

Improve maintenance productivity:

Close the gap between 'should take' and 'does take' in refinery maintenance



Refineries worldwide are under growing pressure to reduce running costs. Most European refineries showed a return to profit at the start of 2014, but margins are tiny and profits can be wiped out by small shifts in the price of crude oil and other costs. In the US and Canada, there's a bigger cushion due to lower prices for crude and gas feed stock. In the Middle East, the availability of crude oil and the move to larger refinery capacities offset some of the pressure. But, globally, the pressure to drive down costs and increase margins is still crucial.

Maintenance costs are one of the main areas of focus for oil companies, for several reasons. In refineries, maintenance costs are typically the third largest expenditure after raw material and energy costs: most refineries spend between \$40 million - \$70 million a year on maintenance alone. Every dollar of reduced maintenance spending has a direct and positive impact on the bottom line and every hour of increased uptime increases capacity without capital investment. Most strikingly of all, maintenance-crew productivity offers the potential for dramatic improvement.

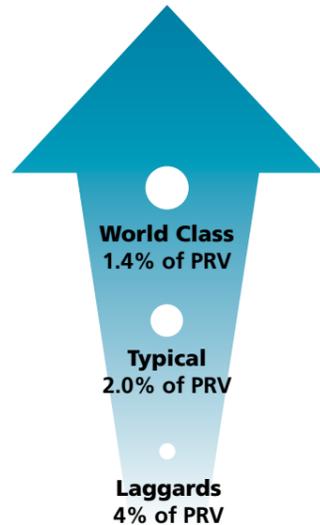


Figure 1. Maintenance cost relevant to plant replacement value

Most oil companies struggle to maximize maintenance-crew productivity

To achieve world-class performance, refineries aspire to achieve maintenance costs below 1.4% of the plant replacement value (PRV) and mechanical availability above 96.7%, with a productivity level of 60 - 65%. However, in most facilities, productivity levels on maintenance activities reach only 30 - 40%. (see figure 1) This means maintenance crews typically spend only 17 hours in a 40-hour working week 'on tools.'

Understanding the reasons for poor productivity

Underlying widespread poor productivity among maintenance crews is typically because there is not an accurate understanding of how long different tasks should take, or an accurate prediction made of how productive their maintenance crews are. Efforts to measure productivity typically take the form of standard 'time and motion' studies. Knowing they are being measured, crews tend to be more productive during these times. As a result, any measures produced are likely to be an inaccurate reflection of productivity. Without accurate measures there is no baseline for developing a plan to improve productivity or to track progress against improvement targets. So performance stagnates rather than evolves.

Furthermore, lack of accurate measures makes it hard to incentivize contractors to improve productivity. Contracts are typically let on a reimbursable basis, with no mechanism for efficiency built in. As a result, contractors can actually gain more profit by continuing to work in the current way.

Together, inaccurate measuring and lack of clarity around 'should take' times for tasks means more time is often scheduled for maintenance jobs than is actually necessary. The knock-on effect is that work crews only spend a small portion of the overall maintenance work order cycle time on direct work. Without clear data and a prioritized improvement process linked to reward, the work order cycle time cannot be adequately reduced to achieve the correct level of productivity nor can the work-orders backlog be reduced significantly.

Productivity can be improved by at least 20%

So how can refineries address and take control of productivity to achieve the reductions in maintenance costs they seek? Accurate measurement and predictability is key to the process and improving productivity can make a significant difference.

Splitting out and defining the activities a maintenance crew or contractor must perform to complete a specific deliverable and establishing a set of measures specifying the time it should take for each activity to be completed is vital.

The key implication is that there are variations in 'should take' times. Weather conditions, country-specific health and safety regulations and site accessibility, for example, all affect task duration, as does contractor efficiency.

These variations can be rolled together and expressed as a 'contract factor.' By multiplying work activity norms (WANs) by 'contract factor' oil companies can generate a set of global norms and use these to:

- successfully and accurately predict productivity levels
- incentivize contractors based on accurate advice
- continuously improve on the benchmarks that have been set.

Targeting the difference between 'should take' and 'does take'

The industry needs to take control of productivity and plan and execute sustained improvements. The starting point for improving productivity using WANs is to measure 'as is' productivity. To ensure accuracy, measures should be based on random sampling carried out throughout the course of the day. By then comparing current productivity with WAN data, oil companies can identify the areas offering the greatest scope for improvement and quantify potential savings.

"When we initially started the journey, we were seeing about 20-30%. Currently, it's at 60%."

Performance Improvement Strategist, International Oil Company

Improving the scheduling process using this approach can increase productive time by as much as 30%. Based on a maintenance crew of 100 operatives, increasing productive time to this degree can represent \$2m-3m in savings annually.

Delivering savings through precision and control

In our experience, this approach can improve productivity by 10 - 20%. For example, as a result, one of our clients was able to perform the same maintenance activities with a crew of 180 instead of the original 230 on one site which provided an annual saving of approximately \$3 million and a 22% excess maintenance crew capacity to handle additional work-orders.

"The strategy has been particularly valuable as a factor of communications between planning, scheduling, field execution groups, as well as our operations group"

Maintaining Excellence Manager, International Oil Company

A strategy based on work activity norms gives refineries a powerful tool for taking control of and improving maintenance-crew productivity. With this comes the opportunity to achieve the reductions in maintenance costs that the sector currently craves.

"This process can increase productive time by as much as 30% and result in \$2m-3m in savings annually based on a 100 operatives' maintenance crew"

To find out how we can help your organization take control of productivity and reduce maintenance costs, please contact:



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