

ISO 55000, the New World Order for Asset Management — why adoption will be easier and more beneficial than you think

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White Paper

Best practice maintenance organizations have long advocated that use of effective, measured and documented asset management methods and work practices lead to increased safety, availability, reliability, throughput, due diligence, insurance reduction, energy reduction, and a reduced carbon footprint.

The new ISO 55000 Asset Management standard sets realistic expectations for asset management and defines structure and accountability for asset management best practices. Given its current level of asset management and vulnerability to high consequence catastrophic asset failures, the petro-chemical industry is an especially prime candidate for ISO 5500 certification.

Why ISO 55000 matters to Industry

ISO 55000 certification signals to investors, clients and customers that an organization who understands its assets and how to manage them on a short term and long term basis can assure deliverable quality in a sustainable manner.

For asset managers, ISO 55000 defines clarity of purpose for the maintenance organization. Adhering to the standard helps the maintenance organization differentiate between and report on what they control (direct maintenance related issues) versus what they manage (non-maintenance related issues) on a day-to-day basis. With that understanding, the maintenance organization can better measure and recognize its impact and value to the corporation.

ISO 55000 demands the maintenance organization critically review its asset management approach, asking “does what we do add value?”, and to address many of the shortcomings often found in the initial maintenance operation effectiveness review (audit).

Typical audit findings include:

- Lack of understanding who the major asset management stakeholders are
- No “asset” definition – what entities in your plant would you describe as an “asset” requiring maintenance
- Incomplete asset portfolio master data/attribute list – often this list is incorrectly inputted, missing assets, or is out of date

- Ineffective or no planning and scheduling methodology in place
- No parts management strategy in place
- Lack of request information leading to sending out a skilled trade, or wrong trade to establish the problem
- Sending the wrong skilled trade to the job,
- Ineffective / out of date work flows and procedures
- Use of experienced trades to perform rudimentary maintenance checks that could be performed by operators or lower skilled individuals
- Subjective language Preventive Maintenance job plans resulting in inconsistent work results (E.g. replace as necessary, lubricate as necessary, check for noises, etc.)
- Global PM job plan assignment not relevant to all assets the PM is assigned to
- No predictive or condition based program in place. Little or no validated use of diagnostic instruments and tools
- Data collection/monitoring tools not utilized effectively—if at all
- Measurement data collection without purpose with no trending or decision points identified
- No tracking of failure causes and effects on service or uptime
- No maintenance service level agreements in place with partners or clients
- Management system used primarily as a work order system and not a management reporting system
- No KPI's in use – code system not set up to capture and filter the correct data to produce value based performance reporting
- Request reports takes days, weeks or months to receive
- No succession planning in place

Most maintenance organizations encounter many of the above stumbling blocks, all resolvable by an ISO 55000 approach to asset management.

ISO 55001 Requirements

The ISO 55000 standard outlines the requirements an organization must have in place to manage its assets in a responsible manner to benefit the corporation as a whole. These requirements are broken down into

1. the business of Asset Management (AM)—the performing of activities to accomplish value from the asset portfolio
2. the Asset Management System (AMS), intended to be the framework (defined as “line of Sight” in PAS-55) designed to align the strategy and objectives of the maintenance department with that of the corporation to enable the corporation to achieve its goals and deliver on its objectives.

It does this through a networked system of key elements designed to put in place an implementable Strategic Asset Management Plan (SAMP) governed by policy, processes, plans and measurable objectives, whose performance can be measured and evaluated on an on-going basis for improvement.

ISO 55000 broadens the definition of “asset”

Traditionally, the maintenance world has viewed a physical asset as a tangible item requiring maintenance, for example: a compressor, valve, storage tank, etc. The ISO standard goes further, detailing an asset as any “item, thing, or entity that has potential or actual value to an organization.” That thinking includes non-tangible assets such as processes, preventive and predictive job plans, measurement and data history, etc.—all of which add significant value to a maintenance organization’s management strategy.

Source:
ISO 55000:2014(E) Annex B, Page 17

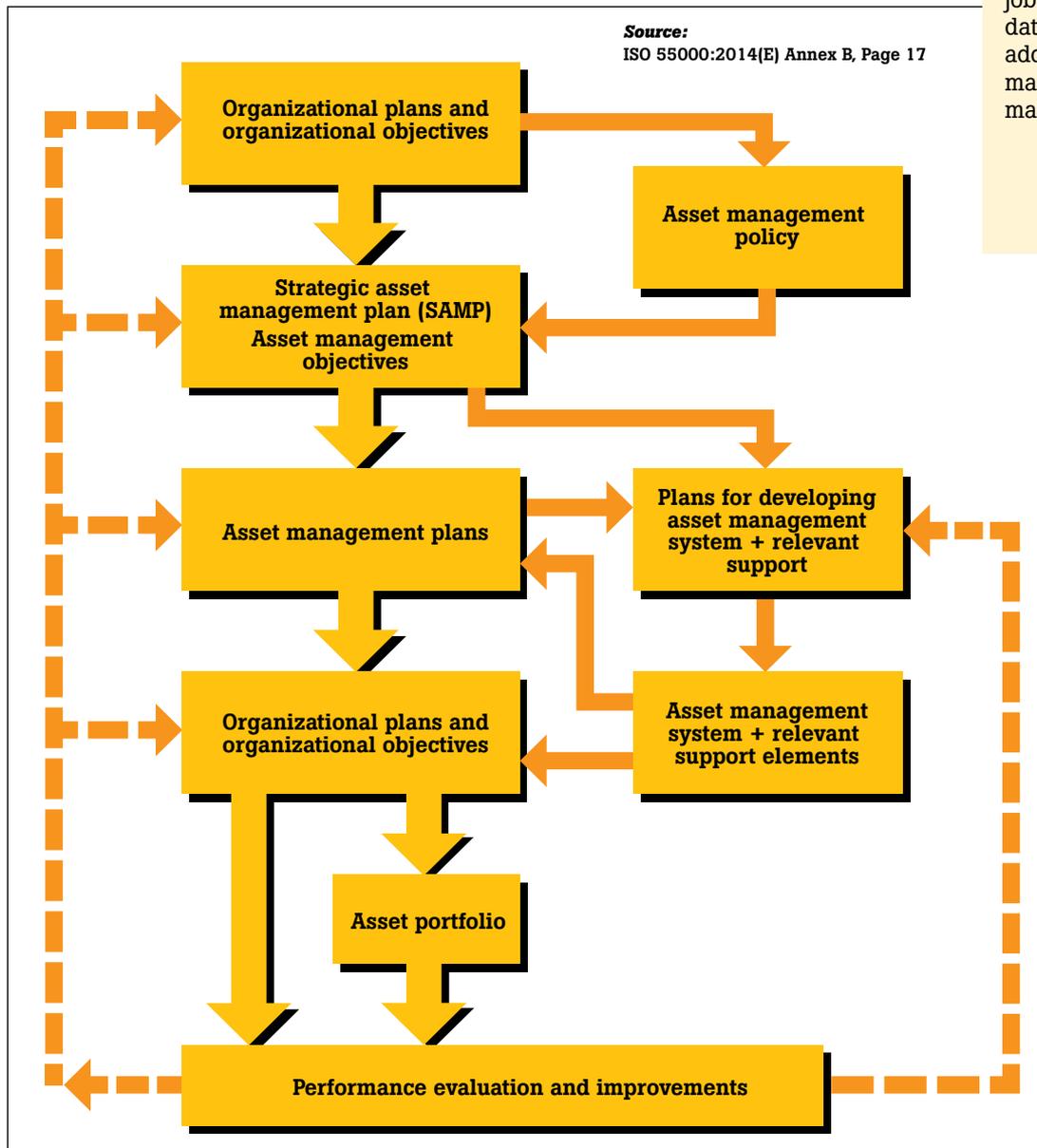


Figure 1. 55000 asset management flow

ISO 55000 is a compendium of three standard documents that include:

1. ISO 55000: Asset Management – an overview document that spells out the principles and terminology used in 55001 and 55002,
2. ISO 55001: Asset Management – the actual management systems requirement document that spells out the elements an applicant company will be audited and certified against,
3. ISO 55002: Asset Management – a guideline document for application of ISO 55001.

All three are stand-alone documents that must be purchased separately, with ISO 55001 as the primary.

Seven basic elements of ISO 55001

Establishing an AMS requires understanding seven basic elements:

1. Context of the Organization (Clause 4):

demonstrates how asset management “fits in” and matters to the corporation as a whole and is a mix of internal and external context to be accounted for when setting up or reviewing the AMS.

- As relevant to asset management, evaluate the
 - i. cultural impact, economic and physical environments
 - ii. mission, vision, and organizational values
 - iii. regulatory, financial and constraint for external context
- Establish and align AMS objectives with that of the corporation
- Outline objectives as part of the SAMP in the planning stage

2. Leadership (Clause 5): is about the top management support for the AMS, recognized by ISO as crucial for success. Many maintenance departments operate in a grey area when it comes to authentic management support. To address this, ISO 55001 requires that senior management take responsibility for the AMS function by

- establishing clear and communicable policies, objectives, roles & responsibilities
- ensuring adequate resources are available to perform effective asset management
- demonstrating commitment in how they advocate the validity of asset management and the AMS to rest of the corporation.

3. Planning (Clause 6): Performing an asset management effectiveness review early on in your ISO 55001–certification journey to assess current and future state is essential to identifying and addressing risk and opportunity in the organization. Findings are used to perform a gap analysis and develop an action plan that, in

conjunction with measurable stakeholder and asset management objectives, is used to provide the building blocks for the organizational Strategic Asset Management Plan (SAMP).

- The SAMP is the blueprint used to develop more detailed plans that include the method and criteria for decision making, prioritizing activity, process and workflow for managing and maintaining assets over their life cycle.
- These include alignment of preventive and predictive strategies/methods into a condition-based approach that employs the latest diagnostic measurement tools and technology to evaluate an asset’s current condition and trend deterioration patterns.

4. Support (Clause 7): Meeting the organization’s requirements to establish, implement, maintain, improve, and deliver on the AMS plans and objectives requires human resources as well as data management. Human resources must be trained, meet the AMS competence requirements, and understand how the asset management policies contribute to the AMS. Effective communication of asset-related data relies on information gathered and managed through various sources and databases, including:

- the Enterprise Asset Management (EAM) system, Enterprise Resource Planning (ERP) system, or Computerized Maintenance Management System (CMMS)
- other equipment data sources such as trending systems employed by predictive and condition based tools such as vibration, infrared, alignment, electrical system metering devices, etc., Building Management Systems (BMS) and manufacturing Supervisory Control and Data Acquisition (SCADA) systems.

These systems and tools must be set up correctly and used discreetly to collect “value based” data that can be turned into management information reports and Key Performance Indicators (KPI’s) designed to validate all elements of the AMS and performance levels for all stakeholders.

- All of these systems and tools utilize documentation that in of itself is viewed as an asset that must be managed according to the standard.
- These can include templates, plans, workflows, job plans, procedures, methods, drawings, photographs, measurement recordings and graphs, etc.
- All documents must also adhere to a corporate defined Classification And Record Retention Schedule (CARRS), requiring a formal approach to document management similar to an ISO 9000 environment.

5. Operation (Clause 8): is the requirement to plan, implement and control the processes needed to meet the needs of the AMS, which requires management to effectively manage change within the organization. Change management presents risks that must be identified, managed and mitigated as required, including risks presented when using outsourced (contracted) resources that also must be managed according to AMS requirements.

6. Performance Evaluation (Clause 9): is necessary to adapt to and continually improve the current situation. Benchmarking the current state and setting objectives allows us to evaluate our performance (measure our success, or lack of it) and adjust the plans accordingly to meet those objectives, if required. To do so, the organization must focus on its assets, asset management performance, and effectiveness of its AMS to determine what needs to be monitored, measured, analyzed and evaluated, how and when it will take place. The capture of comprehensive, consistent, accurate and reli-

able measurement data regarding an asset’s current, past and predicted future condition (trend analysis) is essential to evaluating both the asset’s and the organization’s performance through use of technology, regular audits, management reviews and reporting as described in the Clause 7 – Support section.

7. Improvement (Clause 10): is about what we do when faced with a nonconformity or No-Go situation typical of those found in a condition based maintenance / condition check approach. Nonconformities or incidents occur in assets, asset management, and the asset management system and improvement is about how we react, take control, manage, document and prevent those nonconformities from reoccurring.

Adopting ISO 55001 in Practical Terms

ISO 55001 is not a detailed step-by-step procedure for implementing best practice maintenance, but rather a blueprint for maintenance excellence that must be interpreted and “fleshed out” according to the needs and requirements of the organization choosing to adopt the standard.

	ISO 55000 Practice	Outcome
Strategic Asset Management Plan	<ul style="list-style-type: none"> • Corporate objective alignment • Blueprint for the development of tactical and operational processes and procedures • Management action plan for improvement 	<ul style="list-style-type: none"> • Accountability • Focus on critical equipment • Increased availability • Increased reliability • Increased throughput • Enhanced regulatory compliance • Due diligence
Asset Life Cycle Management	<ul style="list-style-type: none"> • Controlled planning & scheduling • Predictive and Condition based maintenance emphasis • Increased measurement and data trending analytics • Failure analytics 	<ul style="list-style-type: none"> • Increased availability • Increased reliability • Increased throughput • Enhanced regulatory compliance • Due diligence
Value Based Asset Management	<ul style="list-style-type: none"> • Enhanced diagnostics • PM based on failure consequence and asset/component criticality • Planned run to failure • Visual/instrument Go / No Go condition checking 	<ul style="list-style-type: none"> • Increased availability • Increased reliability • Increased throughput • Enhanced regulatory compliance • Due diligence
Materials Management	<ul style="list-style-type: none"> • Demand forecasting • Rationalized reorder levels and lot sizes • Vendor managed inventories • Kitting and staging • Validated inventory 	<ul style="list-style-type: none"> • Increased availability • Increased reliability • Increased throughput • Enhanced regulatory compliance
Document and Data Management	<ul style="list-style-type: none"> • Consistent and accurate data • Retrievable data • Integrated data systems • Data analytics 	<ul style="list-style-type: none"> • Enhanced regulatory compliance • Due diligence
Maintenance and Production Staff Skill Sets	<ul style="list-style-type: none"> • Technology enhancement • Communication devices • Diagnostic / Measurement instruments • Visual/instrument Go / No Go condition checking 	<ul style="list-style-type: none"> • Safety • Due diligence
Safety	<ul style="list-style-type: none"> • Improved work instruction sets • Workflow, process and procedures • Enhanced diagnostics and measurement 	<ul style="list-style-type: none"> • Enhanced regulatory compliance • Due diligence
Sustainability	<ul style="list-style-type: none"> • Enhanced lubrication practice • Enhanced diagnostics and measurement • Analytics • Asset alignment and set up 	<ul style="list-style-type: none"> • Energy reduction • Carbon footprint reduction • Emission reduction

Table 1. The ISO 55000 Chemical Plant Organization.

The petro-chemical industry is a prime candidate for certification to ISO 55000 as it already strives to meet many stringent internal and external corporate and legislative requirements that must be managed and reported on. This demands a highly developed and documented condition-based asset management approach that may already meet many of the ISO 55001 requirements, making adoption of the standard easier than most other industries. Many petro-chemical companies will already be certified to ISO 9000 and/or ISO 14000 and working with an ISO auditor who understands their culture and business.

As shown in Table 1 – “The ISO 55000 Chemical Plant Organization”, there are many practical reasons for adopting the standard as a framework for continuous improvement, arguably none more important than making sense of our data. Many existing management systems and data repositories are full of meaningless, unrelated data, making it difficult to mine meaningful information or make confident and effective decisions regarding the management of people and assets. ISO 55000 requires data confidence, which means

- addressing how we collect, compile and use data
- assessing and addressing the validity and value of our current asset management and maintenance activities, including the use of resources, materials, tools, instruments, data, processes, procedures, plans, methods and activities
- formulating an asset management approach that allows us to mitigate risk and meet our corporate objectives

Asset management in North America faces a rocky ride in the coming decade as companies demand sustainable performance from aging assets and increased diligence in their asset management practices, all with reduced resources. Companies are already starting to feel the change as the skilled trade “baby boom” fraternity ready themselves for retirement. With an estimated loss of 50% of all skilled trades in the next decade due to retirement eligibility and health issues, individual companies must manage their impending risk.

Adoption of the ISO 55001 standard will help corporations

- accept, evaluate and manage the risk associated with the loss of experienced maintenance staff and aging assets
- provide a balanced framework and approach that epitomizes “best practice” in maintenance and asset management
- allow the maintenance organization to organize and capitalize on its many strengths and excellence already in place

Fortunately, as in previous cycles of industrial innovation, technology is quickly evolving to help bridge the pending knowledge gap. Resolving the skills loss and embracing ISO 55001 will involve both old and tools, methods and technologies.

- **Leadership (Clause 5)** ensures that top management is behind the change and committed to making it work – not just the “flavor of the month”
- **Planning (Clause 6)** ensures maintainers are also stakeholders and have a voice in the assessment of current state
- **Support (Clause 7)** allows us to use value-added condition-based maintenance checklists to check for asset nonconformities (No-Go exceptions)

These guidelines are particularly powerful when set up using visual indicators to alert an operator or lower-skilled person of an exception or nonconformity. Those issues can then be addressed by a skilled tradesman as needed, thereby focusing and better leveraging the available skilled resources. To initiate an inquiry, an asset’s physical condition can be recorded with a smart phone camera (still or movie) and sent in real-time to management for assessment and further instruction, jumpstarting the planning process.

Recently, great strides have been made by the test and measurement providers of hand-held condition monitoring tools. Many traditional measurement tools are now linked to a smart phone-accessed cloud database that is easily set up to record and trend readings, and to alarm the user when a No-Go exception is found or impending. Many of these tools can also be used in conjunction with one another. For example: an infrared camera, vibration monitoring pen, and electrical meter could all be employed to monitor a problem with a motor driven drive unit. Once the tools are in place, the encompassing wireless data-management app collects and manages all three sets of data on the same asset simultaneously, helping the inspection team get to root cause more quickly and supporting the ISO 55001 documentation requirement.

User interfaces on the tools have been simplified enough for reliable use by lower-skilled individuals with minimum training and application. Any member of the maintenance team who shows the appropriate aptitude and diligence can take infrared training, become independently certified as a level-one thermographer, and be placed with confidence in a condition-based check program on power transmission systems, heating and cooling systems, steam traps, insulated systems, building envelope checks, etc. This type of approach is also relevant to Performance Evaluation (Clause 9) and Improvement (Clause 10).

Key takeaways

In conclusion, assets are everyone’s responsibility; ISO 55000 recognizes this by specifying transparency and accountability throughout the organization based on an infrastructure designed to codify best practice, break down silos and just “do the right thing at the right time.” Using traditional practices to reflect on current practices combined with modern data capture, management and reporting, can change the way work is performed, based on the value of the outcome. Implementing and certifying to ISO 55001 promises to be a perfect catalyst to add structure, transparency, accountability and effectiveness to maintenance organizations.

Ken Bannister has been implementing asset management programs for over 26 years as a principal asset management consultant for ENGTECH Industries Inc. and is an accredited certified ISO management consultant.



Diagnostic tools now sync with cloud databases, improving the reliability of data capture and communication.



Visual indicators such as this red/green light alert operators to exceptions and non-conformities.

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