

SIMULATION IN PRODUCT DESIGN: CURRENT AND FUTURE CHALLENGES

Dr Alan Prior & Dr Chris Smith

Dassault Systemes

Abstract

Bringing a new product to market successfully requires an holistic approach, which considers the design, the user experience, the manufacturability and assembly, the material and process costs, reliability and robustness, maintenance, repair, disposal and recycling. Within that process, the role of simulation has to be similarly broad: these days, it is no longer about simply predicting a stress in a component.

Developments in simulation tools over the last 15 years, together with notable successes for simulation projects in a number of industries, have led to high expectations for the impact of simulation on product development. During this time the use of simulation has expanded dramatically, both in the physics modeled and the number of practitioners. Individual analysts have expanded into analysis departments increasing the importance of robust processes, data management, integration and reporting. Many more people in senior positions now believe that simulation can deliver something positive for their business. To meet those expectations requires significant further improvement in capability and capacity.

The industrial context is extremely complex: the holistic approach requires people from many different domains to be connected and integrated into the process, both within the company and outside in the supply chain and partner network. The simulation tools need to be capable of addressing multiple physical domains, plus logical/control simulation, sometimes in a fully coupled manner, sometimes integrating with other tools. The complexity and fidelity of the simulation models may demand significant compute power, and there is a limited number of expert users, which means that automation and 'templated' analysis methods are essential and that analysis models may be run many times.

These issues combine to create enormous challenges of data management, process control and collaboration. In this paper we address these challenges, considering current and future approaches,

and identifying key technologies required in order to maximise the contribution of simulation to the product development process.