



Maintenance Strategy Planning Using the Manufactures Reliability Data

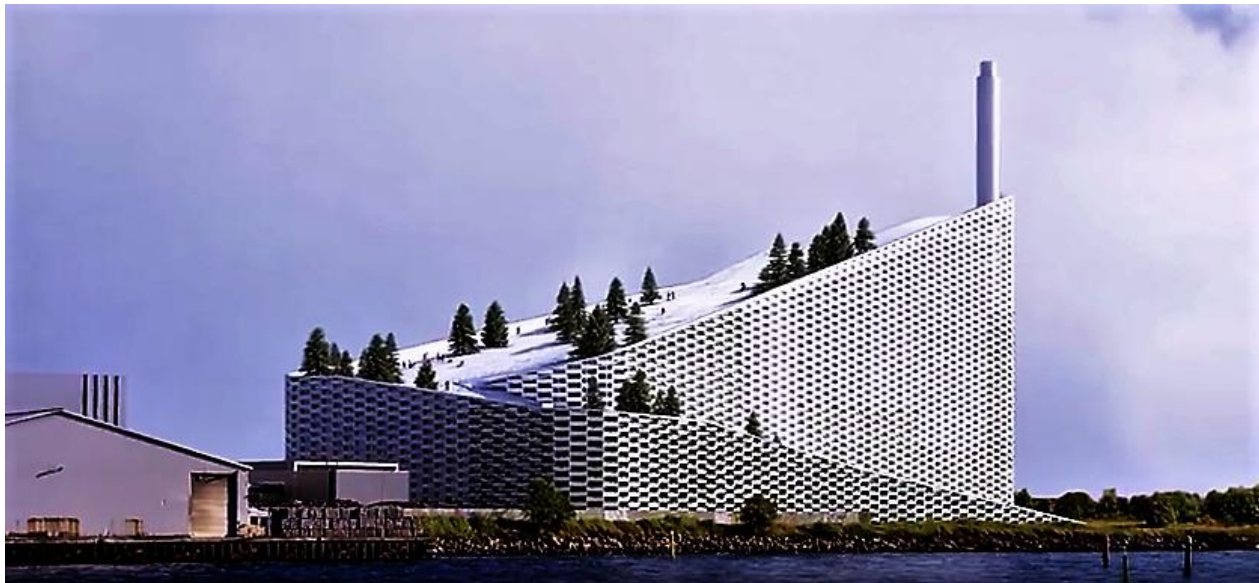
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Result

- The right preventive maintenance tasks ready when the plant starts operation
- Reduction of nonvalue maintenance tasks
- Easier start of the power plant unit for the operating and maintenance staff



Power Plant Unit

- 100% bio fuelled – Co2 Neutral
- District heating and power production
- High level of redundancy
- Approx. 6000 operating hours/year
- Asking for failure data (MTBF, Failure modes etc. as a part of the tender)
- Maintenance strategy for existing units in the company is based on the Reliability Centred Maintenance strategy



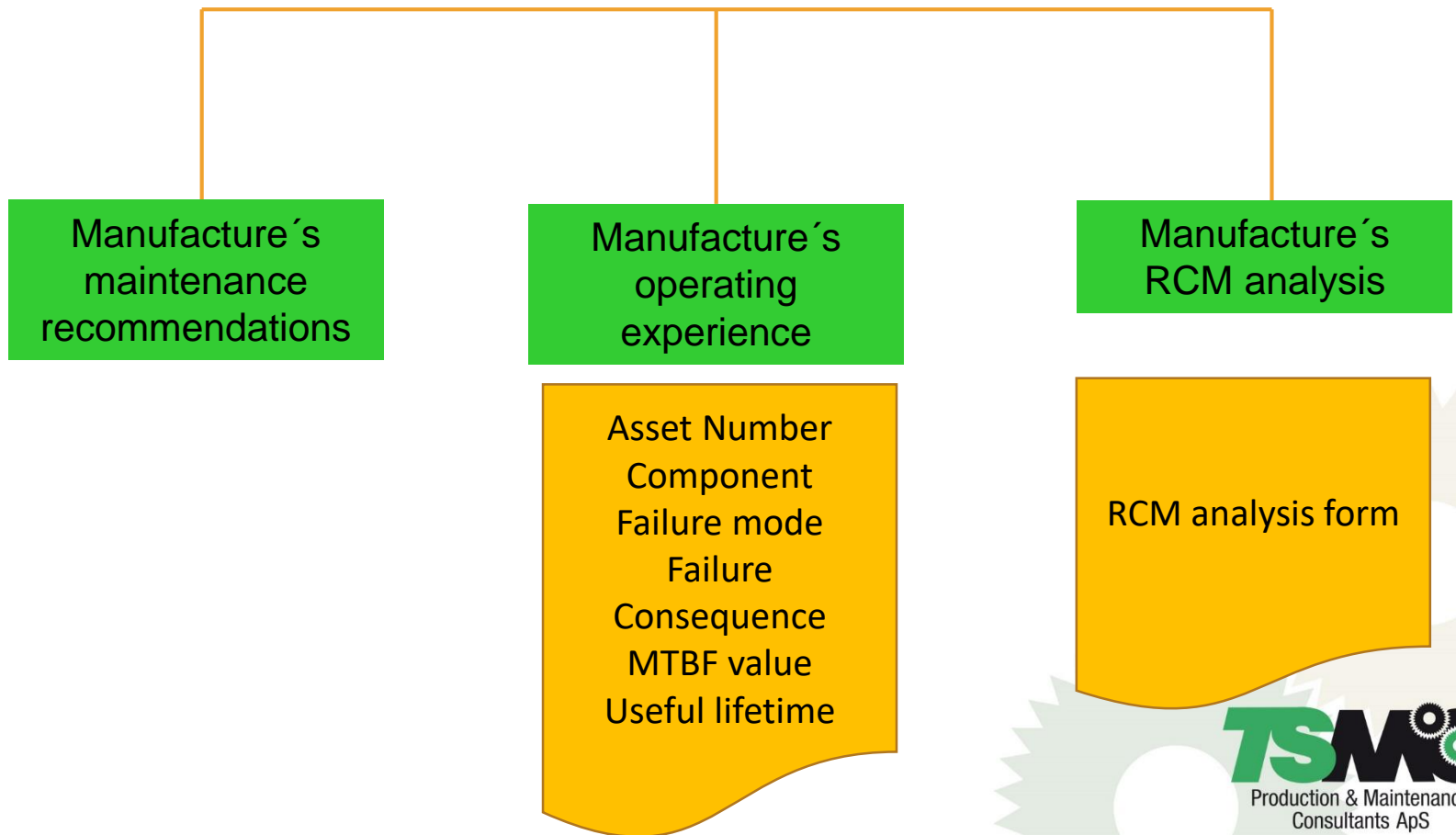
Previous practice for preventive maintenance for new assets



Challenge:

- Preventive Maintenance plans delivered as a part of the hand over process – At which state the unit has been operating in several months
- The Preventive Maintenance plans is normally generic and dont take the power plant units operating context in consideration
- As per experience most manufacturer developed Preventive Maintenance plans are 2 – 3 times "overmaintenance"
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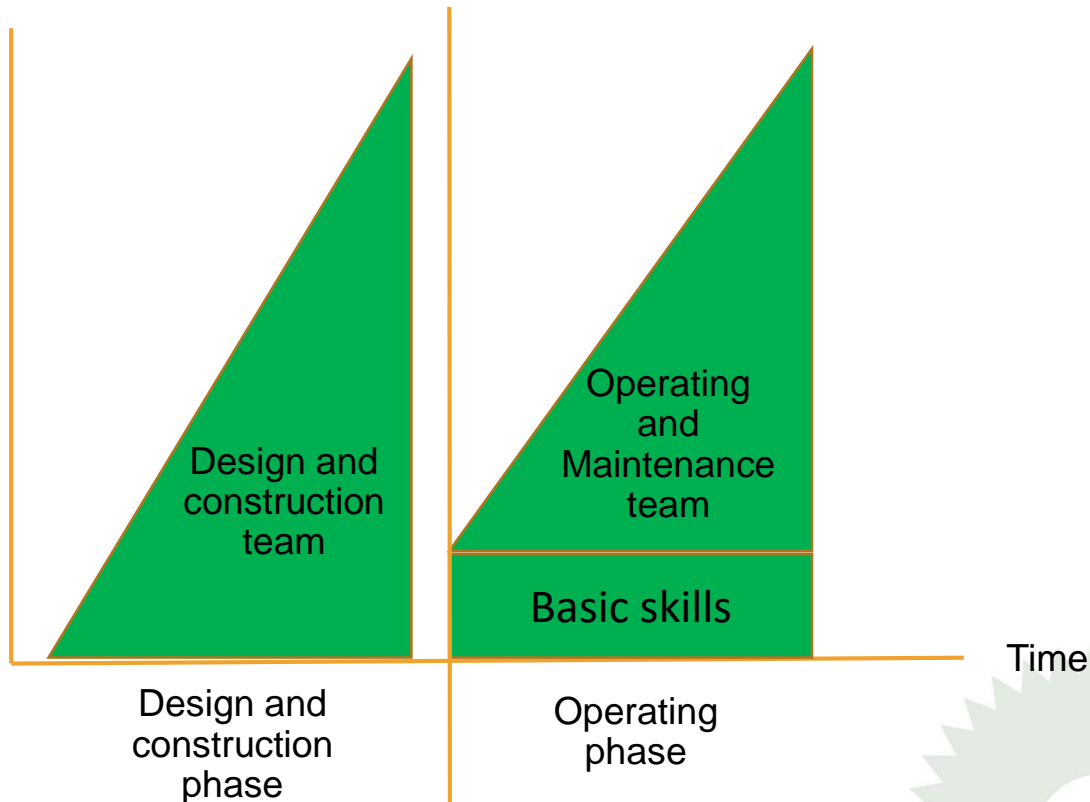
3 strategies for Preventive Maintenance planning



Maintenance experience build up during commissioning of a plant

- Traditional approach

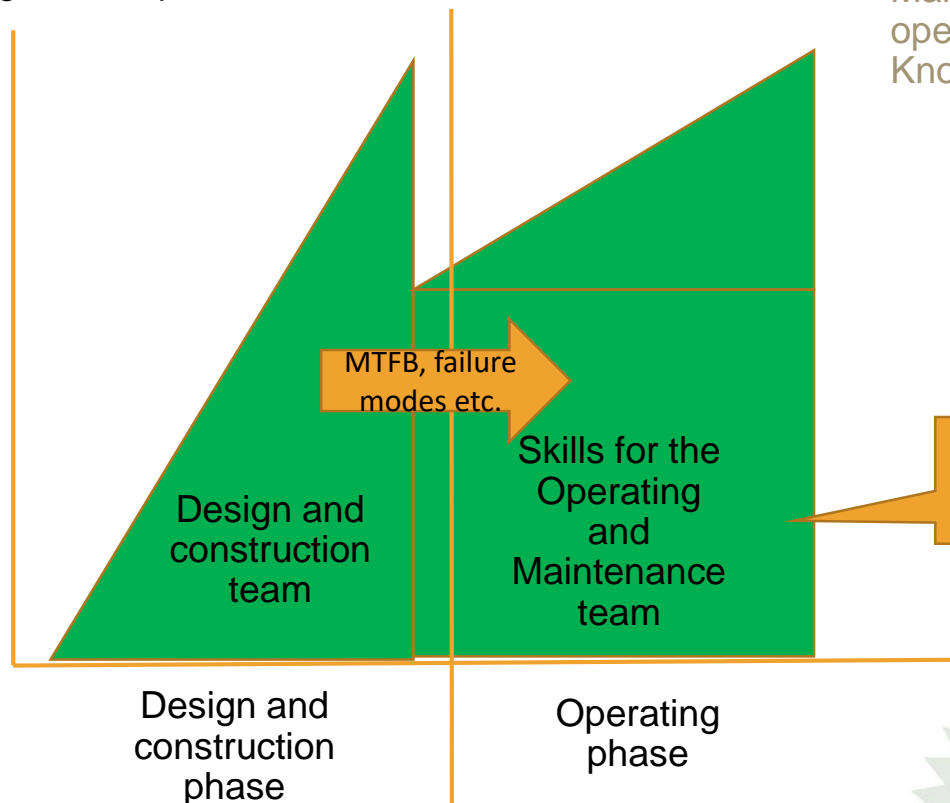
Knowledge build up



Maintenance experience build up during commissioning of a plant - Alternatively approach



Knowledge build up



Manufacturers knowledge + operations knowledge = Best Knowledge

Using manufacturer's and the operating experience

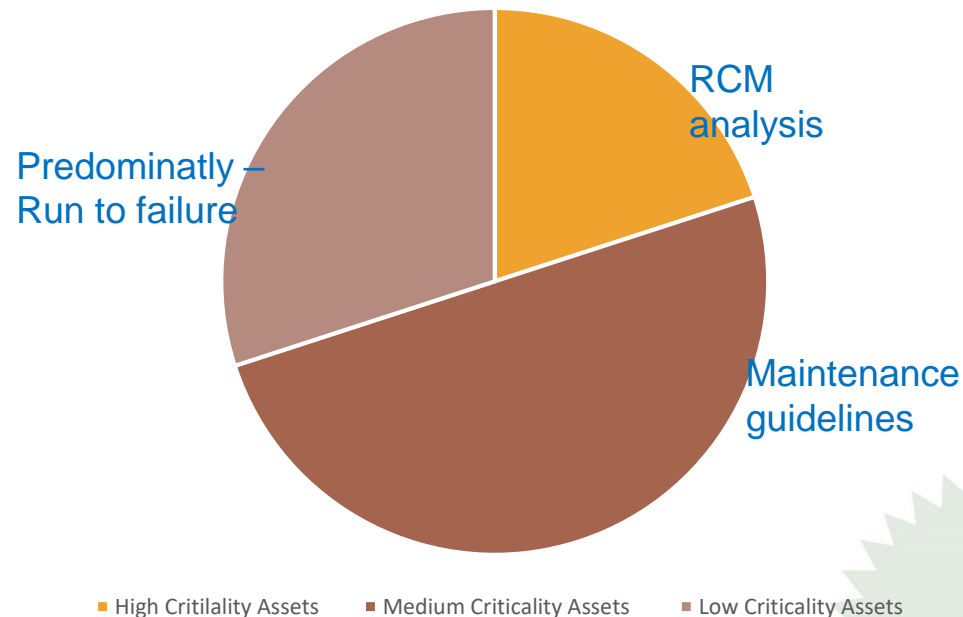
Process

First step – criticality analysis:

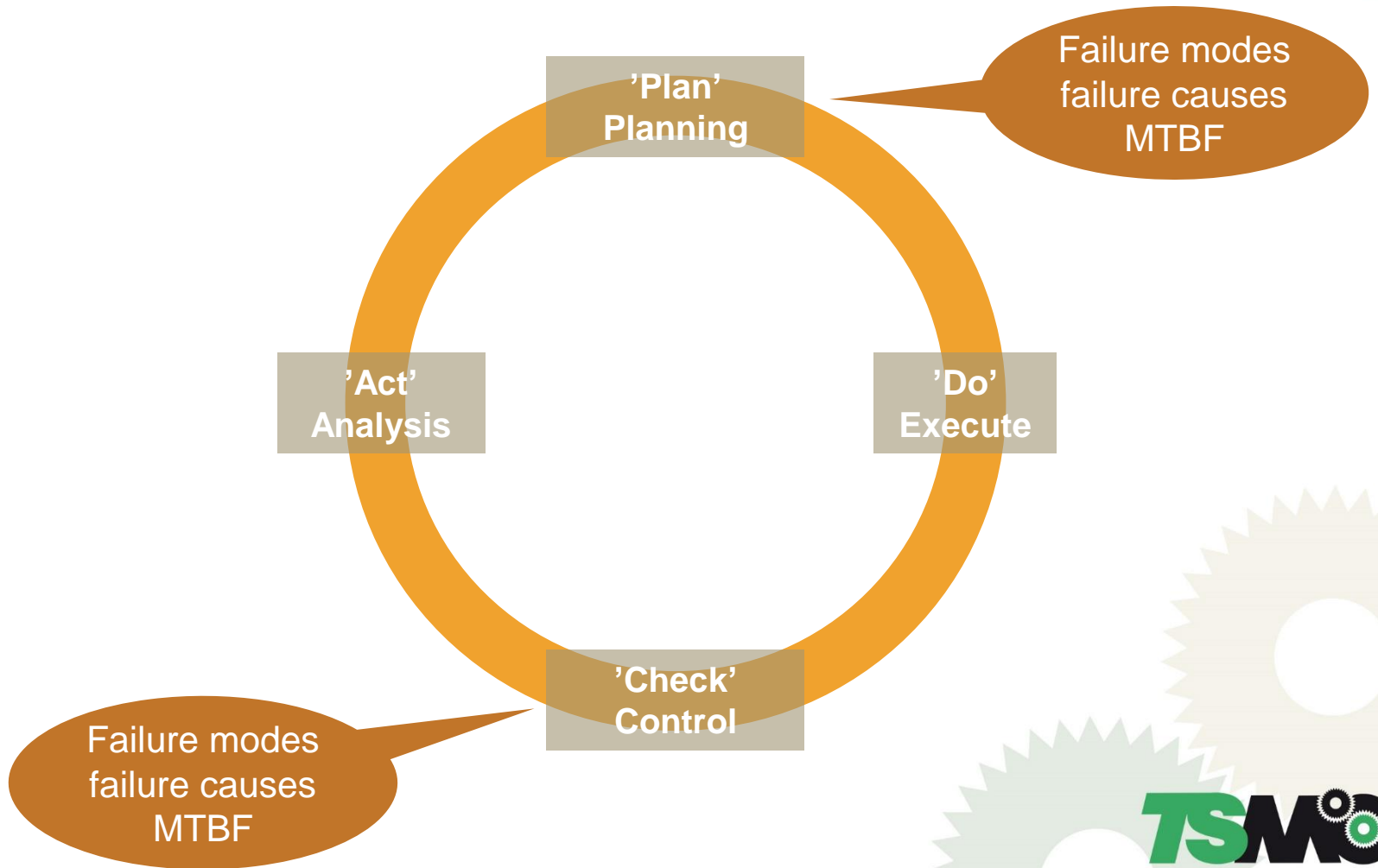
The Power Plant Unit was designed with a high level of redundancy. Most frequently strategy was "Run to Failure"

The Power plant had a proces for criticality system sorting in place. Only high criticality systems was selected for the RCM analysis.

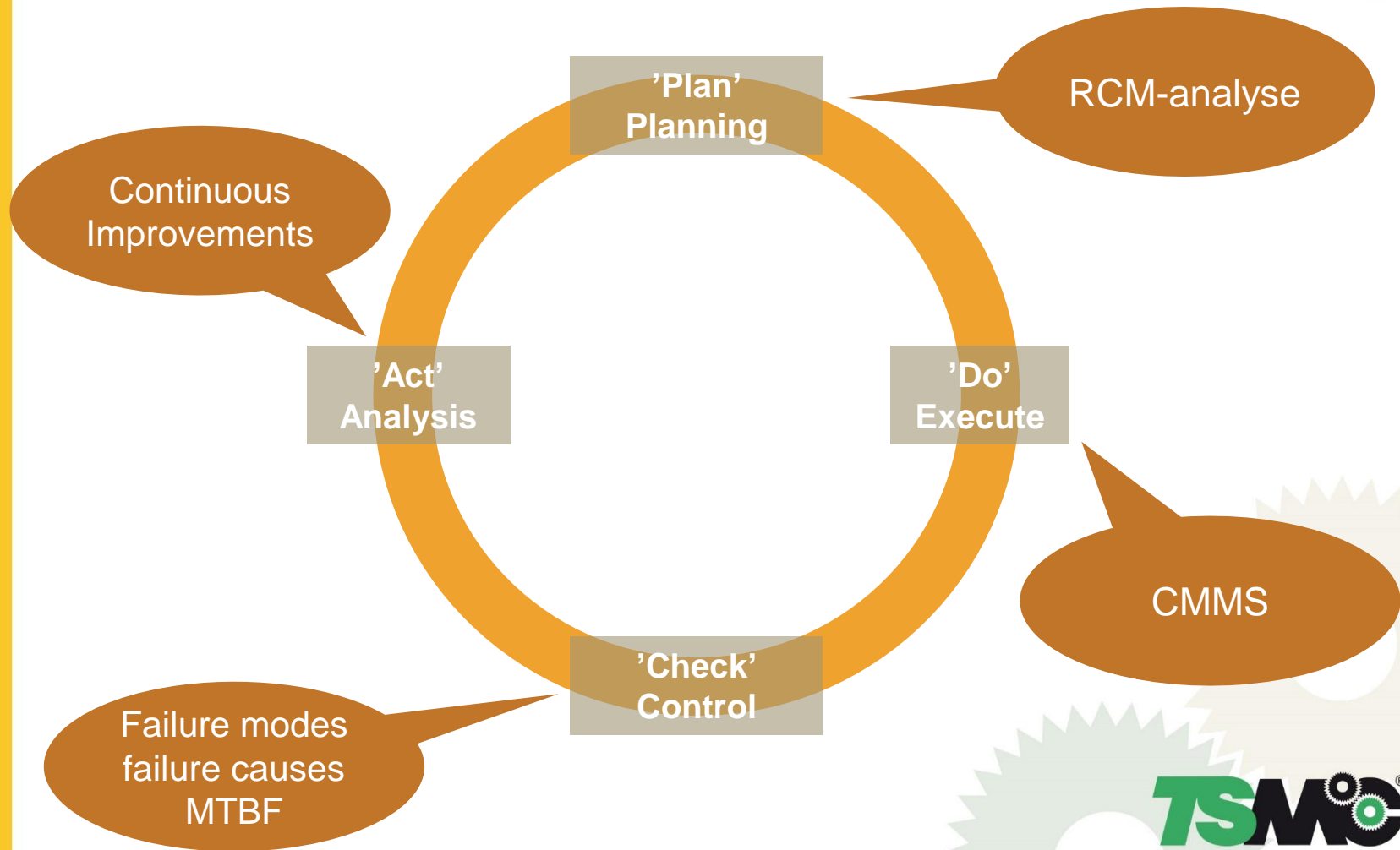
Criticality Distribution - example



Maintenance of the preventive maintenance plans



Maintenance of the preventive maintenance plans



Result

- The preventive maintenance workload was minimised to the necessary level in the unit's operation mode.
- Nonvalue maintenance was identified and removed.
- Failure modes unknown for the manufacturer but identified by the maintenance team were included in the preventive maintenance planning.
- A major and expensive preventive maintenance task recommended by the manufacturer to be performed with a 3-year interval, was changed to a 4-year interval, primarily caused by the operation mode for the unit.
- Several failure modes generated an inspection and subsequently calculation based on the operating data collected in the unit's SCADA system.
(Flow, pressure, power consumption)

Result

- Scope of the analysis

System/Asset	Failure modes with a recommended action	Preventive maintenance plans
Lot 1	88	28
Lot 2	195	36
Lot 3	613	41
Sum	896	105

Conclusion

- The use of the manufacturers' reliability data from operating similar units has proven to be an effective strategy in terms of economy and quality of the Preventive Maintenance plans.
- The Preventive Maintenance planning process has taken both the manufacturers' and the maintenance staffs' experience into account in the preventive maintenance planning process and using the two parties' operating experience. This is the illustration of $1+1=3$ and gave both parties a knowledge increase
- For many manufacturers, the standard procedure is to deliver the standard file with maintenance plans. When - as in this case - a client asks for deviation from the standard process for maintenance documentation, it requires a high level of maturity from the manufacturer's organisation. This case confirmed the need for a high maintenance maturity from the supplier by understanding the customers maintenance strategy.
- And as for any analysis, the data quality was a crucial part of the success.
- In this case the strategy for maintenance data was decided as a part of the request for tender and prior to the contract signing process. This was a key factor in the achievement of success.

Questions and comments



Thank you!

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