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DENTAL DIAMOND ROTARY INSTRUMENTS

Test and Evaluation

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September 1983

Final Report for Period February 1982 - September 1982

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Brooks Air Force Base, Texas 78235

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In this test and evaluation of the quality and performance of dental diamond rotary instruments, the areas evaluated were: dimensions, construction, shank roughness, concentricity, durability, cutting efficiency, and corrosion. The testing methods followed those of the proposed American Dental Association Specification for Dental Diamond Rotary Instruments, with some modifications to meet the needs of the USAF Dental Service. This study provided a means of comparing diamond instruments from different manufacturers.

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DENTAL DIAMOND ROTARY INSTRUMENTS

Test and Evaluation

INTRODUCTION

On 4 August 1977, the U.S. Air Force Dental Investigation Service was tasked with Project 78-2, Test and Evaluation of Dental Diamond Rotary Instruments, by the Office of the USAF Assistant Surgeon General for Dental Services. The purpose of the project was to identify those diamond instruments of suitable quality for purchase by the dental departments of the uniformed services.

The basis for the test methods of this project was the proposed American Dental Association (ADA) specification for Dental Diamond Rotary Instruments. These proposed test methods were followed as closely as possible; however, some modifications were made to meet the specific needs of the U.S. Air Force Dental Service. Most of the equipment for the tests was commercially available. By use of minimal especially designed equipment, the tests can easily be repeated in other laboratories.

This report describes the test methods, used for this evaluation and the resulting data. The "Conclusions" section gives the final results of the test and evaluation, and provides a comparison of the diamond instruments tested.

TEST METHODS AND EQUIPMENT

Dimensions

The proposed ADA specification has an eight-digit code for the identification of various sizes and shapes of diamond instruments. Since these codes have not been implemented and the different manufacturers have their individual shapes, sizes, and identification systems for instruments, the test samples for this study were based on the diamond instruments most used by the military dentists.

The nine-diamond instrument types that were carried on the federal stock table formed the test sample. Listed in Table 1 are these instruments and the specified dimensions to be met by the manufacturers.

Each diamond instrument was measured, to the nearest 0.001 mm, under a Gaertner 30X Toolmaker's Microscope (Figs. 1 and 2). The dimensions measured were: small head diameter, large head diameter, head length, overall length, shank diameter, and head angle.

EDITOR'S NOTE: For the convenience of the reader, all figures and tables have been grouped at the close of the text.

The actual diamond grit was not measured during this study. The grit range for the samples was based on the manufacturer's supplied grit, according to Table 2.

Construction

The criterion for the materials to be used in the construction of the diamond instruments was for these abrasive and metal materials to be suitable for the intended use. The abrasive was to have even distribution, and the binder matrix was to have minimal extension over the cutting surfaces of the diamonds.

The proposed ADA specification called for visual inspection under a 5X to 8X microscope. In this study, the inspection was performed under a 30X microscope. Each sample was examined for material suitability, diamond distribution, and matrix extension.

Shank Roughness

The proposed ADA specification sets a shank roughness limit of 20 μin over a 5-mm cutoff length in the longitudinal direction of the straight portion of the shank. Shank roughness in this study was tested by the equipment listed in Table 3.

The diamond instrument samples were placed in a custom-made holder, and the motor drive stroked the chisel stylus probe in a longitudinal direction along 5 mm of the straight portion of the shank (Fig. 3). The roughness in microinches was displayed on the digital readout. After three consistent roughnesses were read for the sample, a recording of the roughness was made by the digital printout. The shank roughness test equipment setup is shown in Figure 4.

Concentricity

To test the concentricity of the diamond instruments, the axial and radial runout of the head and neck of the samples were measured. Before the runout was measured, the samples were subjected to a run-in period. The instruments were placed in a Levin #16 or #23 collet which was mounted in a custom-designed chuck holder (Fig. 5).

A Bodine Electric Co. NSY-54 Fractional Horsepower Motor (Fig. 6) was used to rotate the diamond instruments, hysteresis-synchronously, at 3800 rpm. A 2-1/4" x 2-1/4" x 1/4" glass plate (Knoop Hardness-530) was then held against the diamond instruments under a 1-lb (454 g) load, and the samples were allowed to cut for 15 sec (Fig. 7). Details of this test set-up are shown in Figures 8 and 9.

After the run-in, the diamond instruments were rotated in a V-block under a 30X toolmaker's microscope. Friction grip samples had 3/8 in. of the shank

resting in the V, and straight handpiece samples had 1-3/8 in. in the V. These depths are representative of the length of shank that is inserted into a handpiece.

Radial runout of the head and neck were measured as the difference between the highest and lowest distance readings of a line, parallel to the axis of rotation, that is tangential to a point on the sample during one complete revolution of the instrument (Fig. 10).

Axial runout of the head was measured as the difference between the highest and lowest distance readings of a line perpendicular to the axis of rotation that is tangent to a point on the sample during one complete revolution of the instrument (Fig. 11).

The proposed ADA specification lists a runout limit of 0.003 in. (0.076 mm) for instruments with a head diameter of 0.5 in. (12.7 mm), and 0.006 in. (0.152 mm) for instruments with a head diameter greater than 0.5 in. For this study, however, the old ADA standard of 0.002-in. (0.051-mm) runout was used as the upper limit.

Durability

The testing apparatus for durability was the same as that used in the concentricity test run-in. Again, glass plates were used for cutting. For this test, however, four 15-sec cutting periods were used with a 30-sec cooling period between each cut. A 3-lb (1362-g) load and 3800-rpm speed were used to accelerate instrument breakdown.

While this test was being designed, we noted that the sample instruments became clogged with glass particles. Therefore, the coolant air and water lines were salvaged from a discarded handpiece, and a minicoolant system was fabricated for the test (Fig. 12). During the durability test, an air flow of 50 liters/min at 30 psi was used to remove the glass particles and to aid in cooling the diamond instruments.

After the cutting had been completed, the samples were examined under a 30X microscope to evaluate how well the matrix material was able to firmly hold the diamond particles. A diamond instrument failed the durability test if more than 25% of the diamond particles were lost, or if excessive matrix peeling occurred. A sample also failed if it broke during the test.

Corrosion

The proposed ADA specification called for boiling the diamond instruments in distilled water, and then noting any corrosion after 24 hrs. In this study, the instruments were tested more along the lines of use in Air Force dental clinics. Since most Air Force installations are now using MDT Harvey Chemiclaves for sterilization, these units were used for the corrosion test.

After being cleaned with denatured alcohol, the diamond instruments were processed through 10 cycles of a Chemiclave 5000. After each cycle, the

samples were examined under a 40X microscope for corrosion. A diamond instrument failed the corrosion test if more than 5% of the total instrument--or 2% of the head--showed corrosion.

The samples were then processed through 10 cycles in an AMSCO Medallion Autoclave to examine any increase that might occur from steam sterilization. Again, the diamond instruments were examined under a 40X microscope after each cycle.

Cutting Efficiency

The cutting efficiency test is not a part of the proposed ADA specification. The test was designed to show which diamond instruments could cut most efficiently and have the least loss of cutting ability over an extended period of use. The equipment was the same as that used for the concentricity test run-in and durability test.

Several practice runs were made to establish the length of cutting time for this test. Times of less than one minute did not show a consistent decrease in cutting ability. Two minutes was established as the time long enough to allow a decrease in cutting ability, and short enough to prevent the diamond instruments from cutting entirely through the glass plates. The diamond instruments were rotated at 3800 rpm, and were used to cut glass plates for five 2-min periods under a 3-lb (1362-g) load. The depth of cut was measured under a 30X microscope after each 2-min cut.

Also noted, in the practice runs, was the fact that air alone could not sufficiently clean and cool the diamond instruments during the 2-min cuts. Therefore, a spray of water (at 20 ml/min) and air (at 50 liters/min at 30 psi) were used during the cutting efficiency test.

EVALUATION OF DATA

Twenty-four diamond instrument manufacturers were contacted concerning the plans to test and evaluate samples in this study. Fourteen manufacturers responded with 5 samples of each of the 9 shapes that were tested. Since no standard code exists for the identification of shapes and sizes of diamond instruments, each manufacturer was allowed to provide their instruments that most closely matched the specifications for the 9 shapes.

Some of the graphs used in this evaluation represent a manufacturer by a letter, instead of by name. Listed in Table 4 (etc.) are the participating manufacturers, their designation for their samples, and the corresponding letter used to identify their samples in the evaluation.

Dimensions

Tabulated in Appendix A are the dimension measurements of the diamond instruments. Of the 600 samples tested, only 12 met all of the dimensions

specified for the diamond shapes used in this study. Therefore, to compare how well the manufacturers could comply with specifications, the shank diameters (SD) were used to check compliance with the standard ADA specifications for SD.

A friction grip (FG) instrument was considered to have failed the test if its SD did not fall between 1.59 and 1.60 mm. A straight handpiece (SH) instrument failed if it was not between 2.334 and 2.350 mm. Shown in Figure 13 are the average SDs of the FG instruments and, in Figure 14, the average SH diameters of all samples submitted by a manufacturer. Those manufacturers with no SH diameter either did not submit a type 5a sample (F,G,I,J)--or their 5a sample had an FG shank (B,C,K), in which case the sample was averaged with the other FG instruments.

While the majority of the SD averages fell within the specifications, several individual specimens did not meet the standard size. Given in Table 5 is the total number of the respective specimens failing this test.

Construction

The results of the construction evaluation test are tabulated in Appendix B. All samples submitted were made of material suitable for its intended use; therefore, only the diamond distribution and matrix extension are listed in the Appendix.

This test was failed by 117 instruments: 91, with overextension of the binder matrix; 12, with an uneven distribution of diamonds; and 14, with both uneven distribution and overextension. The number of specimens that failed the construction test are given in Table 6. Examples of instruments that passed or failed this test are shown in Figure 15.

Shank Roughness

Tabulated in Appendix C are the shank roughness readings for all the specimens tested. Shown in Figure 16 is the average roughness of all the instruments of each manufacturer. Although the average roughness for all the samples fell under the specified roughness, several individual specimens exceeded the limit. The respective numbers of instruments failing the roughness test are given in Table 7. SEM pictures of smooth and rough shanks are shown in Figure 17.

Concentricity

Appendix D contains the radial and axial runouts of the sample instruments. Shown in Figure 18 is the average runout for all the samples of each manufacturer. While the average for each manufacturer did not exceed the specified limits of radial and axial runout, several instruments did fail; and these are listed in Table 8.

Durability

Tabulated in Appendix E are the durability test data. Listed in Table 9 is the respective number of durability failures for each manufacturer. Examples of durability test failures are shown in Figure 19.

Corrosion

Tabulated in Appendix F are the data from the corrosion test. Listed in Table 10 are the number of instruments that exceeded 5% corrosion after 10 cycles in a Chemiclave sterilizer; and, in Table 11, the number of failures after 10 cycles in an Autoclave sterilizer. Examples of corrosion under scanning electromicroscope (SEM) are shown in Figure 20.

Cutting Efficiency

Presented in Appendix G are the cutting efficiency test data. Examples of the cuts on glass plates are shown in Figure 21. Given in Table 12 is a comparison of the total depth of cut over the 10 min of cutting.

(The Type 5a samples for Premier and Venture Technology are not considered in the comparisons because their samples were knife-edged, instead of the specified round-wheel shape. Therefore, their cutting exceeded the capabilities of the test equipment and could not be evaluated.)

Because of the wide variety of shapes, sizes, and grits supplied as samples, the depth of cut should not be the only factor observed for the cutting efficiency test. Another aspect of this test is how much cutting ability remains after the 10 min of cutting. Shown in Table 13 are the respective percentages of cutting ability remaining at the end of the cutting efficiency test. (Types 2a and 5a are not included in the total average, because not all manufacturers provided samples for these shapes.)

CONCLUSIONS

Listed in Table 14, by type, is the respective number of quality test failures for each manufacturer. A comparison of the total quality test failures by type is given in Table 15. A relative quality ranking of manufacturers, by type, is thus provided.

Given in Table 16 is the total number of failures of all the quality tests by manufacturer. This overall relative quality ranking of manufacturers is presented in Table 17.

A comparison of the sample cutting performance by type is given in Table 18. This Table shows the total depth of cut for each manufacturer by type. A relative performance ranking of manufacturers by type is thus provided.

Given in Table 19 is an overall relative ranking of manufacturers for performance. For this ranking, the types 2a and 5a were not included; for not all manufacturers provided samples of these types. The total depth of cut in this table is the average total depth of cut of all other samples of the manufacturer.

In brief, this study provides a means of comparing the quality and performance of dental diamond rotary instruments, and thus aids in the selection of those suitable for use by the Air Force Dental Service.

FIGURES 1 - 21

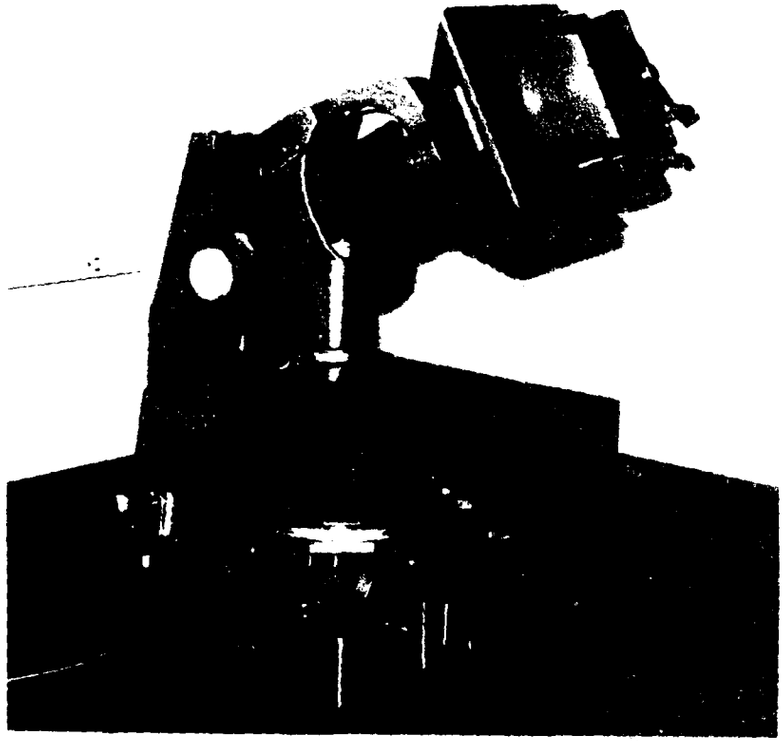

Figure 1. Gaertner 30X toolmaker's microscope.

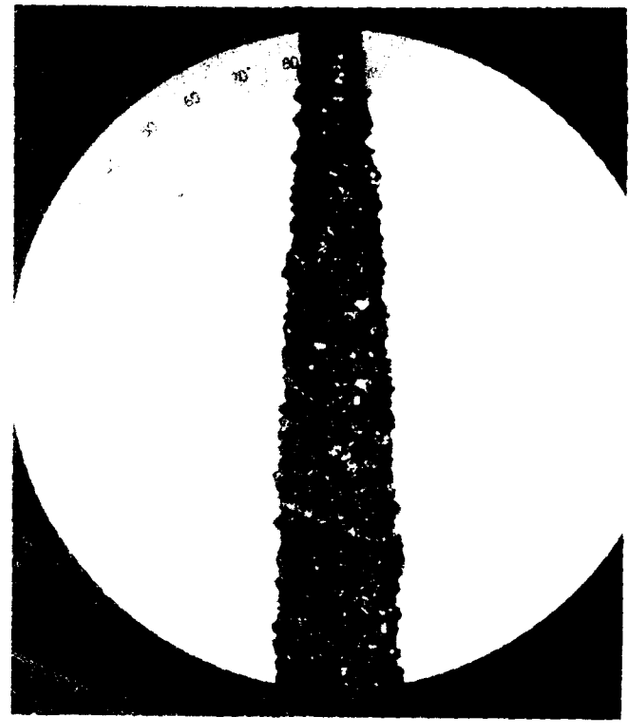

Figure 2. Dimension measurement. (Diamond instrument under 30X microscope)

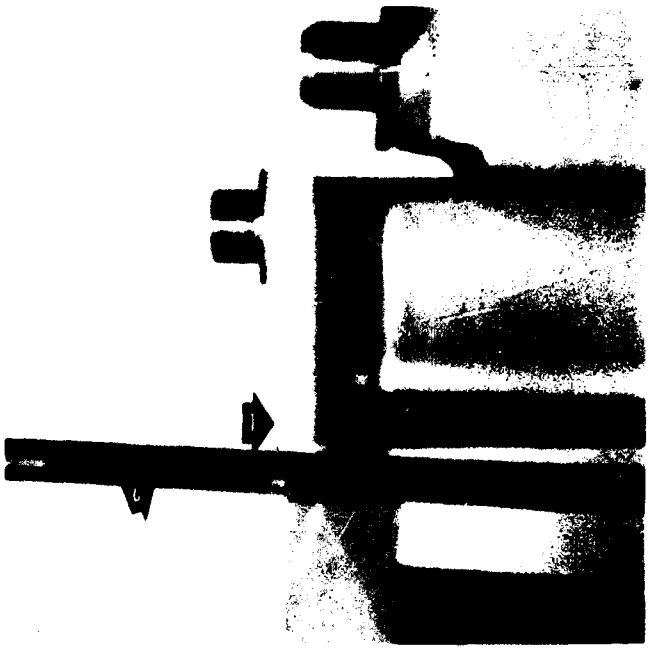

Figure 3. Chisel stylus probe. (1 = probe; and 2 = diamond instrument)

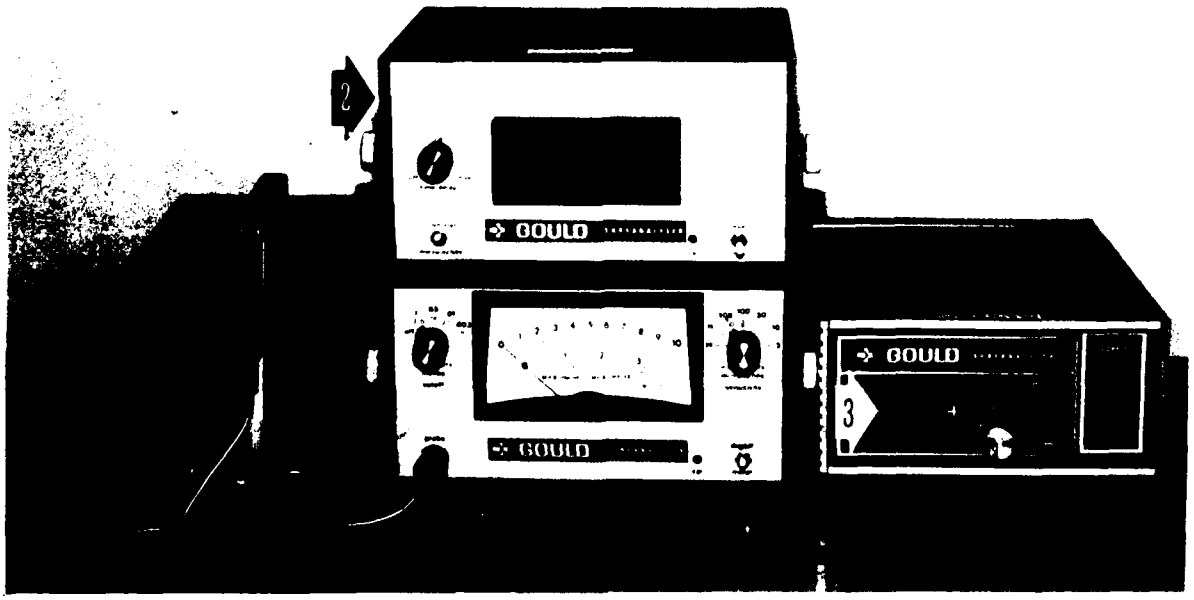

Figure 4. Shank roughness test equipment. (1 = motor drive; 2 = surfanalyzer; and 3 = digital printout)

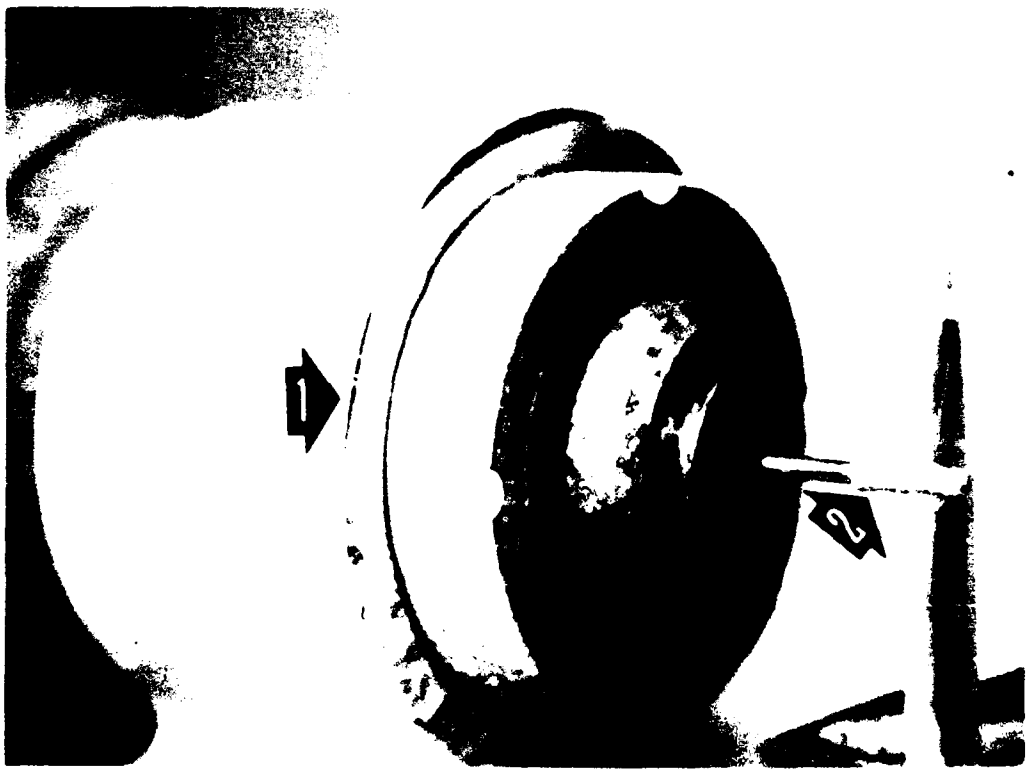

Figure 5. Custom-designed chuck holder = 1; and diamond instrument = 2.

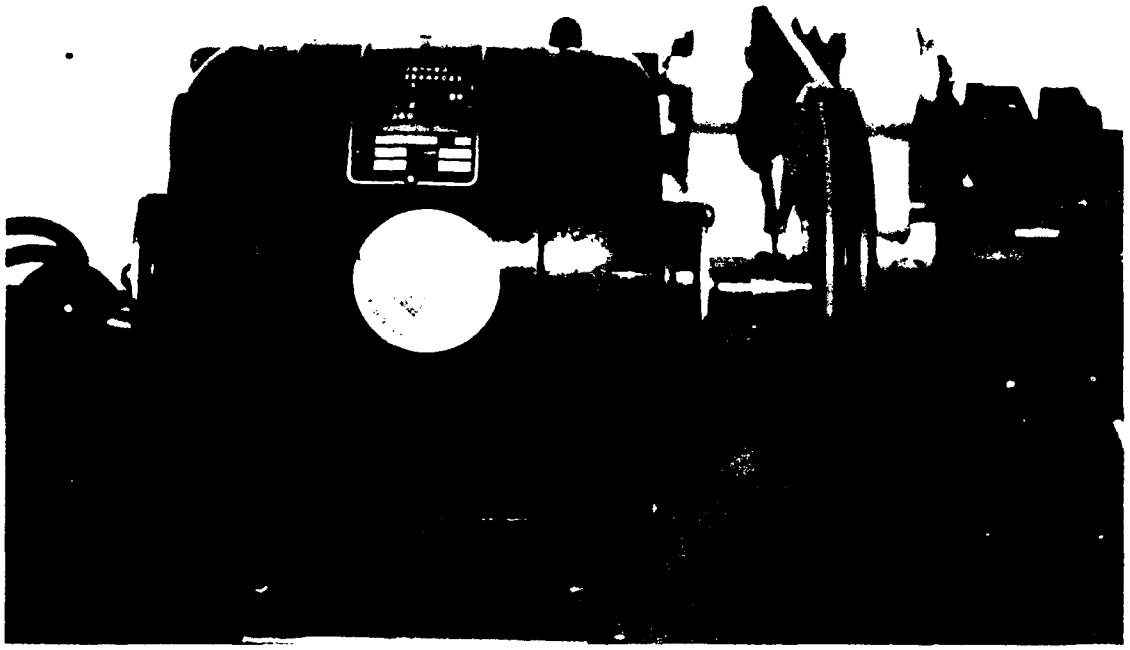

Figure 6. Hysteresis synchronous motor (Bodine Electric Co. NSY-54 Fractional Horsepower Motor).

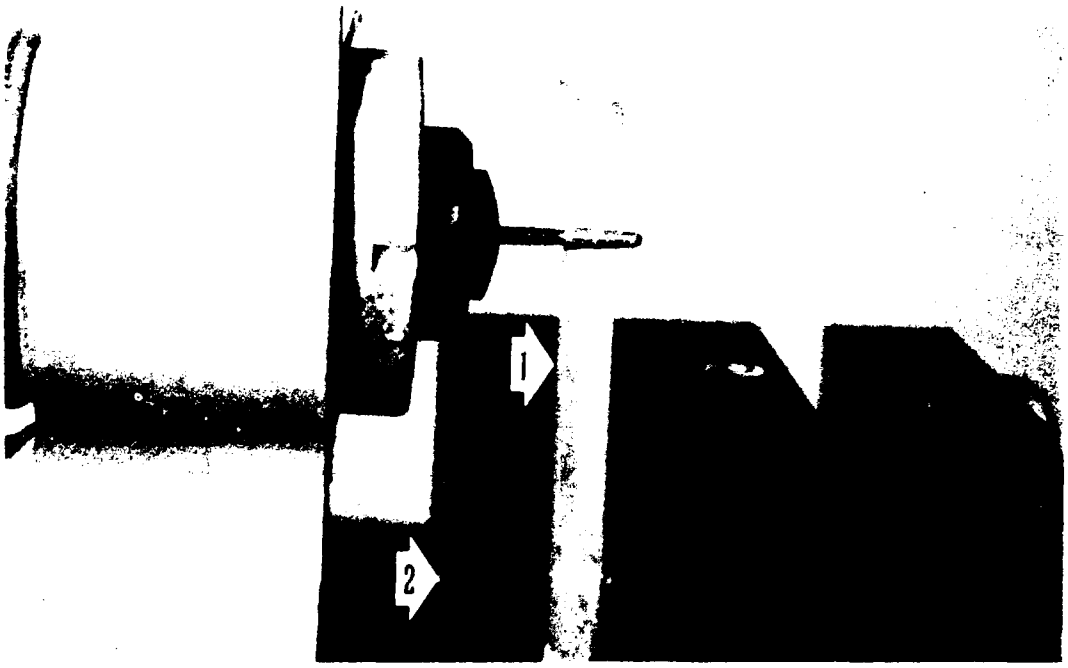

Figure 7. Glass plate. (1 = glass plate; and 2 = plate holder)

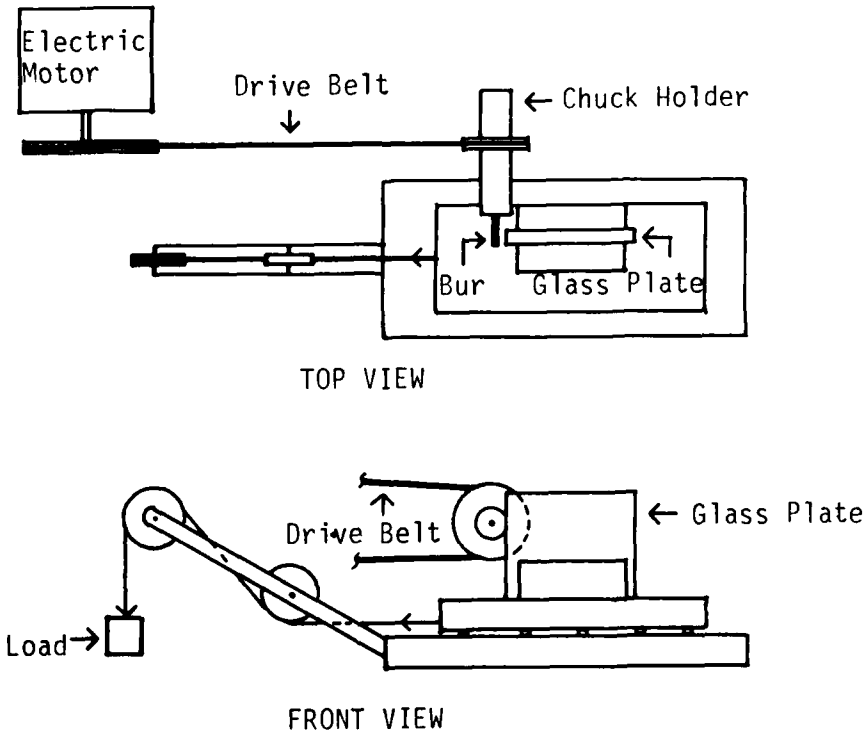

Figure 8. Test equipment. (Schematic drawing)

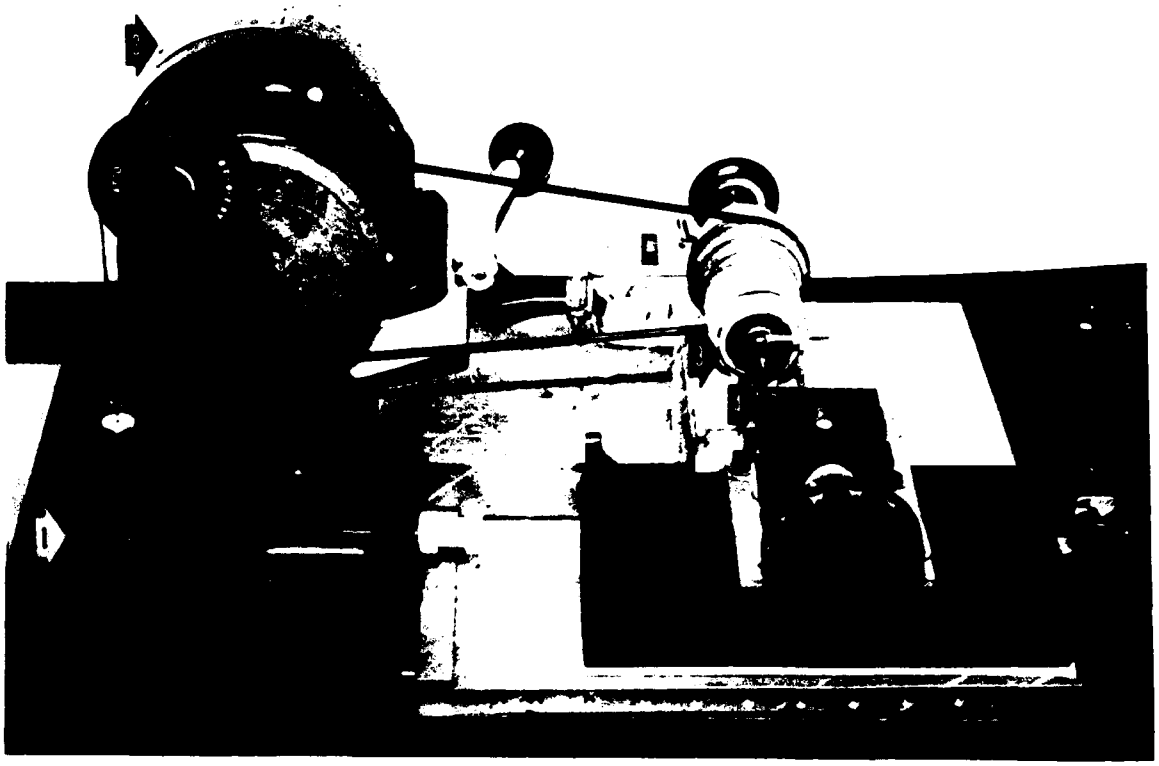

Figure 9. Cutting test equipment.
(1 = weights; 2 = motor;
3 = chuck holder; and 4 = glass plate)

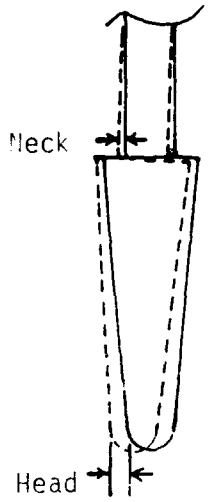

Figure 10. Radial runout measurement.

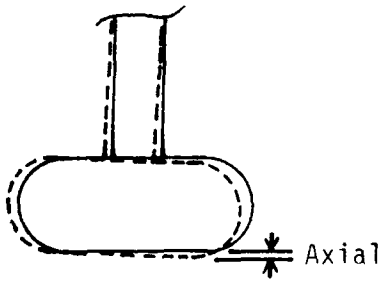

Figure 11. Axial runout measurement.

Figure 12. Coolant system.
(1 = air-water spray)

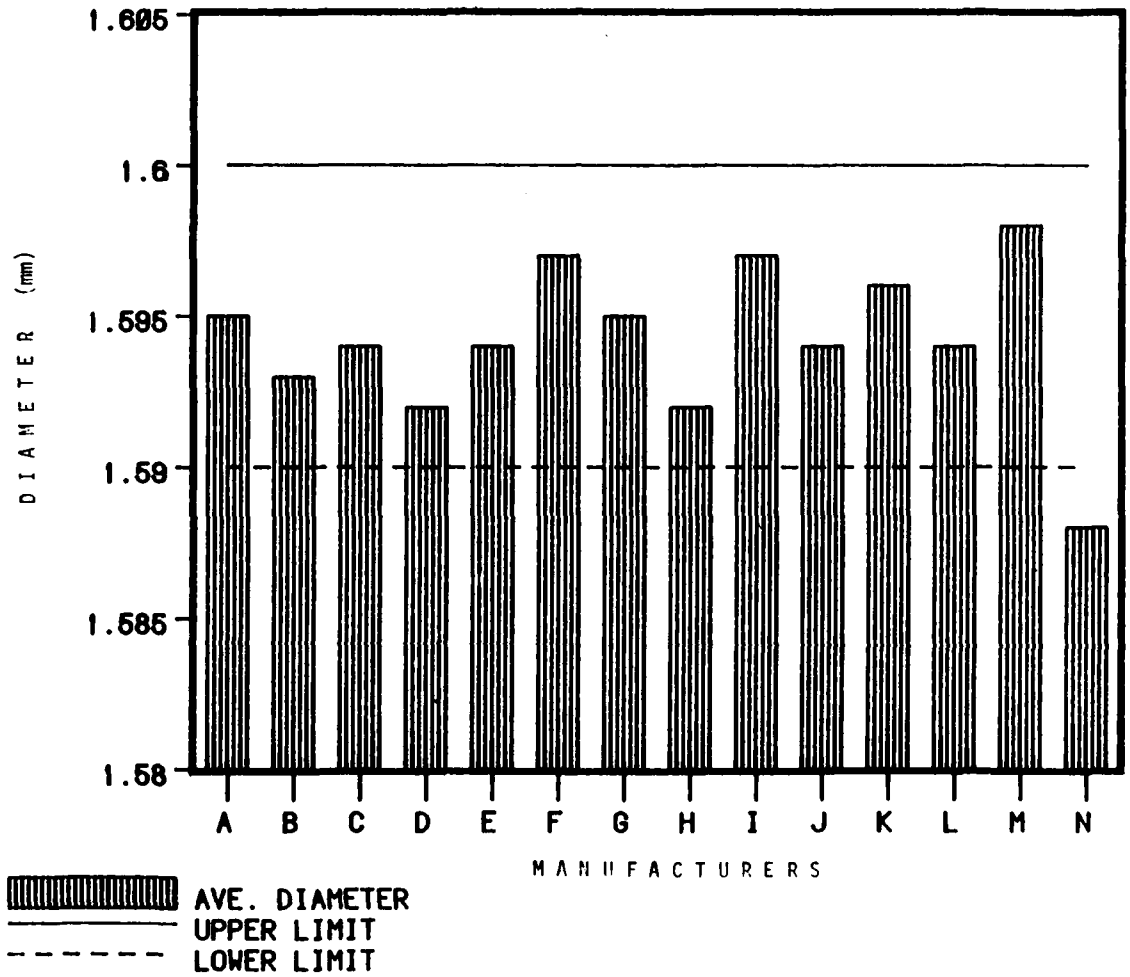

Figure 13. Average FG shank diameter.
(For key to letters designating manufacturers, refer to Table 4, etc.)

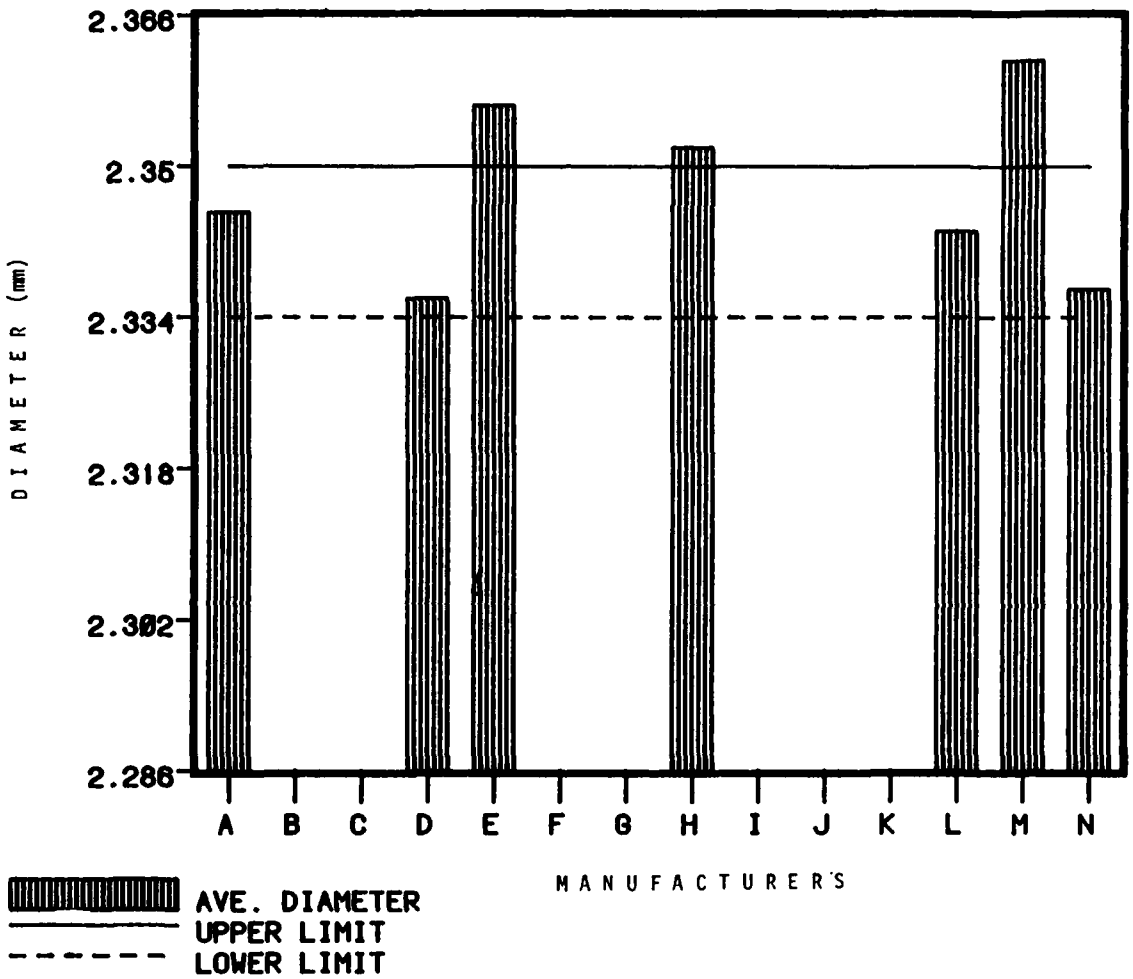

Figure 14. Average SH shank diameter for all samples. (For key to letters designating manufacturers, refer to Table 4, etc.)

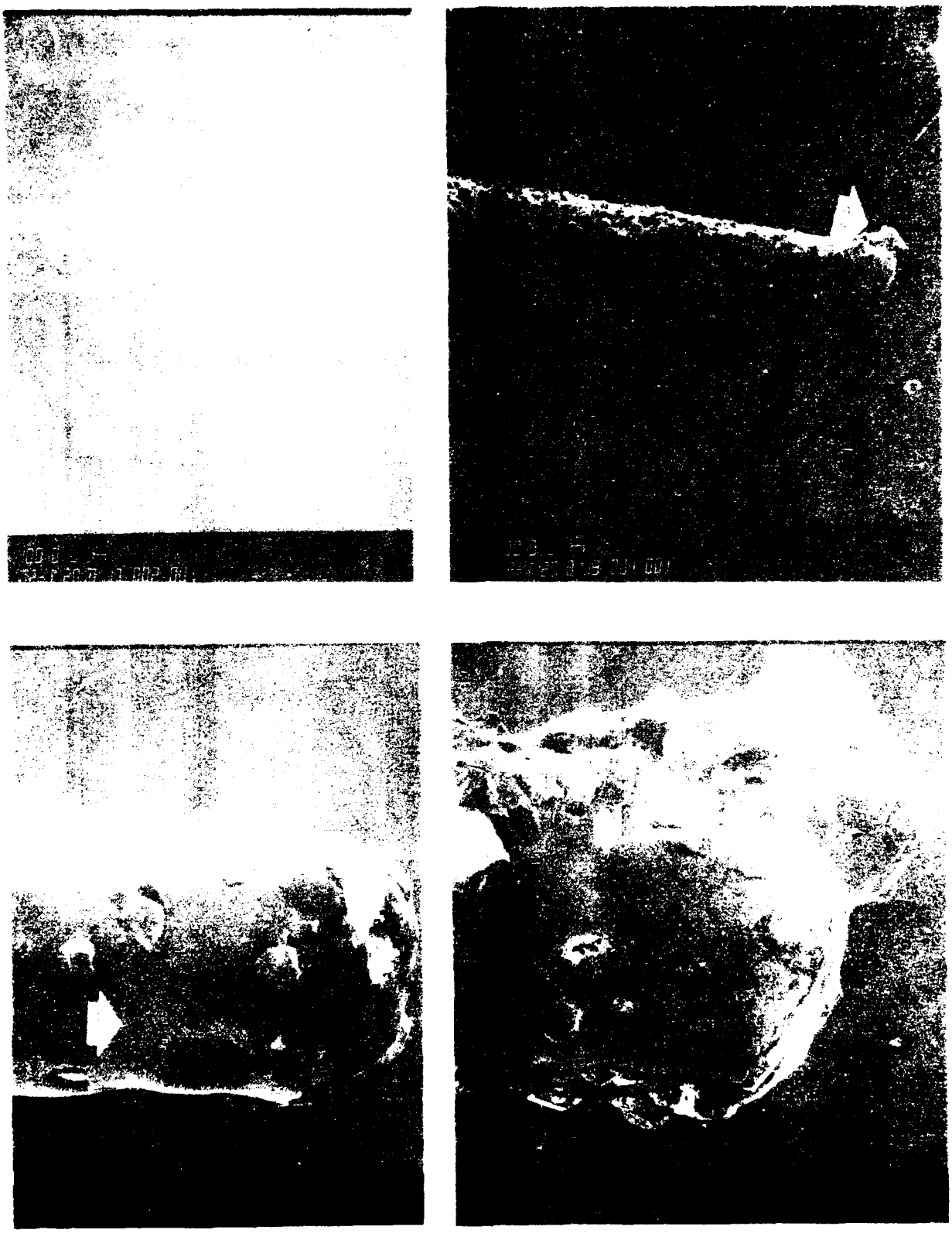

Figure 15. Construction evaluation test examples. (1 = uneven diamond distribution; and 2 = matrix overextention)

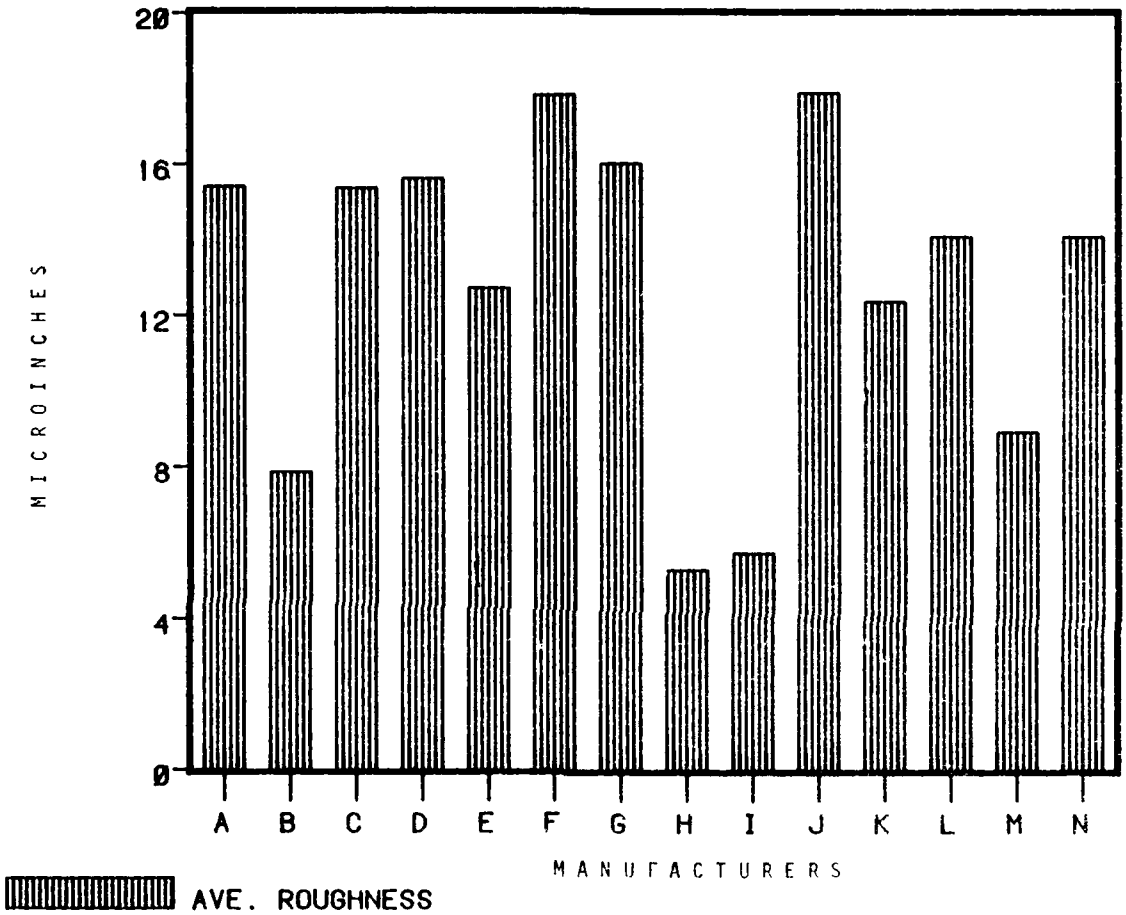

Figure 16. Average shank roughness for all samples. (For key to letters designating manufacturers, refer to Table 4, etc.)

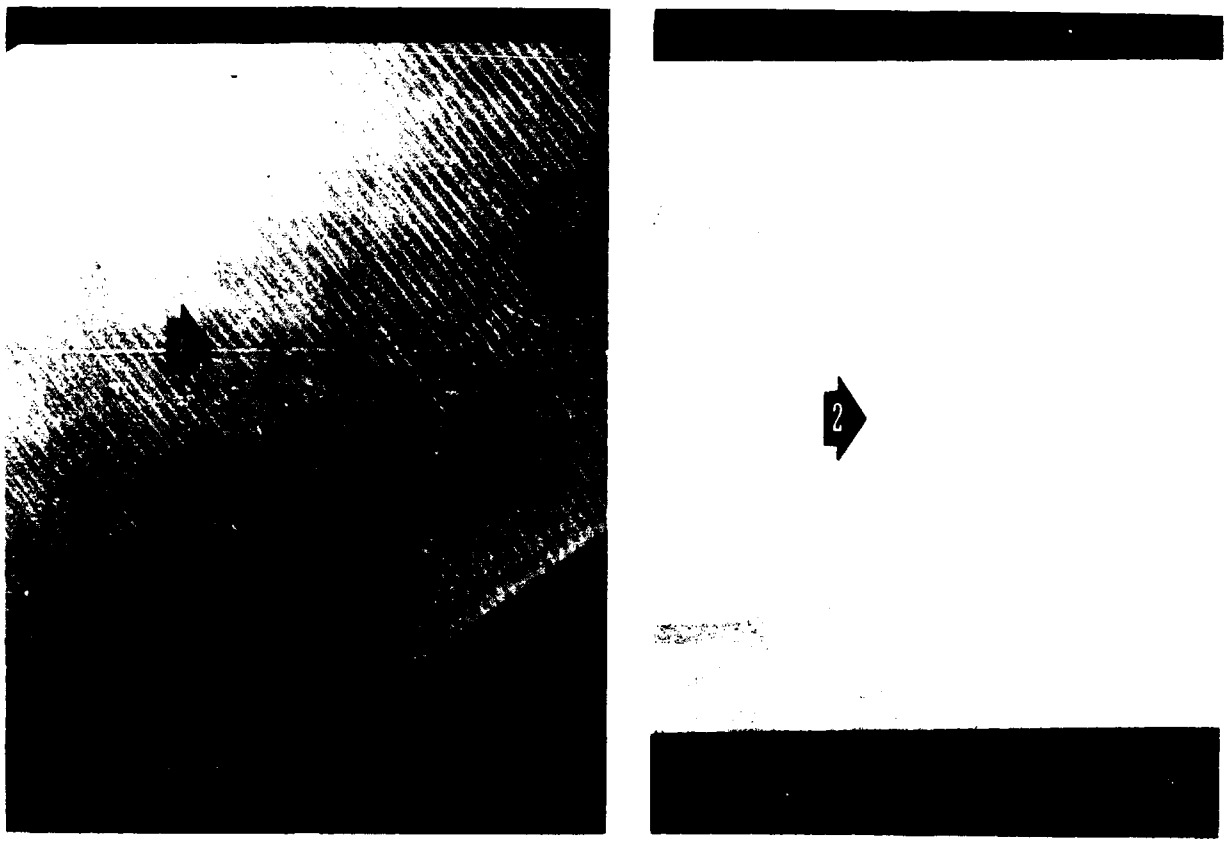

Figure 17. Roughness test examples.
(1 = rough shank; and 2 = smooth shank)

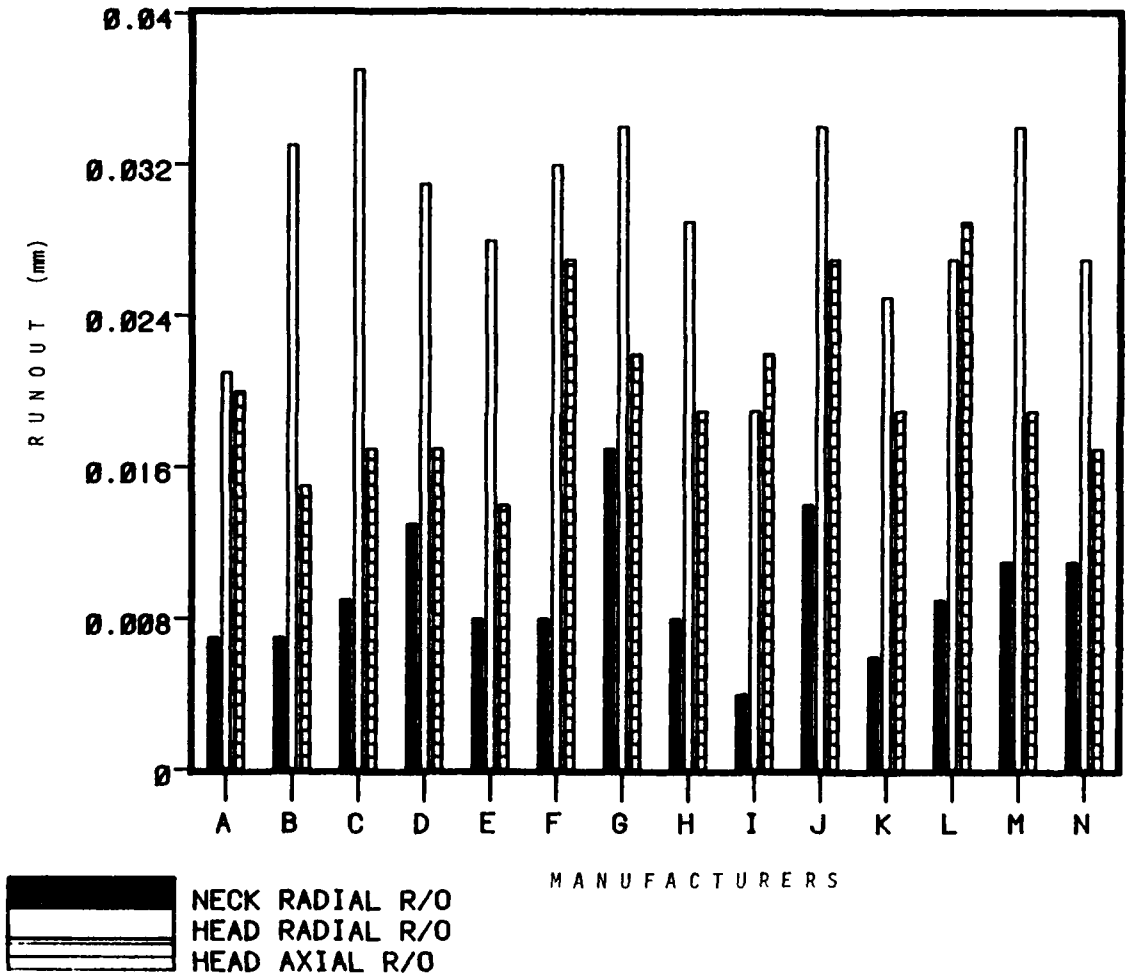

Figure 18. Average runout for all samples.
(For key to letters designating manufacturers, refer to Table 4, etc.)

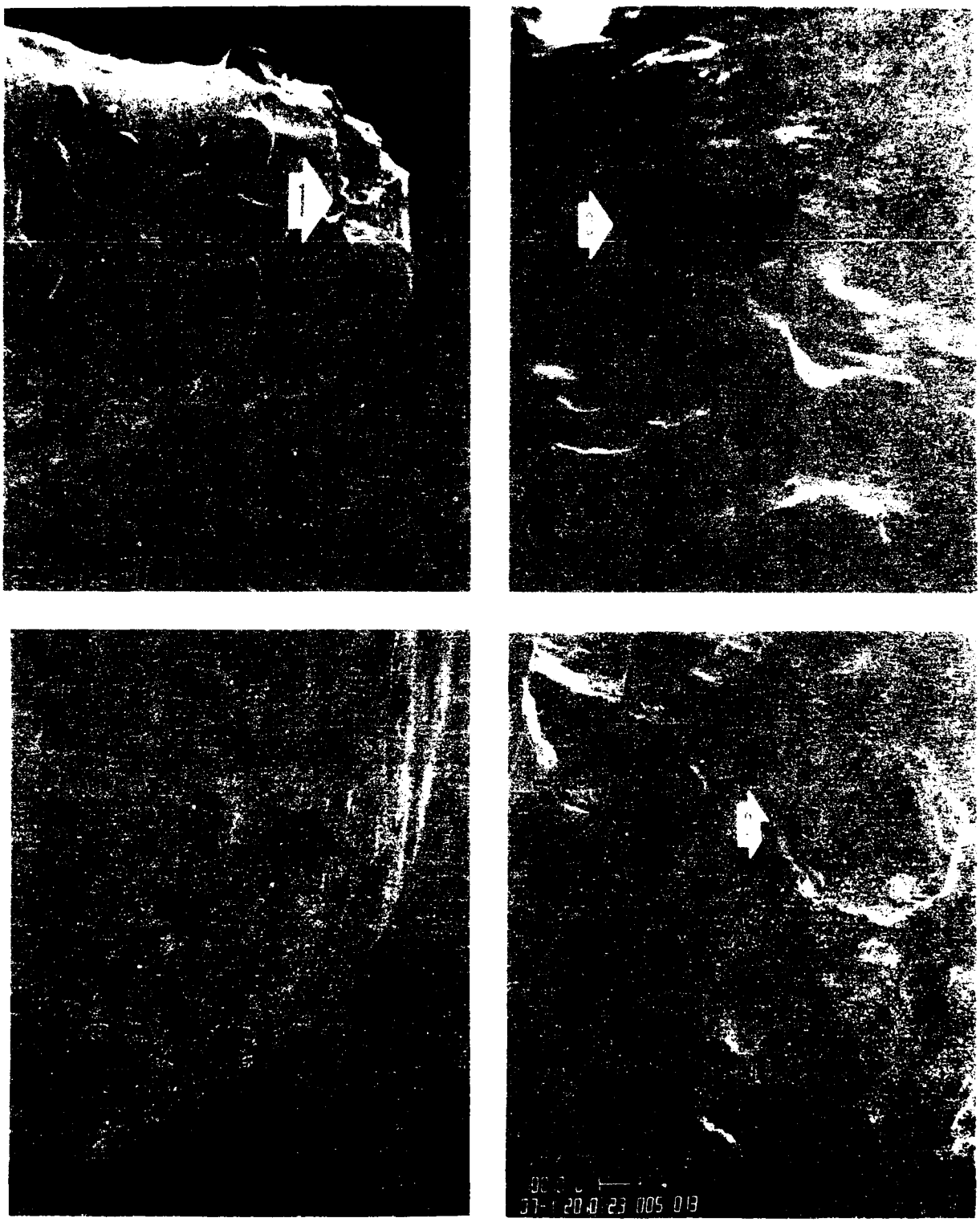

Figure 19. Examples of durability test failures.
(1 = matrix peel; and 2 = diamond loss)

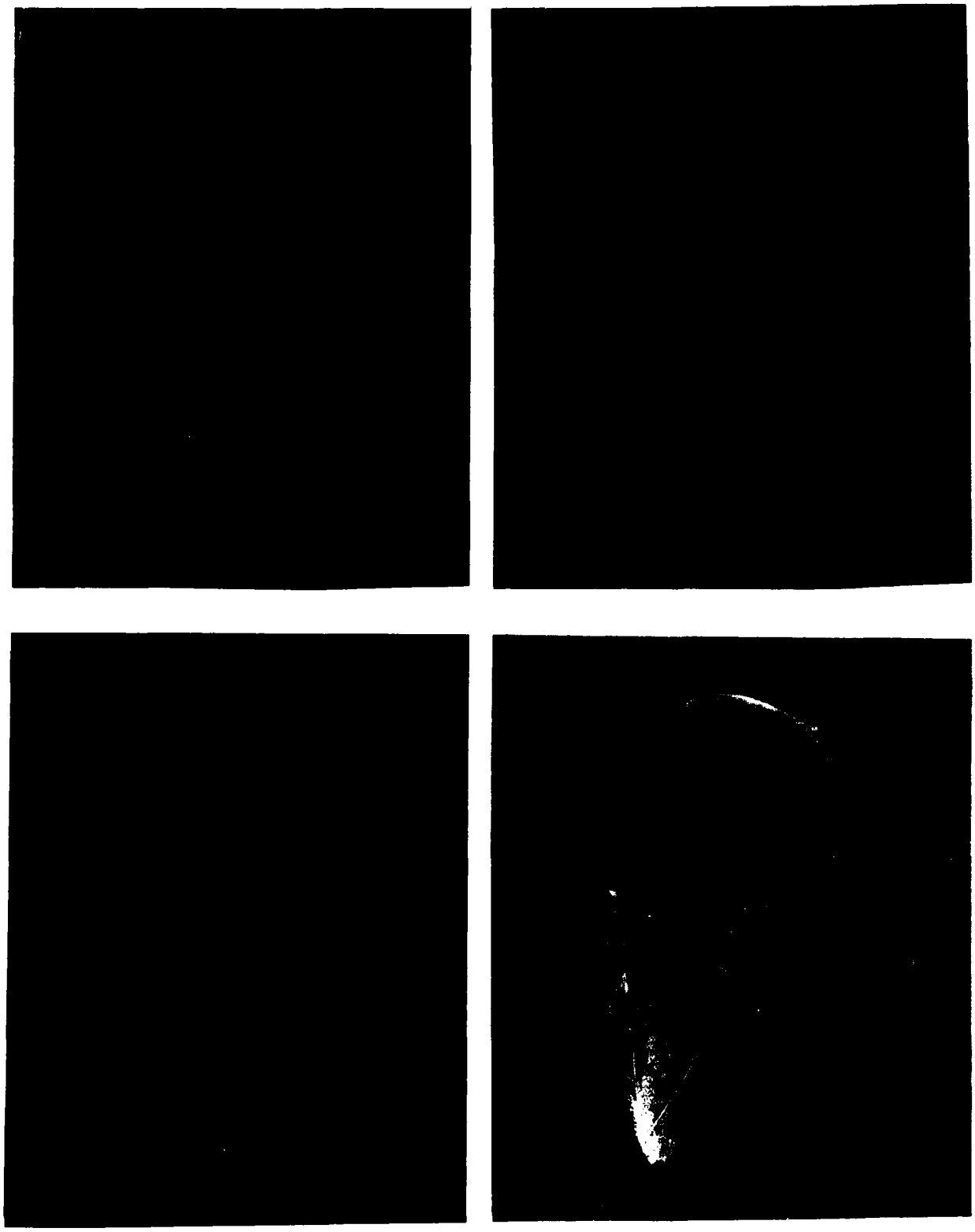

Figure 20. Corrosion test examples. (1 = shank; 2 = grooves; and 3 = base of head)

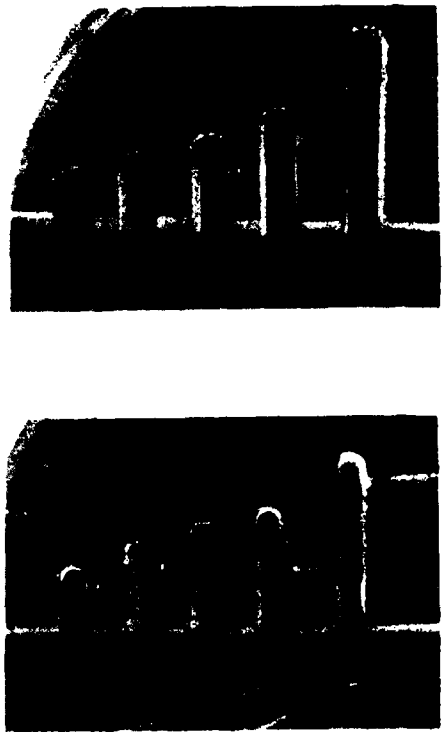

Figure 21. Glass plates with cuts.

TABLES 1 - 19

EDITOR'S NOTE--Throughout these Tables, instrument types are designated as:

1a, 1b, 2a, 2b, 2c, 2d, 3a, 4a, and 5a.

For additional information on these types of instruments, please refer to page 34 :

Table 1. Specifications: Dental Diamond Rotary Instruments

TABLE 1. SPECIFICATIONS: DENTAL DIAMOND ROTARY INSTRUMENTS

Instrument type	Small diameter	Large diameter	Head length	Overall length	Shank diameter	Grit range
1-a Small Ball (FG)		.065 ± .002 [a] (1.65 ± .05)		.689 ± .02 (17.5 ± .5)	.063 - .0004 (1.6 - .01)	Medium[b] 140 to 170
1-b Medium Ball (FG)		.100 ± .002 (2.54 ± .05)		.689 ± .02 (17.5 ± .5)	.063 - .0004 (1.6 - .01)	Coarse 100 to 120
2-a Tapered Cylinder Round End (FG)	.060 ± .002 (1.52 ± .05)	.090 ± .0025 (2.59 ± .06)	.295 ± .003 (7.49 ± .08)	.827 ± .02 (21.0 ± .5)	.063 - .0004 (1.6 - .01)	Regular 120 to 140
2-b Tapered Cylinder Round End (FG)	.033 ± .002 (.840 ± .05)	.063 ± .0025 (1.60 ± .06)	.350 ± .003 (8.89 ± .08)	.886 ± .02 (22.5 ± .5)	.063 - .0004 (1.6 - .01)	Medium 140 to 170
2-c Tapered Cylinder Round End (FG)	.035 ± .002 (0.89 ± .05)	.056 ± .0025 (1.42 ± .06)	.250 ± .003 (6.35 ± .08)	.787 ± .02 (20.0 ± .5)	.063 - .0004 (1.6 - .01)	Super Fine 320 to 400
2-d Tapered Cylinder Round End (FG)	.040 ± .002 (1.02 ± .05)	.070 ± .0025 (1.79 ± .06)	.350 ± .003 (8.89 ± .08)	.886 ± .02 (22.5 ± .5)	.063 - .0004 (1.6 - .01)	Fine 230 to 270
3-a Wheel Round Edge (FG)		.192 ± .002 (4.88 ± .05	.055 ± .0025 (1.40 ± .06)	.689 ± .02 (17.5 ± .5)	.063 - .0004 (1.6 - .01)	Regular 120 to 140
4-a Flame (FG)		.047 ± .0025 (1.19 ± .06)	.250 ± .003 (6.35 ± .08)	.787 ± .02 (20.0 ± .5)	.063 - .0004 (1.6 - .01)	Fine 230 to 270
5-a Wheel Round Edge (SH)		.258 ± .002 (6.55 ± .05)	.125 ± .0025 (3.18 ± .06)	1.752 ± .02 (44.5 ± .5)	.093 - .0006 (2.35 - .016)	Regular 120 to 140

[a] Dimensions: .065 ± .002 = in.
(1.65 ± .05) = mm

[b] Grit Range: Medium = U.S. Std. Mesh
140 to 160 = Grit

TABLE 2. GRIT RANGE

U.S. Std. mesh	Grit
Coarse	100-120
Regular	120-140
Medium	140-170
Fine	230-270
Superfine	320-400

TABLE 3. SHANK ROUGHNESS TEST EQUIPMENT

Equipment	Model No.
Surfindicator	Gould Model 13-1350-00
Digital readout	Gould Model 21-1360-01
Digital printout	Gould Model 21-1370-10-16
Motor drive	Gould Model 21-1440-01
Chisel stylus probe	Gould Model 21-1172-00

TABLE 4. PARTICIPATING MANUFACTURERS AND INSTRUMENT DESIGNATIONS

		Instrument Designation								
ID	MANUFACTURER	1a	1b	2a	2b	2c	2d	3a	4a	5a
A	Brasseler	801/016	6801/023	856/025	856/016	8855/012	856L/018	909/040	8888/012	909/065
B	Diama	801/4	801/6	772/12	850/5	852/4	852/6	909/14	862/SF	909/014
C	Jaro	B-4	B-7	774-7	769.9	770-8XF	770-12F	110	265-8	111
D	Militex	801/016	801/027	NONE	850/016	849/014	850/018	0679	0627	909/060
E	Premier	120-C	135-C	780.9C	L760.9C	799.6.5VF	L770.8F	863.C	265.6.5C	X-889C
F	Ramsom & Randolph	123	134	772X9	770X9	769X9	771X9	862	260X8	NONE
G	Regency	R-100	R-104	T-526	T-527	T-531	T-702	6W	F-903	NONE
H	Repco	IBM	IBP	459	1/2L	2Z	470	9HRT	1A	2HRP
I	Shofu	0874	0876	0837	0832	832F	835F	0885	840F	NONE
J	S. S. White	801/014	801/018	854/016	F858/014	F862/12	F859/016	909/042	F860/012	NONE
K	Star	D4P	D7P	774-7P	771-9M	771-7P	772-8F	1105P	270-7M	111P
L	Teledyne Densco	8B	6BX	2DT	1/2 DTL	1DT-SF	1DT-LF	2 1/2 J	1/8 AF	3 1/2 J
M	Venture Technology	123	134	NONE	770.9	771.7	771.9F	862	265.5F	VD889
N	Vic Pollard	5R	8R	84R	101R	61R	102R	202R	63FL	HP205R

TABLE 5. SHANK DIAMETER FAILURES

ID	MANUFACTURER	Number of Failures*									Total Diameter Failures
		1a	1b	2a	2b	2c	2d	3a	4a	5a	
A	Brasseler	0	0	0	0	0	0	0	0	0	0
B	Diamo	0	2	2	0	0	0	0	0	0	4
C	Jaro	1	0	0	0	0	0	3	0	0	4
D	Militex	1	0	NA	1	1	0	4	0	0	7
E	Premier	0	0	0	0	0	1	0	0	5	6
F	Ramsom & Randolph	0	0	0	2	1	0	0	0	NA	3
G	Regency	2	0	0	0	0	1	0	0	NA	3
H	Repco	0	1	1	0	0	0	1	1	3	7
I	Shofu	0	0	0	0	0	0	0	0	NA	0
J	S. S. White	0	0	0	0	0	0	1	2	NA	3
K	Star	0	2	0	0	0	0	0	0	0	2
L	Teledyne Densco	0	0	0	0	0	0	0	1	0	1
M	Venture Technology	0	0	NA	0	0	0	0	1	5	6
N	Vic Pollard	0	5	5	5	5	2	5	2	1	30

* Samples failed this test if FG shanks did not measure between 1.60 and 1.59 mm, and if SH shanks did not measure between 2.350 and 2.334 mm.

NA = Manufacturer did not submit this shape for testing.

TABLE 6. CONSTRUCTION EVALUATION TEST FAILURES

ID	MANUFACTURER	Number of Failures*									Total Construction Failures
		1a	1b	2a	2b	2c	2d	3a	4a	5a	
A	Brasseler	1	1	0	2	1	0	1	0	0	6
B	Diamo	0	0	0	0	1	5	0	0	0	6
C	Jaro	5	5	0	0	0	0	5	0	5	20
D	Militex	0	5	NA	0	0	0	2	1	2	10
E	Premier	0	0	0	0	0	1	0	0	0	1
F	Ramsom & Randolph	0	0	0	0	1	0	0	1	NA	2
G	Regency	2	1	0	0	0	0	5	0	NA	8
H	Repco	5	0	0	0	0	0	2	0	3	10
I	Shofu	1	2	1	0	0	0	5	2	NA	11
J	S. S. White	5	3	2	0	1	3	0	2	NA	16
K	Star	3	0	0	1	2	0	0	0	0	6
L	Teledyne Densco	1	0	0	0	0	0	0	1	0	2
M	Venture Technology	1	1	NA	0	4	0	2	0	4	12
N	Vic Pollard	5	0	0	0	1	0	1	0	0	7

* Samples failed this test if they did not have an even distribution of diamonds, or if the binder matrix was overextended.

NA - Manufacturer did not submit this shape for testing.

TABLE 7. SHANK ROUGHNESS TEST FAILURES

ID	MANUFACTURER	Number of Failures*									Total Roughness Failures
		1a	1b	2a	2b	2c	2d	3a	4a	5a	
A	Brasseler	0	4	1	0	0	2	0	0	0	7
B	Diamo	0	0	0	0	0	0	0	0	0	0
C	Jaro	0	0	5	0	0	0	1	0	5	11
D	Miltex	2	0	NA	0	0	0	0	0	3	5
E	Premier	0	0	0	0	0	0	2	0	4	6
F	Ramsom & Randolph	3	2	1	2	0	0	0	0	NA	8
G	Regency	0	1	0	0	0	0	2	0	NA	3
H	Repco	0	0	0	0	0	0	0	0	0	0
I	Shofu	0	0	0	0	0	0	0	0	NA	0
J	S. S. White	0	0	1	0	3	1	4	2	NA	11
K	Star	0	0	0	3	0	4	0	0	0	7
L	Teledyne Densco	0	0	0	0	0	0	0	0	0	0
M	Venture Technology	0	0	NA	0	0	0	0	0	0	0
N	Vic Pollard	0	0	0	1	0	0	0	1	0	2

* - Samples failed this test if their shank roughness exceeded 20 microinches.

NA - Manufacturer did not submit this shape for testing.

TABLE 8. CONCENTRICITY TEST FAILURES

ID	MANUFACTURER	Number of Failures*									Total Concentricity Failures
		1a	1b	2a	2b	2c	2d	3a	4a	5a	
A	Brasseler	0	0	0	0	0	0	0	0	0	0
B	Diamo	0	0	1	1	1	1	1	0	0	5
C	Jaro	0	0	0	5	0	1	0	0	0	6
D	Militex	0	0	NA	2	0	0	0	0	0	2
E	Premier	0	0	0	0	0	0	0	0	1	1
F	Ramsom & Randolph	0	0	0	1	1	1	0	0	NA	3
G	Regency	2	0	0	0	1	0	0	0	NA	3
H	Repco	0	0	1	0	0	0	2	0	1	4
I	Shofu	0	0	0	0	0	0	0	0	NA	0
J	S. S. White	1	0	1	2	3	2	0	0	NA	9
K	Star	0	0	0	0	0	0	0	0	0	0
L	Teledyne Densco	0	0	0	0	0	0	0	0	0	0
M	Venture Technology	0	0	NA	1	1	1	0	1	0	4
N	Vic Pollard	1	0	0	1	0	0	0	0	1	3

* - Samples failed this test if they exceeded 0.051-mm eccentricity.

NA - Manufacturer did not submit this shape for testing.

TABLE 9. DURABILITY TEST FAILURES

ID	MANUFACTURER	Number of Failures*									Total Durability Failures
		1a	1b	2a	2b	2c	2d	3a	4a	5a	
A	Brasseler	0	0	0	0	0	0	1	0	0	1
B	Diama	0	0	1	0	0	0	3	0	0	4
C	Jaro	2	0	1	0	0	0	0	0	0	3
D	Miltex	0	0	NA	0	0	0	0	0	0	0
E	Premier	0	0	0	0	0	0	0	0	0	0
F	Ramsom & Randolph	1	0	0	0	0	0	0	0	NA	1
G	Regency	5	0	0	0	0	0	0	0	NA	5
H	Repco	0	0	0	0	0	0	0	0	0	0
I	Shofu	0	0	0	0	0	0	0	0	NA	0
J	S. S. White	2	0	0	0	0	1	0	5	NA	8
K	Star	0	0	0	0	0	0	0	0	0	0
L	Teledyne Densco	1	0	0	0	0	0	0	0	0	1
M	Venture Technology	0	0	NA	0	0	0	5	0	0	5
N	Vic Pollard	5	0	0	5	0	0	0	0	0	10

* - Samples failed this test if they lost more than 25% of their abrasive or had excessive binder matrix peel.

NA - Manufacturer did not submit this shape for testing.

TABLE 10. CORROSION TEST FAILURES IN A CHEMICLAVE STERILIZER

ID	MANUFACTURER	Number of Failures*									Total Chemiclave Failures
		1a	1b	2a	2b	2c	2d	3a	4a	5a	
A	Brasseler	0	0	0	0	0	2	0	0	0	2
B	Diamo	0	0	0	0	0	0	0	0	1	1
C	Jaro	2	0	0	1	0	0	0	2	0	5
D	Militex	0	0	NA	0	0	1	0	0	0	1
E	Premier	0	0	0	0	0	0	0	0	0	0
F	Ramsom & Randolph	0	0	0	2	0	0	1	0	NA	3
G	Regency	0	0	0	0	0	0	2	0	NA	2
H	Re[illegible]	0	0	0	0	0	0	0	0	0	0
I	Shofu	0	0	0	0	0	0	0	0	NA	0
J	S. S. White	0	0	0	0	0	0	0	0	NA	0
K	Star	0	0	0	0	0	0	0	0	0	0
L	Teledyne Densco	0	0	0	0	0	0	0	0	0	0
M	Venture Technology	0	0	NA	0	0	0	0	0	0	0
N	Vic Pollard	0	0	0	0	0	0	0	0	0	0

* Samples failed this test if more than 5% of the shank, or 2% of the head, had corrosion.

NA - Manufacturer did not submit this shape for testing.

TABLE 11. CORROSION TEST FAILURES IN AN AUTOCLAVE STERILIZER

ID	MANUFACTURER	Number of Failures*									Total Autoclave Failures
		1a	1b	2a	2b	2c	2d	3a	4a	5a	
A	Brasseler	0	0	0	0	1	2	0	0	0	3
B	Diama	0	0	5	0	1	0	0	0	2	8
C	Jaro	2	3	5	4	5	3	0	3	0	25
D	Militex	0	0	NA	0	0	1	1	0	0	2
E	Premier	0	0	0	0	0	0	0	0	0	0
F	Ramsom & Randolph	0	0	0	3	2	2	1	5	NA	13
G	Regency	0	0	0	0	0	0	4	0	NA	4
H	Repco	1	1	2	0	0	0	1	0	1	6
I	Shofu	0	0	0	0	0	0	0	0	NA	0
J	S. S. White	0	0	0	0	0	0	0	0	NA	0
K	Star	0	0	0	0	0	0	1	0	0	1
L	Teledyne Densco	1	1	0	0	0	0	5	0	5	12
M	Venture Technology	0	0	NA	1	1	1	1	4	0	8
N	Vic Pollard	0	0	0	1	0	2	0	2	0	5

* - Samples failed this test if more than 5% of the shank, or 2% of the head, had corrosion.

NA - Manufacturer did not submit this shape for testing.

TABLE 12. TOTAL DEPTH OF CUT (MM)*

ID	MANUFACTURER	1a	1b	2a	2b	2c	2d	3a	4a	5a
A	Brasseler	38.1	32.4	4.7	5.7	6.0	4.7	5.4	4.8	7.8
B	Diamo	97.9	85.7	5.2	5.0	8.8	8.9	4.4	3.0	5.5
C	Jaro	108.2	111.1	18.7	18.3	22.3	28.2	60.6	20.7	51.6
D	Militex	74.4	114.3	NA	18.5	22.0	8.0	4.7	4.8	6.3
E	Premier	150.8	128.7	Broke	28.1	32.6	31.4	132.9	30.9	NA
F	Ramsom & Randolph	130.5	95.6	22.8	27.1	27.1	25.0	59.2	19.8	NA
G	Regency	Broke	4.3	20.6	15.4	18.1	15.1	5.7	19.8	NA
H	Repco	88.9	88.7	25.1	Broke	20.2	Broke	95.5	Broke	72.3
I	Shofu	81.0	85.6	25.0	27.3	28.3	26.8	102.7	23.4	NA
J	S. S. White	98.2	4.5	3.7	12.0	Broke	9.3	5.2	8.9	NA
K	Star	114.2	90.4	32.9	29.3	30.4	24.6	81.4	32.8	92.7
L	Teledyne Densco	128.0	120.2	35.9	30.0	26.3	29.2	123.7	29.7	87.8
M	Venture Technology	32.4	52.0	NA	25.9	30.1	13.9	18.0	16.0	NA
N	Vic Pollard	15.2	3.5	15.8	Broke	6.0	Broke	67.9	17.2	43.4

* This test included five 2-min cuts (10 min of cutting) on plate glass. This Table shows the average total of the five cut depths.

Broke - All five samples were broken, so no depth could be measured.

NA - Manufacturer did not provide this shape for testing.

TABLE 13. REMAINING CUTTING ABILITY (%)*

ID	MANUFACTURER	1a	1b	2a	2b	2c	2d	3a	4a	5a
A	Brasseler	62.4	57.3	72.5	78.8	68.0	56.7	67.9	64.2	71.8
B	Diamo	46.2	47.1	69.7	62.1	42.6	43.1	58.4	56.3	85.0
C	Jaro	69.2	75.3	34.0	38.0	42.1	45.4	49.7	45.6	50.0
D	Miltex	84.8	51.8	NA	63.2	52.6	61.3	64.1	71.1	82.0
E	Premier	90.6	70.2	Broke	43.6	51.1	51.5	66.3	62.7	NA
F	Ramsom & Randolph	90.0	47.7	24.3	39.1	34.6	22.0	38.3	12.3	NA
G	Regency	Broke	78.9	45.3	46.6	43.9	50.3	68.5	36.4	NA
H	Repco	39.7	51.7	32.4	Broke	39.9	Broke	80.2	Broke	18.8
I	Shofu	69.0	64.2	36.1	49.1	50.1	44.2	38.2	34.0	NA
J	S. S. White	62.3	84.1	77.7	79.4	Broke	68.3	73.5	63.8	NA
K	Star	67.2	36.6	67.2	49.8	45.2	36.4	78.1	55.9	30.1
L	Teledyne Densco	77.8	73.3	49.6	35.9	28.3	40.5	64.0	47.8	28.6
M	Venture Technology	50.3	54.3	NA	45.6	57.9	35.8	60.3	36.8	NA
N	Vic Pollard	42.8	58.2	49.5	Broke	78.4	Broke	52.3	34.2	32.6

* This test included five 2-min cuts on plate glass. The remaining cutting ability, after the 10 min, was calculated by dividing the average depth of the fifth cut by the average depth of the first cut.

Broke - All five samples were broken, so no depth could be measured.

NA - Manufacturer did not provide this shape for testing.

TABLE 14. FAILURES OF QUALITY TESTS BY TYPE (1a to 5a)

Type 1a

ID	MANUFACTURER	DIMENSION TEST	CONSTRUCTION TEST	ROUGHNESS TEST	CONCENTRICITY TEST	DURABILITY TEST	CORROSION TEST	TOTAL FAILURE
A	Brasseler	0	1	0	0	0	0	1
B	Diamm	0	0	0	0	0	0	0
C	Jaro	1	5	0	0	2	2	10
D	Militex	1	0	2	0	0	0	3
E	Premier	0	0	0	0	0	0	0
F	Ramsom & Randolph	0	0	3	0	1	0	4
G	Regency	2	2	0	2	5	0	11
H	Repco	0	5	0	0	0	0	5
I	Shofu	0	1	0	0	0	0	1
J	S. S. White	0	5	0	1	2	0	8
K	Star	0	3	0	0	0	0	3
L	Teledyne Densco	0	1	0	0	1	0	2
M	Venture Technology	0	1	0	0	0	0	1
N	Vic Pollard	0	5	0	1	5	0	11

Type 1b

A	Brasseler	0	1	4	0	0	0	5
B	Diamm	2	0	0	0	0	0	2
C	Jaro	0	5	0	0	0	0	5
D	Militex	0	5	0	0	0	0	5
E	Premier	0	0	0	0	0	0	0
F	Ramsom & Randolph	0	0	2	0	0	0	2
G	Regency	0	1	1	0	0	0	2
H	Repco	1	0	0	0	0	0	1
I	Shofu	0	2	0	0	0	0	2
J	S. S. White	0	3	0	0	0	0	3

TABLE 14. FAILURES OF QUALITY TESTS BY TYPE

ID	MANUFACTURER	DIMENSION TEST	CONSTRUCTION TEST	ROUGHNESS TEST	CONCENTRICITY TEST	DURABILITY TEST	CORROSION TEST	TOTAL FAILURE
				Type 1b (Cont'd)				
K	Star	2	0	0	0	0	0	2
L	Teledyne Densco	0	0	0	0	0	0	0
M	Venture Technology	0	1	0	0	0	0	1
N	Vic Pollard	5	0	0	0	0	0	5
				Type 2a				
A	Brasseler	0	0	1	0	0	0	1
B	Diamm	2	0	0	1	1	0	4
C	Jaro	0	0	5	0	1	0	6
D	Militex	NA	NA	NA	NA	NA	NA	NA
E	Premier	0	0	0	0	0	0	0
F	Ramsom & Randolph	0	0	1	0	0	0	1
G	Regency	0	0	0	0	0	0	0
H	Repco	1	0	0	1	0	0	2
I	Shofu	0	1	0	0	0	0	1
J	S. S. White	0	2	1	1	0	0	4
K	Star	0	0	0	0	0	0	0
L	Teledyne Densco	0	0	0	0	0	0	0
M	Venture Technology	NA	NA	NA	NA	NA	NA	NA
N	Vic Pollard	5	0	0	0	0	0	5
				Type 2b				
A	Brasseler	0	2	0	0	0	0	2
B	Diamm	0	0	0	1	0	0	1
C	Jaro	0	0	0	5	0	1	6
D	Militex	1	0	0	2	0	0	3

TABLE 14. FAILURES OF QUALITY TESTS BY TYPE

Type 2b (Cont'd)

ID	MANUFACTURER	DIMENSION TEST	CONSTRUCTION TEST	ROUGHNESS TEST	CONCENTRICITY TEST	DURABILITY TEST	CORROSION TEST	TOTAL FAILURE
E	Premier	0	0	0	0	0	0	0
F	Ramsom & Randolph	2	0	2	1	0	2	7
G	Regency	0	0	0	0	0	0	0
H	Repco	0	0	0	0	0	0	0
I	Shofu	0	0	0	0	0	0	0
J	S. S. White	0	0	0	2	0	0	2
K	Star	0	1	3	0	0	0	4
L	Teledyne Densco	0	0	0	0	0	0	0
M	Venture Technology	0	0	0	1	0	0	1
N	Vic Pollard	5	0	1	1	5	0	12

Type 2c

A	Brasseler	0	1	0	0	0	0	1
B	Diama	0	1	0	1	0	0	2
C	Jaro	0	0	0	0	0	0	0
D	Miltex	1	0	0	0	0	0	1
E	Premier	0	0	0	0	0	0	0
F	Ramsom & Randolph	1	1	0	1	0	0	3
G	Regency	0	0	0	1	0	0	1
H	Repco	0	0	0	0	0	0	0
I	Shofu	0	0	0	0	0	0	0
J	S. S. White	0	1	3	3	0	0	7
K	Star	0	2	0	0	0	0	2
L	Teledyne Densco	0	0	0	0	0	0	0
M	Venture Technology	0	4	0	1	0	0	5
N	Vic Pollard	5	1	0	0	0	0	6

TABLE 14. FAILURES OF QUALITY TESTS BY TYPE

Type 2d

ID	MANUFACTURER	DIMENSION TEST	CONSTRUCTION TEST	ROUGHNESS TEST	CONCENTRICITY TEST	DURABILITY TEST	CORROSION TEST	TOTAL FAILURE
A	Brasseler	0	0	2	0	0	2	4
B	Diama	0	5	0	1	0	0	6
C	Jaro	0	0	0	1	0	0	1
D	Militex	0	0	0	0	0	1	1
E	Premier	1	1	0	0	0	0	2
F	Ramsom & Randolph	0	0	0	1	0	0	1
G	Regency	1	0	0	0	0	0	1
H	Repco	0	0	0	0	0	0	0
I	Shofu	0	0	0	0	0	0	0
J	S. S. White	0	3	1	2	1	0	7
K	Star	0	0	4	0	0	0	4
L	Teledyne Densco	0	0	0	0	0	0	0
M	Venture Technology	0	0	0	1	0	0	1
N	Vic Pollard	2	0	0	0	0	0	2

Type 3a

A	Brasseler	0	1	0	0	1	0	2
B	Diama	0	0	0	1	3	0	4
C	Jaro	3	5	1	0	0	0	9
D	Militex	4	2	0	0	0	0	6
E	Premier	0	0	2	0	0	0	2
F	Ramsom & Randolph	0	0	0	0	0	1	1
G	Regency	0	5	2	0	0	2	9
H	Repco	1	2	0	2	0	0	5
I	Shofu	0	5	0	0	0	0	5
J	S. S. White	1	0	4	0	0	0	5

TABLE 14. FAILURES OF QUALITY TESTS BY TYPE

ID	MANUFACTURER	DIMENSION TEST	CONSTRUCTION TEST	ROUGHNESS TEST	CONCENTRICITY TEST	DURABILITY TEST	CORROSION TEST	TOTAL FAILURE
				Type 3a (Cont'd)				
K	Star	0	0	0	0	0	0	0
L	Teledyne Densco	0	0	0	0	0	0	0
M	Venture Technology	0	2	0	0	5	0	7
N	Vic Pollard	5	1	0	0	0	0	6
				Type 4a				
A	Brasseler	0	0	0	0	0	0	0
B	Diama	0	0	0	0	0	0	0
C	Jaro	0	0	0	0	0	2	2
D	Militex	0	1	0	0	0	0	1
E	Premier	0	0	0	0	0	0	0
F	Ramsom & Randolph	0	1	0	0	0	0	1
G	Regency	0	0	0	0	0	0	0
H	Repco	1	0	0	0	0	0	1
I	Shofu	0	2	0	0	0	0	2
J	S. S. White	2	2	2	0	5	0	11
K	Star	0	0	0	0	0	0	0
L	Teledyne Densco	1	1	0	0	0	0	2
M	Venture Technology	1	0	0	1	0	0	2
N	Vic Pollard	2	0	1	0	0	0	3
				Type 5a				
A	Brasseler	0	0	0	0	0	0	0
B	Diama	0	0	0	0	0	1	1
C	Jaro	0	5	5	0	0	0	10
D	Militex	0	2	3	0	0	0	5

TABLE 14. FAILURES OF QUALITY TESTS BY TYPE

Type 5a (Cont'd) ·

ID	MANUFACTURER	DIMENSION TEST	CONSTRUCTION TEST	ROUGHNESS TEST	CONCENTRICITY TEST	DURABILITY TEST	CORROSION TEST	TOTAL FAILURE
E	Premier	5	0	4	1	0	0	10
F	Ramsom & Randolph	NA	NA	NA	NA	NA	NA	NA
G	Regency	NA	NA	NA	NA	NA	NA	NA
H	Repco	3	3	0	1	0	0	7
I	Shofu	NA	NA	NA	NA	NA	NA	NA
J	S. S. White	NA	NA	NA	NA	NA	NA	NA
K	Star	0	0	0	0	0	0	0
L	Teledyne Densco	0	0	0	0	0	0	0
M	Venture Technology	5	4	0	0	0	0	9
N	Vic Pollard	1	0	0	1	0	0	2

TABLE 15. QUALITY COMPARISON BY TYPE

NUMBER OF FAILURES	TYPE OF DIAMOND								
	1a	1b	2a	2b	2c	2d	3a	4a	5a
0	BE	EL	EGKL	EGHIL	CEHIL	HIL	KL	ABEGK	AKL
1	AIM	HM	AFI	BM	ADG	CDGFM	F	DFH	B
2	L	BFGIK	H	AJ	BK	EN	AE	CILM	N
3	DK	J		D	F			N	
4	F		BJ	K		AK	B		
5	H	ACDN	N		M				D
6			C	C	N	B	HIJ		
7				F	J	J	DN		H
8	J						M		
9									M
10	C						CG		CE
11	GN							J	
12									
13				N					
14									
15									
NO SAMPLE			DM						FGIJ

NOTE: For key to letters (indicating manufacturers), refer to Table 14.

TABLE 16. QUALITY TEST FAILURES, BY MANUFACTURER, FOR ALL INSTRUMENT TYPES

NUMBER OF FAILURES	MANUFACTURER
1-2	
3-4	L
5-6	
7-8	
9-10	
11-12	I
13-14	E
15-16	K,A
17-18	
19-20	B,F
21-22	H
23-24	G
25-26	D
27-28	M
29-30	
31-44	
45-46	
47-48	J
49-50	C
51-52	
53-54	N
55-56	

NOTE: Manufacturers D, F, G, I, J, and M had 40 samples, and all others had 45 samples. For key to letters (designating manufacturers), refer to Table 14.

TABLE 17. QUALITY COMPARISON, BY MANUFACTURER, FOR ALL INSTRUMENT TYPES

ID	MANUFACTURER	DIMENSION TEST	CONSTRUCTION TEST	ROUGHNESS TEST	CONCENTRICITY TEST	DURABILITY TEST	CORROSION TEST*	TOTAL FAILURES
A	Brasseler	0	6	7	0	1	2	16
B	Diama	4	6	0	5	4	1	20
C	Jaro	4	20	11	6	3	5	49
D	Miltex	7	10	5	2	0	1	25
E	Premier	6	1	6	1	0	0	14
F	Ramsom & Randolph	3	2	8	3	1	3	20
G	Regency	3	8	3	3	5	2	24
H	Repco	7	10	0	4	0	0	21
I	Shofu	0	11	0	0	0	0	11
J	S. S. White	3	16	11	9	8	0	47
K	Star	2	6	7	0	0	0	15
L	Teledyne Densco	1	2	0	0	1	0	4
M	Venture Technology	6	12	0	4	5	0	27
N	Vic Pollard	30	7	2	3	10	0	52

* - Only chemiclave failures are included for this comparison.

TABLE 18. CUTTING PERFORMANCE COMPARISON BY TYPE

TOTAL DEPTH OF CUT (mm)	TYPE OF DIAMOND								
	1a	1b	2a	2b	2c	2d	3a	4a	5a
140-159	E								
120-139	FL	EL					EL		
100-119	KC	CD					I		
95-99	BJ	F					H		
90-94		K							K
85-89	H	BHI							L
80-84	I						K		
75-79									
70-74	D								H
65-69							N		
60-64							C		
55-59							F		
50-54		M							C
45-49									
40-44									N
35-39	A		L						
30-34	M	A	K	L	EKM	E		EK	
25-29			HI	EFIKM	FIL	CFIL		L	
20-24			FG		CDH	K		CI	
15-19	N		CN	CDG	G	G	M	FGMN	
10-14				J		M			
5-9			B	AB	ABN	BDJ	AGJ	J	ABD
0-4		GJN	AJ			A	BD	ABD	
BROKE	G		E	HN	J	HN		H	
NO SAMPLE			DM						EFGIJM

NOTE: For key to letters (indicating manufacturers), refer to Table 14.

TABLE 19. PERFORMANCE COMPARISON BY MANUFACTURER

TOTAL DEPTH OF CUT (mm)	MANUFACTURER
80-84	
75-79	E
70-74	
65-69	L
60-64	
55-59	K
50-54	C,F,I
45-49	
40-44	H
35-39	D
30-34	B
25-29	M
20-24	
15-19	J,N
10-14	A,G
5-9	
0-4	

NOTE: For key to letters (indicating manufacturers), refer to Table 14.

APPENDIXES A - G

EDITOR'S NOTE--Throughout these Appendixes, instrument types are designated as:

1a, 1b, 2a, 2b, 2c, 2d, 3a, 4a, and 5a.

For additional information on these types of instruments, please refer to page 34 :

Table 1. Specifications: Dental Diamond Rotary Instruments

A P P E N D I X A:

DIMENSIONS TEST DATA

APPENDIX A
DIMENSIONS TEST DATA

Dimensions Type 1a

ID	MANUFACTURER	#	Head Diameter mm	Length mm	Shank Diameter mm
A	Brasseler	1	1.532	19.116	1.593
		2	1.544	19.113	1.591
		3	1.522	19.110	1.594
		4	1.524	19.115	1.591
		5	1.535	19.106	1.592
		Ave.	1.531	19.112	1.592
B	Diama	1	1.528	18.433	1.594
		2	1.509	18.432	1.595
		3	1.531	18.431	1.594
		4	1.530	18.417	1.596
		5	1.523	18.423	1.595
		Ave.	1.524	18.427	1.595
C	Jaro	1	1.549	16.803	1.600
		2	1.524	16.789	1.599
		3	1.533	16.812	1.600
		4	1.497	16.777	1.606
		5	1.529	16.799	1.600
		Ave.	1.526	16.796	1.601
D	Militex	1	1.542	19.056	1.588
		2	1.559	19.061	1.590
		3	1.548	19.053	1.593
		4	1.558	19.052	1.594
		5	1.534	19.064	1.596
		Ave.	1.548	19.057	1.592
E	Premier	1	1.547	17.064	1.595
		2	1.543	17.046	1.598
		3	1.534	17.036	1.594
		4	1.521	17.027	1.598
		5	1.527	17.042	1.595
		Ave.	1.534	17.043	1.596
F	Ramsom & Randolph	1	1.512	17.374	1.597
		2	1.536	17.376	1.597
		3	1.517	17.368	1.599
		4	1.524	17.701	1.596
		5	1.512	17.378	1.595
		Ave.	1.520	17.439	1.597
G	Regency	1	0.857	19.011	1.588
		2	0.879	19.017	1.595
		3	0.858	19.012	1.592
		4	0.881	19.020	1.588
		5	0.884	19.047	1.592
		Ave.	0.872	19.021	1.591

APPENDIX A (Cont'd)

ID	MANUFACTURER	#	Head Diameter mm	Length mm	Shank Diameter mm
H	Repco	1	1.609	19.357	1.597
		2	1.599	19.367	1.598
		3	1.601	19.402	1.593
		4	1.598	19.364	1.592
		5	1.604	19.383	1.591
		Ave.	1.602	19.375	1.594
I	Shofu	1	1.570	19.164	1.596
		2	1.565	19.175	1.598
		3	1.556	19.180	1.598
		4	1.561	19.170	1.598
		5	1.580	19.202	1.595
		Ave.	1.566	19.178	1.597
J	S. S. White	1	1.383	20.033	1.599
		2	1.390	20.020	1.598
		3	1.367	20.007	1.599
		4	1.369	19.974	1.597
		5	1.388	20.053	1.599
		Ave.	1.379	20.017	1.598
K	Star	1	1.458	16.688	1.595
		2	1.452	16.737	1.593
		3	1.438	16.706	1.593
		4	1.436	16.728	1.597
		5	1.447	16.696	1.593
		Ave.	1.446	16.711	1.594
L	Teledyne Densco	1	1.602	17.278	1.597
		2	1.623	17.292	1.592
		3	1.617	17.342	1.596
		4	1.618	17.347	1.596
		5	1.607	17.263	1.595
		Ave.	1.613	17.304	1.595
M	Venture Technology	1	1.464	19.149	1.599
		2	1.490	19.183	1.600
		3	1.453	19.172	1.598
		4	1.468	19.184	1.600
		5	1.458	19.178	1.597
		Ave.	1.467	19.173	1.599
N	Vic Pollard	1	1.537	19.075	1.598
		2	1.549	19.058	1.599
		3	1.524	18.948	1.599
		4	1.551	18.936	1.597
		5	1.533	18.999	1.600
		Ave.	1.539	19.003	1.599

APPENDIX A (Cont'd)

Dimensions Type 1b

ID	MANUFACTURER	#	Head Diameter mm	Length mm	Shank Diameter mm
A	Brasseler	1	2.106	19.160	1.596
		2	2.086	19.176	1.592
		3	2.102	19.179	1.598
		4	2.091	19.158	1.594
		5	2.102	19.178	1.597
		Ave.	2.097	19.170	1.595
B	Diamo	1	1.839	18.354	1.587
		2	1.803	18.352	1.586
		3	1.823	18.371	1.595
		4	1.788	18.365	1.592
		5	1.814	18.370	1.591
		Ave.	1.813	18.362	1.590
C	Jaro	1	2.531	18.469	1.592
		2	2.507	18.452	1.592
		3	2.495	18.480	1.595
		4	2.512	18.485	1.594
		5	2.521	18.470	1.593
		Ave.	1.513	18.471	1.593
D	Militex	1	2.650	19.845	1.594
		2	2.659	19.816	1.592
		3	2.629	19.817	1.591
		4	2.637	19.829	1.593
		5	2.675	19.844	1.591
		Ave.	2.650	19.830	1.592
E	Premier	1	2.638	18.059	1.598
		2	2.613	18.060	1.594
		3	2.607	18.067	1.599
		4	2.606	18.071	1.598
		5	2.597	18.030	1.599
		Ave.	2.612	18.057	1.598
F	Ransom & Randolph	1	2.401	18.095	1.596
		2	2.428	18.057	1.595
		3	2.429	18.108	1.597
		4	2.426	18.093	1.598
		5	2.413	18.099	1.598
		Ave.	2.419	18.090	1.597
G	Regency	1	1.553	19.135	1.591
		2	1.556	19.140	1.593
		3	1.565	19.115	1.592
		4	1.553	19.147	1.597
		5	1.533	19.137	1.597
		Ave.	1.552	19.135	1.594

APPENDIX A (Cont'd)

ID	MANUFACTURER	#	Head Diameter mm	Length mm	Shank Diameter mm
H	Repco	1	2.556	19.398	1.596
		2	2.590	19.248	1.589
		3	2.569	19.385	1.592
		4	2.597	19.419	1.590
		5	2.574	19.357	1.590
		Ave.	2.577	19.361	1.591
I	Shofu	1	2.117	19.069	1.599
		2	2.110	19.084	1.596
		3	2.120	19.076	1.599
		4	2.136	19.060	1.599
		5	2.113	19.082	1.597
		Ave.	2.119	19.074	1.598
J	S. S. White	1	1.811	20.089	1.595
		2	1.821	20.051	1.598
		3	1.829	20.095	1.595
		4	1.816	20.081	1.594
		5	1.809	20.092	1.598
		Ave.	1.817	20.082	1.596
K	Star	1	2.422	18.313	1.600
		2	2.437	18.350	1.600
		3	2.418	18.352	1.610
		4	2.435	18.356	1.607
		5	2.415	18.305	1.600
		Ave.	2.425	18.335	1.603
L	Teledyne Densco	1	2.426	17.671	1.599
		2	2.425	17.738	1.594
		3	2.422	17.731	1.599
		4	2.416	17.676	1.598
		5	2.421	17.696	1.596
		Ave.	2.422	17.702	1.597
M	Venture Technology	1	2.432	17.918	1.592
		2	2.422	17.939	1.592
		3	2.416	17.923	1.596
		4	2.417	17.938	1.593
		5	2.424	17.945	1.592
		Ave.	2.422	17.933	1.593
N	Vic Pollard	1	2.540	17.697	1.588
		2	2.572	17.729	1.588
		3	2.539	17.590	1.589
		4	2.591	17.577	1.587
		5	2.616	17.730	1.588
		Ave.	2.572	17.665	1.588

APPENDIX A (Cont'd)

Dimensions Type 2a

ID	MANUFACTURER	#	Small Diameter mm	Large Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
A	Brasseler	1	1.486	2.386	7.241	21.113	1.599	8°16'
		2	1.491	2.385	7.244	21.123	1.596	8°15'
		3	1.467	2.391	7.249	21.141	1.599	8°09'
		4	1.458	2.371	7.244	21.124	1.599	8°32'
		5	1.495	2.388	7.239	21.135	1.599	8°21'
		Ave.	1.479	2.384	7.243	21.127	1.598	8°19'
B	Diama	1	1.240	2.289	12.314	24.130	1.590	5°48'
		2	1.222	2.274	12.324	24.116	1.585	5°09'
		3	1.239	2.294	12.312	24.130	1.593	5°55'
		4	1.217	2.321	12.300	24.123	1.593	5°41'
		5	1.238	2.277	12.236	23.597	1.586	5°29'
		Ave.	1.231	2.291	12.297	24.019	1.589	5°36'
C	Jaro	1	1.685	2.929	7.039	18.255	1.592	11°42'
		2	1.686	2.885	7.040	18.263	1.592	11°43'
		3	1.686	2.873	7.029	18.242	1.592	11°42'
		4	1.702	2.902	7.054	18.257	1.590	12°10'
		5	1.688	2.872	7.063	18.258	1.591	12°09'
		Ave.	1.689	2.892	7.045	18.255	1.591	11°53'
D	Miltex	1						
		2						
		3			NO SAMPLE			
		4						
		5						
		Ave.						
E	Premier	1	1.358	1.998	9.107	19.981	1.592	4°46'
		2	1.321	2.021	9.136	20.020	1.592	4°58'
		3	1.365	2.016	9.183	20.053	1.592	4°32'
		4	1.364	1.983	9.133	20.026	1.595	4°52'
		5	1.363	2.002	9.151	20.027	1.596	4°58'
		Ave.	1.354	2.004	9.142	20.021	1.593	4°49'
F	Ransom & Randolph	1	1.238	1.962	9.076	22.072	1.595	5°13'
		2	1.257	1.967	9.075	22.083	1.598	5°16'
		3	1.253	1.945	9.088	22.092	1.598	5°15'
		4	1.254	1.959	9.086	22.093	1.597	5°12'
		5	1.249	1.968	9.081	22.092	1.598	5°13'
		Ave.	1.250	1.960	9.081	22.086	1.597	5°14'
G	Regency	1	0.726	1.108	6.530	21.063	1.599	4°32'
		2	0.726	1.126	6.617	21.062	1.599	4°39'
		3	0.736	1.121	6.610	21.069	1.599	4°22'
		4	0.727	1.115	6.611	21.065	1.594	4°31'
		5	0.733	1.111	6.545	21.072	1.595	4°36'
		Ave.	0.730	1.116	6.583	21.066	1.597	4°32'

APPENDIX A (Cont'd)

ID	MANUFACTURER	#	Small Diameter mm	Large Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
H	Repco	1	1.342	2.289	8.451	21.077	1.595	7°12'
		2	1.362	2.296	8.460	21.108	1.592	7°08'
		3	1.366	2.291	8.516	21.028	1.589	7°31'
		4	1.368	2.296	8.547	21.036	1.594	7°39'
		5	1.324	2.294	8.499	21.068	1.596	7°42'
		Ave.	1.352	2.293	8.495	21.063	1.593	7°26'
I	Shofu	1	1.286	2.143	9.375	21.126	1.598	6°36'
		2	1.299	2.147	9.401	21.173	1.600	6°34'
		3	1.273	2.127	9.291	21.090	1.599	6°38'
		4	1.297	2.131	9.407	21.185	1.598	6°35'
		5	1.312	2.143	9.328	21.148	1.600	6°42'
		Ave.	1.293	2.138	9.360	21.144	1.599	6°37'
J	S. S. White	1	1.070	1.612	9.880	23.707	1.593	3°44'
		2	0.988	1.641	9.708	22.792	1.594	4°04'
		3	1.129	1.596	9.904	23.766	1.592	3°39'
		4	1.071	1.584	9.869	23.556	1.592	3°51'
		5	1.082	1.598	9.886	23.766	1.590	3°50'
		Ave.	1.068	1.606	9.849	23.517	1.592	3°50'
K	Star	1	1.702	2.888	7.136	18.722	1.597	11°28'
		2	1.735	2.926	7.177	18.708	1.595	11°36'
		3	1.711	2.902	7.196	18.673	1.597	11°23'
		4	1.707	2.916	7.174	18.717	1.594	11°28'
		5	1.709	2.896	7.223	18.731	1.597	11°31'
		Ave.	1.713	2.906	7.181	18.710	1.596	11°29'
L	Teledyne Densco	1	1.462	2.226	7.588	21.073	1.590	6°17'
		2	1.484	2.225	7.613	21.067	1.590	5°46'
		3	1.472	2.222	7.612	21.046	1.590	5°50'
		4	1.466	2.217	7.589	21.111	1.590	6°15'
		5	1.462	2.216	7.604	21.088	1.594	6°14'
		Ave.	1.469	2.221	7.601	21.077	1.591	6°04'
M	Venture Technology	1						
		2						
		3			NO SAMPLE			
		4						
		5						
		Ave.						
N	Vic Pollard	1	1.588	1.880	8.204	21.158	1.585	6°10'
		2	1.486	1.943	8.306	21.095	1.585	6°12'
		3	1.563	1.897	8.274	21.142	1.586	6°09'
		4	1.539	1.921	8.291	21.108	1.585	6°07'
		5	1.546	1.916	8.268	21.113	1.585	6°11'
		Ave.	1.544	1.911	8.269	21.123	1.585	6°10'

APPENDIX A (Cont'd)

Dimensions Type 2b

ID	MANUFACTURER	#	Small Diameter mm	Large Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
A	Brasseler	1	0.973	1.501	8.150	21.072	1.596	4°28'
		2	0.975	1.520	8.209	21.066	1.598	3°43'
		3	0.980	1.516	8.198	21.058	1.598	4°23'
		4	0.970	1.510	8.182	21.074	1.597	4°04'
		5	0.973	1.531	8.178	21.077	1.596	3°52'
		Ave.	0.974	1.516	8.183	21.069	1.597	4°02'
B	Diama	1	1.128	1.842	7.961	21.939	1.594	5°50'
		2	1.139	1.813	7.960	21.915	1.597	5°52'
		3	1.141	1.796	7.971	21.834	1.594	5°18'
		4	1.052	1.822	7.952	21.926	1.593	5°36'
		5	1.142	1.848	7.983	21.928	1.598	5°22'
		Ave.	1.120	1.824	7.965	21.908	1.595	5°36'
C	Jaro	1	0.538	1.436	9.361	22.677	1.599	5°28'
		2	0.530	1.446	9.401	22.611	1.599	5°31'
		3	0.550	1.478	9.459	22.679	1.599	5°43'
		4	0.527	1.436	9.214	22.617	1.599	5°18'
		5	0.531	1.491	9.502	22.621	1.596	5°41'
		Ave.	0.535	1.457	9.387	22.641	1.598	5°32'
D	Militex	1	0.539	1.456	8.042	22.028	1.593	7°04'
		2	0.528	1.480	8.057	22.041	1.592	7°12'
		3	0.562	1.473	8.070	22.050	1.589	7°15'
		4	0.537	1.471	8.078	22.035	1.593	7°33'
		5	0.547	1.476	8.039	22.022	1.593	7°27'
		Ave.	0.543	1.471	8.057	22.035	1.592	7°18'
E	Premier	1	0.882	1.710	9.059	22.043	1.593	6°56'
		2	0.866	1.760	9.094	22.060	1.597	6°18'
		3	0.866	1.774	9.075	22.054	1.594	6°06'
		4	0.858	1.758	9.113	22.023	1.598	6°33'
		5	0.845	1.729	9.121	22.067	1.594	6°27'
		Ave.	0.863	1.746	9.092	22.049	1.595	6°28'
F	Ransom & Randolph	1	0.732	1.570	9.067	21.012	1.604	6°18'
		2	0.727	1.592	9.126	21.024	1.596	6°05'
		3	0.769	1.590	9.101	21.015	1.600	6°07'
		4	0.748	1.562	9.133	21.023	1.599	6°10'
		5	0.771	1.607	9.082	21.017	1.602	6°07'
		Ave.	0.749	1.584	9.102	21.018	1.600	6°09'
G	Regency	1	0.702	1.160	9.169	23.298	1.597	3°17'
		2	0.686	1.151	9.135	23.309	1.593	3°44'
		3	0.671	1.150	9.109	23.261	1.593	3°40'
		4	0.693	1.146	9.140	23.312	1.597	3°36'
		5	0.674	1.152	9.117	23.277	1.597	3°30'
		Ave.	0.685	1.152	9.134	23.291	1.595	3°33'

APPENDIX A (Cont'd)

ID	MANUFACTURER	#	Small Diameter mm	Large Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
H	Repco	1	0.640	1.339	9.799	22.555	1.592	4°35'
		2	0.644	1.342	9.826	22.567	1.592	4°31'
		3	0.655	1.360	9.840	22.572	1.597	4°37'
		4	0.659	1.345	9.858	22.586	1.594	4°19'
		5	0.628	1.339	9.819	22.576	1.592	4°44'
		Ave.	0.645	1.345	9.828	22.571	1.593	4°33'
I	Shofu	1	0.704	1.529	7.279	19.091	1.593	7°37'
		2	0.744	1.530	7.310	19.128	1.596	7°20'
		3	0.719	1.525	7.313	19.110	1.594	7°31'
		4	0.722	1.538	7.258	19.078	1.597	7°29'
		5	0.701	1.545	7.322	19.110	1.596	7°35'
		Ave.	0.718	1.533	7.296	19.103	1.595	7°30'
J	S. S. White	1	0.392	1.278	8.162	22.046	1.594	6°53'
		2	0.370	1.280	8.102	21.991	1.593	7°07'
		3	0.396	1.285	8.139	22.023	1.595	6°51'
		4	0.396	1.274	8.150	22.071	1.599	7°03'
		5	0.378	1.258	8.250	22.015	1.590	6°37'
		Ave.	0.386	1.275	8.161	22.029	1.594	6°54'
K	Star	1	0.947	1.696	9.097	20.375	1.597	5°24'
		2	0.940	1.651	9.096	20.372	1.597	5°18'
		3	0.967	1.659	9.089	20.384	1.598	5°20'
		4	0.945	1.660	9.086	20.381	1.593	5°27'
		5	0.952	1.684	9.121	20.385	1.593	5°21'
		Ave.	0.950	1.670	9.098	20.379	1.596	5°22'
L	Teledyne Densco	1	0.799	1.620	8.981	22.709	1.590	5°25'
		2	0.792	1.620	9.002	22.563	1.590	5°13'
		3	0.794	1.621	9.054	22.680	1.597	5°20'
		4	0.805	1.605	9.013	22.721	1.600	5°26'
		5	0.802	1.642	9.020	22.743	1.590	4°56'
		Ave.	0.798	1.622	9.014	22.683	1.593	5°16'
M	Venture Technology	1	0.717	1.422	9.309	20.815	1.597	4°34'
		2	0.691	1.410	9.345	20.767	1.599	4°43'
		3	0.714	1.403	9.184	20.797	1.599	4°49'
		4	0.710	1.430	9.324	20.740	1.599	4°48'
		5	0.703	1.400	8.978	20.797	1.595	4°47'
		Ave.	0.707	1.413	9.228	20.783	1.598	4°44'
N	Vic Pollard	1	0.813	1.232	10.008	23.114	1.588	4°56'
		2	0.793	1.227	10.116	23.158	1.589	4°51'
		3	0.806	1.225	10.094	23.139	1.588	5°02'
		4	0.789	1.228	10.103	23.145	1.588	5°01'
		5	0.775	1.219	10.122	23.165	1.588	4°52'
		Ave.	0.795	1.226	10.089	23.144	1.588	4°56'

APPENDIX A (Cont'd)

Dimensions Type 2c

ID	MANUFACTURER	#	Small Diameter mm	Large Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
A	Brasseler	1	0.641	1.077	6.084	21.079	1.590	4°23'
		2	0.636	1.051	6.064	21.020	1.594	4°33'
		3	0.611	1.043	6.016	21.040	1.590	4°33'
		4	0.644	1.061	6.075	21.026	1.590	4°29'
		5	0.635	1.060	6.027	21.006	1.590	4°19'
		Ave.	0.633	1.058	6.053	21.034	1.591	4°27'
B	Diamo	1	0.679	1.717	10.533	23.652	1.594	5°59'
		2	0.692	1.718	10.543	23.653	1.599	5°58'
		3	0.687	1.686	10.587	23.668	1.591	6°19'
		4	0.676	1.685	10.542	23.647	1.596	5°25'
		5	0.691	1.704	10.586	23.655	1.592	6°07'
		Ave.	0.685	1.702	10.558	23.655	1.594	5°58'
C	Jaro	1	0.709	1.474	8.067	19.695	1.592	5°30'
		2	0.714	1.441	7.854	19.687	1.594	5°46'
		3	0.716	1.446	7.852	19.674	1.596	5°41'
		4	0.727	1.479	8.127	19.685	1.593	5°42'
		5	0.725	1.441	7.783	19.710	1.593	5°27'
		Ave.	0.718	1.456	7.937	19.690	1.594	5°37'
D	Miltex	1	0.624	1.406	6.195	21.034	1.590	8°18'
		2	0.622	1.420	6.181	21.023	1.592	8°21'
		3	0.625	1.410	6.228	21.020	1.588	8°13'
		4	0.622	1.408	6.153	21.018	1.596	7°48'
		5	0.626	1.400	6.178	21.001	1.592	8°20'
		Ave.	0.624	1.409	6.187	21.019	1.592	8°12'
E	Premier	1	0.612	1.328	6.355	20.547	1.598	7°12'
		2	0.603	1.311	6.375	20.560	1.594	7°07'
		3	0.606	1.308	6.350	20.550	1.595	7°06'
		4	0.607	1.321	6.373	20.556	1.598	7°01'
		5	0.603	1.314	6.379	20.579	1.597	7°08'
		Ave.	0.606	1.316	6.366	20.558	1.596	7°07'
F	Ransom & Randolph	1	0.562	1.334	9.037	21.048	1.602	6°18'
		2	0.546	1.325	9.036	21.028	1.597	6°09'
		3	0.544	1.355	9.026	21.024	1.596	6°09'
		4	0.550	1.359	9.021	21.049	1.599	6°08'
		5	0.539	1.337	9.017	21.022	1.596	6°12'
		Ave.	0.548	1.342	9.027	21.034	1.598	6°11'
G	Regency	1	0.904	1.509	8.867	22.758	1.597	3°49'
		2	0.918	1.501	8.781	23.013	1.598	3°52'
		3	0.909	1.504	8.774	22.743	1.595	4°13'
		4	0.908	1.489	8.784	22.960	1.599	4°03'
		5	0.910	1.537	8.875	22.727	1.597	3°50'
		Ave.	0.910	1.508	8.806	22.840	1.597	3°57'

APPENDIX A (Cont'd)

ID	MANUFACTURER	#	Small Diameter mm	Large Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
H	Repco	1	0.772	1.427	8.465	21.358	1.596	4°44'
		2	0.777	1.421	8.473	21.357	1.592	4°42'
		3	0.782	1.390	8.451	21.315	1.590	4°46'
		4	0.790	1.402	8.462	21.351	1.595	4°46'
		5	0.770	1.396	8.494	21.344	1.593	4°44'
		Ave.	0.778	1.407	8.469	21.345	1.593	4°44'
I	Shofu	1	0.612	1.456	7.110	19.083	1.599	7°37'
		2	0.582	1.470	7.086	19.065	1.595	7°48'
		3	0.615	1.493	7.200	19.092	1.595	7°40'
		4	0.624	1.475	7.170	19.117	1.598	7°23'
		5	0.578	1.486	7.097	19.081	1.599	7°44'
		Ave.	0.602	1.476	7.133	19.088	1.598	7°38'
J	S. S. White	1	0.355	1.069	7.808	22.025	1.597	13°47'
		2	0.306	1.068	7.766	21.975	1.591	13°58'
		3	0.342	1.048	7.669	21.922	1.593	14°03'
		4	0.309	1.045	7.715	21.834	1.596	14°27'
		5	0.344	1.046	7.843	21.930	1.594	13°51'
		Ave.	0.331	1.055	7.760	21.937	1.594	14°01'
K	Star	1	1.058	1.615	7.066	18.669	1.594	5°07'
		2	1.023	1.594	7.131	18.671	1.593	5°04'
		3	1.042	1.599	7.082	18.652	1.597	5°05'
		4	1.053	1.579	7.129	18.655	1.598	5°14'
		5	1.032	1.574	7.133	18.653	1.597	5°05'
		Ave.	1.042	1.592	7.108	18.660	1.596	5°07'
L	Teledyne Densco	1	0.842	1.458	6.422	20.399	1.593	5°14'
		2	0.835	1.450	6.466	20.358	1.596	4°47'
		3	0.831	1.469	6.476	20.416	1.599	4°39'
		4	0.847	1.469	6.437	20.425	1.600	4°55'
		5	0.836	1.444	6.440	20.381	1.600	5°06'
		Ave.	0.838	1.458	6.480	20.396	1.598	4°56'
M	Venture Technology	1	0.993	1.518	7.439	18.830	1.598	4°47'
		2	0.983	1.516	7.243	18.798	1.599	5°10'
		3	0.987	1.545	7.368	18.806	1.600	5°07'
		4	1.015	1.553	7.420	18.835	1.600	4°53'
		5	0.997	1.524	7.371	18.826	1.600	5°10'
		Ave.	0.995	1.531	7.368	18.819	1.599	5°01'
N	Vic Pollard	1	0.737	1.257	5.639	18.898	1.582	5°28'
		2	0.742	1.265	5.615	18.852	1.582	5°41'
		3	0.749	1.256	5.687	18.835	1.583	5°26'
		4	0.756	1.252	5.716	18.830	1.582	5°35'
		5	0.762	1.257	5.867	18.809	1.582	5°31'
		Ave.	0.749	1.257	5.705	18.845	1.582	5°32'

APPENDIX A (Cont'd)

Dimensions Type 2d

ID	MANUFACTURER	#	Small Diameter mm	Large Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
A	Brasseler	1	1.247	1.783	9.067	21.032	1.597	3°40'
		2	1.240	1.782	9.034	20.967	1.599	3°42'
		3	1.242	1.782	9.095	21.041	1.596	3°37'
		4	1.239	1.766	9.093	21.026	1.595	3°35'
		5	1.238	1.777	9.089	21.045	1.597	3°36'
		Ave.	1.241	1.778	9.076	21.022	1.597	3°38'
B	Diama	1	0.737	1.743	10.523	23.671	1.595	5°32'
		2	0.747	1.760	10.481	23.670	1.594	5°51'
		3	0.731	1.774	10.490	23.665	1.592	5°43'
		4	0.711	1.748	10.502	23.677	1.596	6°02'
		5	0.710	1.766	10.480	23.648	1.593	5°57'
		Ave.	0.727	1.758	10.495	23.666	1.595	5°49'
C	Jaro	1	0.721	1.681	9.411	21.259	1.591	5°13'
		2	0.728	1.683	9.372	21.251	1.591	5°30'
		3	0.731	1.700	9.447	21.307	1.591	5°36'
		4	0.743	1.691	9.332	21.297	1.593	5°24'
		5	0.737	1.680	9.435	21.237	1.594	5°34'
		Ave.	0.732	1.687	9.399	21.270	1.592	5°27'
D	Miltex	1	0.695	1.677	8.069	22.067	1.597	7°26'
		2	0.684	1.651	7.872	22.055	1.594	7°41'
		3	0.694	1.630	7.773	22.028	1.592	7°49'
		4	0.687	1.653	8.003	22.046	1.590	7°51'
		5	0.679	1.650	7.923	22.045	1.594	7°50'
		Ave.	0.688	1.652	7.928	22.048	1.593	7°43'
E	Premier	1	1.057	1.657	8.073	21.016	1.590	4°56'
		2	1.081	1.651	8.063	21.028	1.591	4°48'
		3	1.057	1.659	8.083	21.017	1.590	4°41'
		4	1.074	1.668	8.074	21.010	1.583	4°42'
		5	1.047	1.670	8.083	21.013	1.591	[illegible]49'
		Ave.	1.063	1.661	8.075	21.017	1.589	[illegible]47'
F	Ransom & Randolph	1	0.957	1.662	9.116	21.093	1.595	5°15'
		2	0.984	1.684	9.195	21.090	1.597	5°13'
		3	0.988	1.664	9.105	21.069	1.597	5°15'
		4	0.970	1.679	9.181	21.063	1.595	5°14'
		5	0.984	1.667	9.105	21.091	1.595	5°13'
		Ave.	0.977	1.671	9.140	21.081	1.596	5°14'
G	Regency	1	0.592	1.189	9.208	23.291	1.597	4°00'
		2	0.608	1.195	9.080	23.285	1.597	3°54'
		3	0.597	1.196	9.091	23.268	1.596	3°54'
		4	0.562	1.215	9.077	23.235	1.593	4°03'
		5	0.611	1.316	9.070	23.217	1.588	4°14'
		Ave.	0.594	1.222	9.105	23.259	1.594	4°01'

APPENDIX A (Cont'd)

ID	MANUFACTURER	#	Small Diameter mm	Large Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
H	Repco	1	0.612	1.204	7.750	20.424	1.595	4°43'
		2	0.636	1.205	7.793	20.483	1.590	4°02'
		3	0.617	1.180	7.732	20.343	1.591	4°25'
		4	0.615	1.198	7.747	20.464	1.593	4°37'
		5	0.612	1.185	7.749	20.607	1.592	4°05'
		Ave.	0.618	1.194	7.754	20.464	1.592	4°22'
I	Shofu	1	0.960	1.562	9.179	21.083	1.596	4°22'
		2	0.941	1.570	9.089	21.111	1.592	4°16'
		3	0.975	1.576	9.121	21.105	1.594	4°32'
		4	0.938	1.560	9.133	21.104	1.592	4°24'
		5	0.942	1.574	9.168	21.109	1.594	4°31'
		Ave.	0.951	1.568	9.138	21.102	1.594	4°25'
J	S. S. White	1	0.367	1.520	9.917	24.060	1.592	7°15'
		2	0.380	1.483	9.841	24.053	1.591	7°27'
		3	0.413	1.520	9.927	24.012	1.594	7°35'
		4	0.360	1.484	9.770	24.008	1.593	7°26'
		5	0.397	1.490	9.965	24.027	1.591	7°23'
		Ave.	0.383	1.499	9.884	24.032	1.592	7°25'
K	Star	1	1.241	1.791	8.123	19.639	1.593	4°16'
		2	1.220	1.772	8.093	19.624	1.597	4°37'
		3	1.221	1.787	8.142	19.633	1.592	4°19'
		4	1.218	1.792	8.073	19.623	1.593	4°28'
		5	1.221	1.778	8.180	19.652	1.596	4°40'
		Ave.	1.224	1.784	8.122	19.634	1.594	4°28'
L	Teledyne Densco	1	0.962	1.723	8.923	22.708	1.592	5°17'
		2	0.982	1.739	8.944	22.732	1.590	5°11'
		3	0.967	1.725	8.957	22.714	1.599	5°08'
		4	0.964	1.729	8.968	22.734	1.600	5°06'
		5	0.966	1.720	8.964	22.738	1.591	4°58'
		Ave.	0.968	1.727	8.951	22.725	1.594	5°08'
M	Venture Technology	1	0.889	1.529	9.268	20.777	1.598	4°27'
		2	0.876	1.522	9.577	20.781	1.597	4°30'
		3	0.891	1.530	9.187	20.770	1.599	4°33'
		4	0.879	1.554	9.345	20.750	1.597	4°48'
		5	0.893	1.527	9.270	20.758	1.599	4°42'
		Ave.	0.886	1.532	9.329	20.767	1.598	4°36'
N	Vic Pollard	1	1.054	1.461	10.065	23.203	1.590	5°46'
		2	1.076	1.464	10.077	23.347	1.584	5°51'
		3	1.097	1.450	10.089	23.233	1.589	5°43'
		4	1.091	1.460	10.109	23.212	1.597	5°47'
		5	1.105	1.461	10.147	23.241	1.591	5°52'
		Ave.	1.085	1.459	10.097	23.227	1.590	5°48'

APPENDIX A (Cont'd)

Dimensions Type 3a

ID	MANUFACTURER	#	Head Diameter mm	Head Length mm	Length mm	Shank Diameter mm
A	Brasseler	1	4.073	1.321	17.175	1.598
		2	4.066	1.324	17.160	1.597
		3	4.038	1.327	17.182	1.594
		4	4.060	1.349	17.209	1.598
		5	4.053	1.330	17.206	1.593
		Ave.	4.058	1.330	17.186	1.596
B	Diama	1	3.322	1.243	20.349	1.595
		2	3.314	1.240	20.382	1.599
		3	3.334	1.235	20.362	1.595
		4	3.325	1.227	20.374	1.597
		5	3.341	1.237	20.385	1.595
		Ave.	3.327	1.236	20.370	1.596
C	Jaro	1	4.413	1.432	16.318	1.591
		2	4.374	1.433	16.316	1.591
		3	4.391	1.413	16.319	1.585
		4	4.395	1.445	16.305	1.584
		5	4.406	1.459	16.334	1.586
		Ave.	4.396	1.436	16.318	1.587
D	Militex	1	4.342	1.755	19.290	1.590
		2	4.376	1.743	19.278	1.585
		3	4.352	1.730	19.135	1.585
		4	4.349	1.748	19.262	1.584
		5	4.342	1.757	19.236	1.584
		Ave.	4.352	1.747	19.240	1.586
E	Premier	1	4.636	1.455	17.194	1.591
		2	4.672	1.492	17.222	1.594
		3	4.648	1.503	17.210	1.591
		4	4.643	1.447	17.185	1.593
		5	4.647	1.459	17.215	1.591
		Ave.	4.649	1.471	17.205	1.592
F	Ransom & Randolph	1	4.411	1.402	16.407	1.592
		2	4.373	1.366	16.360	1.591
		3	4.441	1.370	16.378	1.596
		4	4.442	1.377	16.356	1.590
		5	4.433	1.386	16.406	1.592
		Ave.	4.420	1.380	16.381	1.592
G	Regency	1	3.938	1.421	20.090	1.591
		2	3.937	1.383	20.142	1.597
		3	3.946	1.398	20.139	1.592
		4	3.939	1.390	20.137	1.595
		5	3.905	1.387	20.133	1.595
		Ave.	3.933	1.396	20.128	1.594

APPENDIX A (Cont'd)

ID	MANUFACTURER	#	Head Diameter mm	Head Length mm	Length mm	Shank Diameter mm
H	Repco	1	4.497	1.479	19.291	1.592
		2	4.569	1.538	19.303	1.595
		3	4.505	1.549	19.264	1.590
		4	4.516	1.465	19.276	1.594
		5	4.469	1.469	19.295	1.589
		Ave.	4.511	1.500	19.286	1.592
I	Shofu	1	4.292	1.444	19.202	1.594
		2	4.316	1.422	19.198	1.593
		3	4.298	1.450	19.206	1.596
		4	4.296	1.463	19.200	1.597
		5	4.330	1.458	19.213	1.596
		Ave.	4.306	1.447	19.204	1.595
J	S. S. White	1	4.231	1.424	20.087	1.593
		2	4.233	1.361	20.123	1.592
		3	4.219	1.396	20.131	1.594
		4	4.214	1.388	20.076	1.588
		5	4.219	1.377	20.113	1.590
		Ave.	4.223	1.389	20.106	1.591
K	Star	1	3.404	1.214	16.134	1.592
		2	3.403	1.213	16.153	1.592
		3	3.397	1.213	16.172	1.592
		4	3.412	1.233	16.153	1.597
		5	3.409	1.204	16.110	1.597
		Ave.	3.405	1.215	16.144	1.594
L	Teledyne Densco	1	4.774	1.463	17.325	1.590
		2	4.749	1.492	17.323	1.590
		3	4.769	1.475	17.324	1.590
		4	4.772	1.456	17.327	1.590
		5	4.733	1.479	17.321	1.590
		Ave.	4.759	1.473	17.324	1.590
M	Venture Technology	1	4.212	1.035	16.040	1.596
		2	4.182	1.034	16.037	1.599
		3	4.202	1.042	16.018	1.599
		4	4.163	1.026	16.034	1.599
		5	4.179	1.030	16.028	1.597
		Ave.	4.188	1.033	16.031	1.598
N	Vic Pollard	1	4.749	1.702	19.583	1.585
		2	4.756	1.707	19.596	1.583
		3	4.760	1.703	19.588	1.579
		4	4.766	1.706	19.593	1.579
		5	4.763	1.708	19.609	1.581
		Ave.	4.759	1.705	19.594	1.582

APPENDIX A (Cont'd)

Dimensions Type 4a

ID	MANUFACTURER	#	Head Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
A	Brasseler	1	1.076	7.898	21.039	1.597	11°42'
		2	1.073	7.855	21.062	1.595	11°41'
		3	1.099	7.943	21.057	1.595	11°28'
		4	1.086	7.927	21.065	1.593	11°26'
		5	1.078	7.903	21.068	1.590	11°26'
		Ave.	1.082	7.905	21.058	1.594	11°33'
B	Diama	1	1.323	7.785	22.018	1.596	20°50'
		2	1.313	7.798	22.019	1.594	20°23'
		3	1.321	7.815	22.036	1.595	21°14'
		4	1.315	7.834	22.050	1.593	21°27'
		5	1.323	7.796	22.017	1.594	21°23'
		Ave.	1.319	7.806	22.028	1.594	21°03'
C	Jaro	1	1.247	8.414	20.047	1.595	10°16'
		2	1.238	8.364	20.056	1.596	10°12'
		3	1.249	8.453	20.099	1.592	10°05'
		4	1.223	8.360	20.085	1.592	10°06'
		5	1.224	8.399	20.079	1.592	10°02'
		Ave.	1.236	8.307	20.073	1.593	10°08'
D	Miltex	1	1.109	7.157	19.030	1.592	17°42'
		2	1.099	6.758	18.777	1.592	17°54'
		3	1.123	7.303	19.055	1.595	17°24'
		4	1.129	7.170	18.957	1.597	18°21'
		5	1.107	7.279	19.046	1.595	17°34'
		Ave.	1.113	7.133	18.973	1.594	17°47'
E	Premier	1	1.239	6.326	19.091	1.593	14°54'
		2	1.220	6.353	19.073	1.596	15°40'
		3	1.252	6.284	19.080	1.594	15°27'
		4	1.228	6.285	19.063	1.597	15°06'
		5	1.227	6.314	19.054	1.597	15°03'
		Ave.	1.233	6.312	19.072	1.595	15°12'
F	Ransom & Randolph	1	1.123	7.678	21.960	1.596	13°27'
		2	1.133	7.627	21.928	1.595	13°21'
		3	1.120	7.660	21.975	1.593	13°00'
		4	1.126	7.696	21.931	1.596	13°07'
		5	1.135	7.750	22.003	1.597	12°46'
		Ave.	1.127	7.682	21.959	1.595	13°08'
G	Regency	1	1.270	5.987	21.283	1.595	13°03'
		2	1.258	5.970	21.255	1.594	13°45'
		3	1.259	5.905	21.212	1.598	13°12'
		4	1.251	6.032	21.265	1.597	13°05'
		5	1.269	5.887	21.282	1.595	13°52'
		Ave.	1.261	5.956	21.259	1.596	13°23'

APPENDIX A (Cont'd)

ID	MANUFACTURER	#	Head Diameter mm	Head Length mm	Length mm	Shank Diameter mm	Head Angle
H	Repco	1	1.214	7.585	20.318	1.590	15°05'
		2	1.241	7.550	20.289	1.584	15°35'
		3	1.210	7.566	20.314	1.590	15°14'
		4	1.228	7.549	20.347	1.590	15°03'
		5	1.229	7.587	20.329	1.590	15°29'
		Ave.	1.224	7.567	20.319	1.589	15°17'
I	Shofu	1	1.139	7.452	19.525	1.598	15°29'
		2	1.156	7.435	19.513	1.598	15°56'
		3	1.166	7.470	19.541	1.596	15°31'
		4	1.161	7.394	19.464	1.599	15°28'
		5	1.169	7.443	19.563	1.596	16°02'
		Ave.	1.158	7.439	19.521	1.597	15°41'
J	S. S. White	1	1.084	4.115	19.095	1.586	19°39'
		2	1.048	4.061	19.088	1.586	20°25'
		3	1.064	4.112	18.966	1.595	20°10'
		4	1.059	4.037	19.030	1.591	19°32'
		5	1.076	4.122	19.083	1.592	20°30'
		Ave.	1.066	4.089	19.052	1.590	20°03'
K	Star	1	1.581	7.165	18.449	1.593	18°24'
		2	1.617	7.225	18.458	1.596	17°44'
		3	1.541	7.087	18.434	1.598	18°16'
		4	1.588	7.138	18.443	1.598	18°04'
		5	1.583	7.132	18.442	1.593	18°28'
		Ave.	1.582	7.149	18.445	1.596	18°11'
L	Teledyne Densco	1	1.192	6.366	19.822	1.598	14°06'
		2	1.192	6.357	20.080	1.598	14°06'
		3	1.165	6.356	20.170	1.589	13°33'
		4	1.196	6.374	19.836	1.596	14°05'
		5	1.216	6.369	20.163	1.600	14°12'
		Ave.	1.192	6.364	20.014	1.596	14°00'
M	Venture Technology	1	1.210	6.180	19.086	1.598	18°22'
		2	1.204	6.353	19.117	1.598	17°41'
		3	1.205	6.201	19.082	1.602	18°20'
		4	1.208	6.111	19.068	1.598	17°38'
		5	1.206	6.251	19.098	1.600	17°56'
		Ave.	1.207	6.219	19.090	1.599	17°59'
N	Vic Pollard	1	1.479	5.563	19.088	1.593	15°45'
		2	1.457	5.591	19.077	1.593	15°41'
		3	1.461	5.581	19.083	1.586	15°58'
		4	1.431	5.660	19.082	1.593	15°52'
		5	1.422	5.689	19.069	1.588	15°56'
		Ave.	1.444	5.617	19.080	1.591	15°50'

APPENDIX A (Cont'd)

Dimensions Type 5a

ID	MANUFACTURER	#	Head Diameter mm	Head Length mm	Length mm	Shank Diameter mm
A	Brasseler	1	6.415	3.295	44.756	2.350
		2	6.411	3.304	44.764	2.345
		3	6.417	3.312	44.758	2.347
		4	6.411	3.311	44.767	2.341
		5	6.440	3.308	44.741	2.343
		Ave.	6.419	3.306	44.757	2.345
B	Diama	1	4.724	2.447	20.238	1.593
		2	4.720	2.433	20.343	1.590
		3	4.729	2.469	20.279	1.593
		4	4.728	2.457	20.298	1.594
		5	4.731	2.440	20.258	1.591
		Ave.	4.726	2.449	20.283	1.592
C	Jaro	1	5.729	2.397	16.640	1.592
		2	5.701	2.349	16.631	1.593
		3	5.691	2.363	16.637	1.592
		4	5.672	2.357	16.659	1.594
		5	5.713	2.375	16.624	1.594
		Ave.	5.701	2.368	16.638	1.593
D	Miltex	1	6.001	2.306	44.554	2.338
		2	5.992	2.313	44.539	2.336
		3	5.981	2.302	44.522	2.334
		4	5.977	2.305	44.518	2.337
		5	5.965	2.304	44.528	2.335
		Ave.	5.983	2.306	44.532	2.336
E	Premier	1	6.682	1.571	44.045	2.359
		2	6.712	1.610	44.038	2.359
		3	6.683	1.575	43.990	2.355
		4	6.684	1.562	44.004	2.357
		5	6.709	1.623	44.043	2.352
		Ave.	6.694	1.588	44.024	2.356
F	Ransom & Randolph	1				
		2				
		3		NO SAMPLE		
		4				
		5				
		Ave.				
G	Regency	1				
		2				
		3		NO SAMPLE		
		4				
		5				
		Ave.				

APPENDIX A (Cont'd)

ID	MANUFACTURER	#	Head Diameter mm	Head Length mm	Length mm	Shank Diameter mm
H	Repco	1	5.547	2.553	44.317	2.354
		2	5.786	2.600	44.355	2.353
		3	5.808	2.589	44.338	2.348
		4	5.818	2.557	44.333	2.349
		5	5.791	2.586	44.322	2.356
		Ave.	5.750	2.577	44.333	2.352
I	Shofu	1				
		2				
		3		NO SAMPLE		
		4				
		5				
		Ave.				
J	S. S. White	1				
		2				
		3		NO SAMPLE		
		4				
		5				
		Ave.				
K	Star	1	5.639	2.247	17.074	1.597
		2	5.674	2.248	17.075	1.593
		3	5.662	2.225	17.079	1.596
		4	5.680	2.234	17.045	1.592
		5	5.666	2.231	17.089	1.592
		Ave.	5.664	2.370	17.072	1.594
L	Teledyne Densco	1	6.501	2.838	44.503	2.340
		2	6.484	2.866	44.528	2.340
		3	6.460	2.873	44.545	2.342
		4	6.497	2.906	44.553	2.348
		5	6.483	2.863	44.532	2.346
		Ave.	6.485	2.869	44.532	2.343
M	Venture Technology	1	7.301	1.201	44.197	2.368
		2	7.344	1.265	44.177	2.365
		3	7.303	1.248	44.202	2.357
		4	7.335	1.269	44.222	2.354
		5	7.307	1.258	44.218	2.362
		Ave.	7.318	1.248	44.203	2.361
N	Vic Pollard	1	6.458	3.632	44.679	2.342
		2	6.454	3.571	44.626	2.336
		3	6.415	3.610	44.623	2.340
		4	6.440	3.623	44.592	2.330
		5	6.401	3.569	44.514	2.336
		Ave.	6.434	3.601	44.607	2.337

A P P E N D I X B:

CONSTRUCTION TEST DATA

APPENDIX B

CONSTRUCTION TEST DATA

Dia. - Diamond Distribution + - Pass - - No Sample
Mat. - Matrix Extension 0 - Fail

			1a		1b		2a		2b		2c		2d		3a		4a		5a	
ID	MANUFACTURER	#	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT
A	Brasseler	1	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+
		3	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+	+	+
		4	+	0	+	+	+	+	+	0	+	+	+	+	+	+	+	+	+	+
		5	+	+	+	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+
B	Diama	1	+	+	+	+	+	+	+	+	+	+	0	0	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	0	0	+	+	+	+	+	+
		3	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+
		4	+	+	+	+	+	+	+	+	+	0	0	+	+	+	+	+	+	+
		5	+	+	+	+	+	+	+	+	+	+	0	0	+	+	+	+	+	+
C	Jaro	1	+	0	+	0	+	+	+	+	+	+	+	+	+	0	+	+	+	0
		2	+	0	+	0	+	+	+	+	+	+	+	+	+	0	+	+	+	0
		3	+	0	+	0	+	+	+	+	+	+	+	+	+	0	+	+	+	0
		4	+	0	+	0	+	+	+	+	+	+	+	+	+	0	+	+	+	0
		5	+	0	+	0	+	+	+	+	+	+	+	+	+	0	+	+	+	0
D	Militex	1	+	+	+	0	-	-	+	+	+	+	+	+	+	0	0	0	+	+
		2	+	+	+	0	-	-	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	0	-	-	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	+	+	0	-	-	+	+	+	+	+	+	+	+	+	+	+	0
		5	+	+	+	0	-	-	+	+	+	+	+	+	+	0	+	+	+	0
E	Premier	1	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
F	Ransom & Randolph	1	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+	+	-	-
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	-	-
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
G	Regency	1	+	0	+	0	+	+	+	+	+	+	+	+	+	0	+	+	-	-
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	-	-
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	-	-
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	-	-
		5	+	0	+	+	+	+	+	+	+	+	+	+	+	0	+	+	-	-
H	Repco	1	+	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0
		2	+	0	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+
		3	+	0	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+	0
		4	+	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5	+	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0

APPENDIX B (Cont'd)

			1a		1b		2a		2b		2c		2d		3a		4a		5a	
ID	MANUFACTURER	#	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT	DIA	MAT
I	Shofu	1	+	0	+	0	+	+	+	+	+	+	+	+	+	0	+	+	-	-
		2	+	+	+	+	+	0	+	+	+	+	+	+	+	0	+	0	-	-
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	0	-	-
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	-	-
		5	+	+	+	0	+	+	+	+	+	+	+	+	+	0	+	+	-	-
J	S. S. White	1	0	+	+	0	0	+	+	+	+	+	+	+	+	+	+	0	-	-
		2	0	0	+	+	+	+	+	+	+	+	+	0	+	+	+	+	-	-
		3	0	0	+	0	+	+	+	+	+	+	+	0	+	+	+	0	-	-
		4	0	+	+	0	+	+	+	+	+	+	+	0	+	+	+	+	-	-
		5	0	+	+	+	0	+	+	+	+	0	+	+	+	+	+	+	-	-
K	Star	1	+	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+	+	+
		3	+	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	0	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+
		5	+	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
L	Teledyne Densco	1	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
M	Venture Technology	1	+	+	0	0	-	-	+	+	+	0	+	+	+	0	+	+	+	+
		2	+	0	+	+	-	-	+	+	0	0	+	+	+	+	+	+	+	0
		3	+	+	+	+	-	-	+	+	+	0	+	+	+	0	+	+	+	0
		4	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	0
		5	+	+	+	+	-	-	+	+	0	0	+	+	+	+	+	+	+	0
N	Vic Pollard	1	0	0	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+
		2	0	0	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+
		3	0	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	0	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5	0	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

A P P E.N D I X C:

SHANK ROUGHNESS TEST DATA

APPENDIX C

SHANK ROUGHNESS TEST DATA
(micro inches)

ID	MANUFACTURER	#	1a	1b	2a	2b	2c	2d	3a	4a	5a
A	Brasseler	1	10	21	16	14	13	22	13	9	14
		2	6	22	18	17	12	17	18	10	18
		3	9	23	19	17	16	18	16	11	13
		4	8	24	19	17	16	20	13	6	16
		5	8	18	22	20	18	22	13	8	14
B	Diamo	1	11	8	13	7	6	11	4	8	4
		2	8	8	10	10	9	7	5	8	6
		3	12	8	9	10	6	10	7	7	6
		4	8	12	9	6	6	10	4	9	3
		5	12	8	9	6	9	8	5	7	5
C	Jaro	1	13	8	26	12	15	6	15	16	28
		2	12	7	27	13	15	9	17	16	23
		3	10	11	26	13	11	7	15	18	27
		4	12	8	24	12	11	8	17	13	28
		5	11	9	24	14	10	11	21	15	28
D	Miltex	1	19	9	-	14	13	15	14	13	18
		2	21	10	-	11	14	17	13	16	22
		3	19	11	-	15	16	18	14	13	19
		4	21	14	-	15	15	14	17	12	21
		5	17	14	-	12	18	18	18	13	22
E	Premier	1	10	13	15	6	8	7	18	9	20
		2	11	17	18	5	6	9	21	7	23
		3	12	18	19	7	8	5	20	6	21
		4	11	16	16	6	10	5	16	6	24
		5	14	14	19	8	10	9	22	7	21
F	Ransom & Randolph	1	17	18	23	18	16	17	19	14	-
		2	21	23	20	19	15	15	15	14	-
		3	21	23	19	23	14	20	17	11	-
		4	16	17	18	23	19	18	17	16	-
		5	22	17	17	17	18	20	14	12	-
G	Regency	1	14	16	16	16	16	14	18	11	-
		2	15	18	19	14	17	12	22	13	-
		3	17	20	14	17	17	15	20	13	-
		4	15	19	17	14	16	11	22	14	-
		5	16	21	18	16	18	13	19	9	-
H	Repco	1	6	8	3	3	4	4	7	4	3
		2	8	4	7	5	4	8	5	4	3
		3	8	4	7	3	7	4	4	6	7
		4	5	4	7	5	5	8	8	6	4
		5	9	4	3	3	7	6	4	7	3

APPENDIX C (Cont'd)

ID	MANUFACTURER	#	1a	1b	2a	2b	2c	2d	3a	4a	5a
I	Shofu	1	4	5	7	4	6	6	6	5	-
		2	4	10	6	7	5	4	10	5	-
		3	3	8	6	6	6	6	5	5	-
		4	5	6	7	4	5	5	6	6	-
		5	3	6	9	5	10	4	6	3	-
J	S. S. White	1	18	12	21	11	23	23	21	23	-
		2	15	16	20	12	19	20	21	17	-
		3	16	15	15	14	20	17	23	23	-
		4	15	17	15	13	24	18	17	17	-
		5	13	15	19	16	23	19	21	19	-
K	Star	1	5	7	18	22	14	19	5	9	10
		2	10	6	18	23	14	23	7	9	5
		3	9	5	19	20	15	25	7	9	9
		4	6	7	18	20	13	21	5	7	10
		5	6	5	18	24	12	21	5	12	5
L	Teledyne Densco	1	13	10	16	16	16	13	15	18	17
		2	9	13	11	15	14	14	11	17	20
		3	12	11	12	12	16	15	12	15	19
		4	10	10	12	18	11	10	15	20	16
		5	13	15	16	17	11	10	10	19	20
M	Venture Technology	1	9	13	-	10	8	7	11	9	5
		2	7	16	-	6	10	6	7	6	5
		3	9	13	-	8	8	9	12	5	6
		4	7	18	-	11	11	8	8	9	10
		5	12	16	-	8	9	5	9	7	5
N	Vic Pollard	1	8	9	19	19	18	13	11	18	8
		2	5	11	18	18	19	19	10	22	9
		3	7	11	20	22	19	11	13	18	7
		4	7	11	18	19	15	13	13	19	6
		5	11	11	18	19	19	19	11	17	7

A P P E N D I X D:

CONCENTRICITY TEST DATA

APPENDIX D
CONCENTRICITY TEST DATA (mm)

A-Brasseler					B-Olama				
Type	#	Neck Runout	Head Runout	Axial Runout	Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.003	0.033	-	1a	1	0.004	0.018	-
	2	0.015	0.030	-		2	0.009	0.016	-
	3	0.014	0.020	-		3	0.006	0.014	-
	4	0.006	0.022	-		4	0.013	0.016	-
	5	0.002	0.016	-		5	0.015	0.017	-
1b	1	0.012	0.013	-	1b	1	0.007	0.032	-
	2	0.005	0.047	-		2	0.002	0.008	-
	3	0.002	0.013	-		3	0.008	0.018	-
	4	0.008	0.018	-		4	0.009	0.016	-
	5	0.011	0.028	-		5	0.008	0.022	-
2a	1	0.003	0.051	-	2a	1	0.012	0.024	-
	2	0.007	0.024	-		2	0.007	0.034	-
	3	0.002	0.022	-		3	0.016	0.038	-
	4	0.003	0.019	-		4	0.006	0.033	-
	5	0.004	0.025	-		5	0.011	0.054	-
2b	1	0.004	0.022	-	2b	1	0.006	0.025	-
	2	0.003	0.032	-		2	0.004	0.037	-
	3	0.004	0.030	-		3	0.008	0.024	-
	4	0.004	0.048	-		4	0.004	0.049	-
	5	0.005	0.017	-		5	0.005	0.055	-
2c	1	0.004	0.013	-	2c	1	0.004	0.029	-
	2	0.000	0.012	-		2	0.008	0.035	-
	3	0.004	0.009	-		3	0.004	0.050	-
	4	0.000	0.010	-		4	0.002	0.045	-
	5	0.006	0.018	-		5	0.007	0.084	-
2d	1	0.009	0.022	-	2d	1	0.009	0.079	-
	2	0.007	0.021	-		2	0.003	0.046	-
	3	0.006	0.016	-		3	0.016	0.050	-
	4	0.003	0.012	-		4	0.006	0.041	-
	5	0.006	0.009	-		5	0.008	0.041	-
3a	1	0.005	0.010	0.030	3a	1	0.007	0.036	0.019
	2	0.006	0.022	0.020		2	0.004	0.036	0.011
	3	0.006	0.016	0.008		3	0.003	0.055	0.012
	4	0.011	0.023	0.015		4	0.005	0.028	0.016
	5	0.011	0.028	0.032		5	0.010	0.026	0.024
4a	1	0.007	0.009	-	4a	1	0.002	0.018	-
	2	0.000	0.009	-		2	0.002	0.021	-
	3	0.000	0.009	-		3	0.001	0.019	-
	4	0.006	0.010	-		4	0.002	0.015	-
	5	0.004	0.005	-		5	0.002	0.010	-

APPENDIX D (Cont'd)

A-Brasseler

Type	#	Neck Runout	Head Runout	Axial Runout
5a	1	0.020	0.033	0.021
	2	0.017	0.033	0.036
	3	0.016	0.036	0.013
	4	0.016	0.046	0.016
	5	0.024	0.001	0.004
	AVE.	0.007	0.021	0.020

B-Olama

Type	#	Neck Runout	Head Runout	Axial Runout
5a	1	0.004	0.036	0.014
	2	0.009	0.030	0.016
	3	0.009	0.031	0.009
	4	0.005	0.041	0.016
	5	0.004	0.014	0.007
	AVE.	0.007	0.033	0.015

C-Jaro

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.004	0.023	-
	2	0.011	0.034	-
	3	0.004	0.027	-
	4	0.000	0.013	-
	5	0.005	0.028	-
1b	1	0.006	0.033	-
	2	0.015	0.033	-
	3	0.010	0.032	-
	4	0.017	0.024	-
	5	0.010	0.024	-
2a	1	0.007	0.032	-
	2	0.012	0.020	-
	3	0.011	0.030	-
	4	0.012	0.015	-
	5	0.009	0.016	-
2b	1	0.003	0.082	-
	2	0.010	0.092	-
	3	0.012	0.054	-
	4	0.012	0.086	-
	5	0.004	0.094	-
2c	1	0.010	0.029	-
	2	0.007	0.023	-
	3	0.008	0.038	-
	4	0.008	0.039	-
	5	0.008	0.047	-
2d	1	0.014	0.082	-
	2	0.007	0.036	-
	3	0.007	0.032	-
	4	0.009	0.045	-
	5	0.008	0.046	-
3a	1	0.016	0.021	0.021
	2	0.028	0.029	0.013
	3	0.006	0.039	0.015
	4	0.011	0.026	0.013
	5	0.012	0.037	0.017

D-Militex

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.020	0.049	-
	2	0.022	0.036	-
	3	0.014	0.022	-
	4	0.024	0.035	-
	5	0.021	0.039	-
1b	1	0.017	0.030	-
	2	0.013	0.038	-
	3	0.008	0.039	-
	4	0.004	0.015	-
	5	0.006	0.007	-
2a	1			-
	2			-
	3	NO SAMPLE		-
	4			-
	5			-
2b	1	0.019	0.020	-
	2	0.030	0.085	-
	3	0.018	0.044	-
	4	0.013	0.015	-
	5	0.010	0.054	-
2c	1	0.009	0.033	-
	2	0.011	0.020	-
	3	0.006	0.034	-
	4	0.015	0.050	-
	5	0.007	0.029	-
2d	1	0.007	0.029	-
	2	0.000	0.041	-
	3	0.009	0.015	-
	4	0.017	0.024	-
	5	0.016	0.027	-
3a	1	0.013	0.030	0.023
	2	0.018	0.023	0.017
	3	0.008	0.030	0.025
	4	0.007	0.024	0.008
	5	0.007	0.031	0.010

APPENDIX D (Cont'd)

C-Jaro

Type	#	Neck Runout	Head Runout	Axial Runout
4a	1	0.011	0.033	-
	2	0.003	0.017	-
	3	0.006	0.029	-
	4	0.010	0.028	-
	5	0.006	0.025	-
5a	1	0.005	0.039	0.018
	2	0.005	0.036	0.026
	3	0.017	0.017	0.011
	4	0.003	0.036	0.011
	5	0.008	0.036	0.023
	AVE.	0.009	0.037	0.017

D-Militex

Type	#	Neck Runout	Head Runout	Axial Runout
4a	1	0.016	0.037	-
	2	0.006	0.008	-
	3	0.005	0.030	-
	4	0.008	0.038	-
	5	0.006	0.008	-
5a	1	0.012	0.026	0.013
	2	0.012	0.032	0.016
	3	0.017	0.018	0.019
	4	0.014	0.037	0.023
	5	0.018	0.022	0.018
	AVE.	0.013	0.031	0.017

E-Premier

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.005	0.027	-
	2	0.003	0.029	-
	3	0.007	0.031	-
	4	0.006	0.020	-
	5	0.007	0.030	-
1b	1	0.003	0.033	-
	2	0.009	0.018	-
	3	0.011	0.028	-
	4	0.009	0.030	-
	5	0.010	0.033	-
2a	1	0.008	0.043	-
	2	0.008	0.023	-
	3	0.003	0.021	-
	4	0.004	0.047	-
	5	0.008	0.048	-
2b	1	0.000	0.024	-
	2	0.002	0.025	-
	3	0.010	0.042	-
	4	0.008	0.047	-
	5	0.005	0.035	-
2c	1	0.000	0.018	-
	2	0.000	0.012	-
	3	0.002	0.011	-
	4	0.004	0.008	-
	5	0.003	0.007	-
2d	1	0.004	0.028	-
	2	0.003	0.023	-
	3	0.000	0.018	-
	4	0.007	0.018	-
	5	0.005	0.019	-

F-Ransom & Randolph

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.007	0.027	-
	2	0.011	0.019	-
	3	0.012	0.031	-
	4	0.014	0.024	-
	5	0.009	0.024	-
1b	1	0.013	0.018	-
	2	0.010	0.027	-
	3	0.000	0.024	-
	4	0.009	0.024	-
	5	0.007	0.021	-
2a	1	0.007	0.034	-
	2	0.008	0.041	-
	3	0.004	0.046	-
	4	0.011	0.019	-
	5	0.000	0.027	-
2b	1	0.010	0.031	-
	2	0.006	0.064	-
	3	0.015	0.028	-
	4	0.004	0.038	-
	5	0.008	0.030	-
2c	1	0.011	0.037	-
	2	0.006	0.017	-
	3	0.008	0.020	-
	4	0.007	0.022	-
	5	0.005	0.066	-
2d	1	0.005	0.022	-
	2	0.004	0.044	-
	3	0.006	0.036	-
	4	0.003	0.014	-
	5	0.004	0.064	-

APPENDIX D (Cont'd)

E-Premier

Type	#	Neck Runout	Head Runout	Axial Runout
3a	1	0.003	0.031	0.021
	2	0.005	0.026	0.021
	3	0.009	0.029	0.009
	4	0.010	0.027	0.010
	5	0.004	0.028	0.017
4a	1	0.009	0.020	-
	2	0.008	0.029	-
	3	0.005	0.041	-
	4	0.006	0.012	-
	5	0.006	0.007	-
5a	1	0.045	0.063	0.012
	2	0.018	0.047	0.015
	3	0.020	0.046	0.013
	4	0.020	0.036	0.010
	5	0.021	0.043	0.015
	AVE.	0.008	0.028	0.014

F-Ransom & Randolph

Type	#	Neck Runout	Head Runout	Axial Runout
3a	1	0.003	0.033	0.030
	2	0.018	0.029	0.035
	3	0.012	0.025	0.033
	4	0.004	0.049	0.020
	5	0.012	0.039	0.015
4a	1	0.009	0.044	-
	2	0.007	0.034	-
	3	0.009	0.028	-
	4	0.006	0.030	-
	5	0.006	0.037	-
5a	1			
	2			
	3	NO SAMPLE		
	4			
	5			
	AVE.	0.008	0.032	0.027

G-Regency

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.024	0.036	-
	2	0.014	0.062	-
	3	0.027	0.059	-
	4	0.017	0.041	-
	5	0.019	0.046	-
1b	1	0.016	0.042	-
	2	0.016	0.024	-
	3	0.011	0.038	-
	4	0.018	0.044	-
	5	0.021	0.048	-
2a	1	0.017	0.026	-
	2	0.036	0.041	-
	3	0.014	0.026	-
	4	0.016	0.023	-
	5	0.014	0.029	-
2b	1	0.009	0.013	-
	2	0.027	0.036	-
	3	0.016	0.019	-
	4	0.019	0.029	-
	5	0.015	0.019	-
2c	1	0.012	0.031	-
	2	0.020	0.029	-
	3	0.004	0.005	-
	4	0.047	0.087	-
	5	0.013	0.047	-

H-Repco

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.010	0.031	-
	2	0.006	0.030	-
	3	0.008	0.033	-
	4	0.007	0.019	-
	5	0.008	0.034	-
1b	1	0.006	0.051	-
	2	0.006	0.034	-
	3	0.012	0.014	-
	4	0.015	0.035	-
	5	0.005	0.026	-
2a	1	0.000	0.019	-
	2	0.003	0.020	-
	3	0.003	0.053	-
	4	0.004	0.022	-
	5	0.003	0.026	-
2b	1	0.000	0.013	-
	2	0.004	0.017	-
	3	0.003	0.022	-
	4	0.003	0.021	-
	5	0.003	0.028	-
2c	1	0.000	0.012	-
	2	0.000	0.013	-
	3	0.006	0.015	-
	4	0.003	0.017	-
	5	0.004	0.015	-

APPENDIX D (Cont'd)

G-Regency

Type	#	Neck Runout	Head Runout	Axial Runout
2d	1	0.007	0.024	-
	2	0.007	0.025	-
	3	0.007	0.025	-
	4	0.014	0.044	-
	5	0.016	0.023	-
3a	1	0.023	0.032	0.024
	2	0.008	0.021	0.018
	3	0.040	0.044	0.037
	4	0.017	0.031	0.012
	5	0.025	0.028	0.018
4a	1	0.007	0.022	-
	2	0.007	0.040	-
	3	0.008	0.047	-
	4	0.000	0.034	-
	5	0.019	0.029	-
5a	1			
	2			
	3	NO SAMPLE		
	4			
	5			
	AVE.	0.017	0.034	0.022

H-Repco

Type	#	Neck Runout	Head Runout	Axial Runout
2d	1	0.003	0.017	-
	2	0.007	0.037	-
	3	0.007	0.019	-
	4	0.008	0.027	-
	5	0.005	0.024	-
3a	1	0.004	0.056	0.020
	2	0.003	0.056	0.015
	3	0.003	0.024	0.013
	4	0.004	0.051	0.031
	5	0.003	0.026	0.016
4a	1	0.000	0.014	-
	2	0.000	0.007	-
	3	0.003	0.010	-
	4	0.010	0.040	-
	5	0.003	0.014	-
5a	1	0.020	0.046	0.023
	2	0.024	0.044	0.021
	3	0.059	0.098	0.013
	4	0.031	0.047	0.027
	5	0.019	0.028	0.012
	AVE.	0.008	0.029	0.019

I-Shotu

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.000	0.009	-
	2	0.002	0.022	-
	3	0.000	0.008	-
	4	0.003	0.027	-
	5	0.000	0.015	-
1b	1	0.006	0.019	-
	2	0.003	0.018	-
	3	0.010	0.024	-
	4	0.005	0.018	-
	5	0.011	0.018	-
2a	1	0.006	0.039	-
	2	0.003	0.025	-
	3	0.005	0.019	-
	4	0.005	0.034	-
	5	0.004	0.029	-
2b	1	0.006	0.015	-
	2	0.003	0.026	-
	3	0.002	0.020	-
	4	0.007	0.020	-
	5	0.007	0.018	-

J-S. S. White

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.019	0.022	-
	2	0.011	0.034	-
	3	0.018	0.053	-
	4	0.021	0.031	-
	5	0.014	0.021	-
1b	1	0.014	0.018	-
	2	0.029	0.037	-
	3	0.021	0.036	-
	4	0.010	0.022	-
	5	0.021	0.034	-
2a	1	0.009	0.023	-
	2	0.000	0.053	-
	3	0.031	0.033	-
	4	0.015	0.022	-
	5	0.004	0.010	-
2b	1	0.007	0.032	-
	2	0.007	0.074	-
	3	0.014	0.018	-
	4	0.008	0.014	-
	5	0.011	0.059	-

APPENDIX D (Cont'd)

I-Shofu

Type	#	Neck Runout	Head Runout	Axial Runout
2c	1	0.004	0.019	-
	2	0.004	0.013	-
	3	0.000	0.015	-
	4	0.003	0.012	-
	5	0.004	0.029	-
2d	1	0.000	0.016	-
	2	0.000	0.012	-
	3	0.003	0.023	-
	4	0.003	0.014	-
	5	0.004	0.013	-
3a	1	0.011	0.018	0.010
	2	0.018	0.031	0.023
	3	0.006	0.014	0.022
	4	0.003	0.015	0.027
	5	0.009	0.026	0.026
4a	1	0.000	0.010	-
	2	0.003	0.014	-
	3	0.000	0.018	-
	4	0.006	0.011	-
	5	0.007	0.008	-
5a	1			
	2			
	3	NO SAMPLE		
	4			
	5			
	AVE.	0.004	0.019	0.022

J-S. S. White

Type	#	Neck Runout	Head Runout	Axial Runout
2c	1	0.009	0.066	-
	2	0.006	0.053	-
	3	0.009	0.026	-
	4	0.005	0.083	-
	5	0.007	0.019	-
2d	1	0.005	0.026	-
	2	0.008	0.014	-
	3	0.011	0.086	-
	4	0.014	0.030	-
	5	0.007	0.059	-
3a	1	0.020	0.050	0.049
	2	0.010	0.020	0.033
	3	0.008	0.013	0.019
	4	0.007	0.020	0.012
	5	0.007	0.043	0.021
4a	1	0.010	0.028	-
	2	0.008	0.034	-
	3	0.010	0.020	-
	4	0.007	0.014	-
	5	0.006	0.010	-
5a	1			
	2			
	3	NO SAMPLE		
	4			
	5			
	AVE.	0.014	0.034	0.027

K-Star

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.006	0.017	-
	2	0.007	0.047	-
	3	0.000	0.016	-
	4	0.000	0.015	-
	5	0.000	0.026	-
1b	1	0.000	0.025	-
	2	0.004	0.032	-
	3	0.005	0.024	-
	4	0.006	0.028	-
	5	0.007	0.042	-
2a	1	0.000	0.018	-
	2	0.000	0.026	-
	3	0.000	0.009	-
	4	0.000	0.025	-
	5	0.000	0.018	-

L-Teledyne Densco

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.011	0.022	-
	2	0.009	0.023	-
	3	0.005	0.017	-
	4	0.008	0.018	-
	5	0.014	0.035	-
1b	1	0.012	0.031	-
	2	0.011	0.032	-
	3	0.015	0.031	-
	4	0.003	0.035	-
	5	0.017	0.048	-
2a	1	0.008	0.012	-
	2	0.008	0.030	-
	3	0.009	0.026	-
	4	0.006	0.031	-
	5	0.006	0.025	-

APPENDIX D (Cont'd)

K-Star

Type	#	Neck Runout	Head Runout	Axial Runout
2b	1	0.006	0.015	-
	2	0.008	0.014	-
	3	0.008	0.025	-
	4	0.004	0.011	-
	5	0.013	0.031	-
2c	1	0.000	0.014	-
	2	0.009	0.030	-
	3	0.000	0.039	-
	4	0.005	0.015	-
	5	0.008	0.048	-
2d	1	0.012	0.030	-
	2	0.005	0.030	-
	3	0.011	0.028	-
	4	0.002	0.020	-
	5	0.002	0.013	-
3a	1	0.012	0.027	0.027
	2	0.016	0.029	0.017
	3	0.003	0.028	0.014
	4	0.002	0.026	0.011
	5	0.005	0.031	0.008
4a	1	0.007	0.011	-
	2	0.000	0.014	-
	3	0.000	0.010	-
	4	0.004	0.018	-
	5	0.007	0.031	-
5a	1	0.026	0.035	0.021
	2	0.016	0.023	0.019
	3	0.011	0.033	0.032
	4	0.017	0.029	0.017
	5	0.028	0.034	0.027
	AVE.	0.006	0.025	0.019

L-Teledyne Densco

Type	#	Neck Runout	Head Runout	Axial Runout
2b	1	0.013	0.029	-
	2	0.006	0.015	-
	3	0.009	0.017	-
	4	0.008	0.013	-
	5	0.000	0.027	-
2c	1	0.016	0.031	-
	2	0.004	0.016	-
	3	0.013	0.021	-
	4	0.016	0.028	-
	5	0.003	0.008	-
2d	1	0.004	0.026	-
	2	0.006	0.018	-
	3	0.008	0.015	-
	4	0.006	0.022	-
	5	0.009	0.034	-
3a	1	0.007	0.023	0.018
	2	0.011	0.037	0.026
	3	0.014	0.026	0.025
	4	0.012	0.026	0.032
	5	0.007	0.027	0.017
4a	1	0.006	0.046	-
	2	0.007	0.023	-
	3	0.008	0.018	-
	4	0.003	0.015	-
	5	0.011	0.028	-
5a	1	0.014	0.047	0.040
	2	0.011	0.033	0.044
	3	0.016	0.035	0.017
	4	0.011	0.042	0.034
	5	0.007	0.049	0.037
	AVE.	0.009	0.027	0.029

M-Venture Technology

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.002	0.020	-
	2	0.006	0.032	-
	3	0.011	0.027	-
	4	0.011	0.036	-
	5	0.009	0.031	-
1b	1	0.014	0.035	-
	2	0.008	0.023	-
	3	0.010	0.031	-
	4	0.012	0.025	-
	5	0.011	0.033	-

N-Vic Pollard

Type	#	Neck Runout	Head Runout	Axial Runout
1a	1	0.006	0.026	-
	2	0.006	0.052	-
	3	0.006	0.027	-
	4	0.004	0.019	-
	5	0.007	0.029	-
1b	1	0.001	0.027	-
	2	0.006	0.019	-
	3	0.009	0.009	-
	4	0.006	0.020	-
	5	0.009	0.028	-

APPENDIX D (Cont'd)

M-Venture Technology					N-Vic Pollard				
Type	#	Neck Runout	Head Runout	Axial Runout	Type	#	Neck Runout	Head Runout	Axial Runout
2a	1				2a	1	0.003	0.008	-
	2					2	0.016	0.028	-
	3		NO SAMPLE			3	0.013	0.021	-
	4					4	0.004	0.016	-
	5					5	0.016	0.031	-
2b	1	0.006	0.050	-	2b	1	0.008	0.030	-
	2	0.002	0.023	-		2	0.004	0.038	-
	3	0.004	0.029	-		3	0.015	0.028	-
	4	0.003	0.053	-		4	0.006	0.064	-
	5	0.016	0.027	-		5	0.010	0.031	-
2c	1	0.013	0.046	-	2c	1	0.006	0.018	-
	2	0.012	0.043	-		2	0.000	0.010	-
	3	0.011	0.031	-		3	0.004	0.009	-
	4	0.005	0.060	-		4	0.004	0.012	-
	5	0.022	0.030	-		5	0.004	0.013	-
2d	1	0.021	0.068	-	2d	1	0.016	0.027	-
	2	0.013	0.023	-		2	0.017	0.024	-
	3	0.005	0.033	-		3	0.009	0.015	-
	4	0.004	0.015	-		4	0.003	0.041	-
	5	0.003	0.016	-		5	0.007	0.029	-
3a	1	0.024	0.046	0.012	3a	1	0.025	0.028	0.018
	2	0.010	' 031	0.015		2	0.017	0.030	0.012
	3	0.024	0.044	0.021		3	0.040	0.044	0.037
	4	0.010	0.026	0.024		4	0.008	0.021	0.018
	5	0.008	0.026	0.021		5	0.023	0.032	0.024
4a	1	0.008	0.026	-	4a	1	0.007	0.031	-
	2	0.006	0.052	-		2	0.004	0.018	-
	3	0.006	0.027	-		3	0.001	0.010	-
	4	0.004	0.019	-		4	0.001	0.014	-
	5	0.007	0.029.	-		5	0.007	0.011	-
5a	1	0.008	0.026	0.018	5a	1	0.021	0.043	0.015
	2	0.021	0.039	0.010		2	0.020	0.036	0.010
	3	0.023	0.050	0.024		3	0.020	0.036	0.013
	4	0.026	0.028	0.017		4	0.018	0.047	0.015
	5	0.008	0.037	0.025		5	0.045	0.063	0.012
	AVE.	0.011	0.034	0.019		AVE.	0.011	0.027	0.017

APPENDIX E:

DURABILITY TEST DATA

APPENDIX E

DURABILITY TEST DATA

Abr. - Abrasive Loss + - Pass - - No Sample
Mat. - Matrix Peel 0 - Fail

			1a		1b		2a		2b		2c		2d		3a		4a		5a	
ID	MANUFACTURER	#	Abr	Mat	Abr	Mat	Abr	Mat	Abr	Mat	Abr	Mat	Abr	Mat	Abr	Mat	Abr	Mat	Abr	Mat
A	Brasseler	1	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
B	Diama	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+
		4	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+
		5	+	+	+	+	0	+	+	+	+	+	+	+	0	+	+	+	+	+
C	Jaro	1	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
D	Militex	1	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
		2	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
		5	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
E	Premier	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
F	Ransom & Randolph	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		2	0	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
G	Regency	1	Broke		+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		2	Broke		+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		3	Broke		+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		4	Broke		+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		5	Broke		+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
H	Repco	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

APPENDIX E (Cont'd)

ID	MANUFACTURER	#	1a Abr	1a Mat	1b Abr	1b Mat	2a Abr	2a Mat	2b Abr	2b Mat	2c Abr	2c Mat	2d Abr	2d Mat	3a Abr	3a Mat	4a Abr	4a Mat	5a Abr	5a Mat
I	Shofu	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
J	S. S. White	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	-	-
		2	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	-	-
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	0	-	-
		4	Broke		+	+	+	+	+	+	+	+	0	+	+	+	+	0	-	-
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	-	-
K	Star	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
L	Teledyne Densco	1	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
M	Venture Technology	1	+	+	+	+	-	-	+	+	+	+	+	+	0	+	+	+	+	+
		2	+	+	+	+	-	-	+	+	+	+	+	+	0	+	+	+	+	+
		3	+	+	+	+	-	-	+	+	+	+	+	+	0	+	+	+	+	+
		4	+	+	+	+	-	-	+	+	+	+	+	+	0	+	+	+	+	+
		5	+	+	+	+	-	-	+	+	+	+	+	+	0	+	+	+	+	+
N	Vic Pollard	1	0	+	+	+	+	+	Broke		+	+	+	+	+	+	+	+	+	+
		2	0	+	+	+	+	+	Broke		+	+	+	+	+	+	+	+	+	+
		3	Broke		+	+	+	+	Broke		+	+	+	+	+	+	+	+	+	+
		4	0	+	+	+	+	+	Broke		+	+	+	+	+	+	+	+	+	+
		5	0	0	+	+	+	+	Broke		+	+	+	+	+	+	+	+	+	+

A P P E N D I X F:

CORROSION TEST DATA

APPENDIX F

CORROSION TEST DATA

+ - No Corrosion
S - < 5% Corrosion
O - > 5% Corrosion

				Chemiclave Cycle										Autoclave Cycle									
ID	MANUFACTURER	Type	#	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
A	Brasseler	1a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
		1b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
		2a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			5	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		2b	1	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		2c	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			4	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O	O	O
		2d	1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
			4	S	S	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
			5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		3a	1	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		4a	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		5a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
8	Diamo	1a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
		1b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
		2a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	0	0
			3	+	+	+	+	+	S	S	S	S	S	0	0	0	0	0	0	0	0	0	0
			4	+	+	+	+	+	+	+	+	S	S	S	S	S	S	0	0	0	0	0	0
			5	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	0	0	0	0
		2b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
		2c	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	0
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
		2d	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		3a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
		4a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		5a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0	0	0
			5	S	S	S	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	Jaro	1a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	S	S	S	0	0	0	0	0	0	0	0	0	0	0	0
			3	+	+	S	S	S	S	S	0	0	0	0	0	0	0	0	0	0	0	0	0
			4	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		1b	1	+	+	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0
			2	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0	0
			4	+	+	+	+	+	+	+	S	S	S	S	S	0	0	0	0	0	0	0	0
			5	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S
		2a	1	+	+	+	+	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0
			2	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0	0
			3	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0
			4	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0
			5	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0
		2b	1	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0	0
			3	+	+	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0	0
			4	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	0	0	0	0	0
			5	+	+	+	+	+	S	S	S	0	0	0	0	0	0	0	0	0	0	0	0
		2c	1	+	+	+	+	+	+	S	S	S	S	S	0	0	0	0	0	0	0	0	0
			2	+	+	+	+	S	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0
			3	+	+	S	S	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0
			4	+	+	+	+	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0
			5	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0	0

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		2d	1	+	+	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0	0
			2	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0	0
			4	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0	0
		3a	1	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S
		4a	1	+	+	+	+	+	S	S	S	0	0	0	0	0	0	0	0	0	0	0	0
			2	+	+	+	+	+	+	+	S	S	S	S	S	S	S	0	0	0	0	0	0
			3	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	S	S	S	S	0	0	0	0	0	0	0	0	0	0	0	0
		5a	1	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
D	Militex	1a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		1b	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
		2a	1																				
			2																				
			3											N O	S A M P L E								
			4																				
			5																				
		2b	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		2c	1	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			2	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		2d	1	+	S	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		3a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	0	0
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
		4a	1	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		5a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
E	Premier	1a	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
		1b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
		2a	1	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		2b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
		2c	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			2	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			5	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S
		2d	1	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	S	S	S	S	S	S	S	+	+	+	+	+	+	S	S	S	S
		3a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
		4a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
		5a	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
F	Ransom & Randolph	1a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
		1b	1	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		2a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			3	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
		2b	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			4	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0
			5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		2c	1	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0
			5	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	[illegible]	S
		2d	1	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			3	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			5	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		3a	1	+	+	S	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			5	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		4a	1	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0
			2	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0
			3	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0
			4	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0
			5	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0	0
		5a	1																				
			2																				
			3											NO SAMPLE									
			4																				
			5																				
G	Regency	1a	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		1b	1	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
		2a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			5	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		2b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			2	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		2c	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		2d	1	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
		3a	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	0	0	0	0	0
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0	0	0	0	0
			5	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0	0	0	0	0
		4a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		5a	1																				
			2																				
			3											N O	S A M P L E								
			4																				
			5																				

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
H	Repco	1a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	0	0	0	0	0
		1b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
		2a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0
			5	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0	0	0	0
		2b	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
		2c	1	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		2d	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		3a	1	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			4	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			5	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0
		4a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		5a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0	0	0
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
1	Shofu	1a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		1b	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
		2a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
		2b	1	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
		2c	1	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		2d	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
		3a	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		4a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5a	1																				
			2																				
			3											NO SAMPLE									
			4																				
			5																				
J	S. S. White	1a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
		1b	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		2a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
		2b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
		2c	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		2d	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		3a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
		4a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
		5a	1																				
			2																				
			3											N O	S A M P L E								
			4																				
			5																				
K	Star	1a	1	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		1b	1	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			3	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2b	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		2c	1	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		2d	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
		3a	1	+	+	S	S	S	S	S	S	S	S	S	0	0	0	0	0	0	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		4a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
		5a	1	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
L	Teledyne Densco	1a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	S	S	S	0	0	0	0	0	0
		1b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0	0	0	0	0
		2a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
		2b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		2c	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
		2d	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		3a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	0	0	0
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	0
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	0	0	0
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	0	0	0
		4a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		5a	1	+	+	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0
			3	+	+	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0
			4	+	+	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0
			5	+	+	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0
M	Venture Technology	1a	1	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S	S
		1b	1	+	+	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	[illegible]	S	S	S	S
		2a	1																				
			2																				
			3											NO SAMPLE									
			4																				
			5																				

APPENDIX F (Cont'd)

ID	MANUFACTURER	Type	#	Chemiclave Cycle 1	2	3	4	5	6	7	8	9	10	Autoclave Cycle 1	2	3	4	5	6	7	8	9	10
		2a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		2b	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0	0
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
		2c	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
		2d	1	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	0	0	0
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
		3a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
		4a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0	0
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	S
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S	S	S	0	0
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	S	S
		5a	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
			5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

A P P E N D I X G:

CUTTING EFFICIENCY TEST DATA

APPENDIX G

CUTTING EFFICIENCY TEST DATA

Type 1a Depth of Cut (mm)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Brasseler	1	9.237	7.459	6.723	6.129	5.546
		2	10.977	10.528	7.530	6.907	6.318
		3	9.354	8.590	7.857	6.696	6.193
		4	9.201	8.284	7.265	6.388	5.975
		5	9.207	8.640	7.335	6.466	5.900
		Ave.	9.595	8.700	7.342	6.517	5.986
B	Diamo	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	31.147	24.795	23.171	21.956	18.939
		4	31.941	15.270	13.572	12.071	10.207
		5	28.180	18.216	16.556	14.946	13.046
		Ave.	30.423	19.427	17.766	16.204	14.064
C	Jaro	1	23.177	21.591	19.993	19.705	17.890
		2	22.854	22.372	19.619	19.185	16.029
		3	26.690	25.740	22.277	21.496	17.268
		4	26.465	25.969	22.756	22.267	18.601
		5	25.465	24.559	21.270	20.533	16.524
		Ave.	24.930	24.046	21.183	20.637	17.262
D	Militex	1	16.172	15.537	14.914	14.291	13.734
		2	14.661	13.868	13.286	12.703	12.252
		3	17.635	17.113	16.411	15.709	15.169
		4	16.925	16.328	15.654	14.982	14.462
		5	15.379	14.610	13.998	13.387	12.914
		Ave.	16.154	15.491	14.853	14.214	13.706
E	Premier	1	27.499	26.644	25.777	25.133	24.875
		2	33.374	32.616	32.006	30.747	30.363
		3	33.280	32.180	31.237	30.161	29.588
		4	32.508	31.625	30.940	30.375	29.904
		5	32.080	31.287	30.790	29.735	29.147
		Ave.	31.748	30.870	30.150	29.230	28.775
F	Ransom & Randolph	1	26.658	26.017	25.394	24.613	24.071
		2	27.417	26.805	26.240	25.581	24.987
		3	27.666	26.822	25.959	25.135	24.274
		4	28.429	27.883	27.349	26.782	26.264
		5	27.259	26.500	25.237	24.874	24.085
		Ave.	27.486	26.805	26.036	25.397	24.736
G	Regency	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	Broke	-	-	-	-
		4	Broke	-	-	-	-
		5	Broke	-	-	-	-
		Ave.	Broke	-	-	-	-

APPENDIX G (Cont'd)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
H	Repco	1	28.560	22.166	19.019	16.085	13.108
		2	27.146	20.664	17.815	15.180	12.502
		3	26.375	20.123	17.236	15.050	12.579
		4	28.733	21.738	18.425	15.325	12.183
		5	31.452	10.837	8.755	7.471	6.175
		Ave.	28.453	19.106	16.250	13.822	11.309
I	Shofu	1	18.951	17.802	14.737	14.019	13.263
		2	20.584	19.247	15.705	15.136	14.315
		3	20.832	19.260	15.893	15.100	14.269
		4	20.329	18.692	15.406	14.633	13.822
		5	17.634	16.406	13.596	12.918	12.225
		Ave.	19.666	18.281	15.067	14.361	13.579
J	S. S. White	1	25.532	23.488	20.427	19.335	15.634
		2	22.348	21.329	18.226	16.160	14.010
		3	25.876	24.063	19.302	15.952	14.305
		4	Broke	-	-	-	-
		5	22.469	21.213	19.180	18.194	15.955
		Ave.	24.056	22.523	19.284	17.410	14.976
K	Star	1	26.964	24.822	20.240	19.417	18.099
		2	27.344	25.172	20.526	19.691	18.354
		3	27.038	24.891	20.296	19.471	18.149
		4	26.598	24.486	19.966	19.154	17.854
		5	32.578	30.070	24.539	23.503	22.029
		Ave.	28.104	25.888	21.113	20.247	18.897
L	Teledyne Densco	1	28.997	27.673	26.784	25.291	22.408
		2	30.992	27.562	26.014	23.388	22.238
		3	27.785	25.787	24.933	23.679	22.660
		4	29.727	27.441	25.072	23.972	23.180
		5	28.041	25.385	24.608	23.447	22.689
		Ave.	29.108	26.810	25.482	23.996	22.635
M	Venture Technology	1	8.248	7.276	7.117	5.663	5.466
		2	8.514	6.636	6.459	3.169	2.948
		3	10.285	8.537	8.331	5.444	5.187
		4	8.202	6.808	6.644	4.340	4.135
		5	8.937	7.418	7.239	4.730	4.506
		Ave.	8.837	7.335	7.158	4.669	4.448
N	Vic Pollard	1	3.105	2.888	2.546	1.490	1.335
		2	5.432	5.106	4.509	2.662	2.391
		3	Broke	-	-	-	-
		4	4.269	3.927	3.458	2.006	1.793
		5	3.816	3.492	3.081	1.788	1.589
		Ave.	4.156	3.853	3.399	1.987	1.777

APPENDIX G (Cont'd)

Type 1b Depth of Cut (mm)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Brasseler	1	7.267	6.795	6.032	5.615	5.211
		2	9.327	8.851	7.619	7.220	6.200
		3	7.260	6.763	6.007	5.619	4.220
		4	9.318	7.584	5.228	3.485	2.896
		5	8.548	7.377	6.414	5.841	5.370
		Ave.	8.344	7.474	6.260	5.556	4.779
B	Diamm	1	23.465	21.271	16.856	15.147	13.772
		2	25.053	22.064	9.162	7.206	6.553
		3	21.941	18.492	13.681	11.178	9.803
		4	27.903	25.205	17.698	16.134	14.904
		5	25.164	22.481	15.915	14.486	13.157
		Ave.	24.705	21.903	14.662	12.830	11.638
C	Jaro	1	26.570	23.761	22.439	21.542	20.756
		2	24.267	22.466	21.101	19.900	18.809
		3	27.864	23.864	21.407	19.666	18.589
		4	26.932	24.857	23.359	22.025	20.801
		5	23.687	22.022	20.686	19.514	18.452
		Ave.	25.864	23.394	21.798	20.529	19.481
D	Militex	1	29.045	24.287	18.476	15.519	14.496
		2	31.712	26.527	20.129	16.879	15.776
		3	30.209	25.264	19.197	16.113	15.055
		4	35.122	28.972	22.325	18.673	17.675
		5	33.919	29.297	24.528	22.118	19.943
		Ave.	32.001	26.869	20.931	17.860	16.589
E	Premier	1	27.586	25.272	23.621	21.721	19.341
		2	27.932	25.931	24.665	23.653	18.402
		3	32.245	27.453	25.670	23.019	19.887
		4	30.079	27.565	25.739	23.640	21.086
		5	32.559	31.074	29.871	28.567	26.870
		Ave.	30.080	27.459	25.913	24.120	21.117
F	Ransom & Randolph	1	25.922	21.699	18.596	15.559	12.369
		2	26.897	22.145	18.841	15.782	12.393
		3	25.882	21.673	18.547	15.482	12.348
		4	26.989	22.664	19.440	16.356	13.175
		5	26.259	21.994	18.814	15.771	12.636
		Ave.	26.370	22.035	18.848	15.790	12.584
G	Regency	1	0.960	0.903	0.858	0.811	0.763
		2	1.226	1.119	1.061	0.999	0.940
		3	0.767	0.727	0.699	0.661	0.623
		4	1.060	0.984	0.934	0.881	0.828
		5	0.808	0.759	0.730	0.690	0.649
		Ave.	0.964	0.898	0.856	0.808	0.761

APPENDIX G (Cont'd)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
H	Repco	1	24.607	21.249	19.860	18.542	15.669
		2	25.896	19.494	18.204	17.123	12.541
		3	23.019	16.487	15.494	14.573	9.319
		4	23.728	18.630	17.439	16.439	12.216
		5	21.562	17.565	16.474	15.554	11.691
		Ave.	23.762	18.685	17.494	16.446	12.287
I	Shofu	1	22.230	17.920	16.359	15.059	14.362
		2	20.118	16.119	14.705	13.532	12.899
		3	20.368	16.227	14.795	13.607	12.967
		4	24.343	20.255	18.999	17.893	17.058
		5	24.118	18.669	16.492	14.931	14.104
		Ave.	22.235	17.838	16.270	15.004	14.278
J	S. S. White	1	0.851	0.839	0.831	0.766	0.732
		2	0.865	0.841	0.827	0.783	0.754
		3	1.043	1.009	0.998	0.890	0.827
		4	0.843	0.828	0.817	0.779	0.743
		5	1.155	1.130	1.102	1.069	0.945
		Ave.	0.951	0.929	0.915	0.857	0.800
K	Star	1	25.039	16.607	14.452	13.235	10.215
		2	27.318	19.803	17.491	15.507	9.952
		3	28.778	23.299	20.862	18.652	8.847
		4	29.080	15.601	12.653	11.615	8.590
		5	28.336	23.486	21.482	18.307	13.041
		Ave.	27.710	19.759	17.388	15.463	10.129
L	Teledyne Densco	1	25.188	24.120	21.062	19.015	17.950
		2	32.537	28.417	27.330	25.253	24.154
		3	30.421	27.278	24.230	23.153	22.012
		4	25.182	24.087	22.029	19.994	18.920
		5	27.269	26.158	24.106	21.051	19.997
		Ave.	28.119	26.012	23.751	21.693	20.607
M	Venture Technology	1	14.804	14.061	8.990	8.383	8.243
		2	12.953	12.145	9.553	9.147	9.065
		3	13.648	12.931	8.241	7.681	7.552
		4	15.743	15.206	7.024	6.181	6.032
		5	14.333	13.543	8.627	8.039	7.903
		Ave.	14.296	13.577	8.487	7.886	7.759
N	Vic Pollard	1	0.884	0.720	0.621	0.575	0.522
		2	0.938	0.769	0.666	0.619	0.563
		3	0.526	0.421	0.358	0.337	0.295
		4	0.991	0.823	0.723	0.664	0.605
		5	1.372	1.056	0.933	0.871	0.754
		Ave.	0.942	0.758	0.660	0.613	0.548

APPENDIX G (Cont'd)

Type 2a Depth of Cut (mm)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Brasseler	1	0.994	0.912	0.891	0.859	0.796
		2	1.038	0.803	0.788	0.766	0.710
		3	1.363	1.126	1.085	1.050	0.883
		4	1.124	1.025	1.013	0.969	0.879
		5	0.977	0.861	0.829	0.798	0.718
		Ave.	1.099	0.945	0.921	0.888	0.797
B	Diamo	1	1.030	0.982	0.929	0.815	0.718
		2	1.739	1.689	1.589	1.519	1.143
		3	0.964	0.917	0.840	0.776	0.653
		4	1.179	1.075	0.985	0.919	0.818
		5	1.063	0.987	0.951	0.912	0.834
		Ave.	1.195	1.130	1.059	0.988	0.833
C	Jaro	1	6.827	4.605	3.116	2.825	2.616
		2	5.992	3.767	2.877	2.264	1.980
		3	6.002	4.395	3.479	2.791	2.205
		4	6.858	3.756	3.149	2.404	2.132
		5	7.108	4.280	3.109	2.651	2.229
		Ave.	6.557	4.161	3.146	2.587	2.232
D	Miltex	1					
		2					
		3			NO SAMPLE		
		4					
		5					
		Ave.					
E	Premier	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	Broke	-	-	-	-
		4	Broke	-	-	-	-
		5	Broke	-	-	-	-
		Ave.	Broke	-	-	-	-
F	Ransom & Randolph	1	8.236	5.092	4.052	3.005	1.941
		2	8.405	5.282	4.251	3.136	1.967
		3	8.468	5.282	4.326	3.279	2.197
		4	8.129	5.111	4.069	3.033	1.976
		5	Broke	-	-	-	-
		Ave.	8.310	5.212	4.175	3.113	2.020
G	Regency	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	6.052	4.973	4.115	3.342	2.479
		4	5.895	4.889	3.863	3.293	2.804
		5	5.260	4.731	4.304	3.383	2.509
		Ave.	5.736	4.864	4.094	3.339	2.597

APPENDIX G (Cont'd)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
H	Repco	1	8.539	6.655	4.835	4.138	2.675
		2	8.375	5.761	4.610	3.642	2.959
		3	7.123	5.036	4.283	3.247	2.245
		4	8.906	6.797	4.765	3.486	2.503
		5	7.699	6.093	4.683	3.464	2.781
		Ave.	8.128	6.068	4.635	3.595	2.633
I	Shofu	1	8.976	5.992	4.785	3.796	2.837
		2	7.624	4.935	3.622	3.119	2.701
		3	8.203	5.981	5.226	4.701	4.192
		4	8.631	5.023	4.183	3.359	2.743
		5	8.658	5.390	4.340	3.311	2.740
		Ave.	8.418	5.464	4.431	3.657	3.043
J	S. S. White	1	0.871	0.778	0.713	0.640	0.620
		2	0.903	0.868	0.848	0.798	0.751
		3	0.922	0.880	0.858	0.799	0.749
		4	0.687	0.653	0.608	0.551	0.525
		5	0.793	0.718	0.669	0.618	0.602
		Ave.	0.835	0.779	0.739	0.681	0.649
K	Star	1	Broke	-	-	-	-
		2	9.035	7.270	6.403	5.831	5.445
		3	7.506	6.825	6.467	6.176	5.945
		4	8.212	6.747	6.093	5.619	5.249
		5	Broke	-	-	-	-
		Ave.	8.251	6.947	6.321	5.875	5.546
L	Teledyne Densco	1	11.486	9.149	7.058	6.010	5.981
		2	8.113	8.020	6.952	4.918	4.868
		3	9.169	8.014	6.963	5.919	4.852
		4	11.287	9.987	7.922	6.897	4.843
		5	9.154	7.006	5.952	4.902	3.848
		Ave.	9.842	8.435	6.969	5.729	4.878
M	Venture Technology	1					
		2					
		3			NO SAMPLE		
		4					
		5					
		Ave.					
N	Vic Pollard	1	3.269	2.844	2.484	1.863	1.667
		2	4.281	3.811	3.382	2.483	2.098
		3	5.002	4.301	3.701	2.801	2.651
		4	3.763	3.161	2.709	1.919	1.731
		5	5.248	4.618	3.884	2.729	2.519
		Ave.	4.313	3.747	3.232	2.359	2.133

APPENDIX G (Cont'd)

Type 2b Depth of Cut (mm)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Brasseler	1	1.583	1.503	1.361	1.315	1.217
		2	1.068	1.001	0.967	0.930	0.896
		3	1.148	1.071	1.033	0.935	0.905
		4	1.092	1.031	0.971	0.940	0.890
		5	1.535	1.346	1.286	1.212	1.152
		Ave.	1.285	1.190	1.124	1.066	1.012
B	Diamo	1	1.155	0.919	0.886	0.831	0.732
		2	1.151	0.925	0.885	0.779	0.694
		3	1.064	0.868	0.842	0.726	0.611
		4	1.591	1.225	1.098	0.962	0.832
		5	1.401	1.259	1.231	1.139	1.081
		Ave.	1.272	1.039	0.988	0.887	0.790
C	Jaro	1	6.125	3.870	3.454	2.921	2.459
		2	5.776	4.036	3.464	2.999	2.208
		3	6.132	4.149	3.087	2.504	1.872
		4	5.191	3.928	3.266	2.886	2.019
		5	6.013	4.019	3.516	3.069	2.558
		Ave.	5.847	4.000	3.357	2.876	2.223
D	Miltex	1	4.821	4.424	4.132	3.727	3.520
		2	4.832	4.354	3.940	3.622	3.334
		3	4.331	3.762	3.158	2.778	2.594
		4	4.196	3.575	2.895	2.638	2.259
		5	5.181	4.487	3.742	3.278	3.070
		Ave.	4.672	4.120	3.573	3.209	2.955
E	Premier	1	8.343	6.479	5.296	4.349	4.031
		2	9.839	6.055	4.931	4.222	3.795
		3	8.667	6.473	5.228	4.435	3.868
		4	8.380	5.876	4.619	4.007	3.696
		5	8.803	6.209	5.008	4.224	3.821
		Ave.	8.806	6.218	5.016	4.247	3.842
F	Ransom & Randolph	1	8.150	6.544	5.468	4.221	3.071
		2	8.179	6.686	5.617	4.560	3.217
		3	7.891	6.413	5.365	4.284	3.190
		4	7.711	6.258	5.199	4.127	3.010
		5	7.680	6.226	5.168	4.115	3.014
		Ave.	7.922	6.425	5.363	4.261	3.100
G	Regency	1	4.326	3.388	2.952	2.705	2.551
		2	5.226	3.389	2.715	2.329	2.048
		3	4.811	3.670	3.085	2.767	2.454
		4	5.319	3.626	2.794	2.606	2.259
		5	3.914	2.514	2.086	1.825	1.684
		Ave.	4.719	3.317	2.726	2.446	2.199

APPENDIX G (Cont'd)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
H	Repco	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	Broke	-	-	-	-
		4	Broke	-	-	-	-
		5	Broke	-	-	-	-
		Ave.	Broke	-	-	-	-
I	Shofu	1	7.108	5.610	4.830	4.120	3.198
		2	8.168	5.658	4.788	4.239	3.465
		3	7.934	5.308	4.955	4.654	3.720
		4	7.787	6.430	6.110	5.795	4.932
		5	8.043	5.855	5.189	4.772	3.846
		Ave.	7.808	5.772	5.174	4.716	3.832
J	S. S. White	1	2.986	2.905	2.714	2.607	2.473
		2	3.137	3.050	2.958	2.711	2.375
		3	2.123	2.075	1.991	1.828	1.658
		4	2.625	2.591	2.461	2.254	2.105
		5	2.292	2.232	2.098	1.931	1.840
		Ave.	2.633	2.571	2.444	2.266	2.090
K	Star	1	8.446	6.724	6.007	4.798	4.239
		2	9.936	7.637	6.797	5.421	4.816
		3	7.853	5.975	5.357	4.502	3.849
		4	8.150	6.433	5.719	4.550	4.028
		5	7.222	5.731	5.100	4.071	3.604
		Ave.	8.241	6.500	5.796	4.668	4.107
L	Teledyne Densco	1	10.312	7.146	6.108	5.083	3.052
		2	8.408	7.181	6.141	5.124	4.014
		3	7.308	6.114	5.062	4.042	3.996
		4	8.536	6.232	5.106	4.092	2.051
		5	10.457	9.203	7.109	5.056	3.027
		Ave.	9.004	7.175	5.905	4.679	3.228
M	Venture Technology	1	8.020	5.841	4.706	4.183	3.764
		2	7.635	6.283	5.055	4.253	3.873
		3	7.555	6.293	5.197	4.344	3.610
		4	7.213	5.862	3.956	3.115	2.410
		5	7.628	5.838	4.933	4.105	3.688
		Ave.	7.610	6.023	4.769	4.000	3.469
N	Vic Pollard	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	Broke	-	-	-	-
		4	Broke	-	-	-	-
		5	Broke	-	-	-	-
		Ave.	Broke	-	-	-	-

APPENDIX G (Cont'd)

Type 2c Depth of Cut (mm)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Brasseler	1	1.633	1.482	1.289	1.198	1.073
		2	1.434	1.360	1.250	1.151	1.067
		3	1.301	1.162	1.042	0.986	0.833
		4	1.624	1.458	1.357	1.154	1.020
		5	1.123	1.063	0.977	0.901	0.844
		Ave.	1.423	1.305	1.183	1.078	0.967
B	Diama	1	2.219	1.825	1.486	1.359	1.259
		2	2.126	1.781	1.459	1.328	1.227
		3	3.180	2.017	1.535	1.184	1.071
		4	3.611	3.079	1.462	1.216	1.053
		5	2.455	1.859	1.551	1.269	1.173
		Ave.	2.718	2.112	1.499	1.271	1.157
C	Jaro	1	7.519	4.733	3.694	3.350	3.137
		2	7.724	4.582	4.090	3.675	3.464
		3	8.428	4.847	3.707	3.402	3.114
		4	6.559	4.345	3.616	3.331	3.079
		5	6.557	4.775	3.918	3.288	2.701
		Ave.	7.357	4.656	3.805	3.409	3.099
D	Militex	1	6.002	4.917	3.990	3.661	2.932
		2	5.939	4.832	4.053	3.649	3.124
		3	5.435	4.422	3.706	3.333	2.843
		4	6.466	5.236	4.386	3.941	3.379
		5	5.954	5.414	4.718	4.258	3.383
		Ave.	5.959	4.964	4.171	3.768	3.132
E	Premier	1	9.484	7.391	5.859	5.229	5.528
		2	9.665	7.153	6.116	5.487	4.806
		3	9.393	6.470	5.512	5.214	4.468
		4	9.514	7.005	5.829	5.310	4.601
		5	9.445	6.997	6.036	5.423	4.882
		Ave.	9.500	7.003	5.870	5.333	4.857
F	Ransom & Randolph	1	8.672	6.469	5.381	4.199	3.018
		2	8.332	6.233	5.174	4.061	2.942
		3	8.230	6.167	5.046	3.954	2.819
		4	8.422	6.333	5.250	4.135	2.999
		5	8.586	6.504	5.451	4.086	2.848
		Ave.	8.448	6.341	5.260	4.087	2.925
G	Regency	1	5.732	4.476	3.793	3.198	2.444
		2	4.999	3.984	3.662	2.790	2.293
		3	5.664	3.996	3.341	2.640	2.052
		4	4.726	3.834	3.391	2.845	2.543
		5	5.230	4.080	3.465	2.913	2.235
		Ave.	5.270	4.074	3.530	2.877	2.313

APPENDIX G (Cont'd)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
H	Repco	1	5.582	4.789	3.846	2.897	2.334
		2	6.638	6.146	4.770	2.325	2.110
		3	6.033	5.116	4.049	2.975	2.289
		4	6.746	5.611	4.323	3.589	3.279
		5	4.852	3.895	2.772	2.114	1.901
		Ave.	5.970	5.111	3.952	2.780	2.383
I	Shofu	1	7.305	5.043	4.384	3.618	3.375
		2	8.553	6.446	5.895	5.241	4.848
		3	9.025	6.609	5.330	4.007	3.736
		4	9.065	6.833	6.167	5.315	4.586
		5	7.048	5.871	4.951	4.230	3.986
		Ave.	8.199	6.160	5.345	4.482	4.106
J	S. S. White	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	Broke	-	-	-	-
		4	Broke	-	-	-	-
		5	Broke	-	-	-	-
		Ave.	Broke	-	-	-	-
K	Star	1	10.263	7.378	6.341	5.393	4.630
		2	8.251	5.930	5.074	4.307	3.724
		3	9.658	6.990	5.969	5.070	4.651
		4	Broke	-	-	-	-
		5	8.892	6.298	4.969	4.055	3.764
		Ave.	9.266	6.649	5.588	4.706	4.192
L	Teledyne Densco	1	8.253	6.197	4.172	3.131	1.992
		2	10.238	8.168	7.139	5.095	3.026
		3	9.239	8.122	7.096	4.068	3.008
		4	8.226	6.146	5.054	3.021	1.956
		5	6.211	5.123	3.053	2.031	1.959
		Ave.	8.433	6.751	5.303	3.469	2.388
M	Venture Technology	1	8.375	6.327	5.688	5.352	4.921
		2	8.334	6.296	5.661	5.326	4.897
		3	7.955	6.226	5.523	4.976	4.365
		4	9.259	6.938	6.197	5.859	5.366
		5	7.223	5.524	4.946	4.670	4.279
		Ave.	8.229	6.262	5.603	5.237	4.766
N	Vic Pollard	1	1.405	1.373	1.190	1.173	1.163
		2	0.923	0.877	0.748	0.729	0.683
		3	1.879	1.804	1.541	1.484	1.466
		4	1.563	1.469	1.391	1.344	1.266
		5	1.014	0.933	0.892	0.842	0.741
		Ave.	1.357	1.291	1.152	1.114	1.064

APPENDIX G (Cont'd)

Type 2d Depth of Cut (mm)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Brasseler	1	1.521	1.039	0.864	0.807	0.722
		2	1.288	1.047	0.983	0.864	0.757
		3	1.281	1.120	0.976	0.875	0.763
		4	1.075	0.855	0.782	0.731	0.685
		5	1.221	0.989	0.830	0.765	0.695
		Ave.	1.277	1.010	0.887	0.808	0.724
B	Diamo	1	2.045	1.788	1.275	1.061	0.953
		2	3.121	2.103	1.663	1.477	1.254
		3	2.801	1.988	1.657	1.355	1.201
		4	3.614	2.121	1.913	1.737	1.555
		5	2.206	1.731	1.582	1.271	0.974
		Ave.	2.757	1.946	1.618	1.380	1.187
C	Jaro	1	7.957	6.402	5.369	4.404	3.558
		2	8.211	5.894	4.647	3.586	2.931
		3	8.827	6.802	6.053	5.164	4.508
		4	8.502	6.341	5.668	4.954	4.471
		5	8.366	6.158	4.798	4.058	3.522
		Ave.	8.373	6.319	5.307	4.433	3.798
D	Militex	1	2.098	1.773	1.690	1.383	1.206
		2	1.901	1.727	1.586	1.390	1.214
		3	2.268	2.141	1.890	1.396	1.313
		4	1.742	1.514	1.438	1.285	1.190
		5	1.909	1.680	1.563	1.401	1.162
		Ave.	1.984	1.767	1.633	1.371	1.217
E	Premier	1	8.611	7.054	6.212	5.236	5.012
		2	Broke	-	-	-	-
		3	8.894	7.236	5.985	5.132	4.771
		4	9.015	6.824	5.824	5.024	4.503
		5	9.073	6.854	5.644	4.673	4.032
		Ave.	8.898	6.992	5.916	5.016	4.580
F	Ransom & Randolph	1	8.430	6.092	5.006	3.968	1.954
		2	8.355	5.975	4.938	3.897	1.848
		3	8.542	6.037	4.967	3.903	1.874
		4	8.198	5.786	4.742	3.716	1.700
		5	8.496	5.969	4.970	3.892	1.877
		Ave.	8.404	5.972	4.925	3.875	1.851
G	Regency	1	3.779	3.245	2.970	2.546	2.013
		2	Broke	-	-	-	-
		3	3.830	3.226	2.963	2.622	2.462
		4	4.816	3.438	2.859	2.322	2.067
		5	4.776	3.430	2.789	2.315	2.111
		Ave.	4.300	3.335	2.895	2.451	2.163

APPENDIX G (Cont'd)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
H	Repco	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	Broke	-	-	-	-
		4	Broke	-	-	-	-
		5	Broke	-	-	-	-
		Ave.	Broke	-	-	-	-
I	Shotu	1	7.005	5.937	4.481	4.124	3.728
		2	8.502	6.937	5.480	4.574	3.270
		3	7.368	6.140	4.955	4.188	3.284
		4	8.578	6.704	5.216	4.322	3.808
		5	7.888	6.058	4.343	3.727	3.292
		Ave.	7.868	6.355	4.895	4.187	3.476
J	S. S. White	1	2.489	2.386	2.262	2.059	1.806
		2	2.061	1.886	1.849	1.764	1.613
		3	1.939	1.793	1.727	1.593	1.347
		4	2.311	2.112	2.047	1.903	1.382
		5	2.021	1.636	1.601	1.467	1.238
		Ave.	2.164	1.963	1.897	1.757	1.477
K	Star	1	Broke	-	-	-	-
		2	7.860	5.07[illegible]	4.118	3.324	3.048
		3	Broke	-	-	-	-
		4	9.002	5.647	4.466	3.632	3.096
		5	Broke	-	-	-	-
		Ave.	8.431	5.362	4.292	3.478	3.072
L	Teledyne Densco	1	6.430	5.339	4.316	3.196	2.102
		2	9.406	7.359	6.346	4.319	4.279
		3	8.405	7.366	6.338	5.314	3.249
		4	8.416	6.344	5.334	3.309	2.228
		5	9.414	8.294	7.283	6.252	5.188
		Ave.	8.414	6.940	5.923	4.478	3.409
M	Venture Technology	1	4.787	3.383	2.593	1.851	1.628
		2	4.467	3.452	2.557	1.756	1.603
		3	4.860	3.293	2.877	2.207	1.884
		4	4.906	2.685	2.351	1.919	1.717
		5	4.041	3.038	2.454	1.847	1.434
		Ave.	4.612	3.170	2.566	1.916	1.653
N	Vic Pollard	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	Broke	-	-	-	-
		4	Broke	-	-	-	-
		5	Broke	-	-	-	-
		Ave.	Broke	-	-	-	-

APPENDIX G (Cont'd)

Type 3a Depth of Cut (mm)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Brasseler	1	1.038	0.928	0.807	0.773	0.759
		2	1.399	1.185	0.845	0.774	0.762
		3	1.451	1.315	1.187	1.138	1.116
		4	1.471	1.295	1.074	1.015	0.999
		5	1.458	1.284	1.065	1.007	0.991
		Ave.	1.363	1.201	0.996	0.941	0.925
B	Diamo	1	1.287	0.998	0.816	0.767	0.692
		2	1.092	0.972	0.877	0.779	0.699
		3	1.067	0.892	0.768	0.701	0.628
		4	1.398	1.119	0.937	0.868	0.781
		5	0.998	0.861	0.764	0.677	0.612
		Ave.	1.168	0.968	0.832	0.758	0.682
C	Jaro	1	18.205	13.601	11.908	10.210	9.264
		2	16.341	13.473	12.575	11.651	11.018
		3	16.705	12.634	11.076	9.513	8.642
		4	19.569	13.104	10.385	7.662	6.251
		5	17.303	12.755	11.143	9.526	8.626
		Ave.	17.625	13.113	11.417	9.712	8.760
D	Miltex	1	1.356	1.188	1.150	1.032	0.841
		2	1.127	1.022	0.924	0.821	0.743
		3	1.164	0.805	0.767	0.726	0.623
		4	1.135	0.994	0.949	0.914	0.844
		5	1.088	0.947	0.845	0.798	0.710
		Ave.	1.174	0.969	0.927	0.858	0.752
E	Premier	1	33.962	32.833	31.586	29.375	27.269
		2	29.171	26.286	24.947	22.563	20.479
		3	34.037	32.961	28.952	22.072	18.379
		4	31.390	28.182	26.806	24.350	22.138
		5	28.892	27.879	24.660	19.170	16.146
		Ave.	31.490	29.628	27.390	23.506	20.882
F	Ransom & Randolph	1	17.675	13.646	11.566	8.548	5.527
		2	18.750	12.720	10.679	9.653	6.632
		3	17.773	15.742	13.707	10.689	6.668
		4	19.682	14.660	10.625	8.606	7.588
		5	16.646	13.624	11.585	7.519	5.552
		Ave.	18.105	14.078	11.632	9.003	6.393
G	Regency	1	1.620	1.540	1.427	1.128	1.100
		2	1.339	1.279	1.162	0.944	0.917
		3	1.115	1.071	0.962	0.799	0.771
		4	1.449	1.384	1.257	1.022	0.992
		5	1.198	1.144	1.039	0.844	0.820
		Ave.	1.344	1.284	1.169	0.947	0.920

APPENDIX G (Cont'd)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
H	Repco	1	21.216	19.759	19.330	17.206	16.994
		2	19.572	18.629	18.383	16.761	16.565
		3	23.465	22.105	21.631	19.283	19.048
		4	23.433	21.567	21.093	18.748	18.513
		5	19.396	17.806	17.239	14.950	14.756
		Ave.	21.416	19.973	19.535	17.390	17.175
I	Shofu	1	29.571	20.318	17.914	15.820	7.422
		2	30.744	25.249	21.857	20.322	15.093
		3	27.784	22.387	18.827	15.576	10.784
		4	32.784	26.007	21.667	17.636	12.064
		5	31.953	21.906	19.502	17.408	12.978
		Ave.	30.567	23.173	19.953	17.352	11.668
J	S. S. White	1	1.341	1.136	1.121	1.032	0.951
		2	1.196	1.067	1.048	0.975	0.930
		3	1.114	1.017	1.006	0.934	0.907
		4	1.165	1.081	1.063	0.942	0.909
		5	1.331	1.019	1.007	0.919	0.844
		Ave.	1.235	1.064	1.049	0.960	0.908
K	Star	1	17.669	16.650	16.165	15.717	13.635
		2	19.508	18.418	17.703	16.938	15.432
		3	16.504	15.490	14.969	14.250	12.954
		4	18.434	17.211	16.632	15.816	14.385
		5	18.586	17.257	16.578	15.850	14.409
		Ave.	18.140	17.005	16.409	15.714	14.163
L	Teledyne Densco	1	31.336	28.102	25.071	23.009	21.974
		2	33.299	30.144	27.050	23.962	20.883
		3	28.316	26.188	23.119	21.936	19.856
		4	29.296	27.226	22.190	20.103	17.036
		5	30.265	26.196	24.146	19.976	17.918
		Ave.	30.502	27.571	24.315	21.797	19.533
M	Venture Technology	1	4.242	4.047	3.438	2.632	2.547
		2	4.785	4.603	3.929	3.019	2.924
		3	4.514	4.323	3.681	2.823	2.733
		4	5.005	4.730	4.029	3.078	2.978
		5	3.918	3.792	3.211	2.450	2.370
		Ave.	4.493	4.299	3.657	2.800	2.710
N	Vic Pollard	1	17.463	15.891	13.621	11.526	10.652
		2	19.684	17.125	14.566	12.204	11.219
		3	18.711	15.904	13.098	11.039	8.794
		4	20.225	16.382	14.359	11.731	8.873
		5	14.718	13.094	11.186	9.419	7.948
		Ave.	18.160	15.679	13.366	11.184	9.497

APPENDIX G (Cont'd)

Type 4a Depth of Cut (mm)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Brasseler	1	1.413	1.291	1.051	0.886	0.843
		2	1.222	1.130	1.007	0.950	0.892
		3	1.276	1.203	0.963	0.911	0.820
		4	0.959	0.878	-0.705	0.624	0.595
		5	1.113	0.974	0.865	0.731	0.693
		Ave.	1.197	1.095	0.918	0.820	0.769
B	Diamm	1	0.615	0.492	0.455	0.402	0.358
		2	0.887	0.712	0.669	0.575	0.479
		3	0.902	0.761	0.665	0.576	0.486
		4	0.632	0.506	0.471	0.413	0.357
		5	0.914	0.736	0.689	0.604	0.544
		Ave.	0.790	0.641	0.590	0.514	0.445
C	Jaro	1	6.399	4.212	3.428	3.141	2.855
		2	6.672	4.710	3.725	3.339	2.883
		3	5.665	4.356	3.600	3.070	2.543
		4	6.686	4.440	3.701	3.380	3.043
		5	6.493	4.568	3.743	3.422	3.223
		Ave.	6.383	4.457	3.639	3.270	2.909
D	Militex	1	0.985	0.897	0.838	0.809	0.607
		2	1.255	1.131	1.067	1.018	0.883
		3	0.925	0.866	0.832	0.788	0.718
		4	1.277	1.200	1.122	1.067	0.949
		5	1.079	1.037	0.963	0.920	0.770
		Ave.	1.104	1.026	0.964	0.920	0.785
E	Premier	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	8.237	6.203	5.747	5.505	5.163
		4	Broke	-	-	-	-
		5	Broke	-	-	-	-
		Ave.	8.237	6.203	5.747	5.505	5.163
F	Ransom & Randolph	1	6.851	5.818	3.800	1.773	0.745
		2	7.041	5.993	3.976	1.923	0.819
		3	6.952	5.854	3.825	1.790	0.744
		4	7.300	6.268	4.193	2.158	1.111
		5	7.147	6.091	4.067	1.983	0.932
		Ave.	7.058	6.005	3.972	1.925	0.870
G	Regency	1	6.207	4.817	4.167	3.830	3.551
		2	6.961	3.883	3.166	2.991	2.091
		3	Broke	-	-	-	-
		4	7.021	4.141	2.926	2.714	2.475
		5	7.199	4.607	2.642	2.081	1.840
		Ave.	6.847	4.362	3.225	2.904	2.489

APPENDIX G (Cont'd)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
H	Repco	1	Broke	-	-	-	-
		2	Broke	-	-	-	-
		3	Broke	-	-	-	-
		4	Broke	-	-	-	-
		5	Broke	-	-	-	-
		Ave.	Broke	-	-	-	-
I	Shofu	1	7.857	3.712	2.576	2.138	1.783
		2	7.406	4.688	3.920	3.091	2.634
		3	8.426	6.353	5.116	3.957	2.863
		4	7.758	5.361	4.692	4.008	3.400
		5	8.011	6.007	4.838	3.747	2.722
		Ave.	7.892	5.224	4.228	3.388	2.680
J	S. S. White	1	1.895	1.691	1.624	1.367	1.271
		2	2.630	2.529	2.485	1.615	1.248
		3	2.474	2.308	2.246	1.858	1.664
		4	1.937	1.839	1.775	1.554	1.371
		5	1.645	1.559	1.507	1.296	1.198
		Ave.	2.116	1.985	1.927	1.538	1.350
K	Star	1	8.454	6.658	5.789	4.918	4.635
		2	Broke	-	-	-	-
		3	Broke	-	-	-	-
		4	9.422	7.491	6.787	6.124	5.361
		5	Broke	-	-	-	-
		Ave.	8.938	7.075	6.288	5.521	4.998
L	Teledyne Densco	1	8.575	7.510	6.466	5.425	4.395
		2	9.546	7.446	6.429	4.406	3.386
		3	7.554	5.505	4.461	3.434	3.366
		4	7.526	6.469	5.454	4.416	4.383
		5	8.556	7.522	6.501	5.460	4.441
		Ave.	8.351	6.890	5.862	4.628	3.994
M	Venture Technology	1	5.700	5.069	3.934	3.647	3.509
		2	5.145	3.977	2.657	2.195	2.108
		3	4.945	4.302	2.325	1.449	1.383
		4	4.822	2.559	1.712	1.490	1.432
		5	6.120	4.834	1.893	1.580	1.403
		Ave.	5.346	4.148	2.504	2.012	1.967
N	Vic Pollard	1	6.783	4.205	3.866	3.120	2.442
		2	4.096	2.662	2.458	1.924	1.556
		3	5.984	3.531	3.291	2.573	1.974
		4	6.325	3.669	4.545	2.657	1.961
		5	5.690	3.471	2.902	2.286	1.934
		Ave.	5.776	3.508	3.412	2.512	1.973

APPENDIX G (Cont'd)

Type 5a Depth of Cut (mm)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Brasseler	1	1.804	1.778	1.650	1.581	1.475
		2	1.600	1.577	1.421	1.327	1.229
		3	2.085	2.039	1.809	1.667	1.220
		4	1.787	1.765	1.565	1.412	1.213
		5	1.597	1.562	1.387	1.334	1.238
		Ave.	1.775	1.744	1.566	1.464	1.275
B	Diamo	1	1.273	1.241	1.186	1.095	1.082
		2	1.008	0.983	0.943	0.842	0.836
		3	1.059	1.036	0.991	0.943	0.928
		4	1.383	1.341	1.281	1.166	1.152
		5	1.195	1.171	1.126	1.046	1.034
		Ave.	1.184	1.154	1.105	1.018	1.006
C	Jaro	1	13.764	9.708	8.898	7.779	7.063
		2	16.832	11.043	10.026	8.247	7.263
		3	15.268	10.635	9.735	8.496	7.706
		4	13.803	10.110	9.402	8.603	7.862
		5	16.657	11.430	10.446	9.096	8.236
		Ave.	15.265	10.585	9.701	8.444	7.626
D	Miltex	1	1.409	1.340	1.282	1.236	1.141
		2	1.409	1.288	1.236	1.195	1.157
		3	1.355	1.286	1.211	1.161	1.098
		4	1.352	1.249	1.193	1.165	1.128
		5	1.500	1.452	1.372	1.295	1.238
		Ave.	1.405	1.323	1.259	1.210	1.152
E	Premier	1	44.450	44.450	44.450	44.450	44.450
		2	44.450	44.450	44.450	44.450	44.450
		3	44.450	44.450	44.450	44.450	44.450
		4	44.450	44.450	44.450	44.450	44.450
		5	44.450	44.450	44.450	44.450	44.450
		Ave.	44.450	44.450	44.450	44.450	44.450
F	Ransom & Randolph	1					
		2					
		3		NO SAMPLE			
		4					
		5					
		Ave.					
G	Regency	1					
		2					
		3		NO SAMPLE			
		4					
		5					
		Ave.					

APPENDIX G (Cont'd)

ID	MANUFACTURER	#	1st Run	2nd Run	3rd Run	4th Run	5th Run
H	Repco	1	28.825	18.203	14.261	8.960	5.899
		2	29.321	17.999	13.526	6.284	5.155
		3	26.799	12.831	10.763	7.241	5.011
		4	28.575	18.108	13.867	8.866	6.425
		5	30.430	18.531	14.425	6.656	4.635
		Ave.	28.790	17.134	13.368	7.601	5.425
I	Shofu	1					
		2					
		3			NO SAMPLE		
		4					
		5					
		Ave.					
J	S. S. White	1					
		2					
		3			NO SAMPLE		
		4					
		5					
		Ave.					
K	Star	1	28.968	24.814	18.242	9.164	7.945
		2	29.160	24.984	18.363	9.213	7.992
		3	26.681	21.505	17.308	11.089	7.831
		4	31.510	28.069	21.839	14.733	11.243
		5	31.532	23.264	17.330	11.317	9.417
		Ave.	29.570	24.527	18.616	11.103	8.886
L	Teledyne Densco	1	31.541	28.477	20.456	15.386	9.372
		2	27.401	22.354	18.328	14.255	10.233
		3	28.434	24.393	17.382	11.234	8.217
		4	30.424	20.359	13.349	10.276	7.235
		5	26.447	16.388	12.375	8.270	6.232
		Ave.	28.849	22.394	16.378	11.884	8.258
M	Venture Technology	1	44.450	44.450	44.450	44.450	44.450
		2	44.450	44.450	44.450	44.450	44.450
		3	44.450	44.450	44.450	44.450	44.450
		4	44.450	44.450	44.450	44.450	44.450
		5	44.450	44.450	44.450	44.450	44.450
		Ave.	44.450	44.450	44.450	44.450	44.450
N	Vic Pollard	1	14.171	6.070	5.380	4.460	4.328
		2	19.750	9.486	8.294	7.308	6.713
		3	20.812	8.324	7.284	5.827	5.619
		4	16.937	6.944	6.436	5.419	5.081
		5	14.241	7.548	7.405	6.836	6.266
		Ave.	17.182	7.674	6.960	5.970	5.601