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In my last Viewpoint ("Maximizing Asset Reliability Requires Reliability Driven Maintenance," April 2002), I introduced a maintenance business process which I call the Reliability Driven Maintenance Process and identified its four stages: plan, assess, improve, and control.

In the plan stage, the maintenance strategy is aligned with the business goals of the organization. The assess stage analyses the performance of the asset. In the improve stage, work identification strategies are used to identify appropriate actions to address the causes of failures in a timely manner. Companies then move into the control stage for planning, scheduling, execution, and follow up.

Over the next several Viewpoints I will delve into each stage, discussing applicable supporting practices and technologies.

In the plan stage, the alignment of maintenance strategy with the business goals of the organization is accomplished by:

- Reviewing current reliability practices and company goals
- Identifying physical assets contributing to goals
- Prioritizing to identify critical assets
- Establishing targeted performance requirements

To review our current reliability practices we can perform a reliability assessment to compare our current performance and opportunities with world class maintenance practices. The assessment methodology I use is based on 10 years of global benchmarking research and consists of having focused interviews with all levels of the organization: plant floor personnel, supervisors and middle managers, and senior managers.

Once we understand where our reliability practices are in relation to best in class, we next need to understand what our company goals are. Quite often maintenance departments are executing strategies with no real understanding of what the company is expecting to accomplish. We then develop a plan to address deficiencies in our process and practices inhibiting our ability to achieve those goals.

Identifying our assets starts with having a good asset hierarchy. This hierarchy must be defined to:

- The level at which maintenance is performed (parent-child relationships, definition of systems, subsystems, and components)
- The level at which condition is monitored (condition information to be captured and trended)

Most companies have the first level covered because that is where they track costs. However, all too often, the second level is not adequately defined.

With a proper asset hierarchy, we then can prioritize to establish the critical assets that are going to be crucial in helping us to achieve company goals. This Equipment Risk Prioritization is expressed as Risk = Failure Consequence × Probability of Failure.

We can measure failure consequence against business performance criteria such as safety, environmental impact, quality, throughput or capacity, customer service, and operating cost. The result is a total consequence number for each asset. Many companies are assessing their consequence relative only to operating cost which means they are at risk in ways they are not even aware of.

Once we understand the total consequence of failure for each asset, we need to assess the probability of that failure occurring. Does the failure occur weekly or yearly? We then can assign a probability number which we multiply by our consequence number. The result is a relative risk number for each asset, clearly showing which assets are creating most of our problems. Those with the highest relative risk are most likely to impede our ability to achieve company goals.

The relative risk number identifies candidates for reliability improvement (by changing maintenance practices and/or equipment technology) and prioritizes capital projects.

The asset criticality number (a function of failure consequence only and independent of

reliability) drives execution of the maintenance backlog.

The final step of the plan stage is to establish targeted performance requirements for these critical assets. What performance levels are these assets going to have to achieve in order to meet our goals?

The plan stage lays the groundwork for the rest of the Reliability Driven Maintenance Process and is the stage that most organizations are not doing. If your company is not doing something similar to what I have laid out here then you likely are not able to accurately determine what assets you should be spending your time and money on. **MT**