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"Six Sigma for asset dependability reduces the variation in design, procurement, installation, operation, reliability, and maintainability of equipment assets in order to provide predictable performance at optimal cost of ownership."

The intent of these words has long been familiar to the reliability and maintenance community. What has been added are the words "Six Sigma."

Originated by Motorola, Six Sigma took hold in a big way in the early 1990s. The focus was reducing variation in manufacturing processes. This was key for the semiconductor industry in its race to stay ahead of the Japanese. Companies such as Compaq, Intel, and Texas Instruments made great strides in manufacturing productivity. Along came the conglomerate giants such as ABB, AlliedSignal, and GE. Six Sigma is demonstrated to be an effective productivity and cash generator for aerospace, automotive, electrical, chemicals, plastics, and others.

As we began the 2000s, Six Sigma found new "processes" to fix: transactional, design, marketing, and new partnerships in Lean and supply chain. Now we are seeing Black Belts birthed in nonmanufacturing business segments; transportation and financial are among the industries using Six Sigma to enhance productivity.

But wait a minute—is Six Sigma in manufacturing fully matured? Are these Black Belts and Green Belts becoming more a "minimum expectation" in manufacturing? I think the answer is "yes" with one exception. Manufacturing will NOT achieve Five Sigma, let alone Six Sigma, for its internal operations unless it realizes the value of Six Sigma in asset dependability. It's been my experience that the petroleum and chemicals sectors have recognized the value of predictable, stable operations in which asset dependability has played an important role. But have they truly achieved Six Sigma performance in the reliability and maintenance processes? I'm referring to the work processes: dependability in capital design, stores, planning and scheduling, hazardous work permitting, outside support services, reliability methods, work execution, etc.

With perhaps the exception of the aforementioned semiconductor manufacturing sector, my experience with discrete manufacturing has revealed very little regard for the value of asset dependability. The environment is predominantly reactive. Operations has little patience for

preventive maintenance. There is hardly a whisper of predictive or proactive maintenance, and reliability engineering is virtually unheard of. Work processes hardly exist. Operations operates and when it fails, maintenance repairs.

Interestingly, these companies are spending tremendous dollars and resources in people, training, and improving the sigma level of their suppliers. Why do these companies all but ignore their assets' variation in reliability, and the work processes to ensure on-going performance predictability? How can manufacturers espouse to becoming Lean when their continuous flow is interrupted by unplanned equipment downtime?

After seeing the data and talking to some of the leaders, I am convinced the answer is "they don't get it." There is a tremendous paradigm that assets are there at the whim of operations, and maintenance is "staffed to react." Data reveals their overall equipment effectiveness (OEE) capability to be less than 60 percent on average. Best-in-class petroleum and chemical operations have OEE in the 90 percent plus range. Benchmark for discrete operations, I am told but I haven't seen it yet, is 85 percent. Discrete operations have a greater degree of labor cost intensity than continuous processes.

If OEEs were driven to 85 percent, discrete operations could eliminate overtime and even eliminate a second or third shift of operation per week. If business is great, the company can achieve more capacity out of its existing equipment. This seems so obvious, but the folks leading the discrete operations typically don't have a clue concerning their OEE capability.

If your company is truly committed to the Six Sigma philosophy, it needs to get on board with asset dependability as a key component. Even if your company is not going down the Six Sigma path, you should consider carefully that these skills are becoming more the rule to the profession than in the past where the "chosen few" were tapped to become Black Belts. My company offers Six Sigma specialization in asset dependability, as may others in the future. My promise is that you will look at your job and the world of productivity through a new set of lenses if you elect to certify as a Six Sigma Green Belt or Black Belt. **MT**

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