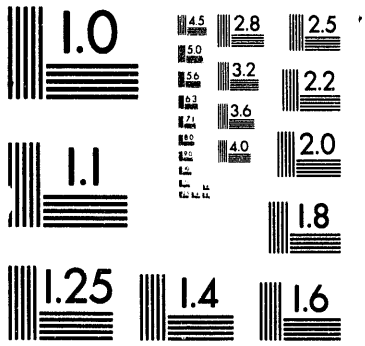
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THE USE OF BENCHMARKING AT THE U.S. DEPARTMENT OF ENERGY'S PANTEX PLANT

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BACKGROUND

The U.S. Department of Energy's (DOE's) Pantex Plant, located in Amarillo, Texas, is responsible for the assembly, stockpile maintenance, and disassembly of nuclear weapons. Pantex is operated by the Mason & Hanger-Silas Mason Co., Inc. The following summarizes the pilot study that was designed to establish Pantex as a leader in using the continuous improvement tool of benchmarking within the DOE's Nuclear Weapon Complex (NWC). The pilot study was conducted with Mason & Hanger-Silas Mason Co. and Pacific Northwest Laboratory (PNL) personnel during 1992.

U.S. manufacturing firms have a long history of analyzing and comparing the cost and quality of products produced by competitors. Competitor products are obtained, disassembled in detail, and "reverse engineered" to understand manufacturing design and cost considerations that might lead to competitive advantages.. While these traditional competitive enhancement efforts have focused on competitors' **products**, a new type of effort is focusing on the business **processes** behind the products.

APPROACH

Benchmarking is the technique used to understand and capture the best practices related to business processes. The benchmarking approach used for the Pantex pilot study emphasized understanding business processes before initiating contact with potential benchmarking partners. While the approach was structured using PNL's 8-step benchmarking approach, the PNL approach is essentially identical in content to the 12-step approach that has been selected by the majority of NWC contractors. PNL's 8-step benchmarking approach consists of the following steps:

Step 1--Select initial benchmarking area(s) and form benchmarking teams.

Step 2--Prioritize elements of benchmarking area(s) and write a scope/problem statement.

Step 3--Describe existing system and identify problems.

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Step 4--Establish performance measures to monitor improvement.

Step 5--Correct problems with clear solutions.

Step 6--Identify potential benchmarking partners and best practices.

Step 7--Exchange information and visit selected sites.

Step 8--Develop short-term and long-term implementation plans and follow up.

Based on previous experience, successful benchmarking teams should range from four to six individuals and should consist of the following team members:

- 1 benchmarking team leader/facilitator
- 1 technical leader in the benchmarking area
- 1 or 2 technical contributors
- 1 or 2 managers responsible for implementing change.

Small teams usually enable the participants to devote a larger proportion of their time (ideally, at least 50 percent) to the benchmarking effort, which helps maintain team momentum. Participants on larger teams would contribute only 20 percent of their time and have to be "re-trained" on the benchmarking effort during weekly team meetings. Active management participation during the benchmarking process is educational, and managers need to see first-hand how benchmarking partners do business, as management is ultimately responsible for implementing change within their functional area. If management is not actively involved, the benchmarking team has to educate and "sell" their management on the best practices that are identified.

Benchmarking teams typically consist of participants who are new to benchmarking and improvement studies. It is important to provide team participants with sufficient information on the deliverable to be produced by their efforts. A detailed report outline is essential early during the benchmarking process. The team can complete sections of the outline throughout the benchmarking effort, resulting in a "build-as-you-go" approach to produce the final deliverable. A suggested benchmarking report outline is as follows:

1.0 Benchmarking Area

- 1.1 Scope/Problem Statement
- 1.2 Potential Benefits from Improvement
- 1.3 Issues Needing Management Input and Review

2.0 Existing Performance in Benchmarking Area

- 2.1 Existing System Description
- 2.2 Need for Improvement
- 2.3 Recommended Performance Measures

3.0 Best Practices

- 3.1 Results of Benchmarking Partner(s) Site Visits
- 3.2 Summary of All Best Practices Identified

4.0 Recommendations for Improvement

- 4.1 Low-Cost Implementation Plans
- 4.2 Long-Term Implementation Plans

Section 1.0 of the suggested benchmarking report outline ensures that the team has a clear understanding of the scope of the bench-

system through the use of project management.

WORK PLANNING/COST ESTIMATING BENCHMARKING EFFORT

The principal reason for selecting this area for benchmarking was the need to effectively meet production schedules and control costs. Both schedule adherence and cost control are important to meet customer (i.e., DOE) needs.

The firms that exchanged information included

- Martin-Marietta Y-12 Plant
- Western Builders
- Mason and Hanger's Iowa Army Ammunition Plant
- John Deere Company.

Current work planning involves implementing actions for recommended improvements.

TRAINING/CERTIFICATION BENCHMARKING EFFORT

The principal reasons for selecting this area for benchmarking were

- enable the organization to more effectively use human resources in training areas
- effectively schedule and plan vital training required by all plant employees on a regular basis
- provide Mason & Hanger with a training plan with necessary flexibility to meet on-going business needs.

The sites involved in the information exchange with the training/certification benchmarking team included

- Martin-Marietta Y-12 Plant
- Diablo Canyon
- Westinghouse's Savannah River Plant.

Training certification is currently in the implementation stage, and results of recommended improvements are being monitored.

LESSONS LEARNED

Several key lessons were learned from the Pantex Plant benchmarking pilot study that will assist in refining the approach used by on-going benchmarking to support Pantex Plant's continuous improvement initiative. The lessons learned are identified as follows.

1. **Clear Guidance Must Be Given on Workload Priorities By Management** - All benchmarking participants have full-time regular duties that do not include benchmarking. This problem is compounded by the fact that problem areas are usually targeted for benchmarking that are the very areas where participants are currently "fighting fires." Management needs to clearly communicate to all benchmarking participants the priority that benchmarking activities have compared with normal duties, as well as approximately what percentage of the participants' time should be devoted to benchmarking.

2. **Participants Need to Receive Recognition for Benchmarking Activities** - Employees are usually rewarded for performing regular duties, and benchmarking detracts from their ability to perform regular duties. Therefore, some form of employee recognition or reward is needed for benchmarking participants.

3. **Benchmarking Facilitator Must Promote Project Ownership** - Teams need to take ownership of their benchmarking projects if the projects are to be successful. By "ownership," it is meant that the benchmarking facilitator cannot complete all of the benchmarking duties for the team. Team participants need to be assigned duties and held responsible for those duties.

4. **Management Responsible for Area Being Benchmarked Must Participate** - Benchmarking is an educational experience that management in the applicable functional area needs to participate in first-hand. Participation is necessary for the functional manager to

understand the benchmarking team's findings and recommendations. "Seeing is believing" holds true in terms of observing a best practice being used by a benchmarking partner.

5. Benchmarking Teams Must Have a Well-Defined Project Scope/Problem Definition - Benchmarking scopes that are too large will result in ineffective data collection exchanges with benchmarking partners. Time does not permit broad areas to be understood at the depth necessary to make recommendations for change. Benchmarking teams must have a well-defined project scope so the benchmarking partners can adequately communicate how targeted area processes work.

6. Benchmarking Teams Must Adequately Characterize Their Own Systems - Teams without an understanding of how their own processes work will not know what information to seek from benchmarking partners in order to make recommendations for change. It is essential to have a thorough understanding of the process being benchmarked, as well as the performance of the process, before the first benchmarking site visit is made.

7. Use the Phone and Mail to Screen Partners and Facilitate Data Exchange - Tremendous amounts of information can be collected without physical site visits. This information can reduce the onsite time needed and can screen out sites that do not merit visitation. (Actual site visitation may not be necessary when completed steps indicate sufficient improvement.)

8. Keep Reasonably Sized Benchmarking Teams - Teams of four to six individuals are typically more effective than teams of six to ten individuals, because smaller teams usually have participants working on benchmarking a larger percentage of each individual's time. This results in a more productive use of an individual's benchmarking hours, as opposed to someone who participates a few hours a month and must "re-learn" the project objectives at each benchmarking meeting.

9. Benchmarking Participants May Need Training in the Area of Process Improvement - Benchmarking team participants will often be crossing organizational boundaries and the chain of command. Management should be informed of benchmarking team activities, and teams need to be given the authority to collect necessary data.

10. Benchmarking Teams May Put Participants in Unfamiliar Roles - Most benchmarking teams will be made up of functional area experts that are not familiar with process improvement tools and techniques. The facilitator assists to make team participants confident in their abilities to identify process improvement opportunities and to give participants the necessary analytical tools (e.g., flow charting).

11. Insufficient Preparation and Organization Make Onsite Visits Awkward - Benchmarking partners will be more responsive to a professional and organized approach during an onsite benchmarking team's visit.

BIOGRAPHICAL SKETCHES

Mr. Fred G. Anderson, Senior Administration Specialist, Mason & Hanger-Silas Mason Co., Inc. Mr. Anderson is the division financial representative for the Manufacturing Division of the Pantex Plant in Amarillo, Texas. His 26-year career spans a broad background in accounting, management, and consulting. Mr. Anderson is a Certified Public Account and was the Leader for the Work Planning/ Cost Estimating Benchmarking Team.

Mr. Jerry Burling, Resource Manager for Engineering and Design Division, Mason & Hanger-Silas Mason Co., Inc. Mr. Burling is providing support to the Division Manager relating to engineering and facility design of division functional areas of responsibility at

Pantex Plant in Amarillo, Texas. He accomplishes special project assignments that interface with plant-wide implementation plans and the coordination of U.S. Department of Energy initiatives, surveys, audits, and studies. Mr. Burling is a Professional Engineer, as well as a facilitator in pilot benchmarking.

Mr. James Fulton, III, Manager of Project Management Support Department, Laboratory Programs Directorate, Pacific Northwest Laboratory. Mr. Fulton has more than twenty years of experience in business and project management, has worked extensively with U.S. Department of Energy (DOE) contract operations, and is knowledgeable of DOE policies on project and financial management. Mr. Fulton is a member of the Project Management Institute and also the Micro-Frame Users Group.

Mr. Cody J. Hostick, Senior Research Engineer in Production Systems Analysis Group, Pacific Northwest Laboratory (PNL). Mr. Hostick is currently working on projects related to the modernization of information systems for manufacturing. He is a Professional Engineer in the area of mechanical engineering.

Dr. Gilbert C. Moncivais, Division Manager of Human Resources Division, Mason & Hanger-Silas Mason Co., Inc. Dr. Moncivais is currently involved as a member of the Pantex Plant Senior Staff. He has been in the U.S. Department of Energy Complex for six years and has extensive experience in training development and organizational systems. Dr. Moncivais is Past President of the Southeastern Idaho Chapter of the American Society for Training and Development.

Mr. Rodney Skelton, Senior Budget Analyst, Mason & Hanger-Silas Mason Co., Inc. Mr. Skelton is currently a Project Leader for a group working to develop and implement a new planning and budgeting system at Pantex Plant in Amarillo, Texas. In the past, he served as a Project Leader to benchmark task order contracting. Mr. Skelton is a past member of the Board of Directors for the Institute of Management Accountants.

Mr. Timothy Tuttle, Manager, Site Management Systems, Pacific Northwest Laboratory. Mr. Tuttle is currently responsible for developing and implementing the annual planning process the Laboratory uses to establish priorities and allocate resources. He is a Certified Public Accountant.

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