



Asset Management • Reliability • Condition Monitoring

Maintenance Strategy Optimisation – Brewery Pasteuriser

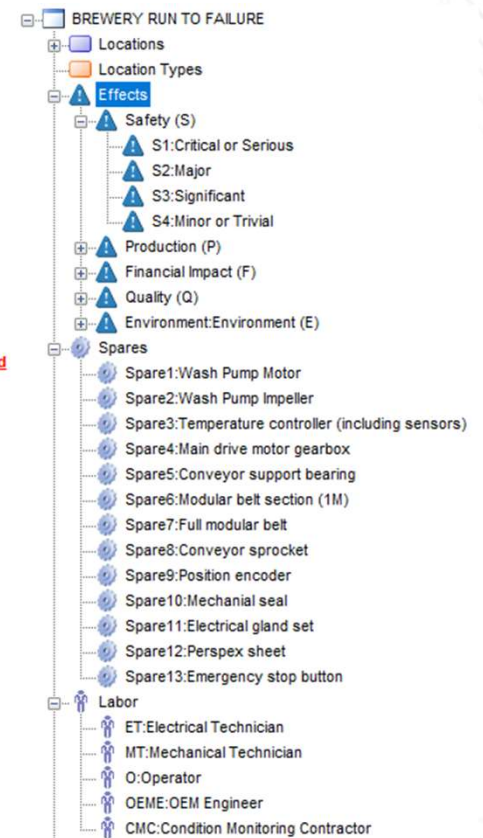
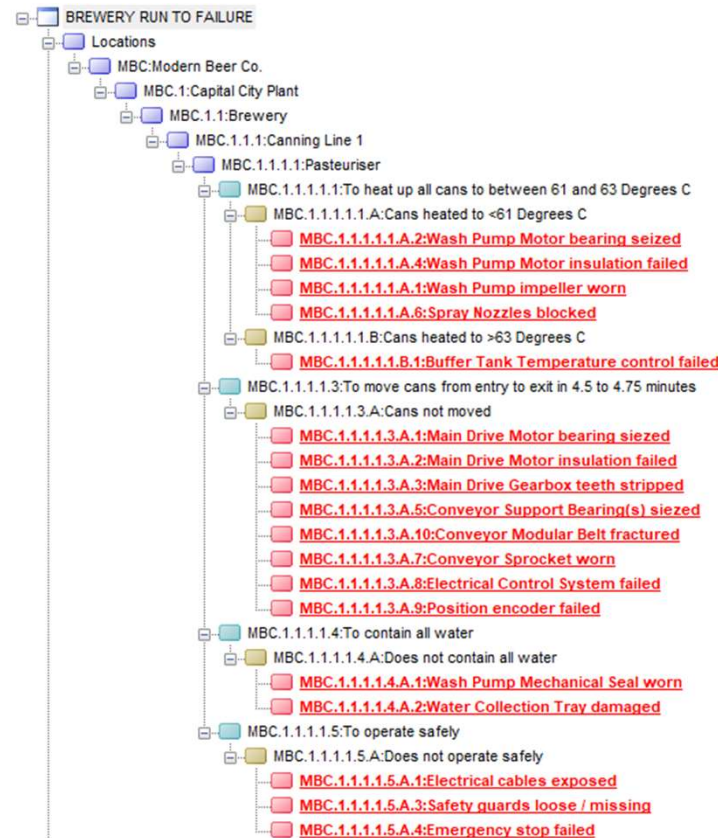
Using Isograph Availability Workbench

The Objectives

- To deliver a **maintenance strategy optimization** of a Canning Pasteuriser Asset at a Brewery.
- To use the **RCM** and **FMECA** approach.
- To use **Isograph Availability Workbench** – RCMCost module
- To compare existing **run to to failure** strategy to **optimised strategy**.
- To quantify the **value** of the optimization project in terms of **costs** and **risks** over a 10 year lifespan.

The FMECA

- Built an AWB model
- Assets, Functions, Functional Failures, Causes
- Populated failure data
- Populated failure effects
- Populated spares
- Populated labour
- Created corrective tasks & times
- Created PM / PdM tasks & times



The FMECA

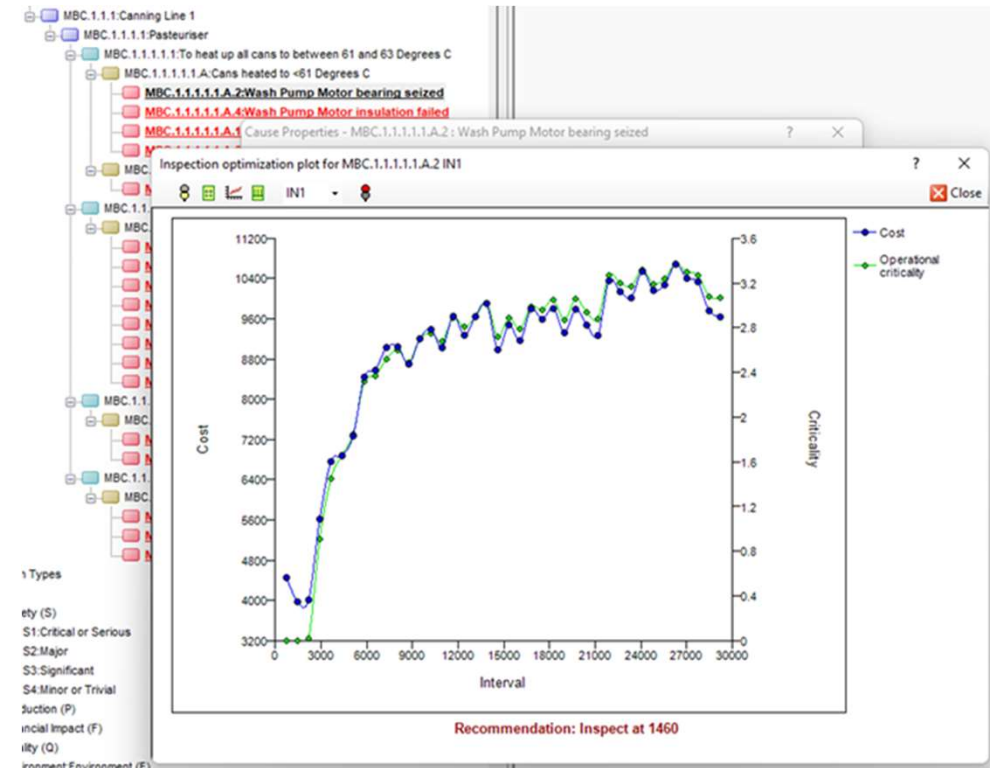
- Optimised each failure cause (failure mode)
- Understood whether maintenance should be RTF, PM, PdM or a combination in terms of costs and risks.

The screenshot displays a hierarchical tree of failure modes on the left and a detailed 'Cause Properties' dialog box on the right. The tree shows a structure starting with 'MBC.1.1.1:Canning Line 1' and 'MBC.1.1.1.1:Pasteuriser', leading to various failure modes like 'Wash Pump Motor bearing seized' and 'Wash Pump Motor insulation failed'. The dialog box for 'MBC.1.1.1.1.A.2: Wash Pump Motor bearing seized' shows a 'Maintenance and design strategy' table with columns for Strategy, Enabled, Interval, Group, and Description. The 'Inspection' strategy is selected with an interval of 730. Below the table, there are sections for 'Interval optimization...', 'Edit task...', and 'Predictions:' which lists various metrics like Cost, Safety criticality, Operational criticality, Environmental criticality, Failure down time, PM down time, Inspection down time, and Statistical error in TDT.

| Strategy | Enabled | Interval | Group | Description |
|---------------------|-------------------------------------|----------|---------|---------------------------------|
| Planned Maintenance | <input type="checkbox"/> | 8760 | Not set | Replace motor |
| Inspection | <input checked="" type="checkbox"/> | 730 | Not set | Vibration monitoring & Analysis |
| Alarm | <input type="checkbox"/> | | | |
| Commission | <input type="checkbox"/> | | | |
| Redesign | <input type="checkbox"/> | | | |

The Optimisation

- Monte Carlo simulation performed.
- Recommended PM or inspection intervals.
- Based on lowest overall costs and/or risks.
- AWB software also recommended RTF when more cost effective.



The Optimisation

- Accepted all **optimised maintenance tasks** for each individual cause.
- Cost benefit ratio of less than 1 = a saving
- e.g. a CBR of 0.37 = 64% reduction
- Created a mirror **run to failure model** to understand overall costs and risk with no proactive maintenance intervention.
- Analysed costs & risks over a 10 year asset life span.

Cause Properties - MBC.1.1.1.1.A.2 : Wash Pump Motor bearing seized

General Effects Failure Maintenance Alarm Commission Redesign Notes Strategy

Maintenance and design strategy:

| Strategy | Enabled | Interval | Group | Description |
|---------------------|-------------------------------------|----------|---------|---------------------------------|
| Planned Maintenance | <input type="checkbox"/> | 8760 | Not set | Replace motor |
| Inspection | <input checked="" type="checkbox"/> | 1460 | Not set | Vibration monitoring & Analysis |
| Alarm | <input type="checkbox"/> | | | |
| Commission | <input type="checkbox"/> | | | |
| Redesign | <input type="checkbox"/> | | | |

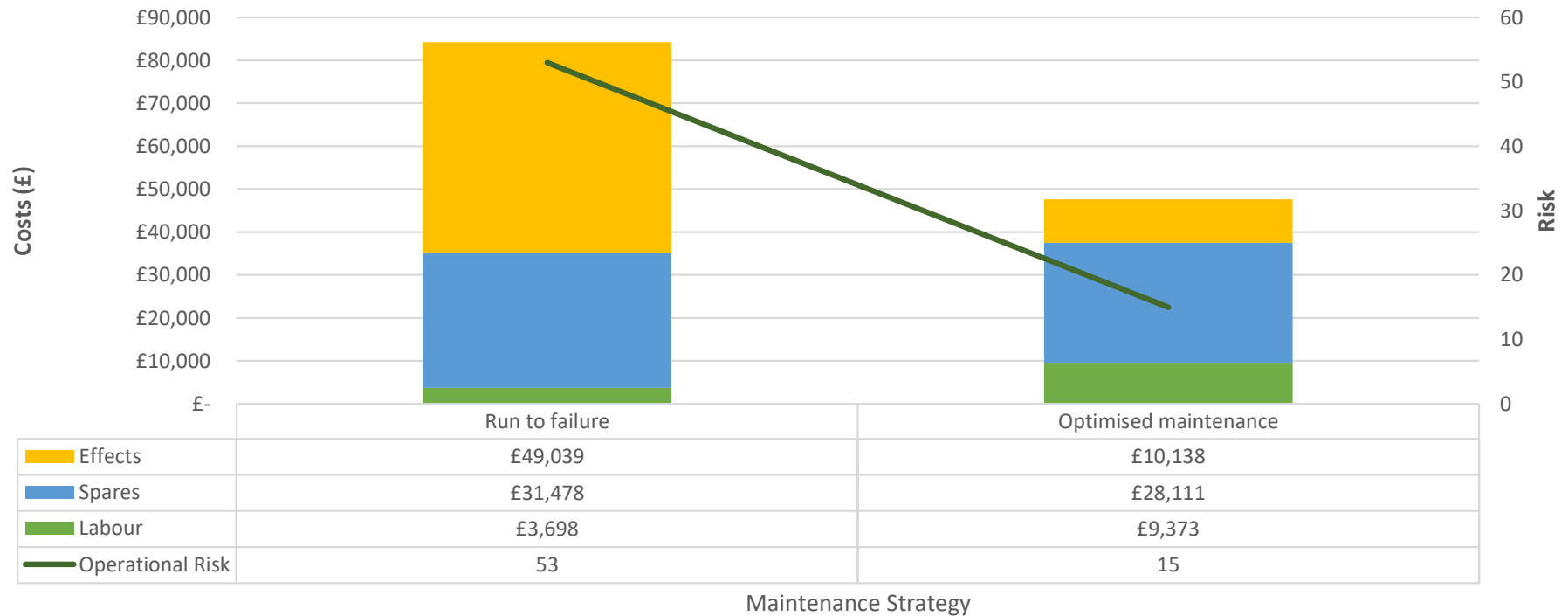
Interval optimization... Edit task...

Predictions:

| | | | |
|----------------------------|--------------|------------------------------|--------------|
| Cost: | 3974.9 | Cost benefit ratio: | 0.371916988 |
| Safety criticality: | 0 | Safety benefit ratio: | 1 |
| Operational criticality: | 0 | Operational benefit ratio: | 0 |
| Environmental criticality: | 0 | Environmental benefit ratio: | 1 |
| Failure down time: | 0 | Number lifetime failures: | 0 |
| PM down time: | 3.38 | Number lifetime PMs: | 3.38 |
| Inspection down time: | 0 | Number lifetime inspections: | 59 |
| Statistical error in TDT: | 2.15279699 % | Statistical error in cost: | 2.99541112 % |

The Results – Lifetime Costs

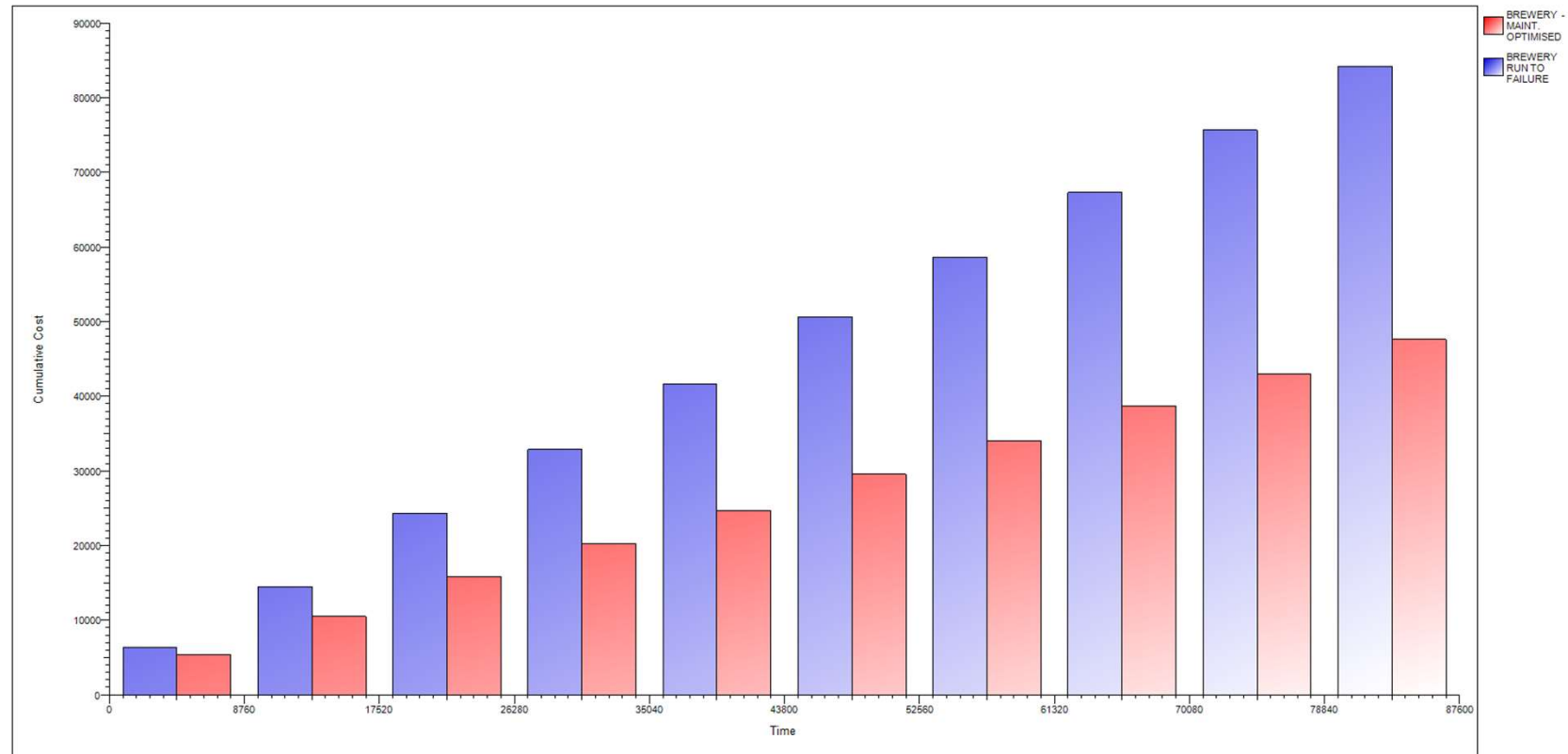
Maintenance Strategy Comparison - 10 Year Life Costs with Risk Reduction



■ Labour
 ■ Spares
 ■ Effects
 — Operational Risk

The Results – Cumulative Costs

Project Comparison



Conclusion

- FMECA maintenance strategy optimisation applied to **one standalone** asset resulted in:
 - Maintenance & Operations cost reduction of 43% over 10 years
 - Operational Risk reduction of 72%
 - Increased accuracy in budget predictions for labour and spares
 - New, optimised maintenance strategy uploaded to CMMS