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5 Steps to Optimal Integrity and Performance

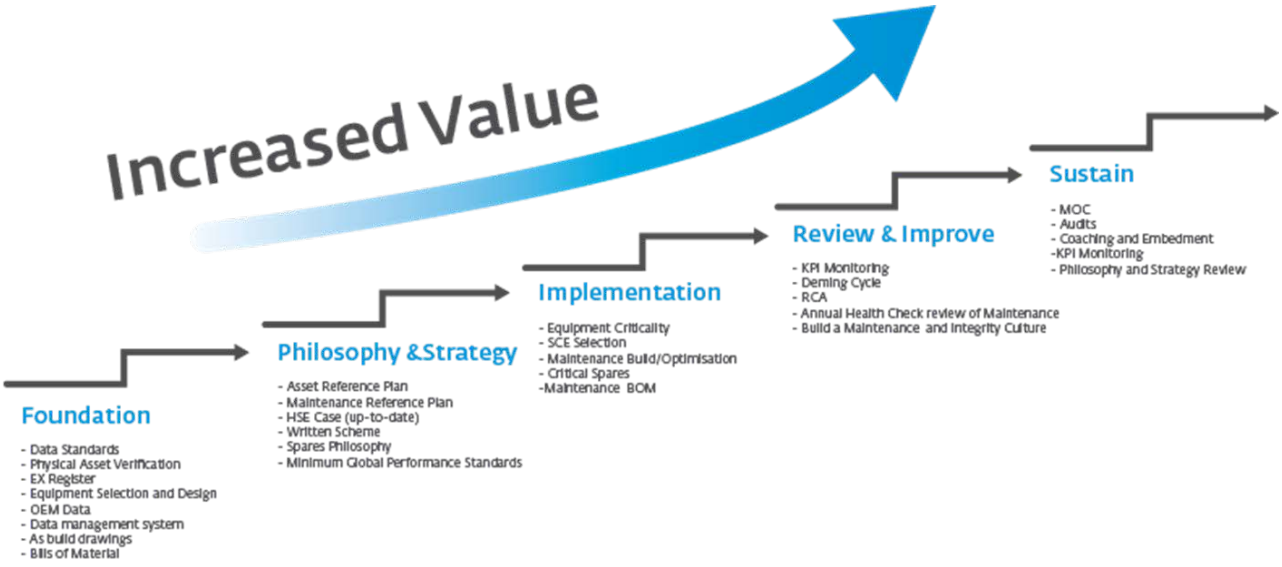
White Paper

Integrity and asset performance ubiquitous within the oil and gas industry are in fact in the requirements. It follows that a company that is managing integrity well will in turn achieve higher uptime and performance from the asset relative to the business case.

In add energy's experience with global delivery of technical integrity and uptime improvements there have been consistent themes which keep presentencing themselves and are required to be approached in strategic steps as part of an integrated plan in order to achieve maximum chance for embedment and return on the investment.

Often when setting out to achieve a goal for integrity or performance there are compromises immediately made because the foundation has not been there in order to support the implementation. Going back to the start and getting a complete and robust solution is often hampered by a legacy of previous uncoordinated improvement, limited budget which forces cherry picking, or the total solution can seem so gargantuan that it appears impossible to solve all of the issues. This can be further compounded by interdepartmental responsibilities across technical integrity and, safety and maintenance not being collaborative or being clear on the shared goals

We at add energy feel there are five simple steps to follow in order to obtain integrity and uptime performance. These can be categorised as foundation, philosophy and strategy, implementation, review and improve, and finally sustain.



Obtaining a clear understanding of where you stand on the steps will help to determine whether there needs to be a step back to the foundation and philosophy stage, or if compromises are going to have to be made on the delivery.

Throughout this white paper we will explore each step, discuss how to get it right first time and understand the benefits associated to the individual improvement and its cumulative effect on the total delivery of asset integrity and performance improvement.

Foundation

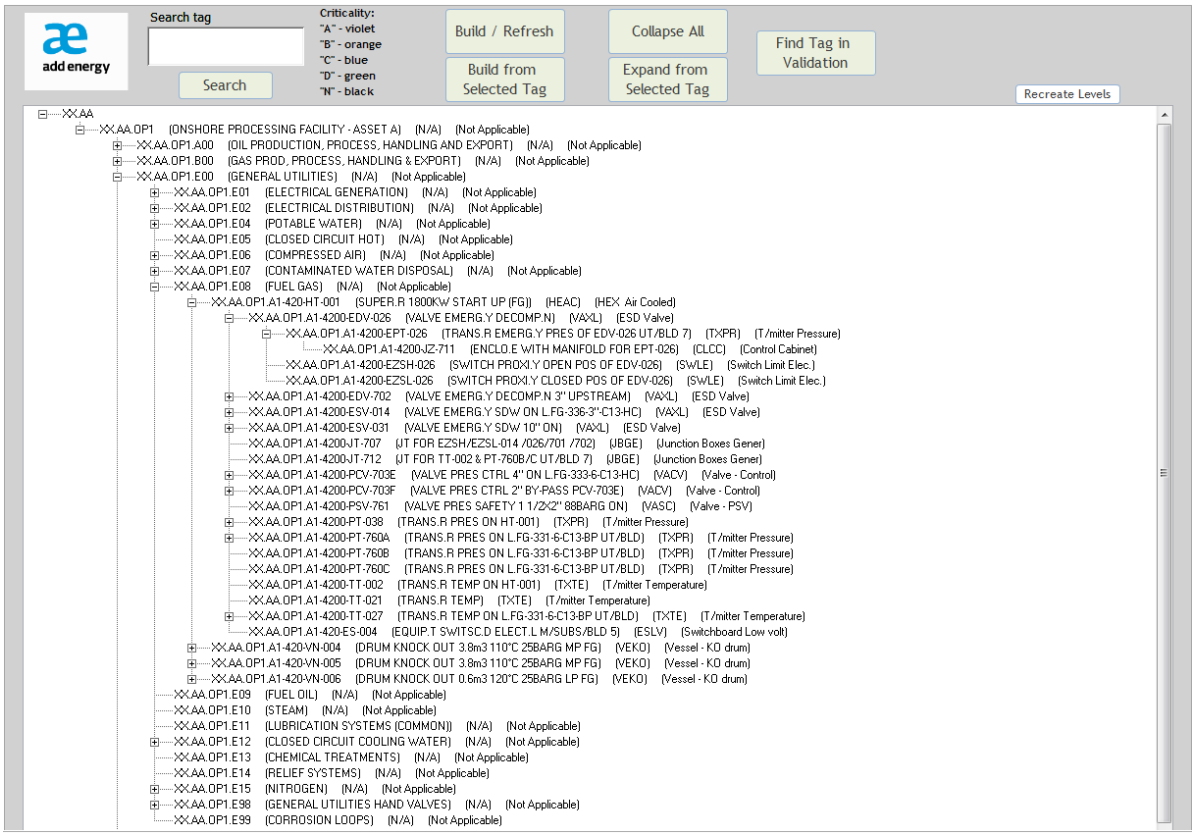
The foundation is built on data in various formats, unfortunately in the oil and gas industry as with other industries huge benefit can be lost from the beginning if concise operational readiness philosophy is not adopted in the project phase. The key elements in the project phase are to ensure that critical information is captured, held in the right place and format and is linked to the correct equipment. This begins in the contract phase and has been especially prevalent in turnkey projects from our experience, where the disconnect exists between contract and project teams and what is required by operations and maintenance for the management of the operational asset. Often in the project phase the budget runs out and the delivery of asset data and documentation in the final stages become the sacrifice. Also vendors can be late in providing data or have not been mandated to deliver it specific to asset being built and the linkage is lost. Asset owners/operators also commonly accept this as punch-list items without close-out.

This can seem the lesser of evils when the project is under pressure to deliver and budgets are reaching exhaustion.

Asset Register

The primary key from a budget, maintenance, criticality, classification, and materials view is ultimately the asset register. The asset register can only be correct if the data standard has been set and defines what the maintainable items will be. Go too deep and the asset register will be bloated, go too high-level and the asset register will lack the granularity to apply criticality per equipment or the materials and will have impacts on planning and compliance. To determine the level of granularity for the asset register you need to determine what equipment are your maintainable items for both planned and unplanned maintenance, and which equipment require a Bill of Materials (BoM). This will ultimately ensure that you can implement integrity assurance, planned and unplanned maintenance, and the materials required to perform the task or as contingency are available.

See example tree view:



A good starting point for determining the basis of the data standard required can be taken from ISO 14224 and NORSOK Z008. These will require interpretation and expansion depending on the company and asset. This standard should be applicable across all of the company's business units so like-for-like measurement, reporting and read-across can be achieved where practicable. It is important to determine equipment object type, in particular the equipment class and equipment type as shown below in the excerpt from ISO 14224 Second Edition 2006-12-15.

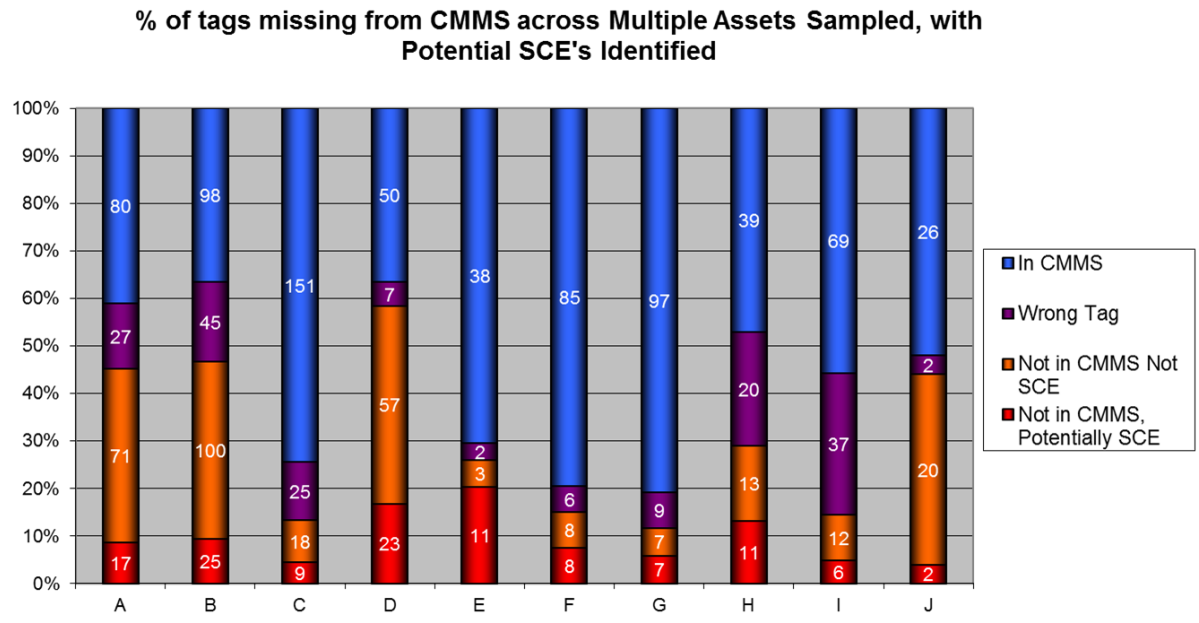
Equipment class — Level 6		Equipment type	
Description	**Code**	**Description**	**Code**
Combustion engines — piston (diesel/gas engines)	CE	Diesel engine	DE
		Otto (gas) engine	GE

To create and manage the asset register a number of engineering documents are required and need to be as-built, to a high standard, and correlate with site tag numbering. The P&IDs (Process and instrumentation Drawings) and E&IDs (Electrical and Instrument Drawings) form the majority of the equipment required for the asset register and help to demine the taxonomy and application of the equipment. In addition to this the Cause and Effect Drawings are critical to determining the safety function of the instrumentation and end elements and are particularly useful when determining which equipment are safety critical elements when it comes to the shutdown hardware barrier. The EX-register is also critical to the registration of equipment and the identification of safety critical equipment as per the ignition control hardware barrier.

Equipment data sheets and OEM (Original Equipment Manufacturer) data are critical to the data scraping for bills of materials. This becomes extremely difficult and much more costly once the project phase is over to get this information and retrospectively populate it through data requests with the OEM. add energy have developed a software library for BoMs in order to auto match, but this requires the model and manufacturer to be populated in the asset register.

Asset Register Completeness

Often the asset register is incomplete. Out of more than 100 assets, for which add energy have performed desktop and physical asset register verification, we have found 15-40% of the asset register to be missing or incorrect for safety (in the example below Shutdown Valves, Vessels, Transmitters and Relief valves) and operationally critical equipment alike. This varies greatly between companies, countries, age, and asset.



This should always be checked before embarking on improvement studies for integrity and performance improvement as the result will be that unknown gaps will exist in the asset register, and a false sense of security will be given.

Gaps in the asset register can mean that safety, operational and commercially critical equipment will not have maintenance tasks assigned to them, and so it will not be possible to demonstrate that any assurance tasks have been performed. Accordingly it will not be possible to assign the budget to maintaining the equipment for which records are missing. Missing data also prevents the correct spares through Bills of Materials to be assigned. These circumstances leave the asset holder exposed from a safety, integrity and compliance view.

A few simple checks can be performed before performing desktop or physical asset verification:

- Sampling Review 10% (electronic if possible, and understand the accuracy/key assumptions reflected) good sources include:
  - Cause and Effect's (C & Es)
  - EX-Register
  - Plot Plans
  - P&ID's
  - E&ID's
- Consecutive missing TAG's (e.g. an A and a C TAG but no B)
- Formatting of TAG's will be an issue, trim Function Locations or change the prefix e.g. (RV could be PSV)
- Use purely the numeric of the tag and read the description
- If available use commissioning logs (in the case of Newer Facilities)
- Benchmark and compare the number of TAG's between facilities
- Ask the maintainers for their judgment and review change requests for the CMMS

Physical Asset Verification

When embarking on verification of equipment it is worthwhile performing the desktop verification of the engineering documentation first. This will determine the scale of the issue which provides the cost benefit of the work, and will allow for the estimation of the effort required for physical verification. The desktop analysis should be performed in such a way as to provide work packs for the physical verification to be performed. Once in the field engineers will be required to walk the line using the work packs, provide concise templates aligned to the minimum data standard (as this can feed into the BOM's and EX work). Where the asset is small or budget is not available it is possible to include verification of tags from the Desktop in the maintenance activities for a period of time, however we have not seen this successfully implemented by clients, as this still requires project management and analysis data management.

Key Benefits of correct PAV:

- Critical to Permit to Work System
- Proof of Presence

- All maintainable equipment is associated to a maintenance task
- No Safety Critical Equipment with unrevealed failures
- Bills of materials can be carried for the equipment
- The Management of Change culture means that people trust the system
- Robustness and Conformity (Corporate Standards), for Generics and Lateral Learning
- Equipment Reliability
- MoC to ensure operational readiness and assurance (OR &A) and Business Process

Philosophy and Strategy

It is critical to determine the philosophy and strategy for the management of the asset to ensure that the business case is viable and that the asset can be managed as a whole to ALARP (As Low as Reasonably Practicable). Without a clear understanding of the assets value and longevity in relation to the location, age and production opportunity it is impossible to manage the integrity and performance of an asset and clearly communicate this through the asset team. The basis of this will determine the viability of the asset and will cascade through to all of the decisions as to what equipment is critical, what maintenance to perform and how often, and what the spares holding will be.

Asset Reference Plan

The Asset Reference Plan (ARP) is a comprehensive business plan of the long-term strategy to recover the reserves and captures all major activities which occur during an asset's lifecycle which impact upon its costs, revenue and overall economics. The ARP for an asset is therefore the basis of that asset team's contribution to the annual corporate programme build. On an annual basis, the ARP should be updated to reflect changes in the internal and external environment and new initiatives. Beyond this, the ARP should provide a summary of development and growth plans for the asset which are geared to maximising its value in the short, medium and long term and should be aligned with corporate goals.

Maintenance Reference Plan

The Maintenance Reference Plan (MRP) in turn follows on from the Asset reference plan in defining the approach to maintenance given the governing economics, field concept selection, and technology in delivering the safe and optimal management of maintenance as a philosophy. It will determine the budget for maintenance and the most effective use of this budget for the return on investment, in terms of reliability and assurance of integrity. This will then drive the approach to maintenance which includes decisions on whether to adopt OEM specific maintenance, calendar based maintenance, Risk Based Inspection (RBI), Reliability Centred Maintenance (RCM), Safety Instrumentation Level (SIL), condition based maintenance (CBM), or on-failure maintenance. These core requirements will be the basis of maintenance strategy documents for the equipment types and disciplines. The best practice which add energy have employed with clients is to create a library of minimum standard maintenance practices from this.

HSE Case

The HSE Case (as per Offshore Installations (Safety Case) Regulations 2005) or COMAH report is a critical document in the licence to operate and defines the Major Accident Hazards (MAH) and Hazards and Effects Management Process (HEMP), it defines safety critical roles and identifies through bowties the methods for prevention and mitigation of the consequences and effects of a MAH event. This is critical in determining the hardware barriers and safety critical elements for which assurance tasks and master inspection characteristics must be applied. It is essential that this cascades through into the maintenance management system in order to ensure that this that HSE case becomes as part of everyday activity and is a living document.

The new independent competent authority bodies that that EU Commission will enforce implementation of across the member states in July 2015, dictate that the requirements of the safety case are taken further. Operators will be have the statutory requirements to have major corporate accident prevention policies in place.

Additionally, environmentally critical elements will have a formal status that will be incorporated into legislation.

Corporate performance standards should be developed for the business which align to the Hardware Barriers and identify the safety critical function(s) of the equipment; the assurance test, the measure of pass fail criteria and the units of measurement thereof. This will ensure the corporate requirements are met through a company's business units to a minimum standard regardless of the global location providing assurance and consistency, compliance can then be fairly measured.

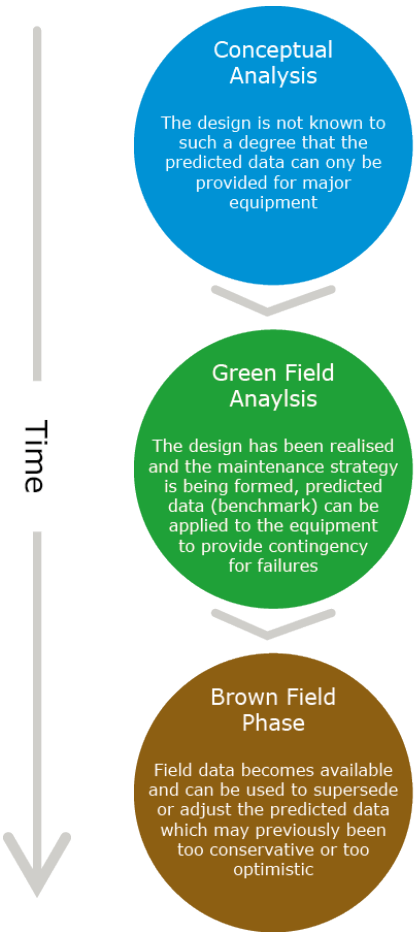
SCE	**ESD Valve operates correctly or ESD Valve Closure Time**	**ESD Valve accetable leak rate or ESD Valve leak rate**
		
EMERGENCY SHOUTDOWN PROCESS VALVES	Y/N = (TIME)	Y/N or < = (LEAK RATE)

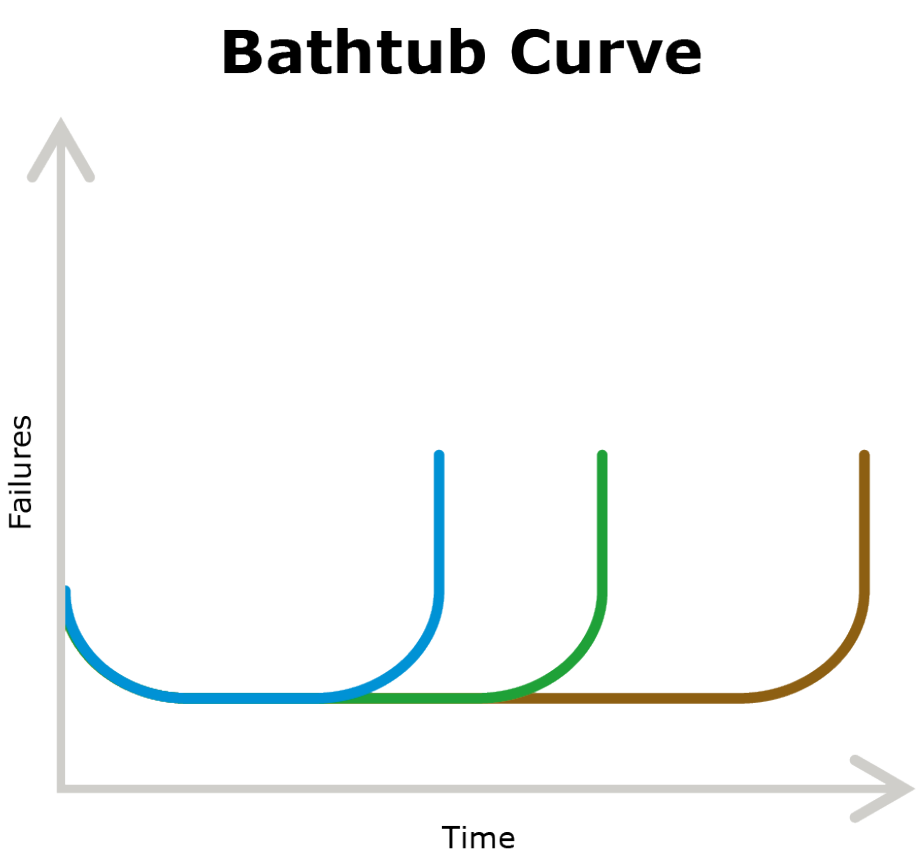
Written Scheme

The Written Scheme of Examination (Pressure Systems Safety Regulations 2000) is a document detailing items of plant or equipment which form a pressure system, operate under pressure and contain a relevant fluid and is defined in the Regulations and covers compressed or liquefied gas, including air, at a pressure greater than 0.5 bar (approximately 7 psi) above atmospheric pressure; pressurised hot water above 110 °C; and steam at any pressure. The documentation should identify the items of plant or equipment within the system and those parts which are to be examined, the nature of the examination required, including the inspection and testing to be carried out on any protective devices, for this the asset register completeness is critical and this will determine a large part of the maintenance for the static equipment across the asset.

Spares Philosophy

Minimisation of spare part inventories is recognised as one of the means to improve competitiveness and profitability of an organisation as a whole. Although direct cost savings through low inventories may be immediately apparent, future production output and efficiency demand that a balance must be drawn between a low spares inventory and operational needs. While operators must work towards a "Just in Time" or "Zero





Inventory" policy. There must be awareness that spares of critical importance must be held in stock against unforeseen breakdowns of essential operating equipment. Analysis and assessment against the importance ranking of equipment (or criticality) should determine spare requirements.

Such analysis should include a level of repair analysis (LORA). Also included should be analysis of spares availability and delivery, the costs and life expectancy, and storage and transport logistics.

When the total spares requirement has been developed for maintainable equipment and potential repair needs, there should be consideration of:

- parts with low Mean Time between Failures (MTBF)
- parts that are routinely replaced during maintenance
- parts subject to sudden failure
- parts without which the equipment will not function
- parts with long delivery time
- parts that have large quantities in use i.e.>10
- parts for critical equipment i.e. for production, safety, environment
- parts consisting of repair kits, not assumed to be supplied for commissioning
- parts of low cost and unlimited shelf life
- Items with defined shelf life & special storage requirements
- Components requiring maintenance and /or preservation during storage periods.

It is important to highlight that the availability of consumable spares or insurance spares has a significant impact on the efficiency to perform planned maintenance and to restore the function of safety or operationally critical equipment. This then impacts on compliance, safety, uptime, and efficiency.

The availability of spare spares also has a significant cost factor. The lack of correct spares can cause additional 40% costs to the maintenance operation.

Implementation

With the foundation, philosophies and strategies in place, the implementation can occur with a higher chance of the maximum benefits to the business. During the implementation there are a number of opportunities to work smart and ensure consistency of approach which can be replicated through the assets and business units.

Equipment criticality

Equipment Criticality must first be determined on the basis of the philosophy and strategies, this will be made significantly easier if the foundation has been completed as the equipment technical object type and asset register hierarchy will help with the filter to assign criticality based on the Cause and Effects, EX register, SIL assessment's, HSE Case/COMAH Bowtie analysis, and finally RAM (risk Assessment Matrix) analysis. During this the Identification of Safety and Environmentally critical equipment will be further defined as Safety Critical Elements and it will be identified whether an assurance task is applicable or if the allocation is for corrective maintenance prioritisation.

In following this process and by having the foundation data right it is possible to perform this work remotely, bringing it forward for review with the Technical Authorities and Asset Teams where the equipment groups, criticality, SCE, and system can be cross compared, giving the most efficient use of review time. This is then repeatable across assets and quality control tests are easily performed through pivot charts.

Maintenance

Maintenance and Integrity organisations aim to execute cost effective maintenance in maintaining integrity, availability and reliability of equipment and hence operating facilities. This requires a balance of preventative and corrective (breakdown) maintenance.

Maintenance impacts on:

- The condition of a company's assets
- The output of a company's assets

Ideally all equipment should have a maintenance strategy which details why and how that equipment is to be maintained, what failure modes are to be addressed by preventative maintenance (if applicable) and, at high level, what preventative maintenance will be carried out at what frequency in order to prevent unacceptable levels of corrective maintenance. The strategy is then used to develop a preventative maintenance routine which tells the maintenance technician exactly what he is required to do and check.

Preventative maintenance (PM) routines can be developed through extensive Reliability Centred Maintenance (RCM) studies or based on knowledge of equipment operation. Over the years many operating assets have carried out both types of PM development and there is a wealth of information available. These have been developed largely in isolation although the base equipment is very similar across the oil and gas industry.

Common issues with maintenance are:

- The maintenance content (strategy development, creation of maintenance items and plans) of Computerised Maintenance Management System (CMMS) data build activities is varied in its quality and completeness
- Individual opinions on maintenance management are often based on previous experience and personal preference rather than on maintenance engineering principles
- The link between the equipment maintenance strategy, Risk & Reliability Management studies and the implemented routines in the CMMS is often unclear and therefore preventive maintenance optimisation does not have an understood starting point
- Maintenance plans for common equipment demonstrate misalignment of frequencies
- There is no continuous improvement from Project to Project and little sharing between operating assets. Each project reworks equipment maintenance strategies and develops its own PM routines, leading to a large amount of duplication of effort
- Process safety initiatives – the management of safety barriers do not always receive the correct priority, for example through longstanding overrides and criteria for temporary or degraded equipment.

Critical Spares

It is necessary to identify and hold critical spares to ensure that safety critical and operations critical equipment can be returned to full operation in as short a time as possible in the event of failure.

Critical spares are deemed to be spare parts without which the safe operation of the rig would be compromised or which would result in significant down time in the event of an equipment failure.

Critical spare parts need to be identified as such by the OEM/OES and by technical personnel familiar with the environment in which the equipment will operate and the maintenance. They should have access to all relevant documentation such as maintenance procedures, manuals and drawings. The selection process should take the following into consideration:

OEM recommended spare parts lists should be used as a basis for a critical spares list but may not necessarily include all critical spares for an item of equipment. Conversely, recommended spare parts lists may include items not considered to be critical.

Critical spares may comprise a complete assembly where replacement of individual part(s) or kits would take longer than replacing the entire assembly and servicing the spare off-line.

Quantities of spare parts should be identified taking into consideration usage of a particular part in multiple equipment, delivery lead time and geographical location.

High value spare parts and complete assemblies may already be held in other parts of the company

There may be equipment whose spares are interchangeable and this should be considered within the stock levels held.

Geographical location should be considered where difficulties may be experienced in importing material in a timely manner

Attention should be paid to the interfaces of replacement components or assemblies as there may be a specific requirement to replace consumables such as gaskets, o-rings etc.

Where specific tooling for disassembly and installation of components is necessary but would not normally be available on-board, this should be considered as part of the kit of spares.

Maintenance BoM's

For optimal performance a maintenance BoM should be assigned to the maintenance task with the specific parts/materials required for the task so as to assure that the materials will be available for the job to commence without delays. There are few oil and gas companies who have this in place, this is rarely achieved as a complete set of equipment BoMs was not prepared at the foundation stage to allow the selection of maintenance BoM's.

Review and Improve

Deming Cycle / Health Check

The Deming cycle (review and improve cycle) has been consistently used and shows us the review and improve cycle required for the continuous improvement of performance. Add energy has worked with a client following this approach by carrying out annual health checks on the performance of maintenance across a fleet of seven assets over the last seven years. This has resulted in an increase from 82% uptime across the fleet to a sustained level of uptime in the mid-nineties. This has been achieved through the identification of improvements, implementation and monitoring. Once optimal performance has been achieved, the objective becomes the sustainment of the uptime.

KPI (Key Performance Indicator) Monitoring

KPIs are an established business tool used to measure and improve effectiveness of maintenance programs, implementing and monitoring external and internal KPIs in line with best practice.

- KPIs measure parameters which describe an aspect of the current state of your operation whether at departmental level or board level
- They can be compared over time to indicate changes or trends
- Their nature and range will vary from company to company, they will be derived from the stated business objectives

Allowing management to manage, rather than react – what gets measured – gets done.

Sample KPI's:

PM Compliance %	Measure maintenance compliance with the planned maintenance schedule
CM Compliance %	Measure compliance in effectively completing maintenance on failed equipment
Maintenance Backlog (hours)	Measure how effective the maintenance teams are reducing open orders
Equipment Failed State %	Measure compliance in how effectively the maintenance group is repairing equipment and closing out work orders
Ration of CM to PM %	Measure how effective the planned maintenance is by directly correlating the corrective tasks generated against the planned tasks
Post Maintenance Failures %	Measure the effect of scheduled maintenance tasks and how they impact reliability
Reliability on Demand %	Measure the functionality of SCE equipment in the result if an emergency based on the number of test, failures and any voting
Deferrals %	Measure Non Conformances for which outstanding actions exist and contingency is in place
Overrides and Inhibits %	Measure the number of action items outstanding rolling value
Risk Level	Measure the probability that accident occurs multiplied by the severity of that harm

Ultimately KPIs should be related back to business objectives, this ensures that improvement in KPIs mean that business goals are addressed correspondingly, KPIs should be reviewed or subject to continuous improvement. As business needs and objectives change then so should the KPIs which support them and they should be communicated in an appropriate manner to all sections of the workforce. A key to driving improvement is the effective communication of progress to the very people who are making it happen.

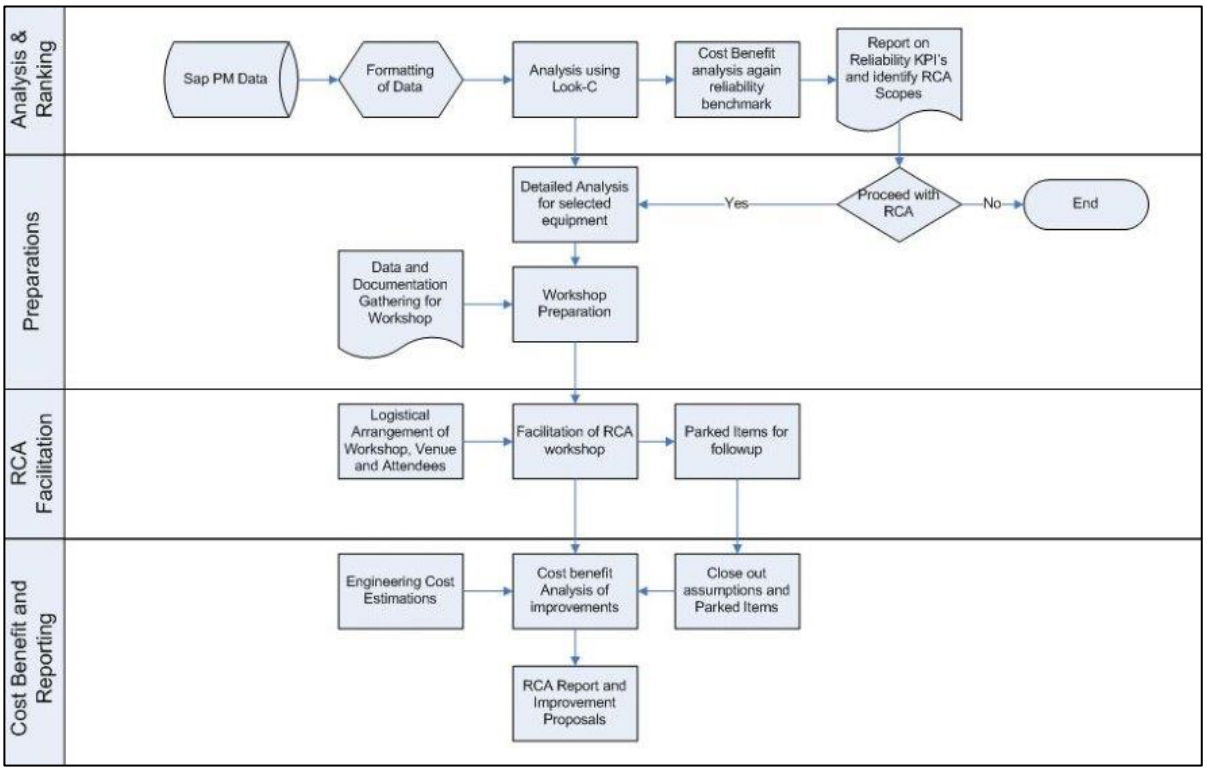
Root Cause Analysis (RCA)

With the measurement of the KPI's in place chronic areas of failure will be highlighted and need investigation. The traditional methodology for this is Root Cause Analysis. Most oil and gas companies are well trained in root cause analysis and people are proactive in conducting RCA on the occurrence of failure.

This satisfies engineers innate need to problem solve. The issues we encounter are that the cost benefit of the root cause analysis is rarely established at the start. Furthermore the analytical data required for the cost benefit of the resulting mitigations which have rightly been identified by the RCA did not support the Engineering Change. In many instances the same failure will happen again in the future because the mitigation

identified by the RCA was never implemented because it never ranked highly enough, joined the queue of engineering changes, or gets parked as too difficult. By comparing the performance of the equipment against a benchmark of common equipment from within the business or industry benchmark data a delta can be established which if the failure mode is mitigated will deliver a return on investment.

Typical add energy approach to RCA improvement process:



Build a Maintenance and Integrity Culture

To build the maintenance and integrity culture in the business it is critical to get the foundation data in place in order that the solutions being implemented are credible and work in order to get the buy in from the maintenance and integrity community. The solutions implemented should follow the KISS (Keep it Simple, Stupid) principle and should be designed so that it can be understood and communicated consistently and effectively throughout the whole organisation. Where possible the solutions implemented should make peoples' day job easier, in the case of BoM's, Master Inspection Characteristics for measurement of SCE pass/fail criteria, asset register quality and completeness for permit to work. In the first instances it is an easier sell to the maintenance and operations community, and then can be used to build on the awareness and culture of maintenance and integrity, it should ultimately just become a part of how we do business.

Sustain

MOC (Management of Change)

Management of change is critical to the sustainability of the work done to improve integrity and performance. This begins to degrade from day one of implementation if the MOC process is not robust. Especially with brownfield engineering projects if the processes have not been embedded into the business, firstly the equipment may not be added to the asset register, or it may not be fully populated. Common reasons behind sustainability falling down are: the same process for criticality may not be applied, the people performing the analysis may not have undergone the training or familiarised themselves with the process, the team signing off on the job may not understand the importance of this in the degradation of the standards which have been created and accept this as punch list items.

There can also be issues with the coaches and champions involved in the establishment of the standards and implementation leaving critical positions resulting in dilution of the future implementation of the standard depending on the quality of the guidelines, standards and handover.

Audits

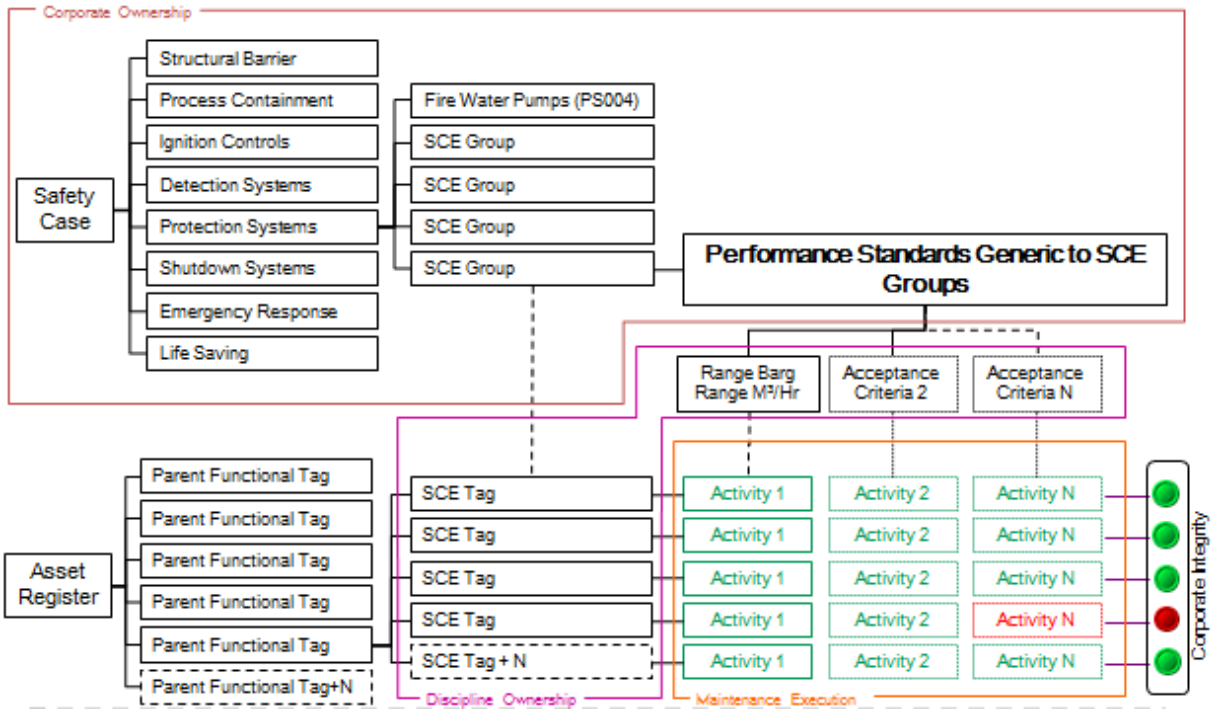
Annual audits can be performed such as add energy's Brownfield Optimiser to establish if standards are being applied measure are in place and being communicated effectively through the asset team, if the implementation is consistent across the business, and to reward and recognise continuous improvement.

Coaching and Embedment

Methods for coaching and embedment include the following to ensure embedment into the organisation:

- Local implementation guides and ready reckoners
- Posters for site on the changes to the system
- Sustainability through training specific to job type
- Coaching on examples for updates to CMMS and planning
- Coaching on completion and reporting of assurance tasks
- Reporting and Ownership of Technical Authorities

Peoples' position in the structure of integrity and how it holds together needs to be illustrated as per the diagram below:



KPI Monitoring

Once established KPI's should be continuously monitored and trended to determine if performance is being sustain, in decline or improving. add energy has designed a KPI analyser. Typical outputs are shown below:

KPI Asset view

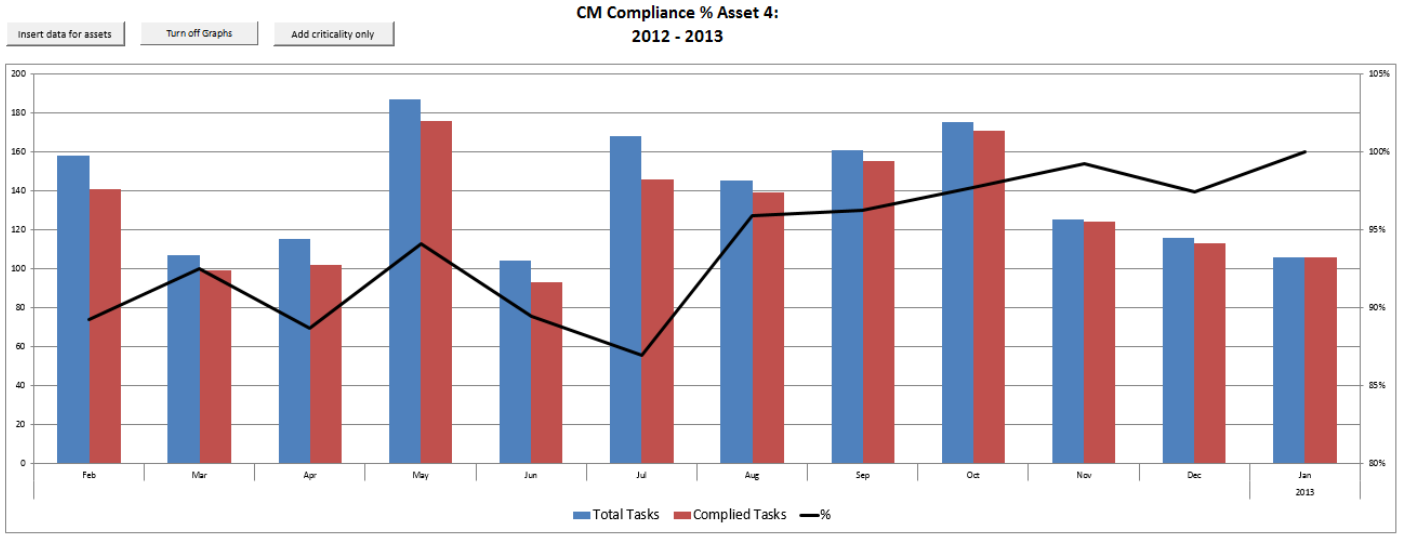
KEY PERFORMANCE INDICATORS	ASSETS						
	Asset 1	Asset 2	Asset 3	Asset 4	Asset 5	Asset 6	Asset 7
PM Compliance %	87%	91%	89%	95%	86%	86%	93%
CM Compliance %	95%	86%	94%	94%	93%	93%	93%
Maintenance Backlog(hrs)	18%	12%	17%	10%	18%	15%	11%
Equipment Failed State %	5%	14%	6%	6%	7%	7%	7%
Ratio of CM to PM %	16%	19%	22%	26%	21%	13%	16%
Post maintenance failures	45%	44%	47%	42%	83%	61%	67%
Reliability on Demand	72%	86%	79%	81%	67%	76%	77%
Deferrals	15%	12%	14%	0%	44%	8%	11%
Outstanding Audit Actions	28%	12%	13%	3%	15%	15%	13%
Overrides and Inhibits	10%	12%	17%	8%	32%	8%	5%
Risk level	18%	12%	17%	10%	18%	15%	11%

SCE/H criticality

All equipment

KEY PERFORMANCE INDICATORS	QUALITY LEVEL					
	Blue	Green		Yellow		Red
PM Compliance %	100%	100%	95%	95%	85%	85%
CM Compliance %	100%	100%	95%	95%	85%	85%
Maintenance Backlog(hrs)	0%	0%	5%	5%	15%	15%
Equipment Failed State %	0%	0%	5%	5%	15%	15%
Ratio of CM to PM %	0%	0%	70%	70%	99%	100%
Post maintenance failures	0%	0%	20%	20%	50%	50%
Reliability on Demand	90%	90%	80%	80%	70%	70%
Deferrals	0%	0%	5%	5%	15%	15%
Outstanding Audit Actions	0%	0%	5%	5%	15%	15%
Overrides and Inhibits	0%	0%	5%	5%	15%	15%
Risk level	0%	0%	20%	20%	70%	70%

Insert data for assets | Turn off Graphs | Add criticality only



Philosophy and Strategy Review

All philosophies and strategies should regularly be revisited through the MOC process or based on a calendar trigger in order for them to accurate and remain live and utilised by the organisation. People quickly lose faith in out of date documents such as the Performance standard and this then quickly becomes an acceptable reason to step out from the standards as they have lost credibility. These documents must drive and filter down through the organisation into the day to day activities of the workforce.

Conclusions

It is essential for oil and gas business to recognise and be realistic about where they sit on the five steps in order to achieve their goals or at least have a clear impact assessment on the compromises which have had to be made. Following the steps improves the likelihood of success in the project and cumulatively through the implementation saves time and money on rework and loss off effectiveness. Each step being complete makes the process easier and has multiple fringe benefits to the organisations effectiveness. Achieving and sustaining performance increases in integrity and uptime means an asset will be able to demonstrate that they are safe and have maximised asset value.

About Add Energy Asset and Integrity Management

add energy's Asset and Integrity Management division combines engineering and software to deliver a complete suite of asset integrity solutions

In our 10 years of providing operational excellence, we have obtained a proven track record of enabling clients in the oil and gas and power sectors to gain results in asset integrity, safety, uptime and cost efficiencies. We have provided robust asset integrity solutions across 280 projects worldwide, all succeeding in enhancing asset safety and performance.

Add energy have delivered successful projects in 27 countries worldwide, our international footprint spans over 14 offices located globally across the world. Through analysing over 900 assets to date, our clients are made up of National and Independent Operators, Drilling Contractors and OEMs.

We belong to add energy an international, independent service company of integrity & well specialist providing specialist and integrated services and solutions across the E&P value chain.