STEM Software White Paper

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Dec 2021

Risk and safety management is critical to product design engineering and even more important in operation.

Today's organisations are faced with a range of challenges in the development of reliable and safe products. The need for products to comply with the complex safety regulatory maze is critically important for the success of the products development.

TCL reviewed the software products available within the industry and found a need for an integrated platform that combined a variety of tools for engineers and designers to develop Reliability availability maintainability (RAM) and safety calculations efficiently and collaborate more closely with the project team to support the design.

What is STEM Software

Safety Transport Engineering Management Software (STEMS) is a new Integrated Software Tool which models safety and RAM characteristics of Transport engineered systems developed by Topfield Consultancy[1], experts in the field of Transport accident hazard assessment and risk management.

STEM Software has been developed to support engineers and specialists, such as safety and RAM engineers, process engineers, manufacturing engineers, mechanical and electronics engineers and technologists on safety and reliability problems within the process, manufacturing, mechanical and electronics sectors to resolve issues arising from the product development.

[1] Topfield Consultancy is a company registered in the UK.

Features of STEM

TCLs software team studied the problems engineers faced when preparing calculations on projects. The team reviewed ways to optimize the safety and reliability processes that engineers regularly encounter in performing routine tasks in the application to engineering problems. The STEM software considered many of the problems and developed tools that could be integrated to provide solutions.

Features: • Simplifying complex calculations • Integrated software modules • Enhanced evidence-based reporting	• Aligned with engineering standards • Adaptive learning tool for organisations[2]

Data Management

Safety and reliability calculations involve a variety of data. Managing the data while maintaining the consistency of the data throughout the software apps is a difficult task manually. STEMS allows a centralised data management tool through the calculation module. This App allows users to input the data once and use it multiple times across the other software Apps.

Calculation Complexity

Safety calculations are often complicated by the complexity of tools required to solve safety engineering problems. STEM Software provides a simple Interface to guide users to perform calculations efficiently.

The calculation tabs within the modules interface enables engineers and specialists to focus on specific technical areas of the calculation model in a systematic manner. This provides the user with a clearer and more efficient approach that can speed up your calculation process and focus on the design issues.

[2] The adaptive learning tool will be available in version 2.0 of the STEM software.

Integrated Tools

STEMS Integrated platform supports 8 calculation modules for engineers and technology specialists to perform a variety of safety and reliability calculations effectively.

All eight Apps are interconnected in the STEMS software. Any calculated data (Output) from the single apps can be accessible across all other Apps.

This allows to users to focus on the data inputs and requirements necessary to perform more complex engineering calculations which can reduce the time taken to process.

STEM software database runs on a cloud computing platform to ensure a high availability for users to access their calculations at any time and in any part of the world. This improves project efficiency as calculations are developed and checked quickly and any changes are updated instantly to reflect current design.

STEMs 8 Apps: • Calculator Management Module (CMM) • Fault Tree Module (FTA) • Failure Mode Effects Analysis (FMEA) • Failure Mode Effects Criticality Analysis (FMECA) • Event tree module (ETA)	• Common Cause Failure (CCF) module • Safety Integrity Level (SIL) module, • Reliability Block Diagram (RBD) module

Enhanced evidence-based reporting

The use of the STEMS reporting tool enables users to document to the design activities and apply assumptions during the development and review process, which ensures traceability of information at each stage of the project. The reporting tool provides transparency when engineers record or revise their calculations.

Supports Industry Standards

The STEMS toolbox uses templates that are aligned with the latest engineering standards and Industry practices to ensure product compliance.

Adaptive learning tool for organisations.

STEMS provides a learning plug-in for organisations to support their future engineering workforce with a bespoke online safety training package that is aimed to complement their on-the job training.

The benefits of using the STEM Software.

Benefits: • Variety of safety and reliability calculations • Simplify complex calculations • Integrated software modules • Enhanced evidence-based reporting	• Supports compliance with safety regulations • Aligned with engineering standards • Adaptive learning tool for organisations.

STEM's 8 software apps are designed to suit the needs of the engineering project to save you time. The following software apps can be integrated within you existing engineering project to help you model safety and reliability calculations efficiently:

- Calculator module
- Event tree module
- Fault tree module
- Failure mode effects analysis (FMEA) module
- Failure mode effects criticality analysis (FMECA) module
- Common cause calculator module
- Safety Integrity Level (SIL) module
- Reliability block diagram (RBD) module

Each calculator can be used separately or in various combinations.

These calculators are designed in accordance with current MIL and IEC standards. We plan to include more standards in our future releases.

STEMS data management and version control features will ensure that your project changes are fully up-to-date and supported.

Technical users can define their systems or subsystems and have access to Topfield's component failure rate database or use their own project data.

Case Study

This case study has applied the STEM's FMEA and FTA tools used to improve product reliability.

The Need	A manufacturing supplier in the transportation industry required a safety review on the product design options and design modification to improve product reliability. FMEA for a manufacturing company
The STEM Solution	The manufacturing company reviewed the project design requirements for the design options; prepared to improve the product reliability; conducted several calculations and design options were considered to enhance the functionality and improve reliability.
The Result	• STEM FMEA tool was used to assess the key failure modes associated with the based design case options and of potential design options. • STEM fault tree app assessed the multiple faults of the product system that could potentially result in service disruption. The range of potential design options were developed to evaluate the overall system reliability. • Initial results indicated a significant improvement in product Mean time between failures (MTBF) • STEM tool provided early transparency in the failure data, product reliability and compliance results. • Recommendations for improvement were prepared that focused on the root cause of the compliance problem. This enabled the organization to focus their attention and resources to resolve quickly.

Who we are?

Topfield Consultancy (TCL) is a safety and risk engineering consultancy firm that specialises in technical safety and reliability engineering services to the Rail, Process and Oil & Gas Industries.

Established in 2013, TCL has grown both internally and through partnerships with like-minded organisations to provide a team of highly experienced independent safety engineers and specialists.

TCL believes in the value of supporting our clients through trust, innovation and creativity that translates into competitive advantages and cost-effective solutions in client's operations and products.

Our mission is to integrate technical safety and reliability as a value-added component into engineering projects, asset design and business operations to achieve a bottom-line robust and sustainable solution that enhances the organisations competitiveness.

Values: ensure the satisfaction of our clients through trust, innovation and creativity that translates into competitive advantages and cost-effective operations.

Goals: become the preferred reference on engineering consultancy and technical training within the industry.

The STEM software is Topfield's Initiative for engineers and managers to use and apply to solve today's engineering problems.

To test drive STEM today visit our website: Topfield Consultancy Limited.

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