Managing Assets by Criticality
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Although most reliability management processes are based on managing critical assets, many organizations fail to fully understand the meaning behind the criticality ranking. Most reliability specialists will tell you that the "critical" assets have the greatest impact on the plant mission, be it production rate, quality of product produced, or cost per product produced. Operating under this mindset, they often overlook the single characteristic that makes each asset "critical" in the first place. Through proper construction of the criticality analysis model, reliability engineering will be able to illustrate what reliability enhancements must be made to manage criticality, thus improving their ability to manage assets by criticality.

What's In the Number?

The first step in setting up a criticality analysis model is to define those characteristics that will be used to analyze each maintainable asset. These characteristics should cover a wide range of business attributes, such as:

- Mission and customer impact
- Safety and environmental impact
- Ability to isolate single-point-failures
- Preventive Maintenance (PM) history
- Corrective Maintenance (CM) history
- Mean-Time-Between-Failures (MTBF) or "Reliability"
- Probability of failure
- Spares lead time
- Asset replacement value
- Planned utilization rate

Each characteristic should then be weighted using a scale from 0 to 10 to identify significance to the business. The greater the scale, the easier it will be to accurately identify "critical" assets; however, the total score possible should not exceed 100. By setting a limit of 100, you are re-enforcing the "weight" of each characteristic.

What Can Be Learned From The Number?

This is the point were most reliability management processes go wrong. Many models in use today will set a criticality ranking based on a scoring range. For example, an asset which scores between 75 and 100 may be considered "critical", while an asset that scores less than 25 may be "expendable". This practice undermines the entire concept of a criticality analysis. The organization might as well give each asset a number from 1 to 5 and call all things equal. This grouping of scores provides no meaningful data for establishing an asset management program, nor does it delineate between “critical” assets to illustrate which assets are regulatory controlled, mission critical, or simply unreliable.

We need to recognize that all assets are not created equal. We also need to remember that the model we are trying to implement is an “analysis”, which by definition means to scrutinize or examine the data collected to gain knowledge for the purpose of making decisions. The results of our analysis should not only identify those assets that are within the top 20%, but should also indicate the leading characteristic that makes each asset critical.

Table 1

Asset	Description	Mission Impact	Customer Impact	Safety Impact	Environmental Impact	Regulatory Impact	Single Point Failure	PM / PdM History	CM History	Reliability	Spares Lead Time	Asset Replacement Value	Planned Utilization	**Criticality Rating**
CWP012	No. 12 Cooling Water Pump	5	1	1	0	2	7	1	2	2	6	3	10	80

Using the Table 1 example, we can deduce that the “No. 12 Cooling Water Pump” is a critical asset as it falls within the top 20% guidelines, but the score of 80 alone tells us nothing about how to manage this “critical” asset. Through further analysis we are able to conclude that by reducing the consequences associated with a single-point-failure, through Single Minute Exchange of Die (SMED), ready service spares, or properly managed critical spares inventory, we can lower the criticality ranking, allowing the reliability group to focus their efforts on the truly unreliable.

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Once we understand the meaning behind the number, the criticality analysis model becomes a tool used to develop the asset management program. For those assets that are within the top 20%, reliability specialists will typically proceed with a Failure Modes Effects Analysis (FMEA) to assess the risk priority associated with each type of failure and to determine the appropriate corrective actions. But we again must consider the critical characteristics that are common throughout the organization, across all assets, critical or not. In doing so, asset management becomes a plant wide process. If “Mission Impact” is commonly critical, then the organization may need to considered equipment redundancy plans. For those organizations that find “Spares Lead Time” particularly critical, a materials management improvement program should be initiated. And within those organizations that struggle to manage the cost of “Corrective Maintenance History”, a formalized Preventive/Predictive Maintenance program should be implemented.

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Ranking Index for Maintenance Expenditures (RIME)
Asset criticality also provides us with a method to manage assets through work prioritization. The method of ranking maintenance expenditures is based on an index that combines both the "work classification" ranking and "asset criticality" ranking, to produce a single "RIME" number that is then used by Planners, Schedulers, and Materials Management to prioritize the weekly workload.

For more information on "Managing Assets by Criticality" contact Darrin Wikoff at DWikoff@lce.com, or Life Cycle Engineering at www.LCE.com.