



Asset Performance Networks

A Culture of Turnaround Excellence *How a mid-size refining company went after it*

By

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During the last couple of years, the refining industry enjoyed record margins. Rising demand and tight crude supply pushed prices upward, starting from a low of \$1.01/gal in February 1999 to a peak of \$1.67/gal in June 2000. Thereafter, prices eased, averaging \$1.57/gal in April 2001. In such an environment, general economic theory indicates that utilization of manufacturing capacity should increase. It did not!

Although available capacity modestly increased during the period, utilization decreased by a whopping 3 points from its 1998 peak of 95.6%. Further study shows that the main culprit behind this decrease in utilization was poor turnaround performance. In the past few years, the industry has been riddled with poorly executed turnarounds, and 40% cost overruns and three-week schedule slippages became familiar. To achieve annualized turnaround cost benchmarks, the industry focused on extending run-time between turnarounds, while downsizing its experienced personnel. The result was a net negative. Poor reliability, forced outages, and prolonged turnarounds prevailed.

The value behind improving turnaround performance has been long overlooked in the refining industry. Some refiners have recognized the need for turnaround improvements. However, the results have been mixed, at best, even for refiners that have recognized the need for improvements. Yet by considering how a mid-size refining company successfully instituted a culture of excellence in approaching and managing turnarounds, we can derive lessons that will benefit other refiners.

It is important to mention that improving turnaround performance for this company was not a stand-alone initiative. It was one of many improvement initiatives that shared common corporate objectives. At some level the company's approach was not much different from others trying to implement corporate-wide improvements. Underpinning this company's approach, however, were subtle yet extremely effective themes that contributed to successful implementation.

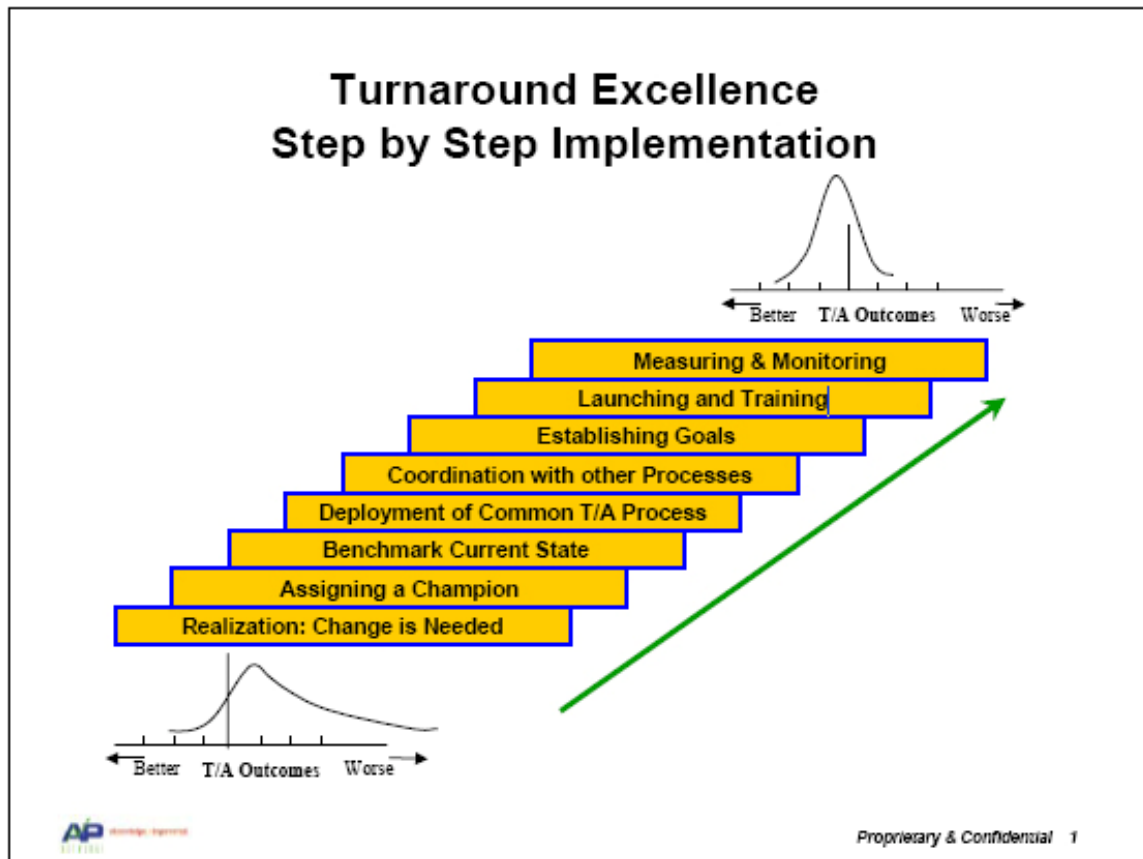
Realization and Resolve

Senior management at the company came to the realization that long-term competitiveness is the product of a collaborative culture of excellence that permeates the enterprise. For this culture to take root and thrive it must be transparent, evident, and visible everywhere – e.g. exemplary conduct of operations, environmental fidelity, immaculate housekeeping, seamless maintenance, excellent material plant condition, aligned processes, well-trained workers, accurate and timely configuration control, professional and deterrent security, honest contractor relations, streamlined 360° communications, efficient and effective meetings, active community citizenship, buoyant working atmosphere, and the list goes on. Many companies that have managed a rebirth

of their culture in the past decade to create robust shareholder value have adopted these principals, e.g. GE, IBM, and others. With some retrospective reflection on my part, this is also not very different from how Mayor Rudy Giuliani succeeded in turning around New York's image, and then its security and economic performance.

“Culture” that characterizes any group is made of the knowledge, beliefs, customs, and practices shared within the group. These are taken for granted, but they guide attitudes and behaviors, which in turn determine actual outcomes. When a business seeks to improve its performance, it must examine its culture and assess the impact of its practices on the desired results.

With that in mind, senior management at the company focused its attention on a survey administered by a third party aiming to identify barriers to better teamwork. Among other areas, the survey indicated that turnaround events were one of the major culprits behind departmental divisiveness. Poorly conducted turnarounds may have been one of the major impediments to achieving a collaborative culture of excellence. In addition to creating an extremely stressful climate, recent poor turnaround performance had drained the organization's morale and created an atmosphere of cynicism. Furthermore, it was already apparent to senior management that recent turnarounds had cost the company millions of dollars in cost overruns, delays, and an undesirable public image. Senior management decided to act.



Empowering a Corporate Champion

The first step was to select a senior manager (corporate champion) to spearhead the turnaround improvement initiative across the company and to establish a common culture of how turnarounds were planned, executed, managed, and measured. Selecting a corporate champion to lead an initiative is fairly ordinary, but a few important decisions were made that helped to drive the ultimate success of the initiative:

1. The corporate champion was dedicated to turnaround improvement across the corporation and no other task;
2. The ultimate objective for the corporate champion was to promote a collaborative culture of excellence through improvements in the turnaround area. This is a subtle but important distinction from improving turnaround performance; and
3. The corporate champion was empowered to institute change, and perhaps more importantly to recommend turnaround Key Performance Indicators (KPIs) which would institutionalize the changes after his initiative was implemented.

The corporate champion, working under the sponsorship of the manufacturing

vice president, started by forming a Turnaround Initiative Steering Team representing each site. Members of the steering team were at the department-manager level and had the authority to commit reasonable plant resources to this effort.

Understanding the Existing State

The Steering Team agreed, early on, to objectively characterize and quantify the current state. This was important for both quantifying the opportunity and motivating the manufacturing organization to support their effort. It was also important for starting to chart a path for improvements. As in planning a journey, it is important to know where you are in order to figure out the best way to get to your destination.

An outside consulting firm was hired to help the Steering Team accomplish these first objectives. The study identified gaps between turnaround practices at each plant, and ranked them against industry best practices. It also quantified turnaround performance outcomes at each plant (e.g. safety, cost, schedule, environmental, and post-turnaround availability). The performance gap between the best and the rest was measured to quantify the potential unrealized value.

The results of the study provided an objective, unemotional understanding of how predictable was the turnaround system across the enterprise. The study characterized the turnaround system as extremely variable. It also produced the following:

1. A baseline to enable the measurement of future improvements;
2. A set of measurable leading indicators that were correlated with outcomes;
3. Quantification of the stake and the alignment of all stakeholders around its importance; and
4. Objective understanding of the dependency on timely departmental input, communications, and decision-making.

Rapid Deployment of a Turnaround Management Process

Just as in manufacturing where the use of statistical process controls is necessary to optimize production, the study identified the need for a company-wide turnaround management process to bring predictability and control to company turnarounds. In addition to providing common terms and comparative measures, a company-wide turnaround process should also provide reasonable assurance around meeting cost, cycle-time, and quality targets.

The Steering Team started charting out a turnaround process, with the objective of involving and soliciting the input and approval of others from their individual plants. After a couple of false starts (and excruciating long discussions

about the fundamentals of a management process), it was realized that precious momentum would be lost during the time it would take to develop an enterprise-wide turnaround process with the deliberation, input, and agreement of many across the manufacturing chain. Moreover, there was a genuine concern that the process of developing the common turnaround process could by itself pose a serious threat to the utmost objective—namely, a collaborative culture of excellence.

Yet the need for a common process was staring at everyone and unwavering. Soon thereafter, the Steering Team realized that they were caught in their old “it had to be invented here” paradigm. Process control systems are procured from specialized companies, so why should a turnaround management process be any different. The search for an outside provider started in earnest.

The Steering Team was weary of “expert” consultants coming on board and having to come up the learning curve to reengineer what may already exist at various plants, cost a million dollars, involve 40 some-odd meetings, and take a year to deliver. With that in mind, it was important that they find a complete solution that met some minimum criteria:

1. Proven and requiring minimal customization;
2. Has intermediate measurable mile-posts;
3. Scaleable to various turnaround types and sizes; and
4. Easy-to-use and non-cumbersome, yet provides enough detail and practical aids.

In three months, a turnaround process was customized to the company and implemented. As part of the customization process, stakeholders were consulted and the critical elements of their input were incorporated into the customization effort. It is important to note that the customization was mainly to align the process with existing processes, some of which were undergoing an improvement initiative. The customization was the necessary minimal and under tight control. It was important, however, to ensure cross-functional alignment and buy-in.

Coordination with other Initiatives

The Steering Team was not only aware of other improvement initiatives within the company and the interfaces they share with the turnaround area, but was also cognizant of the impact that they have on the success of their own initiative. For instance, the management of the capital projects’ portfolio had a direct impact on the turnaround process. Therefore, it was important to align the deliverables across these processes. Here are a few of the affected processes and how they impacted on the turnaround process:

- √ Long-range business planning: The turnaround process starts with the business planning process. The business planning process delineates the objectives for each planned turnaround and defines its success envelope.
- √ Capital projects portfolio: The business planning process also ranks and lays out the capital projects portfolio over a multi-year schedule. It is extremely important for the turnaround process that the capital projects' portfolio is frozen 18 to 24 months prior to each turnaround with perhaps few fluid exceptions that meet certain pre-established criteria.
- √ Commitment tracking: As turnaround windows and capital projects are key elements of the business planning process, a commitment tracking process is as important. As a matter of fact, a commitment to an outside agency may be the pre-cursor to a number of projects or an early turnaround window. It is essential that the commitment tracking process is well aligned with the turnaround scope identification process.
- √ Work identification, prioritization, definition, and execution control: The process by which work is identified (e.g. work order request), prioritized, defined, and executed has a direct impact on the ability to appropriately identify turnaround work and plan it.
- √ Execution of planned on-stream work: The efficacy of the on-stream work process (e.g. percent completion of weekly planned work, management of maintenance backlog, etc.) has a direct impact on the likelihood of completing pre-turnaround fieldwork. Incomplete pre-turnaround work causes havoc if it slips into the draining, cleaning, and clearing window. Furthermore, the more robust the on-stream work process, the easier it becomes to keep non-turnaround work outside the scope of a planned turnaround.

Each of these examples demonstrates the importance of collaboration in order to optimize the whole, that is, the entire enterprise. Functional sub-optimization is too isolated to realize the results of leveraging the resources and processes of the whole.

Establishing Goals

After identifying the gaps and quantifying the stake, it was essential to have the appropriate stakeholders own the results and embrace future goals. It was now important to choose the right metrics that drive the desired behavior to achieve a collaborative culture of excellence. This was the main objective that the corporate champion was tasked with. Again, the rationale was that the right behaviors produce the desired results.

KPIs were based on “turnaround best practices” and “turnaround outcomes”

as follows:

1. Use of Turnaround Best Practices
 - a. Following the corporate turnaround process
 - b. Achieving a good level of readiness (a combination of status and team alignment measure) at each process phase
 - c. Departmental involvement; and
 - d. Meeting turnaround planning milestones and scope freeze date.

2. Turnaround Outcome
 - a. Safety
 - b. Environmental performance
 - c. Cost predictability
 - d. Schedule predictability
 - d. Additional scope
 - f. Reliability after turnaround completion.

Launching, Training, and Knowledge Sharing

The turnaround process was Web-based rather than paper-based. This was not only the low-cost option, but it enabled the process to seamlessly traverse departmental and geographical boundaries. Using the Web also gave team members access to other tools to measure readiness, team alignment, and turnaround risks. Additionally, the team utilized a Web-based collaboration module to share turnaround experience and knowledge.

As part of the implementation process, managers, planners, schedulers, coordinators, and others who play a role in turnarounds were trained. Training included sharing the findings from the survey and the gap analysis studies, as well as a thorough explanation of practices that are leading indicators to superior turnaround outcomes. Additionally, the manufacturing teams from all departments were educated about how important their roles and their individual contributions were to achieving the improvement goals over the next three years. The comments that came out of the training sessions indicated that the trainees felt that the training itself was well worth the effort.

Measuring, Monitoring, and Improving

To drive the right behaviors, the KPIs focused on both practices and outcomes. They were drawn out over a three-year period, with emphasis on the use of the process and best practices in the first year. Again, this was linked to achieving the ultimate goal—changing the culture. The KPIs were distributed as follows:

Turnaround Key Performance Indicators

	% Reward Based on Best Practices	% Reward Based on Performance Goals	Total Reward
First Year	80%	20%	100
Second Year	60%	40%	100
Third Year	40%	60%	100

The manufacturing vice president sponsored the turnaround improvement initiative and its associated KPIs. These became part of the manufacturing organization’s KPI, starting with senior management and cascading throughout the whole manufacturing organization. The KPIs served both to institutionalize the changes and to track progress toward future improvements through the sharing of knowledge and experience.

Early Results

It has been a little less than a year since the implementation of the new turnaround process across the company. Other initiatives have also been implemented since. Thus far, data indicate that the six turnarounds that have been through the process have had no recordable injuries, and have had good predictability in meeting their execution and startup schedules.

Cost predictability has also improved, but is still poor. The trend, albeit with few observations, is significantly improving. The cost predictability issue is being addressed, and may be the result of poor estimating techniques, or the absence of turnaround-cost forecasting tools.

Teamwork amongst the various departments has flourished. But most importantly, there is a sense of pride across the company that conveys the message: “Look at what we can do when we work together.”

Looking Ahead

Within each company there will always be the skeptics. But change requires leadership and a resolute drive to excellence as this refiner continues to demonstrate. At Asset Performance Networks, we know that such improvements are achievable across the whole industry. Another industry was able to achieve it across the board– namely the U.S. commercial nuclear power industry.

The commercial nuclear power industry made marked improvements in outage performance over the past decade. The improvements are nothing short

of a quantum leap toward excellence. Refueling outage durations consistently decreased from an average of 105 days in 1990 to 40 days in 2000. This remarkable performance was accompanied by a steady improvement in production costs from an average of 2.69 cents /KW-hr in 1990 to an average of 1.74 cents/KW-hr in 2000, and an overall improvement of 7% in capacity factor. Additionally, the rate of Reportable Incident Reports significantly dropped in the same period.

Many of the themes discussed in this paper, including structured work processes, accelerated learning structures, design basis libraries, collaborative knowledge sharing, decision basis matrices, benchmarking, and measurement systems, are credited with these improvements—. But above all else, it took the leadership and the courage to bring about corporate cultural changes to collaborate and perform with excellence.

To sum up, culture is the knowledge and practices that are shared within a company. Culture drives attitudes and behaviors, which in turn determine results. For excellent results, a collaborative culture of excellence is required. Management initiative and leadership brings it about by embracing best practices in a transparent, evident, and visible fashion.

Authors Biography: *George DeBakey* is a Managing Partner at *Asset Performance Networks, LLC*. He is a recognized expert on implementing Best Practices for managing turnarounds, shutdowns, and outages. For two years in a row, Mr. DeBakey was a member of an expert panel on turnarounds at the *National Petrochemical Refining Association* Maintenance Conference. He has led a global benchmarking study of turnaround performance and practices. As part of this benchmarking study, Mr. DeBakey interviewed more than 100 turnaround teams from 20 companies, in more than a dozen countries. In addition to identifying the drivers behind successful turnarounds, this experience gave him a unique insight into the distinctive and common challenges facing turnaround teams, and the industry at large. Mr. DeBakey brings this learned perspective to bear in helping oil and chemical companies implement Best Practices aimed at improving turnaround performance. In addition to this experience, Mr. DeBakey has practical hands-on experience in planning and managing seven refueling outages of five commercial nuclear power plants. Mr. DeBakey started his career at *Bechtel Corporation* over twenty years ago, and spent five years at *IPA, Inc.* as the area manager for the chemicals sector, prior to joining *Asset Performance Networks, LLC*. He holds BS and MS degrees in Engineering.