

Total Productive Maintenance

- Basic Principles-



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Version 1.0

The Total Productive Management is:

TOTAL

- Transversal to all departments focused on equipment performance,
- Addresses all forms of efficiency losses

PRODUCTIVE

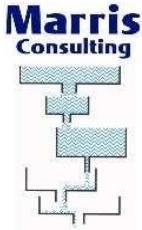
- Maximizes production performance factors,
- Minimizes operating costs

MAINTENANCE

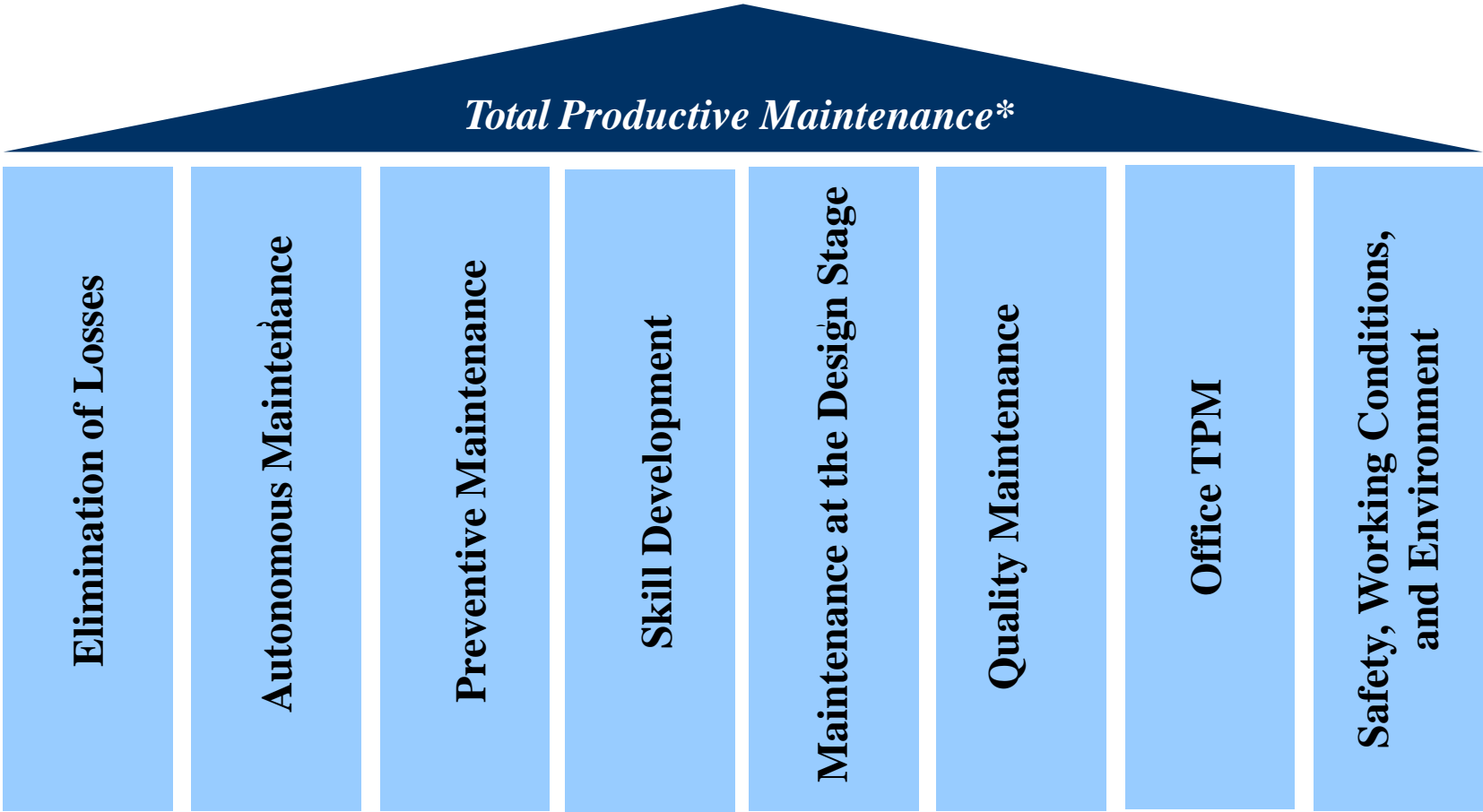
- Enables the maintenance of the following in a reference state::
 - equipment operation
 - standardization of operations
 - workshop organization.

The goal of Total Productive Maintenance is to improve the overall efficiency of the facilities

- TPM focuses on equipment performance:
 - improvement of availability (available time for production),
 - increase in capacity (quantity produced per unit of time).
- TPM enables the reduction of operating expenses by:
 - improving the flexibility of production flows and reducing intermediate stocks,
 - enhancing the utilization of maintenance resources,
 - increasing the lifespan of installations,
 - Optimizing energy consumption and consumables.
- TPM contributes to employee motivation by:
 - empowering the operator and strengthening communication with maintenance,
 - improving ergonomics and safety,
 - enhancing the workshop's image.

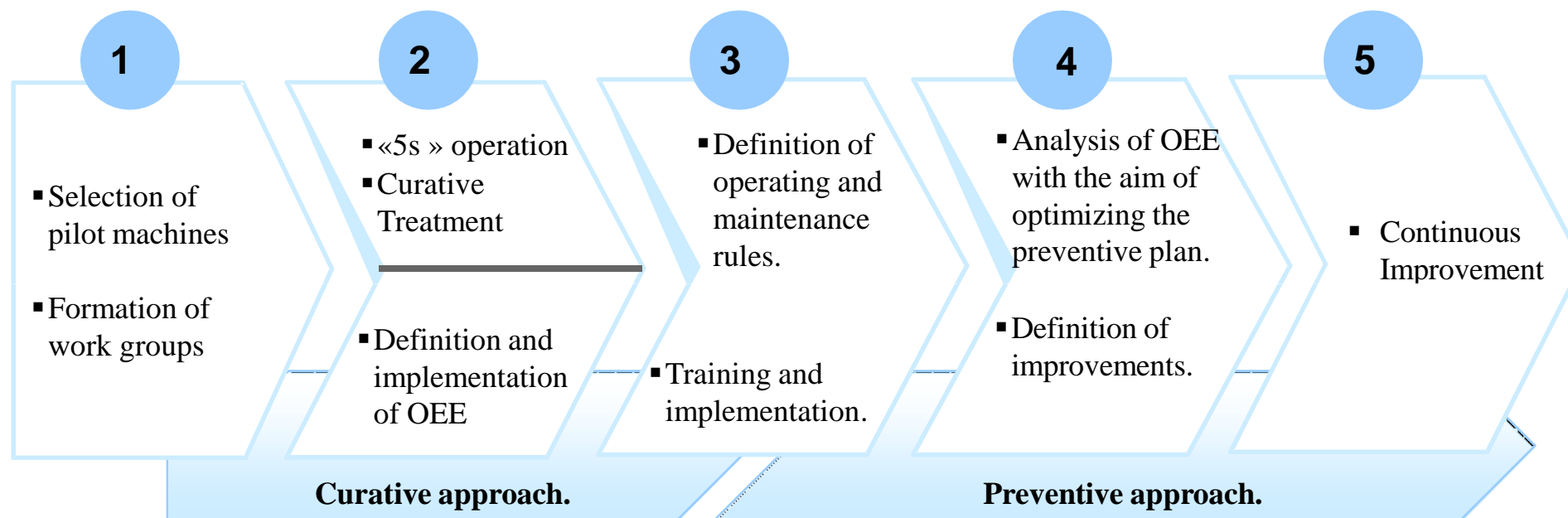


The Pillars of TPM



** Approach of the Japan Institute of Plant Maintenance.*

The pillars of TPM are integrated through the 5 stages of implementing the approach





TPM is an enterprise-wide approach as it encompasses all vertical and horizontal levels of the organization

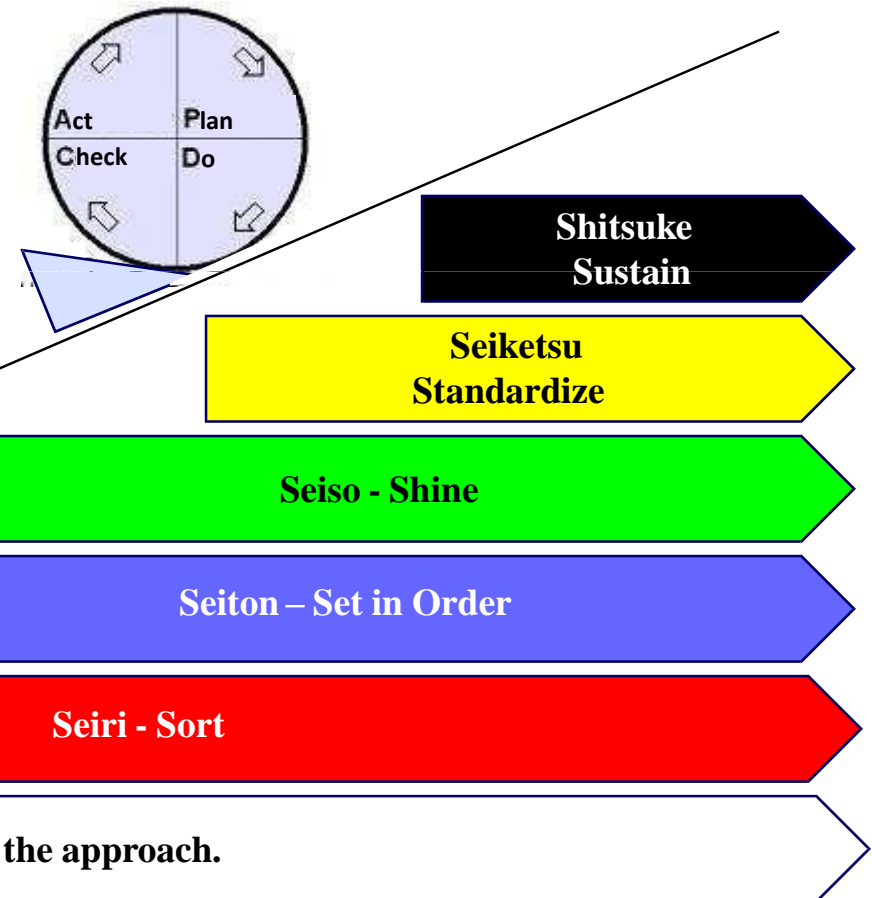
- The implementation of TPM is a project that includes all its components:
 - budget,
 - objectives,
 - deadlines,
 - milestones and steering committee,
 - communication ...etc.
- The working group consists of a multi-skilled team (production management, operators, technicians, and representatives from maintenance, quality, method, logistics departments, etc.). A project manager implements the TPM approach and achieves the set objectives.
- The selection of the pilot project is crucial to disseminate the deployment dynamics in the future.

The more significant the short-term results, the easier it will be to replicate the approach on other projects, hence the importance of the pilot project.



The process of implementing the application of 5S must follow six steps.

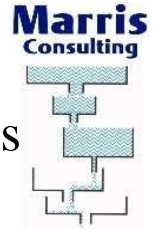
- To deploy the 5S approach, the company must decide to adopt a logical and methodical approach.
- Each step is important as it prepares for the next step and concludes the previous step.
- The 5S cycle is evolutionary and follows the PDCA (Plan-Do-Check-Act) principle, which is integral to improvement processes.



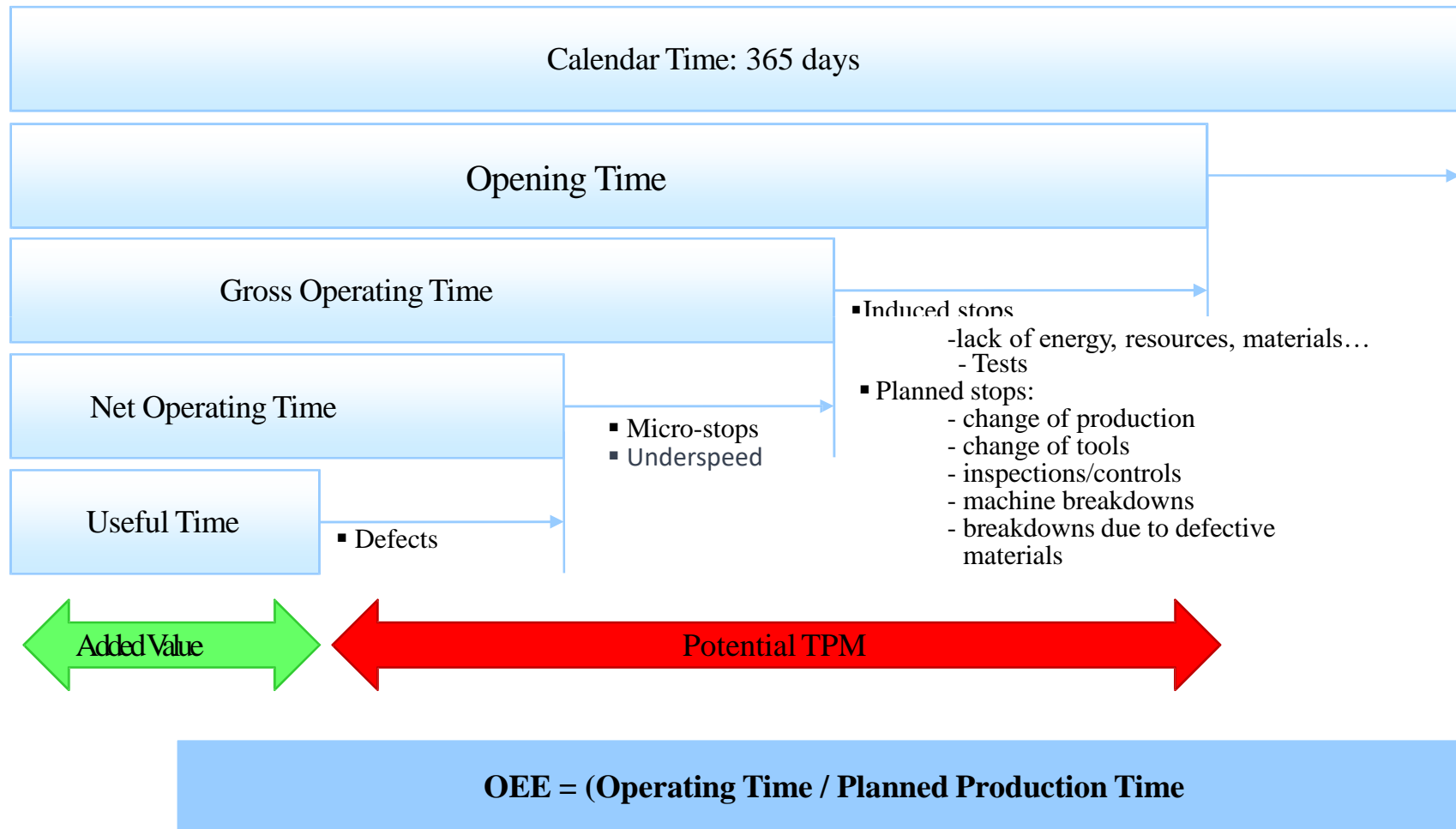


The performance measurement indicator: Overall Equipment Effectiveness (OEE)

- The OEE provides an overall view of performance evolution:
 - it is a single (synthetic) figure expressed as a percentage.
 - it describes the machine's performance (efficiency) by breaking down the sources of "non-performance" or losses as finely as necessary.
- The OEE serves multiple purposes:
 - it measures the results of TPM on machine performance.
 - it provides a basis for problem analysis: where and how is performance being lost? (breakdowns, micro-stoppages, etc.)
 - it raises awareness among all stakeholders (operators and maintenance) about performance changes by displaying and discussing the achieved results).

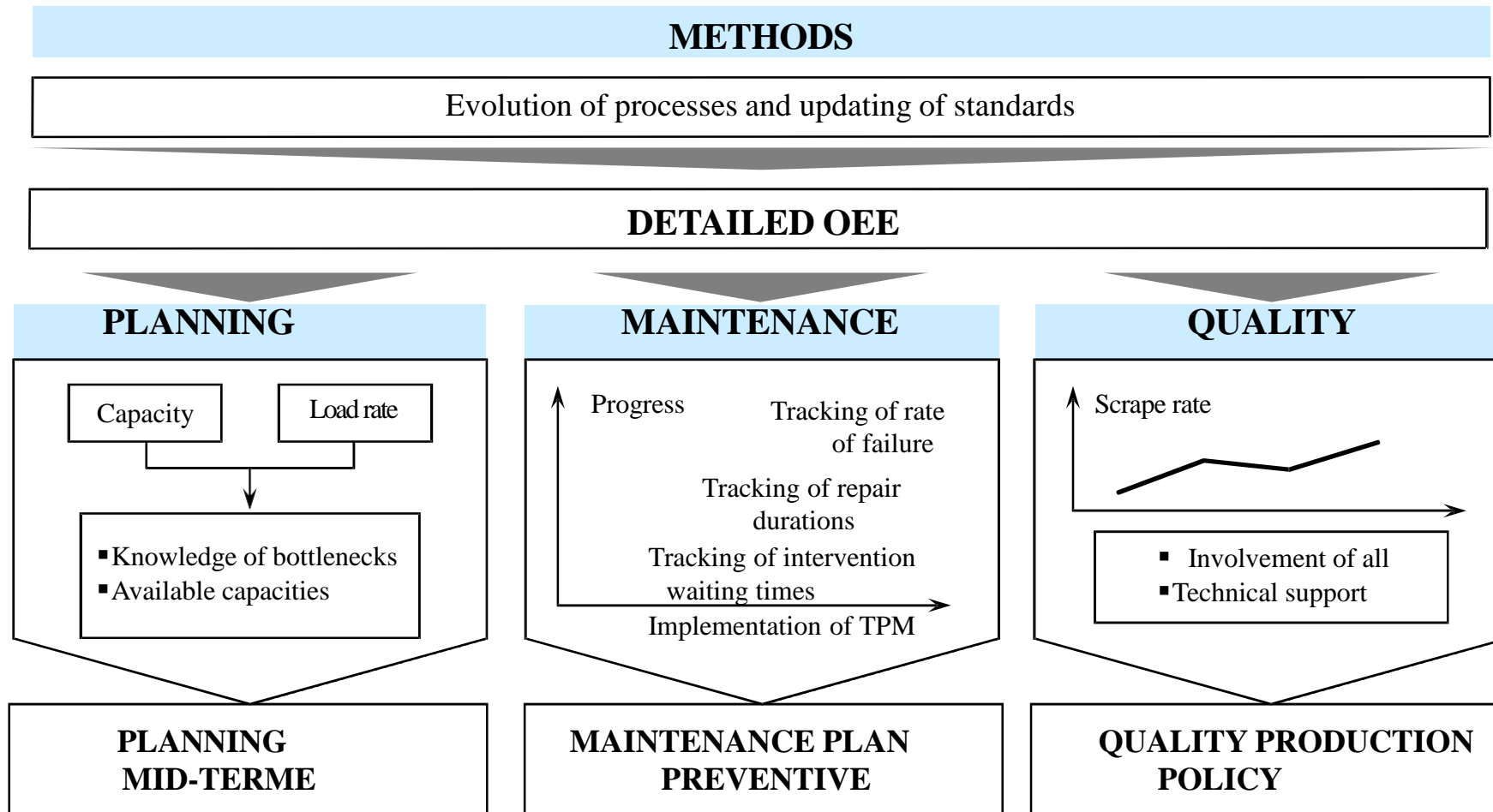


The OEE is a common measurement tool that helps identify improvement opportunities for prioritized equipment





The OEE is an indicator that encompasses various departments





The 3rd step calls upon the pillar of autonomous maintenance...

- Autonomous maintenance aims to improve the reliability of equipment by involving operators in the monitoring and maintenance of their machines. Its objectives include:
 - increasing machine availability.
 - empowering production operators and making them more responsive.
 - reducing equipment maintenance costs.
 - mitigating the risk of accidents.

- Adherence to defined standards in autonomous maintenance is achieved through the creation and display of cleaning procedures, which should include:
 - areas to be cleaned and cleaning methods.
 - areas to be inspected and inspection methods.
 - frequency of cleaning and inspection.

...and also to the revision of preventive maintenance procedures



With adequate training, operators can detect 75% of equipment-related problems within the process

- The training is practical and tailored closely to the field:
 - all training address an identified immediate need.
 - any anomaly serves as an opportunity for quick training (specific lesson).
 - lack of knowledge is considered an anomaly.
- Everyone is trained and becomes a trainer:
 - Support services (maintenance, quality, etc.) and/or hierarchy train the operators.
For example, training operators in systematic inspection or transferring technical knowledge of the machine.
 - Operators can become references for training their colleagues
- Encountering an anomaly is seen as an opportunity for improvement.



The analysis is based on all available elements that characterize the losses in performance.

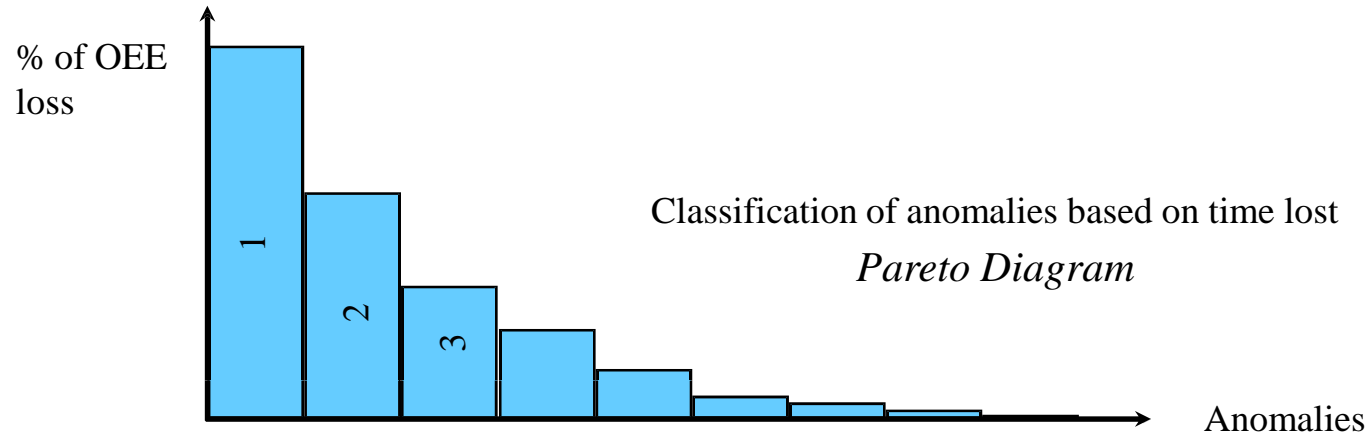
- The OEE provides an overall view of the performance evolution, including:
 - Global variation since the last period and the average value evolution.
 - Evolution of different components (performance, availability, quality) to focus attention on major causes.
- The working group utilizes or implements anomaly records at the workstation to register:
 - Causes of non-compliance with 5S (sources of dirtiness, disorder, etc.).
 - Causes of OEE degradation (failures, induced stops, etc.).
 - Organizational issues (lack of spare parts, etc.).
 - Safety risks.

The records should specify the description of the anomaly, the time allocated to the malfunction, and its impact (time loss, undetected leaks, scrap, etc.).

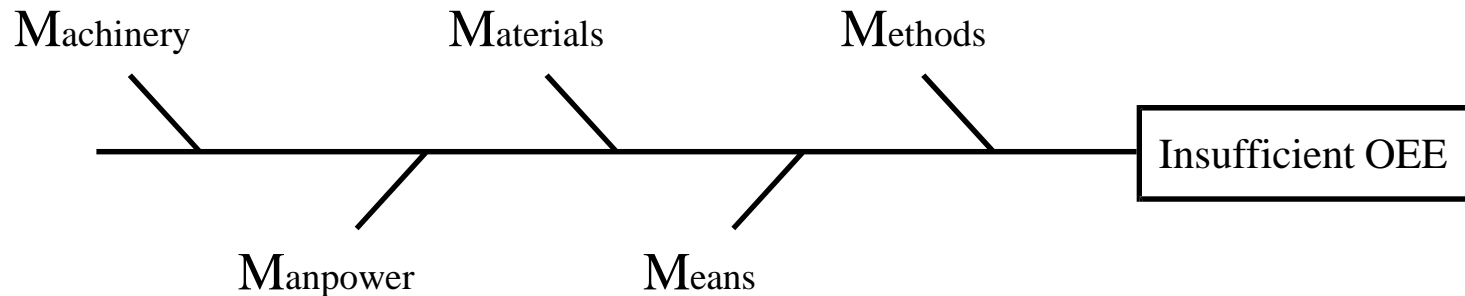


The obtained information allows for the implementation of problem-solving methods in order to prevent the recurrence of these anomalies.

- Classification of anomalies based on their frequency and impact:



- Cause analysis, by investigating at least 5 directions: the 5Ms





Once the main causes are known, the working group should be proactive in proposing sustainable actions.

- Propose solutions to eliminate malfunctions:
 - “Cast a wide net”: all suggestions are welcome.
- Select the most relevant solutions:
 - which ones best address the problem?
 - which ones are the most accessible?
- Organize the implementation of the chosen solutions by defining each one:
 - a responsible person,
 - a deadline,
 - resources,
 - steps (testing phase, validation, implementation, communication, etc.).
- Regularly check progress and address any obstacles:
 - review all actions initiated at the beginning of each working group meeting.



The effectiveness of TPM deployment remains truly measurable in the sustainability of the approach through adherence to previously established standards.

- The purpose of the audit is to verify that the conditions are met to enter into a continuous performance improvement mindset
 - Machine and environment compliance
 - Relevance of measurement and analysis tools
 - Existence of objectives and work plan

- Le label marque l'entrée dans une nouvelle période où la recherche d'amélioration est un réflexe. Pour conserver le label TPM, le groupe de travail s'engage :
 - Ensure adherence to the 5S principles
 - Continuously measure and track OEE performance
 - Regularly meet to develop improvement actions
 - Implement approved actions between meetings with validation from management
 - Conduct regular reviews (every 2 or 3 months) to assess the progress of implemented actions.