Adopting Lightweight Materials

"Simulating the machining process is essential to introducing new materials cost-effectively into legacy programs."

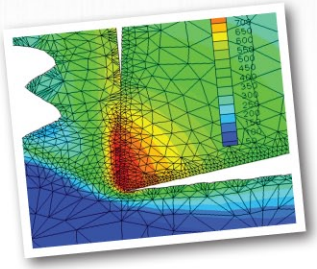
— MATHEW KUTTOLAMADOM, LAINE MEARS, THOMAS KURFESS, JOHN ZIEGERT, JAMES VON OEHSEN
Clemson University Research Team

The Background

Researchers at Clemson University needed machining modeling technology that would allow them to develop and validate cost-effective, high-strength materials technologies that could significantly reduce vehicle weight without compromising cost, performance, safety, or recyclability. Spearheading the pilot program for the Lightweight Automotive Materials Project sponsored by the U.S. Department of Energy, Clemson engineers focused on improving titanium manufacturability and functionality, lowering costs for the deployment of new lightweight materials, and introducing sustainability considerations into the design process. To ensure project completion within the allotted timeframe, machining simulations would be run on Clemson's massive high performance computing (HPC) Palmetto cluster using 100 licenses of AdvantEdge FEM.

The Approach

- TWS enhanced HPC Client software technology to support HPC cluster simulation management and execution
- Clemson University researchers used AdvantEdge FEM's HPC upgrade to more efficiently simulate cutting performance when machining titanium, and subsequently identify key contributors to tool wear and failure



The Outcome

- Tool performance analyzed for many substrates with AdvantEdge FEM
- Feed/speed design space corners tested
- Interfaces developed between various software packages

Next Steps

- Verify simulation results and post-processing
- Insert lightweight materials into production vehicles within 3 years

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