



# Beyond Survival: Excelling Through Operational Reliability

Version 1.0



[www.EruditioLLC.com](http://www.EruditioLLC.com)

## Table of Contents

<i>INSPIRED BLENDED LEARNING CASE STUDY</i> .....	3
Strategic Alignment of Operational Reliability.....	3
The Improvement Process.....	4
Results .....	5
Sustainability .....	6

## INSPIRED BLENDED LEARNING CASE STUDY

*By Ken Buffington, Reliability Manager*



A healthy aggregate industry is essential for economic growth within the United States. 80-90% of asphalt pavement and concrete driveways and sidewalks are comprised of aggregate materials. The aggregate industry today is faced with many challenges, including elevated transportation and energy costs, a depressed residential construction market, and a reduction in government spending for public construction projects. Add to this the fact that the top ten U.S.-owned aggregate companies only make up 30% of the overall market share and it is easy to understand why business leaders are in survival mode.

This story highlights how an aggregate business took charge of its own destiny and excelled through a program it calls Operational Reliability. From 2011 to 2012, it increased its margins 5.6% by driving down operating costs through targeted maintenance and reliability programs and implementing strategies to raise plant availability and enhance productivity. In an era when aggregate prices were plummeting by 43%, this company grew its business. At a time when its competitors were selling out and curtailing, this company became more profitable and did so without using precious capital resources.

We will refer to this aggregate company as “The Mine”. The Mine is a large, multimillion dollar operation and million ton plus a year producer of stone and sand products. The Mine is not constrained by raw material resources as it currently sits on top of a 400,000,000 ton limestone reserve nestled within the harsh southwest landscape.

### Strategic Alignment of Operational Reliability

Operational Reliability is a strategic part of The Mine’s business plan. Beginning in 2010, The Mine set out to reduce operating cost and increase plant availability above 90%. The focus of the reliability improvement efforts was to first establish a mature work execution management process by which the maintenance organization could efficiently manage plant assets without relying on supplemental contract labor. Next, The Mine would turn its attention towards eliminating “bad actors” that were contributing to downtime within the primary and secondary crushing plants. At the onset of Operational Reliability, The Mine suffered from 35% downtime, which proved to be an opportunity worth more than \$10M.

Culturally, Operational Reliability was to be a significant challenge for The Mine. Leadership knew that, despite their unified vision, supervision and hourly employees would be expected to change their day-to-day practices and habits and this would be difficult to overcome. Although a young operation with only four years under their belt, most employees of The Mine were seasoned aggregate veterans who had no doubt proven their abilities through the school of hard knocks. Change would not come easy to those who did not see a need for change.

## The Improvement Process

The timeline for the Operational Reliability improvement process was three years. In the first year, 2010, The Mine applied its energy and resources towards building the foundational elements necessary for effective maintenance and reliability management. As a first step, The Mine performed a thorough evaluation of plant assets, beginning with the development of asset hierarchies and a formal criticality analysis at both the system and asset level. From here, both the Maintenance Manager and Assistant Plant Manager led focus teams through RCM Blitz™ - an approach to designing and implementing a failure modes driven reliability strategy, returning results in a fraction of the time of traditional RCM methods - in order to identify the failure modes associated with critical assets and prioritize preventive and predictive maintenance (PM/PdM) program development. With 960 assets identified and 326 failure modes analyzed, The Mine selected and deployed five condition monitoring technologies: vibration analysis, electrical and mechanical infrared thermography, ultrasound, motor circuit analysis, and oil analysis. The Mine's strategy for PdM deployment was to train and certify three craft persons to collect data and utilize the experience of Allied Reliability for data analysis and corrective action identification. Today, this same deployment model exists and The Mine has added a certified lubrication expert, again from the craft ranks, to expand the oil analysis program.

Fourth quarter of year one, 2010, and into year two, The Mine targeted the work execution management process by implementing a computerized maintenance management system, eMesa Live, and developing formal business processes, which today govern how work is identified, approved and prioritized, planned and scheduled, and executed in the field. Initially, The Mine created a single Planner position to support the 26 maintenance craft persons responsible for keeping the plant running. This proved to be a challenge as the newly defined PM tasks were scheduled and implemented due to the enormous increase in proactive corrective work that needed to be planned and coordinated. Today, because of its success, The Mine has added a dedicated maintenance Scheduler and a second Planner/Scheduler to continually improve the organization's ability to improve craft labor utilization and reduce contract labor costs.

Now in its third year of the Operational Reliability program, The Mine steered improvement efforts towards reliability engineering and optimizing MRO – maintenance, repair, and operating supplies – inventories. Although a formal kitting and staging process was implemented in 2010, The Mine was not properly staffed to manage the demand for parts coming from a maturing, proactive work execution management process. Additionally, The Mine did not have a firm grasp on the types and volumes of spares that needed to be maintained in the warehouse. This effort is

ongoing with the recent addition of two storeroom clerks and a focused effort to begin compiling equipment bill of materials.

To enable a dedicated reliability engineering program to take hold, The Mine separated the role of Maintenance Manager and Reliability Manager. Once the Maintenance Manager's position was filled, the Reliability Manager transitioned away from facilitating the work management process and centered his attention on resolving problems impacting primary and secondary crushing plant availability. Through weekly reviews of plant Overall Equipment Effectiveness (OEE) and bad actor reports generated by eMesa, the Reliability Manager continues to facilitate root cause analysis and works hand-in-hand with the Maintenance Manager and Plant Manager to identify economical solutions to repetitive problems.

To address the culture change challenges, The Mine created three sponsors and aligned its improvement efforts with a project charter. Throughout the three-year journey, as once the Maintenance Manager, the Reliability Manager served as the champion for Operational Reliability. His dedication to the program did not waiver as he remained consistently engaged in all aspects of the program's development, often taking the lead to analyze asset criticality or develop PM procedures. No job was too big or small for him to actively participate in the improvement process. The Assistant Plant Manager spearheaded "gemba walks" to engage Supervisors in the identification of unhealthy assets and correct deficiencies that had been unresolved for far too long. This helped create a sense of ownership within the operating ranks. The Plant Manager has served as the primary sponsor for Operational Reliability, clarifying expectations as the needs of the business changed, removing roadblocks, such as resource issues, to ensure that the program did not stall, and monitoring performance of the project to verify that solutions developed under the watchful eye of both the Assistant Plant Manager and the Reliability Manager were indeed benefiting the organization and maintaining alignment with the overall goal of driving plant availability above 90%.

## Results

Today, the biggest result that is recognizable throughout The Mine is advancement in cultural maturity. Maintainers and Operators are more aware of their actions and how they might impact plant performance. Supervisors have institutionalized behaviors within the new work execution management process in order to ensure a focus on proactive maintenance vs. reactive maintenance. Leadership has also matured. With their sights set on maintaining visibility of a 4-6 week maintenance backlog and keenly aware of changes in OEE, plant management is leading the Operational Reliability program, not just sponsoring.

Did Operational Reliability deliver on the business case? It absolutely did, and then some. By end of year 2012, just two years into its journey, The Mine had recognized a 5.6% increase in operating margin and was sustaining a plant availability of 86%, up 12% from the previous year. Maintenance costs were down \$0.11 per ton, which equates to an \$825k reduction, and tons per



[www.EruditioLLC.com](http://www.EruditioLLC.com)

man-hour improved from 31.3 to 42.6. Sure, there are still some touch-and-go moments when the plant is not performing as desired, but the organization as a whole is capable and confident in its ability to manage these anomalies before the bottom line is unrecoverable. By midyear 2012, The Mine had increased headcount by three, as discussed, but was able to sustain the maintenance cost savings by continuing to reduce contract labor costs. Plant availability also continued to improve with both the primary and secondary crushing plants maintaining 89% or greater.

## Sustainability

The look forward for The Mine is bright. The corporation has approved a 10 FTE – full time equivalent – headcount increase, which is a triumph in itself, due to the success of the Operational Reliability program. These resources will continue to enable The Mine’s reliability efforts and aid in its ability to shed nearly \$1.9M worth of contract labor costs over the next three years. With the addition of the MRO storeroom clerks and a dedicated focus on optimizing MRO inventories, The Mine hopes to reduce expenditures by another \$900K in three years. As for plant availability, the Plant Manager continues to set expectations for 92% in 2013 and 95% in 2014. With government projects starting to emerge locally for The Mine, the additional capacity that will be delivered through the Operational Reliability program will be a victory celebrated by The Mine and its parent corporation.