



Multi-Disciplinary Optimisation of a Vehicle Architecture

This project aimed to optimise the design of a vehicle architecture through simulation by removing mass from the vehicle frame without affecting crash safety. VPAC provided a software automation solution based on its Virtuneer technology that greatly reduced the time and cost involved in such a large-scale simulation and design exercise.

<<< MDO of a Vehicle Architecture

Multi-Disciplinary Optimisation (MDO) is a common technique in automotive engineering. In the concept stage of vehicle development, conflicting performance requirements in the disciplines of crash, noise and vibration, durability, and mass reduction require the generation and evaluation of many alternative designs. The vehicle concept is represented in a parameterised CAD model, which must then be rendered into a high-quality Finite Element (FE) mesh, combined with appropriate inputs in an analysis deck, and submitted to a High Performance Computing (HPC) resource for analysis. Post-analysis, performance metrics must be evaluated and aggregated into a predictive model of vehicle performance.

In addition, with existing automation tools, hours of manual effort may be required to generate a single data point from the parametric CAD model. VPAC was engaged to develop superior automation tools and processes to reduce the manual input required of engineers and improve the quality of results from MDO studies.

The VPAC solution, built on the Virtuneer platform, provided a library of standard components for each processing step and a workflow design environment in which engineers could design an MDO process with simple mouse gestures. MDO workflows were shared between engineers and fragments were reused through incorporation into more complex workflows. The Virtuneer server was used to automatically execute workflows over periods of days or weeks, across Windows and Linux resources, in multiple geographic locations.

The client reduced manual set-up time for a large-scale MDO study from an estimated 6 weeks to 1.5 weeks and greatly reduced the number of failed HPC simulations. The client therefore realised large time and cost savings for both staff and HPC resources and successfully accelerated its innovation process.

For further information please contact Mr David Colls, Projects Manager (VPAC), at davidc@vpac.org or phone +61 3 9647 5436