



The Enterprise Solution for Product Innovation



Altair® BatchMesher™

Take A "Hands-Off" Approach to Building Quality Meshes

In the computer-aided engineering (CAE) process, building quality meshes for finite-element (FE) simulations is extremely time-consuming. Moreover, the resulting mesh must represent the underlying geometry up to a certain level of accuracy to meet the restrictions of mesh quality and geometric parameters.

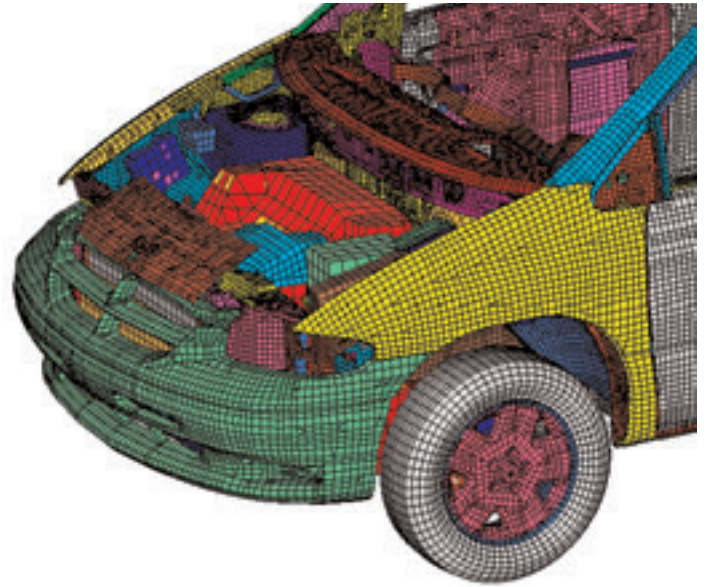
Altair's easy-to-use BatchMesher was developed to speed up the meshing process, without sacrificing quality. The BatchMesher cleans-up geometry and generates high quality meshes automatically, eliminating the need to perform these time-intensive tasks manually. The results are fewer errors, lower labor costs and a greater return on your compute resource investment.



With BatchMesher, the user simply defines the batch process according to the element mesh-quality criteria and geometric parameters. Then, BatchMesher combines fully automated geometry cleanup and iterative optimized meshing, which is performed until the original mesh criteria and geometric parameters are satisfied.

The BatchMesher process requires the following definitions:

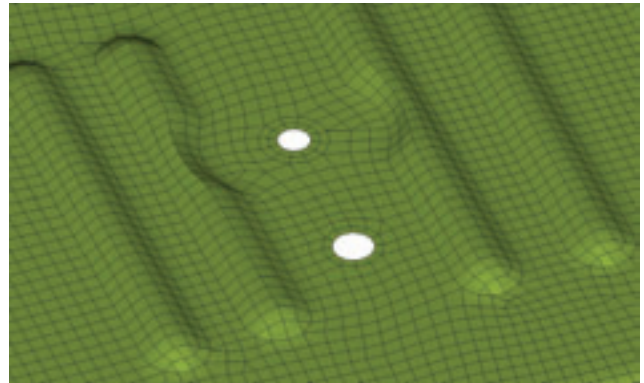
- **Element criteria** — Can be easily defined or manipulated in a stand-alone criteria and parameters editor or in the HyperMesh™ QI panel.
- **Parameter file** — Dictates geometric feature recognition, including flanges, bolt holes, beads and fillets. It also dictates meshing parameters for each one individually, and can be easily specified within a stand-alone criteria and parameters editor. Users can also manipulate other geometric controls, such as fixed-point removal, element type and feature angles, and thin solid extraction.
- **Batch mesh execution** — Supports the same types of geometry supported by HyperMesh. It is intuitively easy to select these files and link mesh types in the graphic user interface (GUI). The final result is a model or selection of models that are ready for assembly.



TAILOR BATCHMESHER TO MEET YOUR UNIQUE NEEDS



Before



After (Washer layer control, bead recognition)

Process automation tools expand BatchMesher's functionality and allow the user to interlace with BatchMesher operations to create custom solutions for your organization. For example:

- Pre-geometry load operations can filter the dataset of erroneous data.
- Post-BatchMesher operations can generate quality and result reports in HTML, XML, h3d or as screenshots.
- Post-run routines can combine all of the resulting meshes into one master file and weld them for mesh assembly.

These individual operations can be conducted at any time in the BatchMesher process — another reason to make this valuable tool the backbone of your entire modeling process.

MAKE BATCHMESHER PART OF AN AUTOMATED MODEL SETUP



The process of building a CAE model consists of three steps: pre-meshing, meshing and post-meshing.

- Pre-meshing prepares the geometry and consists of tasks like mid-surfacing, surface offsetting or geometry cleanup.
- Meshing generates elements that satisfy certain element criteria.
- Post-meshing assembles, welds, and assigns model and material properties.

Traditionally, these steps are performed in a semi-automatic fashion, which is time-consuming and a source for error. In developing BatchMesher, Altair Engineering provides an automated process chain for setting up CAE models, while linking BatchMesher with grid computing software – such as PBS Professional™ – for further reduction in overall model setup time.

REDUCE ERRORS WITH BATCHMESHER: A CASE STUDY

To validate the mesh quality of BatchMesher, we compared crash simulations for two hand-meshed and two batch-meshed models of a body-in-white. All of the models were meshed with an element size of 10mm. The longitudinal beams – which are a major load-carrying component in a front crash – were additionally discretized with 8mm in both hand-meshed batch-meshed models. Three different LS-Dyna versions were used to perform the simulations, and a variety of result values were compared.

Figure 4 shows the scattering of the internal energy of one part and the section force at one cross-section. The red areas identify the simulation results of hand-meshed models, computed with three different versions of LS-Dyna. The results of the hand-meshed models have a noticeably larger scatter when the element size changes from 10mm to 8mm. Whereas, the batch-meshed models – noted in blue – show less sensitivity to variations in element size, and their results actually lay between those from the hand-meshed models. The variation in LS-Dyna versions has a larger influence on hand-meshed models than on batch-meshed models.

Figure 5 shows the influence of the element size for a variety of simulation results. For example, the internal energy of 20 parts in the hand-meshed models varies on average by 30 percent if the element size changes from 8mm to 10mm. For the batch-meshed models, the internal energy only varies by 12 percent.

In this study, the batch-meshed models are less sensitive to changes in element size or different LS-Dyna versions than the hand-meshed models. Additionally, the results from the batch-meshed models lie between those from the hand-meshed models.

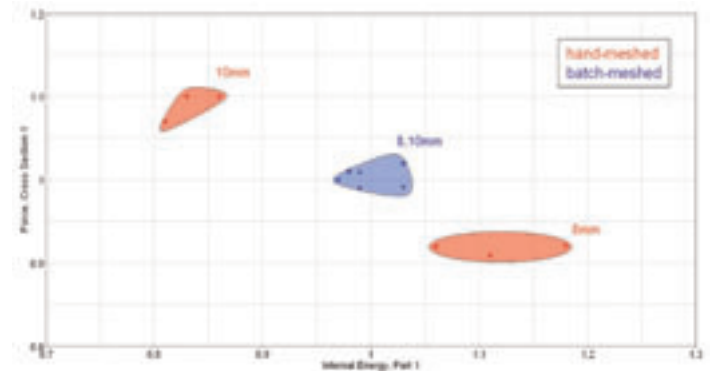


Fig. 4 Variations in the results for section forces and internal energy

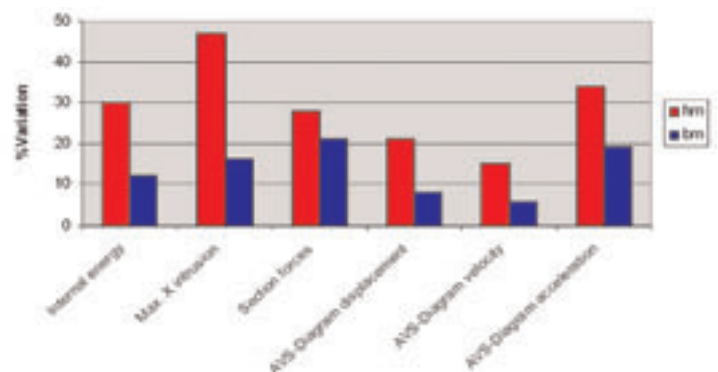


Fig. 5 Variations in the results while changing the element size from 8mm to 10mm

To learn more about the benefits of Altair's BatchMesher, and how this easy-to-use tool can save your business valuable time, without sacrificing reliability and accuracy please visit www.altairhyperworks.com.



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