

The Financial Benefits of Reliability

An effective focus on asset reliability is not just about keeping a plant functioning efficiently and maximising output, it also boosts financial performance. People, processes and the right mind-set hold the key to success. A focus on reliability is a great investment.

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WHEN MANUFACTURING organisations look to asset reliability to improve their facilities, there is often one main driver behind this decision: financial performance. There are many reasons to employ reliability practices including improved safety and production, but many companies focus on reliability initiatives because they touch so many aspects of the business and yield strong financial results.

Reliability in this context is the probability that an item will do what the user needs it to do, under stated conditions for a specified period of time. In the manufacturing world, it is simply: *What is the likelihood that my manufacturing line will produce quality product at full rate for the next month when operated within its design capabilities?* Obviously, the goal is to keep that probability as close to 100 percent as possible to maximise the output of the plant.

It is important to realise that the inherent reliability of a system is a func-

tion of design; a poorly designed system will never be reliable, and no amount of maintenance investment will improve it. Our actions can either preserve this inherent reliability or destroy it.

Reliability Depends on Plant Personnel

Let us consider some of the reasons that the probability might be reduced to significantly less than 100 percent. Nearly every function in the plant that has anything to do with the assets has the potential to negatively impact reliability.

Engineering can destroy reliability by producing marginal designs that operate outside of the equipment's *comfort zone*. For example, selecting an oversized pump that operates far from its best efficiency point on the pump curve will not be in hydraulic balance and will have a relatively short life. Arranging equipment in a way that makes it difficult for the operators and maintainers to clean, inspect, and lubricate it will also reduce reliability.

Procurement personnel can destroy reliability by selecting substandard parts or equipment that does not meet the OEM specifications. They can also select contract personnel who do not have the requisite skills and knowledge to perform quality work.

Storeroom personnel can destroy reliability by failing to care for the parts under their control. It is common to see bearing damage on large rotating assemblies due to *false brinelling* of bearing races because the rotating elements were not periodically rotated, and they developed pits in the races where metal-to-metal contact occurred. Contamination with dust, dirt and moisture can damage precision mechanical assemblies as well as sensitive electronic components.

Operations personnel can destroy reliability by operating the equipment beyond its capabilities, or failing to follow gradual start-up and shutdown procedures. They can also fail to heed the early warning signs of equipment in distress and neglect to take corrective action in a timely fashion.

Maintenance personnel can destroy reliability by neglecting to provide the routine care and lubrication that the equipment requires. They can also shorten equipment life by failing to use care and precision techniques (such as keeping the rebuild area clean, ensuring assemblies are within proper balance and alignment tolerances, and failing to properly apply torque fasteners) in executing a repair.

An organisation that has a reliability

focus is more likely to proactively address these issues within each function. They understand that to achieve high reliability they must not create avoidable *defects* that eventually will have to be addressed through the application of maintenance dollars. Such organisations usually have two common characteristics: a relentless desire to understand the operating condition of their assets so they are not surprised by an unexpected failure, and the firm expectation that the equipment is not supposed to fail and, if it does fail, it is caused by a correctable error that, if understood, can be eliminated in the future.

Financial Return of Reducing and Eliminating Reliability Losses

While there are several ways an organisation will benefit by a greater focus on reliability, generally the greatest value comes from the increased availability of the equipment. Assets that operate longer between outages produce more sellable product volume. The incremental volume produced by more reliable

equipment carries a greater profit margin because the fixed costs were already spread across the baseline volume. Even if the business is not in a sold-out capacity and the additional volume is not needed, there are opportunities to make adjustments to operating shifts to reduce costs.

Increased reliability also results in a more stable process, so those in the continuous process industries will find that the incidence of quality losses due to unstable operating excursions is reduced. This has a corresponding reduction in waste and scrap costs. Minor stops and speed losses are also reduced due to the stability of the process, so reliability has

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a positive impact on all the factors of overall equipment effectiveness – availability, quality and throughput performance.

When reliability is improved, maintenance costs are also reduced – often dramatically. It is not unusual to see a 50 percent or greater maintenance cost reduction as an organisation makes the transition to a reliability focus. As mentioned above, unnecessary maintenance repair work is eliminated because the various functions are no longer creating defects that must ultimately be repaired.

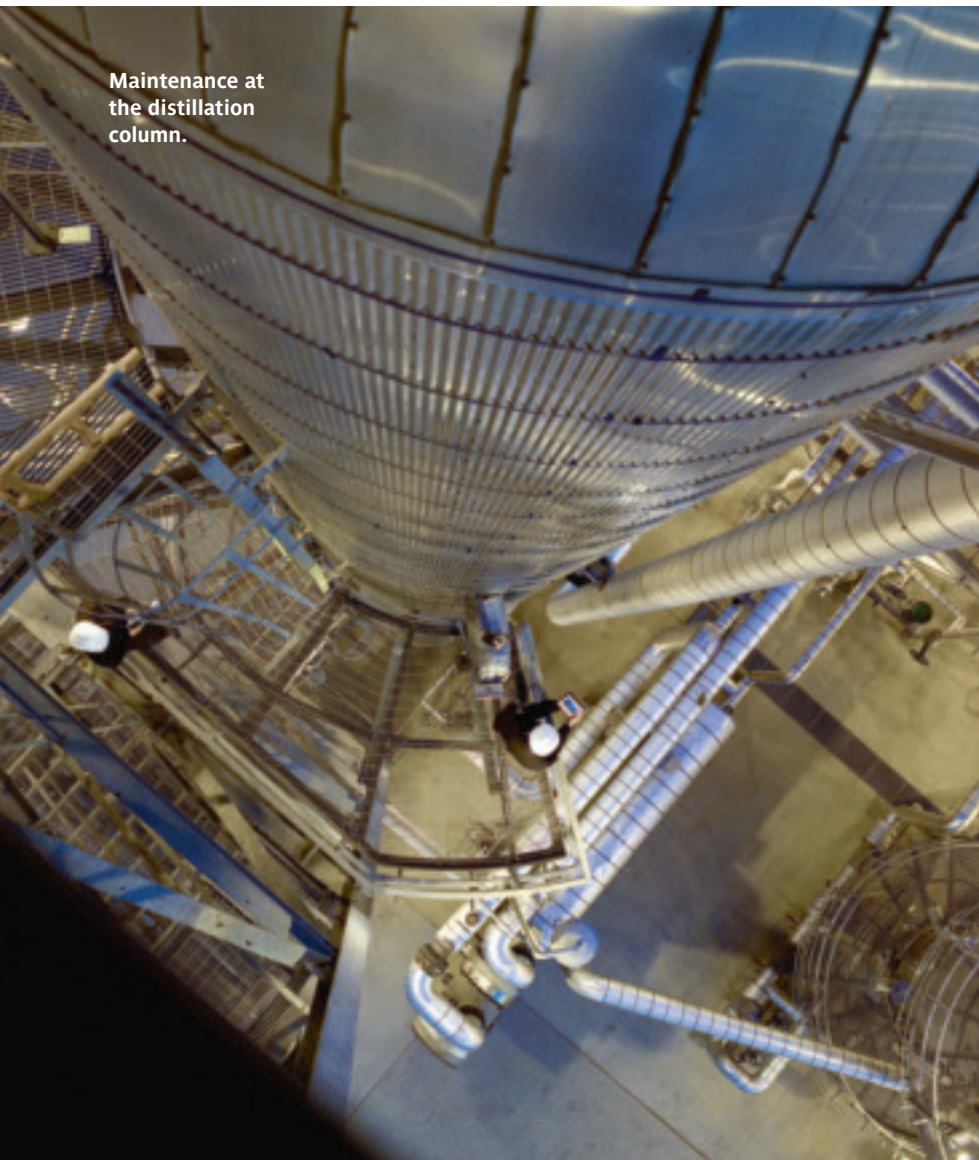
In addition, with the application of condition-monitoring techniques, necessary corrective action can be taken while the scope of the repair is still small and collateral damage has not yet occurred. For example, if a bearing defect is identified in the early stages of failure, it can simply be replaced, but if it is allowed to run to failure, the repair is much more costly because the bearing, seal, shaft, housing, etc., must all be replaced.

A focus on the reliability of the energy systems can also yield significant cost reductions. Energy consumption can be reduced by eliminating steam, compressed air and water leaks. Energy losses through the building envelope are reduced through infrared thermography surveys. This technology is also used to identify and correct faulty electrical connections in the power distribution system, which wastes energy through increased resistance.

An organisation with a focus on reliability understands the operating condition of their equipment, providing enough advanced warning of problems to enable just in time parts procurement. Spare parts inventories can be reduced, releasing working capital for other uses and reducing carrying costs that can be 25-30 percent of the inventory value on an annual basis. It is not unusual to see organisations able to reduce their inventories by as much as 60 percent or more as they become highly reliable.

Finally, a reliability focus can yield higher asset efficiencies or – in other words – the assets are productive for a longer period of time. Assets that are properly cared for over their lives will last significantly longer than those that are mistreated. Capital funds that would normally be used to replace worn-out equipment could be deployed elsewhere for the good of the business. In addition,

Maintenance at the distillation column.





Service technician reading valve diagnostics.

Configuration of a pressure transmitter.

reliability-focused organisations tend to make modifications to the equipment to enhance the asset's reliability over its life, so newer equipment is not necessarily better.

An organisation that is focused on reliability also employs technicians and practitioners who are equally committed to reliability. One of the ways to assess an employee's commitment and experience is by the certifications they hold.

The Certified Maintenance and Reliability Professional (CMRP) certification, administered by the Society of Maintenance and Reliability Professionals (SMRP) and accredited through the American National Standards Institute (ANSI), is the premier certification for maintenance and reliability leaders. This

A poorly designed system will never be reliable.

certification is obtained through a rigorous examination based on the SMRP Body of Knowledge, a compilation of best practices and domain knowledge across a wide spectrum of industry. An employer who hires a CMRP to lead their reliability programme can be assured that the individual has the requisite knowledge to implement the processes and practices necessary to capture the benefits listed above.

SMRP also administers the Certified

Maintenance and Reliability Technician (CMRT) certification, which is targeted at technician level personnel. This certification ensures that technicians have the requisite knowledge and skills across the four domains critical to asset reliability: maintenance practices, preventive and predictive maintenance, troubleshooting and analysis, and proper corrective maintenance.

By focusing on reliability, an organisation capitalises upon its investment in its physical assets by increasing output, decreasing costs, and increasing the longevity of the plant. There are few investments that an organisation can make that will yield as many benefits to the business as a strong focus on reliability. ■