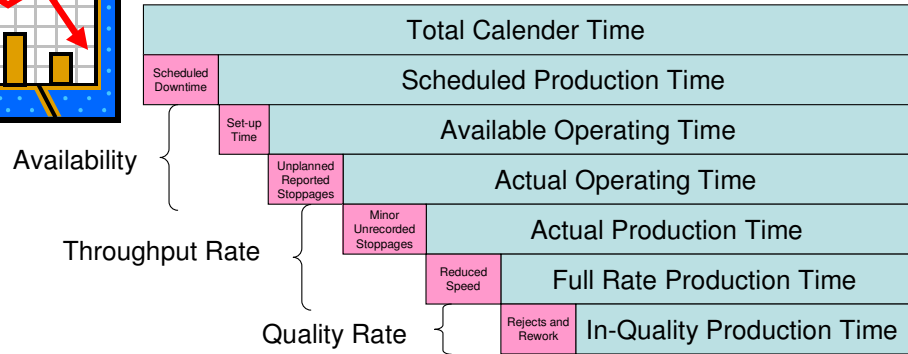
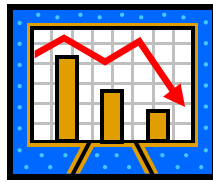


## Production Losses and Overall Equipment Effectiveness



$$\text{OEE} = \text{Availability} \times \text{Throughput Rate} \times \text{Quality Rate}$$

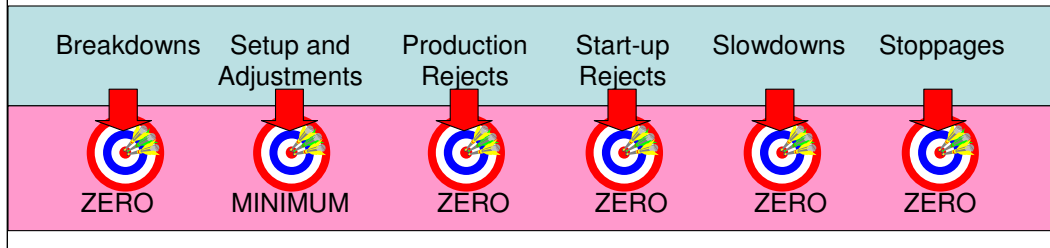
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Calculation of Overall Equipment Effectiveness, (OEE) in TPM is the product of Equipment Availability, Quality performance (non-scrap or reworked product) and Speed (throughput), is not really a complete analysis Professor Sherwin advises. It does not take account of equipment costs and profits, and so it is not a good measure for comparing machines or systems, or for comparing the effect of equipment deterioration over time. OEE is only a part of the Life Cycle Risk Cost/Profit perspective. Within those inherent limitations the OEE concept is useful for monitoring equipment effectiveness and performance.

## Total Productive Maintenance is ... operator driven reliability:

### *The Operators' Creed of TPM –*

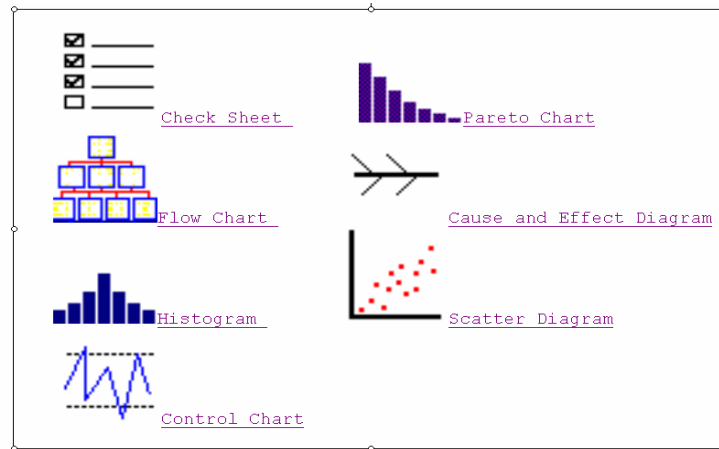
- Keep it clean
- Keep it lubricated
- Monitor for degradation
- Maintain it before production is affected
- Simplify and improve it



Operators are likely to recognise before anyone else that a machine needs to be replaced or overhauled, or a system modified.

David Sherwin, Maintenance and Reliability Professor, tells us that machine deterioration is slowed under TPM by the primary care given to the machine by its operator. The operator can delay the need for maintenance by focusing on key equipment health factors. TPM does not exclude Preventive Maintenance (PM) by technicians, in fact it is required, but there is no specific strategy for it within TPM, and it is almost bound to be neglected if the factory gets too busy, which is just when it is most needed. To address this risk the PM work is planned and scheduled by the maintenance group.

## 7 Visual Quality Management Tools for TPM Problem Solving

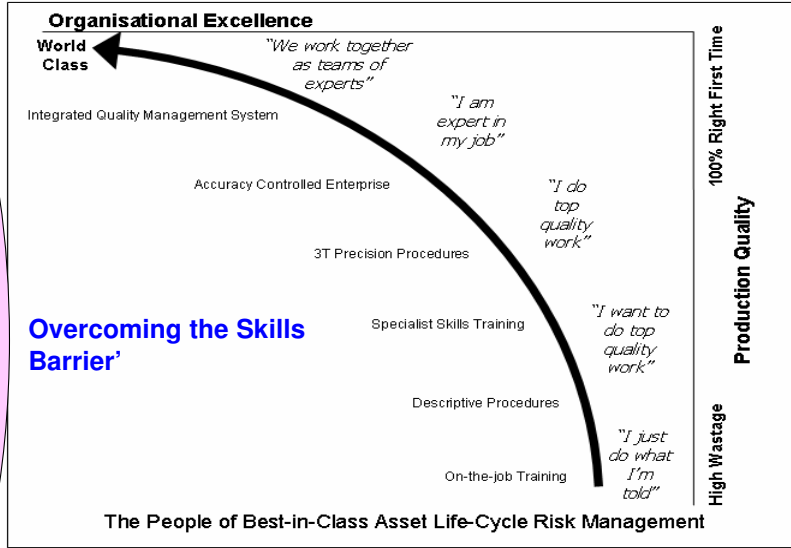


In a TPM program the Team are always looking to 'see' what causes the problems so that they know when it is time to act, and know what problem needs to be fixed. The seven visual quality control tools help to identify relationships and notice interactions between a range of factors that affect the problem. You come to understand better what to do.

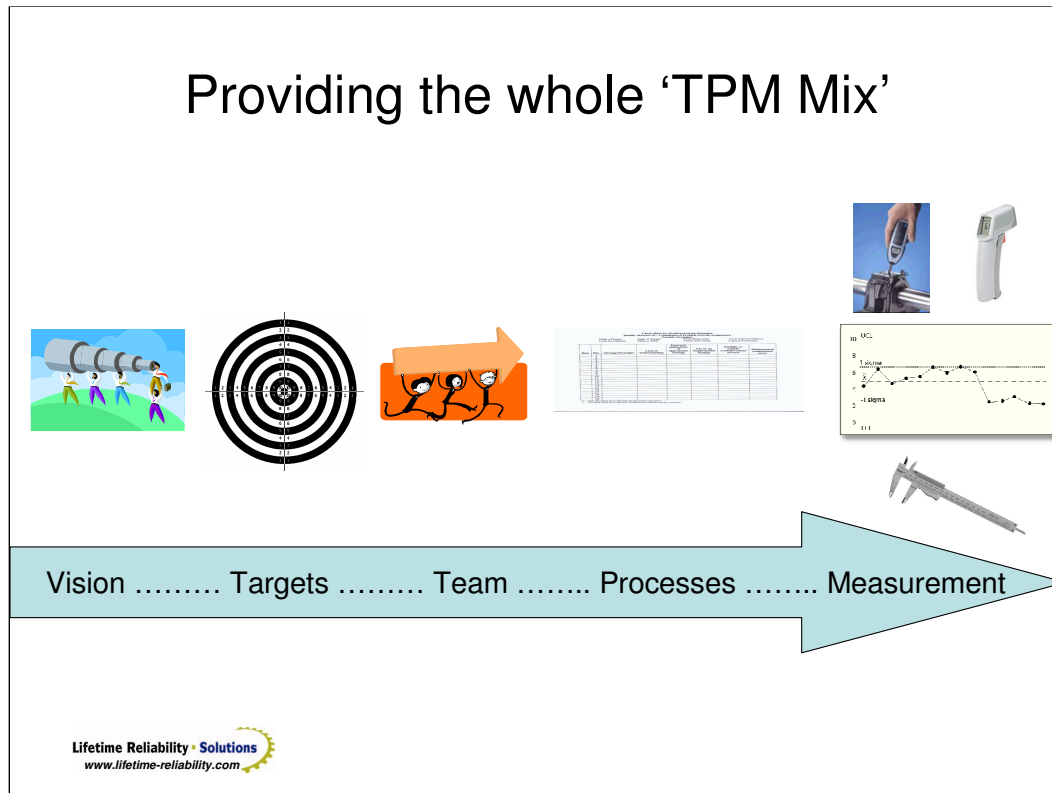
When solving a problem it is necessary to know what to do and what is, or is not, working. The 7 quality control tools shown on the slide let us view a problem in a number of ways to help pinpoint the issues. They are used by the TPM team to analyse the factors that have the greatest influence on a problem and to focus their efforts for the highest payback when fixing the problem.

## The People of Successful TPM

People want to feel valuable, and to be valued. You can do both when you increase their worth to a business. This diagram shows where you need to take your people, and as a consequence they will bring your business with them.



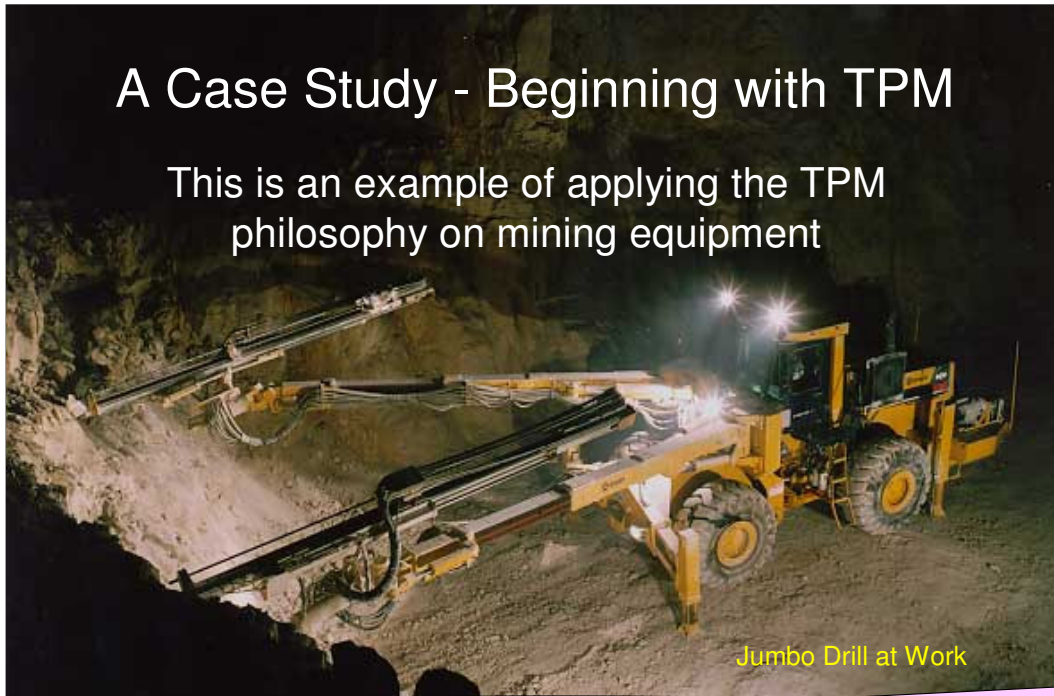
## Providing the whole 'TPM Mix'



Hopefully you are now more aware of what TPM will require of you and your organization. It has more to do with managing change and challenging mindsets than introducing a new way to run your operation. In time your production equipment will be managed by the people on the 'shopfloor', while managers will be more focused on developing new business opportunities. In order for this to happen the people now running your plant and equipment will need to learn how to run their machines well. More importantly they will need to learn how to improve the production equipment so it can perform at highest productivity and efficiency. TPM is a process to let people master the skill they need to do that.

## A Case Study - Beginning with TPM

This is an example of applying the TPM  
philosophy on mining equipment



Jumbo Drill at Work

Because TPM focuses on identifying the root causes of poor equipment performance its purpose of improving equipment operation is universally applicable across all machinery.

## TPM Change Management Requirements

| Pressure for change   | Clear Shared Vision   | Capacity (resources)  | Action (and performance)   |
|---|---|---|--|
| <ul style="list-style-type: none"> <li>•Policy and action plan in place</li> <li>•Regular reviews</li> <li>•Active commitment from top management</li> <li>•Policy agreed and communicated to all staff</li> <li>•Board level "champion" appointed</li> </ul> | <ul style="list-style-type: none"> <li>•High level of awareness and support at all levels</li> <li>•Staff highly motivated</li> <li>•Representatives from all levels of management chain involved in planning process and drawing up action plan(s)</li> <li>•All staff given opportunity to make an input</li> </ul> | <ul style="list-style-type: none"> <li>•Resources (staff and funding) routinely committed</li> <li>•Cost savings re-invested for further improvements</li> <li>•Key staff working on plans and projects.</li> <li>•Staffing and funding needs identified and resources becoming available</li> <li>•"Champion" appointed at middle management level (to support the Board's "Champion").</li> <li>•Training &amp; development needs assessment</li> </ul> | <ul style="list-style-type: none"> <li>•Action being taken and embedded throughout the organisation</li> <li>•Monitoring and reporting of progress</li> <li>•Wider engagement across the organisation</li> <li>•'Low-cost' and more 'no-cost' measures implemented</li> <li>•Commencement of action at some levels of the organisation.</li> <li>•Some 'no-cost' measures implemented</li> </ul> |

I can see Sam as the middle management 'champion', and Walt as the board 'champion'.  
You and I are the 'key staff'. The 'no cost' measures are the 'early wins' in Bill's case study.

We'll only get Walt's support if he can see the benefit of TPM.

In that case we need to make justification a high priority in our planning.

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The bullet points from the 'Change Management Matrix' become the requirements and actions to be undertaken and achieved as the plan to make TPM part of normal business practice unfolds.

