

## NAFEMS UK Regional Conference 2018 - Abstract Submission

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<b>Please identify the event for which your submitting?</b>	NAFEMS UK Conference 2018
<b>Will you be the presenting author?</b>	Yes
<b>Presentation Title</b>	Meeting the End-to-End Process Challenges of Additive Manufacturing with a Platform Approach
<b>Relevant Themes / Keywords</b>	Manufacturing Process Simulation (Additive Manufacturing), Advanced Information Technology, Democratisation, Structural Mechanics, Materials, Computational Fluid Dynamics, Multiphysics/Multiscale Analysis, Optimization, Verification & Validation

**Abstract (plain text)**

Additive Manufacturing (AM) promises a paradigm shift in engineering, with new ways to imagine and realise product design. The discipline is evolving rapidly, with new materials & manufacturing methods coming to market on an almost weekly, making it difficult for businesses to keep up with the latest technology, yet alone to validate their process of choice ready for production components.

Alongside this, there are many key stakeholders who all must be involved in a successful deployment of the process: materials experts are required to validate the fundamental behaviour as the process goes from base material (e.g. metal powder) to manufactured part; designers looking to take advantage of the freedom AM offers must learn new ways of generating functional component designs, leveraging simulation tools as never before to provide design proposals based on functional requirements; manufacturing engineers must be able to take these designs and produce a printable part. Not only must the build be successful – no cracks or defects, minimal porosity, etc, but the gap between the ‘as-designed’ and ‘as-manufactured’ part must be minimised.

To meet these challenges, and in a timeframe suitable for production deployment, it is not sufficient to simply bring together numerous point solutions to address each of these areas in isolation. Data transfer is cumbersome and error-prone and does not lend itself to the iterative approach that is often required to optimise the product design across the full end-to-end process. It is clear that a platform approach is beneficial, providing a single source of truth and all required functionality within a single environment. Furthermore, the variety of skillsets involved, whereby many users will not be experts in all domains, requires many of the tools to be delivered through an intuitive user interface.

This paper presents such an approach, taking an example component from a motorsports application through the full end-to-end process for design, manufacture and validation for a selective laser melting (SLM) process. Starting with design for additive manufacture (DFAM), based on aero-loading from CFD, through virtual build preparation and print simulation to product, and subsequently compensating for part distortion. Finally the redesigned part is assessed under in-service conditions to validate the new design.

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