

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Interactive Presentations - IAF SPACE SYSTEMS SYMPOSIUM (IP)Author: Mr. Manolo Omiciuolo
OHB System AG - Oberpfaffenhofen, GermanyCONCEPTUAL DESIGN OF SPACE MECHANISM BASED ON MODEL BASED ENGINEERING
AND MODEL BASED SYSTEMS ENGINEERING – A SET OF CONCISE METHODS TO INCREASE
ENGINEERING EFFICIENCY**Abstract**

A PhD Study has been carried out at OHB System AG to investigate the conjoint use of Model Based Systems Engineering (MBSE) and Model Based Engineering (MBE) methods, tools and languages in the frame of the conceptual study (proposal phase) of a mechatronics system (operating in the frame of a space satellite mission). The goals of this work are to find a way to improve the decision making process in an early conceptual phase of a complex mechatronics system and improve the efficacy of a proposal.

The interdisciplinary nature of a space mechanism and the increasing number of stakeholders and interfaces pose many challenges already from the conceptual design phase. The research reported in this paper focuses on the early conceptual design of a space mechanism carried out either in the role of the customer or in the role of the supplier, and the preparation of a proposal.

Three main capabilities are identified as key enablers to overcome the challenges. The first capability is to efficiently define, understand, and manage the requirements that will drive the design of the mechanism. The second capability is to efficiently model and simulate the mechanism eliciting all key features influencing its performances. The third capability is to efficiently model a mechanism in the frame of its lifecycle eliciting all the dependencies between the system and its stakeholders, and the dependencies among the components of the system itself.

A framework is eventually identified as a suitable solution to improve the capabilities needed from the industrial point of view. The framework relies on the Object Oriented Systems Engineering MBSE method, the general purpose Systems Modelling Language conjointly used with matrix design methods and domain specific simulation tools. The proposed framework has a horizontal view (i.e. general purpose modelling spanning different disciplines) and a vertical view (i.e. domain specific simulations penetrating the details of a discipline). The framework is validated within the specific boundaries posed by the industrial context with practical applications which might be recurrent in a preliminary design phase of a space mechanism.