



TWO SUCCESS STORIES FROM BP GRANGEMOUTH

No More Jam

BP Grangemouth's Finnart Ocean Terminal depended on a pair of pumps to reinject product pipeline interface material back into products, allowing recovery of the full product value. These pumps were consistently unreliable, and when not functioning properly or at all, the mixture regressed into crude and refining costs had to be paid in full all over again. Confidence in the equipment fell while maintenance costs rose.

A Manufacturing Game® action team decided to focus on solving this on-going problem. Over a short period of time, they experimented until they brought one of the pumps to a highly reliable level. They then concentrated on the other pump until it was upgraded to a reliable status. Both pumps are presently running without any problems. In product terms, the net benefit was about \$35,000 in just a few months. Maintenance costs and aggravation have also diminished.

(This Action Team success story was originally written by BP's Jim Bunten and published in BP Amoco's Grangemouth refinery's "Defect Eliminator")

Soot Blower Problems Blow Over

Another action team targeted eliminating soot blower failures caused by chains snapping when the soot blowers jam. Powerstation soot blowers were failing at a frequency of one every quarter.

INCREASED THROUGHPUT WITHOUT CAPITAL INVESTMENT

excerpted from SMRP 2000 presentation by
Thomas Meyer, Lead Engineer
Jim Dray, Tooling Engineer
from Whirlpool - Findlay Division



Maximized Manufacturing at Whirlpool through TMG

At Whirlpool Corporation's Findlay, Ohio Division, demand for Whirlpool products is at an all-time high. Their division faces a challenge: "How do they get more out of equipment and continue lowering operating costs without making huge capital investments?" Management considered a list of initiatives that were integrated into an approach called "Maximized Manufacturing," which includes a Total Productive Manufacturing (TPM) program as the system's backbone.

The plant achieved significant throughput improvement while

simultaneously lowering production costs with no major capital investment. This level of improvement requires ownership, awareness, and problem solving skills by the equipment operators and maintenance personnel. By inspiring and involving the front-line, the Findlay Division has drastically improved its performance.

Background

Whirlpool Corporation is the world's leading manufacturer of major home appliances with primary brand names such as KitchenAid, Roper, Bauknecht, Ignis, Brastemp, Consul and its global Whirlpool brand, which are marketed in more than 170 countries.

In 1999, Whirlpool set records for market share growth. These results were driven by continued consumer demand for brand-name appliances, enabled by a focus on operational excellence throughout the organization. Recent aggressive growth targets have presented a challenge: their assets, with limited capital investment, need to produce more to maximize return.

*"Whirlpool" continued on
page 2*

*"Success Stories" continued
on page 4*

What's Inside?

Increased Throughput at Whirlpool

1, 2-3

Public Workshop Calendar

2

BP Success Stories

1, 4



Public Workshop Calendar



Throughout the year, The Manufacturing Game® holds workshops for the general public at various universities and/or professional organizations across the country.

January 25-26, 2001
The Manufacturing Game®
Atlanta, GA
For registration information call
(281) 812-4148

February 22-23, 2001
University of Dayton
Dayton, OH
For registration information call
(937) 229-4632
or register online at
<http://ud.udri.udayton.edu/ccf/>

May 25, 2001
NPRA Conference
New Orleans, LA
For registration information call
(281) 812-4148



"Whirlpool" continued from page 1

Creating the Vision

In 1995, Kirk Wolfinger, Maintenance Manager at Findlay, sponsored a cross-functional team to create a Maintenance & Tooling Master Plan (M&TMP). This plan included elements of improved planning, machine specific preventive maintenance, predictive maintenance technologies, TPM, and root cause failure analysis. The team developed and promoted a vision of "Zero Unplanned Downtime," which was a significant change from the past.

It became apparent to the M&TMP team that the maintenance department could not make dramatic changes alone. Success required a partnership with production personnel in eliminating operating losses as well as equipment downtime. Not all of the operations managers shared the vision of eliminating all sources of operating loss, so part of the plan was to form a partnership to gain credibility and support.

Measuring the Opportunity

To gauge current performance and set improvement targets, they adopted a measure called Critical Process Yield (CPY). CPY was Findlay's version of Overall Equipment Effectiveness (OEE), which is often used in TPM implementations. Unlike other measures, CPY accounts for all sources of loss.

In several areas, assets were only producing at 60-70% capability. Benchmarks indicated 85-90% was possible. While this level of opportunity was exciting, it was met with a good deal of skepticism. Many did not believe that major improvement without additional capital was possible, and based on previous improvement initiatives, they were very leery of being drawn in.

Learning from Previous Attempts

To help avoid the pitfalls of previous improvement programs,

an effort was made to capture the key lessons learned:

- *Not everyone understood TPM – "Why are we cleaning?"*
- *Lack of clear and unwavering support from management*
- *Front-line employees did not understand their role*
- *CPY was not well understood or used*
- *Supervisors and engineers were not involved*
- *Shared tasks were never developed*
- *People problems were not addressed*
- *Shift-to-shift communications were poor*
- *Downtime causes were not tracked*

The Maximized Manufacturing process had to address these issues and effectively engage front-line workers. Previous attempts showed that success was not possible without passion and front-line ownership.

Maximized Manufacturing Process

The back bone of the Maximized Manufacturing process is the TPM activities and infrastructure. Total Productive Manufacturing (sometimes called Total Productive Maintenance) is a team-based approach to maintain the condition of equipment. It relies upon operator ownership of equipment, continuous identification and implementation of improvements, and the development of planned maintenance.

At Findlay, TPM also provides the structure necessary to sustain continuous improvement activities. It defines organizational leadership and responsibilities. The TPM organization also creates a system of accountability that keeps the teams focused and moving forward. And finally, TPM promotes the ownership of equipment by the people who are closest to it – the operators and maintainers.

Getting the Team Focused

Maximized Manufacturing focuses on a machine center where CPY can be measured and a goal can be set. The team is comprised of area operators and maintenance personnel, typically led by a process

engineer or supervisor who is the official area TPM coordinator. The team attends a four hour workshop to learn the TPM basics and how to measure CPY. Brainstorming sessions on each shift follow in order to identify the sources of loss in their area. The team uses downtime notes, operator sheets from the previous year, and the experience and intuition of the workers to identify the losses.

Developing Solutions

The team looks for and implements solutions that eliminate the sources of identified loss. They use the TPM checklist containing standard actions to reduce losses. These core TPM activities are now done in the context of identified losses. Implementing the check list also means that some routine maintenance tasks are transferred to operations, helping to build ownership and ensuring that defects are detected and managed.

Engaging the Front-line

In the process of implementing TPM, there were still many pockets of confusion within the organization concerning the different initiatives. Whirlpool sought a tool to show how all the pieces fit together. They discovered the Manufacturing Game[®], which gives participants the ability to see how one moves a manufacturing organization from reactive operations and poor reliability to high reliability and a proactive approach.

The simulation and resulting action teams played a key role in changing the culture at Findlay. Most participants in The Manufacturing Game[®] are now strong proponents of eliminating defects and unplanned downtime. The relationship between maintenance and operations has turned from adversarial to cooperative.

The simulation also changed management's thinking about planned work and helped the

leadership team realize that success in eliminating defects ultimately means less PM work, which both increases throughput and lowers costs.

Leadership of the Effort

The leadership approach had to reflect the partnership between maintenance and operations. Production could no longer use maintenance as a scapegoat for missed production goals, and maintenance would have to find a better method of meeting production needs. Building this partnership meant taking time to build a common vision and including plant leadership.

Maintenance has taken a leadership role in the Findlay plant because it is the only department that sees the entire operation. This unique perspective and the need to balance resources allows the maintenance department to prioritize the improvement efforts more effectively than compartmentalized operations groups.

Production is the eyes and ears of the equipment. They see little problems as well as big breakdowns, and have far more knowledge of the condition of equipment. They also play a role in eliminating small defects, which can help eliminate bigger problems.

The TPM area teams perform the true work of improvement. These groups are the lifeblood of the TPM initiative, providing input to identify equipment and process problems and solutions that eliminate problems.

The implementation teams are supported by a TPM steering committee comprised of the production and maintenance managers, who meet monthly to review the progress of the implementation teams and to help remove obstacles and provide focus for the team. The TPM steering committee tries to identify best practices that can be used in other areas of the plant, publicizes successes, and looks for

opportunities to spread the TPM approach in the plant.

Results

Capacity at Findlay Division has increased over 20% without any major capital expenditures in the last year. These gains were made through the ideas and hard work of the front-line employees. Maximized Manufacturing, including TPM and the action teams launched as part of The Manufacturing Game[®], have generated substantial gains in CPY in most of the plant core processes.

The Doorframe and Auto Collar Lines

The doorframe and auto collar lines provide great examples of how Maximized Manufacturing blends different initiatives into one effort to improve CPY. They also exhibit the kind of ownership, commitment and action generated by the front-line. This team improved the CPY of the doorframe line by 21% over a couple of years and the CPY of the collar line by 12% in a year and a half.

The team used TPM cleaning and inspecting activities to identify problem areas on the equipment. Cross-functional teams also attended the Manufacturing Game[®] and were formed into several action teams. One of these action teams modified a bracket magazine that had been shutting down the line. Their efforts produced an annual savings of \$45,000. Another action team addressed a safety issue created by a burring problem. In addition to improving safety, this team obtained a \$6,000 per year process savings.

Lower Defects Lead to Lower Costs

Eliminating defects in the system and the ensuing losses cut a significant amount of wasted time and resources. Consequently, the Findlay Division reduced spending by over \$1 million. While production and throughput have gone up significantly, costs have actually gone down.



250 E. Ponce de Leon Ave., Ste. 432
Decatur, GA 30030
(404) 370-3900
(404) 633-0992 Fax
web site: <http://www.mfg-game.com>
email: info@mfg-game.com

TMG News

"Whirlpool" continued from page 3

The Culture at Findlay Shifts

The leadership at Findlay believes that improvements are just the beginning because workers have shifted from being skeptical of CPY to embracing it. The elimination of defects has become a widespread discipline, and the benefits will likewise reach far.

Summary

The Findlay Division of Whirlpool has found that an integrated approach to manufacturing improvement can produce significant improvements in throughput while simultaneously lowering operating costs with little or no capital expenditures. The keys to success of Maximized Manufacturing have been:

1. *Support from key leaders in maintenance and operations from the start.*
2. *Integrated, not competing initiatives.*
3. *Passion and ownership from the front-line built by The Manufacturing Game® and Action teams.*
4. *A focus on elimination of defects and unplanned work and.*
5. *Ongoing support, cheerleading and accountability from plant leadership.*

As these things have come together at the plant, gains in performance that initially seemed implausible are now a reality. The present challenge is to continue evolving and sustaining improvements. Further developments, such as Reliability Centered Maintenance (RCM) and Lean Manufacturing, will continue the challenge in the "Improvement Process."

"Success Stories" continued from page 1

The root cause was identified as inadequate greasing and lubrication. The action team comprised of maintenance and operations teams coordinated greasing and lubricating while the soot blowers were activated, resulting in a significant reduction in the rate of failures, increased soot blower operational life, and reduced maintenance requirements.

(This Action Team success story was originally written by BP's Dylan Peters and published in BP Amoco's Grangemouth refinery's "Defect Eliminator")