



1st VMAP User Meeting 2024

PROJECT PIONEER - OPEN PLATFORM FOR OPTIMISING PRODUCTION SYSTEMS

Mónica Salgueiro

AIMEN, Spain

Project Pioneer Consortium: AIMEN, ESI, Engineering Ingegneria Informatica, Limitstate, EBBAMS, TTP, Fankom, Tekniker, ENSAM, Imperial College London, University of Patras, CORE Innovation Center, FhG SCAI, IRES, CLESGO, Marelli, MX3D

European manufacturing enterprises are facing several challenges in a turbulent globalized market dealing with unprecedented and abrupt changes in market demands, an ever-increasing number of product variants and smaller lot sizes, intensifying the worldwide competition and causing a continuous pressure on production costs. This results in large-scale fluctuations of demand, increasing product variants with specific configurations, random dispatching of orders, short delivery lead times of products and shortened product life cycles. Traditional approaches, which consist mostly of rigid, hierarchical manufacturing architectures, have been unable to deal successfully with these upcoming challenges, because the production management become ineffective in a small series manufacturing approach. Therefore, the shift to mass production tailored to customer demands requires new methods and concepts. In this sense, although the benefits of digital-powered manufacturing approaches are widely accepted, their implementation remains a challenge, especially for SMEs.

PIONEER aims the development and implementation of an interoperable Materials-Modelling-Manufacturing Ecosystem enabling multidirectional dataflow along the material value chain, by linking product design and distributed modelling data, with information collected from material characterization, manufacturing processes and product quality criteria. PIONEER combines design-by-simulation approach (by relying on multidisciplinary and multiscale modelling) with manufacturing and quality data, for optimizing product development strategies in high-mix/low-volume production schemes.

One of the key features of PIONEER is the development of a common simulation/modelling methodology framework to ensure data exchange along engineering workflows. To do that, interoperable data formats across distributed simulation/modelling suites are needed to enable engineering workflows.

VMAP as vendor neutral standard will be extended to support models and material information on multiple scales. VMAP allows a seamless data exchange of material and engineering data across different CAE software along virtual engineering workflows.

The solution will be validated in two different manufacturing scenarios by involving multidisciplinary optimization for ensuring certified path planning strategies for the manufacturing of topology optimised structural elements through Wire-Arc Additive Manufacturing (WAAM) in construction –i.e., low-volume production schemes–, as well as for ensuring an efficient design and manufacturing strategy for the manufacturing of Carbon Fibre Sheet Moulding Compound (CF-SMC) components in automotive –i.e., high-mix production schemes.