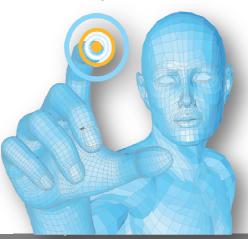# Aerodynamic shape optimization of racing cars using Computational Fluid Dynamics (CFD)

About the Client

A leading automotive race car manufacturer

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The Challenge

A leading automotive race car manufacturer wanted to achieve aerodynamic shape optimization, under given stringent constraints, for a new line of cars in the shortest possible time.

The Solution

A new process was developed for the aerodynamic shape optimization of cars using CFD. The process was based on using the mesh morphing techniques using DEP MeshWorks to create new designs for analysis by morphing the CFD mesh of the original design. The resulting improvements in the analysis turnaround time allowed a quick exploration of the design parameters for determining the optimum aerodynamic design. The approach was used to perform a parametric study to optimize a car shape for maximum downforce.

The client pioneered the application of the morphing techniques for the aerodynamic shape optimization by performing a parametric study for a generic sedan shape. An automatic analysis process was developed for the aerodynamic design of an automotive vehicle shape. The process coupled Meshworks with other software to automate the grid generations and the CFD analysis

The DEP Advantage

The MeshWorks based analysis process developed for the aerodynamic design of racing car shapes proved to be a significant time- saver, by which new designs for the CFD analysis were created by morphing the mesh of the baseline design. The CFD analysis process used in the study was shown to be grid independent and in excellent agreement with the windtunnel measurements for incremental lift and drag changes for effects of spoiler.