

Enabling the Digital Thread in small engineering projects

CHALLENGE

The rapid uptake of digital engineering technology and capability has led to a heterogeneous digital engineering landscape with no one organisation featuring the same IT infrastructure and architecture as another.

The result is digital engineering silos and constrained workflows that do not exploit the full capabilities digital engineering has to offer in terms of design and manufacturing optimisation, traceability of information, decision making, engineering process improvement and business intelligence.

How can we make use of the full potential of digital transformation and exploit this to our advantage in support of the next generation of products, to meet the pressing challenges of net zero and sustainability?



RESULTS AND THE DIGITAL OPPORTUNITY

For organisations to embrace digital transformation, they must manage and control the Digital Thread. Many large engineering organisations have adopted Product Lifecycle Management (PLM) systems to realise this goal. However, enabling the Digital Thread remains a particular technology gap for small engineering projects and organisations (circa less than fewer 20 engineers).

In these settings, it is often not practical to implement a full-scale PLM system due to the prohibitive cost, variety of digital toolsets employed, and the additional overheads and experience required to manage it. In addition, Digital Thread

requirements of small engineering projects are often different to those required by long-term production-scale design projects, which must consider the entire product lifecycle.

CFMS have reviewed academic literature to determine a consistent definition of the term “Digital Thread”; “Data and/or information flow between systems and/or people that is systematic, consistent and auditable delivering the right information at the right time to the right people through the right mechanism.”

A summary of the Digital Threads that are commonly required to be managed for small engineering projects:

- Document Management thread:** manages the operational history of the files used in everyday project work and allows the user to find files quickly
 - Value:** Enhanced visibility and speed of accessing the correct documents
- Unique document numbering thread:** the methodology of numbering with a unique identifier allows a thread to control the relationship between documents
 - Value:** Ensures interoperability across multidisciplinary designs
- Approval workflow thread:** manages the workflow in an approval process required to make changes to documents
 - Value:** Streamlining of the process provides reliability and compliance
- Version control thread:** manages the release of a new version once all the changes have been completed and approved
 - Value:** Improvement in accuracy of operations and product quality
- Configuration management thread:** manages the relationship between assemblies, parts, components, materials and other parameters
 - Value:** Increases ease of use and reliability of design
- Change management thread:** manage changes or iterations necessary as the project progresses
 - Value:** Enhances product innovation and faster time to complete projects
- Ownership thread:** manages the ownership of files, from who owns the files from creation to the ability to read but not change files
 - Value:** Reduces compliance risks
- Software and hardware components thread:** combines the information between the hardware and software components in projects allowing the designer, user, reviewer, full visibility of both parts of the project in synchronisation
 - Value:** Enhances product innovation and faster time to complete the project
- Issue control thread:** manages issues arising such as monitoring of bugs in software, incorrect part definition and corrections required, revision of software to fix problems, and any new features of requirements added
 - Value:** Enhances product quality
- Compliance control thread:** management of data to meet regulations
 - Value:** Reduces compliance risks
- Collaboration thread:** allows full collaboration between multiple members of a project team with full visibility of changes and ownership threads
 - Value:** Increases communication and visibility to enable faster time to complete projects

Having determined the required threads that need to be managed for small engineering projects, a software system is required to manage the different formats that will need to be supported by the Digital Thread.

Detailed reports about the Digital Thread are available from cfms.org.uk/article/digital-thread-a-digital-thread-definition

Partners

