

Information Needed for Effective Asset Management

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Effective asset management requires information about assets, including individual asset performance and the effectiveness of the asset management system as a whole. The recently released ISO 55001 Asset Management standard contains specific requirements for collection, management, and storage of asset-related information. While there is considerable flexibility within these requirements, generally recognized industry best practices define what information is needed as an enabler for the various actions and decisions that will be needed over an asset's life.

ISO 55001 Information Related Requirements

Clause 7.5 of the ISO 55001 standard states that the organization must determine the information required to support its assets and asset management system. There is latitude to determine what this information is, but the decision must consider the potential impact the information has on:

- Risks that the assets present to the business.
- Stakeholder needs.
- The effectiveness of the asset management system.
- The ability of management to make accurate decisions.

The clause goes on to state that the organization has to determine the necessary attributes and quality of that information as well as how it is collected, evaluated, and analyzed for suitability. There must be an ongoing information management process in place to ensure the information remains relevant and accurate. Finally, the information management process must ensure alignment between the financial and technical terminology, and there must be consistency and traceability between financial and technical data.

Clause 7.6 of the ISO 55001 standard presents requirements for documentation and management of the information developed in Clause 7.5. This is done not only to facilitate the effectiveness of the asset management system, but also to meet legal and regulatory requirements. The documents must be organized effectively with consideration given to items such as title, author, date, reference information, format, media, and a review and approval process. It must be controlled to the extent that it is available when and where needed, yet it is protected from improper use or loss of confidentiality or integrity.

Information Needs across the Asset Life Cycle

One of the key concepts presented in the standard is the need to have a structured approach to manage assets across their life cycles—from conceptual design through acquisition, installation, operation, removal, disposal, and any required site remediation. In order to align the asset management activities with the objectives of the organization, there are different information requirements for each life-cycle stage to extract maximum value from the assets.

Early Life

In the design and installation stages of an asset's life, the organization needs detailed specification information for effective management. Information about size, materials of construction, and other attributes that are specific to the asset's class will be needed to facilitate a reliable design. The design capacities—minimum, maximum, and optimum—should be known so the appropriate operating window can be maintained. The organization should know and adhere to the appropriate best practices for construction and installation details, such as:

- Foundation dimensions and construction details.
- Grouting requirements.
- Alignment and balance tolerances.
- Initial lubrication needs.
- Accessibility for operations and maintenance personnel.
- Lifting needs for future disassembly and repair, along with sufficient lay down space for the major components.

The design should also spell out the quantities of any utilities required, such as electrical power, steam, air, water, nitrogen, etc., so the necessary provisions can be made.

For future reference, the organization will need access to accurate technical information about the asset. Drawings produced during the design phase—such as Process and Instrumentation Diagrams (P&IDs), instrument loop sheets, process flow diagrams, equipment layouts, and assembly schematics—will need to be readily available to the organization throughout the asset’s life. Original Equipment Manufacturer (OEM) manuals that provide operational, maintenance, repair, and spare parts information will be used as reference for developing procedures and equipment Bills of Material (BOM). Ideally, the manufacturer will have provided information concerning potential failure modes to be referenced in a Failure Mode and Effects Analysis (FMEA) that will be used to define the asset maintenance strategy. Component failure rate data would also be useful if the organization intends to conduct a Reliability, Availability, and Maintainability (RAM) analysis prior to the end of this stage of the asset’s life.

Commissioning

During the commissioning phase of the asset’s life, a significant amount of information needs to be gathered to prepare the organization to manage the asset effectively during the subsequent operational phase. Data to populate the Computerized Maintenance Management System (CMMS) or Enterprise Asset Management System (EAM) will need to be gathered and uploaded. The location (or system/subsystem in which the asset is installed) will need to be defined for future rollup of cost data. An asset classification/sub-classification (for example pump/centrifugal) will need to be assigned to enable comparison of reliability, performance, and cost history with like assets, and to enable the appropriate failure codes and maintenance strategy to be assigned.

The criticality of the asset will need to be defined to enable appropriate prioritization of work. The asset manufacturer, make, and model must be defined to enable development of the Bills of Material. If the organization is in a regulated industry, the asset may need to have a regulatory classification assigned for proper tracking. Financial information that will be needed for the property accounting function should be set up in the appropriate tracking system at this stage. Items such as initial cost, depreciation schedule, and in-service date will need to be recorded. To ensure management of the asset manufacturer’s warranty, the warranty period will need to be set for effective follow-up, and the maintenance requirements stipulated by the warranty will need to be put in place.

Information to support operations will need to be produced during this phase. Standard operating procedures should be developed with the appropriate operating parameters and allowable tolerances so that damage is not done to the asset as it transitions to the operational phase. This is also a good time to develop “single point lessons” that illustrate operator inspection and maintenance points.

Information needed to support effective maintenance during the operational phase also needs to be developed at this point. A Failure Modes and Effects Analysis (FMEA) or Reliability Centered Maintenance (RCM) analysis should be performed to provide insight into the anticipated potential failure modes, and a maintenance strategy should be designed to mitigate those potential consequences. Maintenance procedures for conducting these asset care activities should be developed to ensure consistent performance.

If the maintenance strategy called for condition monitoring tasks, the necessary attribute data to enable analysis should be collected. For rotating equipment, this should include bearing type and size, the number of gear teeth and speed ratios, the number of fan blades, belt and sheave information, coupling data, critical speeds, and other relevant information. For fixed equipment, attribute data such as materials of construction, wall thickness, weld material, lining material, and insulation type will need to be collected, and the appropriate thickness monitoring locations will need to be identified.

Lockout/tag-out points for equipment isolation should be identified at this stage. If the maintenance strategy will be based on run times rather than calendar time, hour meters may need to be installed, and a data collection strategy should be implemented. Any post-maintenance testing requirements should also be developed at this point. Training in the correct operating and maintenance procedures should be provided to operations and maintenance personnel as the assets transition to the operational phase.

Operation

As the asset transitions to the operational phase of its life, the organization should begin to develop operating information about the asset to ensure that it continues to add maximum value to the enterprise. Actual performance information—such as capacities, operating temperatures, pressures, heat transfer coefficients, etc.—should be compared to the design basis to identify any potential gaps.

Asset condition information should be collected routinely for a number of reasons. Understanding the operating condition of the asset will provide insight into developing problems that can present a potential risk to the business. If the condition is satisfactory, the organization can depend on the asset to operate at capacity (continue to create value) and can take on additional business with confidence. Service level requirements can be defined, which enables the organization to implement a demand management strategy if needed. Condition information also provides insight into remaining life, so refurbishment or replacement plans can be made proactively.

As the asset moves through its life, maintenance and repair history information will need to be collected and analyzed to feed any root cause analysis efforts to resolve chronic problems. This information can also be used to assess the effectiveness of the maintenance strategy, and will enable the organization to make intelligent repair vs. replace decisions should the need arise. It will also provide data point that can be used alongside condition information to identify refurbishment needs. For example, if the Mean Time between Failure (MTBF) is shrinking, it may be time for an overhaul of the asset.

End of Life

The end of the asset's life, when being decommissioned and prepared for disposal, also has unique information requirements. If the asset was installed in an environmentally sensitive location, there may be some site remediation requirements. The asset may be considered hazardous waste, and disposal will have to be treated appropriately. The asset may also have residual value and could potentially be sold, so the market value will need to be determined. The book value should also be known because if not fully depreciated, remaining value will have to be written off of the property accounting records. Spare parts that were stocked for the asset may be rendered obsolete and will have to be disposed of appropriately.

Value of Good Asset Information

As outlined in the above paragraphs, there needs to be significant effort put into collecting, documenting, and managing the information for the assets. Beyond the fact that the ISO 55001 standard requires information to be developed, consider the value proposition for investing in this effort.

Risk Identification and Mitigation

As discussed earlier, the standard requires consideration of asset-related risk when determining the requirements for asset information. Collecting and managing the information discussed above will help mitigate risks in a number of ways. The site will have an accurate valuation of assets for tax purposes, and will have the necessary information to support property accounting audits. From a regulatory perspective, thorough information will be available to enable the organization to manage the assets in such a way as to avoid regulatory incidents. Sufficient information would also be available to demonstrate good stewardship of the assets and to address any regulatory questions or concerns. Additionally, regulatory bodies will have greater confidence in the organization's business decisions.

Business risk will be mitigated by ensuring that asset capacity is known, asset condition is monitored, and unanticipated downtime will be minimized. Assets will be operated within their design parameters and according to standard operating procedures, reducing the risk of operator-induced failures. As there is a valid technical basis for all maintenance performed on the asset that is facilitated by procedures, there is a reduced risk of maintenance-induced failures. With knowledge of equipment health and capacity, business leadership can take actions to manage demand for the good of the business (such as implement pricing strategies). Performance information will enable comparisons between like assets across the enterprise to identify opportunities for improvement.

Stakeholder Needs

When considering the needs of stakeholders, accurate and thorough asset information provides significant benefits. Productivity of the hourly workforce is enhanced because the information needed to perform their daily activities is readily available. For example, technical information will enable effective planning for maintenance and minimize wasted time searching for parts or repair instructions. Good asset information will enable engineering personnel to standardize assets across the fleet, reducing the need to duplicate parts, training, and procedures from location to location. Information developed for one asset—such as FMEAs, Bills of Material, maintenance strategies, etc.—can be leveraged across the asset base.

Information about equipment performance and correct operating parameters will improve the productivity of operations personnel. The sales organization will benefit from greater knowledge of plant capabilities. Financial accounting personnel will be able to ensure that the property accounting register is accurate and up to date. There will be better information for management decisions, such as rationalizing product mix and adjusting plant capacities. Senior management will have the information required to optimize the asset portfolio's value.

External stakeholders will benefit as well. Information required by regulatory agencies and government will be readily available, thorough, and accurate. Effective management of the business enabled by good asset information should result in greater value for the shareholders. A clear understanding of asset-related risks coupled with proper mitigation strategies should result in a reduced likelihood of incidents that could harm the environment or the local community. In the event of a merger or acquisition, good asset information enables accurate valuation and facilitates the due diligence process. Insurers benefit from accurate asset information because they can make a more accurate estimate of both the quantity and probability of loss.

Asset Management System Effectiveness

An asset management system by definition provides a structured approach to the actions applied to the assets throughout their life cycles. As the system's design is aligned with the organization's needs, it ensures that all functions take a holistic view of the value the assets bring to the organization. Sub-optimization of individual department goals to the detriment of the assets is avoided. The asset management system runs on information; without it, the system breaks down and becomes non-functional.

Accurate Decision-Making

Good asset information enables the organization to make data-based decisions instead of relying on opinions or "gut feel"; there will be a reduced dependence on tribal knowledge for decision making. Information about the assets—their condition, their future maintenance needs, and their current and future capabilities—will ensure that the organization deploys capital where it will provide the highest value to the business. Life-cycle cost data will be available to facilitate accurate repair vs. replace decisions. Ultimately, executive credibility with external stakeholders—such as regulatory agencies, government entities, and the securities analyst community—will be enhanced.

Summary

There are several questions that every organization should be able to answer regarding its assets:

- Do you know what assets your organization owns and where they are?
- Do you know which assets are critical to your operation?
- Do you know the life-cycle cost for each asset?
- Do you know the current condition of each asset?
- Do you know the value (market, book, replacement) of each asset?
- Which is the truth—the property accounting register or the computerized maintenance management system (CMMS)?
Have those two systems been reconciled?

With a good asset information system that meets the requirements of the ISO 55001 standard, organizations will be able to answer these questions and more.

Keywords

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