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Ken Bannister, Contributing Editor Technically, the Engineering department is the closest relative to the Maintenance department. Examining each other's role in the context of equipment life cycle management portrays a definitive, closely related directive.

Maintenance is charged with the primary role of providing equipment availability, reliability and capacity (throughput) in accordance with the engineering and production design specifications on a day-to-day basis. Engineering is charged with the primary role of designing and developing equipment specification(s) to fit the needs of the Production department, as well as commissioning of equipment or systems capable of delivering on their specified performance.

More recently, great strides have been achieved in amalgamating technical effort through the introduction of the Reliability department— *wherein reliability engineers and predictive maintenance technicians dovetail the two departments into a cohesive partnership*
. The partners focus specifically on increasing equipment reliability and availability of both new and legacy equipment through increased understanding of equipment failure and the incorporation of Reliability Centered Maintenance principles. Companies that have achieved this advanced partnership state have understood and acknowledged that both partners' roles constantly overlap, requiring mutual exchange of information on a continual basis to realize both mandates and significant increases in equipment availability, reliability (life cycle), and throughput.

As with any successful relationship, both parties must understand and state what they expect from the relationship, then work together on mapping the input and output instruments that will deliver on those expectations, e.g. meetings, work flow, standardized operating procedures or guidelines, informational reports, budgets, tools, skills, etc. Once mapped, both sides must commit to a management action plan and work through the process, adjusting as the

relationship progresses.

The following complaints are typical of the kind that must be addressed in this relationship:

Complaint #1
Maintenance: *"The only time Engineering involves us is when they hand us the keys to the new equipment, at which time they believe their job is finished."*
Engineering: *"We've tried numerous times to involve Maintenance in the design and commissioning process of new equipment, yet every time they are either too busy, unprepared or unable to specify their needs."*

Solution…
Too many times, the performing of a simple maintenance task is made difficult due to either poor access, or having to shut down and lock out the equipment. This increased maintainability easily can be avoided through effective dialogue between the Maintenance and Engineering departments in the early design stage.

Engineers are schooled from the beginning on all facets of operator ergonomic design, but few are aware of designing for maintenance prevention using a perimeter-based maintenance design (PBM) in which all lube access, filter change points and predictive maintenance (PdM) measurement points are brought to the machine's perimeter. This allows Maintenance (or Operators, in a Total Productive Maintenance–TPM environment) to perform proactive work while the equipment is running in production mode.

Adopting guard designs that allow access in less than 30 seconds can reduce redundant maintenance work by hours, freeing up precious resource time. If, however, Engineering actively solicits the assistance of Maintenance in the early design process, Maintenance must commit to the process and provide the services of a maintenance planner who is acutely aware of the access and replacement problems.

New equipment acceptance sign-off at the machine builder's plant and on-site commissioning are great opportunities for Maintenance and Engineering to work together toward common goals. Often a new equipment specification requires the Original Equipment Manufacturer (OEM) to deliver a set of working drawings accompanied by a set of preventive maintenance

(PM) job plans.

Unfortunately, most OEM PM plans are too generic, not taking into account the recipient's work culture or the operating conditions under which the equipment will perform. These stock PM plans can be traded for much more valuable OEM engineering time by inviting the OEM engineer(s) to take part in a Maintenance-department- conducted RCM failure analysis process on the new equipment—PRIOR to receiving the equipment on site. When the equipment is being commissioned, the job plans can be verified while both the reliability engineers and maintainers familiarize themselves with the machine.

Complaint #2
Maintenance: *"When specifying new equipment components such as bearings, controls, chains, gearboxes, etc, why does every Engineer have to specify similar, yet different components? Don't they realize this leads to the stocking of multiple similar parts and unpredictable failure patterns?"*
Engineering: *"If the Maintenance department is unhappy about the components we specify, why can't they make the effort to inform us on items they prefer, with a reasonable justification for their choice?"*

Solution…
Both parties will receive tremendous benefits from a consolidation and standardization process in which known MRO items that produce consistent reliability are documented. Developing a shared preferred-parts and component-specification listing book in which parts are recognized and listed according to reliability, maintainability and life cycle, is crucial for building and maintaining equipment that can be trusted.

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In the parts book, each part is categorized as it would be in the CMMS or EAM maintenance management inventory module, It would include, as a minimum, a photograph of the item, item description, OEM #, corporate inventory identification # (if used), vendor #, and item price. Reliability data used to justify the item listing primarily includes Mean Time Between Failure (MTBF) reports, cost of downtime associated with item failure and item maintenance

replacement cost (item cost + total labor cost). This listing book also will benefit both the Purchasing and Inventory departments—which are able to reap cost savings through the setup of preferred vendors and the reduction of MRO inventory requirements. At the same time, this approach promotes familiarity with both maintenance components and component maintenance.

Complaint #3
Maintenance: *"When capital budgets get cut, the first system to be eliminated on new equipment is always the lubrication system."*
Engineering: *"Maintenance performs manual lubrication throughout the rest of the plant, what's their problem?"*

Solution…
An engineered lubrication approach is crucial to achieving moving equipment reliability. Automated systems deliver up to three times the life cycle of bearings that are manually lubricated. In order to protect and justify an automated lubrication system, the maintenance department must provide lubrication-failure-related data through fault code analysis of lubricationrelated failures tracked and reported within the CMMS program.

Industrial lubrication education is crucial for both Maintenance and Engineering, in order for these departments to be able to better understand and facilitate how to apply a truly efficient failureprevention program.

Concluding thought
The relationships between Maintenance and Engineering have great strengths, whose benefits are multiplied exponentially when harnessed through a team effort.

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