

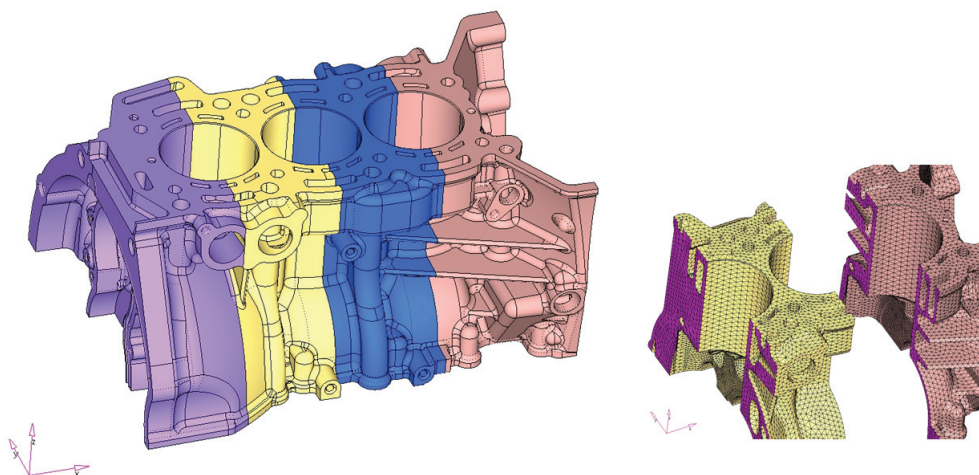
Injecting Innovation in Performance Engine Design with Altair HyperWorks

Overview

MAHLE Powertrain outsourced model generation of large complex parts such as heads and blocks to low cost countries to ensure sufficient mesh quality could be produced for their automotive engine designs. The third party's improved capabilities proved valuable but ultimately MAHLE Powertrain wished to bring the process back in-house to maintain control and reduce external expenditure. To achieve this a new pre and post-processing solution was needed. HyperWorks was selected as the new platform as it afforded the required increase in productivity through its automatic mesh creation and batch processes.

Business Profile

MAHLE Powertrain is an international leading consultancy in the automotive industry specialising in high performance engine design. MAHLE Powertrain is part of the MAHLE group, which is one of the world's 30 largest automobile suppliers. MAHLE is present in all major world markets and has 110 production locations and seven Research and Development centres and employs approximately 48,000 people worldwide.



Complex Engine Geometry

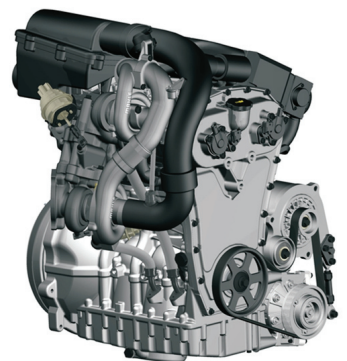
Challenge

MAHLE Powertrain operate in an extremely competitive market where new designs have to be produced and tested in very short time scales and at low cost. Their incumbent model meshing solution was not capable of generating the large, complex component models involved with their engine design processes, forcing them to outsource this activity to low cost countries. Having to involve a third party in the design process proved costly, both in terms of outsourcing expenditure and extended design cycles.

MAHLE

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MAHLE Downsizing Demonstrator Engine

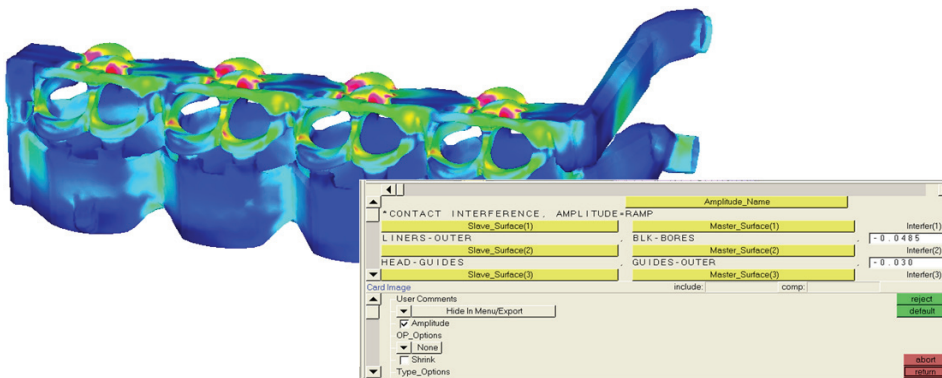
"The meshing functionality found in HyperMesh & Batchmesher automatically generated complex meshes with 95% accuracy. Only a small amount of manual edits were needed, which greatly improved our productivity."

Frederic Humbert
MAHLE Powertrain

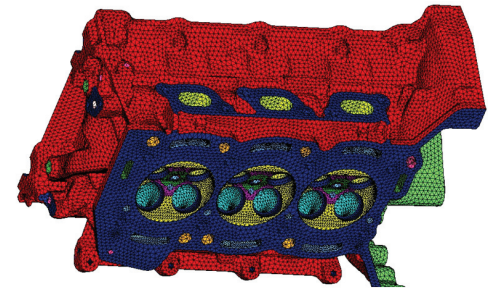
Solution

MAHLE Powertrain decided to bring all of their model generation in-house to reduce outsourcing costs. With limited resources available it was vital that the new solution could offer sufficient productivity benefits to cover the reduction in external manpower.

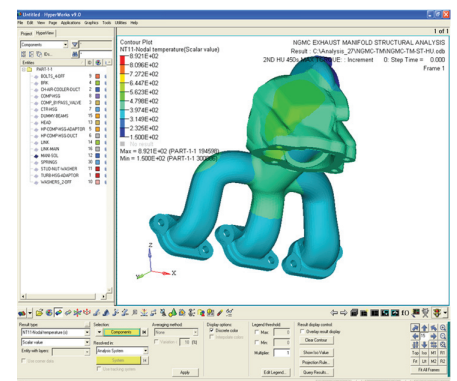
MAHLE adopted Altair HyperMesh and Batchmesher as their new pre-processor solutions after identifying the potential productivity benefits of the suite. The new tools would allow MAHLE to automate many of their meshing tasks, vastly reducing the amount of manual work required to prepare designs for analysis. The extensive ABAQUS keyword support found in HyperWorks contributed heavily to the significantly reduced amount of deck editing required.



Extensive Support for ABAQUS Keywords within HyperMesh



FEA Model Engine Structure



Results Visualization in HyperView

Results

Automating the meshing process through Batchmesher allowed MAHLE to automatically produce fully meshed models in a fraction of the time that was previously possible and with a 95% element accuracy. As a result of this improvement, MAHLE was able to bring all of its model generation back to its in-house engineering team and regain complete control of the development cycle. The switch from a paid up solution to the HyperWorks annual lease model ultimately proved to reduce total expenditure as MAHLE benefited from increased productivity, in-house development control and improved customer support.

Benefits

MAHLE identified the following benefits of HyperWorks adoption for pre and post-processing activities.

- No need for separate geometry clean-up software
- Increase in overall productivity
- Design process brought fully in-house
- Advanced automation macros
- Integration of third party solvers
- Effective technical support

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