



A&M ENVIRONMENTAL TECHNOTES

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Where **LEAN**
Meets **GREEN**



**Chemical Management
Services**
St. Louis / St. Charles

Boeing is working to improve both cost and environmental performance. Cost must be reduced in order to price our products more competitively. To stay ahead of ever-tightening environmental regulations, reductions in emissions and wastes, and tighter controls on handling and use are typically required. In many cases, these two performance issues can conflict with each other. More stringent environmental regulations can result in slowing the work process to perform required record-keeping and reporting, or require the use of expensive emission control equipment. This can result in higher operating costs and reduced competitiveness.

Within Military Aircraft and Missile Systems Group (A&M), in a developing Boeing St. Louis/St. Charles project, these issues, cost and environmental performance, are complimenting each other to result in a process that benefits many areas. The Hazardous Materials Management Improvement project, which originated in Environmental Assurance (EA) and is currently being implemented by the St. Louis SHEA Chemical Management Services (CMS) team, embraces both Lean Enterprise and Environmental Stewardship concepts.

LEAN Enterprise
= *Increased Competitiveness*

Lean thinking is helping Boeing meet the challenge of satisfying customers and running a healthy business. Many of the principles that underpin lean thinking may sound familiar. Do it faster, better, cheaper. Involve

suppliers. Empower employees. Put the customer in the driver's seat.

The newness lies in the approach and the culture that lean thinking creates. Lean Enterprise has succeeded where other ideas have failed. It has produced astonishing results – reductions of up to 95% in cost, cycle times and defects.

Lean thinking changes the way that cost and price of products are viewed as they relate to earnings. It says the market determines the price, and that to increase profits and returns to shareholders, costs must be lowered through improved quality and increased efficiency.

At Boeing-St. Louis, in June '98, Al Haggerty, VP and GM of Engineering, became the Lean Enterprise focal point for A&M. "Lean Enterprise", he says, "is a combination of best practices and tools, implemented at every phase of design, development, procurement and manufacturing – initiatives that drive down costs and cycle time, but at the same time promote quality. It means making all areas of A&M operations – beginning with design through delivery to the support of our products – much more efficient and cost-effective. And it involves everyone on our team, including our suppliers and our customers."

In November '98, Norma Clayton became VP of Lean Manufacturing for A&M. In addition to being responsible for implementing lean initiatives and strategies in manufacturing areas across the group, she also leads the A&M Manufacturing Council. By the first of the year, Council members had developed their Site Lean Plans for 1999.

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St. Louis Production Operations and General Services supervisors, during a January workshop, obtained an overall awareness from Haggerty and Clayton of what the Lean Enterprise activities will be for A&M. They said the activities "will affect our entire organization – engineering, manufacturing, and our suppliers". Supervisors were urged to understand lean principles and apply them to their work environments.

Lean initiatives primarily rest on twin foundations; 1) efficient processes and 2) involved people. Those efficient processes are designed to ensure that the right amount of the right stuff is in the right place at just the right time for the worker to best do his or her task. And it is the involved people of the work force that are utilized to design and improve those processes.

Environmental



Stewardship

Boeing is also striving to continuously improve its environmental stewardship. Environmental stewardship is the disciplined use of resources to conserve energy and material, prevent pollution, and minimize hazardous wastes. Good environmental stewardship requires that Boeing be prepared for the new environmental and safety regulations which are continually being released. These regulations drive A&M sites to make changes like adding containment devices, eliminating specific materials from use, revising operating procedures, and reporting detailed use and emission information, among other things. These new and evolving standards continue to require better monitoring and control of the movement and use of a number of hazardous chemicals.

The Hazardous Material Improvement Project - a little background -

In the Spring of 1990, Boeing Defense & Space Group Environmental Affairs developed the 'Hazardous Materials Management Program' (HMMP) for the Group's sites. Fundamentally, HMMP orders, receives, distributes and manages the inventory of hazardous materials on a just-in-time basis by a single organization, and provides real time tracking of a material from the moment it is ordered until it is consumed at the user level.

The technical heart of HMMP is a unique computerized inventory data management system. This mature process, operating at the Seattle Development Center and Kent Space Center, is owned and performed by a multi-disciplined team of people (known as the E-Team). They are responsible for all chemicals (production, labs, maintenance, etc.) from procurement through use and/or disposal. Easily accessible cabinets on the shop floor are inventoried and restocked by the E-Team. The baseline inventory for each cabinet is coordinated through each shop's supervision and is posted on the front.

At the Philadelphia A&M site, a SHEA Chemical Management organization has, since 1998, handled hazardous material inventory control and storage/distribution of such materials to the using organizations. They are using the same computerized tracking system as the Puget Sound A&M, with their own site unique material identification numbers.

At St. Louis and St. Charles, after a number of initiatives had been evaluated by EA over the past 8 years, an Accelerated Improvement Workshop (AIW) was conducted in late '97 to address hazardous material management issues for those sites. The workout team performing the AIW was given the following mission:

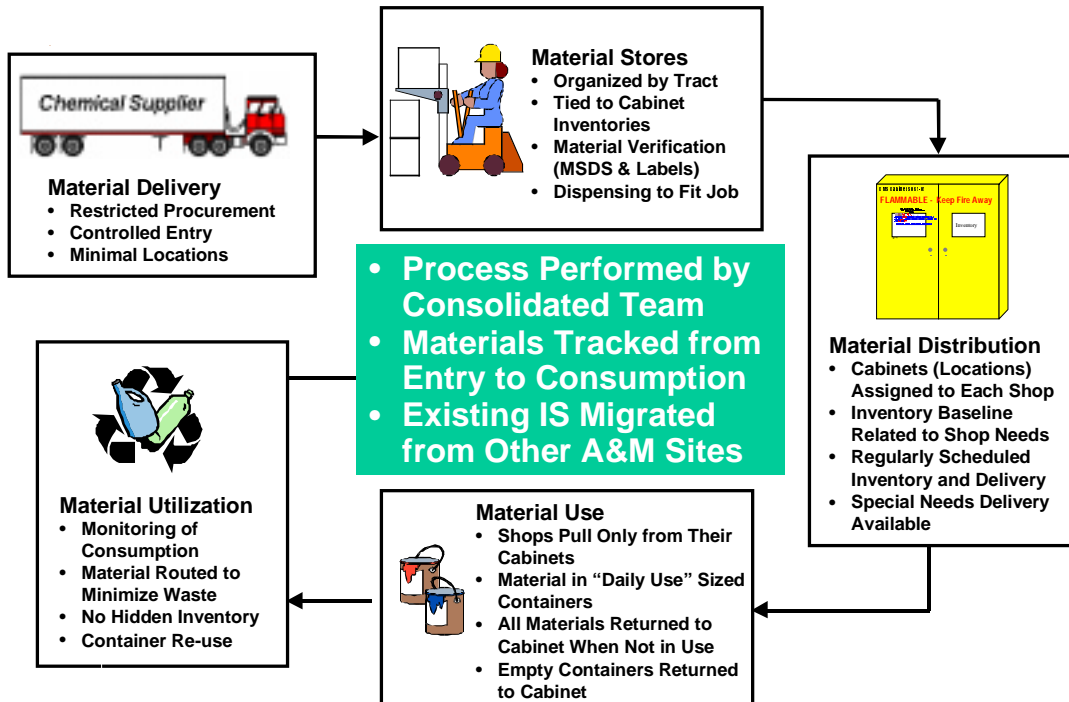
- 1) Capture the 'Best Practices' related to Chemical Management from across the Boeing Company and**
- 2) Develop and implement a Chemical Management System to integrate those 'Best Practices' elements into the St. Louis/St. Charles operations.**

The Workout team created the following vision for Hazardous Material Management Improvement:

- Employees will have the products they need, when and where they need them
- There will be a current record of the location and amount of all HazMats that are in the facility
- All HazMats will be properly moved, stored, used, and disposed of, with attention given to
 - Providing proper labeling and accessible MSDS's
 - Observing appropriate M&P Specifications and relevant Environmental Restrictions
- Required regulatory reports will be generated efficiently and accurately
- All will be done at lower than previous cost

Guided by that vision, a process adapted from Puget Sound's experience and having the basic features depicted in the following graphic was developed:

The CMS Process



The CMS Pilot:

Following completion of the AIW, the St. Louis / St. Charles Chemical Management Services team was established to pilot and then implement the improved process. The F/A-18 E/F assembly building and various departments in Building 598 were selected as pilot areas. In those areas, all chemicals were inventoried and reorganized into hazardous material storage cabinets. Excess products were removed from the floor and restocked in the storeroom or disposed of depending on the condition of each product.

Baseline inventories were established for each area, and cabinets were organized to efficiently store those needed materials in convenient locations throughout the buildings. The cabinets themselves were cleaned and sliding shelf dividers were installed to create individual storage locations for each product used by a given area. The inventory of materials contained in each cabinet was posted on the door of the cabinet. Figure 1 shows a typical hazardous material storage cabinet in the pilot area.

Information on each cabinet and its products was entered into the existing Puget Sound HMMP computer system. This system is now shared among Boeing A&M sites. In keeping with the "one company" vision, common A&M materials are being identified using consistent material identification numbers.

**Figure 1.
Pilot Area Cabinet**



A system of scheduled inventory, delivery, and frequent restocking was established for each cabinet. In most cases the system ensures that materials are available to the operator just prior to need.

For instances where an unforecasted occurrence might result in the need for alternate or additional products, an easily remembered hotline (232-CHEM) was established. An internet catalog for ordering was also developed to ease the process of ordering needed materials. Requesters can call with a need or place an on line order and quickly receive what is needed.

Benefits:

There have been many benefits demonstrated during this pilot. Significant health, safety, environmental, cost, cycle time, and Program benefits available from this process include:

- Elimination of hidden hazardous material inventory
- Reduction of shop floor chemical inventory exceeding 50%
- Cuts in Operator time needed to obtain material
- Increased availability of material safety information
- Reduction of chemical consumption exceeding 30%
- Minimization of wasted materials
- Improved information concerning actual material application
- Enhanced environmental reporting capability at lower cost
- Reduced risk of environmental incidents (e.g. spills, non-compliant use)
- Provision of previously unavailable information for Programs regarding material usage

Customers in the pilot areas of the Hazardous Material Management Improvement project have been excited about the advantages this process provides them. They no longer have to search for material or order it and wait for it to arrive. They go to the cabinet and it is there, ready to be used. Dave Blatner, General Foreman, F/A-18E/F Final Assembly, put it this way- "The service that CMS has provided has been simply exceptional. The organization of our flammable cabinet is outstanding. Every chemical has a designated place and it goes a long way in minimizing search time. The bottom line is this: the CMS team is saving final assembly a minimum of 6-8 minutes per day per operator and we have 91 operators in our shop."

Summary:

Many "Lean" tools were used in the development of this improved process, including an Accelerated Improvement Workshop, multi-disciplined teams, 'just-in-time' concepts, the 5 S's*, and standardized operating procedures.

- * *The five S's (Sort, Simplify, Sweep, Standardize, and Self-discipline) are principles being used across Boeing to provide simple, logically organized work areas and efficient processes.*

During process development, substantial consideration was given to both lean principles and Boeing environmental and safety objectives. The result has been a process that significantly improves St. Louis/St. Charles environmental performance while also improving lean performance in the areas of productivity, cycle time, inventory, and waste.

The St. Louis/St. Charles CMS team drew from other A&M sites' tools and expertise to come up with the best process improvements at the lowest possible cost to the company. Processes and tools were kept consistent with other A&M sites when possible.

Implementation of the Hazardous Material Management Improvement project by CMS is underway and will continue through 1999. The major assembly areas are targeted first with other production areas to follow. This project is a joint improvement effort, currently being supported and funded by the Environmental Assurance Group in Engineering and Safety Health and Environmental Affairs division within General Services.

Additional information about this project can be obtained by visiting the CMS website at <http://engmil.stl.mo.boeing.com/cms/>, or by calling Mark Reighard at (314) 232-CHEM. E-Mail: mark.k.reighard@boeing.com.

Information concerning the use of HMMP at Puget Sound can be obtained by calling Mike McCoy at (206) 655-2768 E-Mail: mike.mccoy@boeing.com.

Your comments are Important to us! Contact Paul Rempes at 314/233-1541 or FAX 314/233-8578

E-Mail: paul.e.rempes@boeing.com

Internally only an Intranet version can be found at following address: <http://engmil.stl.mo.boeing.com/engmil/ea/>

For questions on getting to it call Craig Scott at 314/234-9374. E-Mail: craig.w.scott@boeing.com