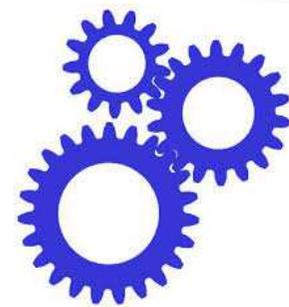


Development of a Asset Care Strategy for Tongaat Hulett



What is Asset Care?

- Asset care is... “finding the optimal **balance between the needs of the process and the needs of your mechanical assets** to achieve your business objectives of safety, quality and profitability.
- “**systematic approach** that optimises your profitability by addressing all available systems associated with your enterprise’s machinery”.
- “is a **strategic, results based program**”.

Asset Care is not...

- A flavour of the month, week year (or even a decade)
- Reactive (hysterical maintenance)
- Rocket science
- Reserved only for the top level employees
- Philosophy (buzzwords, catch-phrases)
- Easy to implement

Rather it...

- Transcends beyond purchasing the “right” software
- Requires people who translates strategy into day-to-day action on the shop floor
- Easy to understand but challenging to implement and maintain (behaviour & culture change)

What are the benefits?

- Obtain **longer useful life** of expensive equipment
- Maintenance staff given **reasonable** and **predictable** working hours
- Significant **reduction** of **plant maintenance cost**
- Greater **safety and environmental protection**
- Increased **product quality and reduced waste**

Elements of Asset Care

Early Equipment Management



- Security, return & risk
- Standards
- Operability
- Maintainability
- Spares (management & sourcing)

Run to failure



Predictive Maintenance



Planned Maintenance



Recapitalisation



Proactive Maintenance



t = 0

t = end of life

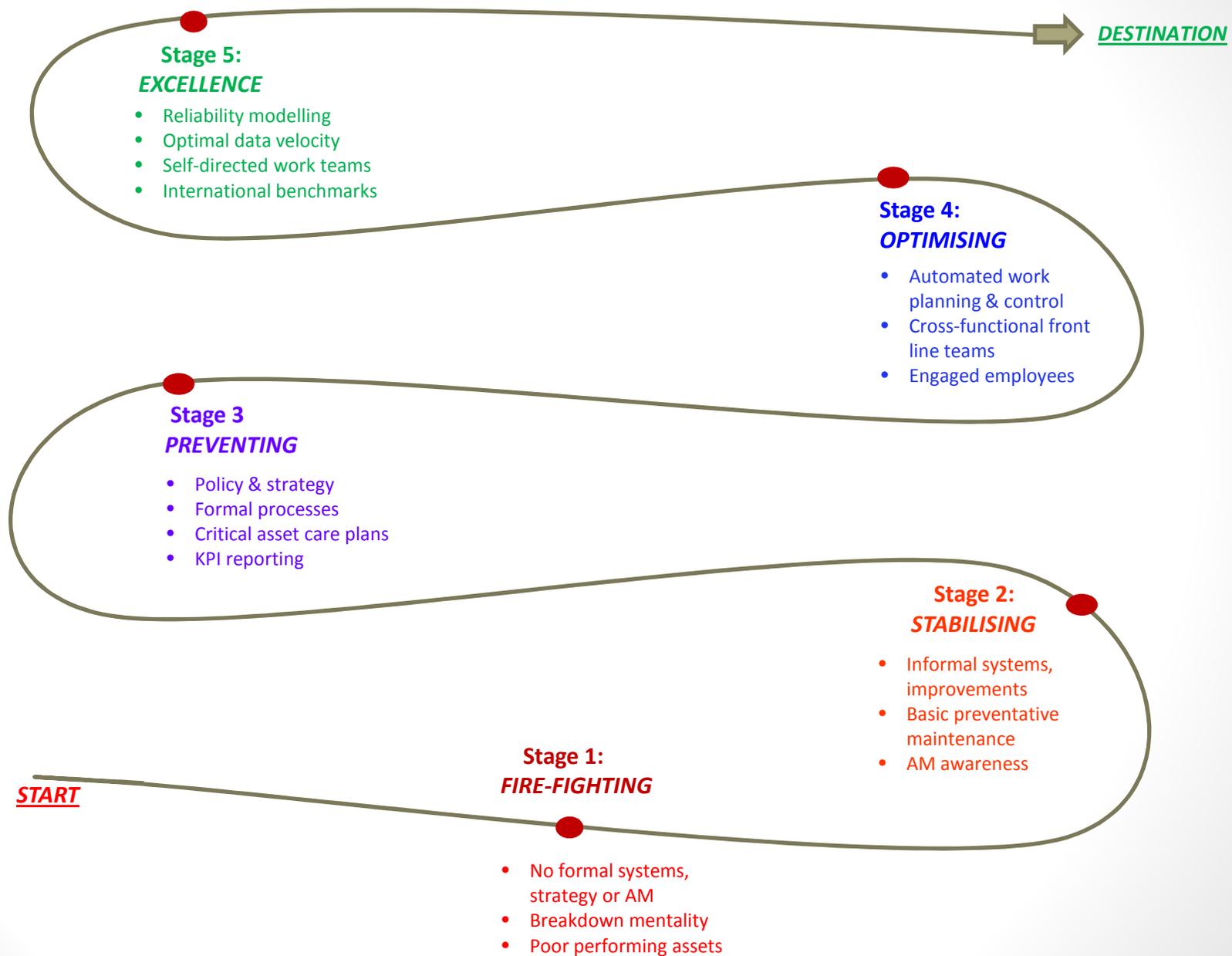
Technical Training



Autonomous Maintenance



Proposed Asset Care Roadmap



What have we found out?

- Breakdown culture
- Incomplete information, inaccurate
- Reliance on pre – determined, time interval based maintenance practises (effective but costly)
- Age of equipment often lead to unexpected failures on parts of equipment considered reliable in the past
- Condition based maintenance not fully embraced

Predetermined, time interval based maintenance

- Presumes failures can be prevented by periodic service & repair
- OEM recommendations & previous experience are used to determine time spacing between intervals
- The associated maintenance tasks usually involve intrusive inspections and replacement of parts

Predetermined, time interval based maintenance (continued)

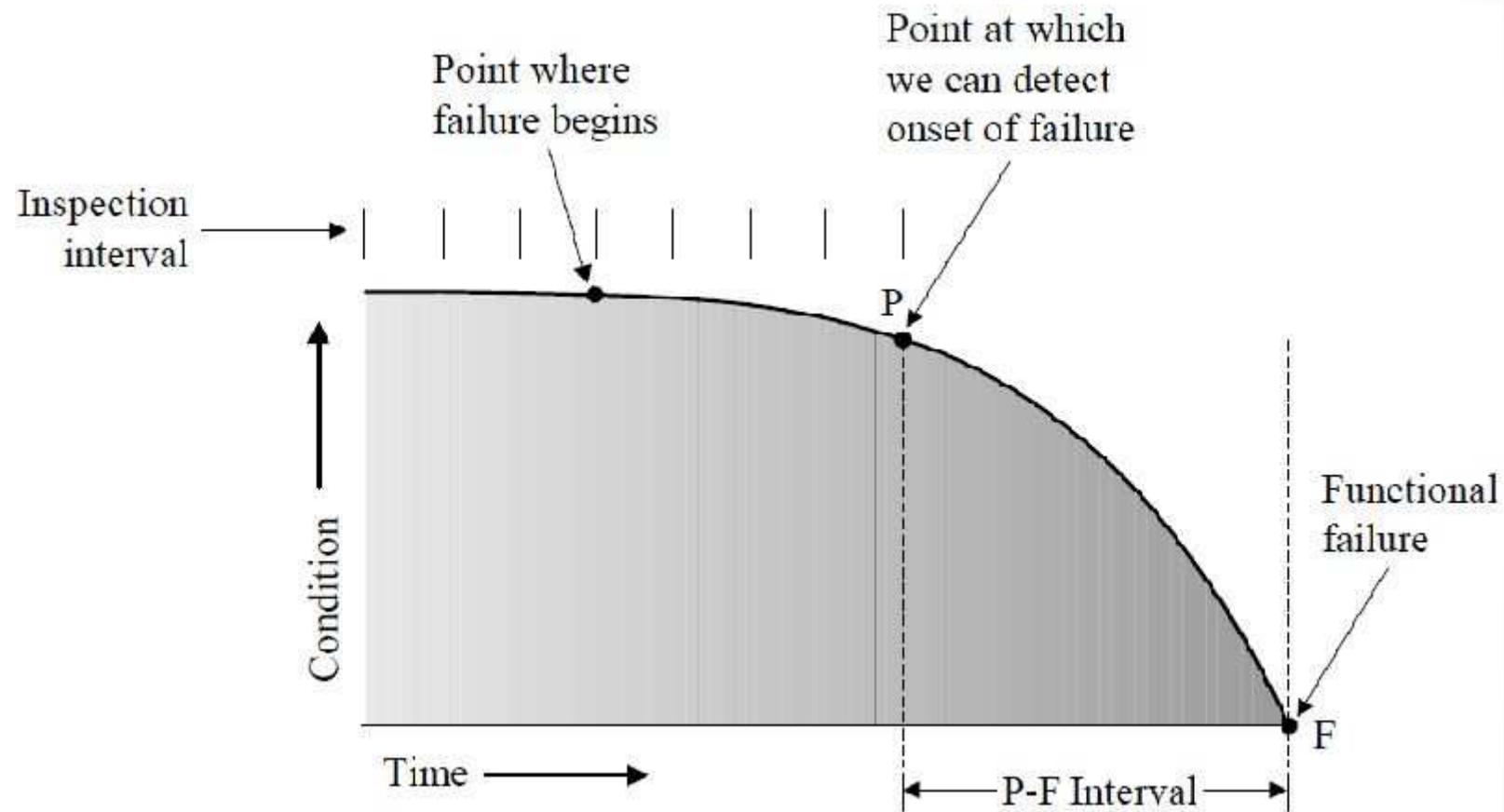
Strategy is expensive & potentially unreliable due to:

- High proportions of unnecessary maintenance
- Frequent catastrophic failures as a result of bad estimation of the required intervention timing or the presence of hidden failure modes
- Infant mortality – faults introduced during the intervention.
- Requirement for high levels of critical spares due to “fear of the unknown”.
- Requirement for substantial maintenance resources
- Age of equipment often lead to unexpected failures on parts of equipment considered reliable in the past

Predictive Maintenance

- Strategy of determining the need for intervention using regular or continuous measurement of condition indicators
- Maintenance schedules are therefore directed at “measurement taking” rather than equipment service and maintenance
- Is based on the theory that most failures do not occur instantaneously, but have a “point of initiation” followed by a period of deterioration leading to a failure or breakdown.
- The goal of strategy is pick up the deterioration as close to the point of initiation as possible.

Predictive Failure Curve



Benefits of Predictive Maintenance

- Scheduling of repairs at convenient times.
- Reduction in the cost of maintenance
- Reduction in catastrophic failures
- Reduced inventory
- Reliability of equipment is controlled at an appropriate level.

Predictive Maintenance Technologies

- Temperature monitoring (infrared thermography)
- Lubricant analysis (spectroscopy, ferrography)
- Electrical condition monitoring (winding resistance, tan delta)
- Vibration monitoring (accelerometer readings)
- Acoustic detection
- Ultrasonic detection
- Radiography detection
- Remote visual inspection (borescope/endoscope)

Time to re - think

- Determine the most economically effective strategy for each type/piece of equipment (criticality analysis)
- Periodic measurement of wear and residual life is also a form of condition monitoring
- Preventative maintenance coexists with predetermined maintenance, it does not replace it

Short Term Implementation Strategy

- Asset condition is managed **holistically** and all players take responsibility for preserving the integrity thereof
- Training in technology is given suitable priority
- Greater reliance on predicative maintenance technologies
- Plant engineers, foremen & supervisors are held accountable for ensuring that predicative maintenance becomes the “tool of choice” for maintaining equipment.
- Weekly review meetings are held to review maintenance works orders and set action plans.
- Physical findings relating to are fed back to the CMMS / planning department for inclusion into the “experience history” database
- Results and learning’s from the asset management program are shared with artisan workforce to assist with understanding and appreciation of the value of the program.

THANK YOU

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