RELIABILITY, AVAILABILITY & MAINTAINABILITY (RAM) MODELLING

An innovative approach to solving production related risks

BUSINESS CHALLENGE

A well-designed and properly implemented asset optimisation program can significantly lower project costs. RAM modeling assesses a production system's capabilities, whether it be in operation or still in design phase. The results from RAM modelling will identify possible causes of production losses and can examine possible system alternatives.

SOLUTION

What is RAM Modelling?

RAM modelling can simulate the configuration, operation, failure, repair and maintenance of equipment. The inputs to RAM modelling will include the physical components and maintenance schedules in a system, and the outputs can determine how productive the system has the potential to be over the plant life. RAM studies will generate sufficient data on which to base decisions for possible systems changes that may increase system efficiency, and therefore increase project profits.

What are the key benefits?

The key benefits of RAM modelling include:

- Detecting failures in the early part of design;
- Optimising maintenance schedules;
- Adequately allocating the spares inventory;
- Increasing the effectiveness of logistics; and
- Identifying equipment priorities on failure.

RELATED **SERVICES**

- Weibull Analysis
- Financial Penalty Analysis
- Failure Mode Effects and Critical Analysis (FMECA)
- Root Cause Analysis (RCA)
- Reliability Centered Maintenance (RCM)
- Planned Maintenance Optimisation (PMO)
- Fault Tree Analysis (FTA)

WHY CHOOSE BUREAU VERITAS?

Recognition Founded in 1828, Bureau Veritas is a world leader specialising in conformity assessment services related to Quality, Health, Safety & Environment (QHSE).
Certified to ISO 9001 for all of its activities globally, Bureau Veritas is well known for its ability to adapt to changing client environments and situations, and for its commitment to providing leading solutions through quality service.

Knowledge & Expertise Through expert local teams and technical knowledge, Bureau Veritas are able to deliver packaged and targeted solutions and information, to support our clients unique business requirements.

Network With a global network of over 900 locations in more than 140 countries, Bureau Veritas provides tailored solutions to clients throughout the world across a diverse range of industries.

OUR APPROACH

Our reliability engineers will liaise with the client to identify their needs and develop the basis for the RAM model. Once the basis is agreed a model of the system is created and run in Optimise©. Analysis of the model generates results and recommendations for improvement of the design or of the operating results. Communication throughout all stages with the client and the reliability engineers is continuous and ensures maximum results.

FAQ – FREQUENTLY ASKED QUESTIONS

Has Bureau Veritas' RAM modelling capability been previously sought by companies looking to increase the productivity of their systems?

Yes. Bureau Veritas has extensive experience that has been developed through more than 100 RAMand supply chain studies. These include:

- Gorgon LNG Development (Chevron)
- LNG Receiving Terminal (ConocoPhillips)
- PNG Gas Project (ExxonMobil)
- Kupe Offshore Gas Development (Technip/ Woodside)
- Cossack Pioneer FPSO (Woodside)
- Iron Ore Upgrade (BHP Billiton Iron Ore)
- Kwinana Power Generation Units (Western Power).

CASE **STUDY**

IRC conducted a RAM analysis to identify operational issues associated with an existing iron ore crushing facility prior to its

The RAM analysis identified the actual bottlenecks in the system and highlighted the equipment which did and did not require an upgrade, to meet future demand. As a result the client was able to significantly reduce their capital expense required to complete the upgrade of the facility to meet their future demand.

Key Elements

Info gathering & project familiarisation	— PFDs and/or P&IDs. —Basis of design / process description.
Development of reliable data set	—Data sources include historical operating records, OREDA database, equipment vendors and engineering judgment.
Preparation of assumptions doc	—Forms basis of RAM model design.
Construction of dynamic availability model	—RAM model populated with latest performance data (historical records, OREDA).
Review & refine model, including sensitivity cases	—Allows "what if" Scenarios to be evaluated. —IRC experience used to identify and model improvements.
Draft & final report preparation	—Description of model elements —Asset register including failure and repair data. —Results quantifying production availability, critical events and design recommendations.

CONTACT

For details about this service, please contact
Risk Management Services Aus & NZ
Phone Australia:
Melb HQ: + 61 (0) 3 9922 0700
Perth: + 61 (0) 8 9481 0100
Phone New Zealand: + 64 (09) 526 4546

FOR MORE **INFORMATION**

Please Visit: www.bureauveritas.com.au
Email: bvaus@au.bureauveritas.com

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