THE MAGNITUDE OF THE GALVANOMETER 'WET KICK' AND THE INSULATION RESISTANCE HAS BEEN ESTABLISHED. THE USEFUL LIFETIME OF THE DRY AIR FILLING IN A THERMOMETER HAS BEEN ESTIMATED FOR VARIOUS CONDITIONS OF USE. BASED ON THESE STUDIES, PROCEDURES HAVE BEEN RECOMMENDED FOR STABILIZING PLATINUM RESISTANCE THERMOMETERS, ANNEALING-OUT QUENCHING EFFECTS, AND REDUCING INSULATION LEAKAGE OVER THIS TEMPERATURE RANGE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-635 697 11/6 20/12
WAYNE STATE UNIV DETROIT MICH DEPT OF METALLURGICAL ENGINEERING

THE NI3AL ORDERING SYSTEM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.
JUN 66 30P COREY,CLARK L. ;LISOWSKY, BEGDAN ;
REPT. NO. TR-1,
CONTRACT: NONR-4520(00),
PROJ: NR-031-703,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NICKEL ALLOYS, PHASE STUDIES), (*ALUMINUM ALLOYS, PHASE STUDIES), RESISTANCE(ELECTRICAL), X-RAY SPECTRUM, MICROSTRUCTURE, GRAIN STRUCTURES(METALLURGY), CRYSTAL LATTICES, QUENCHING(COOLING) (U)
IDENTIFIERS: ORDER-DISORDER THEORY (U)

ELECTRICAL RESISTIVITY, X-RAY LINE POSITIONS, DEGREE OF ORDER, AND MICROSTRUCTURES HAVE BEEN INVESTIGATED FOR NI-AL ALLOYS NEAR THE NI3AL COMPOSITION. THE RESULTS INDICATE THAT NI3AL UNDERGOES DISORDERING BETWEEN 1250C AND THE M.P., ALSO SUPERSATURATED GAMMA, PRODUCED IN GAMMA + GAMMA' ALLOYS BY GAS-QUENCHING, IS EXTENSIVELY ORDERED PRIOR TO GAMMA' (NI3AL) PHASE SEPARATION. THE LATTER REACTION, IF NOT BOTH, MUST FOLLOW THE COOPERATIVE PHENOMENA MODEL. SHIFTS IN LINE POSITION AS A FUNCTION OF QUENCH-INDUCED SUPERSATURATION ARE SHOWN. LATTICE PARAMETERS OF EQUILIBRIUM AND NON-EQUILIBRIUM PHASES ARE GIVEN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-639 056 11/6 20/2 13/8
PENNSYLVANIA UNIV PHILADELPHIA SCHOOL OF METALLURGICAL ENGINEERING

AN ELECTRON MICROSCOPE STUDY OF QUENCHED GOLD-PALLADIUM ALLOYS. I. A STUDY OF THE ELECTRICAL RESISTIVITY CHANGES PRODUCED BY QUENCHING AU PD ALLOYS. II. THE EFFECT OF QUENCHED-IN VACANCIES ON THE MECHANICAL PROPERTIES OF GOLD-PALLADIUM ALLOYS. III. (U)

DESCRIPTIVE NOTE: ANNUAL SUMMARY REPT, 1 OCT 65-30 SEP 66.
SEP 66 3P
CONTRACT: NONR-551(55),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GOLD ALLOYS, *CRYSTAL LATTICE DEFECTS), PALLADIUM ALLOYS, FOILS, ELECTRON MICROSCOPY, RESISTANCE(ELECTRICAL), MECHANICAL PROPERTIES, QUENCHING(COOLING), SINGLE CRYSTALS, WIRE (U)

A STUDY WAS MADE OF POINT DEFECTS IN BINARY ALLOYS. THERE ARE THREE PHASES OF THE RESEARCH, THE FIRST CONCERNED WITH ELECTRON MICROSCOPY OF GOLD-PALLADIUM FOILS, THE SECOND WITH ELECTRICAL RESISTIVITY CHANGES PRODUCED BY QUENCHING IN SIMILAR COMPOSITION ALLOYS, AND THE LAST CONCERNED WITH THE EFFECT OF QUENCHING ON MECHANICAL PROPERTIES OF THESE ALLOYS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-639 092 20/13
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF METALLURGY

COOLING RATES IN SPLAT COOLING. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.
SEP 66 32P RUHL,ROBERT C. ;
REPT. NO. TR-12,
CONTRACT: NONR-1841(38),
PROJ: DSR-7618,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COOLING, LIQUID METALS), (*THERMAL CONDUCTIVITY, COOLING), LIQUIDS, QUENCHING(COOLING), EXPERIMENTAL DATA (U)
IDENTIFIERS: SPLAT COOLING (U)

CALCULATIONS AND EXPERIMENTAL OBSERVATIONS MADE ON COOLING RATES DURING SPLAT QUENCHING ARE PRESENTED. THREE POSSIBLE TYPES OF COOLING BEHAVIOR ARE DISCUSSED: IDEAL COOLING, INTERMEDIATE COOLING, AND NEWTONIAN COOLING. THE EFFECTS OF SPLATTING-PROCESS VARIABLES ON THE COOLING RATES ARE DESCRIBED, THE MOST IMPORTANT OF THESE VARIABLES BEING SPLAT THICKNESS AND THE QUALITY OF THE THERMAL CONTACT BETWEEN THE SPLAT AND SUBSTRATE. SPLAT-COOLING RATES RANGE TYPICALLY FROM 10,000 TO ABOVE 10 TO THE 10TH POWER C/SEC., DEPENDING ON THE ACTUAL CONDITIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-641 786 11/6 20/12
ILLINOIS UNIV URBANA

AN INTERNAL FRICTION STUDY OF VACANCIES IN A QUENCHED AU-NI SOLID SOLUTION. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
MAY 65 6P COST,J. R. ;
CONTRACT: AF-AFOSR-633-64
PROJ: AF-9763
TASK: 976301
MONITOR: AFOSR 66-1601

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN ACTA METALLURGICA V13 P1263-7 DEC 1965.
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED 8 MAR 65.

DESCRIPTORS: (*GOLD ALLOYS, INTERNAL FRICTION), (*NICKEL ALLOYS, INTERNAL FRICTION), (*INTERNAL FRICTION, RELAXATION TIME), ANNEALING, QUENCHING(COOLING), THERMODYNAMICS, CRYSTAL SUBSTRUCTURE, SOLID SOLUTIONS (U)
IDENTIFIERS: ZENER RELAXATION (U)

CHANGES IN THE VACANCY CONCENTRATION IN A QUENCHED AU-30 AT.% NI ALLOY ARE FOLLOWED USING ISOTHERMAL INTERNAL FRICTION MEASUREMENTS OF THE ZENER RELAXATION RATE. ANALYSIS OF THE VACANCY ANNEALING YIELDS A VALUE OF APPROXIMATELY 21 KCAL/MOLE FOR THE ENERGY FOR VACANCY MOTION. FROM THIS ENERGY OF MOTION, TYPICAL RATES OF SHIFTING OF THE ZENER PEAK TEMPERATURE ARE OBTAINED. THIS PEAK SHIFT IS USED TO INTERPRET A PREVIOUSLY UNEXPLAINED INTERNAL FRICTION PEAK OBSERVED IN THIS ALLOY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-643 302 13/8 7/4
NORTHWESTERN UNIV EVANSTON ILL DEPT OF MATERIALS SCIENCE

SPINODAL DECOMPOSITION DURING CONTINUOUS COOLING. (U)

NOV 65 12P HUSTON,E. L. ;CAHN,JOHN W. ;
HILLIARD,J. E. ;
CONTRACT: DA-31-124-ARO(D)-233
MONITOR: AROD 4975:3

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN ACTA METALLURGICA V14 P1053-62 SEP 1966.

DESCRIPTORS: (*SOLID SOLUTIONS, DECOMPOSITION), (*COOLING, *DECOMPOSITION), TRANSFORMATIONS, PHASE STUDIES, QUENCHING(COOLING), THEORY (U)

SPINODAL DECOMPOSITION OF A BINARY SOLID SOLUTION DURING CONTINUOUS COOLING SHOULD LEAD TO A STRUCTURE THAT IS SIMILAR TO THAT RESULTING FROM ISOTHERMAL DECOMPOSITION, CONSISTING OF A SUPERIMPOSITION OF SINUSOIDALLY VARYING COMPOSITION MODULATIONS CLUSTERED ABOUT A WAVELENGTH LAMBDA SUB MAX THAT HAS RECEIVED MAXIMUM AMPLIFICATION. FOR QUENCH RATES WHICH ARE FAST ENOUGH TO PRECLUDE COMPLETE DECOMPOSITION, THE PROFILE OF THE COMPOSITION-AMPLITUDE SPECTRUM IS INDEPENDENT OF QUENCH RATE AND THE LOGARITHM OF THE AMPLITUDE IS INVERSELY PROPORTIONAL TO THE QUENCH RATE. WITH SLOWER QUENCH RATES IN WHICH COMPLETE DECOMPOSITION OCCURS LAMBDA SUB MAX INCREASES AS THE -(1/6) POWER OF THE QUENCH RATE. THE LIMITING COOLING RATE REQUIRED TO SUPPRESS DECOMPOSITION, AS WELL AS THE COMPOSITION DEPENDENCE OF LAMBDA SUB MAX, ARE ALSO OBTAINED. THESE RESULTS HAVE BEEN SUMMARIZED AS ISOTHERMAL-TRANSFORMATION AND CONTINUOUS-COOLING-TRANSFORMATION DIAGRAMS FOR SPINODAL DECOMPOSITION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-643 452 20/2
PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS RESEARCH LAB

EXPERIMENTAL CONFIRMATION OF MAJOR CHANGE OF DEFECT TYPE WITH TEMPERATURE AND COMPOSITION IN IONIC SOLIDS. (U)

MAR 66 4P DINESS,A. M. (ROY,RUSTUM)
CONTRACT: AF-AFOSR-208-63
PROJ: AF-9761
TASK: 976102
MONITOR: AFOSR 66-2150

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN SOLID STATE COMMUNICATIONS V3 P123-5 1965.

DESCRIPTORS: (*CRYSTAL LATTICE DEFECTS, CERAMIC MATERIALS), ZIRCONIUM COMPOUNDS, OXIDES, CALCIUM COMPOUNDS, DOPING, QUENCHING(COOLING), HIGH-TEMPERATURE RESEARCH, DENSITY (U)

THE CHANGE OF PREDOMINANT POINT DEFECT-TYPE FROM INTERSTITIAL CATIONS TO ANION VACANCIES IS PRESENTED AS A FUNCTION OF TEMPERATURE AND CONCENTRATION FOR THE FLUORITE-TYPE CRYSTALLINE SOLUTION FIELD IN THE SYSTEM ZRO2-CAO. THE CHARACTERIZATION OF THE POINT DEFECT CONTENT OF THESE MATERIALS IS BASED UPON EXPERIMENTAL DETERMINATIONS OF DENSITIES AND PRECISION X-RAY LATTICE PARAMETERS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-646 104 11/6 7/4
NORTH CAROLINA STATE UNIV RALEIGH DEPT OF ENGINEERING RESEARCH

DIE KOBALTECKE IM DREISTOFFSYSTEM KOBALT--MOLYBDAN--BOR, (COBALT IN THE TERNARY SYSTEM COBALT - MOLYBDENUM-BORON), (U)

AUG 66 8P STADELMAIER,H. H. (DAVIS,H. H.)

CONTRACT: DA-31-124-ARO(D)-277
PROJ: DA-200145-01B32D
MONITOR: AROD 5010:10

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN MONATSHEFTE FUR CHEMIE V97 N5 P149-4 1966.
SUPPLEMENTARY NOTE: TEXT IN GERMAN.

DESCRIPTORS: (*COBALT ALLOYS, PHASE STUDIES), (*MOLYBDENUM ALLOYS, PHASE STUDIES), (*BORON ALLOYS, PHASE STUDIES), QUENCHING(COOLING), CRYSTAL STRUCTURE (U)

THE EQUILIBRIA IN THE TERNARY SYSTEM COBALT--MOLYBDENUM--BORON WERE INVESTIGATED IN THE REGION AROUND TAU (CR23C6 STRUCTURE) AND COMOB (UNKNOWN STRUCTURE). IN ALLOYS QUENCHED FROM 800C THE COMPOSITION OF TAU IS FOUND AT CO21.7MO1.3B6. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-646 455 11/6 20/2
PENNSYLVANIA UNIV PHILADELPHIA SCHOOL OF METALLURGICAL ENGINEERING

ELECTRON MICROSCOPE OBSERVATIONS OF QUENCHED AND AGED GOLD AND GOLD-PALLADIUM ALLOYS, (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JAN 67 94P COOK,ROGER H. ;MADDIN, ROBERT ;
REPT. NO. TR-1
CONTRACT: NONR-551(55)
PROJ: NR-031-528

UNCLASSIFIED REPORT

DESCRIPTORS: (*GOLD ALLOYS, CRYSTAL LATTICE DEFECTS), (*CRYSTAL LATTICE DEFECTS, PALLADIUM ALLOYS), QUENCHING(COOLING), AGING(MATERIALS), ELECTRON MICROSCOPY, CRYSTALLOGRAPHY, MELTING POINT, CRYSTAL STRUCTURE, FOILS, CRYSTAL LATTICES (U)

A REVIEW OF PAST WORK ON THE BEHAVIOR OF VACANCIES IN QUENCHED METALS IS PRESENTED, WITH EMPHASIS UPON GOLD AND TRANSMISSION ELECTRON MICROSCOPY DATA. RESULTS ARE PRESENTED ON AU, AU-5 AT% PD, AND AU-10 AT% PD FOILS QUENCHED FROM 0.875 TM (TM = ABSOLUTE MELTING TEMPERATURE) AND EXAMINED IN AN ELECTRON MICROSCOPE. IT IS FOUND THAT INCREASING PALLADIUM CONTENT CAUSES AN INCREASE IN THE NUMBER OF FAULTED DISLOCATION LOOPS IN THE QUENCHED AND AGED MATERIAL AND IN THE CONCENTRATION OF VACANCIES ANNIHILATED AT SUCH LOOPS. HOWEVER STACKING FAULT TETRAHEDRA REPRESENT THE MOST IMPORTANT SINKS IN ALL CASES. SOME REASONS FOR THE INCREASED IMPORTANCE OF DISLOCATION LOOPS AS VACANCY SINKS IN THE ALLOYS ARE DISCUSSED. CHANGES IN STACKING FAULT ENERGY DUE TO ALLOYING ARE NOT THOUGHT SIGNIFICANT IN PRODUCING THIS EFFECT. POSSIBLE ROLES OF NUCLEUS CONFIGURATIONS ARE DISCUSSED AND A MODEL IS PRESENTED IN WHICH TETRAHEDRA BECOME LESS EFFECTIVE AS SINKS AS THEIR GROWTH PROCEEDS, OWING TO CHANGES IN SOLUTE CONCENTRATION NEAR THEM. HOWEVER THE EFFECTIVENESS OF LOOPS AS SINKS IS NOT EXPECTED TO CHANGE SIGNIFICANTLY DURING AGEING WITH THE RESULT THAT DISLOCATION LOOPS CAN BECOME THE MAIN SINKS IN THE LATER STAGES OF AGEING. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-649 313 13/8 13/4
EDGEWOOD ARSENAL MD

VACUUM (OR FLUXLESS) BRAZING-GAS QUENCHING OF 6061 ALUMINUM ALLOY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAR 67 41P GURTNER,FRANCIS B. ;SHUTT, PAUL K. , JR.;SCHWARTZ,MELVIN M. ;
REPT. NO. EA-TR-4085

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *CONTAINERS), (*BRAZING, ALUMINUM ALLOYS), (*QUENCHING(COOLING), ALUMINUM ALLOYS), VACUUM APPARATUS, HELIUM, ARGON, COMPATIBILITY (U)
IDENTIFIERS: ALUMINUM ALLOY 6061 (U)

AN INVESTIGATION WAS MADE TO PROVIDE A PROCESS OR METHOD FOR PRODUCING HELIUM LEAK-TIGHT CONTAINERS UNDER CONTROLLED PROCESSING AND THEREFORE WITH A HIGH LEVEL OF COMPATIBILITY. THE CONCEPT EVOLVED AROUND COMBINING VACUUM BRAZING AND GAS QUENCHING INTO ONE OPERATION. THE PARTS WERE QUENCHED IN THE FURNACE AFTER BRAZING OR SOLUTION TREATING. THE ADVANCE INTO THE FIELD OF VACUUM BRAZING-GAS QUENCHING HAS PROVIDED A DEFINITE ADVANCE IN THE FIELD OF MANUFACTURING FOR HIGH OR LOW VOLUMES OF ITEMS. AS A RESULT OF THE INVESTIGATION, THE FOLLOWING CONCLUSIONS WERE DRAWN: (1) VACUUM BRAZING-GAS QUENCHING IS FEASIBLE FOR PRODUCTION QUANTITIES OF COMPLEX AND SIMPLE ITEMS. (2) THE APPLICATION OF SUCH A PROCESS IS NOT LIMITED TO 6061 ALUMINUM, BUT CAN BE EXTENDED TO FERROUS AND NONFERROUS ALLOYS. (3) THE FUTURE FOR A PROCESS SUCH AS VACUUM BRAZING-GAS QUENCHING IS UNLIMITED AT THE PRESENT TIME. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-652 100 13/8
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

THE ROLE OF IMPERFECTION CHEMISTRY IN THE CHARACTERIZATION OF MATERIALS. (U)

DEC 66 17P KROGER,F. A. ;
CONTRACT: AF-AFOSR-986-66
PROJ: AF-9710
TASK: 971003
MONITOR: AFOSR 67-1091

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN MATERIALS RESEARCH BULLETIN V2 P203-16 1967.
SUPPLEMENTARY NOTE: PRESENTED AT THE INTERNATIONAL CONFERENCE ON THE CHARACTERIZATION OF MATERIALS, UNIVERSITY PARK, PENNSYLVANIA, NOV 16-18, 1966.

DESCRIPTORS: (*DEFECTS(MATERIALS), CHEMICAL ANALYSIS), (*CRYSTAL STRUCTURE, PHASE STUDIES), CADMIUM, TELLURIUM, THERMODYNAMICS, CHEMICAL PRECIPITATION, QUENCHING(COOLING), DOPING (U)

FOR A COMPLETE CHARACTERIZATION OF A CRYSTALLINE MATERIAL IT IS NECESSARY TO SUPPLEMENT THE CLASSIC CHARACTERIZATION DATA SUCH AS THE CHEMICAL COMPOSITION, THE CRYSTAL STRUCTURE AND THE GROSS THERMODYNAMIC PARAMETERS BY INFORMATION CONCERNING THE TYPES OF NATIVE AND FOREIGN DEFECTS AND THE THERMODYNAMIC PARAMETERS REGULATING THEIR FORMATION. FOR QUENCHED CRYSTALS, DATA REFERRING TO THE METHOD OF PREPARATION AND QUENCHING, AND THE PARAMETERS OF POSSIBLE PRECIPITATION PROCESSES INVOLVING BOTH THE PHASE DIAGRAM AND KINETIC DATA, ARE REQUIRED IN ADDITION. THE SITUATION IN PURE AND DOPED CDTE IS DISCUSSED AS AN EXAMPLE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-652 132 20/3 11/6
MASSACHUSETTS INST OF TECH CAMBRIDGE NATIONAL MAGNET LAB

MAGNETIC PROPERTIES OF SUPERCONDUCTING MO-RE ALLOYS. (U)

DESCRIPTIVE NOTE: REVISED ED.,
SEP 66 7P LERNER,E. ;DAUNT,J. G. ;
MAXWELL,E. ;
CONTRACT: AF 49(638)-1468
PROJ: AF-9764
MONITOR: AFOSR 67-1010

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN THE PHYSICAL REVIEW V153 N2 P487-92 JAN 10 1967.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH OHIO STATE UNIV., COLUMBUS. REVISION OF MANUSCRIPT SUBMITTED 25 MAR 66.

DESCRIPTORS: (*MOLYBDENUM ALLOYS, *RHENIUM ALLOYS), (*SUPERCONDUCTIVITY, *MAGNETIC PROPERTIES), WIRE, ANNEALING, PHASE STUDIES, MAGNETIC FIELDS, TRANSITION TEMPERATURE, RESISTANCE(ELECTRICAL), SUPERCONDUCTORS, MAGNETIC MOMENTS, THERMAL CONDUCTIVITY, QUENCHING(COOLING) (U)

THIS PAPER GIVES DETAILS OF RESEARCH CARRIED OUT ON THE LOW-TEMPERATURE PROPERTIES OF MO-RE ALLOYS IN THE SUPERCONDUCTING STATE. MEASUREMENTS WERE MADE ON A 52-48% ALLOY OF MO-RE BOTH UNANNEALED AND ANNEALED, THE ALLOY BEING IN THE FORM OF FINE WIRES. MICROGRAPH STUDIES WERE MADE TO DETERMINE THE PERCENTAGE OF THE VARIOUS PHASES PRESENT IN EACH SPECIMEN. THE LOW-TEMPERATURE MEASUREMENTS COVERED OBSERVATIONS OF THE MAGNETIZATION AS A FUNCTION OF APPLIED MAGNETIC FIELD AT VARIOUS TEMPERATURES USING TWO DIFFERENT TECHNIQUES. THE MEASUREMENTS YIELDED THE CRITICAL MAGNETIC FIELDS HC1 AND HC2 AS A FUNCTION OF TEMPERATURE AND OF THE STATE OF ANNEAL, AS WELL AS OF THE TRANSITION TEMPERATURE TC. ESTIMATES WERE MADE OF HC(T) AND THE GINZBURG-LANDAU-ABRIKOSOV-GOR'KOV AND MAKI PARAMETERS KAPPA, KAPPA 1(T), AND KAPPA 3(T). COMPARISONS OF THE RESULTS ARE MADE WITH RESULTS OBTAINED PREVIOUSLY BY US FROM RESISTIVITY MEASUREMENTS ON THE SAME ALLOY AND BY OTHER AUTHORS ON SIMILAR SUPERCONDUCTING ALLOYS; THE COMPARISONS SHOW CONSISTENCY IN THE DATA. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-652 399 11/2
LINDEN LABS INC STATE COLLEGE PA

CHEMICAL STRENGTHENING OF CERAMIC MATERIALS. (U)

DESCRIPTIVE NOTE: SUMMARY REPT., 7 APR 66-6 APR 67, APR 67 156P KIRCHNER,HENRY P. (GRUVER, ROBERT M. (PLATTS,DENNIS R. (WALKER,RALPH E. (
CONTRACT: NOW-66-0441

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-634 361.

DESCRIPTORS: (*CERAMIC MATERIALS, MECHANICAL PROPERTIES), ALUMINA, SPINELS, MAGNESIUM OXIDES, SILICON DIOXIDE, TITANIUM COMPOUNDS, NICKEL COMPOUNDS, OXIDES, MINERALS, FAILURE(MECHANICS), INHIBITION, COMPRESSIVE PROPERTIES, FLEXURAL STRENGTH, THERMAL SHOCK, ADDITIVES, HEAT TREATMENT, SURFACE PROPERTIES, CERAMIC COATINGS, QUENCHING(COOLING) (U)
IDENTIFIERS: CORDIERITE, FORSTERITE, NICKELOUS OXIDE, STEATITE, TITANIUM DIOXIDE (U)

AN INVESTIGATION OF THE EFFECT OF COMPRESSIVE SURFACE LAYERS ON THE STRENGTH OF POLYCRYSTALLINE CERAMIC BODIES IS DESCRIBED. LOW EXPANSION SURFACE LAYERS WERE FORMED ON CONVENTIONAL CERAMICS BY CHEMICAL REACTIONS AT HIGH TEMPERATURES. FAILURE, BY SHEARING OF THE SURFACE LAYERS, WAS PREVENTED BY ESTABLISHING GRADUAL VARIATIONS IN COMPOSITION WITHIN THE BODY. CHEMICAL STRENGTHENING WAS ATTEMPTED WITH ALUMINA, TITANIA, SPINEL, MAGNESIA, FORSTERITE, STEATITE, NICKEL OXIDE, SILICA AND CORDIERITE BODIES AND WAS ACHIEVED WITH SEVERAL OF THESE MATERIALS. GLAZING AND QUENCHING ALSO RESULTED IN IMPROVED FLEXURAL STRENGTH. COMBINED PROCESSES INVOLVING CHEMICAL STRENGTHENING, ATMOSPHERIC TREATMENTS, GLAZING AND QUENCHING WERE INVESTIGATED. IN SOME CASES STRENGTH INCREASES OF MORE THAN 90% WERE OBSERVED. THE THERMAL SHOCK RESISTANCE OF SOME OF THE SAMPLES WAS IMPROVED. ABRASION OF THE SURFACES OF SOME OF THE TREATED SAMPLES DID NOT RESULT IN LOSS OF STRENGTH. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-652 947 11/6
WINDSOR UNIV (ONTARIO)

TRANSFORMATIONS IN FE-CO ALLOYS, (U)

66 3P PARR,J. GORDON 1

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN JOURNAL OF THE IRON AND STEEL INSTITUTE V205 P426-7 APR 1967.

DESCRIPTORS: (*IRON ALLOYS, *TRANSFORMATIONS), (*COBALT ALLOYS, *TEMPERATURE), COOLING, ALLOYS, CARBON, RODS, MEASUREMENT, ACCURACY, NICKEL, MANGANESE, CHROMIUM, ANNEALING, THERMAL ANALYSIS, SAMPLING, THERMOCOUPLES, QUENCHING(COOLING), WELDING, TABLES (U)

VALUES OF MS IN FE-CO ALLOYS CONTAINING BETWEEN 0.1 AND 24% CO SHOW A MINIMUM OF (ABOUT) 600C AT 1%CO. EXTRAPOLATION OF MS VALUES FOR THE DILUTE ALLOYS SUGGESTS AN MS IN PURE IRON OF 740C. THESE ALLOYS ALSO SHOW A SIMILARITY TO FE-NI ALLOYS IN THE APPEARANCE OF TWO CONSTANT TEMPERATURE PLATEAUX IN THE GRAPHS OF TRANSFORMATION TEMPERATURE V. COOLING RATE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMC1

AD-653 088 20/12 20/3
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PHYSICS

SUPERCONDUCTING TRANSITIONS IN BODY-CENTERED CUBIC THALLIUM-INDIUM ALLOYS. (U)

JUN 66 4P LUE,H. L. ;WILLENS,R. H.
;
CONTRACT: AF-AFOSR-631-64
PROJ: AF-9763
TASK: 976302
MONITOR: AFOSR 67-1237

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PHYSICAL REVIEW V154 N2 P436-8 FEB 10 1967.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH CALIFORNIA INST. OF TECH., PASADENA, W. M. KECK LABS.

DESCRIPTORS: (*SUPERCONDUCTORS, TRANSITION TEMPERATURE), (*THALLIUM ALLOYS, SUPERCONDUCTIVITY), (*INDIUM ALLOYS, SUPERCONDUCTIVITY), CRYSTAL STRUCTURE, CRYSTAL LATTICES, PHASE STUDIES, THERMAL EXPANSION, QUENCHING(COOLING), ANNEALING (U)

THE SUPERCONDUCTING TRANSITION TEMPERATURE AND THE LATTICE PARAMETER OF THE BODY-CENTERED CUBIC PHASE IN THE IN-TL SYSTEM ARE REPORTED. THE TRANSITION TEMPERATURE OF BCC-TL IS EXTRAPOLATED TO BE 3.0 PLUS OR MINUS 0.1K. THE LINEAR THERMAL-EXPANSION COEFFICIENT OF THE BCC ALLOYS IS COMPUTED TO BE 0.0000029/DEG.K BETWEEN 77 AND 300 K INDEPENDENT OF COMPOSITION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-653 304 7/4 20/2 11/6
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PHYSICS

LATTICE PARAMETERS OF IRON-RICH IRON-GALLIUM ALLOYS, (U)

SEP 66 4P LUO,H. L. I
CONTRACT: AF-AFOSR-631-64
PROJ: AF-9763
TASK: 976302
MONITOR: AFOSR 67-1224

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN TRANSACTIONS OF THE METALLURGICAL SOCIETY OF AIME V239 P119-20 JAN 1967.

DESCRIPTORS: (*CRYSTAL LATTICES, *IRON ALLOYS), (*GALLIUM ALLOYS, CRYSTAL LATTICES), SOLUBILITY, CRYSTAL STRUCTURE, SOLID SOLUTIONS, QUENCHING(COOLING), X-RAY DIFFRACTION ANALYSIS, INTENSITY, HIGH-TEMPERATURE RESEARCH, BISMUTH, CESIUM COMPOUNDS, CHLORIDES, ATOMIC PROPERTIES, HEAT-RESISTANT METALS + ALLOYS, PHASE STUDIES, COBALT, FERROMAGNETIC MATERIALS, TESTS (U)

SYSTEMATIC INVESTIGATIONS OF THEFE-GA SYSTEM HAVE BEEN REPORTED ONLY RECENTLY. THE MAXIMUM SOLID SOLUBILITY OF GALLIUM IN ALPHA-FE IS NEARLY 50 AT. PCT. AT 900C. HOWEVER, IT WAS NOT EVIDENT THAT THE ALPHA-FE SOLID SOLUTION COULD BE RETAINED SUCCESSFULLY BEYOND 17.38 AT. PCT GA BY SOLID-STATE QUENCHING. THE PRESENT INVESTIGATION REPORTS THE RETENTION OF ALPHA-FE SOLID SOLUTION AT 50 AT. PCT GA BY QUENCHING FROM THE LIQUID. AN ORDERED PHASE OF CSCL-TYPE (B2) STRUCTURE WAS OBSERVED BETWEEN 34 DIFFERENCE 50 AT. PCT GA. SINCE IT WAS CONSIDERED VERY PROBABLE THAT THE CSCL STRUCTURE WOULD OCCUR AT HIGH TEMPERATURES, ALLOY FILINGS WERE ALSO QUENCHED BY THE CONVENTIONAL QUENCHING TECHNIQUE. IN ADDITION TO THE CSCL PHASE, A SECOND ORDERED PHASE OF BIF3-TYPE (DO3) STRUCTURE WAS FOUND IN THE RANGE 25 DIFFERENCE 30 AT. PCT GA. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-656 051 11/6
FRANKLIN INST RESEARCH LABS PHILADELPHIA PA

A STUDY OF ALLOYING THEORY USING METASTABLE STRUCTURES. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 66-1 JUN 67, JUN 67 73P STOERING,ROLF ;CONRAD,HANS ;
REPT. NO. F-C1869
CONTRACT: N00014-66-C-0231
PROJ: NR-039-314

UNCLASSIFIED REPORT

DESCRIPTORS: (*COPPER ALLOYS, PHASE STUDIES), ZINC ALLOYS, SILVER ALLOYS, QUENCHING(COOLING), DIFFRACTION ANALYSIS, ELECTRON MICROSCOPY, HEAT TREATMENT, DECOMPOSITION, CHEMICAL PRECIPITATION, PHASE DIAGRAMS, ANNEALING, METALLURGY (U)

THE PHASES AND STRUCTURES OF LIQUID QUENCHED AND VAPOR QUENCHED CU-AG ALLOYS AND LIQUID QUENCHED CU-ZN ALLOYS WERE INVESTIGATED BY X-RAY AND ELECTRON DIFFRACTION AND BY ELECTRON TRANSMISSION MICROSCOPY. FOR THE CU-AG ALLOYS A SINGLE PHASE FCC RANDOM SOLID SOLUTION WITH A MAXIMUM DEVIATION OF ABOUT +1% FROM VEGARD'S LAW WAS ONLY OBTAINED FOR THE THINNEST REGIONS (1000-3000 A) WITH A SUBSTRATE TEMPERATURE OF -150 C. FOR THE THICKER REGIONS AND FOR HIGHER SUBSTRATE TEMPERATURES, SEGREGATED SILVER-RICH FCC PHASES DESIGNATED GAMMA DOUBLE PRIME AND ALPHA PRIME WERE OBTAINED. THE COPPER-RICH BETA PRIME PHASE WAS ONLY OBSERVED FOR THE HIGHEST SUBSTRATE TEMPERATURE OF 50 C. A NEW HEXAGONAL PHASE TERMED DELTA WAS FOUND IN VERY SLIGHT AMOUNTS IN THE LIQUID QUENCHED CU-AG ALLOYS. FOR THE CU-ZN ALLOYS, THE SOLUBILITY OF ZINC IN THE ALPHA PHASE WAS INCREASED TO 48% BY LIQUID QUENCHING. ANNEALING OF LIQUID QUENCHED CU50AG50 ALLOYS INDICATED THE FOLLOWING SEQUENCE FOR THE DECOMPOSITION OF THE METASTABLE PHASES: GAMMA PRIME (RANDOM) TO GAMMA DOUBLE PRIME (SPINODAL) TO ALPHA PRIME (SPINODAL) TO ALPHA PRIME + BETA PRIME TO ALPHA + BETA (EQUILIB.). (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-656 117 9/1 11/3
DU PONT DE NEMOURS (E I) AND CO WILMINGTON DEL PLASTICS DEPT

TOUGHER WIRE JACKETS OF NYLON, (U)

63 7P BONNER,R. M. ;KJELLMARK,E. W. , JR.;SHAW,R. E. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED FOR PRESENTATION AT SYMPOSIUM (12TH) ASBURY PARK, N. J., 4-6 DEC 1963.

DESCRIPTORS: (*ELECTRIC WIRE, *NYLON COATINGS), TOUGHNESS, EXTRUSION, QUENCHING(COOLING), TEMPERATURE (U)

STUDIES OF VARIOUS 610 NYLON RESINS SHOW THAT THE TOUGHNESS OF WIRE JACKETS FABRICATED FROM THESE MATERIALS CAN BE IMPROVED CONSIDERABLY BY INCREASING THE TEMPERATURE OF THE SURFACE UPON WHICH THE NYLON IS EXTRUDED AND THE TEMPERATURE OF THE QUENCH WATER. AT THE SAME TIME, WE DO NOT BELIEVE THAT THIS FACTOR, ALONE, IS ANY PANACEA THAT WILL GUARANTEE PERFECT QUALITY WIRE; CERTAINLY MANY OTHER PROCESS FACTORS PLAY AN EQUALLY IMPORTANT PART IN PRODUCING A TOUGH NYLON JACKET. BASED ON OUR FINDINGS, WE WOULD ENCOURAGE THE MANUFACTURERS OF NYLON JACKETED WIRE TO EXPERIMENT WITH THE HEATED WIRE AND/OR HOT WATER QUENCH TO SEE IF IT RESULTS IN A TOUGHER NYLON JACKET FOR THEIR PARTICULAR CONSTRUCTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-666 872 20/2
ILLINOIS UNIV URBANA MATERIALS RESEARCH LAB

VACANCY ANNEALING IN THREE DIFFERENT EXPERIMENTS IN GOLD. (U)

DESCRIPTIVE NOTE: REVISED ED.,
OCT 67 6P SHARMA,R. K. ;LEE,C. ;
KOEHLER,J. S. ;
CONTRACT: DA-31-124-ARO(D)-65, AT(11-1)1198
PROJ: DA-20014501B32D
MONITOR: AROD 3369:4

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PHYSICAL REVIEW LETTERS, V19 N24 P1379-81 11 DEC 67.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 14 AUG 67.

DESCRIPTORS: (*CRYSTAL LATTICE DEFECTS, TRANSPORT PROPERTIES), GOLD, ANNEALING, CRYOGENICS, ELECTRON BOMBARDMENT, QUENCHING(COOLING), DEFORMATION, TENSILE PROPERTIES (U)

IF THE CONCEPT OF LATTICE VACANCIES IS TO BE USEFUL, THEN ONE SHOULD BE ABLE TO IDENTIFY LATTICE-VACANCY MIGRATION IN DIFFERENT EXPERIMENTS IN WHICH OTHER DEFECTS HAVE ALSO BEEN INTRODUCED. TO DATE, SUCH A DEMONSTRATION HAS NOT BEEN GIVEN FOR ANY METAL. THE PRESENT NOTE REPORTS BRIEFLY THE RESULTS OF EXPERIMENTS IN WHICH VACANCIES WERE INTRODUCED INTO VERY PURE GOLD BY QUENCHING, BY 3-MEV ELECTRON IRRADIATION AT 100K, AND BY A FEW PERCENT TENSILE DEFORMATION AT 4.2K. ONE OBSERVES IN ALL CASES A PROMINENT ANNEALING PROCESS WHICH OCCURS IN THE RANGE FROM 20 TO 80C (FOR THE CONCENTRATIONS USED HERE) WITH AN ACTIVATION ENERGY IN THE PUREST SPECIMENS OF 0.90 PLUS OR MINUS 0.06 EV. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-667 238 20/2 11/6
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS

ON THE INTERACTION BETWEEN POINT DEFECTS AND INCLUSIONS IN CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JAN 68 29P ASHBY,M. F. ;
REPT. NO. TR-548
CONTRACT: N00014-67-A-0298
PROJ: NR-031-503

UNCLASSIFIED REPORT

DESCRIPTORS: (*CRYSTAL LATTICE DEFECTS, INTERACTIONS), (*METALS, CRYSTAL LATTICE DEFECTS), FREE ENERGY, ELASTICITY, STRESSES, STRAIN(MECHANICS), INTERFACES, QUENCHING(COOLING), DIFFUSION (U)

WHEN A CRYSTAL CONTAINING INCOHERENT INCLUSIONS IS QUENCHED, THE VACANCY CONCENTRATION IN IT CAN APPROACH ITS NEW EQUILIBRIUM VALUE IF VACANCIES ENTER THE INCLUSION - MATRIX INTERFACE. THE LOSS OF VACANCIES LOWERS THE FREE ENERGY OF THE MATRIX, BUT IT GENERATES MISFIT AT THE INCLUSION WHICH IS ASSOCIATED WITH AN INCREASING ELASTIC STRAIN-ENERGY. EQUILIBRIUM IS TEMPORARILY RE-ESTABLISHED WHEN A VACANCY LEAVING THE MATRIX AND ENTERING THE INTERFACE LOWERS THE CHEMICAL FREE ENERGY OF THE MATRIX AND INCREASES THE STRAIN ENERGY BY EQUAL AMOUNTS. THIS EQUILIBRIUM IS TEMPORARY ONLY, SINCE, GIVEN TIME, THE VACANCIES ULTIMATELY DRAIN TO THE FREE SURFACE, THE VACANCY CONCENTRATION FALLS TO ITS TRUE EQUILIBRIUM VALUE, AND THE ELASTIC STRAIN DISAPPEARS AGAIN. THIS REPORT CALCULATES THE MAGNITUDE OF THE ELASTIC STRAINS WHICH FORM AT INCLUSIONS DUE TO THIS EFFECT. THEY CAN BE LARGE: MUCH LARGER THAN THOSE DUE TO DIFFERENCE IN COEFFICIENT OF THERMAL EXPANSION. IF THE STRAINS ARE LARGE ENOUGH, PRISMATIC PUNCHING WILL OCCUR AT THE INCLUSIONS TO RELIEVE THEM. INCLUSIONS THUS PROVIDE A MECHANISM FOR CONDENSING VACANCIES INTO PRISMATIC LOOPS WITHOUT THE USUAL NUCLEATION STEP. THE ACTUAL NUMBER OF VACANCIES WHICH CAN BE ACCEPTED BY AN INCLUSION IS LARGE, IN SPITE OF THE STRAINS WHICH FORM: THIS MEANS THAT A VOLUME FRACTION OF, SAY, 1% OF INCLUSIONS CAN ACT AN AN EFFICIENT SINK FOR VACANCIES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-668 606 11/6
CLARKSON COLL OF TECHNOLOGY POTSDAM N Y DEPT OF PHYSICS

EFFECT OF HEAT TREATMENT ON THE RESISTIVITY OF BETA-BRASS, (U)

APR 68 2P HARKCOM,J. K. ;MARTIN,M. C. ;

CONTRACT: AF-AFOSR-794-65
PROJ: AF-9763
TASK: 976301
MONITOR: AFOSR 68-0806

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED PHYSICS, V39 N1 P339-40 1968.

DESCRIPTORS: (*BRASS, RESISTANCE(ELECTRICAL)), HEAT TREATMENT, SINGLE CRYSTALS, AGING(MATERIALS), QUENCHING(COOLING) (U)

THE CHANGE IN ELECTRICAL RESISTIVITY AS A FUNCTION OF QUENCH TEMPERATURE WAS DETERMINED FOR A BETA-BRASS SINGLE CRYSTAL FOR THE RANGE OF TEMPERATURES 120-560C. THE AS-QUENCHED CURVES SHOW TWO RESISTIVITY PEAKS WHICH CAN BE IDENTIFIED AS THOSE OBSERVED BY BROWN, AND BY CLARK AND BROWN. THE HEIGHT OF THE PEAK AT 200C OBTAINED IN THIS EXPERIMENT IS SOMEWHAT LESS THAN HALF THE HEIGHT OF THE ONE OBSERVED BY CLARK AND BROWN IN RELATION TO THE MAXIMUM AT 470C. THE CURVE SHOWING THE RESISTIVITY AFTER AGING IS ESSENTIALLY THE SAME AS THE RESULTS OF MARTIN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-673 407 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

METASTABLE PHASES IN ALLOYS OF TITANIUM, THE MECHANISM AND KINETICS OF THEIR FORMATION (METASTABILNYE FAZY V SPLAVAKH TITANA, MEKHANIZM I KINETIKA IKH OBRAZOVANIYA), (U)

OCT 67 50P FEDOTOV,S. G. ;
REPT. NO. FTD-MT-24-194-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONO. ISSLEDOVANIYA METALLOV V ZHIDKOM I TVERDOM SOSTOYANIYAKH (INVESTIGATION OF METALS IN THE LIQUID AND SOLID STATES) MOSCOW, 1964 P207-240.

DESCRIPTORS: (*TITANIUM ALLOYS, USSR), PHASE STUDIES, MODULUS OF ELASTICITY, QUENCHING(COOLING), VANADIUM ALLOYS, MOLYBDENUM ALLOYS, NIOBIUM ALLOYS, STABILITY, MARTENSITE, ANNEALING, DISLOCATIONS, CHROMIUM ALLOYS, MANGANESE ALLOYS, ZIRCONIUM ALLOYS, KINETIC ENERGY (U)
IDENTIFIERS: TRANSLATIONS (U)

A SHORT REVIEW IS GIVEN WITH 56 REFERENCES FOLLOWED BY THE AUTHOR'S EXPTS. FOR DETG. YOUNG'S AND SHEAR MODULI, AS WELL AS POISSON COEFFS. IN QUENCHED AND ANNEALED ALLOYS OF THE FOLLOWING SYSTEMS: TI-MO, TI-V, TI-NB, TI-MO-V, TI-V-NB, AND TI-MO-V-NB. ELASTIC PROPERTIES OF ALPHA-TI ARE TWICE THOSE OF BETA-TI. WITH ANNEALED SPECIMENS THE ALLOYING INGREDIENTS LOWERED ELASTIC PROPERTIES OF ALPHA-TI, THE MORE LOWERED WERE THE ELASTIC PROPERTIES OF THE RESP. ALLOYS; THE ALLOYING ELEMENTS CAN BE PUT IN THE FOLLOWING ORDER OF DECREASING EFFECT ON THE ELASTIC PROPERTIES OF TI ALLOYS: MO-V-NB. WITH QUENCHED SPECIMENS AND ALPHA-TI OR ALPHA + BETA TI, THE ALLOYING INGREDIENTS LOWERED INITIALLY THE ELASTIC PROPERTIES SHARPLY AND AFTERWARDS RESTORED THEIR LEVEL JUMPWISE OR EVEN INCREASED THE LEVEL TO A NEW MAX. VALUE. AFTERWARDS THERE WAS AGAIN A DROP, FOLLOWED BY A SLOW INCREASE. ONE-PHASE BETA-TI ALLOYS DID NOT SHOW ANY DIFFERENCE IN BEHAVIOR OF ANNEALED AND QUENCHED SPECIMENS. MECHANISMS AND KINETICS OF MARTENSITIC BETA - ALPHA TRANSFORMATION IS DISCUSSED AND DESCRIBED AS TAKING PLACE IN 2 STAGES: (1) SPONTANEOUS DISLOCATION OF SEP. TI ATOMS INTO A NEW MECH. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-677 557 13/8
GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

EVALUATION OF METHODS TO REDUCE HAND STRAIGHTENING OF QUENCHED ALUMINUM PARTS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUL 61 12P MATTEK,L. J. (BARTOLORUI, G. D.)
REPT. NO. GDC-PR-349

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, COOLING), MECHANICAL WORKING, AGING(MATERIALS), QUENCHING(COOLING), SHEETS, DUCTILITY, HARDNESS, TIME (U)
IDENTIFIERS: ALUMINUM ALLOY 2024, ALUMINUM ALLOY 7075, ALUMINUM ALLOY 7178 (U)

TWO METHODS OF REDUCING HAND STRAIGHTENING TIME OF HEAT TREATED SHEET ALUMINUM PARTS WERE EVALUATED. NO REDUCTION OF DISTORTION OCCURRED BY QUENCHING ALUMINUM PARTS IN WATER 'DISPERSED' BY A DOUBLE SCREEN FLOOR IN A STANDARD QUENCH RACK. AN INCREASE IN DUCTILITY AND SUBSEQUENT REDUCTION IN HAND STRAIGHTENING TIME RESULTED BY REDUCING THE NATURAL AGING TIME OF QUENCHED PARTS. THIS WAS ACCOMPLISHED BY A RAPID POST-QUENCH COOLING CYCLE AND A REDUCED HANDLING DELAY INVOLVED IN TRANSFERRING QUENCHED MATERIAL TO THE REFRIGERATORS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-677 839 11/6 13/8
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

QUENCHABLE EFFECTS OF HIGH PRESSURES AND TEMPERATURES ON THE CUBIC MONOXIDE OF TITANIUM. (U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,
JUL 68 14P BANUS,MARIO D. I
REPT. NO. JA-3303
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-68-323

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN MATERIALS RESEARCH BULLETIN, V3 N9 P723-734 1968.

DESCRIPTORS: (*TITANIUM COMPOUNDS, QUENCHING(COOLING)), MONOXIDES, HIGH-PRESSURE RESEARCH, HIGH-TEMPERATURE RESEARCH, CRYOGENICS, CRYSTAL LATTICE DEFECTS, DENSITY, TRANSPORT PROPERTIES, TRANSITION TEMPERATURE, SUPERCONDUCTIVITY, RESISTANCE(ELECTRICAL) (U)
IDENTIFIERS: TITANIUM MONOXIDES (U)

CHANGES IN LATTICE PARAMETER, DENSITY, NUMBER OF VACANCIES AND SEVERAL TRANSPORT PROPERTIES OF CUBIC TIO SUB X, WHERE 0.85 < OR = X < OR = 1.25, RESULT FROM QUENCHING UNDER PRESSURES OF 50-60 KBAR FROM ANNEALING TEMPERATURES OF 1100-1800C. THE SUPERCONDUCTING TRANSITION TEMPERATURE (T SUB C) INCREASES LINEARLY WITH OXYGEN CONTENT TO A MAXIMUM OF 2.0K AT X = 1.24 WHEN APPROXIMATELY 18% OF THE VACANCIES BECOME FILLED DURING THE PRESSURE TREATMENT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-678 367 11/6 7/4
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

INFLUENCE OF IRON ON PHASE COMPOSITION, STRUCTURE, AND PROPERTIES OF A HEAT RESISTANT NICKEL-CHROMIUM-TUNGSTEN ALLOY, (U)

OCT 67 11P BAIKOVA,T. P. ;LASHKO,N. F. ;SOROKINA,K. P. ;
REPT. NO. FTD-HT-23-1062-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF MONO. FAZOVYI SOSTAV, STRUKTURA I SVOISTVA LEGIROVANNYKH STALEI I SPLAVOV (PHASE COMPOSITION, STRUCTURE, AND PROPERTIES OF ALLOYED STEELS AND ALLOYS), MOSCOW, 1965 P55-62, BY R. WALLACE.

DESCRIPTORS: (*HEAT-RESISTANT METALS + ALLOYS, NICKEL ALLOYS), (*NICKEL ALLOYS, PHASE STUDIES), DISPERSION HARDENING, MICROSTRUCTURE, INTERMETALLIC COMPOUNDS, CARBIDES, IRON ALLOYS, CHROMIUM ALLOYS, TUNGSTEN ALLOYS, HEAT TREATMENT, QUENCHING(COOLING), SOLID SOLUTIONS, AGING(MATERIALS), USSR (U)

THE ALLOY EI868 WAS HEATED TO 1200C FOR 5 MIN. AND THEN COOLED IN WATER OR AIR. ALLOY EI868 HARDENED DURING AGING OWING TO THE FORMATION OF THE DISPERSED PHASES: CARBIDES M23C6, SOLID SOLNS. OF TUNGSTEN IN CHROMIUM, OR INTERMETALLIC PHASE FE2W. IN ALLOYS CONTG. FE GREATER THAN OR EQUAL TO 20% THE ALPHA PHASE WAS FORMED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-678 931 11/6 20/11
CLARKSON COLL OF TECHNOLOGY POTSDAM N Y DEPT OF PHYSICS

HEAT TREATMENT EFFECTS ON SOME PHYSICAL PROPERTIES OF METALLIC SINGLE CRYSTALS. (U)

DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT.,
JUL 68 19P MARTIN,MARTIN C. ;
CONTRACT: AF-AFOSR-794-65
PROJ: AF-9763
TASK: 976301
MONITOR: AFOSR 68-1718

UNCLASSIFIED REPORT

DESCRIPTORS: (*BRASS, PHASE STUDIES), (*PHASE STUDIES, X-RAY DIFFRACTION ANALYSIS), COPPER, ZINC, CRYSTAL GROWTH, GRAIN STRUCTURES(METALLURGY), QUENCHING(COOLING), DIFFUSION, CRYSTAL LATTICES, POWDER METALS, RESISTANCE(ELECTRICAL), LIFE EXPECTANCY (U)
IDENTIFIERS: BINARY ALLOYS, ORDERED LATTICE, DISORDERED LATTICE (U)

RESULTS ON THE EFFECT OF PLASTIC DEFORMATION ON THE ELECTRICAL RESISTIVITY OF HIGH PURITY POLYCRYSTALLINE COPPER, ALUMINUM AND NICKEL SHOWED THE CHANGE IN ELECTRICAL RESISTIVITY WITH PLASTIC STRAIN WAS NOT AFFECTED BY STRAIN RATE OVER THE RANGE INVESTIGATED. EXTENDED WORK ON NICKEL SHOWED THAT STAGES 2 AND 3 OF PLASTIC DEFORMATION WERE WELL DEFINED FOR THAT METAL. THE RESULTS OF THE EFFECT OF QUENCHING ON THE ELECTRICAL RESISTIVITY OF BETA-BRASS SHOWED TWO RESISTIVITY PEAKS FOR RESISTIVITY MEASUREMENTS MADE 3 MINUTES AFTER QUENCHING AND ONE RESISTIVITY PEAK FOR RESISTIVITY MEASUREMENTS MADE APPROXIMATELY 18 HOURS AFTER QUENCHING IN THE RELATIVE CHANGE IN RESISTIVITY VERSUS QUENCH TEMPERATURE GRAPHS. RESULTS ON X-RAY ANALYSIS OF BETA-BRASS AFTER QUENCHING PROVIDED NO EVIDENCE FOR THE FORMATION OF ANTIPHASE DOMAINS OR THAT A LARGE AMOUNT OF DISORDER CAN BE QUENCHED IN. THERE WAS SOME EVIDENCE THAT STACKING FAULTS MIGHT BE FORMED IN THE CRYSTAL BY THE QUENCHING PROCESS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-682 219 11/6
CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF METALLURGY AND MATERIALS SCIENCE

THE EFFECT OF PRIOR-AUSTENITE GRAIN-SIZE ON THE STRESS-CORROSION CRACKING SUSCEPTIBILITY OF A.I.S.I. 4340 STEEL. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JAN 69 40P PROCTER,R. P. M. ;PAXTON, H. W. ;
CONTRACT: NONR-760(31), ARPA ORDER-878

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, STRESS CORROSION), (*STRESS CORROSION, CRACK PROPAGATION), AUSTENITE, HEAT TREATMENT, QUENCHING(COOLING), DUCTILE BRITTLE TRANSITIONS, FRACTOGRAPHY, HYDROGEN EMBRITTLEMENT, GRAIN SIZE, YIELD POINT, TENSILE PROPERTIES, RECRYSTALLIZATION (U)
IDENTIFIERS: STEEL 4340 (U)

USING BOTH CONVENTIONAL HEAT-TREATMENTS AND REPEATED RAPID AUSTENITISING AND QUENCHING HEAT-TREATMENTS, A SERIES OF AISI 4340 STEELS WITH PRIOR-AUSTENITE GRAIN-SIZES COVERING THE RANGE ASTM 7-12 WERE DEVELOPED. THE STRESS-CORROSION CRACKING SUSCEPTIBILITY OF THE STEELS IN A 3.5% AQUEOUS SOLUTION OF NACL WAS INVESTIGATED USING FATIGUE-PRECRACKED, PLANE-STRAIN CANTILEVER-BEAM SPECIMENS. THE RESULTS OF AN ELECTRON FRACTOGRAPHIC INVESTIGATION OF THE STRESS-CORROSION FRACTURE SURFACES ARE DESCRIBED; THE EXPERIMENTAL RESULTS ARE INTERPRETED IN TERMS OF A HYDROGEN-EMBRITTLEMENT MECHANISM OF SLOW CRACK GROWTH. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-682 776 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

SOME STRUCTURAL PECULIARITIES AND DISTINCTIVE PROPERTIES OF CAST TITANIUM ALLOYS. (U)

MAR 68 12P BOCHVAR,G. A. ;CHISTYAKOV, E. P. ;
REPT. NO. FTD-HT-23-1487-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF ISSLEDOVANIE SPLAVOV TSVETNYKH METALLOV (USSR) V4 N4 P249-256 1963.

DESCRIPTORS: (*TITANIUM ALLOYS, PHASE STUDIES), QUENCHING(COOLING), TRANSPORT PROPERTIES, RECRYSTALLIZATION, PLASTICITY, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

THE LEVEL OF THE MECHANICAL PROPERTIES OF THE SINGLE-PHASED ALPHA AND DOUBLE-PHASED ALPHA-BETA TITANIUM ALLOYS IN THE CAST STATE DEPENDS NOT ONLY ON THE ADDITION, BUT ON THE CONDITION OF CRYSTALLIZATION AND PHASE RECRYSTALLIZATION; THE LATTER SHOWS A SIGNIFICANTLY GREATER EFFECT THAN THE PROCESS OF CRYSTALLIZATION. THE STABILITY OF ALPHA AND ALPHA-BETA TITANIUM ALLOYS IN THE CAST STATE DETERMINES THE COOLING RATE OF THE BETA REGION. HOWEVER, THE RATE OF COOLING DOES NOT INFLUENCE THE PLASTICITY OF THE SINGLE-PHASED ALPHA ALLOYS. THE EFFECT OF CRYSTALLIZATION ON THE MECHANICAL PROPERTIES OF TITANIUM ALLOYS IN THE CAST STATE INCREASES WITH INCREASING AMOUNT OF ALLOY COMPONENT. THE MICRO-STRUCTURES OF ALPHA AND ALPHA-BETA TITANIUM ALLOYS IN CAST STATE ARE CHARACTERIZED BY A PLASTIC FORMATION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMC1

AD-683 905 7/4 11/2
CHICAGO UNIV ILL JAMES FRANCK INST

NUCLEAR MAGNETIC RESONANCE IN THALLIUM BORATE GLASSES. I. THE THALLIUM-205 CHEMICAL SHIFT, (U)

FEB 68 11P MOMII,ROBERT K. INACHTRIEB, NORMAN H. ;
CONTRACT: AF-AFOSR-1087-66, SD-89
PROJ: AF-9763
TASK: 976302
MONITOR: AFOSR 69-0520TR

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF PHYSICAL CHEMISTRY, V72 N10 P3416-3423 OCT 68.

DESCRIPTORS: (*GLASS, *NUCLEAR MAGNETIC RESONANCE), MELTING, OXYGEN, PARAMAGNETIC MATERIALS, QUENCHING(COOLING), THALLIUM COMPOUNDS, BORATES, OXIDES (U)
IDENTIFIERS: *THALLIUM-205 CHEMICAL SHIFT, THALLIUM(I) OXIDE, *THALLIUM BORATE GLASS, BORATE GLASS (U)

CHEMICAL SHIFT MEASUREMENTS ON 205TL IN THALLIUM BORATE GLASSES AT TEMPERATURES UP TO AND ABOVE THE SOFTENING TEMPERATURE (300C) INDICATE THAT THE INTERACTIONS OF TL(I) WITH OXYGEN ATOMS IN THE BORATE NETWORK ARE PREDOMINANTLY IONIC. THERE IS RELATIVELY LITTLE EFFECT OF COMPOSITION ON THE CHEMICAL SHIFT UP TO 18 MOL % TL2O, BUT ABOVE THIS CONCENTRATION THE 205TL RESONANCE SHIFTS SHARPLY DOWNFIELD. FOR ALL GLASS COMPOSITIONS UP TO 27 MOL % TL2O THE TEMPERATURE DEPENDENCE OF THE CHEMICAL SHIFT IS LINEAR AND DOWNFIELD. IT IS ATTRIBUTED TO AN INDUCED PARAMAGNETIC SUSCEPTIBILITY CAUSED BY THE THERMAL VIBRATIONAL OVERLAP OF CATION AND ANION WAVE FUNCTIONS. THE MODE OF PREPARATION OF THE GLASSES, IN PARTICULAR THE RATE OF COOLING FROM THE MELT AND THE TEMPERATURE FROM WHICH THE QUENCH IS MADE, AFFECTS THE 205TL CHEMICAL SHIFT. RAPID QUENCHES FROM HIGH TEMPERATURES CAUSE THE 205TL RESONANCE TO SHIFT TO HIGHER FIELDS. THE SYMMETRY OF TL(+) SITES INCREASES WITH INCREASING MELT TEMPERATURE AND QUENCH RATE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-684 497 11/6 13/8
CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF METALLURGY AND MATERIALS SCIENCE

GRAIN BOUNDARY SEGREGATION OF IMPURITIES IN METALS AND INTERGRANULAR BRITTLE FRACTURE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAR 69 37P LOW,JOHN R. , JR.;GOODMAN, STEPHEN R. ;SMITH,CRAIG L. ;
REPT. NO. CMU-031-727-1
CONTRACT: N00014-67-A-0314
PROJ: NR-031-727

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, HEAT TREATMENT), GRAIN BOUNDARIES, DUCTILE BRITTLE TRANSITION, IMPACT TESTS, PHOSPHORUS ALLOYS, ANTIMONY ALLOYS, ETCHING, NEUTRON ACTIVATION, CHEMICAL ANALYSIS (U)

THE REPORT DISCUSSES TWO INVESTIGATIONS OF TEMPER EMBRITTLEMENT IN LOW ALLOY QUENCHED AND TEMPERED STEEL. PART I DEALS WITH ADDITIVE EFFECTS OF PHOSPHORUS AND ANTIMONY AS EMBRITTLING IMPURITIES IN THIS TYPE OF GRAIN-BOUNDARY EMBRITTLEMENT. PART II DESCRIBES EFFORTS TO DEVELOP A METHOD OF DETERMINING THE DEGREE OF SEGREGATION OF ALLOYS AND IMPURITIES TO GRAIN-BOUNDARIES DURING TEMPER EMBRITTLEMENT. THE METHOD UNDER STUDY INVOLVES NEUTRON ACTIVATION ANALYSIS OF THE ETCHANT FROM ETCHED INTERGRANULAR FRACTURE SURFACES.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-685 836 11/6 20/11 13/8
ARMY MATERIALS AND MECHANICS RESEARCH CENTER WATERTOWN MASS

FRACTURE SURFACE TOPOGRAPHY AND TOUGHNESS OF 4340 STEEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
FEB 69 19P CARR,FRANK L. ;LARSON, FRANK R. ;
REPT. NO. AMMRC-TR-69-03
PROJ: DA-1-T-062105-A-328

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, FRACTOGRAPHY), HEAT TREATMENT, TENSILE PROPERTIES, NOTCH TOUGHNESS, IMPACT TESTS, FRACTURE(MECHANICS), QUENCHING(COOLING), SURFACE ROUGHNESS, VISUAL INSPECTION, DUCTILE BRITTLE TRANSITION (U)
IDENTIFIERS: STEEL 4340 (U)

AISI 4340 STEEL WAS HEAT TREATED TO EIGHT STRENGTH LEVELS BY TEMPERING GROUPS OF SPECIMENS AT INTERVALS OF 100 F BETWEEN 500 F AND 1200 F. TENSION, NOTCH TENSION, AND CHARPY V-NOTCH IMPACT SPECIMENS WERE MACHINED FROM THESE MATERIALS AND TESTED OVER A RANGE OF TEMPERATURES BETWEEN THAT OF LIQUID NITROGEN AND 400 F. THE FRACTURE OF EACH SPECIMEN WAS EXAMINED AT LOW MAGNIFICATION AND EACH ZONE OF FRACTURE SURFACE CONFIGURATION WAS MEASURED. WHEN PLOTTED AS A FUNCTION OF TESTING TEMPERATURE, THESE MEASUREMENTS RESULTED IN TRANSITIONAL CURVES FOR ALL THREE TYPES OF SPECIMENS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-685 880 19/4 13/8 20/11
UNITED STATES STEEL CORP MONROEVILLE PA APPLIED RESEARCH LAB

UNIDIRECTIONALLY SOLIDIFIED WROUGHT STEEL ARMOR. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUL 67-29 OCT 68,
APR 69 101P BIENIOSEK,C. E. ;SKIDMORE, K. F. ;PORTER,L. F. ;
CONTRACT: DAAG46-67-C-0158
PROJ: DA-1-F-141812-D-154
MONITOR: AMMRC CR-69-01(F)

UNCLASSIFIED REPORT

DESCRIPTORS: (*ARMOR PLATE, CASTING), (*CASTINGS, MECHANICAL PROPERTIES), STEEL, QUENCHING(COOLING), LIQUID METALS, HARDNESS, CRACK PROPAGATION, DENDRITIC STRUCTURE, SHEAR STRESSES, IMPACT TESTS, TENSILE PROPERTIES, DUCTILITY, HEAT TREATMENT, GRAIN STRUCTURES(METALLURGY), SEPARATION (U)
IDENTIFIERS: SOLIDIFICATION, *COLUMNAR STRUCTURE, *UNIDIRECTIONAL SOLIDIFICATION, INGOTS, HOMOGENIZING (U)

CAST STEELS, WITH SUPERIOR DUCTILITY, CAN BE PRODUCED BY UNIDIRECTIONAL SOLIDIFICATION, WHICH RESULTS IN MINIMUM MACROSEGREGATION AND MACROPOROSITY AND LESS MICROPOROSITY THAN IS FOUND IN CONVENTIONAL CASTINGS. TO PRODUCE A SUPERIOR WROUGHT STEEL ARMOR, TECHNIQUES WERE ESTABLISHED FOR CASTING UNIDIRECTIONALLY SOLIDIFIED SLABS 10 BY 16 BY 5-1/2 INCHES WEIGHING ABOUT 240 POUNDS. THE SLABS WERE HOMOGENIZED BY HOLDING IN EVACUATED STAINLESS-STEEL BOXES FOR 64 HOURS AT 2400 F, AND ROLLED TO PLATES FOR BALLISTIC TESTING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-687 077 11/6
NAVAL RESEARCH LAB WASHINGTON D C

CORROSION-FATIGUE CRACK PROPAGATION STUDIES OF SOME NEW HIGH-STRENGTH STRUCTURAL STEELS. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
APR 69 18P CROCKER,T. W. ;LANCE,E. A. ;
REPT. NO. NRL-6870
PROJ: SF-51-541-003-12383, RR-007-01-46-5432

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, CRACK PROPAGATION), HEAT TREATMENT, STRESS CORROSION, FATIGUE(MECHANICS), STRESSES, LOADING(MECHANICS), LIFE EXPECTANCY, TENSILE PROPERTIES, IMPACT TESTS, ENVIRONMENTAL TESTS, PLASTICITY, NICKEL ALLOYS, COBALT ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS (U)
IDENTIFIERS: STEEL 4CO 9NI, STEEL 8CO 2CR MO 10NI, STEEL 13CR 2MO 8NI (U)

FATIGUE CRACK PROPAGATION STUDIES WERE CONDUCTED ON THREE NEW HIGH-STRENGTH STRUCTURAL STEELS: 9NI-4CO-0.20C, QUENCHED AND TEMPERED; 10NI-2CR-1MO-8CO, DUAL STRENGTHENED; AND 13CR-8NI-2MO, PRECIPITATION-HARDENED STAINLESS. THE YIELD STRENGTHS OF THESE STEELS RANGED FROM 176 TO 193 KSI. NOTCHED CANTILEVER-BEND SPECIMENS OF EACH STEEL WERE CYCLED ZERO-TO-TENSION IN TWO ENVIRONMENTS - ROOM AIR AND 3.5% NACL SALT WATER. FATIGUE CRACK GROWTH RATES WERE MEASURED EXPERIMENTALLY AND CORRELATED WITH THE CRACK TIP STRESS-INTENSITY FACTOR RANGE. THE RESULTS INDICATE THAT THESE NEW STEELS POSSESS GREATER RESISTANCE TO FATIGUE CRACK PROPAGATION AND LESS SENSITIVITY TO ENVIRONMENT THAN PREVIOUSLY STUDIED STEELS OF COMPARABLE STRENGTH. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-687 663 11/6
DEFENCE STANDARDS LABS MARIBYRNONG (AUSTRALIA)

IMPROVED TECHNIQUES FOR DETERMINING TRANSFORMATION TEMPERATURES DURING SIMULATED WELDING CONDITIONS. (U)

DEC 67 6P PHILLIPS,R. H. ;

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN BRITISH WELDING JNL. P547-552 NOV 68. NO COPIES FURNISHED.

DESCRIPTORS: (*STEEL, PHASE STUDIES), (*WELDING, PHASE STUDIES), WELDS, TRANSFORMATIONS, AUSTENITE, MARTENSITE, LIFE EXPECTANCY, HEAT TREATMENT, QUENCHING(COOLING), DIFFERENTIAL THERMAL ANALYSIS, BAINITE, AUSTRALIA (U)
IDENTIFIERS: PHASE TRANSFORMATIONS, TIME TEMPERATURE TRANSITION CURVES (U)

A STUDY HAS BEEN MADE OF THE ERRORS OCCURRING IN THE DETERMINATION OF TRANSFORMATION TEMPERATURES IN LOW HARDENABILITY STEEL SPECIMENS THERMALLY CYCLED TO SIMULATE WELDING CONDITIONS. THERMAL GRADIENTS IN THE RAPIDLY COOLING SAMPLE WERE A SOURCE OF ERROR IN THE DILATOMETRIC METHOD. SOME WAYS OF REDUCING THE ERRORS ARE DISCUSSED. THE TRANSFORMATION TEMPERATURES DETERMINED BY DILATOMETRY ARE COMPARED WITH THOSE OBTAINED BY THERMAL ANALYSIS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-687 738 11/6
DREXEL INST OF TECH PHILADELPHIA PA DEPT OF METALLURGICAL ENGINEERING

SPHEROIDIZATION OF BINARY IRON-CARBON ALLOYS OVER A RANGE OF TEMPERATURES. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 69 38P HECKEL,RICHARD W. ;VEDULA, KRISHNA M. ;
REPT. NO. TR-1
CONTRACT: N00014-67-A-0406
TASK: NR-031-714

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, HEAT TREATMENT), PHASE STUDIES, IRON ALLOYS, CARBON ALLOYS, MICROSTRUCTURE, METALLOGRAPHY, AUSTENITE, MARTENSITE, DIFFUSION, STATISTICAL ANALYSIS, QUENCHING(COOLING), FERRITES, CARBIDES, SPHERES (U)
IDENTIFIERS: *AUSTENITIZING, CEMENTITE, *SPHEROIDIZING, OSTWALD RIPENING, BINARY ALLOYS (U)

THE SPHEROIDIZATION OF CEMENTITE IN BINARY IRON-CARBON ALLOYS WAS INVESTIGATED OVER A RANGE OF TEMPERATURES (594, 649, AND 704C) FOR TIMES UP TO ABOUT A MILLION SECONDS. QUANTITATIVE METALLOGRAPHY TECHNIQUES WERE USED TO OBTAIN THE FOLLOWING MICROSTRUCTURAL DATA ON THE CEMENTITE PARTICLES: SHAPE, SIZE DISTRIBUTION, MEAN SIZE, NUMBER OF PARTICLES PER UNIT VOLUMES, AND GROWTH (AND SHRINKAGE) RATES OF VARIOUS SIZES IN THE SIZE DISTRIBUTION. THE VARIATIONS OF THESE MICROSTRUCTURAL PARAMETERS WERE ANALYZED IN TERMS OF EXISTING MODELS FOR THE SPHEROIDIZATION PROCESS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-688 142 11/6 20/2
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND APPLIED PHYSICS

FORMATION, STABILITY AND STRUCTURE OF PALLADIUM-SILICON BASED ALLOY GLASSES. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
FEB 69 42P CHEN,H. S. ;TURNBULL,D. ;
REPT. NO. TR-19
CONTRACT: N00014-67-A-0298
PROJ: NR-032-485

UNCLASSIFIED REPORT

DESCRIPTORS: (*PALLADIUM ALLOYS, PHASE STUDIES), (*SILICON ALLOYS, SOLID SOLUTIONS), GLASS, QUENCHING(COOLING), RESISTANCE(ELECTRICAL), RHEOLOGY, CRYSTALLOGRAPHY, X-RAY DIFFRACTION ANALYSIS, MICROSTRUCTURE, TRANSITION TEMPERATURE, ELECTRON MICROSCOPY (U)
IDENTIFIERS: TERNARY SYSTEMS, BINARY ALLOYS, *SPLAT COOLING, AMORPHOUS MATERIALS (U)

A SERIES OF PD-SI BASED ALLOY GLASSES WERE FORMED BY QUENCHING MELTS TO ROOM TEMPERATURE AT VARIOUS COOLING RATES. CERTAIN TERNARY ALLOYS OF PD-AU-SI, PD-AG-SI AND PD-CU-SI FORMED GLASSES WITH THICKNESSES GREATER AND 1 MM AT COOLING RATES AS LOW AS 100C/SEC. THE GLASS-LIQUID TRANSITION WAS EXHIBITED THERMALLY BY BOTH BINARY AND TERNARY ALLOYS. THE RHEOLOGICAL MANIFESTATIONS OF THE GLASS TRANSITION WAS OBSERVED QUALITATIVELY FOR CERTAIN OF THE TERNARY ALLOYS. THE ELECTRICAL RESISTIVITY OF THE ALLOYS IN THEIR VARIOUS STATES WERE ALSO MEASURED. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-688 721 11/6 20/2
FRANKLIN INST RESEARCH LABS PHILADELPHIA PA

NON-EQUILIBRIUM EFFECT STRUCTURES PRODUCED BY DRASTIC QUENCHING FROM THE LIQUID STATE. (U)

DESCRIPTIVE NOTE: FINAL REPT. 10 JUN 65-9 JUN 68, MAR 69 75P MEAKIN,J. D. ;
REPT. NO. F-B2362
CONTRACT: DA-31-124-ARO(D)-368
PROJ: DA-2-0-014501-B-32-D
MONITOR: AROD 5409:2-MC

UNCLASSIFIED REPORT

DESCRIPTORS: (*METALS, CRYSTAL STRUCTURES), (*CRYSTAL STRUCTURE, QUENCHING(COOLING)), ANTIMONY, SILICON, TITANIUM, IRON, ALUMINUM ALLOYS, INDIUM ALLOYS, X-RAY DIFFRACTION ANALYSIS, PHOTOMICROGRAPHY, SOLID SOLUTIONS (U)
IDENTIFIERS: *SPLAT COOLING (U)

THE DEVELOPMENT OF HIGH SPEED QUENCHING BY THE SPLAT COOLING TECHNIQUE WAS FOLLOWED BY WORK ON METASTABLE SYSTEMS. STUDIES WERE CONDUCTED ALONG LINES SIMILAR TO TRADITIONAL PHASE DIAGRAM RESEARCH BUT USING INTENTIONALLY METASTABLE SPECIMENS. THE PRIMARY AIM OF THIS RESEARCH WAS THE DEDUCTION OF STRUCTURAL INFORMATION ON THE LIQUID STATE BY EXAMINING AMORPHOUS MATERIAL PRODUCED BY SPLAT COOLING. THIS REPORT DESCRIBES AND SEEKS TO INTERPRET THE STRUCTURE PRODUCED IN PURE METALS BY THE SPLAT COOLING TECHNIQUE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-691 529 20/2
NORTHWESTERN UNIV EVANSTON ILL DEPT OF MATERIALS SCIENCE

THE DEFECT STRUCTURE OF IRON OXIDE, (U)

FEB 68 16P KOCH,F. ;COHEN,J. B. ;
CONTRACT: AF-AFOSR-327-63
PROJ: AF-9763
TASK: 976301
MONITOR: AFOSR 69-1887TR

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ACTA CRYSTALLOGRAPHICA, VB25 PT2 P275-287 FEB 69.

DESCRIPTORS: (*IRON OXIDES, *CRYSTAL LATTICE DEFECTS), SINGLE CRYSTALS, QUENCHING(COOLING), X-RAY DIFFRACTION ANALYSIS (U)
IDENTIFIERS: WUSTITE (U)

THE SUPERSTRUCTURE PEAKS FIRST REPORTED BY MANENC IN QUENCHED SPECIMENS OF FE(1-X)O HAVE BEEN STUDIED IN DETAIL, WITH A SINGLE CRYSTAL OF FEO.9020. THESE PEAKS WERE FOUND TO BE DUE TO PERIODICALLY SPACED CLUSTERS OF VACANCIES, EACH CLUSTER OF NEIGHBORING OCTAHEDRAL CATION SITES BEING GROUPED ABOUT OCCUPIED TETRAHEDRAL CATION SITES. THE CLUSTERS DO NOT APPEAR TO BE REGIONS OF MAGNETITE. STRUCTURE FACTOR CALCULATIONS, BASED ON A MODEL WHERE EACH CLUSTER CONSISTED OF 13 VACANCIES AND 4 TETRAHEDRAL IONS, GIVE SUBSTANTIAL AGREEMENT WITH THE OBSERVED INTENSITIES. SMALL DISPLACEMENTS TOWARDS THIS CLUSTER ARE FOUND FOR THE SURROUNDING CATIONS WHILE DISPLACEMENTS IN THE OPPOSITE SENSE ARE FOUND FOR ANIONS. THE BASIC CLUSTER PERSISTS AT TEMPERATURES IN THE ONE PHASE FIELD, UP TO AT LEAST 1150C AND TO A VALUE OF X = 0.082, ALTHOUGH THE LONG-RANGE PERIODICITY OF THE CLUSTERS IS DESTROYED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-691 798 13/8 11/6
BOEING CO PHILADELPHIA PA VERTOL DIV

TENSILE PROPERTIES OF TI 7AL-4MO HEAVY-SECTION FORGINGS, (U)

JAN 69 28P RAEFSKY,M. ;
REPT. NO. D8-2161-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, TENSILE PROPERTIES), (*FORGING, TITANIUM ALLOYS), ALUMINUM ALLOYS, MOLYBDENUM ALLOYS, HEAT TREATMENT, AGING(MATERIALS) (U)
IDENTIFIERS: TITANIUM ALLOY 7AL 4 MO, FORGINGS (U)

IN GENERAL, BETA FORGING TI 7AL-4MO RESULTS IN LOWER TENSILE PROPERTIES, ESPECIALLY REDUCTION IN AREA. THE BEST COMBINATION OF ANNEALED PROPERTIES OCCURS ON MILL ANNEALING FOLLOWED BY A SINGLE HIGH (1700F) TEMPERATURE ANNEAL. THE BEST COMBINATION OF SOLUTION TREATED PROPERTIES RESULTS FROM LOW TEMPERATURE FORGING, FOLLOWED BY QUENCHING FROM 1720F. YIELD STRENGTH CAN BE INCREASED BY QUENCHING FROM HIGHER TEMPERATURES. OVER AGING AT 1250F RESULTS IN A DECREASE IN TENSILE AND YIELD STRENGTHS, WITH A CORRESPONDING INCREASE IN DUCTILITY. SOLUTION HEAT TREAT TEMPERATURES FOR ALPHA/BETA FORGED MATERIAL SHOULD NOT EXCEED 1720F. TI 7AL-MO, IN GENERAL, IS CAPABLE OF HIGHER SOLUTION TREATED AND AGED STRENGTHS THAN TI 6AL-4V. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-693 455 11/6 13/8 20/11
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

CHANGE IN THE STRUCTURE OF A FRACTURE AND THE IMPACT STRENGTH OF 3X13H7C2 STEEL AS A RESULT OF OVERHEATING IN HOT WORKING UNDER PRESSURE AND HEAT TREATMENT. (U)

JAN 69 9P KONOROVICH,I. E. ;TAMARINA, A. M. ;
REPT. NO. FTD-HT-23-859-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENII. CHERNAYA METALLURGIYA (USSR) V10 N6 P113-116 1967.

DESCRIPTORS: (*STEEL, HOT WORKING), HEAT TREATMENT, FRACTURE(MECHANICS), MATERIAL FORMING, AUSTENITE, DISPERSION HARDENING, GRAIN STRUCTURES(METALLURGY), CRACKS, CRACK PROPAGATION, USSR (U)
IDENTIFIERS: STEEL 3X13H7C2(USSR), TRANSLATIONS (U)

BRITTLE FRACTURE WITH A CRYSTALLINE APPEARANCE MAY DEVELOP IN STEEL OWING TO THE PRESENCE OF PEARLITE AND BAINITE IN THE MICROSTRUCTURE OR OWING TO THE DEVELOPMENT OF TEMPER BRITTLENESS AND OVER HEATING DURING HOT WORKING AND HEAT TREATMENT. THE ARTICLE DEALS WITH CHANGES IN THE STRUCTURAL APPEARANCE OF FRACTURE OF 3X13H7C2 STEEL (0.28 PERCENT C, 2.5 PERCENT SI, 0.55 PERCENT MN, 12.9 PERCENT CR, 6.95 PERCENT NI, 0.20 PERCENT S, 0.025 PERCENT P) DUE TO OVERHEATING DURING DIE FORGING AT 850, 950, 1050, 1150 AND 1200 DEGREES C (DEGREE OF DEFORMATION 40 PERCENT) AND HEAT TREATMENT (QUENCHING FROM 1050 DEGREES IN WATER (40 MIN) PLUS ANNEALING AT 870 DEGREES C (7 HR), COOLING WITH FURNACE PLUS NORMALIZING AT 670 DEGREES C (70 MIN), COOLING IN AIR PLUS QUENCHING FROM 850 DEGREES C (40 MIN) IN OIL. FOLLOWING THIS TREATMENT SPECIMENS OF THE STEEL WERE SUBJECTED TO MECHANICAL TESTS AT ROOM TEMPERATURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-693 524 11/6 13/8
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

IMPACT THERMOMECHANICAL QUENCHING OF ALUMINUM ALLOYS. (U)

JUL 69 10P ANDREEVA,O. I. ;
REPT. NO. FTD-HT-23-319-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF MONO. AKUSTICHESKAYA I MAGNITNAYA OBRABOTKA VESHCHESTV, NOVOCHERKASSK, 1966 P117-120, BY L. THOMPSON.

DESCRIPTORS: (*QUENCHING(COOLING), *ALUMINUM ALLOYS), MELTING, SHOCK(MECHANICS), VIBRATION, STRESSES, DEFORMATION, HARDNESS, USSR (U)
IDENTIFIERS: IMPACT THERMOMECHANICAL QUENCHING, TRANSLATIONS (U)

THE EFFECT OF HYDRAULIC SHOCK AND MECHANICAL VIBRATIONS IN THE PROCESS OF MELTING OF THE ALLOYS D1 AND V95 ON THEIR MECHANICAL PROPERTIES WAS INVESTIGATED. IT WAS ESTABLISHED THAT FOLLOWING THEIR IMPULSIVE THERMOMECHANICAL QUENCHING THE HARDNESS OF SPECIMENS OF THESE ALLOYS IS HIGHER THAN THAT OF CONTROL SPECIMENS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-693 849 11/6 13/8
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

NOTCH SENSITIVITY AFTER VARIOUS METHODS OF THERMOMECHANICAL HARDENING OF STEEL, (U)

FEB 69 6P SHAKHNAZAROV,YU. V. I
REPT. NO. FTD-HT-23-1057-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENNII. CHERNAYA METALLURGIYA (USSR) V11 N2 P115-117 1968, BY L. THOMPSON.

DESCRIPTORS: (*STEEL, HARDENING), NOTCH SENSITIVITY, TENSILE PROPERTIES, HEAT TREATMENT, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

MINIMUM SUSCEPTIBILITY TO PRESSURE CONCENTRATORS IS PROVIDED BY HIGH TEMPERATURE MECHANICAL TREATMENT. DURING TREATMENT AT EQUAL STRENGTH, THE SUSCEPTIBILITY TO PRESSURE CONCENTRATORS AFTER COMBINED THERMOMECHANICAL TREATMENT IS LOWER THAN AFTER LOW TEMPERATURE MECHANICAL TREATMENT. INTERMEDIATE HIGH TEMPERING WITH SUBSEQUENT HARDENING BY QUENCHING, IMPROVES MACHINABILITY BY MEANS OF CUTTING, AND DECREASES THE SUSCEPTIBILITY OF STEEL, SUBJECTED TO THERMOMECHANICAL TREATMENT TO CONCENTRATIONS OF PRESSURES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-695 891 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

WORK HARDENING OF 26KH2NGSM STEEL DURING PLASTIC DEFORMATION IN THE HARDENED STATE, (U)

APR 69 15P ASHMARINA,G. I. ;VASILEVA, A. G. ;KELEKHSAEV,V. YA. ;PROKOSHKIN,D. A.
;
REPT. NO. FTD-MT-24-66-69

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF FIZIKA I KHIMIYA OBRABOTKI MATERIALOV (USSR) N5 P80-85 1968.

DESCRIPTORS: (*MARTENSITE, MECHANICAL WORKING), STEEL, STRAIN HARDENING, DEFORMATION, TEMPERING, REDUCTION OF AREA, DISPERSION HARDENING, YIELD POINT, PLASTICITY, VISCOSITY, STRESS RELIEVING, USSR (U)
IDENTIFIERS: TRANSLATIONS, STRUCTURAL STEEL, WORK HARDENING (U)

THE WORK HARDENING OF 26KH2NGSM STEEL DURING DEFORMATION IN THE MARTENSITE STATE DEPENDING UPON THE DEGREE OF REDUCTION AND TEMPERING WAS INVESTIGATED. IT WAS SHOWN THAT THE EFFECT OF WORK HARDENING AND THE CHARACTER OF THE CHANGE IN PLASTICITY AND VISCOSITY DEPEND ON THE METHOD OF TREATMENT. THE HIGHEST COMPLEX OF PROPERTIES IS OBTAINED DURING TREATMENT BY THE METHOD OF QUENCHING-TEMPERING AT 200 DEGREES - 20 PERCENT REDUCTION. DEFORMATION OF MARTENSITE PROMOTES THE DECELERATION OF THE PROCESSES OF STRESS RELIEF DURING FINAL TEMPERING. THE HIGH VALUES OF THE YIELD POINT AND OF ULTIMATE STRENGTH ARE MAINTAINED DURING HEATING UP TO 400 DEGREES C. WITH TESTING DURING THE BIAXIAL STATE OF STRAIN IT WAS ALSO ESTABLISHED THAT TREATMENT BY THE 'MARFORMING' PROCESS IMPROVES THE PROPERTIES WHICH ARE CHARACTERIZED BY THE STRUCTURAL STRENGTH OF THE INVESTIGATED STEEL. ON THE BASES OF THE OBTAINED RESULTS PROPOSALS WERE FORMULATED ON THE POSSIBLE STRUCTURAL PROCESSES, ENTERING INTO THE FORMATION OF THE PROPERTIES OF STEEL DURING ITS DEFORMATION IN THE MARTENSITE STATE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-696 301 11/6 20/12
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

STRUCTURE AND PROPERTIES OF THE KHN60MVTYU (EP487) ALLOY, (U)

SEP 69 12P ZIMINA,L. N. ;KOSHELEVA,G. F. ;KARDONOV,B. A. ;TSVETKOVA,V. K. ;
REPT. NO. FTD-HT-23-449-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF MONO. STRUKTURA I SVOISTVA ZHAROPROCHNYKH METALLICHESKIKH MATERIALOV (STRUCTURE AND PROPERTIES OF HEAT-RESISTANT METALLIC MATERIALS), MOSCOW 1967 P181-186, BY D. KOOLBECK.

DESCRIPTORS: (*REFRACTORY METALS, NICKEL ALLOYS), (*NICKEL ALLOYS, MECHANICAL PROPERTIES), DISPERSION HARDENING, AGING(MATERIALS), HARDNESS, MICROSTRUCTURE, HEAT TREATMENT, QUENCHING(COOLING), CREEP, ELONGATION, USSR (U)
IDENTIFIERS: TRANSLATIONS, NICKEL ALLOY KHN60MVTYU(USSR), NICKEL ALLOY EP-487(USSR) (U)

THE STRUCTURE AND PROPERTIES OF THE NEW KHN60MTYU (EP487) HEAT-RESISTANT, WROUGHT NICKEL ALLOY (17-20 PERCENT CHROMIUM, 9-11 PERCENT MOLYBDENUM, 4-5 PERCENT TUNGSTEN, 2.2-2.8 PERCENT TITANIUM, 1.0-1.5 PERCENT ALUMINUM, NOT MORE THAN 6 PERCENT IRON AND 0.08 PERCENT CARBON) HAS BEEN INVESTIGATED. THE ALLOY WAS DEVELOPED BY TSNIICHM JOINTLY WITH OTHER INSTITUTIONS AND IS BEING USED FOR THE MANUFACTURE OF WELDED ARTICLES OPERATING AT 750-900 DEGREES CENTIGRADE. THE ALLOY ATTAINS ITS MAXIMUM STRENGTH AFTER AGING AT 800-850 DEGREES CENTIGRADE. ITS HARDNESS INCREASES RAPIDLY DURING THE FIRST 2-3 HOURS AND THEN INCREASES INSIGNIFICANTLY WITH HOLDING TIME INCREASING UP TO 25 HOURS. THE MICROSTRUCTURE OF THE ALLOY, AFTER AGING AT 800 DEGREES CENTIGRADE FOR 10 HOURS, CONSISTS OF A SOLID SOLUTION WITH PRECIPITATES OF THE STRENGTHENING GAMMA-PHASE AT GRAIN BOUNDARIES AND FAIRLY LARGE INCLUSIONS OF CARBIDE PHASES. THE OPTIMAL MECHANICAL PROPERTIES OF THE ALLOY ARE OBTAINED AFTER AIR-QUENCHING FROM 1100-1130 DEGREES CENTIGRADE AND AGING AT 850 DEGREES CENTIGRADE FOR 3 HOURS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-696 503 11/6 20/12 13/8
ILLINOIS INST OF TECH CHICAGO DEPT OF METALLURGICAL ENGINEERING

THE DEFORMATION OF MARTENSITE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
SEP 69 6P BREYER,NORMAN N. I
REPT. NO. IIT-55217-F
CONTRACT: DA-31-124-ARO(D)-420
MONITOR: AROD 5533:6

UNCLASSIFIED REPORT

DESCRIPTORS: (*COLD WORKING, MARTENSITE), (*MARTENSITE, DEFORMATION), PHYSICAL PROPERTIES, MECHANICAL PROPERTIES, TEMPERING, MICROSTRUCTURE, METALLOGRAPHY, DISLOCATIONS, CARBON, INTERACTIONS, STEEL, TEST METHODS (U)
IDENTIFIERS: STEEL 1018, STEEL 1035, STEEL 1045, STEEL 4340 (U)

THE CHANGES IN PHYSICAL AND MECHANICAL PROPERTIES INTRODUCED BY DEFORMING AS-QUENCHED MARTENSITE OF 1018, 1035, 1045 AND 4340 STEEL WERE STUDIED DURING SUBSEQUENT TEMPERING USING SEVERAL TECHNIQUES. TEMPERING IN THE TEMPERATURE RANGE FROM 200 TO 500 F REVEALED A RETARDATION OF TEMPERING. THE RESISTANCE TO TEMPERING WAS OBSERVED DURING USE OF HARDNESS, DILATION, COLOR CARBON AND ELECTRICAL RESISTIVITY TECHNIQUES. A MODEL EMPLOYING A CARBON ATOM-VACANCY INTERACTION WAS FOUND TO BE CONSISTENT WITH THE OBSERVED EFFECTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-697 145 11/6
CALIFORNIA UNIV LOS ANGELES SCHOOL OF ENGINEERING AND APPLIED SCIENCE

RELATION BETWEEN K SUB IC AND MICROSCOPIC STRENGTH FOR LOW ALLOY STEELS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 69 40P MALKIN,JOEL ;TETELMAN,ALAN S. ;
REPT. NO. TR-1, UCLA-69-58
CONTRACT: DAHC04-68-C-0008
MONITOR: AROD 8016:1-MC

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, FRACTURE(MECHANICS)), ARMY RESEARCH, TRANSITION TEMPERATURE, BRITTLENESS, HARDENING (U)
IDENTIFIERS: *LOW ALLOY STEELS, IRRADIATION EMBRITTLEMENT (U)

A SIMPLE MODEL WAS DEVELOPED TO DETERMINE K SUB IC IN TERMS OF THE MICROSCOPIC CLEAVAGE STRENGTH AND THE TENSILE YIELD STRENGTH FOR LOW TEMPERATURE CLEAVAGE FRACTURE IN A302B AND A533 REACTOR GRADE QUENCHED AND TEMPERED STEELS. THE MODEL APPLIES AT SUFFICIENTLY LOW TEMPERATURES OR IN IRRADIATED STEELS WHERE MICROSCOPIC CLEAVAGE STRENGTH < OR = 3.4 TENSILE YIELD STRENGTH. IT WAS DETERMINED THAT MICROSCOPIC CLEAVAGE STRENGTH IS INDEPENDENT OF TEMPERATURE BELOW -150F AND THEN INCREASES WITH INCREASING TEMPERATURE. AT THIS TIME, IT APPEARS THAT MICROSCOPIC CLEAVAGE STRENGTH IS INDEPENDENT OF IRRADIATION. AT TEMPERATURES ABOVE THAT AT WHICH MICROSCOPIC CLEAVAGE STRENGTH < OR = 3.4 TENSILE YIELD STRENGTH, UNSTABLE FRACTURE INITIATES WHEN A CRITICAL PLASTIC STRAIN IS ACHIEVED NEAR TO THE CRACK TIP. THE CRITICAL LOCAL PLASTIC STRAIN FOR UNSTABLE FRACTURE ALSO INCREASES WITH INCREASING TEMPERATURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-697 571 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

HIGH STRENGTH ALLOYS OF THE TI-AL-MO-V SYSTEM, (U)

MAR 69 10P GLAZUNOV,S. G. ;CHINENOV, A. M. ;KHOREV,A. I. ;GRUZDEV,L. A. ; MARTYNOV,M. M. ;
REPT. NO. FTD-MT-24-28-69
PROJ: FTD-6010703

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF TSVETNYE METALLY (USSR) V41 N8 P91-92 1968.

DESCRIPTORS: (*TITANIUM ALLOYS, MECHANICAL PROPERTIES), ALUMINUM ALLOYS, MOLYBDENUM ALLOYS, VANADIUM ALLOYS, HEAT TREATMENT, TENSILE PROPERTIES, PLASTICITY, USSR (U)
IDENTIFIERS: TRANSLATIONS, *TITANIUM ALLOY 2AL 4MO 8V, *TITANIUM ALLOY 2AL 5MO 6V (U)

A STUDY WAS MADE OF SEVERAL TI-AL ALLOYS ALLOYED WITH ONE OR TWO BETA-STABILIZING ELEMENTS (MO AND V). THE ALLOYS WERE CAST INTO 6 KG INGOTS WHICH WERE FORGED INTO BARS 25 MM IN DIAMETER AND FINALLY ROLLED INTO SHEETS 1.5 MM THICK. TO INCREASE THE PLASTICITY OF THE SHEETS, THEY WERE ANNEALED AT 750 DEGREES C AND FURNACE COOLED. SPECIMENS CUT FROM THE SHEETS, WATER-QUENCHED FROM 780 DEGREES C AND AGED AT 480-520 DEGREES C FOR 8 HR WERE TENSILE TESTED. THE OPTIMAL COMBINATION OF MECHANICAL PROPERTIES WAS FOUND IN TI-4MO-8V-2AL-0.05ZR ALLOY (TENSILE STRENGTH 145 KG/MM (TO THE SECOND POWER), ELONGATION 9.5 PERCENT AND REDUCTION OF AREA 40 PERCENT) AND IN TI-5MO-6V-2AL-0.05ZR ALLOY (TENSILE STRENGTH 147 KG/(SQ MM), ELONGATION 7 PERCENT AND REDUCTION OF AREA 30 PERCENT). (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-697 6C3 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

THE EFFECT OF ALLOYING AND HEAT TREATMENT ON THE STRENGTH AND CAVITATION RESISTANCE OF ALLOYS WITH AGE-HARDENABLE MARTENSITE, (U)

MAR 69 14P MALINOV,L. S. ;MASLAKOV,T. M. ;STRIZHAK,V. A. ;
REPT. NO. FTD-HT-23-1147-68
PROJ: FTD-6040102

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF ENERGOMASHINOSTROENIE (USSR) V13 N5 P29-32 1967, BY H. PECK.

DESCRIPTORS: (*STEEL, *CORROSION), (*CAVITATION, CORROSION), MARAGING STEELS, DISPERSION HARDENING, MARTENSITE, NICKEL ALLOYS, COBALT ALLOYS, MOLYBDENUM ALLOYS, EROSION, HARDNESS, USSR (U)
IDENTIFIERS: *CAVITATION CORROSION, TRANSLATIONS (U)

IN AN ATTEMPT TO FIND A CAVITATION-RESISTANT MATERIAL FOR HYDRAULIC TURBINES, TESTS WERE MADE OF SEVERAL LOW-CARBON MARAGING STEELS, N20, N20M2, N20K15, N20TYU, N20M3TYU AND N20K10M5TYU, CONTAINING 0.03 PERCENT CARBON, 19.7-19.85 PERCENT NICKEL, 0-14.75 PERCENT COBALT, AND 0-4.85 PERCENT MOLYBDENUM. AFTER ANNEALING AND QUENCHING, ALL THE STEELS EXCEPT N20K10M5TYU HAS A MARTENSITE CONTENT OF 80-90 PERCENT. WATER-QUENCHED N20K10M5TYU STEEL CONTAINED 45 PERCENT MARTENSITE AND AFTER REFRIGERATION IN LIQUID NITROGEN, 67 PERCENT. HOWEVER, AFTER AGING AT 400-500C THIS STEEL HAD THE HIGHEST HARDNESS, OWING TO THE COMBINED EFFECT OF COBALT, MOLYBDENUM, TITANIUM AND ALUMINUM. N20K10M5TYU STEEL ALSO HAD THE HIGHEST CAVITATION RESISTANCE. IN ANOTHER SERIES OF EXPERIMENTS, SEVERAL PRECIPITATION-HARDENABLE STEELS, SUCH AS 0KH12N4TYU, 00KH14N6M2TYU, 00KH16N4MD2, AND 1KH17N5TYU WERE TESTED. THESE STEELS, AFTER ANNEALING AND QUENCHING, CONTAINED 80-95 PERCENT MARTENSITE. AGING AT 450-600C RAISED THE STEEL HARDNESS TO 400--500 HB. IN THE ANNEALED AND AGED CONDITION THE STEELS HAD A CAVITATION RESISTANCE COMPARABLE TO THAT OF MARAGING STEELS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-699 419 19/4
UNITED STATES STEEL CORP MONROEVILLE PA APPLIED RESEARCH LAB

IMPROVED PROCESSING PROCEDURES FOR HEAT-TREATABLE DUAL-HARDNESS STEEL ARMOR. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 4 SEP 68-4 SEP 69,
DEC 69 91P MANGELLO,SAMUEL J. I
CONTRACT: DAAG46-69-C-0003
PROJ: ARL-39.018-026
MONITOR: AMMRC CR-69-19

UNCLASSIFIED REPORT

DESCRIPTORS: (*ARMOR, MANUFACTURING METHODS), (*STEEL, ARMOR), HARDNESS, ARMOR PLATE, HEAT TREATMENT, CRACKS, CUTTING, CHEMICAL MILLING, SURFACE PROPERTIES, ENCAPSULATION, QUENCHING(COOLING) (U)
IDENTIFIERS: DUAL HARDNESS ARMOR, DECARBURIZING (U)

BECAUSE OF VARIOUS PROCESSING DIFFICULTIES AND A HIGH REJECTION RATE ENCOUNTERED IN THE EARLY COMMERCIALIZATION OF HEAT-TREATABLE DUAL-HARDNESS STEEL ARMOR, EXTENSIVE STUDIES WERE MADE TO SOLVE THESE PROBLEMS. THE PROCESS-TECHNOLOGY STUDY DESCRIBES WORK CULMINATING IN THE MINIMIZATION OF DECARBURIZATION, ELIMINATION OF SURFACE GRINDING, CUTTING OF PLATES WITHOUT EDGE CRACKING, AND ELIMINATION OF QUENCH CRACKING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-700 072 11/6
BATTELLE MEMORIAL INST COLUMBUS OHIO COLUMBUS LABS

MECHANICAL-PROPERTY DATA 300M STEEL: QUENCH AND TEMPERED FORGING. (U)

DEC 69 8P
CONTRACT: F33615-69-C-1115
PROJ: AF-7381
TASK: 738106

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, MECHANICAL PROPERTIES), FORGING, HEAT TREATMENT, DATA (U)
IDENTIFIERS: *STEEL 300-M, HIGH STRENGTH STEELS, STRUCTURAL STEELS (U)

THE MAJOR OBJECTIVES OF THE PROGRAM ARE TO EVALUATE NEWLY DEVELOPED STRUCTURAL MATERIALS OF POTENTIAL AIR FORCE WEAPONS-SYSTEM INTEREST AND THEN TO PROVIDE DATA-SHEET-TYPE PRESENTATIONS OF THESE DATA. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-700 391 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

SHORT-DURATION AND STRESS-RUPTURE STRENGTH OF BETA-ALLOY OF TI-MO-CR-FE-AL SYSTEM AT HIGH TEMPERATURES. (U)

OCT 69 15P AGEEV,N. V. ;GLAZUNOV,S. G. ;PETROVA,L. A. ;TARASENKO,G. N. ; GRANKOVA,L. P. ;
REPT. NO. FTD-MT-24-240-69
PROJ: FTD-6010703

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. FROM AKADEMIYA NAUK SSSR. INSTITUT METALLURGII, MOSCOW. TRUDY, P294-300 1967.

DESCRIPTORS: (*TITANIUM ALLOYS, HEAT-RESISTANT METALS + ALLOYS), MOLYBDENUM ALLOYS, CHROMIUM ALLOYS, IRON ALLOYS, ALUMINUM ALLOYS, THERMAL STABILITY, STRESSES, RUPTURE, CREEP, MICROSTRUCTURE, HEAT TREATMENT, USSR (U)
IDENTIFIERS: TRANSLATIONS, TITANIUM ALLOY 3AL 5.5CR 3FE 7MO (U)

A BETA-ALLOY OF TI CONTG. MO 7, CR 5.5, FE 3, AND AL 3 PERCENT WHEN QUENCHED FROM 800 DEGREES AND AGED AT 550 OR 525 DEGREES FOR 15 HRS. AT 500 DEGREES FOR 20 HRS., AND AT 450 DEGREES FOR 50 HRS. EXHIBITS HIGH MECH. PROPERTIES AT ELEVATED TEMPS. WHEN EXPOSED TO THE ANTICIPATED WORKING TEMP. (350 DEGREES) FOR 100, 500, AND 1000 HRS. ITS MECH. PROPERTIES ARE INFLUENCED SLIGHTLY, INDICATING HIGH THERMAL STABILITY. TO ACCOMPLISH THE HEAT-RESISTANCE TESTS, SPECIMENS 4 MM. IN DIAM. WERE SUBJECTED TO BENDING WITH THE APPLICATION OF CENTRIFUGAL FORCE THAT PERMITTED A SIMULTANEOUS DETN. OF CREEP RESISTANCE AND STRESS-RUPTURE STRENGTH. THE SAMPLES WERE TESTED AT 350 DEGREES IN THE AIR AND THE RATE OF CREEP WAS ASSESSED FROM BENDING INFLECTION. THE MICROSTRUCTURE OF STRAINED SAMPLES AFTER 250 HRS. TESTING DIFFERS SLIGHTLY FROM THAT OF INITIAL SPECIMENS AND THE ONLY CHANGE OBSERVABLE IS THE APPEARANCE OF SUBGRAIN BOUNDARIES IN PRIMARY BETA-GRAINS. SPECIMENS QUENCHED FROM 800 DEGREES AND AGED ACCORDING TO THE REGIME A OR B WERE TESTED AS TO HEAT RESISTANCE AT 20-700 DEGREES. FROM 250 TO 450 DEGREES THEIR MECH. STRENGTH VARIES SLIGHTLY. AT 500 DEGREES IT DECREASES BUT STILL MAINTAINS RELATIVELY HIGH VALUES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-700 626 11/6 13/8
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

INVESTIGATION OF THE FORMATION OF TITANIUM ALUMINIDE TI3AL FROM A SOLID SOLUTION BY THE MODULUS OF ELASTICITY METHOD. (U)

SEP 69 11P KORNILOV,I. I. ;FEDOTOV,S. G. ;NARTOV,T. T. ;
REPT. NO. FTD-MT-24-218-69
PROJ: FTD-6010703

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONO. DIFFUZIONNYE PROTSESSY V METALLAKH (DIFFUSION PROCESSES IN METALS), N.P., 1968 P110-113.

DESCRIPTORS: (*TITANIUM ALLOYS, *HEAT TREATMENT), ALUMINUM ALLOYS, INTERMETALLIC COMPOUNDS, ELASTICITY, USSR (U)
IDENTIFIERS: TITANIUM INTERMETALLICS, TRANSLATIONS (U)

THE EFFECT OF HEAT TREATMENT OF TI-AL ALLOYS OF CONSTITUTION NEAR TO THAT OF TI3AL AND CONTG. 15.9 AND 16.6 PERCENT AL BY WT. ON THEIR MECH. PROPERTIES WERE STUDIED. THE MODULUS OF ELASTICITY E AND THE MODULUS OF TRANSVERSE ELASTICITY G WERE DETD. BY THE RESONANCE METHOD. THE SPECIMENS WERE ANNEALED AT 600 DEGREES FOR 200 HRS., THEN WERE HEATED IN SEALED QUARTZ AMPULS AT 800, 900, 1000, 1100, 1150, 1200, AND 1300 DEGREES FOR 48, 24, 18, 3, 2, 1, AND 0.4 HRS., RESP., AND QUENCHED IN WATER. THE RESULTS OBTAINED SHOW THE CONTINUOUS DECREASE OF E AND G, AS THE QUENCHING TEMPS. INCREASE IN THE RANGE OF 900-1100 DEGREES FOR 15.9 PERCENT AND 900-1150 DEGREES FOR 16.6 PERCENT AL. FURTHER INCREASING OF THESE TEMPS. CAUSED INCREASE OF E AND G. AFTERWARDS THE SPECIMEN OF 15.9 PERCENT AL WAS QUENCHED FROM 1100 DEGREES AGAIN AND THE EFFECT OF THE DURATION OF ITS TEMPERING AT 600, 700, AND 800 DEGREES ON THE PARAMETERS INVESTIGATED WAS STUDIED. G AND E INCREASE ONLY DURING THE 1ST 5-10 HRS. OF TEMPERING AT 600-700 DEGREES. FURTHER HOLDING OF ALLOY AT THESE TEMPS. DID NOT AFFECT THESE PARAMETERS. THE TEMPERING AT 800 DEGREES CAUSED INCREASE OF G AND E ONLY DURING THE 1ST 2 HRS. AND FURTHER HOLDING CAUSED DECREASE OF THESE PARAMETERS DOWN TO VALUES FOR AS-QUENCHED STATE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-702 289 11/6 13/8
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

INVESTIGATION OF WEAR RESISTANCE OF ALUMINUM ALLOYS V95, VAD23 AND D16, (U)

OCT 69 11P KESTNER,O. E. ;SPEKTOROVA, S. I. ;GERASIMOVA,I. I. ;KONDRASHINA,M. V.
;
REPT. NO. FTD-MT-24-282-69
PROJ: FTD-7230278

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF ALYUMINIEVYE SPLAVY (USSR) N5 P176-180 1968.

DESCRIPTORS: (*ALUMINUM ALLOYS, WEAR RESISTANCE), (*HEAT TREATMENT, ALUMINUM ALLOYS), FRICTION, ANODIC COATINGS, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

IN SOME DOMAINS OF TECHNOLOGY IT HAS BECOME NECESSARY TO USE ALUMINUM ALLOYS AS THE MATERIALS OF PARTS OF GEAR AND FRICTION DRIVES (GEARINGS, CAMS, ETC.) WHICH MUST MEET HIGH REQUIREMENTS FOR WEAR RESISTANCE AND PRECISION DIMENSIONING. ANALYSIS SHOWS THAT THE MOST SUITABLE ALLOYS FOR THIS PURPOSE ARE THE ALLOYS V95, VAD23 AND D16 PROVIDED THAT THEY ARE SUBJECTED TO THE FOLLOWING REGIMES OF HEAT TREATMENT TO ASSURE SATISFACTORY DIMENSIONAL STABILITY AND MECHANICAL PROPERTIES: (A) V95, QUENCHING FROM 470 PLUS OR MINUS 5 DEGREES CENTIGRADE, COOLING IN 80 DEGREES CENTIGRADE WATER, AGING AT 140 PLUS OR MINUS 5 DEGREES CENTIGRADE FOR 16 HR; (B) D16, QUENCHING FROM 500 PLUS OR MINUS 5 DEGREES CENTIGRADE, COOLING IN 80 DEGREES CENTIGRADE WATER, AGING AT 190 PLUS OR MINUS 5 DEGREES CENTIGRADE FOR 12 HR; (C) VAD23, QUENCHING FROM 525 PLUS OR MINUS 5 DEGREES CENTIGRADE, COOLING IN 20 DEGREES CENTIGRADE WATER, AGING AT 190 PLUS OR MINUS 5 DEGREES CENTIGRADE FOR 12 HR. ACCORDINGLY, FOLLOWING THIS HEAT TREATMENT, SPECIMENS OF THE ABOVE ALLOYS WERE SUBJECTED TO WEAR TESTS IN KH-2 AND AMSLER FRICTION MACHINES. THESE TESTS SHOWED THAT THE MAXIMUM WEAR RESISTANCE IS DISPLAYED BY THE ALLOY V95 WHEN HARDENED BY MEANS OF HEAT TREATMENT TO A BRINELL HARDNESS OF 150-180 KG/SQ MM. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-702 912 19/6 13/8 11/6
WATERVLIET ARSENAL N Y

SOME OBSERVATIONS ON THE RELATIONSHIP BETWEEN MICROSTRUCTURE AND MECHANICAL PROPERTIES IN LARGE CYLINDRICAL GUN TUBE FORGINGS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAR 70 38P DEFRIES,RICHARD S. ;NOLAN, CHARLES J. ;BRASSARD,THERESA V. ;
REPT. NO. WVT-7018
PROJ: DA-1-C-024401-A-110, DA-1-T-062105-A-328

UNCLASSIFIED REPORT

DESCRIPTORS: (*GUN BARRELS, MECHANICAL PROPERTIES), MICROSTRUCTURE, FORGING, MARTENSITE, BAINITE, TENSILE PROPERTIES, HEAT TREATMENT, IMPACT TESTS, NOTCH TOUGHNESS (U)

A SERIES OF LABORATORY ISOTHERMAL AND CONTINUOUS COOLING HEAT-TREATMENTS WERE EMPLOYED TO DEVELOP AND CHARACTERIZE THE LOW TEMPERATURE TRANSFORMATION PRODUCTS OR MICROSTRUCTURES WHICH COULD BE PRESENT IN COMMERCIALLY PRODUCED LARGE GUN TUBE FORGINGS. THE TENSILE MECHANICAL PROPERTIES, HARDNESS AND CHARPY V-NOTCH IMPACT TRANSITION CURVES WERE DETERMINED FOR EACH OF THE VARIOUS MICROSTRUCTURES PRODUCED. OF THE THREE MICROSTRUCTURES (MARTENSITE AND TWO BAINITES) EVALUATED, TEMPERED MARTENSITE PRODUCED THE BEST COMBINATION OF STRENGTH AND TOUGHNESS. CONTINUOUS COOLING HEAT TREATING STUDIES WERE USED TO DEMONSTRATE THAT A FULLY MARTENSITIC MICROSTRUCTURE COULD BE PRODUCED AT THE MID-RADIUS OF FULL SIZE LARGE GUN TUBE FORGINGS. LOW YIELD STRENGTHS AND IMPACT ENERGIES WERE CORRELATED WITH THE TEMPERED BAINITIC STRUCTURES PRODUCED BY TRANSFORMING OR QUENCHING THE GUN STEEL FORGINGS TOO SLOWLY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-703 120 19/6 11/6
WATERVLIET ARSENAL N Y

VARIATION IN MECHANICAL PROPERTIES OF TEMPERED MARTENSITE GUN STEEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAR 70 22P BALDREY,DOUGLAS ILYONS,
THOMAS I
REPT. NO. WVT-7020
PROJ: M1-8-23022

UNCLASSIFIED REPORT

DESCRIPTORS: (*ORDNANCE STEEL, MECHANICAL PROPERTIES), (*GUN BARRELS, ORDNANCE STEEL), HEAT TREATMENT, MARTENSITE, MICROSTRUCTURE (U)

THE PURPOSE OF THE INVESTIGATION WAS TO DETERMINE THE LEVEL AND REPRODUCIBILITY OF MECHANICAL PROPERTIES IN THE PRESENT GUN TUBE MATERIALS, QUENCHED TO A UNIFORM MICROSTRUCTURE OF 100% MARTENSITE AND TEMPERED TO YIELD STRENGTH RANGES OF 140-160,000 PSI AND 160-180,000 PSI. REHEAT TREATMENT OF SMALL SECTIONS OF GUN TUBE MATERIAL RESULTS IN A FINER, MORE UNIFORM MARTENSITIC STRUCTURE THAN EXISTED IN THE ORIGINAL TUBE. THESE RESULTS SHOULD REPRESENT THE MINIMUM VARIATION IN MECHANICAL PROPERTIES THAT CAN BE EXPECTED IN OUR PRESENT GUN TUBE MATERIAL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-704 400 13/8 11/6
DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA

QUENCHING (COOLING). VOLUME I. (U)

DESCRIPTIVE NOTE: REPORT BIBLIOGRAPHY JUN 61-SEP 69.
APR 70 156P
REPT. NO. DDC-TAS-70-28-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*QUENCHING(COOLING), *BIBLIOGRAPHIES), HEAT TRANSFER, BERYLLIUM ALLOYS, NICKEL ALLOYS, ALUMINUM ALLOYS, TITANIUM ALLOYS, STEEL, REFRACTORY METALS, REFRACTORY METAL ALLOYS, GOLD ALLOYS, PALLADIUM ALLOYS, IRON, SUBMARINE HULLS, ROCKET CASES, GUN COMPONENTS, MACHINE TOOLS, WELDING, HEAT TREATMENT, MECHANICAL PROPERTIES (U)
IDENTIFIERS: BINARY SYSTEMS(ALLOYS), TERNARY SYSTEMS(ALLOYS) (U)

THE REFERENCES IN THE BIBLIOGRAPHY DEAL WITH VARIOUS TECHNIQUES OF QUENCHING METALS AND ALLOYS TO OPTIMIZE THEIR PROPERTIES. TESTS OF THE TREATED MATERIALS ARE MADE IN THE PRODUCTION OF SUBMARINE HULLS, ROCKET CASES, GUN COMPONENTS AND MACHINE TOOLS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-705 920 11/6 13/8
ILLINOIS INST OF TECH CHICAGO

INFLUENCE OF DEFORMATION ON THE TEMPERING OF 1045 MARTENSITE, (U)

JUL 69 14P MILLER,M. F. ;BREYER,N. N. ;
CONTRACT: DA-31-124-ARO(D)-420
PROJ: DA-2-0-061102-B-32-D
MONITOR: AROD 5533:3-MC

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN TRANSACTIONS OF THE ASM, V62 P891-901 1969.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 9 MAY 69.

DESCRIPTORS: (*MARTENSITE, TEMPERING), DEFORMATION, STEEL (U)
IDENTIFIERS: STEEL 1045 (U)

AS-QUENCHED MARTENSITIC 1045 STEEL BARS WERE PLASTICALLY DEFORMED BY DRAWING THROUGH A DIE. HARDNESS, DILATION, AND COLOR CARBON (EGGERTZ TEST) WERE USED TO FOLLOW THE CHANGES DURING TEMPERING TO 800 F AS A FUNCTION OF DEFORMATION. THE DEFORMED STEEL INCREASED IN DENSITY WITH DEFORMATION, AND THE PRECIPITATION OF CARBIDES WAS RETARDED UPON TEMPERING. THE CARBON-VACANCY ATTRACTION MODEL IS FOUND TO BE CONSISTENT WITH THE OBSERVED EFFECTS OF PLASTICALLY DEFORMED AS-QUENCHED MARTENSITE. THE EFFECTS CAN BE RATIONALIZED ON THE BASIS THAT EACH VACANCY CAN TIE UP AT LEAST TWO CARBON ATOMS, EFFECTIVELY TAKING THE ATOMS OUT OF SOLUTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-706 842 11/6 13/8
EDGEWOOD ARSENAL MD

SUCCESSFUL GAS QUENCHING OF 6061 ALUMINUM ALLOY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. JUL 66-JUL 67, APR 70 34P GURTNER,FRANCIS B. ;SHUTT, PAUL K. , JR.;KIRK,FRANK T. , JR;
REPT. NO. EA-TR-4375

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *QUENCHING(COOLING)), CARBON DIOXIDE, BRAZING (U)
IDENTIFIERS: GAS QUENCHING, ALUMINUM ALLOY 6061 (U)

THE INVESTIGATION WAS DIRECTED TOWARD GAS QUENCHING OF THIN WALLED ITEMS (0.040 THICKNESS). IT HAS NOT, HOWEVER, BEEN LIMITED JUST TO THICKNESS OF MATERIAL BUT ALSO TO DESIGN AND QUALITY REQUIREMENTS THAT DO NOT LEND THEMSELVES TO CONVENTIONAL QUENCHING METHODS. GAS QUENCHING REQUIREMENTS ARE MANY, BUT THE FOLLOWING CHARACTERISTICS ARE BEING INVESTIGATED: (1) GAS ENTRANCE AND EXIT - NUMBER OF ORIFICES AND ORIENTATION; (2) VOLUME OF GAS (CFH) PER LOAD - CROSS SECTION OF MATERIAL BEING QUENCHED; AND (3) DISTRIBUTION SYSTEM - ESSENTIAL AND RELATIVE TO TYPE OF FURNACE AND PART CONFIGURATION. THE PROGRESSIVE ATTITUDE THROUGHOUT THE INVESTIGATION PROVED THAT CONTAINERS CAN BE GAS QUENCHED TO A T-4 SOLUTION CONDITION, AGED TO T-6, AND VERIFIED BY PHYSICAL PROPERTIES AND HARDNESS VALUES. THE PHYSICAL PROPERTIES AND HARDNESS VALUES HAVE BEEN TAKEN OVER SEVERAL HUNDRED ACTUAL HARDWARE ITEMS TO DETERMINE THE BANK WIDTH OR VARIATION. IF SIMULATED SAMPLES WERE USED IN THE GAS QUENCHING PROCESS, EXTRAPOLATION WOULD BE NECESSARY. NONE OF THE CONTAINERS WERE DISTORTED IN THIS PROCESS. THE QUENCHING BY GAS FROM 980F IS ACCOMPLISHED IN THE SAME CONTAINER OR FURNACE AS THE HEATING AND SOAK TIME. IN ORDER TO MAINTAIN PHYSICAL PROPERTIES, MATERIAL MUST BE REMOVED FROM THE FURNACE IN A VERY SHORT PERIOD OF TIME TO REDUCE THE EFFECT OF RESIDUAL HEATING. SUCCESSFUL GAS QUENCHING WAS ACCOMPLISHED IN A RETORT DEVELOPED BY EDGEWOOD ARSENAL PERSONNEL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-707 740 11/6 20/12
LOCKHEED-GEORGIA CO MARIETTA MATERIALS RESEARCH AND DEVELOPMENT LAB

MECHANISM OF SUPERPLASTICITY IN AL-78%ZN ALLOY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. NO. 3, 20 JUN 69-20 JUN 70,
JUN 70 32P UNDERWOOD,ERVIN E. ;LEE, ENU U. ;KRANZLEIN,HARVARD H. ;
CONTRACT: N00014-67-C-0503
PROJ: NR-031-723

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM, DEFORMATION), (*ZINC ALLOYS, DISLOCATIONS), ALUMINUM ALLOYS, PLASTICITY, HEAT OF ACTIVATION, RECOVERY (U)
IDENTIFIERS: SUPERPLASTICITY (U)

ACTIVATION ENERGIES WERE OBTAINED FOR DYNAMIC RECOVERY AND FOR TENSILE DEFORMATION. THE VALUES FOR DEFORMATION ARE DELTA H SUB D = 22.5 PLUS OR MINUS 3.5 KCAL/MOL (AT LOW TEMPERATURES) AND DELTA H SUB D = 37.5 PLUS OR MINUS 2.5 KCAL/MOL (AT HIGH TEMPERATURES). THESE TWO ACTIVATION ENERGIES ARE RELATED TO THE RATE-CONTROLLING PROCESSES OF CROSS-SLIP AND DISLOCATION CLIMB, RESPECTIVELY. THUS, THE ACTIVATION ENERGY FOR DYNAMIC RECOVERY, DELTA H SUB R = 22 KCAL/MOL, CORRESPONDS TO THE CROSS-SLIP OF SCREW DISLOCATIONS, WHICH LEADS TO THE FORMATION OF STABLE DISLOCATION NETWORKS AND DISLOCATION-FREE SUB-GRAINS. AT HIGHER DEFORMATION TEMPERATURES, DISLOCATION CLIMB PREDOMINATES, AND SUBBOUNDARY DISINTEGRATION AND COALESCENCE OF SUBGRAINS ARE OBSERVED. DISLOCATION LOOPS HAVE BEEN REPORTED MOSTLY IN FCC METALS AND ALLOYS AFTER QUENCHING FROM ELEVATED TEMPERATURES AND SUBSEQUENT AGING. THIS PAPER REPORTS THE FORMATION AND CHARACTERISTICS OF DISLOCATION LOOPS IN THE HCP ZN-0.7%AL ALLOY RESULTING FROM QUENCHING AND AGING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-709 043 11/6
BOEING CO RENTON WASH COMMERCIAL AIRPLANE GROUP

USE OF PRECRACKED SPECIMENS IN SELECTING HEAT TREATMENTS FOR STRESS-CORROSION RESISTANCE IN HIGH-STRENGTH ALUMINUM ALLOYS, (U)

NOV 69 21P HYATT,MICHAEL V. ;
REPT. NO. D6-24467
CONTRACT: N00014-66-C-0365, ARPA ORDER-878

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *STRESS CORROSION), (*HEAT TREATMENT, ALUMINUM ALLOYS), CANTILEVER BEAMS, CRACK PROPAGATION, AGING(MATERIALS), QUENCHING(COOLING) (U)
IDENTIFIERS: ALUMINUM ALLOY 7075 (U)

THREE TECHNIQUES USING PRECRACKED DOUBLE CANTILEVER BEAM (DCB) SPECIMENS WERE EMPLOYED TO MEASURE RESISTANCE TO STRESS-CORROSION CRACK PROPAGATION AS A FUNCTION OF THE DEGREE OF OVERAGING IN THE ALLOY 7075. TWO TECHNIQUES USED SINGLE DCB SPECIMENS CONTAINING AGING GRADIENTS ALONG THEIR LENGTHS. THE THIRD TECHNIQUE USED MULTIPLE DCB SPECIMENS, EACH ONE HAVING A DIFFERENT HEAT TREATMENT. ALL THREE TECHNIQUES GAVE SIMILAR RESULTS, BUT STRESS-CORROSION RESISTANCE AS A FUNCTION OF HEAT TREATMENT WAS DETERMINED MOST RAPIDLY USING SEPARATE DCB SPECIMENS HAVING DIFFERENT HEAT TREATMENTS. DATA FROM THIS STUDY SUGGEST THAT DCB SPECIMENS WOULD BE USEFUL IN SEVERAL OTHER STRESS-CORROSION STUDY AREAS, INCLUDING THAT OF THERMOMECHANICAL TREATMENTS FOR ALUMINUM ALLOYS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-709 047 11/6
BOEING CO RENTON WASH COMMERCIAL AIRPLANE GROUP

USE OF PRECRACKED SPECIMENS IN STRESS-CORROSION TESTING OF HIGH-STRENGTH ALUMINUM ALLOYS. (U)

NOV 69 58P HYATT,MICHAEL V. I
REPT. NO. D6-24466
CONTRACT: N00014-66-C-0365, ORDER-878

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *STRESS CORROSION), (*HEAT TREATMENT, ALUMINUM ALLOYS), CANTILEVER BEAMS, CRACK PROPAGATION, QUENCHING(COOLING), SODIUM CHLORIDE (U)
IDENTIFIERS: ALUMINUM ALLOY 7075, ALUMINUM ALLOY 7079, ALLUMIUM ALLOY 2024 (U)

RESISTANCE TO STRESS-CORROSION CRACKING OF 10 HIGH-STRENGTH ALUMINUM ALLOYS IN A VARIETY OF HEAT-TREATMENT CONDITIONS WAS MEASURED USING PRECRACKED DOUBLE CANTILEVER BEAM (DCB) SPECIMENS. A NEW TECHNIQUE IS DESCRIBED, AND STRESS-CORROSION CRACK GROWTH RATES FOR THE ALLOYS TESTED ARE PRESENTED AS A FUNCTION OF THE PLANE-STRAIN STRESS INTENSITY K(I). DOUBLE CANTILEVER BEAM SPECIMEN DATA CORRELATED WITH ESTABLISHED TRENDS FROM SMOOTH SPECIMENS TESTED BY ALTERNATE IMMERSION IN 3.5% NACL SOLUTION.

FROM THE CRACK GROWTH RATE DATA AND THE SPEED AND SIMPLICITY WITH WHICH IT IS OBTAINED, IT IS CONCLUDED THAT THE DCB SPECIMEN WILL BE HIGHLY USEFUL FOR (1) COMPARING AND RATING ALLOYS, (2) DEVELOPING NEW ALLOYS AND HEAT TREATMENTS, (3) COMPARING THE EFFECTS OF ENVIRONMENTS, (4) ACHIEVING OR ENSURING PRODUCT UNIFORMITY, AND (5) STUDYING MECHANISMS OF CRACKING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-709 050 11/6
BOEING CO RENTON WASH COMMERCIAL AIRPLANE GROUP

EFFECT OF QUENCHING RATE ON STRESS-CORROSION CRACK GROWTH RATES IN 2024-T4 ALUMINUM, (U)

NOV 69 12P HYATT,MICHAEL V. I
REPT. NO. D6-24471
CONTRACT: N00014-66-C-0365, ARPA ORDER-878

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *STRESS CORROSION), (*HEAT TREATMENT, ALUMINUM ALLOYS), CANTILEVER BEAMS, CRACK PROPAGATION, QUENCHING(COOLING) (U)
IDENTIFIERS: ALUMINUM ALLOY 2024 (U)

STRESS-CORROSION CRACK GROWTH RATES IN DOUBLE CANTILEVER BEAM SPECIMENS OF 2024-T4 ALUMINUM QUENCHED AT TWO RATES FROM THE SOLUTION-TREATMENT TEMPERATURE WERE COMPARED. THE SPECIMENS QUENCHED AT THE SLOWER RATE HAD THE FASTER CRACK GROWTH RATE. THIS FINDING AGREES WITH DATA FROM OTHER STUDIES IN WHICH INTERGRANULAR CORROSION SUSCEPTIBILITY WAS DETERMINED BY MEASURING PERCENT LOSS IN TENSILE STRENGTH OF PREEXPOSED SHEET TENSION SPECIMENS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-709 051 11/6
BOEING CO RENTON WASH COMMERCIAL AIRPLANE GROUP

EFFECTS OF RESIDUAL STRESSES ON STRESS-CORROSION CRACK GROWTH RATES IN ALUMINUM ALLOYS. (U)

NOV 69 23P HYATT,MICHAEL V. I
REPT. NO. D6-24469
CONTRACT: N00014-66-C-0365, ARPA ORDER-878

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *STRESS CORROSION), (*HEAT TREATMENT, ALUMINUM ALLOYS), CANTILEVER BEAMS, CRACK PROPAGATION, QUENCHING(COOLING) (U)
IDENTIFIERS: ALUMINUM ALLOY 7075, ALUMINUM ALLOY 7079, ALUMINUM ALLOY 7175 (U)

STRESS-CORROSION CRACK GROWTH RATE DATA OBTAINED AS A FUNCTION OF THE PLANE-STRAIN STRESS INTENSITY USING DOUBLE CANTILEVER BEAM SPECIMENS OF 7079, 7075, AND 7175 ARE PRESENTED. THE EFFECTS OF QUENCHED-IN RESIDUAL STRESSES ON CRACK GROWTH RATES IN SPECIMENS OF THIS DESIGN ARE DISCUSSED, AND METHODS OF ELIMINATING THE RESIDUAL-STRESS PROBLEM ARE PRESENTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-710 130 18/10 11/6
NAVAL RESEARCH LAB WASHINGTON D C

EXPERIMENTAL DEVELOPMENT OF RADIATION RESISTANT 85,
000 PSI YIELD STRENGTH REACTOR VESSEL LOW ALLOY
STEEL FILLER METAL (PRE-IRRADIATION EVALUATION), (U)

FEB 70 8P HAWTHORNE,J. R. (GRANT,S.
P. (FORTNER,EDWARD)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ASME PAPER NO. 70-MET-
3.
SUPPLEMENTARY NOTE: PRESENTED AT THE ASME METALS
ENGINEERING CONFERENCE AND AWS WELDING SHOW,
CLEVELAND, OHIO, 20-24 APR 70.

DESCRIPTORS: (*REACTOR MATERIALS, *STEEL),
RADIATION DAMAGE, EMBRITTLEMENT, MICROSTRUCTURE,
CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, COPPER ALLOYS,
NICKEL ALLOYS, MANGANESE ALLOYS, MECHANICAL
PROPERTIES (U)

SMALL AMOUNTS OF COPPER ARE KNOWN TO ENHANCE THE
550 F RADIATION EMBRITTLEMENT SENSITIVITY OF ALLOY
STEEL PLATE AND WELD METALS. PREIRRADIATION DATA
ARE PRESENTED FROM A STATISTICAL PROGRAM AIMED AT
DEFINING COMPOSITION LIMITS OF A NEW WELD METAL FOR
QUENCHED AND TEMPERED A543 AND A542 STEELS BASED
ON 2-1/4CR-1MO AND VARYING COPPER, NICKEL, AND
MANGANESE. AS-WELDED PLUS STRESS RELIEF NOTCH
DUCTILITY PROPERTIES ARE MUCH IMPROVED WHEN THE
MANGANESE CONTENT IS KEPT LOW (0.75 PERCENT).
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-710 521 13/5 13/8
BATTELLE MEMORIAL INST COLUMBUS OHIO

EFFECT OF FLAME AND MECHANICAL STRAIGHTENING ON MATERIAL PROPERTIES OF WELDMENTS. (U)

DESCRIPTIVE NOTE: SUMMARY REPT.,
70 50P PATTEE,H. E. ;EVANS,R. M. ;MONROE,R. E. ;
CONTRACT: N00024-68-C-5324
PROJ: SR185
MONITOR: SSC 207

UNCLASSIFIED REPORT

DESCRIPTORS: (*WELDS, ALIGNMENT), STEEL, HEAT TREATMENT, MECHANICAL WORKING, DISTORTION, REMOVAL (U)
IDENTIFIERS: *METAL STRAIGHTENING (U)

AN EXPERIMENTAL STUDY WAS CONDUCTED TO DETERMINE THE EFFECTS OF MECHANICAL STRAIGHTENING AND FLAME STRAIGHTENING ON THE PROPERTIES OF STEELS USED IN SHIPBUILDING. THE STEELS INVESTIGATED DURING THIS PROGRAM INCLUDED AN ORDINARY CARBON STEEL (ABS-B), TWO LOW-ALLOY, HIGH-STRENGTH STEELS (A441 AND A537), AND A QUENCHED AND TEMPERED STEEL (A517, GRADE A). THE REMOVAL OF DISTORTION IN UNWELDED AND WELDED TEST PLATES WAS ACCOMPLISHED BY (1) MECHANICAL STRAIGHTENING AT ROOM TEMPERATURE, 1000F, 1300F, AND (2) FLAME STRAIGHTENING IN THE TEMPERATURE RANGES OF 1100-1200F AND 1300-1400F. CONTROLLED AMOUNTS OF DISTORTION WERE PROVIDED IN UNWELDED PLATE BY MECHANICAL BENDING; DISTORTION IN WELDED PLATES WAS PROVIDED BY JIGGING THE RESTRAINT CONTROL. DROP-WEIGHT TEAR TESTS WERE CONDUCTED TO ASSESS THE EFFECT OF THE STRAIGHTENING PARAMETERS ON THE NOTCH-TOUGHNESS BEHAVIOR OF THE RESPECTIVE STEELS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-710 789 11/6
CASE WESTERN RESERVE UNIV CLEVELAND OHIO DIV OF METALLURGY AND MATERIALS SCIENCE

THE INFLUENCE OF STRUCTURAL PARAMETERS ON THE YIELD STRENGTH OF TEMPERED MARTENSITE AND LOWER BAINITE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUL 70 33P SMITH,D. W. IHEHEMANN,R. F. 1
REPT. NO. TR-1
CONTRACT: N00014-67-A-0404-0001
PROJ: NR-031-717

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, *TEMPERING), MARTENSITE, BAINITE, TENSILE PROPERTIES, DISPERSION HARDENING, GRAIN STRUCTURES(METALLURGY) (U)
IDENTIFIERS: STEEL 4340 (U)

THE CONTRIBUTIONS TO THE YIELD STRENGTH OF TEMPERED MARTENSITIC AND BAINITIC STRUCTURES WAS EXAMINED IN 4340 STEEL. THE PRINCIPAL FACTORS THAT CONTRIBUTE TO THE REDUCTION IN YIELD STRENGTH WITH TEMPERING IN THE RANGE FROM 600 TO 1000F ARE CARBIDE COARSENING AND ENLARGEMENT OF THE CELLULAR SUBSTRUCTURE. THE YIELD STRENGTH OF BOTH TEMPERED MARTENSITIC AND BAINITIC STRUCTURES CAN BE DESCRIBED IN TERMS OF CELL SIZE AND DISPERSOID DISTRIBUTION BY A SINGLE RELATIONSHIP IN WHICH THE OROWAN MODEL IS EMPLOYED FOR THE CONTRIBUTION FROM DISPERSION HARDENING AND THE LANGFORD-COHEN MODEL FOR THAT FROM CELL SIZE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-710 807 11/6
POLYTECHNIC INC OF BROOKLYN N Y DEPT OF PHYSICAL AND ENGINEERING METALLURGY

FIRST AND SECOND ORDER PHASE CHANGES IN SPLAT COOLED AU-CD AND AU-ZN ALLOYS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 69 31P FERRAGLIO,PAUL ;MUKHERJEE,K. ;CASTLEMAN,L. S. ;
REPT. NO. TR-1
CONTRACT: N00014-67-A-0438-0002
PROJ: NR-031-731

UNCLASSIFIED REPORT

DESCRIPTORS: (*GOLD ALLOYS, PHASE STUDIES), CADMIUM ALLOYS, ZINC ALLOYS, COOLING, GRAIN STRUCTURES(METALLURGY) (U)
IDENTIFIERS: SPLAT COOLING (U)

X-RAY DIFFRACTION, TRANSMISSION ELECTRON MICROSCOPY AND SELECTED AREA ELECTRON DIFFRACTION STUDIES WERE PERFORMED ON SPLAT COOLED EQUI-ATOMIC AU-CD AND AU-ZN ALLOYS. A VERTICAL SHOCK-TUBE APPARATUS IS USED FOR SPLAT QUENCHING SAMPLES FROM VARIOUS TEMPERATURES. A SUBSTANTIAL INCREASE IN SUPERLATTICE LINE INTENSITIES WERE OBSERVED FOR BOTH ALLOYS AFTER SPLAT COOLING. THIS RESULT WAS TENTATIVELY INTERPRETED IN TERMS OF THE FORMATION OF PREFERENTIAL SUBLATTICE VACANCIES. A NEW MORPHOLOGY AND CRYSTAL STRUCTURE OF THE MARTENSITIC PHASE IN SPLAT COOLED AU-CD ALLOY WERE OBSERVED AND A PERIODICALLY FAULTED MARTENSITE LIKE PHASE WAS OBSERVED IN A SPLAT COOLED 50 AT.% AU-ZN ALLOY. ALSO OBSERVED IN THE SPLAT COOLED AU-ZN ALLOY WAS A HITHERTO UNREPORTED MODULATED STRUCTURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-712 474 11/6
PENNSYLVANIA UNIV PHILADELPHIA SCHOOL OF METALLURGY AND MATERIALS SCIENCE

PLASTIC PROPERTIES AND FRACTURE OF TITANIUM-ALUMINUM ALLOYS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 27 MAY 68-26 MAY 69, JUL 69 33P TRUAX,D. J. ;MCMAHON,C. J. , JR;
CONTRACT: N00019-68-C-0384

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, *STRESS CORROSION), ALUMINUM ALLOYS, PLASTICITY, FRACTURE(MECHANICS), STRAIN(MECHANICS) (U)

A PROGRAM OF RESEARCH WAS CONDUCTED TO DETERMINE THE EFFECTS OF AL CONTENT AND TI3AL PRECIPITATION O THE MICRO- AND MACROPLASTIC BEHAVIOR OF TI-AL ALLOYS, AND ALSO TO INVESTIGATE THE EFFECTS OF AL CONTENT AND TI3AL ON THE SUSCEPTIBILITY TO, AND MECHANISM OF, STRESS CORROSION CRACKING IN A METHANOL - 1.5% HCL ENVIRONMENT. THE TENSILE MICROSTRAIN PARAMETERS SIGMA SUB E AND SIGMA SUB A INCREASE WITH AL CONTENT. TESTS ON AGED TI-6 AND TI-8 WT. % AL MATERIAL INDICATE THAT THE INFLUENCE OF TI3AL ON THE MICROSTRAIN PARAMETERS AND FLOW STRESS IS ATHERMAL. STRESS CORROSION SPECIMENS WHICH HAD BEEN SOLUTION TREATED AND QUENCHED FAILED PRIMARILY BY INTERGRANULAR PARTING. SPECIMENS IN THE AGED CONDITION EXHIBIT A MIXTURE OF CLEAVAGE FRACTURES AND SOME INTERGRANULAR PARTING. IT IS THOUGHT THAT STRESS CORROSION FAILURE IN TI-AL ALLOYS PROCEEDS AS A CONSEQUENCE OF ANODIC DISSOLUTION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-712 485 13/8
PHILCO-FORD CORP NEWPORT BEACH CALIF AERONUTRONIC DIV

PRELIMINARY THERMOMECHANICAL TREATMENT OF D6AC STEEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
OCT 70 29P KOPPENAAL,THEODORE J. ;
REPT. NO. TR-1
CONTRACT: N00014-70-C-0223
PROJ: NR-031-742

UNCLASSIFIED REPORT

DESCRIPTORS: (*HEAT TREATMENT, *STEEL), DEFORMATION, MECHANICAL PROPERTIES (U)
IDENTIFIERS: STEEL D6AC, *THERMOMECHANICAL TREATMENT (U)

THE EFFECT OF PRELIMINARY THERMOMECHANICAL TREATMENT ON THE STRENGTH, ELONGATION, HARDNESS, X-RAY LINE BROADENING, AND PRIOR AUSTENITE GRAIN SIZE OF D6AC STEEL WAS INVESTIGATED. IN THIS TYPE OF TREATMENT THE DEFORMATION IS PERFORMED PRIOR TO AUSTENITIZING, AND RAPID RATE HEATING TO THE AUSTENITIZING TEMPERATURE MUST BE USED. THE RESPONSE TO PRELIMINARY THERMOMECHANICAL TREATMENT WAS DETERMINED AS A FUNCTION OF PRIOR STRUCTURE, AMOUNT OF PRIOR DEFORMATION, AUSTENITIZING TEMPERATURE AND TIME, PRE-AUSTENITIZING HEAT TREATMENT, AND TEMPERING TEMPERATURE. THUS FAR, THE YIELD STRENGTH HAS BEEN INCREASED ABOUT 25 PERCENT ALONG WITH A SIGNIFICANT INCREASE IN TENSILE ELONGATION FOR SOME TEMPERING TEMPERATURES. THE TENSILE STRENGTH, HOWEVER, REMAINS ESSENTIALLY CONSTANT. A COMPARISON OF THE X-RAY LINE BROADENING AND YIELD STRENGTH MEASUREMENTS INDICATES THAT THESE PARAMETERS ARE BEING INFLUENCED BY THE SAME STRUCTURAL CHANGES. THE RESULTS ARE EXPLAINED ON THE BASIS OF A RETENTION OF THE WORK HARDENED STRUCTURE (INTRODUCED DURING THE PRIOR DEFORMATION) THROUGH THE AUSTENITE AND MARTENSITE TRANSFORMATIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-712 809 11/6
RENSSELAER POLYTECHNIC INST TROY N Y MATERIALS DIV

TRANSMISSION ELECTRON MICROSCOPY STUDY OF AL-ZN-MG. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
OCT 70 28P JUDD,G. ISHASTRY,C. R. 1
REPT. NO. TR-1
CONTRACT: N00014-67-A-0117-0009

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, GRAIN STRUCTURES(METALLURGY)), ELECTRON MICROSCOPY, MICROSTRUCTURE, ZINC ALLOYS, MAGNESIUM ALLOYS, GRAIN BOUNDARIES (U)

THE EFFECT OF QUENCH RATE ON THE DISTRIBUTION OF PRECIPITATES IN THE MATRIX AND AT THE GRAIN BOUNDARIES WITH SPECIAL ATTENTION TO THE FORMATION OF GRAIN BOUNDARY PRECIPITATE FREE ZONES IN AN AL-ZN-MG ALLOY AGED AT TWO DIFFERENT TEMPERATURES WAS STUDIED BY TRANSMISSION ELECTRON MICROSCOPY. FOR RELATIVELY FAST QUENCHED SPECIMENS, DEFINITE CORRELATION WAS FOUND TO EXIST BETWEEN THE WIDTH OF PRECIPITATE FREE ZONES AND THE EXTENT OF GRAIN BOUNDARY PRECIPITATION. THE VARIATION OF PRECIPITATE FREE ZONE WIDTH WITH QUENCH RATE WAS ALSO FOUND TO DEPEND ON THE GRAIN BOUNDARY TYPE. FOR RELATIVELY SLOW QUENCHED SPECIMENS, A FINE MATRIX PRECIPITATE DISTRIBUTION WITH NARROW GRAIN BOUNDARY PRECIPITATE FREE ZONES WAS OBSERVED. THE RESULTS ARE DISCUSSED IN TERMS OF THE CURRENT-THEORIES OF PRECIPITATION IN ALUMINUM ALLOYS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-713 747 11/6
POLYTECHNIC INC OF BROOKLYN N Y DEPT OF PHYSICAL AND ENGINEERING METALLURGY

MARTENSITIC TRANSFORMATION IN A SPLAT COOLED AU-50 AT% CD ALLOY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAR 70 7P FERRAGLIO,PAUL ;MUKHERJEE,K.
;CASTLEMAN,L. S. ;
REPT. NO. TR-2
CONTRACT: N00014-67-A-0438-0002
PROJ: NR-031-731

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ACTA METALLURGICA, V18 P1067-1070 OCT 70.

DESCRIPTORS: (*GOLD ALLOYS, PHASE STUDIES), (*CADMIUM ALLOYS, PHASE STUDIES), COOLING (U)
IDENTIFIERS: PHASE TRANSFORMATIONS, SPLAT COOLING (U)

MARTENSITIC TRANSFORMATIONS WERE STUDIED IN SPLAT COOLED SAMPLES OF AN AU-50 AT.% CD ALLOY. A VERTICAL SHOCK-TUBE APPARATUS WAS USED TO QUENCH THE MOLTEN ALLOY FROM VARIOUS CONTROLLED TEMPERATURES IN THE LIQUID STATE TO ROOM TEMPERATURE, THE QUENCHING RATE BEING OF THE ORDER OF 10 TO THE 7TH POWER C/SEC. THE SPLAT COOLED SAMPLES WERE STUDIED BY THE USE OF X-RAY AND ELECTRON DIFFRACTION AS WELL AS TRANSMISSION ELECTRON MICROSCOPY. IT WAS FOUND THAT QUENCHING, EVEN AT THIS HIGH SPEED, FROM TEMPERATURES AS HIGH AS 300C ABOVE THE MELTING POINT OF THIS ALLOY DID NOT AFFECT ITS LONG RANGE ORDER. FURTHERMORE, THE MARTENSITIC TRANSFORMATION TEMPERATURE WAS SUPPRESSED IN THE SPLAT COOLED SAMPLES, AND THE HIGH TEMPERATURE BETA-PHASE CSCL TYPE STRUCTURE PERSISTED. THIS METASTABLE STRUCTURE WAS THEN FOUND TO DECOMPOSE ISOTHERMALLY AT ROOM TEMPERATURE INTO THREE MORPHOLOGICALLY AND CRYSTALLOGRAPHICALLY DIFFERENT MARTENSITIC PHASES. EXCELLENT RESOLUTION OF THE MARTENSITIC FINE STRUCTURE WAS OBTAINED BY THIS SPLAT COOLING TECHNIQUE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-713 921 11/6 13/8
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D
C

CHANGE IN PROPERTIES DURING AGING OF
ALUMINUM ALLOYS (ZAKONOMERNOSIT IZMEHENIYA
SVOISTV PRI STARENII ALYUMINIEVYKH
SPLAVOV). (U)

SEP 70 16P FRIDLYANDER,I. N. ;
REPT. NO. FSTC-HT-23-236-70

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF MONO. LIGHTWEIGHT
ALLOYS AND THEIR TREATMENT METHODS, MOSCOW, 1968
P90-101.

DESCRIPTORS: (*ALUMINUM ALLOYS,
AGING(MATERIALS)), MECHANICAL PROPERTIES,
ANNEALING, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

ACCORDING TO A. A. BOCKVAR, THE TYPE OF HEAT
TREATMENT BASED ON THE PROCESSES OF A DISSOCIATION OF
A STATE OF AN ALLOY FIXED BY HARDENING, IS CALLED
ANNEALING OR AGING. DURING ARTIFICIAL AGING IN
DISTINCTION TO NATURAL AGING NOT ONLY ARE THE
PROCESSES OF DISSOCIATION OF THE SUPERSATURATED
SOLUTION ACCELERATED BUT ANOTHER STRUCTURE AND A
DIFFERENT COMPLEX OF MECHANICAL AND PHYSICAL
PROPERTIES OF THE ALLOYS APPEAR. WHEN INCREASING
THE DURATION OF THE ARTIFICIAL AGING OR WHEN
INCREASING THE AGING TEMPERATURE ABOVE THE
CONDITIONS, WHICH LEAD TO MAXIMUM HARDNESS THERE
OCCURS A LOWERING OF THE HARDNESS AND A CREEP LIMIT,
AND ELONGATION INCREASES INSIGNIFICANTLY OR DOESN'T
CHANGE REMAINING AT A COMPARATIVELY LOW LEVEL.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-713 979 13/8 11/6
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D C

EFFECT OF COMBINED DEFORMATION AND HEAT TREATMENT ON PROPERTIES OF ALUMINUM ALLOYS (VLNYANIE SOVMESHCHENNOI DEFORMATSIONNO-TERMICHESKOI OBRABOTKI NA SVOISTVA ALYUMINIEVYKH SPLAVOV). (U)

SEP 70 21P RABINOVICH,M. KH. ;
REPT. NO. FSTC-HT-23-237-70

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF MONO. LIGHTWEIGHT ALLOYS AND THEIR TREATMENT METHODS, MOSCOW, 1968 P102-114.

DESCRIPTORS: (*HEAT TREATMENT, *ALUMINUM ALLOYS), DEFORMATION, MECHANICAL WORKING, HARDNESS, USSR (U)
IDENTIFIERS: *THERMOMECHANICAL TREATMENT, TRANSLATIONS (U)

THE EFFECTS OF COMBINED TREATMENT ON THE PROPERTIES AND STRUCTURE OF A BROAD CLASS OF ALLOYS ARE INVESTIGATED. THE RESULTS OF TESTS INDICATE THAT COMBINED TREATMENT HAS A NEGATIVE EFFECT ON ALLOYS IN THE FRESHLY ANNEALED STATE. THE HARDNESS OF ALLOYS AFTER DEFORMATION AT THE TEMPERATURE OF NORMAL HARDENING WITH SUBSEQUENT RAPID COOLING WAS LESS THAN THAT OF THE SAME ALLOYS AFTER ONLY QUENCHING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-714 120 13/8 11/6
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D C

STRENGTHENING OF MAGNESIUM ALLOYS RICH IN ALUMINUM BY COMBINED ACTION OF PLASTIC DEFORMATION AND HEAT TREATMENT (UPROCHENIE MAGNIEVYKH SPLAVOV, BOGATYKH ALUMINIEM PUTEM SOVMESTNOGO VOZDEISTVIYA PLASTICHESKOI DEFORMATSII I TERMICHESKOI OBRABOTKI), (U)

SEP 70 17P SVIDERSKAYA,Z. A. I
REPT. NO. FSTC-HT-23-240-70

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF MONO. LIGHTWEIGHT ALLOYS AND THEIR TREATMENT METHODS, MOSCOW, 1968 P199-207.

DESCRIPTORS: (*HEAT TREATMENT, *MAGNESIUM ALLOYS), DEFORMATION, ALUMINUM ALLOYS, MECHANICAL WORKING, HARDNESS, USSR (U)
IDENTIFIERS: *THERMOMECHANICAL TREATMENT, TRANSLATIONS (U)

THE RESULTS OF STUDIES ON THE DETERMINATION OF A MORE EFFECTIVE METHOD OF STRENGTHENING AGING ALLOY OF THE TYPE MA 5, A MEMBER OF THE MG-AL-ZN-MN SYSTEM. THE INITIAL MATERIAL CONSISTED OF HOT PRESSED BARS 16MM IN DIAMETER. THE EFFECT OF VARIOUS CONDITIONS OF HEAT AND HEAT PLUS MECHANICAL TREATMENT ON THE PROPERTIES OF MA 5 ALLOY IS EXAMINED USING SPECIMENS SUBJECTED TO QUENCHING AND IN THE HOT PRESSED STATE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-715 877 11/6
BATTELLE MEMORIAL INST COLUMBUS OHIO COLUMBUS LABS

MECHANICAL-PROPERTY DATA 38-6-44 TITANIUM ALLOY: AGED FORGING. (U)

SEP 70 9P
CONTRACT: F33615-69-C-1115
PROJ: AF-7381
TASK: 738106

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, MECHANICAL PROPERTIES), ALUMINUM ALLOYS, VANADIUM ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, ZIRCONIUM ALLOYS (U)

38-6-44 ALLOY (3AL-8V-6CR-4MO-4ZR) IS A NEW DEEP-HARDENING BETA COMPOSITION ALLOY. THE LARGE AMOUNT OF BETA STABILIZING ELEMENTS IN THIS COMPOSITION RESULTS IN SLUGGISH TRANSFORMATION CHARACTERISTICS WHICH GIVE DEEP HARDENING. THE METALLURGY OF 38-6-44 ALLOY IS SIMILAR TO OTHER BETA ALLOYS SUCH THAT SOLUTION ANNEALING RETAINS THE MORE DUCTILE BODY-CENTER-CUBIC BETA PHASE AT ROOM TEMPERATURE. THE 6-INCH BY 6-INCH BILLET USED IN THIS PROPERTY SURVEY WAS SOLUTION ANNEALED AT 1500 F FOR 15 MINUTES AND AIR COOLED, PLUS AGING AT 1050 F FOR FOUR HOURS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-716 076 11/6
WASHINGTON UNIV SEATTLE

FATIGUE HARDENING IN ANNEALED AND DEFORMED ALUMINUM AND COPPER, (U)

FEB 70 6P VAN DEN BEUKEL,A. ;MISRA, M. S. ;DAWSON,H. I. ;
CONTRACT: DA-ARO(D)-31-124-G1039
PROJ: DA-2-0-061102-B-32-D
MONITOR: AROD 7504:3-MC

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN METALLURGICAL TRANSACTIONS, V1 P2111-2113 AUG 70.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH DELFT INST. OF TECH. (THE NETHERLANDS).

DESCRIPTORS: (*ALUMINUM ALLOYS, FATIGUE(MECHANICS)), (*COPPER, FATIGUE(MECHANICS)), HARDENING (U)
IDENTIFIERS: ALUMINUM ALLOY 2024 (U)

FATIGUE HARDENING IN 2024 ALUMINUM AND IN OFHC COPPER HAS BEEN INVESTIGATED BY MEASURING THE HYSTERESIS-LOOP WIDTH AT ZERO STRESS AS A FUNCTION OF THE NUMBER OF TENSION-COMPRESSION CYCLES WITH A CONSTANT STRESS AMPLITUDE. PRIOR TO CYCLING, THE SPECIMENS WERE EITHER ANNEALED, ELONGATED, OR TWISTED. FOR THE ANNEALED AND THE PREELONGATED SPECIMENS, THE LOOP WIDTH IS SHOWN TO DECAY WITH THE NUMBER OF CYCLES AS A SECOND-ORDER PROCESS, AND FOR THE PRETWISTED SPECIMENS, AS A FIRST-ORDER PROCESS. THIS BEHAVIOR CAN BE ACCOUNTED FOR BY REASONABLE ASSUMPTIONS REGARDING THE DISLOCATION MOVEMENTS INVOLVED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-716 228 11/6
DEFENCE STANDARDS LABS MARIBYRNONG (AUSTRALIA)

THE STRUCTURAL FEATURES OF UNDERCOOLED NICKEL AND NICKEL-OXYGEN ALLOYS, (U)

SEP 70 6P JONES,B. L. ;WESTON,G. M. ;

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN THE JNL. OF THE AUSTRALIAN INSTITUTE OF METALS, V15 N4 P189-194 NOV 70. NO COPIES FURNISHED.

DESCRIPTORS: (*NICKEL, GRAIN STRUCTURES(METALLURGY)), (*NICKEL ALLOYS, GRAIN STRUCTURES(METALLURGY)), COOLING, GRAIN SIZE, DENDRITIC STRUCTURE, RECRYSTALLIZATION, AUSTRALIA (U)

A SERIES OF NICKEL INGOTS HAVING OXYGEN CONTENTS RANGING BETWEEN 22 AND 540 PPM HAVE BEEN UNDERCOOLED BY AMOUNTS UP TO 271 DEGC TO EXAMINE THE SEPARATE EFFECTS OF OXYGEN AND UNDERCOOLING ON GRAIN STRUCTURE. IN NICKEL CONTAINING MORE THAN 100 PPM OXYGEN, UNDERCOOLING BY MORE THAN 100 DEGC PRODUCES A UNIFORM VERY FINE GRAIN STRUCTURE (<0.2 MM DIA.), BY A DENDRITE ARM REMELTING PROCESS. INGOTS CONTAINING LESS THAN 100 PPM OXYGEN UNDERCOOLED BY LESS THAN 160 DEGC HAD VERY COARSE DENDRITIC STRUCTURES, BUT UNDERCOOLING BY MORE THAN 160 DEGC CAUSED GRAIN REFINEMENT TO (0.6-0.9 MM) BY A RECRYSTALLIZATION PROCESS. THIS RECRYSTALLIZATION IS BELIEVED TO BE ASSOCIATED WITH THE INHIBITION OF RECOVERY PROCESSES BY INTERSTITIAL SOLUTE IMPURITIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-716 368 11/6
GENERAL STEEL INDUSTRIES INC GRANITE CITY ILL CASTINGS DIV

MANUFACTURING METHODS, AND PHYSICAL PROPERTIES OF DIRECTIONALLY SOLIDIFIED 48 IN. X 60 IN. X 4 IN. AND 5 IN. THICK CAST STEEL PLATES. (U)

DESCRIPTIVE NOTE: FINAL REPT. AUG 67-JAN 70,
JAN 70 57P PATTON,JOHN R. ;
CONTRACT: DAAG46-67-C-0118
MONITOR: AMMRC CR-70-6

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, *CASTINGS), METAL PLATES, CASTING, HEAT TREATMENT, MANUFACTURING METHODS, MECHANICAL PROPERTIES, RADIOGRAPHY (U)

THE WORK COVERS THE DETAILS OF PRODUCTION METHODS USED IN PRODUCING EIGHT CAST STEEL PLATES 48 IN. X 60 IN. X 5 IN. AND 6 IN. THICK. STEEL FOR THIS WORK IS A CR - MO COMPOSITION OF .28% C; 2.50% CR; .5% MO. CASTING TECHNIQUE FOR THE RAPID UNIDIRECTIONALLY SOLIDIFIED SECTION EMPLOYED A 48 IN. X 60 IN. X 7 IN. THICKNESS CAST IRON CHILL IN THE DRAG WITH A 48 IN. X 60 IN. X 3 IN. THICKNESS EXOTHERMIC CORE ON THE COPE SURFACE. THE PLATES WERE WATER QUENCHED AND TEMPERED TO A HARDNESS LEVEL OF 320 - 370 BHN. FOUNDRY PROCEDURE, HEAT TREATMENT, AND PRODUCTION PROCESSING ARE REPORTED IN DETAIL. PHYSICAL TEST VALUES OF TENSILE AND IMPACT PROPERTIES AND THE RADIOGRAPHIC INSPECTION RESULTS ARE REPORTED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-717 328 20/12 11/6
NORTH CAROLINA STATE UNIV RALEIGH

EXPERIMENTALLY-DETERMINED PLASTIC WAVE VELOCITIES IN FULLY-ANNEALED 1100F ALUMINUM (STRIKER VELOCITY 89 FT/SEC TO 788 FT/SEC). (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
DEC 70 44P LIDDELL,W. L. ;STEELE,R. S. ;BINGHAM,W. L. ;DOUGLAS,R. A. ;
REPT. NO. TR-70-11
CONTRACT: N00014-68-A-0187
PROJ: NR-064-504

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ERRATA SHEET INSERTED.

DESCRIPTORS: (*IMPACT TESTS, RODS), (*ALUMINUM ALLOYS, STRAIN(MECHANICS)), PLASTICITY, STRAIN GAGES, DIFFRACTION GRATINGS, TEST EQUIPMENT, TEST METHODS, LASERS (U)
IDENTIFIERS: ALUMINUM ALLOY 1100F, PLASITIC DEFORMATION, DYNAMIC RESPONSE, RUBY LASERS (U)

A PREVIOUSLY-REPORTED EXPERIMENTAL SYSTEM FOR DETERMINING THE LARGE STRAINS, SURFACE ROTATIONS, STRAIN RATES, AND PLASTIC WAVE VELOCITIES DURING FREE-FREE AXIAL IMPACTS IS USED TO INVESTIGATE THE BEHAVIOR OF FULLY-ANNEALED SMALL GRAIN 1100F ALUMINUM RODS UNDER IMPACT CONDITIONS. THE SYSTEM EMPLOYS IN-SURFACE DIFFRACTION GRATING STRAIN TRANSDUCERS ILLUMINATED BY A PULSED RUBY LASER, WITH THE STRAIN-SURFACE ROTATION-TIME-DEPENDENT DIFFRACTION PATTERN RECORDED BY HIGH-SPEED STREAK CAMERAS. STRAIN-TIME AND PLASTIC WAVE VELOCITY-STRAIN DATA ARE PRESENTED FOR FREE-FREE AXIAL IMPACTS OF ALUMINUM RODS AT STRIKER VELOCITIES RANGING FROM 89 FT/SEC TO 788 FT/SEC. STRAINS TO 5.5% AND STRAIN-RATES TO 2000/SEC ARE RECORDED. THE DATA IS COMPARED TO PREVIOUSLY-REPORTED DATA AS A MEANS OF ESTABLISHING THE VALIDITY OF THE EXPERIMENTAL TECHNIQUE, AND AS CORROBORATION OF SOME OF THE EXISTING DATA. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-717 553 11/6 19/6
WATERVLIET ARSENAL N Y

SUSCEPTIBILITY OF GUN STEELS TO STRESS CORROSION CRACKING. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 70 47P COLANGELO,VITO J. ;FERGUSON, MARTIN S. ;
REPT. NO. WVT-7012
PROJ: DA-66661

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, *STRESS CORROSION), (*GUN BARRELS, STRESS CORROSION), EMBRITTLEMENT, FRACTURE(MECHANICS), CRACK PROPAGATION (U)
IDENTIFIERS: HIGH STRENGTH STEELS (U)

PRECRACKED CANTILEVER BEAM SPECIMENS EXTRACTED FROM SPECIFIC GUN TUBES WERE SUBJECTED TO A CONSTANT LOAD IN VARIOUS ENVIRONMENTS TO DETERMINE FRACTURE TIMES. SPECIMENS EXHIBITED STRESS CORROSION SUSCEPTIBILITY IN 3% NACL, DISTILLED WATER AND 100% RH AIR, WITH 3% NACL BEING THE MOST DEGRADING ENVIRONMENT. VARIATIONS IN SUSCEPTIBILITY APPEARED ON A TUBE TO TUBE BASIS AND WERE RELATED TO THE TEMPER EMBRITTLED CONDITION OF THE TUBE. ADDITIONAL TESTS IN DISTILLED WATER, VARYING YIELD STRENGTH MATERIAL, SHOWED THAT FRACTURE TIME WAS DECREASED AND CRACK GROWTH RATES INCREASED AS THE YIELD STRENGTH WAS INCREASED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-718 041 11/6
TRW EQUIPMENT GROUP CLEVELAND OHIO MATERIALS TECHNOLOGY LAB

EFFECT OF ALLOYING ELEMENTS ON TEMPERED MARTENSITE EMBRITTLEMENT AND FRACTURE TOUGHNESS OF LOW ALLOY HIGH STRENGTH STEELS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 13 MAR 69-13 AUG 70, JAN 71 87P VISHNEVSKY,C. ;
REPT. NO. ER-7384-1
CONTRACT: DAAG46-69-C-0060
PROJ: DA-1-T-062105-A-328
MONITOR: AMMRC CR-69-18/F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT DATED FEB 70, AD-702 908.

DESCRIPTORS: (*STEEL, NOTCH TOUGHNESS), MARTENSITE, TENSILE PROPERTIES, FRACTURE(MECHANICS), EMBRITTLEMENT (U)
IDENTIFIERS: *HIGH STRENGTH STEELS (U)

A STUDY WAS PERFORMED ON THE INFLUENCE OF VARIOUS ELEMENTS ON THE NOTCH BEND FRACTURE TOUGHNESS AT 75F AND -100F OF .35%C, 3NI-CR-MO-V MARTENSITIC STEELS TEMPERED BETWEEN 400 AND 800F. THE ELEMENTS EXAMINED INCLUDED C, MN, SI, CR, NI, MO, CO, V AND AL. THE OVERALL VARIATION IN ROOM TEMPERATURE YIELD AND TENSILE STRENGTHS FOR TWENTY-FOUR STEELS WAS 155-230 KSI YIELD STRENGTH AND 188-288 KSI TENSILE STRENGTH. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-718 902 11/6 13/8
MASSACHUSETTS INST OF TECH CAMBRIDGE

STRUCTURE AND PROPERTY CONTROL THROUGH RAPID QUENCHING OF LIQUID METALS. (U)

DESCRIPTIVE NOTE: SEMI-ANNUAL TECHNICAL REPT. NO. 1, 22 JUN-31 DEC 70,
JAN 71 80P GRANT,NICHOLAS J. ;PELLOUX, REGIS M. N. ;FLEMINGS,MERTON C. ;ARGON,ALI S. ;
CONTRACT: DAHC15-70-C-0283, ARPA ORDER-1608
PROJ: ARPA-0010

UNCLASSIFIED REPORT

DESCRIPTORS: (*MARAGING STEELS, QUENCHING(COOLING)), (*NICKEL ALLOYS, QUENCHING(COOLING)), (*POWDER METALLURGY, *QUENCHING(COOLING)), MICROSTRUCTURE, MECHANICAL PROPERTIES, HEAT TREATMENT, AGING(MATERIALS), FREEZING (U)
IDENTIFIERS: STEEL 300-M, NICKEL ALLOY IN100 (U)

THE FIRST RESULTS OF THE PROCESSING OF COARSE METAL POWDERS OF MARAGING 300 AND IN 100 ARE REPORTED. THE EFFECT OF COOLING RATES ON THE DENDRITE STRUCTURE OF MARAGING 300 ALLOY HAS BEEN INVESTIGATED IN A WIDE RANGE OF COOLING RATES. THE STRUCTURE OF ATOMIZED PARTICLES ARE PRESENTED AND THEIR COOLING RATES ARE DERIVED FROM THE DENDRITE ARM SPACINGS. THE SIZE AND DISTRIBUTION OF INCLUSIONS IN A COMMERCIAL 300 GRADE MARAGING HAS BEEN DETERMINED AND RELATED TO THE MECHANICAL PROPERTIES (TENSILE AND FATIGUE). THE ANALYSIS OF THE STRESS AND STRAIN CONDITIONS AROUND AN INCLUSION AS A FUNCTION OF THE OVERALL STATE OF STRESS IS BEING INVESTIGATED IN ORDER TO DETERMINE THE CRACK INITIATION CRITERIA. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-720 379 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

THE MECHANISM OF THE VARIATION IN THE ABRASIVE WEAR RESISTANCE OF G13L STEEL AFTER HARDENING, (U)

DEC 70 12P KASHCHEEV,V. N. ;SANITSKII, K. V. ;NOVOMEISKII,YU. D. ;
REPT. NO. FTD-MT-24-287-70
PROJ: AF-7343

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENII. CHERNAYA METALLURGIYA (USSR) V12 N12 P103-105 1969, BY LEE D. THOMPSON.

DESCRIPTORS: (*STEEL, WEAR RESISTANCE), HARDENING, NIOBIUM ALLOYS, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

THE ASSIGNMENT OF THIS STUDY IS TO EXPLAIN THE MECHANISM OF THE EFFECT OF THE HARDENING TEMPERATURE ON THE CHANGE IN RESISTANCE TO ABRASIVE FAILURE OF G13L ALLOYS OF STANDARD COMPOSITION AND WITH ADDITIONS OF NIOBIUM, WHICH IN THE OPTIMUM CONCENTRATION (0.3-0.4%) NOTICEABLY IMPROVES THEIR ABRASIVE WEAR RESISTANCE BOTH IN THE CAST, AND IN THE TEMPERED STATES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-720 398 11/6 1/3
ALUMINUM CO OF AMERICA NEW KENSINGTON PA ALCOA RESEARCH LABS

INVESTIGATION TO DEVELOP A HIGH STRENGTH STRESS-CORROSION RESISTANT NAVAL AIRCRAFT ALUMINUM ALLOY. (U)

DESCRIPTIVE NOTE: FINAL REPT. 16 DEC 69-16 SEP 70, NOV 70 114P STALEY,J. T. !
CONTRACT: N00019-70-C-0118, N00019-69-C-0292

UNCLASSIFIED REPORT

DESCRIPTORS: (*AIRFRAMES, *TITANIUM ALLOYS), (*ALUMINUM ALLOYS, NAVAL AIRCRAFT), METAL PLATES, CORROSION-RESISTANT ALLOYS, STRESS CORROSION, MECHANICAL PROPERTIES, ANODIC COATINGS (U)

THE REPORT PRESENTS THE RESULTS OF AN EVALUATION OF THREE TEMPERS OF COMMERCIALLY FABRICATED ALLOY MA15 PLATE IN 1 IN. TO 6 IN. THICKNESS. COMPARED AT EQUAL STRENGTHS, MA15 DEVELOPED HIGHER RESISTANCE TO STRESS-CORROSION CRACKING, GREATER RESISTANCE TO EXFOLIATION CORROSION, HIGHER TOUGHNESS, AND BETTER FATIGUE PERFORMANCE THAN ESTABLISHED COMMERCIAL ALUMINUM ALLOYS. COMPARED AT EQUAL RESISTANCE TO STRESS-CORROSION CRACKING, MA15 DEVELOPED SUBSTANTIALLY HIGHER STRENGTH THAN ESTABLISHED COMMERCIAL ALUMINUM ALLOYS. FIELD TESTING OF THIS MATERIAL IS RECOMMENDED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-721 537 13/5 13/13
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING

INVESTIGATION OF DISTORTION REMOVAL IN WELDED STRUCTURES. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 70 51P WALSH,RICHARD A. (DUFFY, DAVID K. (MASUBUCHI,KOICHI)
CONTRACT: DOT-CG-92784-B
PROJ: CG-793105/002

UNCLASSIFIED REPORT

DESCRIPTORS: (*WELDS, ALIGNMENT), HEATING, STRUCTURES, DISTORTION, REMOVAL, STEEL, FLAMES (U)
IDENTIFIERS: *FLAME STRAIGHTENING, WELDMENTS, HIGH STRENGTH STEELS, STEEL CORTEN, STEEL 1021, STEEL HY-80 (U)

THE OBJECTIVE OF THE STUDY IS TO INVESTIGATE MECHANISMS OF FLAME STRAIGHTENING WITH EMPHASIS ON ITS EFFECTIVENESS ON HIGH-STRENGTH-STEEL STRUCTURES. IN THE PHASE 1 STUDY AN INVESTIGATION WAS MADE OF MECHANISMS OF FLAME STRAIGHTENING ON SIMPLE WELDMENTS IN LOW-CARBON STEEL AND HY-80 STEEL (QUENCHED AND TEMPERED STEEL WITH SPECIFIED MINIMUM YIELD STRENGTH OF 80,000 PSI). FLAME STRAIGHTENING WAS TWO TO THREE TIMES MORE EFFECTIVE ON LOW-CARBON STEEL SPECIMENS THAN ON HY-80 STEEL SPECIMENS. IN THE PHASE 2 STUDY AN INVESTIGATION WAS MADE OF MECHANISMS OF FLAME STRAIGHTENING ON FRAMED PANEL STRUCTURES. THE SPECIMENS WERE MADE IN LOW-CARBON STEEL (AISI 1020), LOW-ALLOY HIGH-STRENGTH STEEL (U. S. STEEL CORTEN), AND QUENCHED AND TEMPERED STEEL (U. S. STEEL T-1). IT WAS ALSO FOUND THAT FLAME STRAIGHTENING TECHNIQUES WERE MORE EFFECTIVE ON LOW-CARBON STEEL SPECIMENS THAN ON HIGH-STRENGTH STEEL SPECIMENS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-722 034 11/6
RENSSELAER POLYTECHNIC INST TROY N Y MATERIALS DIV

AN ELECTRON MICROPROBE ANALYSIS OF SOLUTE SEGREGATION NEAR GRAIN BOUNDARIES IN AN AL-ZN-MG ALLOY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 71 24P SHASTRY,C. R. ;JUDD,G. ;
REPT. NO. TR-2
CONTRACT: N00014-67-A-0117-0009

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, GRAIN BOUNDARIES), STRESS CORROSION, ZINC ALLOYS, MAGNESIUM ALLOYS, GRAIN STRUCTURES(METALLURGY) (U)

THE CONCENTRATION OF ZINC AND MAGNESIUM ACROSS GRAIN BOUNDARIES WAS MEASURED BY MEANS OF AN ELECTRON PROBE MICROANALYSER FOR AN AL-ZN-MG ALLOY AFTER DIFFERENT QUENCHING (BRINE, WATER, OIL AND AIR) AND AGING HEAT TREATMENTS (ROOM TEMPERATURE, 165C AND 200C). SIGNIFICANT SOLUTE SEGREGATION WAS DETECTED IN QUENCHED SPECIMENS AND ALSO IN SPECIMENS THAT WERE AGED AT ROOM TEMPERATURE. WHILE NO SEGREGATION WAS MEASURED IN SPECIMENS THAT WERE AGED AT ELEVATED TEMPERATURES, SOLUTE DEPLETION WAS OBSERVED IN A CONSIDERABLE PROPORTION OF THE EXAMINED BOUNDARIES. IT WAS CONCLUDED THAT SOLUTE SEGREGATION TO GRAIN BOUNDARIES OCCURRED DURING QUENCHING AND WAS RELIEVED DURING AGING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-722 622 13/8
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER CHARLOTTESVILLE VA

HEAT AND MECHANICAL TREATMENT OF TITANIUM AND ITS ALLOYS (CHAPTER 5), (U)

NOV 70 64P BERNSHTEIN,M. L. ;
REPT. NO. FSTC-HT-23-492-70

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF MONO.
TERMOMEKHANICHESKAYA OBRABOTKA METALLOV I SPLAVOV,
MOSCOW, 1968 P1110-1165.

DESCRIPTORS: (*HEAT TREATMENT, *TITANIUM ALLOYS),
DEFORMATION, QUENCHING(COOLING),
AGING(MATERIALS), MECHANICAL PROPERTIES,
USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

THE SUPERIORITY OF TITANIUM ALLOYS FOR USE AS CONSTRUCTION MATERIAL IS DISCUSSED AND THE ADVANTAGES OF HEAT AND MECHANICAL TREATMENT OF SPECIFIC TITANIUM ALLOYS INCLUDING VT3-1, VT8 AND VT14 ARE POINTED OUT. CHANGES IN TREATMENT PROCESSES, INCLUDING DEGREE OF DEFORMATION, QUENCHING PROCEDURE, AGING TIMES AND TEMPERATURES ARE SHOWN TO AFFECT THE MECHANICAL PROPERTIES OF TITANIUM ALLOYS. SPECIFIC CHANGES IN MECHANICAL PROPERTIES, INCLUDING TENSILE STRENGTH, PLASTICITY AND IMPACT TOUGHNESS ARE PRESENTED GRAPHICALLY. OPTIMAL TREATMENT CONDITIONS ARE DEVELOPED FOR SPECIFIED INCREASES IN STRENGTH AND PLASTICITY. THE INVESTIGATION INCLUDES COMPARATIVE STUDIES OF THE MICROSTRUCTURES OF ALLOYS SUBJECTED TO DIFFERENT MECHANICAL AND HEAT TREATMENTS.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-722 730 13/8
EDGEWOOD ARSENAL MD

VACUUM-BRAZING -- GAS-QUENCHING HISTORY, DEVELOPMENT, AND OVERALL PROGRAM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JAN 71 190P GURTNER,FRANCIS B. ;SHUTT, PAUL K. , JR.;BURROWS,CHARLES F. ;WERNER,W. J. ;MCCALL,JAMES L. ;
REPT. NO. EA-TR-4482

UNCLASSIFIED REPORT

DESCRIPTORS: (*BRAZING, METAL JOINTS), (*QUENCHING(COOLING), METAL JOINTS), ALUMINUM ALLOYS, STEEL, TITANIUM ALLOYS, BRAZING ALLOYS (U)
IDENTIFIERS: *VACUUM BRAZING, *GAS QUENCHING, ALUMINUM ALLOY 2014, ALUMINUM ALLOY 2219, ALUMINUM ALLOY 6061, STEEL 4130, STEEL 4340, STEEL 18 NI, STEEL 316, STEEL 321, TITANIUM ALLOY 6AL 4V (U)

THE VACUUM-BRAZING AND VACUUM-HEAT-TREAT, GAS-QUENCHING PROCESS IS A RELIABLE PROCESS FOR FABRICATING HARDWARE ITEMS WHERE HELIUM LEAK-TIGHT JOINTS ARE REQUIRED. NEW FILLER METALS WERE DEVELOPED FOR VACUUM-BRAZING ALUMINUM ALLOYS, AND METALLOGRAPHIC EXAMINATION WAS ACCOMPLISHED ON ALL METALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-723 546 11/6 13/8
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

EFFECT OF INTERMEDIATE ANNEALING ON THE TEXTURE OF TRANSFORMER STEEL, (U)

JAN 71 10P KOCHNOV,V. E. IFOMINYKH,R. P. IGERSHMAN,R. B. I

REPT. NO. FTD-HT-23-897-70
PROJ: FTD-6010704
TASK: DIA-T68-01-02

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENII. CHERNAYA METALLURGIYA (USSR) V12 N4 P101-104 1969, BY D. KOOLBECK.

DESCRIPTORS: (*STEEL, *ANNEALING), TRANSFORMERS, COLD WORKING, GRAIN STRUCTURES(METALLURGY), USSR (U)
IDENTIFIERS: *ELECTRICAL STEELS, TRANSLATIONS (U)

THE ARTICLE IS CONCERNED WITH THE QUESTION OF THE EFFECT OF INTERMEDIATE ANNEALING CONDITIONS ON THE PERFECTION OF THE CRYSTALLOGRAPHIC TEXTURE AFTER THE HIGH-TEMPERATURE ANNEALING. EXPERIMENTS WERE CONDUCTED WITH COLD-ROLLED SPECIMENS OF TRANSFORMER STEEL. CHANGES IN MECHANICAL MOMENT WITH VARIOUS ANNEALING CONDITIONS ARE OUTLINED. IT IS DETERMINED THAT OTHER CONDITIONS BEING EQUAL, INTERMEDIATE ANNEALING TEMPERATURES CAN HAVE AN ESSENTIAL INFLUENCE ON THE PERFECTION OF TEXTURE IN SHEETS OF TRANSFORMED STEEL. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-723 636 11/6
AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OHIO

IMPROVED PROPERTIES OF TI-6A1-6V-2SN
THROUGH MICRO-STRUCTURE MODIFICATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. JAN-AUG 70,
FEB 71 30P HALL,J. A. 1PIERCE,C. M.
;
REPT. NO. AFML-TR-70-312
PROJ: AF-7351
TASK: 735105

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, MICROSTRUCTURE),
FRACTURE(MECHANICS), HEAT TREATMENT, ALUMINUM
ALLOYS, TIN ALLOYS, VANADIUM ALLOYS, TENSILE
PROPERTIES (U)
IDENTIFIERS: TITANIUM ALLOYS 6AL 2SN 6V (U)

THE FRACTURE TOUGHNESS OF THE TI-6AL-6V-2SN
ALLOY IN THE ANNEALED CONDITION IS GREATLY INFLUENCED
BY MICROSTRUCTURAL FEATURES WHICH MAY VARY
CONSIDERABLY AS A RESULT OF DIFFERING THERMAL-
MECHANICAL PROCESSING OPERATIONS EMPLOYED PRIOR TO
THE ANNEALING HEAT TREATMENT. THE VARIETY OF
MICROSTRUCTURES WHICH CAN RESULT MERELY BY HEAT
TREATMENT IS CATEGORIZED AND THE RELATED TENSILE AND
TOUGHNESS PROPERTIES ARE PRESENTED. IN INSTANCES
WHERE HIGHER FRACTURE TOUGHNESS IS DESIRED, JUDICIOUS
HEAT TREATMENT OF THE AS-RECEIVED MATERIAL CAN OFTEN
INCREASE THIS PROPERTY. OF THE HEAT TREATMENTS
EMPLOYED IN THIS INVESTIGATION, THE PROPERTIES WERE
MOST SIGNIFICANTLY IMPROVED BY SOLUTION TREATING AT
1710F FOR 80 MINUTES, AIR COOLING, AND SUBSEQUENTLY
HEATING TO 1400F FOR ONE HOUR FOLLOWED BY AN AIR
COOL. THE TENSILE STRENGTH OF THE ALLOY WAS
INCREASED FROM 150 TO 155.6 KSI AND THE FRACTURE
TOUGHNESS (K SUB Q) WAS RAISED FROM 55.8 TO 68.0
KSI SQ IN. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-723 990 11/6
CASE WESTERN RESERVE UNIV CLEVELAND OHIO DIV OF METALLURGY AND MATERIALS SCIENCE

MICROSTRUCTURAL-MECHANICAL PROPERTY RELATIONSHIPS IN HIGH STRENGTH CAST STEELS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 21 JUN 69-31 MAY 70, DEC 70 79P SULLY,LIONEL J. D. ; WALLACE,JOHN F. ;
CONTRACT: DAAG46-68-C-0052
PROJ: DA-586332
MONITOR: AMMRC CR-69-12(F)

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, CASTINGS), METAL PLATES, DENDRITIC STRUCTURE, MICROSTRUCTURE, MECHANICAL PROPERTIES, HEAT TRANSFER (U)
IDENTIFIERS: *STEEL CASTINGS (U)

THE INFLUENCE OF DIFFERENT TYPES OF CHILL MATERIALS PLACED UNDER THE ENTIRE BOTTOM SURFACE OF 20 IN. X 20 IN. X 5-1/2 IN. THICK AISI 4335 TYPE CAST STEEL PLATES ON THE RATE OF REMOVAL OF HEAT FROM THE SOLIDIFYING CASTING WAS DETERMINED. THE EFFECTS THAT THESE CHILLS EXERTED ON THE METALLOGRAPHIC STRUCTURE AND MECHANICAL PROPERTIES AFTER QUENCHING AND TEMPERING TO HIGH STRENGTH WERE DETERMINED. THE RESULTS OBTAINED WITH THESE CHILLED 20 IN. X 20 IN. X 5-1/2 IN. PLATES WERE COMPARED TO BOTTOM CHILLED 60 IN. X 48 IN. X 4 TO 6 IN. THICK PLATES CAST BY TWO COOPERATING COMMERCIAL FOUNDRIES. IT WAS DETERMINED THAT THE RATE OF HEAT TRANSFER INTO A BOTTOM CHILL INCREASES SOMEWHAT DURING THE POUR TO A RELATIVELY HIGH VALUE BUT THEN DECREASES SHARPLY TO A CONSTANT VALUE OF ABOUT 75 PLUS OR MINUS 5 BTU/HR-FTF ABOUT 3 MINUTES AFTER THE POUR FOR ALL CHILL MATERIALS TESTED. THIS DECREASE IN HEAT TRANSFER OCCURS BECAUSE OF A GAP FORMATION AT THE CASTING-CHILL INTERFACE. WATER COOLED COPPER WAS THE MOST EFFECTIVE CHILL MATERIAL BECAUSE OF ITS HIGHER HEAT DIFFUSIVITY. THE SECONDARY DENDRITE ARM SPACING IN THE STEEL CASTINGS ARE REFINED BY THE STEEPER THERMAL GRADIENTS ACCOMPANYING THE FASTER RATE OF HEAT REMOVED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-726 582 11/6
RUTGERS - THE STATE UNIV NEW BRUNSWICK N J MATERIALS RESEARCH LAB

FATIGUE STUDY OF QUENCHED AL-6.5 AT % ZN ALLOY. (U)

DESCRIPTIVE NOTE: SUMMARY REPT. 1 JUL 70-31 JAN 71, MAY 71 27P WEISSMANN,S. !KIRITANI,M. !
CONTRACT: F33615-70-C-1240
PROJ: AF-7353
TASK: 735301
MONITOR: AFML TR-71-68

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, FATIGUE(MECHANICS)), ZINC ALLOYS, MICROSTRUCTURE, GRAIN STRUCTURES(METALLURGY), DISLOCATIONS, QUENCHING(COOLING) (U)
IDENTIFIERS: ALUMINUM ALLOY 6.5 ZN (U)

THE DEFECT STRUCTURE OF AN AL-6.5 AT % ZN ALLOY INDUCED BY QUENCHING AND LOW-TEMPERATURE AGING (-80 TO +60C) AND THE EFFECTS OF FATIGUE CYCLING WERE INVESTIGATED. THE DEFECT STRUCTURE UPON QUENCHING CONSISTED OF HOMOGENEOUSLY NUCLEATED DISLOCATION LOOPS, HELICAL DISLOCATIONS DEVELOPED FROM SCREW DISLOCATIONS, THE LATTER BEING INTRODUCED BY TWO DIFFERENT PROCESSES. THE DEFECT STRUCTURE ALSO CONTAINED PERFECT LOOPS CONVERTED FROM HELICAL DISLOCATIONS AND FAULTED DISLOCATION LOOPS WHOSE NUCLEATION WAS ENHANCED BY VACANCIES GENERATED BY QUENCH DEFORMATION. BASED ON EXPERIMENTAL EVIDENCE, A MODEL IS PRESENTED EXPLAINING THE FORMATION OF A ROW OF PERFECT DISLOCATION LOOPS FROM A SINGLE HELICAL DISLOCATION. THE INTERRELATION OF THE VARIOUS TYPES OF INDUCED DEFECTS IS SHOWN BY CORRELATING THEIR FORMATION WITH THE AID OF VACANCY MECHANISMS. THE ABSENCE OF A DELINEATED CELL STRUCTURE IN THE FATIGUE-CYCLED SPECIMENS AND THE HOMOGENEOUS DISTRIBUTION OF THE DISLOCATIONS WITHIN THE GRAIN WERE ATTRIBUTED TO THE BARRIER EFFECT OF THE QUENCH-INDUCED DISLOCATION LOOPS PINNED BY PRECIPITATES. THIS BARRIER EFFECT ALSO GAVE RISE TO A LARGE ACCUMULATION OF DISLOCATIONS AT GRAIN BOUNDARIES INDUCED BY CYCLING. THE ACCUMULATION OF DISLOCATIONS AT THE GRAIN BOUNDARIES APPEARED TO PROVIDE THE DRIVING FORCE FOR FATIGUE-INDUCED BOUNDARY MIGRATION. THE LATTER FACILITATED PRECIPITATION OF ZINC-RICH PARTICLES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-726 758 13/8
ARCOS CORP PHILADELPHIA PA

DEVELOPING A HEAT-TREATABLE HY-80 WELDING ELECTRODE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUN 71 48P CAMPBELL,HALLOCK C. I
CONTRACT: NOBS-92490
PROJ: SR007-01-01
TASK: 2832

UNCLASSIFIED REPORT

DESCRIPTORS: (*WELDING RODS, STEEL), HEAT TREATMENT, WELDS (U)
IDENTIFIERS: STEEL HY-80 (U)

A HEAT-TREATABLE LOW HYDROGEN ELECTRODE OF MIL-8218 CLASSIFICATION WAS DEVELOPED, SUITABLE FOR WELDS IN 5-INCH THICK HY-80 STEEL TO BE QUENCHED AND TEMPERED AFTER WELDING. THE ELECTRODE DEPOSITS WELD METAL WITH CHEMICAL COMPOSITION SLIGHTLY OVERMATCHING THE COMPOSITION OF HY-80 STEEL. THE ELECTRODE COATING IS SIMILAR TO THAT OF EXISTING ARCOS 'DUCTILEND' ELECTRODES WHICH ENJOY WELDER ACCEPTANCE IN SHIPYARDS AND FABRICATING PLANTS THROUGHOUT THE COUNTRY. SAMPLES OF THE ELECTRODE HAVE SUCCESSFULLY BEEN USED TO WELD HY-80 FORGINGS 5-1/2 INCHES THICK WITHOUT ENTRAPMENT OF SLAG, OR EVIDENCE OF CRACKING OR POROSITY. OPERATION OF THE ELECTRODE IS SATISFACTORY IN ALL POSITIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-726 952 11/6 19/6
WATERVLIET ARSENAL N Y

THE ELEVATED TEMPERATURE PROPERTIES OF TWO 81MM MORTAR TUBE ALLOYS 4337M AND 4140. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUN 71 57P DEFRIES,RICHARD S. ;
REPT. NO. WVT-7106

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, GUN BARRELS), MORTARS, MECHANICAL PROPERTIES, TEMPERATURE (U)
IDENTIFIERS: STEEL 4337, STEEL 4140, *MORTAR TUBES (U)

AN EVALUATION WAS MADE OF THE EFFECT OF ROOM AND ELEVATED TEMPERATURES (800 TO 1200F) AND TIMES AT THESE TEMPERATURES (0 TO 30 HOURS) ON THE MECHANICAL PROPERTIES OF TWO MORTAR TUBE ALLOYS, AISI 4140 AND AISI 4337 MODIFIED, QUENCHED AND TEMPERED TO FOUR STRENGTH LEVELS. THE ELEVATED TEMPERATURE YIELD STRENGTH AND DUCTILITY AFTER EXPOSURE TO THE VARIOUS TEMPERATURES FOR VARIOUS TIMES ARE DISCUSSED. THE ROOM TEMPERATURE YIELD STRENGTH AND -40F IMPACT ENERGY AFTER EXPOSURE TO VARIOUS TEMPERATURES FOR VARIOUS TIMES ARE ALSO DISCUSSED. RESULTS OF THE ELEVATED TEMPERATURE TENSILE TESTING OF THE TWO ALLOYS SHOWED THAT THE YIELD STRENGTH DECREASES RAPIDLY WITH HIGH TEMPERATURES. THE DUCTILITY (%RA) INCREASES WITH INCREASING TEMPERATURE AND REMAINS FAIRLY CONSTANT WITH TIME AT TEMPERATURE. THE ROOM TEMPERATURE YIELD STRENGTH DECREASES WITH TIME AFTER EXPOSURE AT TEMPERATURES ABOVE THE TEMPERING TEMPERATURE OF THE ALLOY. THE -40F CHARPY V-NOTCH IMPACT STRENGTH INCREASES AFTER EXPOSURE AT TEMPERATURES HIGHER THAN THE TEMPERING TEMPERATURE OF THE ALLOY. INCREASING THE ROOM TEMPERATURE YIELD STRENGTH (BY LOWERING THE TEMPERING TEMPERATURE) DOES NOT SIGNIFICANTLY INCREASE THE ELEVATED TEMPERATURE YIELD STRENGTH OF THE ALLOY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOMC1

AD-727 872 13/5 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

CREEP LIMIT AND STRUCTURAL STABILITY OF THE PARENT METAL AND WELD JOINTS MADE FROM IMPROVED LOW-ALLOY HEAT-RESISTING STEEL 12MKH AND 12KH1MF. (U)

JUN 71 16P KUZMAK,E. M. ;KROSHKIN,V. A. ;
REPT. NO. FTD-MT-24-130-71
PROJ: FTD-60108
TASK: DIA-T65-01-82, DIA-T65-01-83

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF INSTITUT NEFTEKHIMICHESKOI I GAZOVOI PROMYSHLENNOSTI, MOSCOW. TRUDY (USSR) N70 P84-90 1967, BY ROBERT WALLACE.

DESCRIPTORS: (*WELDS, *STEEL), HEAT-RESISTANT METALS + ALLOYS, STRUCTURAL PROPERTIES, MECHANICAL PROPERTIES, STABILITY, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

THE STEELS 12MKH AND 12KH1MF ARE WIDELY USED TO FABRICATE EQUIPMENT AND PIPE OPERATING AT TEMPERATURES OF UP TO 540 AND 560 DEGREES CENTIGRADE, RESPECTIVELY. PRELIMINARY TESTS OF THESE STEELS ESTABLISHED THAT THE OPTIMAL REGIME OF IMPROVING THEIR QUALITIES AND WELDING (SUCH AS WOULD ASSURE A WELDED JOINT OF THE SAME STRENGTH AS THE BASE METAL AT NORMAL AND ELEVATED TEMPERATURES DURING SHORT-TIME TESTS) IS AS FOLLOWS: FOR 12MKH STEEL: WATER QUENCHING FROM 930 DEGREES CENTIGRADE: TEMPERING AT 680 DEGREES CENTIGRADE FOR 2 HR: RUNNING ENERGY OF WELDING 2500-4500 CAL/CM: FOR 12KH1MF STEEL, WATER QUENCHING FROM 980 DEGREES CENTIGRADE TEMPERING AT 750 DEGREES CENTIGRADE FOR 3 HR: RUNNING ENERGY OF WELDING 4000-6000 CAL/CM. 12MKH STEEL IS BEST POSTHEATED AT 630 DEGREES CENTIGRADE AND 12KH1MF STEEL, AT 700 DEGREES CENTIGRADE. THE HIGH TEMPERATURE STRENGTH OF THESE STEELS AND OF THEIR WELDED JOINTS, AS DETERMINED BY TENSILE STRESS-RUPTURE TESTS WAS FOUND TO BE GREATER FOR THE STEELS IN IMPROVED STATE. HOWEVER, IN TIME THE EFFECT PRODUCED BY THIS IMPROVEMENT GRADUALLY DIMINISHES AND ON EXTRAPOLATION TO 100,000 HR OF NORMAL OPERATION THIS EFFECT COMPLETELY DISAPPEARS. ON THE OTHER HAND, IF THE STEELS ARE TESTED AT APPROXIMATELY 520 DEGREES CENTIGRADE THIS BENEFICIAL EFFECT OF HEAT TREATMENT PERSISTS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-728 239 11/6
MIDWEST RESEARCH INST KANSAS CITY MO

MECHANISMS OF FATIGUE IN MILL-ANNEALED TI-6AL-4V AT ROOM TEMPERATURE AND 600F. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. 1 APR 70-28 FEB 71, APR 71 51P BENSON,DAVID K. ; GROSSKREUTZ,J. CHARLES ;SHAW,GORDON G. ;
CONTRACT: F33615-70-C-1284, F33615-67-C-1547
PROJ: AF-7353
TASK: 735303
MONITOR: AFML TR-71-81

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, FATIGUE(MECHANICS)), ALUMINUM ALLOYS, VANADIUM ALLOYS, CRACK PROPAGATION, CRACKS (U)
IDENTIFIERS: TITANIUM ALLOY 6AL4V (U)

THE MECHANISMS OF THE FATIGUE OF MILL-ANNEALED TI-6AL-4V WERE STUDIED AT 600F AND ROOM TEMPERATURE. EARLY CRACK INITIATION (N SUB 0 APPROXIMATELY = OR < 0.14 NF) WAS FOUND TO OCCUR IN HCP ALPHA-GRAINS BY A SLIP-BAND MECHANISM UNDER ALL BUT THE LEAST SEVERE CONDITIONS OF CYCLIC STRESS. UNDER STRESSES NEAR THE FATIGUE LIMIT AT ROOM TEMPERATURE, FATIGUE CRACKS BEGAN MUCH LATER (NO APPROXIMATELY 0.4 NF) AT THE INTERFACE BETWEEN HCP ALPHA- AND BCC BETA-GRAINS WITHOUT DETECTABLE SLIP. UNDER ALL CONDITIONS, STAGE 1 FATIGUE CRACK GROWTH OCCUPIED 50-80% OF THE TOTAL LIFE. ALTHOUGH MECHANICAL TWINS WERE PRODUCED IN PROFUSION NEAR THE GROWING STAGE 2 FATIGUE CRACKS, THEY APPEARED TO PLAY NO ROLE IN CRACK INITIATION OR STAGE 1 CRACK GROWTH; NOR DID THEY FACILITATE STAGE 2 GROWTH. A VERY THIN POLYGONIZED LAYER (APPROXIMATELY 1 MICROMETER THICK) WAS DISCOVERED ADJACENT TO THE STAGE 2 FATIGUE CRACK SURFACES. NEITHER THIS NOR ANY OTHER OF THE OBSERVATIONS COULD BE INTERPRETED AS EVIDENCE FOR A METALLURGICAL INSTABILITY OR STRAIN-INDUCED PHASE TRANSFORMATION WHICH MIGHT BE HARMFUL TO THE FATIGUE RESISTANCE OF THE ALLOY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-728 654 11/6
DAYTON UNIV OHIO RESEARCH INST

AN INVESTIGATION OF VERY-HIGH-SPEED-DROP-IMPINGEMENT EROSION OF 1100 ALUMINUM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 71 48P ENGEL,OLIVE G. ;
CONTRACT: F33615-69-C-1385
PROJ: AF-7340
TASK: 734007
MONITOR: AFML TR-71-104

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, WATER IMPINGEMENT), EROSION, RAINDROPS (U)

AN INVESTIGATION OF FIVE AVAILABLE SPECIMENS OF 1100-O ALUMINUM, WHICH WERE TESTED UNDER WATERDROP IMPINGEMENT AT VELOCITIES FROM MACH 1.5 TO MACH 4, WAS UNDERTAKEN TO DETERMINE THE MECHANISM OF EROSION OF ALUMINUM AT VERY HIGH VELOCITIES. THE RESULTS OF INSPECTION OF THE ERODED SPECIMENS WITH USE OF A LIGHT MICROSCOPE AND SCANNING ELECTRON MICROSCOPE REVEALED THAT PLASTIC FLOW OF THE ALUMINUM INCREASED AS THE TEST VELOCITY INCREASED. CROSS-SECTIONAL CUTS OF THE SPECIMENS REVEALED A SMALL SMOUNT OF WORK-HARDENING AT VELOCITIES OF MACH 2.5 AND ABOVE, BUT NO EVIDENCE OF CRACK FORMATION WAS FOUND. THESE FINDINGS ARE COMPATIBLE IF THE HEAT GENERATED BY THE AMOUNT OF PLASTIC FLOW OF ALUMINUM THAT OCCURS IS LARGE ENOUGH TO ANNEAL THE WORKED METAL. IF THIS IS THE CASE, ALUMINUM IS A PERMANENTLY PLASTIC MATERIAL. TWO MECHANISMS OF METAL REMOVAL ARE CONSIDERED. THE FIRST, WHICH IS APPLICABLE AT VELOCITIES UP TO MACH 2.5, IS THE BREAKING OFF OF PROTURBERANCES FORMED BY PLASTIC FLOW OF THE METAL. THE SECOND, WHICH IS APPLICABLE AT VELOCITIES ABOVE MACH 2.5, IS THE EXTRUSION OF SEPARATE MASSES OF METAL WHICH HAVE BECOME SURROUNDED BY SURFACES OF DISCONTINUITY AS A RESULT OF THE PUMMELING EFFECT OF THE INDIVIDUAL WATERDROP BLOWS. THE SECOND MECHANISM OF METAL LOSS CAN BE EXPECTED TO PROGRESS AS A LAYER-REMOVAL PROCESS.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-729 039 13/8
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

COMPARATIVE WEAR RESISTANCE OF DIFFUSION LAYERS, (U)

JUN 71 13P VOROSHNIN,L. G. ;LYAKHOVICH, L. S. ;FUNSHTEIN,YA. N. ;
REPT. NO. FTD-MT-24-44-71
PROJ: AF-7343

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. FROM KHIMIKO-TERMICHESKAYA OBRABOTKA STALI I SPLAVOV (USSR) P138-141 1969, BY ROBERT ALLEN POTTS.

DESCRIPTORS: (*CASE HARDENING, *STEEL), WEAR RESISTANCE, QUENCHING(COOLING), DIFFUSION, FRICTION, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

STEELS 20, 25, 45 AND 25KHGT, AFTER SURFACE HARDENING BY VARIOUS DIFFUSION METHODS, WERE SUBJECTED TO ABRASIVE WEAR TESTS. THE HIGHEST RESISTANCE TO WEAR IN ROLLING FRICTION WAS OBSERVED AFTER HOLDING 2 HR IN A GIVEN MELT CONTAING 3 PERCENT OF A GIVEN COMPOSITION AT 850 DEGREES, FOLLOWED BY IMMEDIATE QUENCHING IN WATER OR OIL; GAS CARBURIZING (IN NATURAL OR SYNTHETIC GAS), HIGH TEMPERATURE CYANIDING (IN A GIVEN MOLTEN MIXTURE AT 920 DEGREES), AND NITROCARBURIZING (IN A MIXTURE OF AMMONIA AND KEROSENE AT 880 DEGREES) PRODUCED SURFACES OF LOWER WEAR RESISTANCE. THE HIGHEST RESISTANCE IN SLIDING FRICTION WAS OBTAIND IN THE CASE OF STEEL 45 AFTER BORONIZING FOR 5 HR IN A GIVEN MELT AT 980-1000 DEGREES, IMMEDIATELY FOLLOWED BY QUENCHING IN OIL AND TEMPERING FOR 90 MIN AT 250 DEGREES; BORONIZING IN A GIVEN MELT RESULTED IN SOMEWHAT LOWER WEAR RESISTANCE, BUT THE WEAR RESISTANCE OF ALL BORONIZED STEEL 45 SAMPLES WAS STILL MUCH HIGHER THAN THAT OF STEELS 20 AND 25 KHGT AFTER ANY OF THE ABOVE MENTIONED CARBURIZING TREATMENTS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-732 028 11/6
SOUTHWEST RESEARCH INST SAN ANTONIO TEX DEPT OF STRUCTURAL RESEARCH

THE EFFECT OF RESIDUAL STRESS ON CRACK PROPAGATION IN HY-80 STEELS. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
OCT 71 19P SHERMAN,ROBERT !
CONTRACT: N00014-70-C-0265
PROJ: SWRI-03-2801

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, *CRACK PROPAGATION), STRESSES, FATIGUE(MECHANICS), FRACTURE(MECHANICS) (U)
IDENTIFIERS: RESIDUAL STRESS, STEEL HY-80 (U)

TESTS WERE CONDUCTED TO DETERMINE THE EFFECT OF RESIDUAL STRESS ON THE RATE OF CRACK GROWTH IN HY-80 PLATE STEEL. A RESIDUAL STRESS FIELD, OVER AND ABOVE THAT INHERENTLY PRESENT IN AS-QUENCHED AND TEMPERED MATERIAL, WAS INDUCED BY MEANS OF WELDING-IN OF A PRE-CRACKED PATCH PLATE INTO THE SPECIMEN BODY! A CYCLIC LOAD, WHICH WOULD INDUCE PARTICULAR VALUES OF STRESS INTENSITY, WAS THEN APPLIED. FROM THE ENSUEING TEST RESULTS, A GROWTH RATE RELATION WAS DETERMINED AND COMPARED TO A SIMILAR RELATION OBTAINED FROM LIKE TESTS PERFORMED ON SPECIMENS HAVING ZERO WELD-INDUCED RESIDUAL STRESS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-733 068 11/6
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD

EFFECTS OF MICROSTRUCTURE, COMPOSITION, AND STRENGTH ON THE STRENGTH-DIFFERENTIAL PHENOMENON OBSERVED IN HY-80 STEEL. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
OCT 71 51P SALIVE,MARCEL L. ;WILLNER, ABNER R. ;
REPT. NO. NSRDC-3701
PROJ: SF35-422-212

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, MECHANICAL PROPERTIES), MICROSTRUCTURE, NICKEL ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, TENSILE PROPERTIES, COMPRESSIVE PROPERTIES, HEAT TREATMENT, COMPUTER PROGRAMS (U)
IDENTIFIERS: STEEL HY-80 (U)

STEEL FROM 22 HEATS OF LOW-CARBON NI-CR-MO STEEL (MIL-S-16216G AND ASTM A543-65) WERE HEAT TREATED TO STUDY THE EFFECTS ON THE STRENGTH-DIFFERENTIAL EFFECT AND THE DIFFERENCE BETWEEN TENSILE AND COMPRESSIVE YIELD STRENGTH OF (1) COMMERCIAL VARIATION IN COMPOSITION AND INCLUSION CONTENT, (2) VARIATION IN MICROSTRUCTURE SUCH AS PRIOR AUSTENITIC GRAIN SIZE AND THE RELATIVE AMOUNT OF ISOTHERMALLY PRODUCED FERRITE OR BAINITE IN A TEMPERED MARTENSITIC MATRIX, AND (3) THE OBSERVED VARIATION IN STRENGTH OBTAINED AFTER A 1-HOUR 1150 F TEMPER FOLLOWED BY A WATER QUENCH TO PREVENT EMBRITTLEMENT WHILE COOLING FROM THE TEMPERATING TEMPERATURE. THE DIFFERENCE BETWEEN THE TENSILE AND COMPRESSIVE YIELD STRENGTH, SOMETIMES CALLED THE STRENGTH DIFFERENTIAL (S-D) EFFECT, WAS OBSERVED IN THIS STUDY TO BE AT LEAST 5 PERCENT OF THE TENSILE YIELD STRENGTH. DATA ARE CITED TO SHOW THAT IN THE LOW-CARBON NI-CR-MO STEELS STUDIED HERE, THE S-D EFFECT OBSERVED WAS A RELATIVELY CONSTANT PERCENT OF THE TENSILE YIELD STRENGTH, AND WAS MARKEDLY STRUCTURE-SENSITIVE TO PRIOR AUSTENITIC GRAIN SIZE, MICROSTRUCTURAL CONSTITUENTS, TEMPERING TEMPERATURE, TYPE AND DISTRIBUTION OF CARBIDES FORMED DURING TEMPERING, AND TEMPERING SLIGHTLY ABOVE THE LOWER CRITICAL TEMPERATURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-733 335 11/6
AEROSPACE CORP EL SEGUNDO CALIF LAB OPERATIONS

THE EFFECT OF MICROSTRUCTURE ON FATIGUE CRACK PROPAGATION IN TI-6AL-6V-2SN ALLOY. (U)

DESCRIPTIVE NOTE: REPT. FOR SEP 70-JUN 71, OCT 71 43P AMATEAU,MAURICE F. !HANNA, W. DAVE !KENDALL,E. GEORGE !
REPT. NO. TR-0172(2250-10)-3
CONTRACT: F04701-71-C-0172
MONITOR: SAMSO TR-71-268

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, CRACK PROPAGATION), MICROSTRUCTURE, FATIGUE(MECHANICS), FRACTOGRAPHY, ALUMINUM ALLOYS, TIN ALLOYS, VANADIUM ALLOYS (U)
IDENTIFIERS: TITANIUM ALLOY 6AL 2SN 6V (U)

THE FATIGUE CRACK GROWTH BEHAVIOR OF TI-6AL-6V-2SN WAS INVESTIGATED FOR FIVE DIFFERENT MICROSTRUCTURES, USING CONTOURED DOUBLE-CANTILEVER BEAM SPECIMENS. THE FATIGUE CRACK GROWTH BEHAVIOR WAS COMPARED WITH THE MECHANICAL STRENGTH, TOUGHNESS, AND DUCTILITY PROPERTIES FOR EACH MICROSTRUCTURE. THE FATIGUE FRACTURE SUFFACES WERE EXAMINED WITH A SCANNING ELECTRON MICROSCOPE. ANNEALED STRUCTURES CONSISTING OF EQUIAXED PRIMARY ALPHA HAVE THE LOWEST CRACK GROWTH RESISTANCE, WHILE THE ACICULAR ALPHA MICROSTRUCTURE RESULTING FROM BETA ANNEALING HAS A GROWTH RESISTANCE FOUR TIMES GREATER IN THE INTERMEDIATE GROWTH REGIME. NO SIMPLE MODEL OF CRACK GROWTH RATE USING GROSS MECHANICAL PROPERTIES DESCRIBES THE RELATIVE MAGNITUDE NOR THE RALATIVE ORDER OF CRACK RESISTANCE AMONG THE DIFFERENT MICROSTRUCTURES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-734 116 11/6
BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS INFORMATION CENTER

REVIEW OF RECENT DEVELOPMENTS. MECHANICAL PROPERTIES OF METALS, (U)

NOV 71 6P CAMPBELL,J. E. 1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, MECHANICAL PROPERTIES), (*ALUMINUM ALLOYS, MECHANICAL PROPERTIES), (*TITANIUM ALLOYS, MECHANICAL PROPERTIES), REVIEWS, CRACK PROPAGATION, METALS (U)
IDENTIFIERS: STEEL 4140, STEEL 4337, STEEL 5CR 3MO 12NI, TITANIUM ALLOY 6AL 4V, ALUMINUM ALLOY 2024, TITANIUM ALLOY 6AL 2SN 6V, ANNOUNCEMENT BULLETINS (U)

;CONTENTS: ELEVATED-TEMPERATURE TENSILE PROPERTIES OF AISI 4140 AND 4337A ALLOY STEELS; ELEVATED-TEMPERATURE PROPERTIES OF 12 NI MARAGING STEEL PLATE AND WELDS; FATIGUE PROPERTIES OF MILL-ANNEALED TI-6AL-4V ALLOY AT ROOM TEMPERATURE AND 600F; COMPARISON OF FATIGUE-CRACK-GROWTH RATES IN ALUMINUM ALLOYS, TITANIUM ALLOYS, AND ALLOY STEELS; FRACTURE TOUGHNESS AND FLAW GROWTH IN D6 ALLOY STEEL. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-734 617 11/6
RENSSELAER POLYTECHNIC INST TROY N Y MATERIALS DIV

A STUDY OF GRAIN BOUNDARY PRECIPITATE-FREE ZONE FORMATION IN AN AL-ZN-MG ALLOY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 71 8P SHASTRY,C. R. ;JUDD,GARY ;
REPT. NO. TR-3
CONTRACT: N00014-67-A-0117-0009
PROJ: NR-031-737

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN METALLURGICAL TRANSACTIONS, V2 P3283-3287 DEC 71.

DESCRIPTORS: (*ALUMINUM ALLOYS, CHEMICAL PRECIPITATION), (*GRAIN BOUNDARIES, CHEMICAL PRECIPITATION), HEAT TREATMENT, ZINC ALLOYS, MAGNESIUM ALLOYS, ELECTRON MICROSCOPY (U)
IDENTIFIERS: TRANSMISSION ELECTRON MICROSCOPY (U)

THE EFFECT OF QUENCH RATE BOUNDARY TYPE ON THE WIDTH OF PRECIPITATE - FREE ZONES IN AN AL-6.86 WT PCT ZN-2.35 WT PCT MG ALLOY THAT WAS AGED AT TWO DIFFERENT TEMPERATURES WAS STUDIED BY TRANSMISSION ELECTRON MICROSCOPY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-735 314 11/6
ARMY MATERIALS AND MECHANICS RESEARCH CENTER WATERTOWN MASS

FACTORS INFLUENCING THE STRENGTH DIFFERENTIAL OF HIGH STRENGTH STEELS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 71 22P CHAIT,RICHARD I
REPT. NO. AMMRC-TR-71-48
PROJ: DA-1-T-061101-A-91-A

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, METALLOGRAPHY), MICROSTRUCTURE, COMPRESSIVE PROPERTIES, TENSILE PROPERTIES (U)
IDENTIFIERS: *HIGH STRENGTH STEELS, STEEL 4340, STEEL 410, STEEL H-11, STEEL 18 NI (U)

ROOM TEMPERATURE TENSILE AND COMPRESSIVE TRUE STRESS-TRUE STRAIN CURVES OF VARIOUS HIGH STRENGTH STEELS (QUENCHED AND TEMPERED 4340 STEEL, 410 MARTENSITIC STAINLESS STEEL AND H-11 STEEL) AND AGED 300-GRADE 18 NI MARAGING STEEL) WERE ANALYZED TO DETERMINE THE EFFECT OF THE VARIOUS MICROSTRUCTURES ON WHAT HAS BEEN TERMED THE STRENGTH DIFFERENTIAL (SD), I.E., THE STRENGTH LEVEL DIFFERENCE BETWEEN THE TENSILE AND COMPRESSIVE FLOW CURVES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-737 640 11/6
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD

EFFECTS OF MICROSTRUCTURE, COMPOSITION, AND STRENGTH ON THE NIL DUCTILITY TRANSITION (NDT) TEMPERATURE OF HY-80 STEEL. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JAN 72 131P SALIVE,MARCEL L. ;
REPT. NO. NSRDC-3722
PROJ: SF35.422.212

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, TRANSITION TEMPERATURE), DUCTILITY, MICROSTRUCTURE, GRAIN SIZE, TENSILE PROPERTIES (U)
IDENTIFIERS: STEEL HY-80 (U)

STEEL FROM 22 HEATS OF LOW-CARBON NI-CR-MO STEEL, HY-80 (ASTM A543065, AND MIL-S-16216G (SHIPS)) WAS HEAT TREATED TO STUDY THE EFFECTS ON THE DROP WEIGHT NIL DUCTILITY TRANSITION (NDT) TEMPERATURE OF (1) COMMERCIAL VARIATION IN COMPOSITION AND INCLUSION CONTENT, (2) VARIATION IN MICROSTRUCTURE SUCH AS PRIOR AUSTENITIC GRAIN SIZE AND THE RELATIVE AMOUNT OF ISOTHERMALLY PRODUCED FERRITE OR BAINITE IN A TEMPERED MARTENSITIC MATRIX, AND (3) THE OBSERVED VARIATION IN STRENGTH OBTAINED AFTER A ONE-HOUR 1150 F TEMPER FOLLOWED BY WATER QUENCH TO PREVENT EMBRITTLEMENT WHILE COOLING FROM THE TEMPERING TEMPERATURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-739 340 11/6 13/8
MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR MATERIALS SCIENCE AND ENGINEERING

STRUCTURE AND PROPERTY CONTROL THROUGH RAPID QUENCHING OF LIQUID METALS. (U)

DESCRIPTIVE NOTE: SEMI-ANNUAL TECHNICAL REPT. NO. 3, 1 JUL-31 DEC 71,
JAN 72 130P GRANT,NICHOLAS J. !PELLOUX, REGIS M. N. !FLEMINGS,MERTON C. !ARGON,ALI S. !
CONTRACT: DAHC15-70-C-0283, ARPA ORDER-1608
PROJ: ARPA-0010

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO SEMI-ANNUAL TECHNICAL REPT. NO. 2, AD-728 053.

DESCRIPTORS: (*MARAGING STEELS, POWDER METALLURGY), (*NICKEL ALLOYS, POWDER METALLURGY), (*COBALT ALLOYS, POWDER METALLURGY), (*POWDER METALLURGY, *QUENCHING(COOLING)), MELTING, ATOMIZATION, HOT PRESSING, MICROSTRUCTURE, MECHANICAL PROPERTIES, FREEZING, HEAT TREATMENT (U)
IDENTIFIERS: STEEL 18 NI, NICKEL ALLOY IN-100, SOLIDIFICATION, THERMOMECHANICAL TREATMENT (U)

VARIOUS POWDER METALLURGY (P/M) AND QUENCH-CASTING TECHNIQUES WERE EMPLOYED TO GENERATE EXTREMELY FINE DENDRITE ARM SPACINGS AND HOMOGENEOUS STRUCTURES. IRON, NICKEL AND COBALT-BASE ALLOY POWDERS, PRODUCED BY STEAM ATOMIZATION (COARSE POWDERS), ARGON ATOMIZATION, VACUUM ATMOIZATION, AND THE ROTATING ELECTRODE PROCESS, WERE CONSOLIDATED INTO DENSE BILLETS BY HOT ISOSTATIC PRESSING (HIP) AND/OR EXTRUSION. NEW POWDER PROCESSES BASED ON SEPARATING SOLID NODULES FROM A LIQUID-SOLID MIXTURE AND RANDOM BREAK UP OF A FINE STREAM OF LIQUID METAL INTO SPHERICAL PARTICLES ARE BEING EVALUATED. THE HOT WORKING PROPERTIES OF P/M BILLETS AND QUENCH-CAST BARS WERE EVALUATED BY HOT ROLLING, HIGH STRAIN RATE TESTS, AND CREEP (SUPERPLASTIC) TESTING. TWO P/M SUPERALLOYS, MAR-M-509 (COBALT-BASE) AND IN-100 (NICKEL-BASE) AFTER HIP AND HOT EXTRUSION DEMONSTRATED EXCELLENT HOT WORKABILITY UNDER HIGH STRAIN RATE AND CREEP FORMING CONDITIONS, RESPECTIVELY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-739 516 11/6
ARMY WEAPONS COMMAND ROCK ISLAND ILL WEAPONS LAB

EFFECT OF STRAIN RATE ON THE MECHANICAL PROPERTIES OF CR-MO-V STEEL AT ELEVATED TEMPERATURES. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
FEB 72 22P IYER,KAILASAM R. ;
REPT. NO. SWERR-TR-72-6
PROJ: DA-1-W-562604-A-607

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, MECHANICAL PROPERTIES), HIGH-TEMPERATURE RESEARCH, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, VANADIUM ALLOYS, TEMPERATURE (U)
IDENTIFIERS: STRAIN RATE (U)

THE MECHANICAL PROPERTIES OF QUENCHED AND TEMPERED CR-MO-V STEEL WERE DETERMINED AT TEMPERATURES BETWEEN 800F AND 1300F AT STRAIN RATES RANGING FROM 0.002 TO 20/MIN. EXPERIMENTAL DATA WERE ANALYZED AS FUNCTIONS OF STRAIN RATE AND TEMPERATURE ON THE BASIS OF THREE SEMI-EMPIRICAL MECHANICAL EQUATIONS OF STATE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-739 906 11/6
ARMY MATERIALS AND MECHANICS RESEARCH CENTER WATERTOWN MASS

HARDNESS AND MICROSTRUCTURE OF PARTIALLY AUSTENITIZED 43XX STEEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
DEC 71 22P CHIAO,WEILY F. IKULA,ERIC B. I
REPT. NO. AMMRC-TR-71-58
PROJ: DA-1-T-062105-A-328

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, MICROSTRUCTURE), HARDNESS, PHASE DIAGRAMS, HARDENING, QUENCHING(COOLING), METALLOGRAPHY (U)
IDENTIFIERS: HIGH STRENGTH STEELS (U)

A STUDY WAS MADE OF MICROSTRUCTURES OF SEVERAL PARTIALLY AUSTENITIZED 43XX STEELS. BY QUENCHING FROM TEMPERATURES BELOW THOSE AT WHICH COMPLETE AUSTENITIZATION WOULD OCCUR, MICROSTRUCTURES OF MARTENSITE WITH FERRITE AND/OR CEMENTITE WERE OBTAINED. MICROSTRUCTURAL ANALYSIS ENABLED THE PHASE BOUNDARIES OF THE PERTINENT SECTION OF THE PHASE DIAGRAM TO BE DETERMINED. HARDNESS CHANGES IN THE AS-QUENCHED STRUCTURES WERE CORRELATED WITH THE PHASE DIAGRAM. THE MAJOR FACTOR CONTROLLING THE AS-QUENCHED HARDNESS IS THE VOLUME FRACTION AND CARBON CONTENT OF THE MARTENSITE IN THE STRUCTURE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-742 038 11/6
RENSSELAER POLYTECHNIC INST TROY N Y MATERIALS DIV

HETEROGENEOUS NUCLEATION OF GAMMA IN AL-AG AND AL-AG(CD OR CU) ALLOYS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 71 13P PASSOJA,DANN E. ;ANSELL, GEORGE S. ;
REPT. NO. TR-3
CONTRACT: N00014-67-A-0117-0011
PROJ: NR-031-689

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ACTA METALLURGICA, V19 P1253-1261 NOV 71,
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 7 JUN 68.

DESCRIPTORS: (*ALUMINUM ALLOYS, PHASE STUDIES), NUCLEATION, SILVER ALLOYS, CADMIUM ALLOYS, COPPER ALLOYS, DISLOCATIONS, ELECTRON MICROSCOPY (U)
IDENTIFIERS: TRANSMISSION ELECTRON MICROSCOPY (U)

TRANSMISSION ELECTRON MICROSCOPY STUDIES OF HETEROGENEOUS NUCLEATION OF THE METASTABLE GAMMA' PHASE WERE MADE IN BINARY AND TERNARY ALLOYS OF AL-5 AT .% AG, AL-4.8 AT .% AG-0.15 AT .% CD AND AL-4.8 AT .% AG-0.2 AT .% CU. HETEROGENEOUS NUCLEATION OF GAMMA' WAS FOUND TO BE ASSOCIATED WITH FOUR TYPES OF DISLOCATIONS REGARDLESS OF THE QUENCHING TREATMENT OR ALLOY ADDITIONS WHICH WERE USED. NUCLEATION WAS FOUND TO OCCUR ON: (A) JOGGED DISLOCATIONS; (B) HELICAL DISLOCATIONS; (C) DISLOCATION LOOPS; (D) HETEROGENEOUS CLIMB SOURCES. ONLY ONE NUCLEATION MECHANISM WAS FOUND TO BE UNIQUE TO THE TERNARY ALLOYS: THAT OF NUCLEATION ON HETEROGENEOUS CLIMB SOURCES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-745 487 11/6
CARNEGIE-MELLON UNIV PITTSBURGH PA

EXTENSION OF SOLID SOLUBILITY DURING
MASSIVE TRANSFORMATIONS, (U)

APR 71 11P MASSALSKI,T. B. (PERKINS,
A. J. (JAKLOVSKY,J. (
CONTRACT: DA-ARO-D-31-124-72-G90
PROJ: DA-2-0-061102-B-32-D
MONITOR: AROD 8253:7-MC

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN METALLURGICAL
TRANSACTIONS, V3 P687-694 MAR 72.

DESCRIPTORS: (*COPPER ALLOYS, PHASE STUDIES),
(*SILVER ALLOYS, PHASE STUDIES), (*CADMIUM
ALLOYS, PHASE STUDIES), ZINC ALLOYS, ALUMINUM
ALLOYS, PHASE DIAGRAMS, MICROSTRUCTURE (U)

RECENT STUDIES OF MASSIVE TRANSFORMATION IN SYSTEMS
BASED ON COPPER OR SILVER HAVE SHOWN THAT THE DEGREE
TO WHICH THE PRIMARY SOLID SOLUTION, ALPHA, MAY BE
EXTENDED INTO THE TWO-PHASE FIELD, (ALPHA +
BETA), DURING A COMPOSITION INVARIANT MASSIVE
TRANSFORMATION, VARIES FROM SYSTEM TO SYSTEM, AND
DEPENDS UPON A NUMBER OF FACTORS. A SYSTEMATIC
STUDY OF THIS POINT WAS PERFORMED IN THE CU-ZN,
CU-AL, AND AG-CD SYSTEMS, USING QUENCHING AND
HEATING TECHNIQUES. IN EACH SYSTEM A SERIES OF
ALLOYS, INCREASING BY SMALL INTERVALS (0.1 AT.
PCT) OF SOLUTE CONTENT, WAS EXAMINED. PARTICULAR
CARE WAS TAKEN IN THE CONTROL OF COMPOSITION AND
HOMOGENEITY OF THESE ALLOYS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-745 491 11/6 20/12
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER

IMPURITY CURRENTS GENERATED BY VACANCY CURRENTS IN METALS. (U)

71 17P ANTHONY,T. R. ;
CONTRACT: DAHC04-69-C-0070
PROJ: DA-2-0-061102-B-32-D
MONITOR: AROD 8156:7-MC

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ATOMIC TRANSPORT IN SOLIDS AND LIQUIDS, V4 N5 P138-150 1971.

DESCRIPTORS: (*ALUMINUM ALLOYS, GRAIN STRUCTURES(METALLURGY)), (*GRAIN STRUCTURES(METALLURGY), IMPURITIES), GRAIN BOUNDARIES, RADIATION DAMAGE, NEUTRON REACTIONS, BREMSSTRAHLUNG (U)
IDENTIFIERS: VACANCIES(CRYSTAL DEFECTS) (U)

DURING COOLING FROM A HIGH-TEMPERATURE ANNEAL, VACANCY CURRENTS WERE OBSERVED TO CAUSE IMPURITIES TO SEGREGATE AROUND VACANCY PRECIPITATE CAVITIES IN ALUMINUM. FROM THE VACANCY AND VACANCY-GENERATED IMPURITY CURRENTS DIRECTLY MEASURED IN THESE EXPERIMENTS, THE RATIOS OF VACANCY JUMP FREQUENCIES AWAY FROM AND AROUND IMPURITY ATOMS IN ALUMINUM ARE DETERMINED. THESE RATIOS SUGGEST ONLY A SMALL INTERACTION BETWEEN VACANCIES AND IMPURITIES AND/OR AN INCREASE IN THE JUMP FREQUENCY OF ALUMINUM ATOMS AROUND IMPURITIES IN ALUMINUM. THE SEGREGATION THAT WOULD BE PRODUCED AROUND GRAIN BOUNDARY VACANCY SINKS DURING QUENCHING AND IRRADIATION WAS COMPUTED FROM THE VACANCY CURRENT AND THE VACANCY-GENERATED IMPURITY CURRENTS MEASURED IN THESE EXPERIMENTS. IT WAS FOUND THAT MODERATE AND VERY LARGE CHANGES IN THE GRAIN BOUNDARY IMPURITY CONCENTRATION COULD BE EXPECTED DURING QUENCHING AND IRRADIATION, RESPECTIVELY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-746 195 11/6
RENSSELAER POLYTECHNIC INST TROY N Y MATERIALS DIV

EFFECT OF TITANIUM ADDITIONS ON THE AGING CHARACTERISTICS OF AN AL-ZN-MG ALLOY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 72 27P JUDD,GARY ;GROVE,C. A. ;
REPT. NO. TR-4
CONTRACT: N00014-67-A-0117-0009

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *DISPERSION HARDENING), TITANIUM, PHASE STUDIES, AGING(MATERIALS), HARDNESS, MICROSTRUCTURE, DISLOCATIONS, HEAT TREATMENT (U)
IDENTIFIERS: ALUMINUM ALLOY 5.32ZN 1.66MG .041TI, SOLVUS TEMPERATURE (U)

A MINUTE TITANIUM ADDITION (.04%) WAS ADDED TO AN AL-ZN-MG ALLOY IN ORDER TO DETERMINE THE EFFECT OF TITANIUM ON MICROSTRUCTURE AND AGING CHARACTERISTICS OF THIS ALLOY. TITANIUM WAS FOUND TO RETARD THE KINETICS OF PRECIPITATION AND TO PREVENT SOLUTE SEGREGATION TO GRAIN BOUNDARIES ON AIR QUENCHING. BELOW G.P. SOLVUS TEMPERATURE, HARDENING OF THE ALLOY WAS DUE BOTH TO DISLOCATION LOOP FORMATION AND TO G.P. ZONE FORMATION. ABOVE G.P. SOLVUS TEMPERATURE, HARDENING WAS DUE ONLY TO FORMATION OF PRECIPITATE. THESE RESULTS HAVE BEEN EXPLAINED IN TERMS OF TITANIUM REDUCING THE LIKELIHOOD OF THE FORMATION OF SOLUTEVACANCY COMPLEXES; CAUSING A REDUCTION IN ZINC AND MAGNESIUM MOBILITY. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-749 508 19/1 11/6
ALUMINUM CO OF AMERICA NEW KENSINGTON PA ALCOA RESEARCH LABS

FEASIBILITY STUDY FOR DEVELOPMENT OF AN ALUMINUM ALLOY FOR FABRICATION OF SMALL ARMS CARTRIDGE CASES. (U)

DESCRIPTIVE NOTE: FINAL REPT. 2 APR 70-2 JUN 72,
JUN 72 75P ROGERS,RALPH W. , JR1
REPT. NO. 13-AX202
CONTRACT: DAAA25-68-C-0771

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CARTRIDGE CASES, *ALUMINUM ALLOYS), FEASIBILITY STUDIES, ZINC ALLOYS, COPPER ALLOYS, MAGNESIUM ALLOYS, ZIRCONIUM ALLOYS, STRAIN HARDENING, MECHANICAL PROPERTIES, CORROSION RESISTANCE, THERMAL STABILITY, HEAT TREATMENT, GRAIN SIZE (U)

SEVENTEEN EXPERIMENTAL HEAT-TREATABLE AL-ZN-MG-CU ALLOYS AND FOUR AL-MG OR AL-MG-ZN STRAIN-HARDENABLE ALLOYS WERE EVALUATED FOR SUITABILITY AS CARTRIDGE CASE MATERIALS. SIXTEEN ALLOYS WERE OF LOW IMPURITY LEVEL ACHIEVED BY USE OF REFINED 99.99 AL INGOT AS BASE METAL AND WERE ROLLED TO .015 INCH AND .063 INCH SHEET BY PRACTICES DEVELOPING HIGH DEGREES OF HOMOGENEITY. FIVE ALLOYS WERE OF MODERATE PURITY. COMPARISONS AMONG ALLOYS WERE MADE ON BASIS OF STRENGTH-TOUGHNESS CHARACTERISTICS, CORROSION RESISTANCE, TEMPERATURE STABILITY, QUENCH SENSITIVITY, ANNEALING CHARACTERISTICS AND GRAIN SIZE PROPERTIES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-749 679 11/6 13/8
MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR MATERIALS SCIENCE AND ENGINEERING

STRUCTURE AND PROPERTY CONTROL THROUGH RAPID QUENCHING OF LIQUID METALS. (U)

DESCRIPTIVE NOTE: SEMI-ANNUAL TECHNICAL REPT. NO. 4, 1 JAN-31 JUL 72,
JUL 72 140P GRANT,NICHOLAS J. !PELLOUX, REGIS M. !FLEMINGS,MERTON C. !ARGON,ALI S.
!
CONTRACT: DAHC15-70-C-0283, ARPA ORDER-1608

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-739 340.

DESCRIPTORS: (*ALUMINUM ALLOYS, POWDER METALLURGY), (*MARAGING STEELS, POWDER METALLURGY), (*NICKEL ALLOYS, POWDER METALLURGY), (*COBALT ALLOYS, POWDER METALLURGY), (*POWDER METALLURGY, *QUENCHING(COOLING)), (*ALUMINUM, POWDER METALLURGY), MELTING, ATOMIZATION, HOT PRESSING, MICROSTRUCTURE, MECHANICAL PROPERTIES, FREEZING, HEAT TREATMENT, HOT WORKING (U)
IDENTIFIERS: STEEL 18NI, NICKEL ALLOY IN-100, ALUMINUM ALLOY 7075, THERMOMECHANICAL TREATMENT, COBALT ALLOY MAR-M-509 (U)

VARIOUS POWDER METALLURGY (P/M) AND QUENCH-CASTING TECHNIQUES WERE EMPLOYED TO GENERATE EXTREMELY FINE DENDRITE ARM SPACINGS AND HOMOGENEOUS STRUCTURES. IRON, NICKEL AND COBALT-BASE ALLOY POWDERS, PRODUCED BY STEAM ATOMIZATION (COARSE POWDERS), ARGON ATOMIZATION, VACUUM ATOMIZATION, AND THE ROTATING ELECTRODE PROCESS, WERE CONSOLIDATED INTO DENSE BILLETS BY HOT ISOSTATIC PRESSING (HIP) AND/OR EXTRUSION. THE HOT WORKING PROPERTIES OF P/M BILLETS AND QUENCH-CAST BARS WERE EVALUATED BY HOT ROLLING, HIGH STRAIN RATE TESTS, AND CREEP (SUPERPLASTIC) TESTING. DETAILED ANALYSES OF MICROSTRUCTURE, HEAT TREATMENT, AND MECHANICAL PROPERTIES ARE PRESENTED FOR ALL P/M ALLOYS AND COMPARED TO EQUIVALENT CAST MATERIALS.
(AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-751 534 11/6
NAVAL RESEARCH LAB WASHINGTON D C

SIGNIFICANCE OF CHARPY-V TEST PARAMETERS AS CRITERIA FOR QUENCHED AND TEMPERED STEELS, (U)

OCT 72 21P PUZAK,P. P. ;LANGE,E. A.
;
REPT. NO. NRL-7483
CONTRACT: AT(04-3)-863
PROJ: NRL-M01-25, RR-022-01-46
TASK: 5432

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, *FRACTURE(MECHANICS)), (*IMPACT TESTS, FRACTURE(MECHANICS)), TEST METHODS, DUCTILITY (U)
IDENTIFIERS: HIGH STRENGTH STEELS, STEEL HY-130, STEEL 2.25CR 1MO (U)

A DUCTILITY PARAMETER HAS BEEN SUGGESTED TO REPLACE THE ENERGY PARAMETER AS THE CRITERION OF PERFORMANCE OF A QUENCHED AND TEMPERED STEEL. THE LATERAL EXPANSION (LE) OF THE CHARPY V SPECIMEN HAS BEEN HYPOTHESIZED TO BE A SELF-ADJUSTING INDEX OF FRACTURE RESISTANCE TO COMPENSATE FOR THE WIDE RANGE IN THE YIELD STRENGTH OF QUENCHED AND TEMPERED STEELS. THIS HYPOTHESIS IS EXAMINED USING INFORMATION FROM AN EXTENSIVE BANK OF DATA GENERATED AT NRL AS WELL AS THE INFORMATION IN THE LITERATURE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-753 273 11/6
MARTIN MARIETTA CORP BALTIMORE MD RESEARCH INST FOR ADVANCED STUDIES

STRESS-CORROSION CRACKING OF AL-ZN-MG ALLOYS: THE CORROSION BEHAVIOR OF GRAIN BOUNDARY CONSTITUENTS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
DEC 72 18P SEDRIKS,A. J. ;GREEN,J. A. S. ;NOVAK,D. L. ;
REPT. NO. RIAS-TR-72-25C, TR-6
CONTRACT: N00014-67-C-0496
PROJ: NR-031-716

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *STRESS CORROSION), GRAIN BOUNDARIES, ZINC ALLOYS, MAGNESIUM ALLOYS, ELECTROCHEMISTRY, SIMULATION (U)

SINCE THE GRAIN-BOUNDARY CONSTITUENTS IN AL-ZN-MG ALLOYS ARE GENERALLY TOO FINE FOR THEIR CORROSION BEHAVIOR TO BE STUDIED IN SITU, AN EXPERIMENTAL APPROACH INVOLVING SIMULATION WAS ADOPTED. THIS INVOLVED THE EXAMINATION OF THE CORROSION BEHAVIOR OF A SMALL INGOT OF MGZN2, THE AL-ZN-MG ALLOY IN THE AS-QUENCHED STATE, AND PURE ALUMINUM. THE PURE ALUMINUM AND THE AS-QUENCHED ALLOY WERE CONSIDERED TO REPRESENT THE TWO LIMITING CASES OF THE MATERIAL COMPRISING THE PRECIPITATE-FREE ZONE; PURE ALUMINUM REPRESENTING THE LIMITING CASE OF THE SOLUTE-DEPLETED REGION AND THE AS-QUENCHED ALLOY THE VACANCY DEPLETED REGION. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-753 928 11/6
WATERVLIET ARSENAL N Y

RAPIDLY AUSTENITIZED LOW CARBON STEEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
OCT 72 35P GRIFFIN,RICHARD B. IPEPE,
JOSEPH ;
REPT. NO. WVT-7252
PROJ: DA-1-T-062105-A-32-B

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, PHASE STUDIES), HEAT TREATMENT, IRON COMPOUNDS, CARBIDES, DISSOCIATION, NUCLEATION (U)
IDENTIFIERS: STEEL 1010, DISSOLVING, PHASE TRANSFORMATIONS, IRON CARBIDES (U)

A 1010 CARBON STEEL, IN THE ANNEALED CONDITION, WAS USED TO STUDY THE DISSOLUTION BEHAVIOR OF FE3C PARTICLES UNDER CONDITIONS OF RAPID HEATING AND SHORT TIMES AT TEMPERATURE. THE STUDY USED A CAPACITOR-DISCHARGE PULSE HEATING AND QUENCHING SYSTEM TO ACHIEVE HEATING RATES OF 1,000,000 C/SEC, QUENCHING RATES OF 10,000 C/SEC, AND TIMES AT TEMPERATURES FROM 15 TO 500 MSEC. A QUALITATIVE DESCRIPTION IS GIVEN OF THE EFFECT PULSE HEATING OF ALLOYS, INTO THE TWO PHASE (FERRITE PLUS AUSTENITE) AND INTO THE SINGLE PHASE (AUSTENTIE REGION), HAVE ON THE SAMPLES. METALLOGRAPHIC EVIDENCE IS PRESENTED CONFIRMING THE SUGGESTION THAT PULSE HEATING AND RAPID QUENCHING CAN PRODUCE REGIONS HAVING HIGHER CARBON CONCENTRATIONS THAN THE SAME ALLOY HEATED UNDER EQUILIBRIUM CONDTIONS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-754 530 14/2 19/6
WATERVLIET ARSENAL N Y

THE PULSAR: AN ULTRA HIGH SPEED
HEATING AND QUENCHING SYSTEM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
SEP 72 22P GRIFFIN,RICHARD B. !
REPT. NO. WVT-7250
PROJ: DA-1-T-062105-A-345

UNCLASSIFIED REPORT

DESCRIPTORS: (*LABORATORY EQUIPMENT, HEAT TREATMENT), (*GUN BARRELS, THERMAL STRESSES), HEATING, QUENCHING(COOLING), PHASE STUDIES (U)
IDENTIFIERS: CAPACITOR DISCHARGE PULSE HEATING (U)

A CAPACITOR-DISCHARGE PULSE HEATING AND QUENCHING SYSTEM, CALLED THE PULSAR, HAS BEEN BUILT AND MADE OPERATIVE AT THE WATERVLIET ARSENAL. METALLIC SAMPLES, UP TO 1/10 INCH IN CROSS SECTIONAL AREA, MAY BE HEATED AT 1,000,000 C/SEC HELD AT TEMPERATURE FROM 15 TO 500 MILLISEC, AND THEN SPARY WATER QUENCHED AT 10,000 C SEC. THIS ALLOWS METALLURGICAL REACTIONS, SUCH AS DISSOLUTION, GRAIN REFINEMENT, AND CONSTITUTIONAL LIQUATION TO BE STUDIED BEFORE COMPLETION. THE SYSTEM ENABLES ONE TO SEPARATE OUT THE EFFECTS OF TEMPERATURE FROM THE OTHER METALLURGICAL MECHANICAL AND CHEMICAL EFFECTS THAT A GUN TUBE UNDERGOES DURING A FIRING CYCLE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-757 677 11/6 13/8
MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR MATERIALS SCIENCE AND ENGINEERING

STRUCTURE AND PROPERTY CONTROL THROUGH RAPID QUENCHING OF LIQUID METALS. (U)

DESCRIPTIVE NOTE: SEMI-ANNUAL TECHNICAL REPT. NO. 5, 31 JUL-31 DEC 72,
DEC 72 128P GRANT,NICHOLAS J. ;PELLOUX, REGIS M. ;FLEMINGS,MERTON C. ;ARGON,ALI S.
;

CONTRACT: DAHC15-70-C-0283, ARPA ORDER-1608

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT DATED 31 JUL 72, AD-749 679.

DESCRIPTORS: (*MARAGING STEELS, POWDER METALLURGY), (*NICKEL ALLOYS, POWDER METALLURGY), (*COBALT ALLOYS, POWDER METALLURGY), (*POWDER METALLURGY, *QUENCHING(COOLING)), MECHANICAL PROPERTIES, MICROSTRUCTURE, FREEZING, ATOMIZATION, HOT PRESSING, PROCESSING, HOT WORKING, HEAT TREATMENT (U)

IDENTIFIERS: STEEL 18NI, NICKEL ALLOY IN-100, COBALT ALLOY MAR-M-509 (U)

THE PROCESSING OF BILLETS FROM RAPIDLY QUENCHED LIQUID METALS WAS INVESTIGATED. VARIOUS POWDER METALLURGY (P/M) AND QUENCH-CASTING TECHNIQUES WERE EMPLOYED TO GENERATE EXTREMELY FINE DENDRITE ARM SPACINGS AND HOMOGENEOUS STRUCTURES. IRON, NICKEL AND COBALT-BASE ALLOY POWDERS, PRODUCED BY STEAM ATOMIZATION (COARSE POWDERS), ARGON ATOMIZATION, VACUUM ATOMIZATION, AND THE ROTATING ELECTRODE PROCESS, WERE CONSOLIDATED INTO DENSE BILLETS BY HOT ISOSTATIC PRESSING (HIP) AND/OR EXTRUSION. THE HOT WORKING PROPERTIES OF P/M BILLETS AND QUENCH-CAST BARS WERE EVALUATED BY HOT ROLLING, HIGH STRAIN RATE TESTS, AND CREEP (SUPERPLASTIC) TESTING. DETAILED ANALYSES OF MICROSTRUCTURE, HEAT TREATMENT, AND MECHANICAL PROPERTIES ARE PRESENTED FOR ALL P/M ALLOYS AND COMPARED TO EQUIVALENT CAST MATERIALS. (AUTHOR MODIFIED ABSTRACT) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-759 117 13/8 11/6 19/1
EDGEWOOD ARSENAL MD

VACUUM BRAZING-GAS QUENCHING OF CHEMICAL AND ORDNANCE MUNITIONS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. SEP 67-DEC 70, MAR 73 65P GURTNER,FRANCIS B. I
REPT. NO. EA-TR-4659
PROJ: AMC-4932-5671129

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALLOYS, BRAZING), (*BRAZING, *VACUUM APPARATUS), (*ORDNANCE, *MANUFACTURING METHODS), ORDNANCE LABORATORIES, THERMAL JOINING, HELIUM GROUP GASES, QUENCHING(COOLING), MICROSTRUCTURE, METALLOGRAPHY, HEAT TREATMENT (U)
IDENTIFIERS: ALUMINUM ALLOY 2219, ALUMINUM ALLOY 2014, ALUMINUM ALLOY 7039, ALUMINUM ALLOY 6061, TITANIUM ALLOY 6AL 4V, MARAGING STEEL 250, STEEL 2219, STEEL 2014, STEEL 7039, STEEL 1045, STEEL 8620, STEEL 4130, STEEL 4340, STEEL 1020, STEEL 316, STEEL 347, VACUUM BRAZING GAS QUENCHING PROCESS (U)

THE VACUUM BRAZING-GAS QUENCHING PROCESS OR VACUUM HEATING-GAS QUENCHING PROCESS IS NOW A RELIABLE METHOD OF JOINING MATERIALS, MILITARY AND/OR COMMERCIAL HARDWARE ITEMS. THESE HARDWARE ITEMS INCLUDE SMALL MUNITIONS FOR CHEMICALS, ORDNANCE MUNITIONS, PARTS FOR JET ENGINES, TANKS, MORTARS, VEHICLE ASSEMBLIES, AND TRANSPORTATION MECHANISMS SUCH AS TRUCKS AND PERSONNEL CARRIERS. THE APPLICATION OF THIS PROCESS INDICATES QUITE READILY THAT IT IS EXTREMELY BROAD, NOT LIMITED TO A SMALL AREA OR SCOPE OF ENDEAVOR. ALL THAT IS LACKING IS THE COORDINATED EFFORT TO PUT THIS PROCESS TO WORK WITHIN DOD. THE DESIGN CAPABILITY EXISTS FOR MANUFACTURING, CONSTRUCTIN, OR BUILDING A MULTI-CONTINUOUS CHAMBER SYSTEM. THE PROCESS PRODUCES AN ULTRAHIGH VALUE WHEN RELATED TO QUALITY - PRODUCIBILITY IS 99.99% FOR A HELIUM LEAK STANDARD OF .000006 CC PER SECOND FOR 15 SECONDS AT ONE ATMOSPHERIC DIFFERENTIAL IN PRESSURE. THE MECHANICAL PROPERTIES OF THE MATERIALS OF THIS PROCESS ARE EQUAL TO AND/OR SUPERIOR TO THOSE MECHANICAL PROPERTIES OF THE MATERIALS PROCESSED BY CONVENTIONAL METHODS. THE MICROSTRUCTURE OF EACH MATERIAL OR OF THE OVERALL MATERIALS ARE SLIGHTLY DIFFERENT BUT SERVES AS AN ADVANTAGE TO PROCESSING. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-759 626 11/6
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

THE EFFECT OF PRELIMINARY HEAT TREATMENTS
ON THE CORROSION OF TITANIUM ALLOY TVO. (U)

APR 73 16P SHAPOVALOVA,O. M. (KURILEKH,
L. P. (KAMENSHCHIK,E. L.)
REPT. NO. FTD-MT-24-1712-72

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF
METALLURGIYA I KHIMIYA TITANA. SBORNIK TRUDOV
(USSR) N5 P90-99 1970, BY ROBERT ALLEN POTTS.

DESCRIPTORS: (*TITANIUM ALLOYS, *CORROSION),
HEAT TREATMENT, QUENCHING(COOLING),
MICROSTRUCTURE, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

THE REPORT GIVES THE RESULTS OF INVESTIGATION OF
THE EFFECT OF QUENCHING ON THE CORROSION OF SECONDARY
TITANIUM ALLOY (TVO). (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-761 148 11/6
NAVAL RESEARCH LAB WASHINGTON D C

LIGAMENT INSTABILITY MODEL FOR STRESS CORROSION AND FATIGUE CRACK PROPAGATION IN A 4340 STEEL. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
APR 73 47P KRAFFT,JOSEPH M. ;SMITH, HERSCHEL L. ;
REPT. NO. NRL-MR-2598
PROJ: NRL-F01-03, RR023-03-45

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, *STRESS CORROSION), FATIGUE(MECHANICS), CRACKS, CRACK PROPAGATION, TENSILE PROPERTIES, CREEP, CORROSION, MATHEMATICAL MODELS (U)
IDENTIFIERS: STEEL 4340, STEEL A-533, FRACTURE MECHANICS (U)

THE MODEL IS ONE WHICH EXPLAINS THE GROWTH OF CRACKS IN TERMS OF THE ECONOMICS OF MAINTAINING STABILITY OF PLASTIC FLOW AT THE CRACK TIP. THE MATERIAL THERE IS TAKEN TO BE SUBDIVIDED INTO TENSILE ELEMENTS, UNITS OF SIZE D SUB T. THERE INSTABILITY IS INDUCED BY CORROSION BY STRESS RELAXATION, BY CONTRACTION IN AREA DUE TO STRETCHING; THEIR STABILITY IS RESTORED BY STRAIN HARDENING, BUT THIS REQUIRES STRAIN AND THIS, AT CONSTANT LOAD, CRACK GROWTH. THE MODEL IS TESTED IN TERMS OF DATA ON THE AQUEOUS STRESS CORROSION CRACKING AND CORROSION FATIGUE CRACK PROPAGATION IN AN AISI 4340 STEEL, QUENCHED AND TEMPERED BACK AT 204, 316, 427 AND 538C. DATA FROM THE LITERATURE ON ANOTHER 4340 AND ON A533 B-1 PRESSURE VESSEL STEEL IS ALSO EXAMINED. TENSILE AS WELL AS CYCLIC STRESS-STRAIN CURVES WERE ANALYZED FOR EACH MATERIAL. (MODIFIED AUTHOR ABSTRACT) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-762 979 11/6
LEHIGH UNIV BETHLEHEM PA DEPT OF METALLURGY AND MATERIALS SCIENCE

THE DEVELOPMENT OF MARTENSITIC MICROSTRUCTURE AND MICROCRACKING IN AN FE-1.86C ALLOY, (U)

JAN 72 8P MENDIRATTA,M. G. ;KRAUSS, G. ;
CONTRACT: DA-ARO-D-31-124-73-G25
MONITOR: AROD 9121:2-MC

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN METALLURGICAL TRANSACTIONS, V3 P1755-1760 JUL 72.

DESCRIPTORS: (*STEEL, MICROSTRUCTURE), MARTENSITE, FRACTURE(MECHANICS), PHASE STUDIES, REACTION KINETICS, METALLOGRAPHY (U)

THE DEVELOPMENT OF THE MARTENSITIC MICROSTRUCTURE IN A 1.86 WT PCT C STEEL WAS FOLLOWED BY QUANTITATIVE METALLOGRAPHIC MEASUREMENTS OVER THE TRANSFORMATION RANGE OF 0.12 TO 0.60 FRACTION TRANSFORMED (F). THE TRANSFORMATION KINETICS ARE DESCRIBED BY THE EQUATION F = 1 - EXP (-0.008 (M SUB S - T SUB Q)) WHERE M SUB S AND T SUB Q ARE THE MARTENSITE START AND THE QUENCHING TEMPERATURES RESPECTIVELY. FULLMAN'S ANALYSIS SHOWS THAT THE AVERAGE VOLUME PER MARTENSITE PLATE DECREASES BY ALMOST AN ORDER OF MAGNITUDE OVER THE TRANSFORMATION RANGE STUDIED, BUT THIS DECREASE IS LESS THAN THAT PREDICTED BY THE FISHER ANALYSIS FOR PARTITIONING OF AUSTENITE BY SUCCESSIVE GENERATIONS OF MARTENSITE. MICROCRACKING INCREASES WITH INCREASING F UP TO 0.3, BUT DOES NOT INCREASE FOR F ABOVE 0.3 WHERE TRANSFORMATION PROCEEDS BY THE NUCLEATION OF LARGE NUMBERS OF SMALL MARTENSITE PLATES. THESE OBSERVATIONS INDICATE THAT A CRITICAL SIZE OF MARTENSITE PLATE IS NECESSARY TO CAUSE MICROCRACKING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-763 900 11/6
ARMY MATERIALS AND MECHANICS RESEARCH CENTER WATERTOWN MASS

THERMAL EMBRITTLEMENT OF 4340 STEEL. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
DEC 72 19P CARR,FRANK L. 1DESISTO,
THOMAS S. 1
REPT. NO. AMMRC-TR-72-39
PROJ: DA-1-T-062105-A-328

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, EMBRITTLEMENT),
BRITTLENESS, TRANSITION TEMPERATURE, TOUGHNESS,
HARDNESS, TEMPERING, MICROSTRUCTURE, IMPACT
TESTS (U)
IDENTIFIERS: STEEL 4340 (U)

FRACTURE APPEARANCE TRANSITION TEMPERATURES OBTAINED WITH IMPACT SPECIMENS WERE USED TO STUDY THE THERMAL EMBRITTLEMENT OF 4340 STEEL BETWEEN 950 AND 1250 F (510 AND 675 C). EMBRITTLEMENT OCCURRED AT THE HIGHER TEMPERATURES BUT NOT IN THE VICINITY OF 1000 F WITHIN 16 DAYS. THE DEGREE OF EMBRITTLEMENT DEPENDED ON BOTH TIME AND TEMPERATURE. REDUCTIONS IN TOUGHNESS WERE CORRELATED WITH CHANGES IN THE MORPHOLOGY AND SIZE OF FERRITE GRAINS AS WELL AS THE SIZE OF CARBIDE PARTICLES. THESE MICROSTRUCTURAL CHANGES WERE SIMILAR TO THOSE OBSERVED IN BOTH 3140 AND PLAIN CARBON STEELS BY OTHER INVESTIGATORS. CONVENTIONAL ANISOTHERMAL PROCEDURES USED TO PRODUCE TEMPER BRITTLENESS IN LOW ALLOY STEELS ALSO EMBRITTLE THESE STEELS BY ANOTHER MECHANISM. THUS, THE DEGRADATION OF TOUGHNESS ATTRIBUTED TO TEMPER BRITTLENESS RESULTS FROM TWO DIFFERENT MODES OF EMBRITTLEMENT. TRANSITIONAL BEHAVIOR PREVIOUSLY DESCRIBED AS THE RETROGRESSION OF TEMPER BRITTLENESS IS CONCLUDED TO RESULT FROM THERMAL EMBRITTLEMENT. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-763 988 11/6 19/1
NATIONAL MATERIALS ADVISORY BOARD (NAS-NAE) WASHINGTON D C

PRODUCIBILITY OF ARTILLERY SHELLS MADE FROM HF-1 STEEL. REPORT OF THE AD HOC COMMITTEE ON SHELL STEEL. (U)

DESCRIPTIVE NOTE: FINAL REPT.
APR 73 112P
REPT. NO. NMAB-307
CONTRACT: DAAA25-73-C-0106

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, FEASIBILITY STUDIES), (*PROJECTILE CASES, STEEL), FRAGMENTATION, HAZARDS, QUALITY CONTROL, POWDER METALLURGY, FRACTURE(MECHANICS), STRESSES, DEFECTS(MATERIALS) (U)
IDENTIFIERS: STEEL HF-1, HIGH CARBON STEELS (U)

A REVIEW OF PROBLEMS THAT MIGHT ARISE IN CONVERTING TO HF-1 STEEL FOR SHELL PRODUCTION LED TO THE CONCLUSION THAT SUCH DIFFICULTIES AS MIGHT BE ENCOUNTERED IN STEEL PRODUCTION OR IN MANUFACTURING WOULD NOT BE OF A NATURE AS TO IMPEDE USE OF THE NEW STEEL. RECOMMENDATIONS TO EXPEDITE THE CONVERSION ARE MADE. ATTENTION IS CALLED TO THE NEED FOR MORE STRINGENT INSPECTION, WHICH FOLLOWS FROM THE GREATER FLAW SENSITIVITY OF HF-1. THE NEED FOR DATA TO ASSESS THE CRITICAL FLAW SIZE OF QUENCHED-AND-TEMPERED HF-1 IS EMPHASIZED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-764 150 11/6
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF METALLURGY AND MATERIALS SCIENCE

ON THE MECHANISM OF DISPERSION STRENGTHENING. (I). STORED ENERGY MEASUREMENT IN DISPERSION STRENGTHENED IRON. (II). (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUL 73 44P GRANT,NICHOLAS J. ;KENAGY, DONALD ;WOLF,STANLEY ;
CONTRACT: NONR-3963(18)
PROJ: MIT-DSR-74621

UNCLASSIFIED REPORT

DESCRIPTORS: (*COPPER ALLOYS, DISPERSION HARDENING), (*IRON, DISPERSION HARDENING), ALUMINA, SILICON DIOXIDE, MOLYBDENUM, COBALT ALLOYS, ALUMINUM ALLOYS, POWDER METALLURGY, INTERMETALLIC COMPOUNDS, MECHANICAL PROPERTIES (U)

A GROUP OF 42 COPPER BASE ALLOYS CONTAINING 5 DISPERSOIDS (A1203, SIO2, COAL, FE, AND MO) IN AMOUNTS OF 3, 7, AND 11 PERCENT, WITH PARTICLE SIZES RANGING FROM 0.01 TO 25 MICRONS (3 SIZES IN EACH ALLOY SERIES), WERE PREPARED BY POWDER BLENDING. AFTER EXTRUSION AT A REDUCTION RATIO OF 6 TO 1 AT 745C, THE ALLOYS WERE TESTED FOR HARDNESS, YIELD AND TENSILE STRENGTH, DUCTILITY, AND IN STRESS RUPTURE AT 650C. IN ADDITION TO THE AS-EXTRUDED CONDITION, TESTS WERE ALSO RUN ON MATERIAL ANNEALED 10 HOURS AT 650C. ON AVERAGE, ALL MATERIALS RESPONDED TO THE PARTICLE SIZE AND VOLUME FRACTION OF THE DISPERSOID IN THE SAME DIRECTION, HOWEVER, IMPORTANT DIFFERENCES IN THE EXTENT AND RATE OF THE RESPONSE WERE OBSERVED FOR BOTH AS-EXTRUDED AND ANNEALED MATERIALS, AND IN TERMS OF METALLIC, INTERMETALLIC, OR OXIDIC DISPERSIONS. THE OXIDE DISPERSED ALLOYS TEND TO BEHAVE AS A COLD WORKED COPPER MATRIX STABILIZED BY A FINELY DISPERSED STABLE PHASE WHICH DOES NOT INTERACT DIRECTLY WITH THE MATRIX. THE METALLIC DISPERSED ALLOYS TEND TO BEHAVE AS REAL ALLOYS RESPONDING BOTH TO COLD WORK AND THE EFFECTS OF INTERACTIONS BETWEEN MATRIX AND DISPERSOID. IN THIS RESPECT THE 'INSOLUBLE' MO DISPERSOID PRODUCES A STRONGER, MORE STABLE ALLOY THAN DOES THE 'SOLUBLE' FE DISPERSOID. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-765 108 11/6
STATE UNIV OF NEW YORK STONY BROOK DEPT OF MATERIALS SCIENCE

PRECIPITATION IN LIQUID-QUENCHED AL-BASE SI, (U)

FEB 73 10P AGARWAL,S. C. ;KOCZAK,M. J. ;HERMAN,H. ;
CONTRACT: DA-ARO-D-31-124-72-G60
PROJ: DA-2-0-061102-B-32-D
MONITOR: AROD 8571:2-MC

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN SCRIPTA METALLURGICA, V7 P365-370 1973.

DESCRIPTORS: (*ALUMINUM ALLOYS, DISPERSION HARDENING), (*QUENCHING(COOLING), ALUMINUM ALLOYS), SILICON ALLOYS (U)
IDENTIFIERS: LIQUID QUENCHING (U)

LIQUID-QUENCHING PRESENTS THE POSSIBILITY OF OBTAINING ALLOYS HAVING UNIQUE PROPERTIES. EXAMINATIONS WERE MADE ON HOW LIQUID QUENCHING CAN MODIFY THE RESPONSE TO AGE-HARDENING. THE REPORT IS ON LIQUID QUENCHING OF AL-BASE SI ALLOYS. SOME INTERESTING DIFFERENCES ARE NOTED BETWEEN LIQUID QUENCH AND SOLID QUENCH FOR THIS SYSTEM. (MODIFIED AUTHOR ABSTRACT) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-765 130 11/6
STATE UNIV OF NEW YORK STONY BROOK DEPT OF MATERIALS SCIENCE

PHASE DECOMPOSITION OF LIQUID-QUENCHED AL-28 AT .% ZN, (U)

FEB 73 11P AGARWAL,S. (KOCZAK,M. J. ; HERMAN,H. ;
CONTRACT: DA-ARO-D-31-124-72-G60
PROJ: DA-2-0-061102-B-32-D
MONITOR: AROD 8571:3-MC

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN SCRIPTA METALLURGICA, V7 N4 P401-408 1973.

DESCRIPTORS: (*ALUMINUM ALLOYS, PHASE STUDIES), ZINC ALLOYS, CRYSTAL LATTICE DEFECTS, QUENCHING(COOLING), DECOMPOSITION, ELECTRON MICROSCOPY, X-RAY DIFFRACTION ANALYSIS (U)
IDENTIFIERS: ALUMINUM ALLOY 28ZN (U)

AL-BASE ZN ALLOYS ARE KNOWN TO HAVE A STRONG TENDENCY TO DECOMPOSE DURING QUENCHING. IT IS ALSO KNOWN THAT QUENCHED-IN VACANCIES CAN PLAY AN IMPORTANT ROLE IN THE LOW TEMPERATURE DECOMPOSITION IN THIS SYSTEM. COOLING RATE THUS BECOMES AN IMPORTANT FACTOR IN PRECIPITATION BEHAVIOR. SINCE LIQUID-QUENCHING CAN ACHIEVE QUENCHING RATES OF THE ORDER OF 1,000,000C/SEC., IT WAS CONSIDERED FRUITFUL TO EXAMINE PHASE DECOMPOSITION BEHAVIOR IN LIQUID-QUENCHED (LQ) VS. SOLID-QUENCHED (SQ) SPECIMENS. LQ WILL OBTAIN A MORE RANDOM AS-QUENCHED STRUCTURE DUE TO EXTREMELY HIGH COOLING RATES. IN THE INVESTIGATION, LIQUID-QUENCHED SPECIMENS WERE STUDIED BY TRANSMISSION ELECTRON MICROSCOPY (TEM) AND SAXS TECHNIQUES. THE AGING TEMPERATURES WERE CHOSEN IN THE RANGE WHERE RESULTS ON BULK-QUENCHED MATERIAL ARE AVAILABLE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-765 139 11/6
STATE UNIV OF NEW YORK STONY BROOK DEPT OF MATERIALS SCIENCE

SPINODAL DECOMPOSITION IN LIQUID-QUENCHED AL-22 AT .% ZN. (U)

MAR 73 10P AGARWAL,S. ;HERMAN,H. ;
CONTRACT: DA-ARO-D-31-124-72-G60
PROJ: DA-2-0-061102-B-32-D
MONITOR: AROD 8751.4-MC

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN SCRIPTA METALLURGICA, V7 N5 P503-508 1973.

DESCRIPTORS: (*ALUMINUM ALLOYS, DECOMPOSITION), ZINC ALLOYS, AGING(MATERIALS), X-RAY SPECTRUM, QUENCHING(COOLING), MICROSTRUCTURE, ELECTRON MICROSCOPY (U)
IDENTIFIERS: ALUMINUM ALLOY 22ZN, TRANSMISSION ELECTRON MICROSCOPY (U)

THE TEMPORAL EVOLUTION OF THE SMALL ANGLE X-RAY SCATTERING SPECTRA DURING AGING OF LIQUID-QUENCHED AL-22 AT.% ZN IS DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-765 141[1] 11/6
UTAH UNIV SALT LAKE CITY DIV OF MATERIALS SCIENCE AND ENGINEERING

SUPERLATTICE FORMATION IN THE NI-CO SYSTEM, (U)

SEP 72 7P WAN,C. M. [BYRNE,J. G.]
CONTRACT: DA-ARO-D-31-124-70-G57
PROJ: DA-2-0-061102-B-32-D
MONITOR: AROD 8591[3-MC

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICA STATUS SOLIDI (A), V14 PK85-K87 1972.

DESCRIPTORS: (*NICKEL ALLOYS, CRYSTAL LATTICES), COBALT ALLOYS, FATIGUE(MECHANICS), ANNEALING, COOLING (U)
IDENTIFIERS: NICKEL ALLOY 20CO, SUPERLATTICES (U)

THE PAPER DISCUSSES THE PRESENCE OF SUPERLATTICE STRUCTURE IN NI-20 CO FATIGUE SPECIMENS AFTER PRE-FATIGUE ANNEAL OF 600C FOR ONE HOUR. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-765 829 7/4
STANFORD UNIV CALIF DEPT OF MECHANICAL ENGINEERING

INTERPRETATION OF SODIUM LINE-REVERSAL MEASUREMENTS IN RAPID EXPANSIONS OF NITROGEN. (U)

OCT 71 5P MACDONALD,JOHN R. ;
CONTRACT: F44620-68-C-0051
PROJ: AF-9752
TASK: 975202

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF CHEMICAL PHYSICS, V57 N2 P1016-1018, 15 JUL 72.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH MAX-PLANCK-INSTITUT FUER PLASMAPHYSIK, MUENCHEN, GERMANY.

DESCRIPTORS: (*NITROGEN, *RELAXATION TIME), SHOCK WAVES, SODIUM, QUENCHING(INHIBITION), TEMPERATURE (U)
IDENTIFIERS: MOLECULAR RELAXATION, ATOM MOLECULE INTERACTIONS, EXPANSION, MOLECULAR VIBRATION (U)

MANY INVESTIGATIONS HAVE INDICATED THAT THE RELAXATION TIME FOR THE VIBRATION ENERGY OF NITROGEN IN RAPID EXPANSIONS WAS CONSIDERABLE LESS THAN BENIND SHOCK WAVES. FOR MEASUREMENTS IN RAPID EXPANSIONS BASED ON THE SODIUM LINE-REVERSAL METHOD, THIS WORK SHOWS THAT THE DISCREPANCY CAN BE RESOLVED BY REDUCING THE DATA IN TERMS OF A NON-RESONANT NA-N2 INTERACTION MODEL. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-766 214 11/6
LOCKHEED MISSILES AND SPACE CO INC PALO ALTO CALIF PALO ALTO RESEARCH LAB

PHYSICAL METALLURGY BASIS FOR ACHIEVING 300-KSI STRENGTH IN TRANSAGE TITANIUM ALLOYS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 14 OCT 71-14 AUG 73, AUG 73 77P CROSSLEY,FRANK A. I
CONTRACT: DAAG46-72-C-0016
PROJ: DA-1-T-061101-A-91-A
MONITOR: AMMRC CTR-73-28

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, MECHANICAL PROPERTIES), MICROSTRUCTURE, ALUMINUM ALLOYS, TIN ALLOYS, VANADIUM ALLOYS, ZIRCONIUM ALLOYS (U)
IDENTIFIERS: TITANIUM ALLOY 2.5AL 5SN 14.5V 7ZR, TITANIUM ALLOY 3AL 5SN 15.5V 10ZR, TITANIUM ALLOY 2AL 2SN 11.5V 11ZR, TITANIUM ALLOY 2.1AL 2SN 11.9V, 6ZR (U)

FOUR MARTENSITIC TITANIUM ALLOYS: TRANSAGE 117 (TI-2.5AL-14.5V-5SN-7ZR), TRANSAGE 120 (TI-3AL-15.5V-5SN-10ZR), TRANSAGE 129 (TI-2AL-11.5V-2SN-11ZR) AND TRANSAGE 134 (TI-2.1AL-11.9V-2SN-6ZR) WERE STUDIED METALLOGRAPHICALLY TO DETERMINE THEIR MICROSTRUCTURAL CHARACTERISTICS IN BETA-ANNEALED AND ALPHA-BETA-ANNEALED CONDITIONS. THIN-FOIL ELECTRON TRANSMISSION WAS THE PRINCIPAL METALLOGRAPHIC MEANS BECAUSE THE ATHERMAL MARTENSITE OF THESE ALLOYS IS OF THE ORDER OF 10 A IN THICKNESS. THE ALLOYS UNDERGO STRESS INDUCED TRANSFORMATION IN THE ANNEALED CONDITION AND POSSIBLY THEY EXPERIENCE THIS PHENOMENON IN SOME AGE HARDENED CONDITIONS. THE ANNEALED CONDITIONS WERE STARTING STATES FOR THERMOMECHANICAL TREATMENT (TMT) STUDIES FOR ACHIEVING 300-KSI STRENGTH. THE STRENGTH GOAL SEEMED INHERENT IN A NUMBER OF THE COMBINATIONS OF ALLOY AND TMT SCHEDULE. CONFIRMATION OF THE STRENGTH GOAL WAS NOT REALIZED DUE TO DEFICIENCIES IN TEST SPECIMENS DESIGN AND CONDITION, AND IN THE QUALITY OF MACHINING. THE FRACTURE SURFACES SUGGEST THAT THE MATERIALS HAVE SUFFICIENT DUCTILITY TO DEMONSTRATE THE YIELD STRENGTH GOAL OF 300-KSI. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-766 328 11/6
ALUMINUM CO OF AMERICA NEW KENSINGTON PA ALCOA RESEARCH LABS

COMPARISON OF ALUMINUM ALLOY 7050, 7049, MA52, AND 7175-T736 DIE FORGINGS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUN 71-31 DEC 72,
MAY 73 129P STALEY,JAMES T. I
CONTRACT: F33615-69-C-1644
PROJ: AF-7351
TASK: 735105
MONITOR: AFML TR-73-34

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, FORGING), (*STRESS CORROSION, ALUMINUM ALLOYS), MICROSTRUCTURE, TENSILE PROPERTIES, YIELD POINT, FRACTURE(MECHANICS) (U)
IDENTIFIERS: ALUMINUM ALLOY 7050, ALUMINUM ALLOY 7049, ALUMINUM ALLOY MA52, ALUMINUM ALLOY 7175, DIE FORGINGS, FRACTURE STRENGTH (U)

DIE FORGINGS IN ALUMINUM ALLOYS 7050, 7049, AND MA52 WERE FABRICATED AND EVALUATED FOR RESISTANCE TO STRESS-CORROSION CRACKING, QUENCH SENSITIVITY, AND FRACTURE TOUGHNESS. IN ADDITION, ALL ALCOA DATA ON 7050, 7049, AND SPECIAL PROCESS 7175-T7X DIE FORGINGS WERE EXAMINED AND THE PROPERTIES WERE COLLATED. STRESS-CORROSION RESISTANCES WERE EVALUATED USING THE SEVEREST COMBINATIONS OF FORGING TYPE AND TEST CONDITIONS. ALL OF THESE NEWER ALLOYS WERE LESS QUENCH SENSITIVE THAN ALLOY 7075, AND ALL DEVELOPED BETTER COMBINATIONS OF RESISTANCE TO STRESS-CORROSION CRACKING AND FRACTURE TOUGHNESS THAN 7075-T6 AND 7079-T6 AT EQUAL STRENGTHS. BECAUSE IT DEVELOPED THE BEST COMBINATION OF PROPERTIES, ALLOY 7050 IS A PREFERRED SELECTION FOR USE AS DIE FORGINGS OF RELATIVELY HEAVY SECTION THICKNESS FOR THE AEROSPACE INDUSTRY. THIS ALLOY ALSO CAN BE SUPPLIED AS HAND FORGINGS, PLATE, EXTRUSIONS, AND SHEET. SPECIAL PROCESS 7175 IS AN EQUALLY GOOD SELECTION FOR DIE FORGINGS OF THIN TO MODERATE SECTION THICKNESS. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-767 270 11/6
CALIFORNIA UNIV BERKELEY LAWRENCE BERKELEY LAB

AN INVESTIGATION OF METALLURGICAL FACTORS WHICH AFFECT FRACTURE TOUGHNESS OF ULTRA-HIGH STRENGTH STEELS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 26 JUN-26 DEC 72, MAY 73 213P WOOD,WILLIAM E. !PARKER, EARL R. !ZACKAY,VICTOR F. !
REPT. NO. LBL-1474
CONTRACT: DAAG46-72-C-0220, W-7405-ENG-48
PROJ: DA-1-T-061101-A-91-A
MONITOR: AMMRC CTR-73-24

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, *FRACTURE(MECHANICS)), TOUGHNESS, HEAT TREATMENT, MICROSTRUCTURE, MARTENSITE, EMBRITTLEMENT (U)
IDENTIFIERS: HIGH STRENGTH STEELS, FRACTURE PROPERTIES, STEEL 4130, STEEL 4140, STEEL 4330, STEEL 4340, STEEL 300-M (U)

THE RELATIONSHIP BETWEEN MICROSTRUCTURE, HEAT TREATMENT AND ROOM TEMPERATURE FRACTURE TOUGHNESS HAS BEEN DETERMINED FOR THE LOW ALLOY ULTRA-HIGH STRENGTH STEELS 4130, 4330, 4340, 4140 AND 300-M. OPTICAL METALLOGRAPHY, MICROPROBE ANALYSIS, AND SCANNING ELECTRON MICROSCOPY WERE USED TO CHARACTERIZE THE STRUCTURE AND MORPHOLOGY, WHILE BOTH CHARPY V-NOTCH IMPACT TESTS AND PLANE STRAIN FRACTURE TOUGHNESS TESTS WERE USED TO DETERMINE THE FRACTURE PROPERTIES. THE NORMAL COMMERCIAL HEAT TREATMENT RESULTED IN THE FORMATION OF SOME BAINITE IN ALL THE ALLOYS. MNS INCLUSIONS ON PRIOR AUSTENITE GRAIN BOUNDARIES WERE FOUND TO INITIATE CRACKS DURING LOADING. BY INCREASING THE AUSTENITIZING TEMPERATURE TO 1200C, THE FRACTURE TOUGHNESS COULD BE INCREASED BY AT LEAST 60%. FOR SOME ALLOYS INCREASING THE SEVERITY OF THE QUENCH IN CONJUNCTION WITH THE HIGHER AUSTENITIZING TEMPERATURES RESULTED IN FURTHER INCREASES IN THE FRACTURE TOUGHNESS, AND THE ELIMINATION OF ANY OBSERVABLE UPPER BAINITE. THERE WAS NO CORRELATION BETWEEN THE CHARPY IMPACT TEST RESULTS AND THE FRACTURE TOUGHNESS RESULTS. (MODIFIED AUTHOR ABSTRACT) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-803 270 11/6
AEROJET-GENERAL CORP SACRAMENTO CALIF MATERIALS RESEARCH LAB

TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART II. TERNARY SYSTEMS. VOLUME XIII. PHASE DIAGRAMS OF THE SYSTEMS TI-B-C, ZR-B-C, AND HF-B-C. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 66 212P RUDY,E. !WINDISCH,ST. !
CONTRACT: AF 33(615)-1249
PROJ: AF-7350
TASK: 735001
MONITOR: AFML TR-65-2-PT-2-VOL-13

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TITANIUM ALLOYS, PHASE STUDIES), (*ZIRCONIUM ALLOYS, PHASE STUDIES), (*HAFNIUM ALLOYS, PHASE STUDIES), BORON, CARBON, SILICON, MELTING POINT, DIFFERENTIAL THERMAL ANALYSIS, SINTERING, PRESSES(MACHINERY), X RAYS, QUENCHING(COOLING), HYDRIDES, TEMPERATURE, ETCHING, MICROSTRUCTURE (U)

THE TERNARY ALLOY SYSTEMS TI-B-C, ZR-B-C, AND HF-B-C HAVE BEEN INVESTIGATED BY MEANS OF X-RAY, METALLOGRAPHIC, MELTING POINT, AND DIFFERENTIAL-THERMOANALYTICAL TECHNIQUES. THE EXPERIMENTAL ALLOY MATERIAL COMPRISED OF HOT-PRESSED AND SINTERED, ARC- AND ELECTRON-BEAM MOLTEN, AS WELL AS HIGH TEMPERATURE EQUILIBRATED AND QUENCHED, SPECIMENS! EACH PHASE OF THE EXPERIMENTAL WORK WAS SUPPORTED BY CHEMICAL ANALYSIS. THE RESULTS OF THIS INVESTIGATION ARE DISCUSSED AND POSSIBLE FIELDS OF APPLICATION OUTLINED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-816 189 11/6
AEROJET-GENERAL CORP SACRAMENTO CALIF MATERIALS RESEARCH LAB

TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART I. RELATED BINARY SYSTEMS. VOLUME XI. FINAL REPORT ON THE MO-C SYSTEM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 67 68P RUDY,E. ;WINDISCH,ST. ;
STOSICK,A. J. ;HOFFMAN,J. R. ;
CONTRACT: AF 33(615)-1249
PROJ: AF-7350
TASK: 735001
MONITOR: AFML TR-65-2-PT-1-VOL-11

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MOLYBDENUM ALLOYS, *CARBON ALLOYS), X-RAY DIFFRACTION ANALYSIS, METALLOGRAPHY, MELTING POINT, TRANSFORMATIONS, HIGH-TEMPERATURE RESEARCH, QUENCHING(COOLING), DECOMPOSITION, POWDER METALS, IMPURITIES, GRAPHITE, DIFFERENTIAL THERMAL ANALYSIS, SINTERING, THERMAL EXPANSION, PHASE STUDIES, HELIUM, DIFFUSION (U)
IDENTIFIERS: BINARY ALLOYS, MOLYBDENUM CARBON ALLOYS (U)

THE BINARY ALLOY SYSTEM MOLYBDENUM-CARBON WAS INVESTIGATED BY MEANS OF X-RAY, METALLOGRAPHIC, THERMOANALYTICAL, AND MELTING POINT TECHNIQUES ON CHEMICALLY ANALYZED SPECIMENS. THE SYSTEM IS CHARACTERIZED BY THREE CONGRUENTLY MELTING, INTERMEDIATE PHASES, MO2C, ETA-MOC(1-X), AND ALPHA-MOC(1-X), OF WHICH ONLY MO2C IS STABLE AT TEMPERATURES BELOW 1650 C.
SUBSTOICHIOMETRIC (IS GREATER THAN 32.5 AT% C) DIMOLYBDENUM CARBIDE UNDERGOES A HOMOGENEOUS SUBLATTICE ORDER-DISORDER TRANSFORMATION AT TEMPERATURES OF APPROXIMATELY 1400 C, WHEREAS HYPERSTOICHIOMETRIC COMPOSITIONS UNDERGO A DISCONTINUOUS PHASE-CHANGE. THE ORDER-DISORDER TRANSITIONS IN THE ME2C PHASES ARE DISCUSSED IN TERMS OF THE STRUCTURAL CHANGES INVOLVED IN THE TRANSFORMATION PROCESSES AND THE ABSENCE OF LONG RANGE SUBLATTICE COHERENCY IN STOICHIOMETRIC OR HYPERSTOICHIOMETRIC COMPOSITIONS ATTRIBUTED TO THE IMPOSSIBILITY OF OBTAINING LONG RANGE. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-851 293 11/6
OFFICE OF NAVAL RESEARCH LONDON (ENGLAND)

METALLURGY AT LIVERPOOL, (U)

APR 69 10P LIPSITT,HARRY A. ;
REPT. NO. ONRL-R-18-69

UNCLASSIFIED REPORT

DESCRIPTORS: (*METALLURGY, GREAT BRITAIN),
RESEARCH PROGRAM ADMINISTRATION, PHASE STUDIES,
SOLID SOLUTIONS, MARTENSITE, FERRITES,
FRACTURE(MECHANICS), RECRYSTALLIZATION,
TEMPERING, DISLOCATIONS, UNIVERSITIES,
DEOXIDATION(METALLURGY), STEEL,
METALLOGRAPHY (U)

THE REPORT IS A REVIEW OF MATERIALS RESEARCH IN THE METALLURGY DEPARTMENT, UNIVERSITY OF LIVERPOOL. CURRENT RESEARCH IN OXIDATION, SULPHIDATION, FRACTURE, RECRYSTALLIZATION, SOLID SOLUTION EFFECTS, DISLOCATION INTERACTIONS, MARTENSITE TRANSFORMATIONS AND TEMPERING IS DISCUSSED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-857 807 11/6 20/11
NORTH AMERICAN ROCKWELL CORP LOS ANGELES CALIF LOS ANGELES DIV

DESIGN ALLOWABLES FOR TITANIUM ALLOYS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. MAY 66-MAY 69, JUN 69 380P SOMMER,ALFRED W. (MARTIN, GARDNER R.)
REPT. NO. NA-69-350
CONTRACT: AF 33(615)-3979
PROJ: AF-7381
TASK: 738106
MONITOR: AFML TR-69-161

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, MECHANICAL PROPERTIES), (*MECHANICAL PROPERTIES, STATISTICAL DATA), HANDBOOKS, ALUMINUM ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, TIN ALLOYS, VANADIUM ALLOYS, THERMAL STABILITY (U)
IDENTIFIERS: TITAMIUM ALLOY 4AL3MO1V, TITANIUM ALLOY 3AL11CR132, TITANIUM ALLOY 6AL4V, TITANIUM ALLOY 6AL2SN6V (U)

THE PURPOSE OF THIS PROGRAM WAS TO DEVELOP DESIGN INFORMATION ON FOUR TITANIUM ALLOYS FOR INCLUSION INTO MILITARY HANDBOOK-5. THE ALLOYS INVESTIGATED WERE TI-6AL-4V CONDITION STA, TI-4AL-3MO-1V ANNEALED CONDITION(TI-13V-11CR-3AL ANNEALED CONDITION(AND TI-6AL-6V-2SN ANNEALED CONDITION AND CONDITION STA. THE MECHANICAL PROPERTIES INVESTIGATED WERE TENSILE, COMPRESSION, SHEAR, BEARING, FRACTURE TOUGHNESS AND FATIGUE. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-857 984 11/6 20/11
ILLINOIS UNIV CHICAGO DEPT OF MATERIALS ENGINEERING

DYNAMIC BEHAVIOR OF METALS UNDER TENSILE IMPACT. PART II: ANNEALED AND COLD WORKED MATERIALS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. 1 MAR 67-15 MAR 69, JUN 69 49P SCHULTZ,ALBERT B. I
CONTRACT: F33615-67-C-1283
PROJ: AF-7351
TASK: 735106
MONITOR: AFML TR-69-76-PT-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*METALS, IMPACT SHOCK), ALUMINUM ALLOYS, STEEL, COPPER, BRASS, SHOCK WAVES, DYNAMICS, ANNEALING, LOADING(MECHANICS), TENSILE PROPERTIES (U)
IDENTIFIERS: ALUMINUM ALLOY 1100, ALUMINUM 2024 (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-858 353 11/6
BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS INFORMATION CENTER

REVIEW OF RECENT DEVELOPMENTS. HIGH-STRENGTH STEELS, (U)

AUG 69 2P GROENEVELD,T. P. 1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*METALS, *REVIEWS), STEEL, ARMOR, EMBRITTLEMENT, NICKEL ALLOYS, GRAIN SIZE, MARAGING STEELS, DEFECTS(MATERIALS), GRAIN BOUNDARIES, STRESS CORROSION (U)
IDENTIFIERS: *ANNOUNCEMENT BULLETINS (U)

CONTENTS: UNIDIRECTIONALLY SOLIDIFIED WROUGHT STEEL ARMOR; TEMPER EMBRITTLEMENT OF ALLOY STEELS; THERMAL GRAIN REFINEMENT OF 18NI (300) MARAGING STEEL; INCLUSIONS IN HIGH-STRENGTH STEEL; EUROPEAN LITERATURE SURVEY. TEMPER EMBRITTLEMENT OF ALLOY STEELS; T (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-859 713 11/6 20/12 13/8
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING

THE INFLUENCE OF BETA PROCESSING VARIABLES ON THE MICROSTRUCTURE OF THE TITANIUM 6AL-4V ALLOY. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
JUN 69 108P ADINOLFI,JERRY D. , JR1
REPT. NO. GAW/MC/69-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, MICROSTRUCTURE), FORGING, GRAIN STRUCTURES(METALLURGY), ALUMINUM ALLOYS, VANADIUM ALLOYS, GRAIN SIZE, DEFORMATION, TEMPERATURE, COOLING, QUENCHING(COOLING) (U)
IDENTIFIERS: TITANIUM ALLOY 6AL 4V, BETA FORGING (U)

AN OPEN DIE, PANCAKE FORGING STUDY WAS CONDUCTED TO DETERMINE THE INTERPLAY OF BETA PROCESSING VARIABLES (TEMPERATURE, DEFORMATION, AND COOLING RATE) IN CONTROLLING THE AS-WORKED (WROUGHT) MICROSTRUCTURE OF TI 6AL-4V. EMPHASIS WAS PLACED ON OBTAINING THE FINEST WROUGHT BETA STRUCTURE AND/OR FINEST RECRYSTALLIZED BETA GRAIN SIZE. BOTH MACROSTRUCTURES AND MICROSTRUCTURES WERE PREPARED AND OBSERVED OPTICALLY. IT WAS FOUND THAT THE FINEST WROUGHT STRUCTURE WAS OBTAINED BY INCREASING THE AMOUNT OF DEFORMATION AT THE HIGHER TEMPERATURE FOR EITHER AIR COOLING OR WATER QUENCHING. RECRYSTALLIZATION ENSUES IF THE MATERIAL IS HELD IN THE BETA FIELD IMMEDIATELY AFTER FORGING. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZDHC1

AD-864 122 11/6 20/2
MARTIN MARIETTA CORP ORLANDO FLA ORLANDO DIV

RESEARCH ON DEFORMATION AND POSSIBLE STRENGTHENING MECHANISMS FOR SOLID SOLUTION PHASES OF TITANIUM. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 66-31 JUL 69, DEC 69 76P CASS,THOMAS R. ;SPENCER, WILLIAM R. ;
REPT. NO. OR-10257
CONTRACT: AF 33(615)-3863
PROJ: AF-7351
TASK: 735103
MONITOR: AFML TR-69-293

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, *GRAIN STRUCTURES(METALLURGY)), TITANIUM, ALUMINUM ALLOYS, SINGLE CRYSTALS, SOLID SOLUTIONS, CRYSTAL GROWTH, DISLOCATIONS, CRYSTAL SUBSTRUCTURE, DEFORMATION, TWINNING(CRYSTALLOGRAPHY) (U)
IDENTIFIERS: SOLID SOLUTION ALLOYS (U)

THE REPORT IS A SUMMARY OF RESEARCH ON THE GROWTH, PERFECTION AND SLIP PROCESSES IN PURE TITANIUM AND TITANIUM-ALUMINUM SINGLE PHASE ALLOYS. A TECHNIQUE WAS DEVELOPED FOR THE GROWTH OF TITANIUM AND DILUTE TITANIUM ALLOY SINGLE CRYSTALS USING AN ELECTRON-BEAM ZONE REFINER. A DISLOCATION ETCHANT WAS DISCOVERED, ALLOWING THE PERFECTION OF THESE CRYSTALS OF 10 TO THE MINUS 9TH POWER/SQ CM. HOWEVER, ANNEALING THE CRYSTALS JUST BELOW THE TRANSFORMATION TEMPERATURE FOR LONG TIMES LOWERS THE DISLOCATION DENSITY BY TWO TO THREE ORDERS OF MAGNITUDE. COMPRESSION SPECIMENS WERE SPARK-EROSION MACHINED FROM SINGLE CRYSTALS, ANNEALED AND MECAHNICALLY TESTED. A C-AXIS COMPRESSION SPECIMEN OF HIGH PURITY TITANIUM DEFORMED BY TWINNING. HOWEVER, HIGH INTERSTITIAL CONTENT AND DILUTE ALUMINUM ALLOYS BOTH DEFORMED BY C+A GLIDE WHEN THE LOAD AXIS WAS NEAR (0001). THIS ADDITIONAL DEFORMED SYSTEM ACCOUNTS FOR THE POLYCRYSTALLINE DUCTILITY OF ALPHA-TITANIUM ALLOYS. AN ANALYSIS OF PLASTIC DEFORMATION MODES IN TIAL WAS ALSO MADE. RESULTS ON POLYCRYSTALLINE TIAL WERE IN AGREEMENT WITH THESE PREDICTIONS. HOWEVER, SINGLE CRYSTALS COULD NOT BE GROWN FOR DEFINITIVE VERIFICATION OF THE HYPOTHESIZED MODES. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-867 106 11/6 19/1 13/8
ALUMINUM CO OF AMERICA NEW KENSINGTON PA ALCOA RESEARCH LABS

FEASIBILITY STUDY FOR DEVELOPMENT OF AN ALUMINUM ALLOY FOR FABRICATION OF SMALL ARMS CARTRIDGE CASES. (U)

DESCRIPTIVE NOTE: FINAL REPT. 28 JUN 68-28 OCT 69, NOV 69 70P ROGERS,RALPH W. , JR1
CONTRACT: DAAA25-68-C-0771

UNCLASSIFIED REPORT

DESCRIPTORS: (*CARTRIDGE CASES, SMALL ARMS AMMUNITION), (*ALUMINUM ALLOYS, METALLOGRAPHY), HEAT TREATMENT, AGING(MATERIALS), DISPERSION HARDENING, GRAIN STRUCTURES(METALLURGY), STRESS RELIEVING, CORROSION RESISTANCE, STRESS CORROSION, CRACKS, HARDNESS, THERMAL STABILITY, QUENCHING(COOLING), MAGNESIUM ALLOYS, MATERIAL FORMING, FRACTOGRAPHY, ZINC ALLOYS, AGE HARDENING, COPPER ALLOYS, STRAIN HARDENING, TENSILE PROPERTIES, TEMPERATURE, ROLLING(METALLURGY), FRACTURE(MECHANICS), YIELD POINT, TOUGHNESS, NOTCH TOUGHNESS (U)
IDENTIFIERS: STRESS CORROSION CRACKING, ALUMINUM ALLOY MA07, ALUMINUM ALLOY MA08, ALUMINUM ALLOY MA09, ALUMINUM ALLOY MA05, ALUMINUM ALLOY MA06 (U)

FIVE EXPERIMENTAL, LOW IMPURITY CONTENT ALUMINUM ALLOYS WERE EVALUATED FOR CHARACTERISTICS SUCH AS TENSILE PROPERTIES, FRACTURE TOUGHNESS, RESISTANCE TO CORROSION AND STRESS CORROSION, TEMPERATURE STABILITY AND QUENCH SENSITIVITY. ALTHOUGH NONE OF THE ALLOYS ACHIEVED THE TARGET STRENGTH-TOUGHNESS CRITERIA, TWO COMPOSITIONS WERE SUPERIOR TO CONVENTIONAL ALLOYS IN THIS RESPECT. THESE WERE NOMINALLY AL-5 ZN-2.4 MG-1.2 CU-.15 CR (MA07) AND AL-5.9 ZN-2.4 CU-2.2 MG-.3 MN (MA08). ONE STRAIN-HARDENABLE ALLOY, AL-7.5 MG-.1 MN-.1 CR (MA09) WAS INCLUDED IN THE EVALUATION AND DISPLAYED GOOD NOTCH TOUGHNESS AND MODERATE RESISTANCE TO CRACK GROWTH BUT AT A RELATIVELY LOW STRENGTH LEVEL COMPARED TO THE HEAT-TREATABLE ALLOYS. ELECTRON METALLOGRAPHY AND FRACTOGRAPHY SHOWED FRACTURE TOUGHNESS TO DEPEND UPON THE RELATIVE PROPORTIONS OF FRACTURE PATH THAT WERE INTERGRANULAR OR TRANSGRANULAR AND, HENCE, UPON RELATIVE STRENGTHS OF GRAIN INTERIORS AND BOUNDARIES. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-873 261 11/6
REYNOLDS METALS CO RICHMOND VA METALLURGICAL RESEARCH DIV

HIGH STRENGTH ALUMINUM ALLOY DEVELOPMENT. (U)

DESCRIPTIVE NOTE: ANNUAL SUMMARY TECHNICAL REPT. 1 JUN 69-31 MAY 70,
AUG 70 77P THOMPSON,DAVID S. ;LEVY, SANDER A. ;
CONTRACT: F33615-69-C-1643
PROJ: AF-7351
TASK: 735105
MONITOR: AFML TR-70-171

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, MECHANICAL PROPERTIES), QUENCHING(COOLING), FRACTURE(MECHANICS), STRESS CORROSION, TENSILE PROPERTIES, FORGING, METAL PLATES, MICROSTRUCTURE (U)

THE STUDY ATTEMPTS TO PRODUCE AN ALLOY SUITABLE FOR 3 IN. PLATE OR AN 8 IN THICK FORGING POSSESSING DEFINITE STRENGTH, STRESS CORROSION, FRACTURE TOUGHNESS, AND FATIGUE PROPERTIES. VARIOUS QUENCHES WERE USED ON 1 IN PLATE TO SIMULATE QUENCHING THESE PRODUCTS. A SINGLE COMPOSITION OF 6.75% ZN, 2.5% MG, 1.2% CU WAS CHOSEN AND BOTH THE MINOR ADDITION ELEMENTS (ZR, CR, AND MN) AND THE AGING PRACTICES WERE VARIED. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-873 832 11/6 11/4
UNITED AIRCRAFT CORP EAST HARTFORD CONN RESEARCH LABS

INVESTIGATION TO DEVELOP A HIGH STRENGTH
EUTECTIC ALLOY WITH CONTROLLED
MICROSTRUCTURE. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 AUG 69-31 JUL 70,
JUL 70 89P THOMPSON,EARL R. !GEORGE,
FREDERICK D. !KRAFT,EDWIN H. !
REPT. NO. UACRL-J910868-4
CONTRACT: N00019-70-C-0052

UNCLASSIFIED REPORT

DESCRIPTORS: (*NICKEL ALLOYS, EUTECTICS),
(*EUTECTICS, COMPOSITE MATERIALS), ALUMINUM
ALLOYS, NIOBIUM ALLOYS, INTERMETALLIC COMPOUNDS,
MICROSTRUCTURE, FREEZING, FATIGUE(MECHANICS),
PHASE STUDIES, HEAT-RESISTANT METALS + ALLOYS (U)
IDENTIFIERS: SUPERALLOYS, EUTECTIC COMPOSITES,
DIRECTIONALLY SOLIDIFIED EUTECTICS (U)

THE NI3AL (GAMMA') - NI3CB (DELTA)
EUTECTIC ALLOY WAS DIRECTIONALLY SOLIDIFIED IN A
PLANE FRONT MANNER AT RATES VARYING FROM 0.3 TO 10.6
CPH. THE LAMELLAR SPACING WHICH DECREASED WITH
INCREASING RATE AFFECTED THE STRENGTH OF THE EUTECTIC
ACCORDING TO A HALL-PETCH CORRELATION. BY
DECREASING THE SPACING BY A FACTOR OF 4.7, THE
TENSILE STRENGTH WAS INCREASED BY 35 PERCENT AT ROOM
TEMPERATURE AND BY 100 PERCENT AT 2000F. THE
EUTECTIC GROWN AT 10.6 CPH POSSESSED THE PHENOMENAL
STRENGTH OF 140,000 PSI AT 2000F. THE RESISTANCE
OF THE EUTECTIC TO A TENSION-TENSION FATIGUE CYCLE
PROVED EXCELLENT. THIS RESISTANCE WAS PROVIDED BY
THE STRENGTH OF THE PHASES, AS WELL AS THE PRESENCE
OF DEBONDABLE INTERFACES WHICH AFFECT CRACK
PROPAGATION. THERMAL FATIGUE TESTS CONDUCTED ON THE
DIRECTIONALLY SOLIDIFIED EUTECTIC SHOWED NO ADVERSE
EFFECT DUE TO THE DIFFERENCES IN THERMAL EXPANSION OF
THE PHASES. QUENCHING THE EUTECTIC PRODUCED A RES
DUAL TENSILE STRESS IN THE GAMMA' WHICH LOWERED THE
PROPORTIONAL LIMIT OF THE COMPOSITE. STUDIES OF THE
STRENGTH ANISOTROPY SHOWED THAT THE STRENGTH IS
DECREASED IN DIRECTIONS NONPARALLEL TO THE GROWTH
AXIS WITH BRITTLE BEHAVIOR AT ROOM TEMPERATURE AND
DUCTILE BEHAVIOR AT 2000F. (AUTHOR) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-875 540 11/6 13/8
BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS INFORMATION CENTER

REVIEW OF RECENT DEVELOPMENTS. ALUMINUM AND MAGNESIUM, (U)

OCT 70 6P WILLIAMS,D. N. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ALUMINUM ALLOYS, REVIEWS), (*MAGNESIUM ALLOYS, REVIEWS), PROPELLANT TANKS, CASTING, ZINC ALLOYS, CORROSION RESISTANCE, HEAT TREATMENT, STRAIN(MECHANICS), POWDER METALLURGY, CASTING ALLOYS, COPPER ALLOYS (U)
IDENTIFIERS: ANNOUNCEMENT BULLETINS (U)

CONTENTS: PROPELLANT TANK FABRICATED FROM 2021 ALLOY; IMPROVED PROPERTIES BY CONTROLLED SOLIDIFICATION; FINISHING TECHNIQUES FOR MAGNESIUM; IMPROVING STRESS-CORROSION RESISTANCE OF HIGH-STRENGTH ALUMINUM-ZINC-MAGNESIUM ALLOYS; REDUCING QUENCH SENSITIVITY OF HIGH-STRENGTH ALUMINUM-ZINC-MAGNESIUM ALLOYS; EFFECTS OF SMALL AMOUNTS OF STRAIN ON THE PROPERTIES OF 2024 ALLOY; HIGH-STRENGTH ALUMINUM-ZINC-MAGNESIUM ALLOYS PREPARED BY POWDER METALLURGY PROCESSING; ADDITIONAL DATA ON KO-1 ALUMINUM-COPPER CASTING ALLOY; AND PROGRESS IN THE DEVELOPMENT OF WROUGHT ALUMINUM ALLOYS. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZOHC1

AD-885 271 11/6
WESTINGHOUSE ELECTRIC CORP PITTSBURGH PA ASTRONUCLEAR LAB

THE RELATIONSHIP OF MICROSTRUCTURE AND MECHANICAL PROPERTIES OF EXTRUDED TITANIUM ALLOY BARS TO THE PRIOR DEFORMATION PROCESSING HISTORY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. 17 NOV 68-15 JUL 70, APR 71 92P GURNEY,FRED J. (MALE,ALAN T. ;
CONTRACT: F33615-69-C-1198
PROJ: AF-7351
TASK: 735108
MONITOR: AFML TR-71-28

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, *MICROSTRUCTURE), (*EXTRUSION, TITANIUM ALLOYS), MECHANICAL PROPERTIES, HEAT TREATMENT, SHEAR STRESSES, COOLING, ALUMINUM ALLOYS (U)
IDENTIFIERS: TITANIUM ALLOY 5AL 2.5SN, TITANIUM ALLOY 6AL 4V, TITANIUM ALLOY 3AL 11CR 13V (U)

THE INTER-RELATION OF EXTRUSION PROCESS VARIABLES WITH MECHANICAL PROPERTIES AND MICROSTRUCTURE IS ANALYZED FOR THREE TITANIUM ALLOYS (TI-5AL-2.5SN, TI-6AL-4V AND TI-13V-11CR-3AL). INFORMATION IS OBTAINED FROM DUPLICATE BILLETS WHICH WERE EXTRUDED AT SAME CONDITIONS WITH ONE EXTRUDED BAR ALLOWED TO AIR COOL AND THE OTHER BAR WATER QUENCHED IMMEDIATELY AFTER EXTRUSION. RESULTS INDICATE THAT SIGNIFICANT REDUCTION IN DEFORMATION LOADS CAN BE ACHIEVED IN ALPHA AND ALPHA-BETA TITANIUM ALLOYS BY PROCESSING THEM IN THE BETA TEMPERATURE RANGE. RESULTANT METALLURGICAL STRUCTURES AND MECHANICAL PROPERTIES (ROOM TEMPERATURE TENSILE AND CHARPY V NOTCH IMPACT) ARE FOUND TO NOT BE SIGNIFICANTLY AFFECTED BY PROCESS VARIABLES OTHER THAN PREHEAT TEMPERATURE AND PRODUCT COOLING RATE. IN ALPHA AND ALPHA-BETA ALLOYS, THE ROOM TEMPERATURE STRENGTH PROPERTIES OF BETA PROCESSED AND WATER QUENCHED PRODUCT IS SIGNIFICANTLY IMPROVED OVER THOSE OF BETA PROCESSED AND AIR COOLED PRODUCT AND SOMEWHAT IMPROVED OVER THOSE FOR ALPHA-BETA PROCESSED FOLLOWED BY EITHER AIR COOLING OR WATER QUENCHING. (U)

CORPORATE AUTHOR - MONITORING AGENCY

*AEROJET-GENERAL CORP AZUSA CALIF
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0414 01 9
STRESS-CORROSION CRACKIG OF HIGH-STRENGTH ALLOYS.
AD-405 898

*AEROJET-GENERAL CORP SACRAMENTO CALIF
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TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. ART II. TERNARY SYSTEMS. VOL. I. TA-HF-C SYSTEM.
(AFML-TR-65-2-PT-2-VOL-1)
AD-470 827

*AEROJET-GENERAL CORP SACRAMENTO CALIF MATERIALS RESEARCH LAB
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TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART I. RELATED BINARY SYSTEMS. VOLUME VIII. ZR-B SYSTEM.
(AFML-TR-65-2-PT-1-VOL-8)
AD-480 949
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TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART II. TERNARY SYSTEMS. VOLUME X. THE ZR-SI-C, HF-SI-C, ZR-SI-B, AND HF-SI-B SYSTEMS.
(AFML-TR-65-2-PT-2-VOL-10)
AD-489 752
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TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART II. TERNARY SYSTEMS. VOLUME XIII. PHASE DIAGRAMS OF THE SYSTEMS TI-B-C, ZR-B-C, AND HF-B-C.
(AFML-TR-65-2-PT-2-VOL-13)
AD-803 270
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TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART I. RELATED BINARY SYSTEMS. VOLUME XI. FINAL REPORT ON THE MO-C SYSTEM.
(AFML-TR-65-2-PT-1-VOL-11)
AD-816 189

*AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
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ASD-TDR62 181
INVESTIGATION OF THE EFFECT OF ULTRA-RAPID QUENCHING ON METALLIC SYSTEMS, INCLUDING BERYLLIUM ALLOYS
AD-284 409
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ASD-TDR62 329
A STUDY OF QUENCH HARDENING IN PLATINUM AND GOLD
AD-282 836
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ASD-TDR63 309 P1
PEST REACTIONS IN INTERMETALLIC COMPOUNDS. I. GRAIN BOUNDARY HARDENING IN NIGA.
AD-405 821
* * *
TDR62 329
A STUDY OF QUENCH HARDENING IN PLATINUM AND GOLD
(ASD-TDR62 329)
AD-282 836

*AEROSPACE CORP EL SEGUNDO CALIF LAB OPERATIONS
* * *
TR-0172(2250-10)-3
THE EFFECT OF MICROSTRUCTURE ON FATIGUE CRACK PROPAGATION IN TI-6AL-6V-2SN ALLOY.
(SAMSO-TR-71-268)
AD-733 335

*AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO
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ARL-63 104
A STUDY OF THE TI-ZR-O SYSTEM.
AD-410 593

*AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF ENGINEERING
* * *
GAW/MC/69-1

THE INFLUENCE OF BETA PROCESSING VARIABLES ON THE MICROSTRUCTURE OF THE TITANIUM 6AL-4V ALLOY.
AD-859 713

*AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OHIO

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AFML-TDR64 134
EQUILIBRIUM SOLUTIONS OF NITROGEN IN COLUMBIUM-BASE ALLOYS.
AD-602 829

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AFML-TR-65-2-PT-1-VOL-8
TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART I. RELATED BINARY SYSTEMS. VOLUME VIII. ZR-B SYSTEM.
AD-480 949

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AFML-TR-65-2-PT-1-VOL-11
TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART I. RELATED BINARY SYSTEMS. VOLUME XI. FINAL REPORT ON THE MO-C SYSTEM.
AD-816 189

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AFML-TR-65-2-PT-2-VOL-1
TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. ART II. TERNARY SYSTEMS. VOL. I. TA-HF-C SYSTEM.
AD-470 827

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AFML-TR-65-2-PT-2-VOL-10
TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART II. TERNARY SYSTEMS. VOLUME X. THE ZR-SI-C, HF-SI-C, ZR-SI-B, AND HF-SI-B SYSTEMS.
AD-489 752

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AFML-TR-65-2-PT-2-VOL-13
TERNARY PHASE EQUILIBRIA IN TRANSITION METAL-BORON-CARBON-SILICON SYSTEMS. PART II. TERNARY SYSTEMS. VOLUME XIII. PHASE DIAGRAMS OF THE SYSTEMS TI-B-C, ZR-B-C, AND HF-B-C.
AD-803 270

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AFML-TR-69-76-PT-2
DYNAMIC BEHAVIOR OF METALS UNDER TENSILE IMPACT. PART II: ANNEALED AND COLD WORKED MATERIALS.
AD-857 984

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AFML-TR-69-161
DESIGN ALLOWABLES FOR TITANIUM ALLOYS.
AD-857 807

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AFML-TR-69-293
RESEARCH ON DEFORMATION AND POSSIBLE STRENGTHENING MECHANISMS FOR SOLID SOLUTION PHASES OF TITANIUM.
AD-864 122

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AFML-TR-70-171
HIGH STRENGTH ALUMINUM ALLOY DEVELOPMENT.
AD-873 261

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AFML-TR-70-312
IMPROVED PROPERTIES OF TI-6AL-6V-2SN THROUGH MICRO-STRUCTURE MODIFICATION.
AD-723 636

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AFML-TR-71-28
THE RELATIONSHIP OF MICROSTRUCTURE AND MECHANICAL PROPERTIES OF EXTRUDED TITANIUM ALLOY BARS TO THE PRIOR DEFORMATION PROCESSING HISTORY.
AD-885 271

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AFML-TR-71-68
FATIGUE STUDY OF QUENCHED AL-6.5 AT % ZN ALLOY.
AD-726 582

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AFML-TR-71-81
MECHANISMS OF FATIGUE IN MILL-ANNEALED TI-6AL-4V AT ROOM TEMPERATURE AND 600F.
AD-728 239

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AFML-TR-71-104
AN INVESTIGATION OF VERY-HIGH-SPEED-DROP-IMPINGEMENT EROSION OF 1100 ALUMINUM.
AD-728 654

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AFML-TR-73-34
COMPARISON OF ALUMINUM ALLOY 7050, 7049, MA52, AND 7175-T736 DIE FORGINGS.
AD-766 328

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH ARLINGTON VA

* * *

AFOSR-65-0590
DIFFUSION IN METALS AT ULTRA-HIGH PRESSURES.
AD-614 839

* * *

AFOSR-65-1802
PLASMA JET CHEMISTRY.
AD-625 591

* * *

AFOSR-66-1601
AN INTERNAL FRICTION STUDY OF VACANCIES IN A QUENCHED AU-NI SOLID SOLUTION.
AD-641 786

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AFOSR-66-2150
EXPERIMENTAL CONFIRMATION OF MAJOR CHANGE OF DEFECT TYPE WITH TEMPERATURE AND COMPOSITION IN IONIC SOLIDS.
AD-643 452

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AFOSR-67-1010
MAGNETIC PROPERTIES OF SUPERCONDUCTING MO-RE ALLOYS.
AD-652 132

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AFOSR-67-1091
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*GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER

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*GENERAL STEEL INDUSTRIES INC GRANITE CITY ILL CASTINGS DIV

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*ILLINOIS INST OF TECH CHICAGO DEPT OF METALLURGICAL ENGINEERING
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•STATE UNIV OF NEW YORK STONY BROOK DEPT OF MATERIALS SCIENCE

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*WINDSOR UNIV (ONTARIO)
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