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Proceedings of the REAPS Technical Symposium

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APPLI CATION OF MODULAR SOFTWARE TO ESTABLISH
A "CLOSED LOOP" SYSTEM FOR SHIPYARD PRODUCTION CONTROL

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Arthur Andersen & Company
Hartford, Connecticut

Mr. Burgess is currently manager of a project to assist a shipyard in the installation of MAC-PAC, which is Arthur Andersen & Company proprietary manufacturing planning and control software.

Mr. Burgess holds a degree in business administration from North Texas State University.

ABSTRACT

This paper addresses the key functions of a closed-loop production and inventory, and planning control system generally applicable to the shipbuilding industry. A key feature of the shipbuilding closed-loop system is the application of made-to-order concepts not generally used in production and inventory planning, and control systems for other industries. The use of modular packaged software to make the system operational on a timely step-by-step basis are explored. Special considerations for tailoring the software to satisfy general shipbuilding requirements are reviewed. A summary of the potential benefits of a closed-loop system (i.e., "what if" planning) is also included.
Background

The shipbuilding industry presents challenges to its management that are nearly unequaled in other industries. The dimensions of delivered ships exceed the size of comparable end products. Shipyard engineering must define and control several hundred thousand parts for each design. Much of the equipment used in outfitting ships is advanced state-of-the-art technology. To deliver the ships to budget and schedule, extensive efforts are expended to plan and control the required resources. In most cases, ships are built one-at-a-time and, while not always visible, no two ships of a class/contract are exactly the same. Systems to support shipyard management have generally satisfied single management functions (i.e. master planning, engineering, accounting) and relied on analysts, planners, and expediters to link the functional elements together. In yards with advanced technology shipbuilding programs (typically associated with a high level of contract specification changes), the efforts required to maintain the functional system links expand quickly.

Despite the intense attention of shipyard management to assure the systems support the various building programs, many situations develop in which material or other resources are not available to satisfy the contract/schedule requirements and schedules/budgets are missed.
Evolution of Closed Loop System

Generally, the complications of planning and controlling shipyard efforts parallels the manufacturing industry with the exception of contract focus, technical specification requirements and traceability. In coping with their system requirements, the manufacturing industry promoted the development of a system concept that became viable as computer applications software technology advanced. Originally, this concept was known as MRP (Material Requirements Planning). With field experience, MRP advocates converted this acronym to mean manufacturing resources planning, since not just material had to be planned and controlled to make production goals. Successful MRP systems captured the imagination of top management and the opportunity to integrate the planning and control process from top to bottom via closed loop concepts (feedback communication and data integration) became reality.

Make-To-Order

Interest on the part of manufacturers who make products for the government led to the refinement of Make To-Order concepts and software which address many of the contract and technical requirements of shipbuilding. The
opportunity now exists to apply 'Closed Loop' concepts in shipyards to support management in planning and controlling resources, priorities, and performance to deliver ships on schedule, at planned costs, at the right ROI, and correctly configured.

Because of the size, complexity, inertia of work-in-process, and overall employee reluctance to change, shipyards cannot expect to install a Closed Loop system overnight. Extensive design, planning, and education efforts are required for all levels of the shipyard organization. A practical approach can be adopted to install the Closed Loop system in modules so shock is minimized and experience builds a strong foundation for success. Overall success of the system will be determined by: 1) constant evaluation and response to the feedback mechanisms and 2) a program to continually monitor key system performance factors.

The following schedules explain in more detail the closed loop system, associated Make-To-Order features, what modular software can be used to build the closed loop system and a strategy for installing the modules:

- Make-To-Order (MTO) Features: (Schedule #1)
- Closed loop concept for shipyard production control. (Schedule #2)
  - Basic Data
  - Top Management planning
  - Operations management planning
  - Operations execution
- Matrix analysis of shipyard closed loop elements to available software modules. (Schedule X3)

- Installation strategy (Schedule #4)

Key features of M-T-O (make-to-order) include:

- Order pegging to control component parts for a given order or contract.

- Allocation of Inventory to specific contracts or orders. (Inventory balances may be optionally maintained by receipt or expiration date, user determined cost, vendor or lot data.)

- Component availability analysis by order or contract.

- Mass rescheduling or order cancellation by order or contract.

- Tracking of material issues by order or contract for actual cost purposes (issues from stock in optional data sequence, such as FIFO).

- Maintain bill-of-material user comments for special purposes such as additional engineering change revision information.

- Material lot control through reference identification on inventory transactions by order or contract.

- Order or contract configuration history by reporting the pegged structure, component revision level and actual quantities for closed orders.
"CLOSED LOOP" CONCEPT FOR SHIPYARD PRODUCTION CONTROL

**BASIS DATA**

<table>
<thead>
<tr>
<th>BASIC ELEMENTS</th>
<th>FUNCTION</th>
<th>INPUT TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>BILLS OF MATERIAL DATA</td>
<td>Maintain part specifications</td>
<td>Construction Planning/Master Scheduling</td>
</tr>
<tr>
<td></td>
<td>Define each product on level by level basis - for all functions</td>
<td>Key Event/System Scheduling</td>
</tr>
<tr>
<td></td>
<td>Maintain product configuration (Hull effectivity)</td>
<td>Requirements Planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inventory Planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product Costing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product Design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAD/CAM</td>
</tr>
<tr>
<td>INVENTORY DATA</td>
<td>Maintain inventory balances and order status data by part and contract</td>
<td>Requirements Planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inventory Control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchasing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Performance Accounting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAD/CAM</td>
</tr>
<tr>
<td>ROUTINGS</td>
<td>Maintain specifications for manufacturing process of a part</td>
<td>Construction Planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Master Scheduling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shop Floor Control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAD/CAM</td>
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<td></td>
<td></td>
<td>Product Costing</td>
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<tr>
<td></td>
<td></td>
<td>Performance Accounting</td>
</tr>
<tr>
<td>Closed Loop Element</td>
<td>Function</td>
<td>Input to</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>BUSINESS PLANNING</td>
<td>Set overall objectives of company and manage to support those objectives.</td>
<td>Production Planning, Sales Planning</td>
</tr>
<tr>
<td></td>
<td>Plans sales to meet objectives.</td>
<td>Production Planning</td>
</tr>
<tr>
<td>SALES PLANNING</td>
<td>Determine rates and allocate the resources required to meet the company's business objectives and satisfy contract/construction demands.</td>
<td>Master Scheduling</td>
</tr>
<tr>
<td>PRODUCTION PLANNING</td>
<td>States production demands in terms of &quot;what&quot;, &quot;How Much&quot; and &quot;When&quot;. Provides key facility load analysis (Rough cut capacity plan). Interface with master construction/key event/system schedules.</td>
<td>Schedule Adjustments, Inventory Plan, Material Requirements Planning, what to schedule, how much, when</td>
</tr>
<tr>
<td>MASTER SCHEDULING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Product -</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"CLOSED LOOP" CONCEPT FOR SHIPYARD PRODUCTION CONTROL
TOP MANAGEMENT PLANNING
<table>
<thead>
<tr>
<th>Closed Loop Element</th>
<th>Function</th>
<th>Input to</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATERIAL REQUIREMENTS PLANNING - Priority -</td>
<td>Calculates requirements, plans orders and maintains priorities (time phased) using master schedule, bills of material and inventory status.</td>
<td>Inventory Control</td>
<td>Master Scheduling</td>
</tr>
<tr>
<td>INVENTORY CONTROL - Availability - - Contract Operations Management -</td>
<td>VARIETY</td>
<td>Capacity Requirements Planning</td>
<td>Production Planning</td>
</tr>
<tr>
<td></td>
<td>Maintains part balance and order status data</td>
<td>Detail Order Data for Load Analysis</td>
<td>. Inventory Status</td>
</tr>
<tr>
<td></td>
<td>MTO</td>
<td>Purchasing</td>
<td>Master Scheduling</td>
</tr>
<tr>
<td></td>
<td>Explodes order requirements at all levels to support construction schedules</td>
<td>Performance Accounting</td>
<td>. Inventory Status</td>
</tr>
<tr>
<td></td>
<td>Maintains contract and common stock part balance and pegged contract order status</td>
<td>. Planned/Actual Data</td>
<td>. Relieves Master Schedule</td>
</tr>
<tr>
<td></td>
<td>Maintains lot control/contract location</td>
<td></td>
<td>. Material Requirements Planning</td>
</tr>
<tr>
<td></td>
<td>Maintains contract allocations</td>
<td></td>
<td>. Covered Requirements</td>
</tr>
<tr>
<td></td>
<td>Drives contract accounting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAPACITY REQUIREMENTS PLANNING -Ship/Shop/Floor Capacity-</td>
<td>Assists in determination of the most efficient production schedule based on projected facility load.</td>
<td>Production Planning</td>
<td>Operations Execution Function</td>
</tr>
<tr>
<td></td>
<td></td>
<td>. Load analysis</td>
<td>. Detail Planning for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Master Scheduling</td>
<td>resource check</td>
</tr>
</tbody>
</table>
### Closed Loop Element

#### SHOP FLOOR CONTROL
- Schedule Performance -

### Function
Executes the plan by controlling ship/shop capacity and priorities, reporting contract order status and maintaining delivery, quality and productivity performance.

### Input to
Performance Accounting
- Adjustments for:
  - Master Scheduling
  - Inventory Control
  - Capacity Planning

### Feedback
Performance Accounting
- Adjustments for:
  - Master Scheduling
  - Inventory Control
  - Capacity Planning

#### PURCHASING
- Schedule Performance -

### Function
Executes the plan by controlling vendor capacity and priorities, reporting purchase order status and maintaining delivery, quality and cost performance.

### Input to
Performance Accounting
- Adjustments for:
  - Master Scheduling
  - Inventory Control
  - Capacity Planning

### Feedback
Performance Accounting
- Adjustments for:
  - Master Scheduling
  - Inventory Control
  - Capacity Planning

#### PERFORMANCE ACCOUNTING
- (Cost and Inventory Accounting)
- Accountability -
- Cost at Complete -

### Status
Maintains and reports key cost, rate and other variance data.

### Performance Accounting Adjustments
- Drives progress accounting and cost at complete analysis.

### Input to
Performance Accounting
- Adjustments for:
  - Master Scheduling
  - Inventory Control
  - Capacity Planning

### Feedback
Performance Accounting
- Adjustments for:
  - Master Scheduling
  - Inventory Control
  - Capacity Planning

### Bill of Material
- (Design Engineering)
- Routing data -

### Overall Business Planning
<table>
<thead>
<tr>
<th>CLOSED LOOP ELEMENT</th>
<th>GENERALLY APPLICABLE MODULE</th>
<th>SYSTEM INSTALLATION CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUSINESS PLANNING</td>
<td>MODELING SYSTEM</td>
<td>NO CHANGES EXPECTED BUT MUST CONTAIN STRATEGIES AND INTEGRATE TO PRODUCTION PLAN</td>
</tr>
<tr>
<td>PRODUCTION PLANNING (Contract/Construction Planning)</td>
<td>COST SCHEDULE CONTROL SYSTEM Generally home grown but packages are available</td>
<td>KEY EVENT/SYSTEM SCHEDULING WORK BREAKDOWN STRUCTURE ACTUAL COST AND PROGRESS DATA INTERFACE SCHEDULE MAINTENANCE EXPLOSION/CAPABILITY</td>
</tr>
</tbody>
</table>
## Closed Loop Elements to Software Modules

<table>
<thead>
<tr>
<th>Closed Loop Element</th>
<th>Generally Applicable Module</th>
<th>System Installation Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Scheduling</td>
<td>Master Scheduling</td>
<td>Technique to interface with production planning (Work Package) control system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How to maintain planning bills for long lead material</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How to plan/forecast service requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Shops</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Molds, special equipment, jigs, fixtures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Spares</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Other products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rough cut load analysis level for labor/machine/facility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How to formally keep off hull work paced to on hull work (time fences)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Policies must be strict to maintain momentum but practical to get maximum from equipment, manpower and material</td>
</tr>
</tbody>
</table>
CLOSED LOOP ELEMENTS TO SOFTWARE MODULES

CLOSED LOOP ELEMENT

GENERALLY APPLICABLE MODULE

BILLS OF MATERIAL

DESIGN ENGINEERING

PART SPECIFICATION

INVENTORY DATA AND INVENTORY CONTROL

ORDER/WORK PACKAGE CONCEPTS

INTERFACES TO CAD/CAM

PART SPECIFICATION

INVENTORY CONTROL (MTO CAPABILITIES)

ORDER PEGGING AND RELATED NETWORK REQUIREMENTS (MTO Requirements)

ORDER LAUNCH AND CONTROL

LOT CONTROL/TRACEABILITY

CONTRACT ALLOCATIONS

INTERFACES TO CAD/CAM

STOP WORK NOTIFICATION AND CONTROLS

CLOSE OUT MECHANISM

HULL EFFECTIVITY:

PLANNING/BID BILLS

CONTRACT CHANGES

WORK BREAKDOWN STRUCTURE

SYSTEM INSTALLATION CONSIDERATIONS

280
## CLOSED LOOP ELEMENTS TO SOFTWARE MODULES

<table>
<thead>
<tr>
<th>CLOSED LOOP ELEMENT</th>
<th>GENERALLY APPLICABLE MODULE</th>
<th>SYSTEM INSTALLATION CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROUTINGS</td>
<td>MANUFACTURING ENGINEERING</td>
<td>Interfaces to Group Technology?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HULL Applicability?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QUALITY REQUIREMENTS</td>
</tr>
<tr>
<td>MATERIAL REQUIREMENTS</td>
<td>MATERIAL REQUIREMENTS PLANNING</td>
<td>ALLOCATE TO CONTRACTS AND DETER-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MINE NET REQUIREMENTS BY CONTRACT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MTO/RP INTERFACE</td>
</tr>
<tr>
<td>CAPACITY REQUIREMENTS</td>
<td>CAPACITY PLANNING</td>
<td>NONE SPECIAL AT INDUSTRY LEVEL</td>
</tr>
<tr>
<td>PLANNING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHOP FLOOR CONTROL</td>
<td>SHOP FLOOR CONTROL</td>
<td>NONE SPECIAL AT INDUSTRY LEVEL</td>
</tr>
<tr>
<td>PURCHASING</td>
<td>PURCHASING</td>
<td></td>
</tr>
</tbody>
</table>

GENERAL HOME GROWN SHOULD ADDRESS BID PROCESS, VENDOR QUALIFICATIONS, AND RELIABILITY, AND SPECIAL REPORTING.
<table>
<thead>
<tr>
<th>CLOSED LOOP ELEMENT</th>
<th>GENERALLY APPLICABLE MODULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERFORMANCE ACCOUNTING</td>
<td>INVENTORY ACCOUNTING</td>
</tr>
<tr>
<td>PRODUCTION COSTING</td>
<td>SYSTEM INSTALLATION</td>
</tr>
</tbody>
</table>

**CONSIDERATIONS**

- HOW TO MAINTAIN "BID BILL" BY CONTRACT AND MEASURE
  - ENGINEERING TAKEOFF VARIANCES
  - ACTUAL USAGE VARIANCES

- INTEGRATION WITH CONTRACT CHANGE
  - FOLLOWUP COST ANALYSIS

- CONTRACT ACCOUNTING

- USING THE VARIANCES IN MANUFACTURING TO EVALUATE BID ESTIMATES
  - ESTIMATE
  - BID
  - PURCHASING
  - MATERiAL
  - MANUFACTURING (Labor)

- MAINTAIN FULL ABSORPTION OF COST IN PRICED OUT BILLS
  - UNIT COST EFFECTIVITY?
CLOSED LOOP SYSTEM FOR SHIPYARD PRODUCTION PLANNING AND CONTROL

INSTALLATION STRATEGY

Step | Modules Addressed | Benefits Anticipated
--- | --- | ---
1 | Design Engineering, Manufacturing Engineering | Accurate and timely product engineering information
2 | Inventory Control/Make To Order | Minimize manufacturing lead times and related costs by facility usage control
3 | Master Scheduling, Material Requirements Planning | Computer order status control
4 | Shop Floor Control | Rough cut validation of construction plan
5 | Capacity Planning, Inventory accounting, (Product costing) | Efficient facility loading

Ties performance to business planning
Closes the loop
APPLICATION OF MODULAR SOFTWARE TO ESTABLISH A "CLOSED LOOP" SYSTEM FOR SHIPYARD PRODUCTION CONTROL

SHIPBUILDING ENVIRONMENT

- LEADERS IN ADVANCED TECHNOLOGY PROCESSES
- ENVIRONMENTAL AND SAFETY FACTORS EMPHASIZED
- MORE OFF HULL WORK
- VERTICAL INTEGRATION EXPANDING
  - MORE OPPORTUNITIES FOR PROFIT
  - TOLERANCES DIFFICULT TO MEET
  - HIGH LEVEL OF EXPEDITION
- COMPETITIVENESS
- MAKE-TO-ORDER FOCUS

IN A SHIPYARD, WHAT IS A CLOSED LOOP SYSTEM?

IT IS AN INFORMATION SYSTEM FOR PLANNING AND CONTROLLING RESOURCES, PRIORITIES, AND PERFORMANCE TO DELIVER SHIPS.

- ON SCHEDULE
- AT PLANNED COST
- AT THE RIGHT ROI
- CORRECTLY CONFIGURED
SHIPYARD PLANNING AND CONTROL

MASTER SCHEDULE INPUT

LOADING METHODS

INFINITE - Without Regard For Capacity

FINITE - Not To Exceed Capacity

"A PLAN THAT EXCEEDS CAPACITY WILL NOT GET PRODUCED AND WILL BUILD INVENTORY"

PRIORITY DISPATCH LIST

WORK CENTER: START DATE SEQUENCE

AVAILABLE AT WORK CENTER

286
**SHIPYARD PLANNING AND CONTROL**

### INPUT-OUTPUT CONTROL

<table>
<thead>
<tr>
<th></th>
<th>WEEK</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>INPUT CRP</td>
<td></td>
</tr>
<tr>
<td>PLANNED</td>
<td>260</td>
</tr>
<tr>
<td>ACTUAL</td>
<td>260</td>
</tr>
<tr>
<td>CUMM DEVIATION</td>
<td>0</td>
</tr>
<tr>
<td>OUTPUT SFC</td>
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</tr>
<tr>
<td>PLANNED</td>
<td>290</td>
</tr>
<tr>
<td>ACTUAL</td>
<td>296</td>
</tr>
<tr>
<td>CUMM DEVIATION</td>
<td>+5</td>
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</table>

**BACKLOG STATUS**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>PLAN</td>
<td>300</td>
<td>270</td>
<td>240</td>
<td>210</td>
</tr>
<tr>
<td>ACTUAL</td>
<td>266</td>
<td>270</td>
<td>260</td>
<td></td>
</tr>
</tbody>
</table>

*A PLAN THAT EXCEEDS CAPACITY WILL NOT GET PRODUCED.*

### PERFORMANCE MEASUREMENT

<table>
<thead>
<tr>
<th>BILL OF MATERIAL</th>
<th>PERFORMANCE MEASUREMENT</th>
<th>RESPONSIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERFORMANCE CRITERIA</td>
<td>PERFORMANCE MEASUREMENT</td>
<td>RESPONSIBILITY</td>
</tr>
<tr>
<td>PRODUCT STRUCTURE</td>
<td>PARTS, QUANTITIES, LEVEL, ECONOMIES</td>
<td>ENGINEERING</td>
</tr>
<tr>
<td></td>
<td>FOR ASSEMBLY</td>
<td>MEASUREMENT METHOD</td>
</tr>
<tr>
<td>ENGINEERING CHANGE CONTROL</td>
<td>PLANNED AND ACTUAL EFFECTIVENESS RATES</td>
<td>PULL PARTS AND ASSEMBLY</td>
</tr>
<tr>
<td></td>
<td>QUARTERLY OBSCEDURE INVENTORY REPORT</td>
<td></td>
</tr>
</tbody>
</table>

### MAC-PAC MANUFACTURING PLANNING AND CONTROL SYSTEM

- **DESIGN ENGINEERING**
- **MATERIAL REQUIREMENTS PLANNING**
- **PRODUCT COSTING**
- **INVENTORY CONTROL**
- **SHOP FLOOR CONTROL & PURCHASING**
- **INVENTORY ACCOUNTING**
- **MANUFACTURING ENGINEERING**
- **CAPACITY PLANNING**

### PERFORMANCE QUESTIONS

- WHAT IS THE PERFORMANCE?
- WHAT SHOULD IT BE?
- WHAT IS PERFORMING?
- WHAT IS NOT?
- WHAT ACTION IS REQUIRED?
- WHO IS RESPONSIBLE?
- WHEN WILL IT BE DONE?
- WHAT IS THE FOLLOW-UP?

### CLASS A, B, C, D USERS

<table>
<thead>
<tr>
<th>SYSTEM CLASSIFICATION</th>
<th>SYSTEM PERFORMANCE</th>
<th>SYSTEM CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>95%</td>
<td>COMPLETE CLOSED LOOP SYSTEM; TOP MANAGEMENT VIEWS THE SYSTEM AS A WHOLE; ALL ELEMENTS POSITIVELY RELATE TO ONE ANOTHER.</td>
</tr>
<tr>
<td>B</td>
<td>85%</td>
<td>PARALLEL SYSTEM IN PLACE BUT NOT ALL ELEMENTS ARE WORKING EFFECTIVELY; MANAGEMENT APPROVES BUT DOES NOT PARTICIPATE; ELEMENTS AVERAGE 40% TO 50%.</td>
</tr>
<tr>
<td>C</td>
<td>70%</td>
<td>STRAIGHT-LINE CURRENT; SOME PLANNING PRIORITIES, FORMAL AND INFORMAL SPLIT; SELECTIVE FEEDBACK PROVIDED FOR ELEMENTS AVERAGE 40% TO 60%.</td>
</tr>
<tr>
<td>D</td>
<td>50%</td>
<td>PARALLEL SYSTEM BUT INCONCEIVABLE; DOES NOT IN PLACE; SOME DATA INCONSISTENCY; LITTLE MANAGEMENT AGREEMENT; SELECTIVE FEEDBACK REPORT; FEW ELEMENTS AVERAGE 30% TO 40%.</td>
</tr>
</tbody>
</table>

287
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