Holistic Asset MANAGEMENT

CASE STUDY

Utilise Reliability, Availability and Maintainability to Validate a New Design

Holistic Asset Management (HolisticAM) partnered with an international technology company, who design, build and operate Data Centre across APAC, to provide reliability engineering expertise to build a Reliability, Availability and Maintainability (RAM) baseline modelling to validate its new Data Centre design.

In the wake of travel restrictions (Covid-19), HolisticAM was able to effectively conduct the reliability modelling remotely, to achieve a more cost-effective delivery and to provide a safe working environment by utilising Microsoft Teams video conferencing and Teams Channels.

Mission Critical Facilities

The Challenge

The client required a Data Centre Simulation Model to validate its availability and reliability performance for the mechanical system, fuel system and electrical system.

Support was provided to:

- Establish failure characteristics of required components based on industrial standards and Weibull Analysis such as failure rate, Mean Time Between Failure, Mean Time To Repair etc.
- Develop baseline Reliability Block Diagram (RBD) model that provide a high level of accuracy confidence for its availability and reliability.
- Predict future performance results of the Data Centre through Availability Simulation.
- Perform what-if scenarios to validate if the redundancy may be beneficial and cost effective.

THE SOLUTION

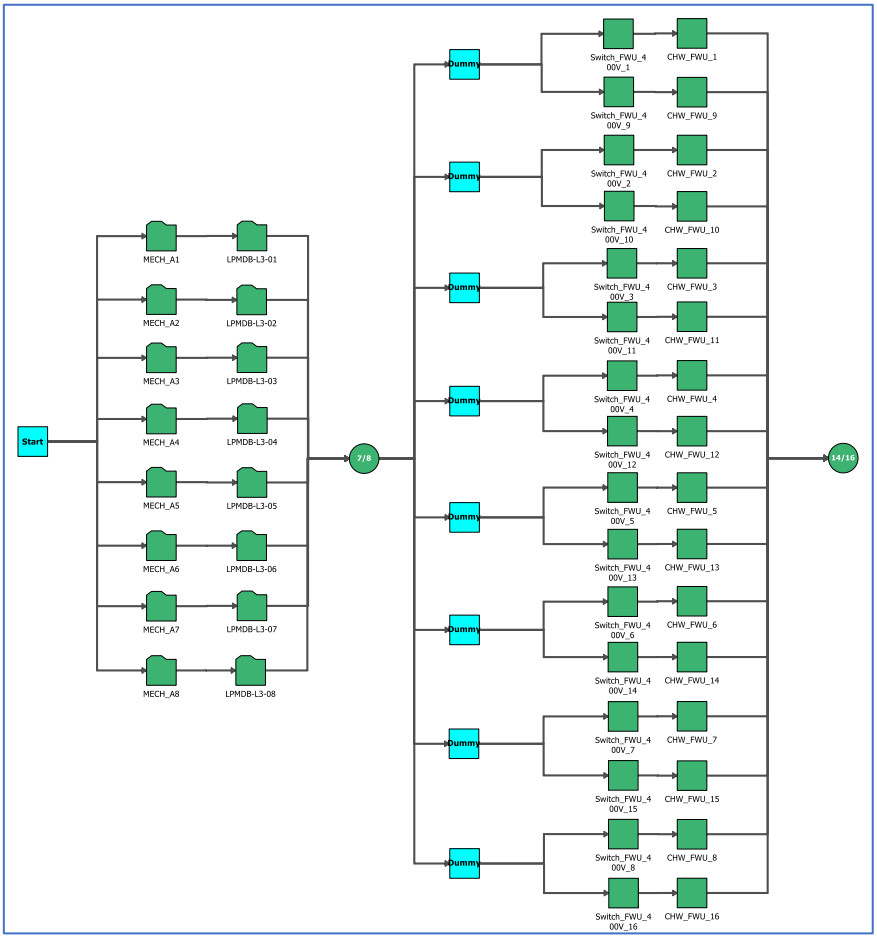
HolisticAM mobilised a Senior Reliability Specialist to deliver a RAM model at system, sub-system and component level. The RAM study included Weibull Analysis, RBDs for the required three systems and what-if scenarios. HolisticAM worked closely with the client's design team to provide working knowledge transfer of the RBD and simulation process. All RBDs designs were reviewed and validated by the client's subject matter experts to ensure accuracy of simulation results.

Weibull Analysis

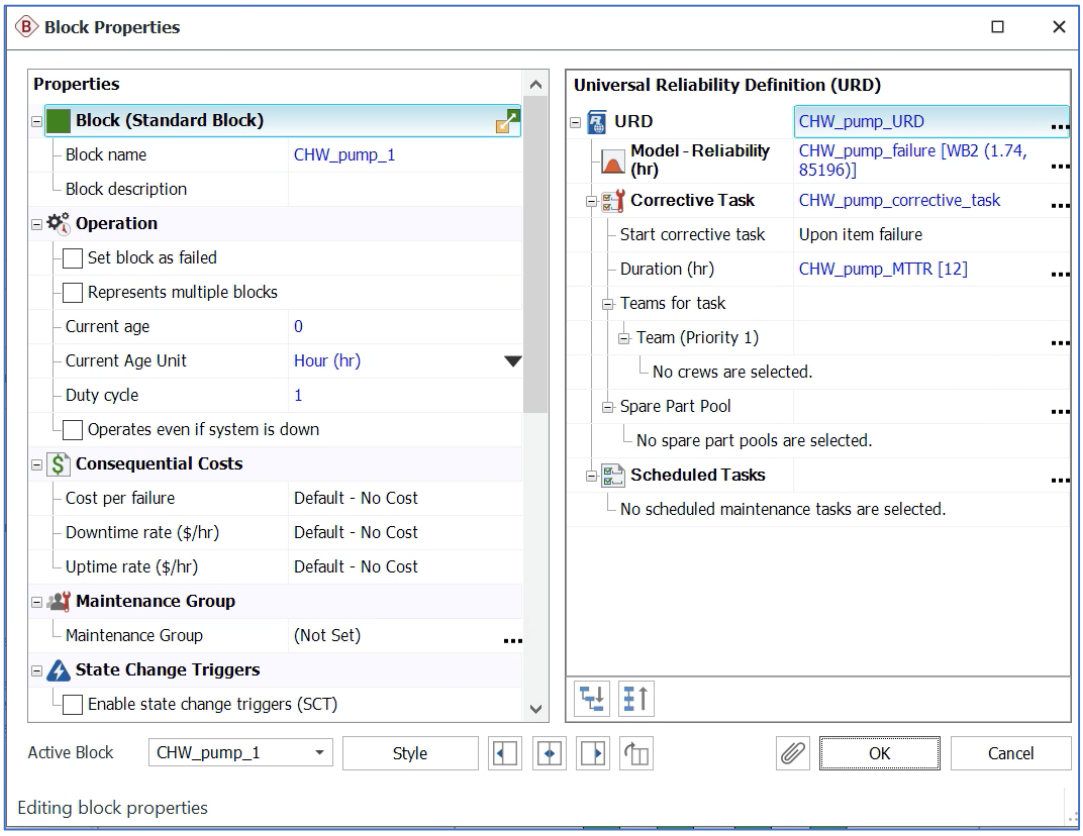
Each component's failure distribution was derived from the industrial standards IEEE 3006.8-2018 and ReliaSoft Weibull++ tool to calculate Beta and Eta value.

RBD

ReliaSoft BlockSim tool was used to develop reliability-wise systems and component level RBDs as per the client's technical drawings.



RBD for electrical system – electrical service data hall Mech string level 3



Example Block Properties for CHW pump in ReliaSoft BlockSim

Modelling

RBDs were modelled with failure distribution (reliability) and maintenance characteristics (a corrective task and/or scheduled tasks) as per the agreed simulation period.

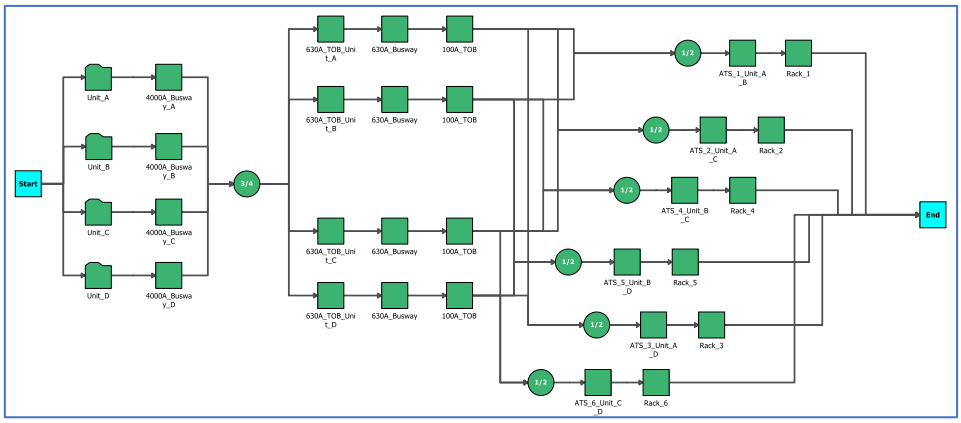
What-if scenario

What-if scenarios were performed to validate the reduced redundancy were able to meet the availability and reliability performance requirement and to provide high level of accuracy confidence of emergency system design and performance

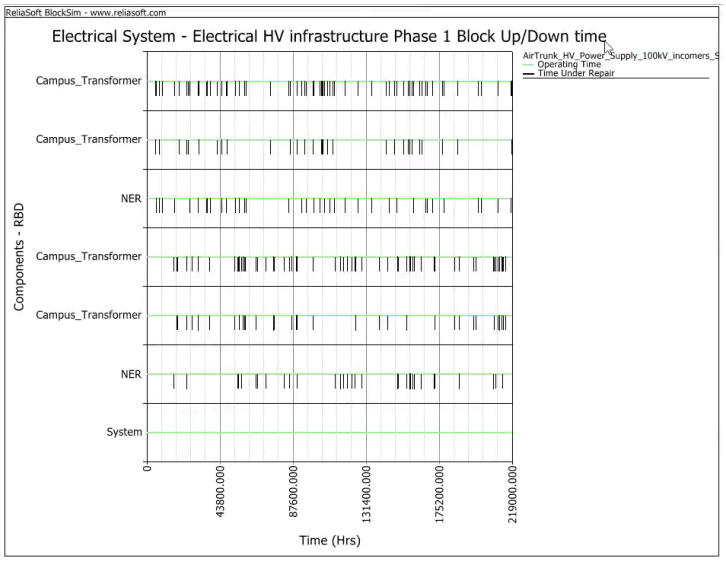
THE RESULTS

A baseline RAM model has been established and were validated to meet the design performance goals. The model verified that a robust multi-level redundancy system was built into the current Data Centre design.

Simulation modelling results were analysis to identify bad actors and area of vulnerability which can affect operational availability and to quantify the systems/components downtime.



Example RBD for electrical system – electrical service data hall IT string



Example Block Up/Down time graph for electrical HV infrastructure

ADDED VALUE

In this project, HolisticAM used ReliaSoft Weibull++ and BlockSim software to perform what-if scenarios to validate a reduced redundancy was able to achieve the required performance objectives in conjunction with appropriate corrective and scheduled tasks. It has resulted in over a few million-cost saving for the capital expenditure of a new Data Centre.

Holistic Asset MANAGEMENT

You can rely on our effective and economical solutions if your organisation does not have sufficient time, expertise or resources in-house to accomplish specific reliability goals. Whether you need a quick statistical analysis, a complete assessment of your reliability program plan or something in between, we can assist.