

Operator Care (Part 2)

Operator Asset Ownership ... This is my Equipment!

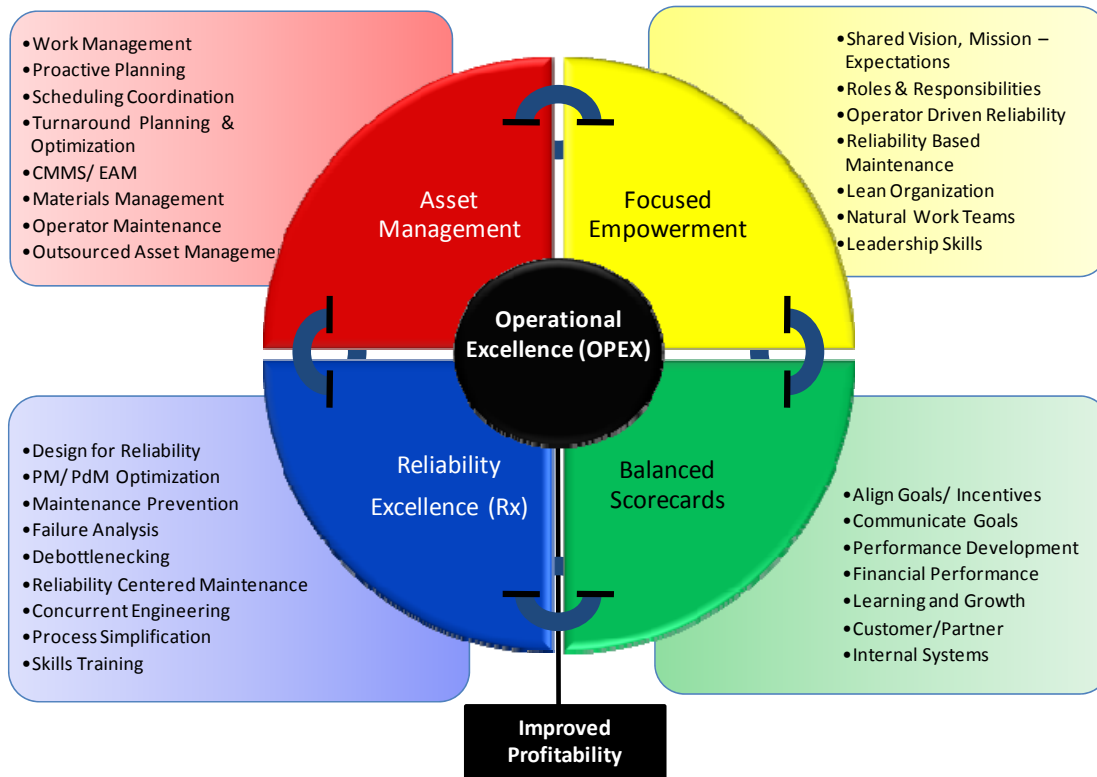
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Introduction

Operational Excellence (OPEX) is based on a holistic asset design, asset management and asset care concept powered by Reliability Excellence (Rx). It requires a total collaborative and fully integrated effort by all functional departments at a plant. Driving an organization toward OPEX is a realistic goal when there is an established Rx program coupled with proven TPM strategies.

The minimization and outright elimination of losses continues to dominate the agenda of manufacturers especially in capital intensive industries. Successful companies are required to report and demonstrate Continuous Improvement (CI) and communicate best practices across the entire company globally on a regular basis. Significant improvements and progress made with such techniques as Lean/ TPM/ AM/ etc., in turn minimizing losses across their manufacturing processes, are being shared from board rooms to shop floors. Even with the most up-to-date processes, technologies and tools available, it is the people, a well trained work force, that ultimately drive the success of a company.

LCE's proven Rx implementation methodologies, processes and tools are designed to support achieving OPEX. The illustration below defines some of the key aspects and links Rx to OPEX.



Any success realized in maintenance or Rx cannot be sustained in the long-term without the complete buy-in, active participation, and ownership of plant leadership, operations, engineering and maintenance and all other functional support groups whether on site or not (remote procurement). It is not enough if operations believes in the concepts of OPEX. Understanding, willingness to be involved and asset ownership must include all employees to provide real behavior change and opportunities for sustained, long-term success. Each functional group must have a clear understanding of the causes and effects of their support (or lack there of) on a daily basis (daily management activities). A highly effective partnership between operations and maintenance is a key enabler to long-term success in OPEX. It's a never ending journey.

Operational Excellence doesn't just happen...

Operational Excellence requires a set of disciplines that require sustained effort to transform into habit.

Attaining Operational Excellence requires a performance improvement focused way of:

- **Changing** Culture & Behavior
- **Thinking** of "Value Added" Processes
- **Measuring** KPI's and Performance
- **Managing** the New Re-engineered Processes
- **Sustaining** and continuously improve Processes

....a structured Pathway is needed!

To successfully undertake the journey we need to supplement intentions with knowledge based on implementation experience.

The Operational Excellence program provides a framework to enable management to understand why and how performance needs to improve. It addresses BU, Plant and Departmental challenges through a series of Guiding Principles encompassing topics such as:

- Medium Term Strategic Clarity & Focus (3 year)
- External Customer Focus
- Master Plan (Pathway) development (all Initiatives)
- Attention to KPI's & Measures
- Performance Management
- Leadership and Communication
- Improvement Methods (e.g. CI and Lean methods)

Implementation of an Operator Care Program

In follow-up to Part 1, Operator Care Part 2 will concentrate on LCE's Operator Care implementation methodology and conceptual approach as well as on the tools available:

1. The Methodology – The Rx/ OPEX connection
2. The Processes and Tools – Rx and OPEX overlap
3. The Education – Operator Care Workshops (TPM/ AM)
4. The Discovery – Identifying TPM/ Operator Care activities
5. The Implementation – The Visual Factory
6. The Lean Aspects – Operator's involvement in Lean Manufacturing
7. Autonomous MTCE (AM) – Jishu Hozen as a preferred model (Appendix)

The Methodology

In keeping with the Reliability Excellence (Rx) implementation theme of starting and testing re-engineered processes and cultural change in a pilot area, the same concept is typically used when implementing Operator Care. Although the OPEX pilot area may not be the same pilot area chosen for the Rx implementation, the activities of asset restoration and PM/PdM reviews appear both in the Rx and OPEX focus work flow streams. Because of this synergy, implementation efficiencies can be gained by engaging the OPEX focus team in the same selected pilot area as the Rx focus team.

Based on the LCE Rx Implementation Milestone Chart, which requires approximately 10-20% commitment of time from focus team members, a typical implementation in a selected pilot area could be 4-8 months, depending on the "as found" condition of the assets, ability of maintenance to complete necessary restoration activities, and availability and complexity of the pilot area assets/asset groups. Critical to the success of establishing Operator Care is a clear process layout with assigned RASI's, a fulltime Rx/ TPM/ AM Facilitator leading a cross functional team and sponsorship by the Plant Leadership Team.

The Processes and Tools

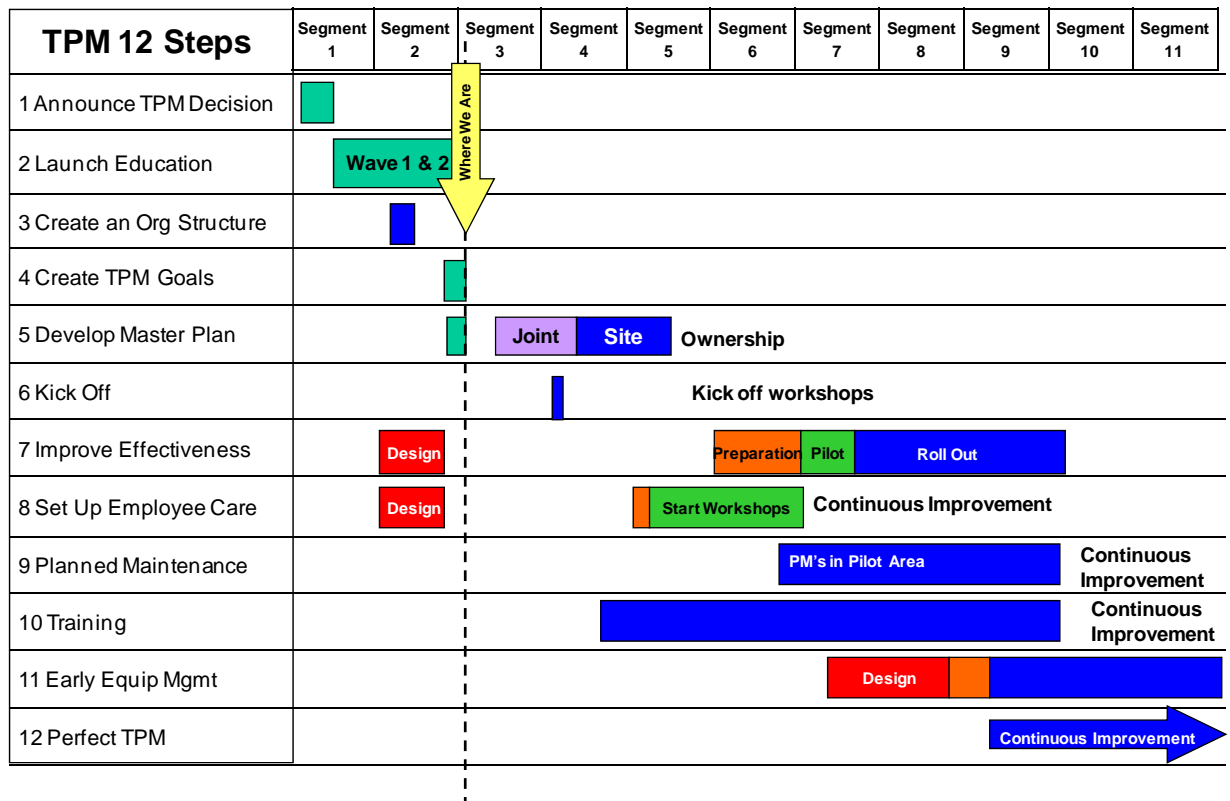
Following below is a simplified description of the OPEX/ Operator care implementation process:

1. Focus Team Selection – All disciplines in the pilot area should be represented.
2. Pilot Area Selection – Implementation in a selected pilot area.
3. Focus Team Training – Standard LCE Focus Team training, followed by OPEX Awareness training that will include OEE, Operator Care best practices, TPM and Lean basic concepts, 5S Program, Elimination of Waste and Production Losses, Visual Workplace and Metrics (including development and implementation of a Daily Management System Display in the pilot area).
4. Focus Team Charter Development – Same process as other Rx Focus Teams.
5. Brown Paper/ White Paper Development- Current and Target Processes.
6. Focused Equipment Improvement (FEI) – Not a "Kaizen". Coordinated activities to establish the current condition of assets.
7. Manufacturing Process Analysis – Engaging Process Engineers and operators, review current manufacturing process value streams and all associated SOPs for asset operation.
8. PM/PdM Analysis – Engaging Reliability Engineering Focus Team. Conduct SFMEAs in the pilot area.
9. Analysis of Asset Activities – Based SFMEA results determine activities for Autonomous Operator Care, Maintenance Craft activities (PM and other), and PdM technologies (PdM, Condition Monitoring), Visual Controls.
10. Pilot Area Training – Training of Operators in advanced 5S, Visual Controls, and Daily Autonomous Operator Care. Training of Maintenance personnel in methods and practices in support of Autonomous Operator Care
11. Implementation of a the Daily Management System – implement data capture and entry, and display of resulting metrics and data on a daily basis
12. Implementation of OPEX/ Operator Care in the Pilot Area – Daily monitoring to observe operator and maintenance personnel activities.
13. Continuous Improvement – of the OPEX processes, procedures and principles.

Critical Success Factors:

- Successful implementation of OPEX will be evident in daily Autonomous Operator Care activities, ongoing efforts to eliminate losses and OEE improvement.
- Fully functional collaboration and partnership between Operations and Engineering & Maintenance in the ongoing success of the program and asset operations.
- A set of performance measures (KPIs) has been established.
- Daily Management process has been established.

TPM Implementation Milestone Example



The Education - Operator Care Workshops (TPM/ AM)

The goal of the Operator Care Workshop is to develop a team of operations and maintenance personnel dedicated to implement continuous improvement in asset management and care. Therefore, the OPEX focus team should be made up of a dedicated team exclusively from the initial implementation (pilot) area. TPM/ AM education up-skills equipment operators to maintain and improve their equipment. The person using an asset knows when it is not working right, and if they acquire the skills they can return the equipment to the optimum operating conditions.

The success of the OPEX Focus Team is dependent upon solid support from maintenance (in asset restoration), Process Engineering (manufacturing process and operating SOPs) and Reliability Engineering (in potential asset modifications and in PM/PdM reviews) to create stable and reliable process and asset performance upon which the Autonomous Maintenance (AM), or Operator Care program can be built.

1) Team Training

- Overview of OPEX
- Rationalize the need, immediate and long-term benefits
- OEE results and other key metrics
- Visualization of performance measurement
- Change Management

2) Select a Pilot Area to start

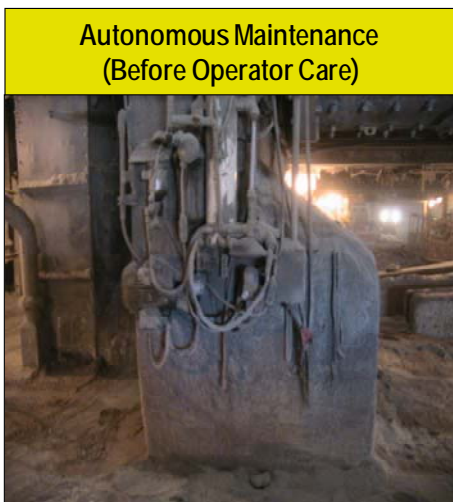
- If there is an ongoing Rx Wave 3, use the same pilot area
- Some place that can use the help
- High-visibility if possible
- Needs to be an area where Production personnel (operators) can take some part of the basic PM inspections and care from what is now Maintenance-accomplished activity (taking Ownership of the Process)

3) Determine Baseline (current) metrics:

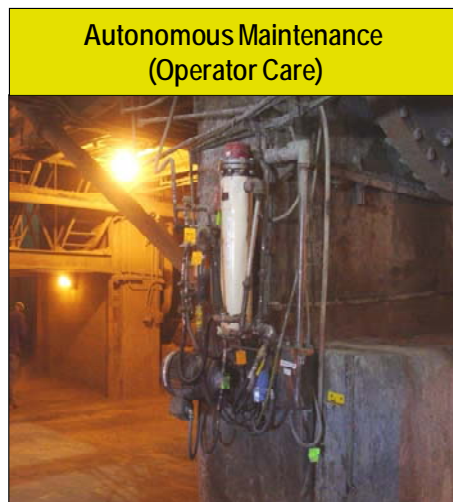
- Actual production vs. design or best demonstrated performance
- Downtime Losses
- Production/Maintenance overtime
- First pass quality
- OEE/ MTBF
- PM compliance
- Schedule breakers

4) Take Photos (Before & After)

- “Before” and “after” condition pictures are going to be your "show and tell" to spread around the plant to get everyone else ready for their turn at OPEX
- Mark or scribe the floor so the “before” and “after” photos are taken from the same position showing the same situation



Cleaning
 Inspections
 Lubrication
 Minor adjustments
 5S
 Visual controls
 Metrics

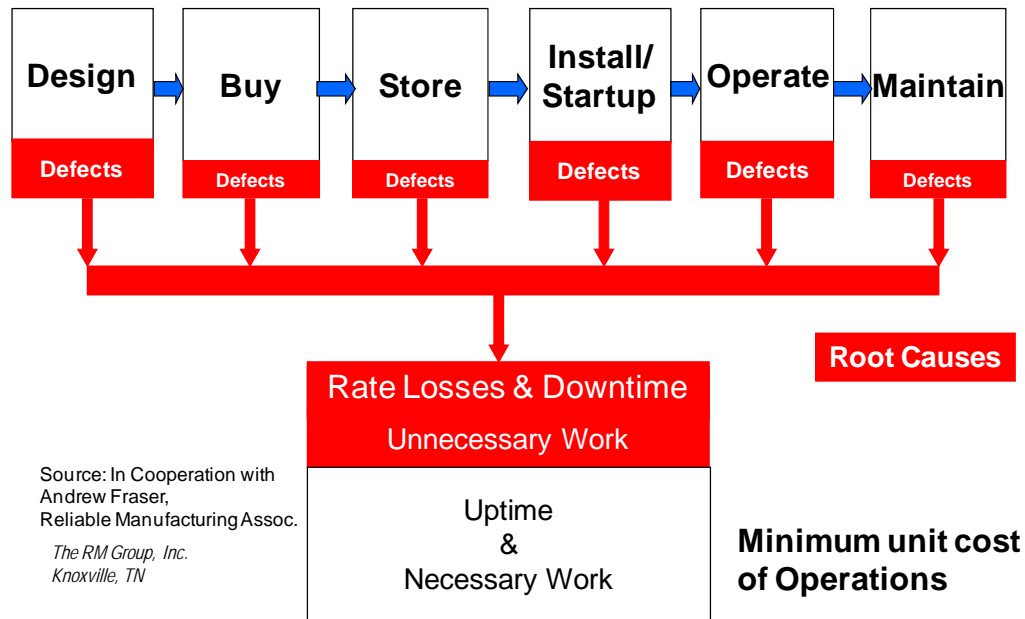


Cleaning
 Clean to inspect
 Inspect to detect
 Detect to correct
 Correct to perfect

The Discovery – Identifying TPM/ Operator Care Activities

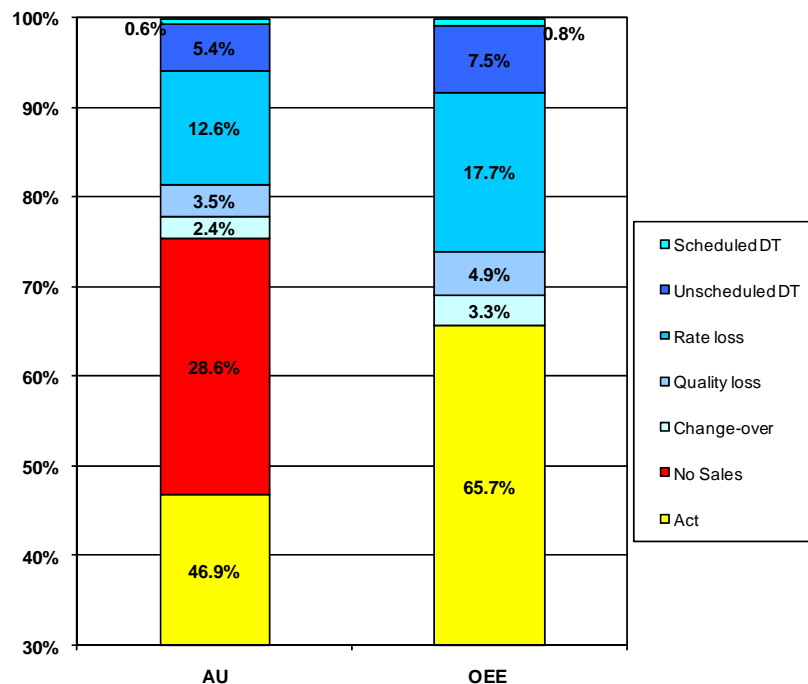
There are three key points that LCE is emphasizing (Toyota model) regarding TPM implementation. These points are critical for long term success of the program and include a total life cycle approach, total pursuit of production efficiency, total employee participation, and a total systems approach.

First, a total life cycle approach recognizes that much like humans assets require different levels of resources and types of attention during their life cycle (useful life). One way to think of achieving operator care involvement is the elimination of asset deterioration & loss prevention during the entire asset design, management and care cycle as pictured below.



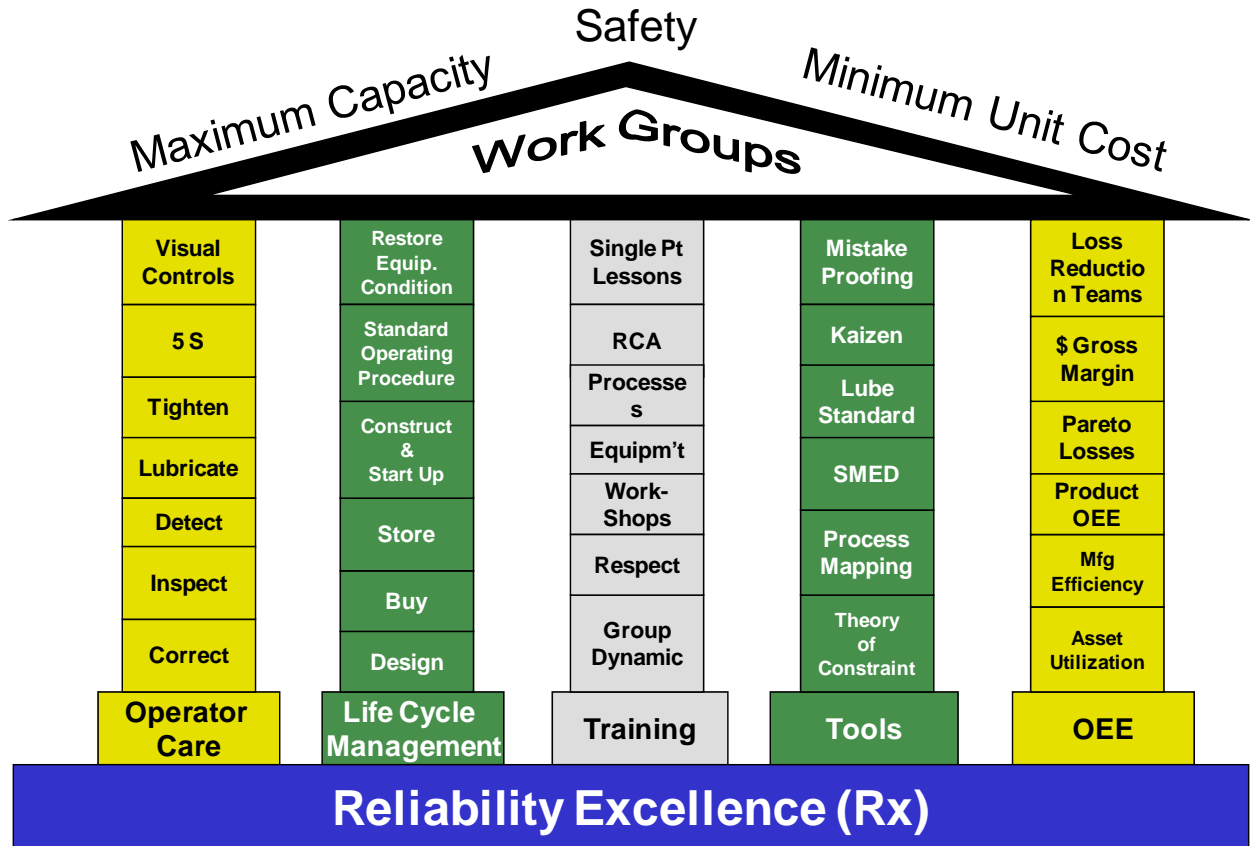
Second, total pursuit of production efficiency relates to the goal of eliminating all types of production losses associated with a piece of equipment. Different situations and types of equipment require different improvement activities. The type of manufacturing environment and the type of loss should drive improvement actions.

See type of losses in the example below (Asset Utilization vs. OEE)



Lastly, critical to success is a holistic systems approach. Like a chain composed of multiple links, the total strength of the system is only as good as the weakest link in the chain. A total systems approach means effectively linking and improving all support activities, such as employee training and development, spare parts and documentation management, maintenance data collection and analysis, and feedback with equipment vendors.

TPM Pillars Example

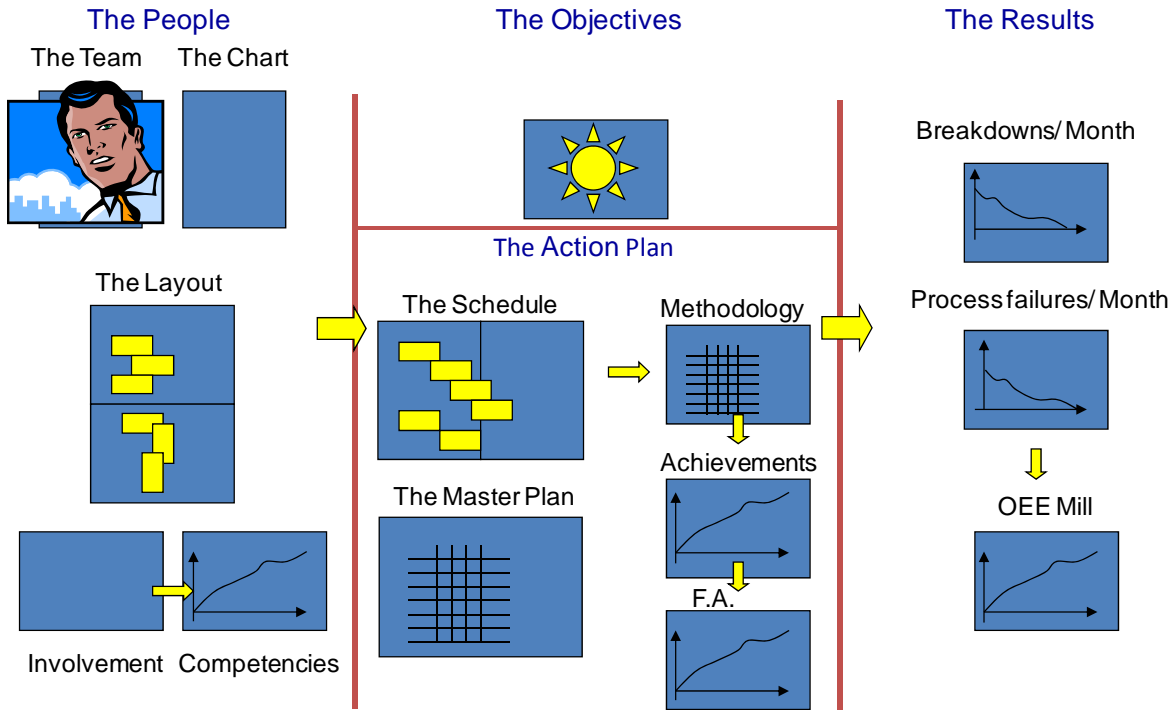


Implementation – DMS/ TPM/ AM/ 5S and The Visual Factory

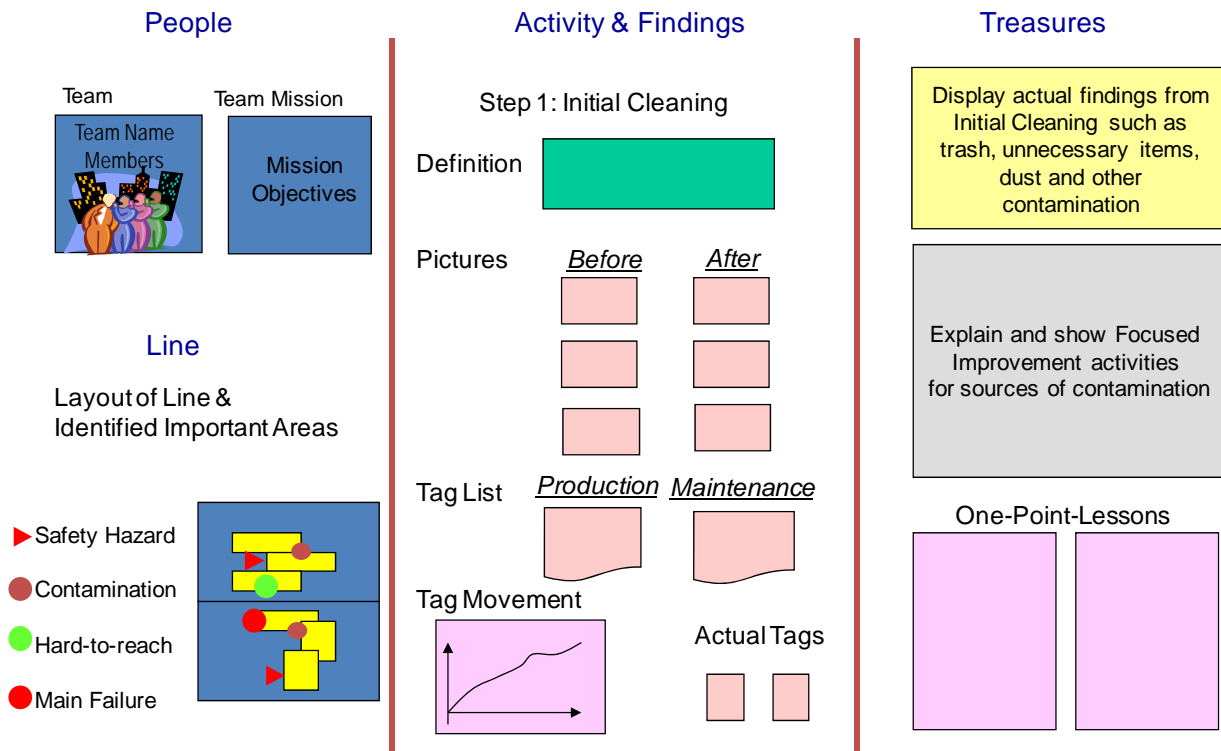
The goal of the visual factory program is to increase production through systematic elimination of losses while at the same time increase employee morale and job satisfaction. TPM brings asset reliability and maintenance into focus as a necessary and vitally important part of the business. Downtime is scheduled as a part of the manufacturing day and, in some cases, as an integral part of the manufacturing process. Daily management systems are being established by all functions at a plant in support of company goals and objectives, and visual controls are established to quickly identify when the process is in an unsatisfactory condition.

Daily Management: Examples of Activity Boards

TPM/AM Process Area 1



Example of AM Activity Board



Key benefits of DMS/ TPM/ AM/ 5S and The Visual Factory

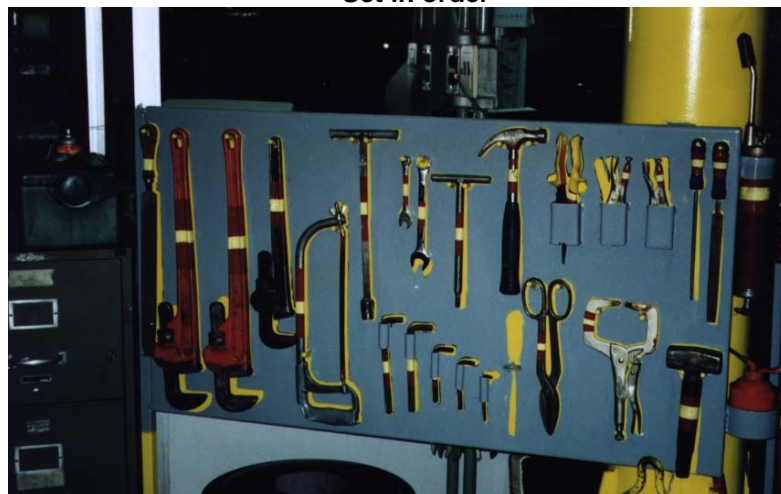
- A Safer Workplace
- Employee Empowerment
- Workload Reduction
- Increased Production
- Fewer Defects
- Fewer Breakdowns
- Fewer Short Stoppages
- Decreased Costs
- Decreased Losses/ Waste

5S Definitions		
<i>Japanese</i>	<i>English</i>	<i>LCE</i>
Seri	Organization	Sort
Seiton	Orderliness	Set in Order (Straighten)
Seiso	Cleanliness	Shine (Sweep)
Seiketsu	Standardized Clean-up	Standardize
Shitsuke	Discipline	Sustain

Sort



Set in order



Shine



Standardize

1. Make cleaning and organizing a routine
2. Schedule quarterly clean-up days
3. Assigned location for parts/supplies
4. Operating procedures at point of use
5. Single point lessons at point of use
6. Help lines established

Sustain!

Equipment Health: Here is an old Scheller phrase:

- 1) Understand the Equipment
- 2) Respect the Equipment
- 3) Take Care of the Equipment
- 4) Continuously improve and optimize Equipment

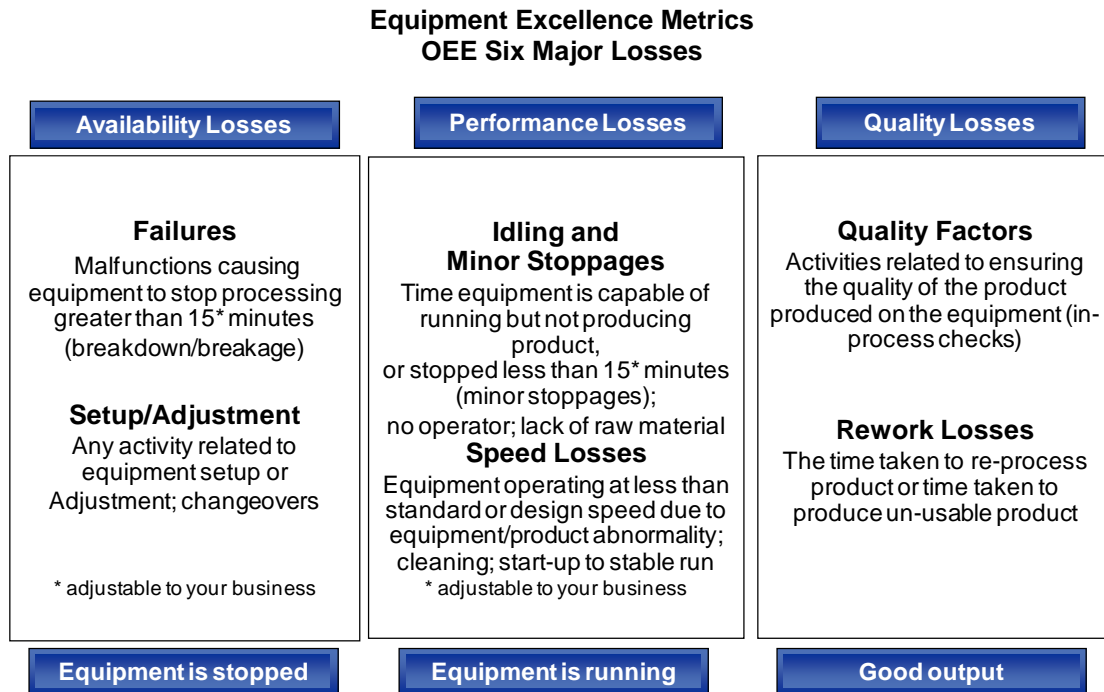
The “LEAN” Aspects - Operator’s involvement in Lean Manufacturing

Operators are the first-line of defence and should own the performance of their equipment and should be responsible for delivering on-time, quality production. They first must be able to do so, while gaining satisfaction and pride when doing it. This often requires a new mindset for Operators and their supervisors.

Operators must demonstrate competence in:

- Understanding the equipment (Operation, Reliability & Maintenance)
- Respecting the equipment (Process requirements, Technology & Potential Risk and Consequences)
- Caring for the equipment (TPM/ AM/ 5S activities)
- Improving the equipment (Field experience, modifications, daily problem solving)

Operators must become masters of their assets and routinely monitor the six major losses in order to drive performance through OEE.



Autonomous MTCE (AM) – Jishu Hozen (JH) as a preferred model

Jishu Hozen, which means autonomous or self-maintenance, promotes development of Operators to take care of small maintenance tasks, such as cleaning, inspecting, and lubricating their equipment, thus freeing the maintenance associates to spend time on more value-added activities and technical repairs. The Operators are responsible for upkeep of their equipment to prevent it from deteriorating.

Goals of Jishu Hozen (JH):

- Uninterrupted operation of equipment
- Flexible operators who can operate and maintain other equipment
- Elimination of defects at the source through active employee participation
- Stepwise implementation of JH activities

Effects of Autonomous Maintenance include:

- Equipment condition is known at all times
- Unexpected breakdowns are minimized
- Corrosion is prevented, wear is delayed, and machine life is extended
- Judgment of machine capability is improved
- Parts costs are reduced
- Machine operation ratio is improved

Erich Scheller, CMRP, is a Principal Consultant at Life Cycle Engineering with extensive experience in Design, Construction, Maintenance and varying Manufacturing environments. Erich has over 35 years experience in Mechanical Engineering and Maintenance as well as Corporate Asset Management, including over 30 years experience with BASF AG, the biggest Chemical Company in the world. Erich managed BASF's Maintenance & Reliability Business in the NAFTA region for 14 years and was the corporate sponsor of the OSHA PSM 1910.119 Mechanical Integrity program. He is an accomplished leader in team development and motivation, with a unique ability to combine technical expertise, project coordination, and interpersonal development towards the execution of complex problem resolutions.

Appendix - Autonomous Maintenance (Jishu Hozen) Steps

Steps	Activities	Target		Guidance and Promotion	
		Equipment	Operator		
1	Initial Cleaning and Inspection	Complete elimination of dust and dirt, especially on the equipment	Prevention of forced deterioration caused by dust or dirt	Understand the equipment - through touching and handling equipment detect abnormalities	Pointing out & guidance of the priority clean-up areas.
		Performance of lubrication & retightening, discovery & rectification of slight equipment defects	Discovery and rectification of latent defects through clean-up	Cultivation of the ability to identify potential equipment failures early detect abnormalities	Instructions in the importance of clean-up (education)
		Removal of unnecessary things, orderliness and tidiness of tools and jigs (1S & 2S)	Discovery of areas where clean-up is difficult	Recognition of the importance of clean-up detect abnormalities	Preparation of diagnosis sheets
			Removal of unnecessary things around the equipment		
		Rationalization of lubrication			
2	Counter Measures	Implementation of countermeasures against such sources as dust & dirt & prevention of spilling leakages.	Making the equipment cleaning and inspection easy through improvement of the sources of dust and dirt and areas where inspection and cleaning are difficult	KAIZEN of nearby items to practice and to master the application of the KAIZEN method and concept	Concept and practice of equipment Kaizen
		Implementation of countermeasures against areas where cleaning and inspection are difficult (operation improvement for shortening the time needed for cleaning and service)	Improvement of maintainability	Enjoy the KAIZEN activities (Pleasure of hand-made)	How to prepare the criteria or standards
		Ranking the priority places for daily inspection			Implementation of visual control and instruction on device development
		Confirmed of KAIZEN and its effect			
3	Preparation of Standards	Preparation of action criteria to allow positive clean-up, lubrication and retightening maintenance within shortest time	Keeping the 3 basic elements of equipment maintenance clean-up, lubrication & retightening	Self-decision of criteria and its strict observance	Preparation of standards for technologies and techniques
		Kaizen of inspection method and visual control		Each worker learns to be aware of individual roles.	Clarification of procedures to study what the equipment must be
4	General Inspection	Mastering inspection skill, utilizing inspection manuals	Restoration of deterioration by exterior general inspection of equipment and reliability improvement	Acquaintance of inspection skill	Preparation of training text for general inspection
		Discovery and restoration of general inspection	KAIZEN of areas where remedial action and normal inspection are difficult	Understanding the equipment functions and mechanism	Planning of education & training schedule
		Preparation of autonomous inspection standards	Making inspection efficient	Mastering how to put together data and how to use it	Execution of leader training
				Activation through KAIZEN activities	Follow-up of education and training
Learning the importance of education on communication	Preparation of general inspection manual and check sheets				
5	Autonomous Inspection	Review clean-up, lubrication and general inspection criteria and integrate them into comprehensive criteria to contribute to efficiency activities	Positively keeping the restoration from deterioration by means of general inspection	Maintenance of one's own equipment by oneself	Teaching how to precisely analyze the data
		Preparation and implementation of autonomous inspection check sheets	KAIZEN of equipment which has good operability	Self-decision and strict observance	Effective equipment management & maintenance
		improvements of visual control and operability		JH is learning what the ideal	
6	Standardization	Picking the items to be managed	KAIZEN of equipment reliability, maintainability and operability	Improvement of management technology	Technical guidance to promote standardization
		Standardization of management items and systematization of maintenance management	Review and Kaizen of equipment environment and layout	Expansion of JH management scope Thoroughness of visual control	Revision of management standards and thoroughness of management
7	Autonomous Management	Development of company policy/goals and quantitative analysis of Kaizen activities	KAIZEN of equipment reliability, maintainability and operability through equipment KAIZEN by applying various data analysis	Enhancement of goal consciousness, including maintenance cost	Technical assistance for equipment KAIZEN
		Positive implementation of MTBF analysis and recording (recording failure by visual control) and equipment KAIZEN	Keeping overall equipment efficiency at its best	Acquirement of skill to perform minor repair by oneself Acquisition of data recording and analyzing technique and KAIZEN technology	Standardization of improved items Education and training in repair skills