

Reliability Technology Brochure



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1. Reliability Technology Services

Reliability Technology Brochure enlists Becht's technologies related to Reliability improvement. The brief introduction of each technology accompanies with an explanation on application and organization of content in respective module. The RTM modules are named after these technologies. Complete portfolio is detailed as below;

1.1. Reliability Management System (RMS)

The RMS module provides guidelines on an effective Reliability Management System (RMS) with recommended work procedures and requirements for each of RMS elements. The module gives a comprehensive view on a reliability management system and can be utilized to identify areas of reliability improvement at a facility. Becht has track record of both executing individual elements and whole RMS standard for different clients.

1.2. Reliability Gap Assessment (RGA)

The RGA module outlines the work process of performing reliability gap assessment on various elements of a reliability and maintenance management system at a facility. The module starts with basic definition, followed by gap assessment criteria, team preparation and ends with gap assessment methodology. The templates for performing gap assessment are in appendices B, C, D and E. The work process must be supported by subject matter experts on different areas of reliability since this module only outlines the general work process.

1.3. Priority Screening and Criticality Evaluation

This module outlines recommended procedure for screening and prioritizing units in a facility to optimize the workload and resources and to show scope of immediate benefits. The module also has a process of critically analyzing equipment in a particular unit. The goal is to finalize the minimum number of ERPs required to achieve top tier reliability performance for the unit.

1.4. Becht Inspection Development and Execution Strategy (BIDES)

BIDES module explains the implementation and effectiveness of Becht's knowledge base. This work process is an integral part of Becht's ERP development and provides guidance on damage mechanism, failure modes, and probability and mitigation aspects of ERP. This module applies to Fixed Equipment and Piping only. Becht offers this tool to be customized and licensed per client's requirement.

1.5. Equipment Reliability Planning (ERP)

Becht's Equipment Reliability Plan (ERP) process is documented in ERP module. The first half of the module outlines the development and execution of an ERP in a hydrocarbon facility and second half talks about the ERP work process steps. The module also provide fundamental guidance on ERP development tools like ERP platform (STIER), knowledge base (BIDES), Inspection Based Probability Assessment (A_{rt}) and Consequence Assessment Process (CAP). This module fundamentally applies to all classes of equipment with slight variation on application of ERP development tools for machinery, electrical and Instrumentation.

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1.6. STIER Tool

This module describes Becht's proprietary ERP tool STIER. The architecture, data structure and knowledge base in STIER are explained in first half of the module and the second half deals with background calculations, risk matrix and graphic user interfaces. STIER can be embedded with any risk matrix and hence is suitable for being implemented at different sites. Various screen shots of STIER captures various functionalities of this tool. Becht's consequence assessment process is programmed in STIER tool covering Fire and Explosion scenarios. Becht offers this tool to be customized and licensed per client's requirement.

1.7. Risk Based Work Selection

Becht's Risk Based Work Selection process (RBWS) is described in this module. The work process covers a priority and a risk assessment screening followed by a cross functional team workshop for finalizing T/A and routine maintenance work scope. The implementation of this process for both T/A and Routine Maintenance work is explained in the module. The RBWS work process steps are embedded into STRAITS tool. STRAITS is a proprietary tool developed by Becht's technology group.

1.8. STRAITS Tool

STRAITS stands for Strategic Tool for Risk Assessment for Improved Turn-Around Scope. The RBWS work process steps are embedded into this tool and are explained in this module. STRAITS module covers architecture, data structure and RBWS work steps in STRAITS with background calculations, risk matrix and graphic user interfaces. STRAITS can be embedded with any risk matrix and hence is suitable for being implemented at different sites for both Routine and T/A Maintenance. Various screen shots of STRAITS captures various functionalities of this tool. Becht offers this tool to be customized and licensed per client's requirement.

1.9. Root Cause Failure Analysis (RCFA)

RCFA stands for Root Cause Failure Analysis and is a work process designed to identify the root cause of failures and develop solutions to eliminate future failures. RCFA module starts with an introduction and team composition for a RCFA with defined roles and responsibilities, and explains the RCFA work process steps and Tool elements in subsequent sections. One of the key end results of this process is a visual of entire failure investigation in the form of a diagram called "Cause Map". Guidance on report generation is also provided. Becht offers this technology for RCFA studies in industry.

1.10. Inspection Based Probability Assessment (A_{rt})

This work process is also known as Becht's A_{rt} method and is designed to assist sites in using inspection data to compute probability of failure (POF) for thinning mechanisms. An essential concept in Risk Based Inspection Planning and a part of Becht's ERP process. This process can also be standalone-implemented where sites may already have RBI program, but not equipped with this industry best practice. Turn-around worklist screenings, BIDES assessments and regular maintenance planning are other areas of application. This work process is documented in **Appendix F** of technology manual.

1.11. Non-Intrusive Inspection Techniques (NII)

Non-Intrusive Inspection (NII) offers a range of benefits compared to traditional internal visual internal inspection (IVI) of Pressure Vessels. NII, when properly developed and implemented, provides the capability for effective on-stream condition monitoring and reduces the risks of vessel entry. Where local regulations permit, NII offers invaluable opportunities for deferment of internal vessel inspection. The **Appendix G** in technology manual provides a comprehensive narrative on NII Development, Implementation and Execution, for Process Pressure Vessels. This technology is jointly offered by Becht and Sonomatics.

1.12. Consequence Assessment Process (CAP)

The consequence assessment forms the basis of other Risk Based Initiatives such as Equipment Reliability Planning (ERP), Risk Based Work Selection (RBWS), and criticality evaluation. These are typically documented in terms of Health, Safety and Environment (HSE) and Business. The information needed, factors considered and evaluation process is compiled in Appendix I of technology manual. The process can also be utilized for consequence-based maintenance prioritization, widely known as Integrity Criticality Ranking in industry. The **Appendix I** has Becht's CAP process.

