Vehicle Simulation Management

Industry Examples

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Abstract

As part of the manufacturing and engineering industry, NASA shares a growing need for knowledge management of vehicle performance simulation information. Until now, the processes used to simulate vehicle or product function and the data and knowledge created through these processes have not been managed effectively. As a result, vital functional, behavioral, and performance information created through simulation has been virtually inaccessible, adding cost and time delay to the final product.

Yet in recent years, progressive manufacturing companies have begun to manage their simulation processes and data resulting in a knowledge creation and management system for their virtual product development and simulation needs. An effective knowledge creation and management system needs consistent management of functional data from test and simulation infrastructure that can provide:

- Repeatable, automated, and standardized processes for simulation
- Ready, structured access to all simulation data, enterprise wide
- Seamless integration between “islands” of existing systems and disciplines
- Systematic means of comparing numerical simulations and physical simulations (test) results.

MSC.Software Corporation has developed an enterprise system that addresses all of these challenges called Simulation Data Management (MSC.SDM). The MSC.SDM solution focuses on managing and automating the whole simulation (and test) process, from model creation to result extraction. All the data created in the process and its associated metadata attributes are automatically stored within MSC.SDM. This mitigates the need of analysts to explicitly check-in and annotate data. MSC.SDM also integrates with other databases throughout the enterprise to allow it to create a complete knowledge base of functional information as well as to seamlessly exchange information with other systems. MSC.SDM employs powerful querying tools that allow data to be searched down to the simulation parameter or individual functional response level. Thus, it is possible to search not only for a piece of information, but also for a specific behavior that exists within an object within the knowledge base.

The MSC.SDM solution is predominately used to accelerate engineering processes through:

- Increasing the efficiency of the analyst (offloading him from the laborious logistics of routine tasks)
- Increasing the effectiveness of the simulation process (through a faster and more consistent communication of the results to the process partners)

MSC.SDM is in operation at major automotive manufacturers and suppliers in Germany and the United States creating, for each, a huge knowledge pool of functional results obtained by all their simulations. The system has allowed analysts to conduct more simulations and has enabled faster turn-around time for assessments. It also has provided a streamlined collaborative platform to

easily exchange data, results, and insights from simulation assessments within the enterprise and supply chain. The companies that have deployed MSC.SDM have seen their product development time decrease. They have also reaped millions of dollars per year in savings and enhanced productivity and have increased the quality and reliability of their products.

In addition to these benefits, the accumulated knowledge base created by MSC.SDM systems has equivalent value to the operational part of the product life cycle. It allows for rapid queries of product anomalies observed in previous simulations and tests performed. Additionally it enables templated and automated product re-simulation to provide dramatically faster and more effective anomaly resolution and product performance verification. This knowledge mining greatly accelerates response to critical issues encountered by the product in operation.