



Keep the Bugs Out of Capital Projects!

An Introduction To The Project Value Game®

A client of ours recently expanded one of its facilities. The goal of this expansion, if you asked the project manager, was to deliver the specified design in the designated time at or below budget. With a heavy focus on cost and schedule, they were able to hit the budget and actually deliver ahead of schedule. Sounds like a successful capital project.

Not exactly. During start-up a host of engineering mistakes, poor craftsmanship and ill-suited equipment caused costly delays. Months after start-up the facility still is well below intended capacity and over budgeted costs. This example illustrates the phenomenon we see all too often: project success is not aligned with organizational success or with the original justification for the project. Why did the client above take on the expansion? To be on-time? To be on-budget? Of course not! People familiar with TMG should recognize that these are consequence measures and not goals. The goal of the expansion was to produce a new profitable product in a safe, reliable facility. Somehow, in the translation from an AFE to specification, that goal was lost and the focus shifted to delivering specs on-time and on-budget. When projects lose their focus on long term value, they are likely to introduce new defects and poor reliability to the plant.

The quality of project execution is relevant to operations and maintenance because it can be a major source of defects. TPM literature asserts that up to 75% of the failures in a plant are designed in. But to eliminate these defects at the source, you must tackle the prevailing culture of project management. Following are some examples of this culture that we have seen first hand at client sites.

You Light up My Life!!

Kay Barecky: *The Manufacturing Game® with The Premcor Refining Group, Inc.*

YOU LIGHT UP MY LIFE! That's what Kelly Taylor, head operator and amateur astronomer, is doing at The Premcor Refining Group, Inc.'s Port Arthur Refinery (formerly Clark Refinery) at Port Arthur, Texas—and he has saved the company thousands of dollars in the process.

After attending a Manufacturing Game® workshop, Kelly had the backing from plant manager Don Kuenzli, the head of maintenance, and other Port Arthur refinery management to spearhead an action team to improve the approximately 20,000 lights at the refinery, reducing cost and increasing efficiency. The original action team, consisting of Kelly, Jeff Felder (the purchaser) and Phil Losack (line-gang electrical supervisor over outside lighting), researched the effect of installing \$20 shields over lights and discovered the shields increased focused lighting by 130%. The new shields now cover 70% of the lighting in Kelly's area. The team also got the heads of the refinery's electrical team (Kurt Schexnayder, Mike Foster and Bill James) and the shield manufacturers (Appleton and Crouse-Hinds) involved.

Reducing Cost

Using lower wattage bulbs to reduce electrical operating expenses is another cost-saving initiative the team is implementing. They now replace dead 100-watt or

150-watt high-pressure sodium ballasts with 50-watt or 70-watt ballasts. This initiative is a direct result of Kelly's survey confirming that the workplace had eight times more lighting than necessary, much of it misdirected upward, forming a light dome visible at night from 25 miles away.

Traditionally 150-watt incandescent bulbs using 1760 lumens illuminated most work areas, but the team discovered that 4000 lumens can be efficiently focused on work areas using only 50-watt high-pressure sodium bulbs with shields. Sixty percent of the 250 to 300 lights in Kelly's area have been replaced, and several 450-watt outdoor fixtures have been eliminated. Unfortunately, most lighting at this refinery cannot be turned off during daylight hours, despite the manufacturer designing the lights to be off 11-1/2 hours daily, because lighting and instrumentation circuits are integrated. The action team is looking for ways to segregate the lighting circuits from instrumentation.

Energy costs are a big concern at the refinery. The action team is particularly concerned with upcoming electrical load issues in conjunction with monetary considerations. Although the refinery produces most of its own power in high efficiency cogeneration plants, summertime peak loading requires purchasing additional power at an average cost of 3.3

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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.

September 20, 2000
Productivity Inc.
TPM Conference
Dallas, TX

For registration information call (800) 394-6868 or register online at www.productivityinc.com

October 4, 2000
SMRP Conference
Cleveland, OH

For registration information call (800) 950-7354 or register online at www.smrp.org

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/cccl>



My Life...

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cents per kWh, and frequent power curtailments require the use of less efficient generators which cost as much as 20 cents per kWh to operate. The new Heavy Oil Upgrade Project (HOUP) may require more power purchases in the future, draining available resources even more.

Improving Safety

On the safety side, an overlit workplace causes glare from safety glasses reflecting too much light. This leads to fatigue and stress. The shields and lower watt ballasts have gone a long way toward eliminating this type of eyestrain.

Addressing Environmental Concerns

As an amateur astronomer, Kelly Taylor realizes that overlighting severely impacts migratory birds and certain amphibians, and hinders astronomers. This is what originally sparked his interest in tackling this project. The Port Arthur refinery wants to set an example in caring about the community, the environment, saving money, and eliminating aggravating glare and stress. Kelly credits International Dark Sky (www.darksky.org; phone: 520-293-3198), a worldwide environmental association, with providing the data that impassioned him to confront energy wastefulness, starting in his own area and expanding to encompass the refinery community.

Because of the improved lighting, a machinist recently tore down an oil-feed steam turbine without even using a droplight—possible only because the shield was up. He saved at least two hours by not having to get the droplight and take it back.

The Premcor Port Arthur Refinery four-step plan is:

1. Improve existing lighting by shielding which results in 130% increased lighting over work areas. As existing fixtures need replacement, replace 100-watt fixtures with 50-watt fixtures where lighting levels permit, at the average purchased cost

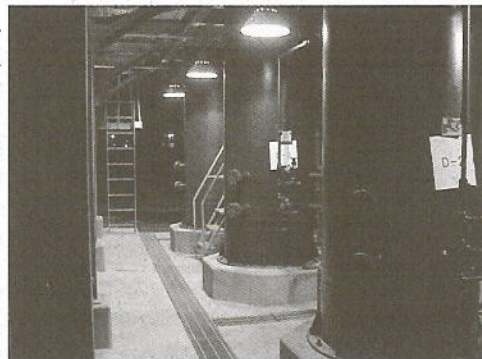
of 3.3 cents per kWh, resulting in annual savings for the refinery of about \$18.50 per fixture. If they can rewire and turn lights off during daylight hours, the savings jump to \$28.65 per fixture annually. Given the large number of fixtures at this refinery, this will constitute a substantial savings.

2. Determine what optimum lighting is (according to OSHA), standardize light fixtures normally used on all units, and align with specific manufacturers as ballasts are changed out to take advantage of bulk rates.

3. Eliminate all unnecessary lighting. For example, each 400-watt pole light fixture costs about \$131 to run annually; the 1,000-watt fixtures cost about \$315 annually. Eliminating 50 unnecessary pole lights would save an average of \$6,576 a year at a one-time labor cost of one hour (approx. \$20) per fixture.

An example of superfluous lighting is the contractor's trailer that no one uses at night, routinely furnished with two 1,000-watt outdoor light fixtures. Each fixture costs \$900 plus \$315 in annual operating expense. The defect elimination team is asking, "Why?"

4. Get shields installed from the beginning of the new HOUP project and lighting circuits that are designed to automatically shut off during the day. Contract electricians include light shields on bid sheets, but they're not always putting them up. Kelly takes personal responsibility for holding contractors accountable to put the shields on.



According to International Dark Sky, this refinery is the first large corporation in any industry to pursue lighting efficiency improvements of this magnitude. Kelly summed it up, "I tried this before and got nowhere. Until proactive manufacturing was pursued, there was no way to make this happen, until Don (the plant manager) gave us his support and encouragement to eliminate defects. We want to be the most efficient we can, and to be the best."

Action Teams in Action



What's up with BP-Amoco—Greater Forties? In less than three months, 42 action teams have formed, and by mid-June almost one-third of those teams swapped congratulations. Thirteen teams have completed work that, when fully implemented, will result in an **annualized** estimated gain of **437,000** barrels of oil, **1700** manhours and **annual** budget savings of about **\$520,000**. The implementation cost will occur one time only, totaling approximately \$65,000. Each of these 13 action teams also made strides in health, safety and environmental improvements which are not easily quantifiable in dollars.

The current successes have a history rooted in The Manufacturing Game® (TMG) which was brought into Forties in 1997, but more recently, Supervising the Change Process workshops have kicked defect elimination efforts into high gear.

By October 1997, four TMG workshops resulted in six newly trained and certified facilitators in Forties & Wytch Farm. Further workshops were run through the first half of 1998, with other assets sending attendees. This was all concurrent with a reorganization affecting Forties, which changed Forties from platform-based business centers to a field-based business center (i.e., instead of each of four Forties platforms running as separate business units, the four platforms became one business center). During the reorganization, an Operations Excellence Facilitator (OEF) role was created in order to coach operations and the field maintenance teams. The second half of 1998 brought the organizational change implementation offshore. Consequently, TMG workshops were held in abeyance until these new changes could be completed.

During 1997 and 1998, about 250 employees participated in TMG from Forties and other assets. Of these, about 60 employ-

ees remain with Greater Forties today.

During the first half of 1999, the implications of BP's merger with Amoco spread to Forties which became Greater Forties Unit (GFU) with the addition of two other oilfields in the same region (Andrew and Montrose/Arbroath). Defect elimination emerged as a key focal point after the merger. Plant operators continued to focus on procedures, monitoring to identify defects, and avoiding shutdowns through proactively correcting defects once identified. The maintenance team made regular one month long visits to each platform. However all was not smooth — the maintenance team would be called away from their regularly scheduled preventive maintenance functions in order to deal with shutdown situations on any of the four platforms. The planned maintenance schedule would then fall behind, sometimes delayed until the team was due back four months later.

At the end of 1999, the management team reviewed organizational effectiveness. While they felt the organization was performing adequately, they agreed there was still an unacceptably high level of equipment breakdown and decided to raise the priority on defect elimination. In January and February 2000, two Supervising the Change Process (SCP) workshops were conducted, primarily for the management team. Participants included all senior management and a portion of engineers and first-line supervisors (about 60 people). These workshops focused on the managers in order to get their commitment to make defect elimination a priority item. Approximately one-third to one-half of these leaders had also previously played TMG. The Operations Delivery Team Leader came out of the SCP workshops issuing a clear statement to be disseminated throughout the organization: "We are committed to remove defects—both major issues and irritant distractions."

From that point, Offshore Installation Managers, who report to the Operations Delivery Team Leader, gathered their subordinate teams to brainstorm identifying, targeting and eliminating defects through

action teams. A key impetus to successfully completing defect elimination goals has been the OEF's role in coaching everyone (at all levels) in the action team process and removing obstacles from the teams' paths when possible. Warren Burgess and Nick Wayth have been responsible for coaching the effort at Greater Forties, and recently the number of site facilitators has been increased to four. Warren commented that the SCP workshops were valuable in clarifying leadership styles and helping everyone recognize which style is most effectively used in different situations.

Plans going forward emphasize the continuing identification of defects and forming new action teams. Greater Forties management support for defect elimination is evidenced by the recent increase in facilitator support from two to four OEFs. Marshall Gile, the business unit leader, is a keen supporter and has expressed the hope that everyone involved will receive recognition for their success in completing action team goals.

We expect more good news from BP-Amoco in the near future as the action teams continue progress with their missions, tabulate successful gains and identify new opportunities for defect elimination.

The 11th Annual TPM Conference sponsored by Productivity Inc. will take place September 19-22, 2000 at the Adams Mark Hotel in Dallas, TX.

The Manufacturing Game® will conduct a public workshop session on Wednesday, September 20, 2000. We will also participate as an exhibitor at The Plant Operations and Maintenance show. Come visit us in booth #200.

For further details about the conference or our public workshop please call (800) 394-6868 or online at www.productivityinc.com



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Capital Projects...

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1. Quality assurance work is purposefully left out of estimates to enable projects to get justified even though everyone knows that "debottlenecking" will have to be done on the plant's nickel to get the facility up to rated speed.
2. The people who will operate the facility are brought into the process at the last possible minute. Immediately after start up, maintenance spends significant time and money replacing or fixing equipment that they believe was mis-specified or installed incorrectly.
3. Organizations chronically under-resource key engineering tasks in the front-end that ultimately drive up construction and operations costs.
4. Other than Haz-Op analysis very little risk analysis is done in the front-end of the project.
5. Most projects track few if any performance metrics other than cost and schedule.

If project performance is going to improve there must be a change in mindset and approach by project teams. Our newest product, The Project Value Game® (PVG) helps participants make the connection between business value and good project management practices. We offer The Project Value Game® as part of two different on-site workshops that can be tailored to the needs of the specific participants:

1. Project Launch: This workshop is for project teams at the beginning of a new project, like the construction of a new plant, a major expansion, or a turnaround. The workshop uses The Project Value Game® experience as a springboard into real world work on a pending project. The purpose is to get the team started on actions at the front-end of a project that can prevent problems and crises during execution and beyond.

For example, at a recent *Project Launch* workshop for a petrochemical manufacturer, the project team created a plan for mitigating previously underestimated risks in the process

design. This same team also discovered that several of the key front-end loading tasks were under-resourced and would probably not be done well. The team created an action plan to diagnose the resource needs and prevent the inevitable scope change that would ensue if these activities did not get the attention they deserved.

2. Project Connections: This workshop is for project leaders anywhere in the organization. The purpose is to improve project performance by making a connection between the lessons of The Project Value Game® and an organization's current project methodology and tools. It serves as an excellent catalyst for project management improvement and training efforts, particularly those geared at small and mid-sized projects.

With both workshops, the bottom line is finding a way to refocus projects from the short-sighted time and cost perspective, to a more holistic view of their work. We have found that when we do this, people discover new ways to work together to deliver more value to their organization.

TMG News