SPACE SYSTEMS SYMPOSIUM (D1)
Interactive Presentations (IP)

Author: Ms. Louise Lindblad
Valispace, Germany

Mr. Simon Vanden Bussche
Valispace, Germany
Mr. Marco Witzmann
Valispace, Germany

ENGINEERING DATA MANAGEMENT: THE MAJOR BLINDSPOT THAT PLM SYSTEMS DO NOT COVER

Abstract

The concept of Product Lifecycle Management (PLM) has a history of over 30 years and started with the automotive company American Motors Corporation (AMC) developing systems to be able to speed up production and compete against its larger competitors in 1985. The focus was on computer-aided design (CAD) and making engineers more productive by saving drawings and documents in a central database.

In the space industry highly complex products are designed and built, in which CAD data only represents a limited subset of all the engineering data. Analyses like power budgets, AOCS simulations, thermal cycles, thruster efficiencies, average data rates and many more are performed and stored in Excel, Word, Matlab and other specialized software. PLM systems offer simple storage and configuration control of these documents, but are agnostic to their contents or the relationships between their contents. The lack of data representation as well as data interconnection for any non-CAD data has been observed to result in major configuration control problems in big projects. Mistakes and incompatibilities only become apparent after many months, when sometimes the hardware might already have been built. This results in project delays and cost overruns.

In attempts to mitigate these problems some companies have set up concurrent engineering facilities and corresponding software to provide solutions for early project stages. Model based approaches have been evaluated by industry to for their practical use in complex projects for later stages. However, in practice non-CAD engineering data in large projects is stored and communicated via documents which are manually kept consistent by engineers. Excel-sheets commonly serve as “databases” and tracking tables to manage the engineering data.

This paper analyzes the strengths and limitations of commercially available PLM systems throughout the lifecycle of a spacecraft. Thereafter, it examines in detail the major gaps of non-CAD data management and how companies cope in the status quo with these limitations. An analysis is presented, examining workaround solutions, commonly observed problems as well as available lessons learned from conference presentations by major space companies. As a result, high-level requirements for engineering data management tools are derived, which could complement existing PLM software and close the gap of non-CAD data management. As a last step, available COTS software solutions are evaluated against these high-level requirements with the specific focus on the design and production of complex spacecraft.