



White paper

Four key questions to optimize performance and align your asset maintenance strategy with business objectives

Assets are your lifeblood.

For asset-intensive organizations in industries like utilities, the ability to align a whole-life approach to the management of physical assets with business objectives is vital to success. As such, asset and maintenance managers are increasingly required to report on performance against key performance indicators (KPIs) such as asset utilization, risk and return on assets (ROA). These metrics are critical to understanding the overall health of an asset-intensive organization, and rely on a current and correct view of all underlying asset information.

The “Manage Physical Assets” process, depicted below, starts at the senior management level, with the definition of an asset management policy and the asset-related strategies and plans to support the policy objectives. The ISO 55000 standard spells out these relationships in the context of asset management best practices.

Evaluating the alignment of the Manage Physical Assets process with policy requires the ability to measure both the efficiency of maintenance activities and their overall effectiveness, as shown in the diagram below. This implies that organizations have access to the data they need to evaluate their activities.

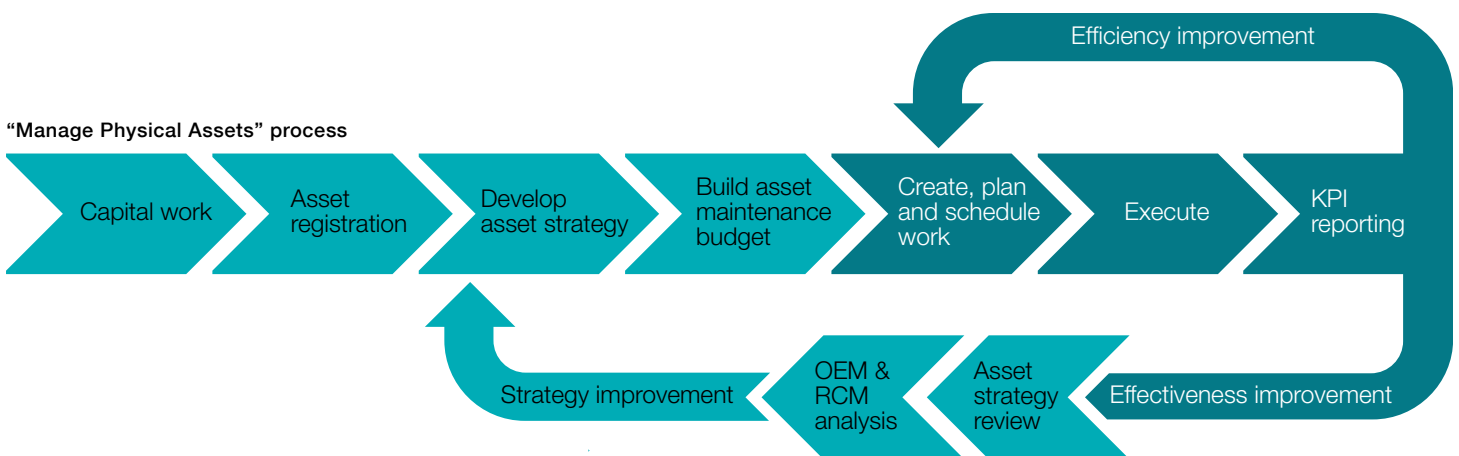
Best practice development of asset management policy and corresponding strategies for the maintenance of individual assets are based on the criticality of an asset – that is, the risk and consequences associated with its failure to production, safety, the environment, maintenance and other key factors.

Asset criticality is a function of a company’s specific operations and equipment. For example, at a nuclear power plant, the failure of one reactor coolant pump can take down the entire plant – thus its criticality is very high, yet at the same time, the likelihood of its failure may currently be low. These factors would collectively impact the maintenance strategy for that asset.

Optimizing an asset maintenance strategy around an asset’s criticality is vital to maximizing the return on investment in the asset.

To optimize maintenance strategies, an organization must know:

1. Where is the asset in its lifecycle and what is the expected end of life for that asset?
2. What is the asset’s detailed maintenance history? Based on that, what is its current age and condition in relation to its expected end of life?
3. What is the value of the work the asset is performing, in relation to the cost of maintaining it?
4. Are the right asset management capabilities in place to optimally maintain the asset?



1

Where is the asset in its lifecycle and what is the expected end of life for that asset?

Organizations have typically focused on measuring sunk costs for assets. This view considers the asset lifecycle in terms of overall costs, from commissioning through operation and disposal. From this perspective, the goal of asset maintenance is simply to minimize the sum total of all costs associated with keeping an asset in operation during its life, while meeting availability goals.

Another way to view the asset lifecycle is to **track where an asset is in its lifecycle timeline, and adjust management strategies accordingly**. This best practice approach enables a more refined maintenance strategy that allocates cost and effort efficiently across each asset's lifecycle to dynamically optimize maintenance expense in relation to availability targets.

In the case of a new truck, for example, the manufacturer might rate the expected engine life at approximately 12,000 hours (about 6 years). Leveraging knowledge of where the asset is in its lifecycle timeline, a maintenance organization could choose not to do detailed engine inspections for the first 10,000 hours of operation, since the likelihood of finding a major problem is low.

However, as the truck approaches its expected end-of-life (say at 10,000 hours of operation), maintainers could begin performing detailed engine inspections to monitor the asset's condition in detail and look specifically for the impending failure of various engine components.

2

What is the asset's detailed maintenance history? Based on that, what is its current age and condition in relation to its expected end of life?

As asset-intensive organizations first develop and then execute on their maintenance strategies, it becomes important to measure whether a strategy is functioning optimally. Both efficiency and effectiveness criteria factor into this evaluation:

- Efficiency relates to how well the maintenance organization executed its intended strategy. For example, were preventive tasks completed within acceptable timeframes?
- Effectiveness relates to whether the efficient execution of the strategy produced the desired results. Did it provide the projected asset availability within cost parameters? Did it produce the required production output?

Only by measuring maintenance efficiency as well as effectiveness can businesses optimize the return on their asset maintenance investment. Improving efficiency enables incremental gains, while improving effectiveness lets organizations see the “big picture” to drive longer-term strategic gains.

The ability to build, access and collate historical data on assets not only helps management evaluate the effectiveness of maintenance strategies, but also enables the field force to do a better job.

For example, when repairing a failed bearing, it's useful to know if the bearing's life was significantly less than expected. Did the failure reflect normal wear-and-tear, or might there be an underlying problem to look for?

Of course, to make these determinations, the enterprise asset management (EAM) system must contain the necessary data, which means that field workers and others must enter it in the first place. By and large, the “what failed, why did it fail and how was it corrected?” level of historical data on assets must be captured by the maintenance staff who do the work – preferably in the field, as part of the activity.

This is much more likely to happen if the field force (1) understands how capturing this data will enable them to do their jobs better, and (2) is given a straightforward way, such as a mobile device interface, to enter high-quality data quickly and easily, in alignment with maintenance activities.

3

What is the value of the work the asset is performing, in relation to the cost of maintaining it?

Maintenance organizations have often measured their performance in isolation from the wider business context. If asset availability does not constrain production targets, then the maintenance strategy is perceived to be effective.

But relating maintenance effectiveness only to asset availability fails to factor in the other side of the equation: What productive work did the asset do? It is relevant to know what value an asset produced, in order to know whether the maintenance performed was worth the cost associated with doing it in the context of the overall business strategy.

For example, is increasing asset availability in alignment with production goals? Is the increased availability worth the additional cost associated with providing it? The fact that turbine uptime was increased by 3% in 2015 might not be a positive statistic if the demand for turbine output decreased by 10% during that timeframe.

The ISO 55000 standard advocates that asset maintenance take place in the context of the organizational strategic plan. The Institute of Asset Management defines the organizational strategic plan as the overall long-term plan for the organization that is derived from and embodies its vision, mission, values, business policies, stakeholder requirements, objectives and the management of its risks.

From this perspective, **best practice measurement of maintenance effectiveness involves balancing maintenance expenditures with overall goals like production output.** Failure to encompass the wider context could result in a failure to recognize that the organization is over-maintaining its assets, and consequently wasting money. The repercussions of under-maintaining assets are, by comparison, far less liable to be overlooked as the impact on production is likely to be readily evident.

4

Are the right asset management capabilities in place to optimally maintain the asset?

An EAM system is a critical enabler for asset-intensive organizations to optimize their Manage Physical Assets processes in accordance with their asset management policies. For example, energy providers generally wish to maximize service delivery uptime, and to minimize or eliminate unplanned service outages. Planned outages should be as infrequent as possible, with normal 100% service being resumed promptly on demand.

To enable the maintenance organization to easily track and access the various information discussed above, a range of EAM capabilities are required. For example:

- To track where assets are in their lifecycle timeline, the EAM system must support storing that data, along with historical maintenance data, in relation to individual assets. Ideally, organizations can likewise track maintenance experience with all similar assets, to develop richer trend data.
- To measure the value of work produced by individual assets, the EAM system must make it straightforward

to record and retrieve production data at the level of individual assets.

- To leverage “as-found” and “as corrected” asset data, the EAM system must provide highly usable screens and strong mobile application support to make it easy for maintenance workers to capture data while in the field.

Asset registry capabilities

An underlying capability that supports the above information storage and retrieval is the ability to define assets and their parts and components, and associated attributes and activities, in standard and optimal ways. This is a function of the equipment registry component of the EAM solution.

Specifically, **asset intensive organizations need a way to apply asset management strategies against assets and their components at a level of granularity that organically reflects “real life”** (ie, you want to manage a turbine, not the dials on a turbine).

The EAM equipment registry should embody a hierarchical structure that breaks the company and plant down, in logical units, from the highest level to a level where costs can be collected and failure analysis performed.

Maintenance and other activities can be planned and recorded at any level within the hierarchy. This enables organizations to clearly relate physical assets and strategies for managing and maintaining them to business goals, in alignment with best practices.

For example, entering the “make” and “model” attributes for a transformer asset into the EAM system should automatically set up all the maintenance tasks associated with that equipment, such as standard overhaul activities. It should also define any condition monitoring parameters you want to associate with that equipment.

These capabilities help guarantee that maintenance management strategies and best practices are applied consistently across all similar assets in the organization, to ensure that similar equipment is managed similarly, and that configuration and process information is reused appropriately. They also make it easy to review the performance of assets at the “make/model” level; for example, how well a certain type of transformer is performing overall, and how individual units are performing.

It should also be simple to compare performance across different asset models. If performance is not up to expectations, the maintenance strategy could be adapted to improve performance, eg, changing the inspection protocol to check for a specific problem before it causes a failure.

A correctly configured EAM equipment registry should also:

- Support a reliability centered maintenance (RCM) and reporting strategy
- Let organizations record the relative criticality of equipment and associated items and parts in relation to business objectives

- Make it easy to create, plan and schedule work
- Drive long-term planning of procurement of parts and services
- Provide an effective way to evaluate when to replace equipment

A specialized solution for asset-intensive organizations

Asset-intensive organizations need an EAM system that supports maintenance strategies and other activities that ensure their assets are available for the optimal amount of time to deliver on production or service goals. For some assets this may be 100% uptime; for others, 50%. A business may, for example, wish to utilize a “run to failure” approach for assets that are easy to replace and only needed 50% of the time (provided there are two or more of them on hand) such that a failure of the asset will never cause an outage.

Asset-intensive organizations must solve many complex and difficult problems to meet service and production goals while balancing cost, safety, environmental and other variables.

Since the introduction of the original PAS 55 standard in 2004, ABB has made alignment with this standard and the subsequent ISO 55000 standard a core development priority for the Ellipse EAM solution. As a result, the Ellipse Manage Physical Assets process follows and embodies all the guiding principles of ISO 55000. Ellipse therefore enables asset-intensive businesses to focus financial and other resources precisely where it makes the most sense.

The focal point for aligning the Manage Physical Assets process with organizational objectives is the Ellipse Equipment Registry. This registry identifies all maintainable assets as unique items. Built-in configuration management, classification and costing features support best practices in alignment with ISO 55000.

The Ellipse Equipment Registry and other Ellipse modules are purpose-built to enable maintenance organizations to capture and retrieve the key asset data to support an asset maintenance strategy based on the expected life and current condition of assets.

ABB’s Ellipse is an EAM system built specifically to help companies optimize operations by achieving key asset management objectives. To learn more about the 30 years of best practices built into Ellipse, [click here](#).

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