Written by Ken Bannister, Contributing Editor Monday, 01 January 2007 00:00



Ken Bannister, Contributing Editor Role definition is crucial if both Maintenance and Production departments are to strike an accord and work in an autonomous, yet cohesive manner to deliver a high-quality product in a waste-free, cost-effective manner. Virtually every major management philosophy and methodology in practice today recognizes and fosters the integral relationship between the Maintenance and Production departments. Zero inventories-based Just In Time (JIT) and Lean-manufacturing methods would not be possible without high levels of equipment reliability and availability, driven by active operator involvement in the maintenance process.

Autonomous operator-based maintenance is foundational to the Total Productive Maintenance (TPM) philosophy, and is a cornerstone of the Reliability Centered Maintenance (RCM) methodology, both of which heavily utilize operator input to design, implement and continuously improve equipment maintenance reliability strategies. Increasing reliability and throughput requires Maintenance and Production to work together on a two-pronged management and hourly workforce level.

# **Operator-based maintenance**

Operator-based maintenance can be implemented through the following three-step approach designed to promote confidence in both parties:

**Step 1**: Commence with a revised work acceptance procedure.Whenever Production calls in a machine problem, guide the caller(s) to disclose their name, the machine #/description, location, area of the problem (component or system) and a primary sense STILL (Smell, Touch, Intuition, Look, Listen) analysis of what the problem is believed to be.Operators instinctively know when their equipment is not running in the "sweet spot," but they are rarely asked for their opinion(s). This step simplifies and speeds up the pre-planning process and allows the scheduler to more accurately dispatch the correct resources the first time.

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*Step 2*: Allow and encourage operators to be part of the testing, start-up and acceptance after repair completion.

**Step 3**: Introduce Reliability Centered Maintenance (RCM). Choose a suitable RCM pilot and always include the relevant equipment operator and supervisor as part of the RCM analysis team when performing the FMEA analysis and condition-based maintenance work tasks. Use a perimeter-based maintenance approach in which the equipment is set up for rudimentary preventive and condition

monitoring checks while running. These checks can include temperature, flow, throughput, fill level, pressure and filter cleanliness-*set up in an interactive "Go/No Go" style that lends itself perfectly to a regular operator check*. This type of "Go/No Go" check only requires paperwork in the form of a work request when a "No Go" state is in effect.

Take, for example, a pre-RCM PM work order that might have instructed a maintainer to check and record all gauge pressures. This would not just be a waste of maintenance resources-*the maintainer also would have to know the upper and lower safe operating window (SOW) limit for every gauge if a situation were to be immediately averted* 

Recording every good pressure in the CMMS history also is meaningless and a waste of resources when it comes to input of the data. Marking each gauge with the SOW allows any person viewing the instrument to tell if the needle is in the safe or "Go" position between the lines, in which case no further action is required or taken. If, however, the needle is outside the SOW mark lines, or in a "No Go" state, the operator contacts the supervisor who immediately raises a work request for Maintenance to attend the pending situation. Because of the RCM FMEA analysis, Maintenance knows right away what the problem root cause could be and activates a planned work order in response to the event condition

RCM, which advocates autonomous maintenance work by operators (Total Productive Maintenance - TPM), is a perfect catalyst in building and cementing autonomous operator maintenance as a first-level maintenance approach, wherein the operator becomes the true machine guardian on a daily basis. Once a comfortable maintainer/operator working relationship

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is established, more complex PM-styled tasks, such as lubrication and filter changeouts, can be engineered into the operator-based maintenance program. In Fig. 1, operator-based maintenance is shown dovetailing into the core element of the maintenance process.



# Maintenance/production management alignment

Aligning the Maintenance and Production management teams to work in partnership is achieved through communication and an understanding of each other's goals and objectives. In the process, the parties work collaboratively in the planning and scheduling of the production equipment uptime and downtime activities.

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As both departments own the equipment in different ways, both compete for "alone" time with the equipment. Unfortunately, if both agendas are not harmonized, the equipment will suffer and both departments will lose.

The interactive input/output information required of both departments in order to prepare and schedule weekly forecasts and daily work schedules effectively is depicted in Fig. 2. In both cases, monthly and weekly schedule forecasts are being built on an ongoing basis, and being used as "best guesstimates" for assessing and managing resource requirements. From these forecasts come the daily schedules that are usually 70% to 95% accurate–*and which should be just flexible enough to allow for minor unforeseen changes* 

. To synchronize these daily schedules, both Maintenance and Production must agree, through the RCM process, what point in an asset's condition dictates an uncontested responsive event in which both the Maintenance and Production planning and scheduling departments will work together in the asset's interest alone.



Fig. 2. Maintenance / production combines input/output model.

The Maintenance department can further assist the Production staff by providing a series of documents that include: a daily equipment condition report spelling out any triggered alarm conditions and found "No Go" exceptions that require planning and scheduling; a status report of unfinished or "carryover" work from a previous day or shift; a report-driven form with the fault codes marked on the work orders to show the percentage of non-maintenance-caused equipment failures (i.e., operator error, loading errors or jamming, overloading, etc.); and an equipment availability report. The Production department can further assist the Maintenance

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staff through the provision of a report detailing any pending product changeover or retooling event from which Maintenance can take the forced downtime opportunity to plan and schedule backlog or pending work on that equipment. Production will also assist Maintenance by providing reports on raw material problems, equipment incidents and any work requests. Getting together on a daily basis allows the information transfer and the setting of an almost fixed daily schedule. The product of this is equipment reliability and availability that translates directly into sustainable throughput and quality!

Ken Bannister is lead partner & principal consultant for Engtech Industries, Inc. Telephone: (519) 469-9173; e-mail: <u>kbannister@engtechindustries.com</u>

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