

EFFICIENT MIDDLE MESHING - A BENCHMARK ON A HEADLIGHT HOUSING PART

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ABSTRACT –

Meshing of casting parts can be a time-consuming, hard task. ANSA offers functionality that helps the user in three different ways: save time, assure quality and exploit similarities between parts (updated CAD version of a part, left side - right side parts, symmetrical parts). BMW's Body and Exterior Trim department deals with a big amount of injection moulding parts that take up the lion share of the meshing as well as the overall model preparation effort. Using a headlight housing injection moulded part from this department, a benchmark has been carried out: the time needed for meshing with conventional methodologies was compared and with the "Align constraints" tool and workflow that ANSA has to propose. In addition, the quality of the outcome was assured with "Inspect" functionality and it was compared with the quality of the conventional methodology result. "Inherit mesh", the functionality that ANSA provides to exploit similarities of parts, was also taking into account in this benchmark. The results showed that, using the proposed ANSA functionality and workflow, the user can be benefited with great reduction of the meshing time. This meshing time reduction can be even bigger if the similarity of parts is exploited. The results also showed that ANSA functionality guides the user to achieve a high quality result, in terms of middle surface and thickness accuracy.

TECHNICAL PAPER -

1. CHALLENGES IN MIDDLE MESHING OF MOULDED PARTS

The Middle Meshing process has three critical challenges:

1. High cost
2. Multiple design updates of the same part
3. The final result depends heavily on the individual user

These challenges become more important for BMW's Closures department, because this department deals with a big amount of injection moulding parts that take up the lion share of the meshing effort

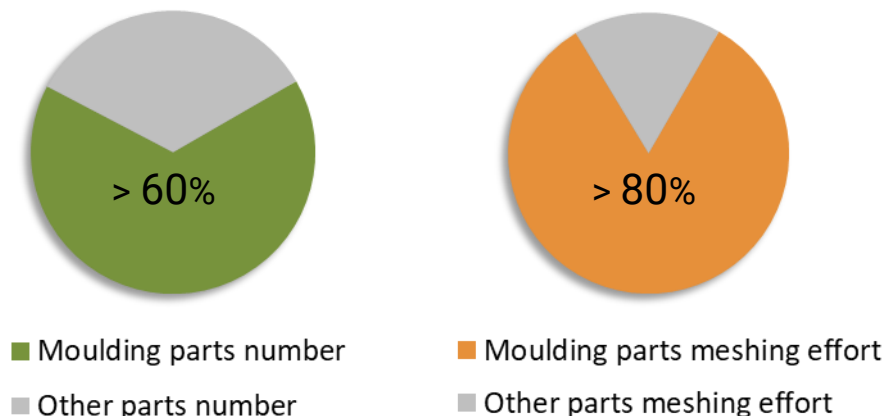


Figure 1 – Indicative parts number and meshing effort for BMW's Closures department injection moulded parts.

2. OVERCOME THE CHALLENGES

ANSA has to propose functionality that helps to overcome the challenges of Middle Meshing moulded parts. ANSA's tools promise:

1. Less time needed for Middle Meshing
2. A simple and robust workflow for inheriting mesh from previous design versions
3. Guidance to fix the Middle Mesh, so the final result does not depend on the user's subjective perception

These tools are:

- Middle Mesh generator / Align Constraints
- Inherit mesh
- Inspect Middle Mesh

The aforementioned tools were developed having in mind a list of requirements:

1. Ease of use
2. High level of automation
3. Easily identify design changes
4. Reuse efficiently as much as possible mesh from previous design version
5. The final result should be independent from the individual user, as much as possible

3. THE BECHMARK

In order to test and ensure the effectiveness of the tools ANSA has to offer, a benchmark was carried out. The housing of a headlight from BMW's closure department was used. The benchmark was about comparing the work effort and result quality of a reference mesh, provided by BMW, to:

- the Middle Mesh that was created with no reuse of previous mesh and was improved using Align Constraints and Inspect
- the Middle Mesh that was created by Inheriting mesh from previous design version and was improved using Align Constraints and Inspect

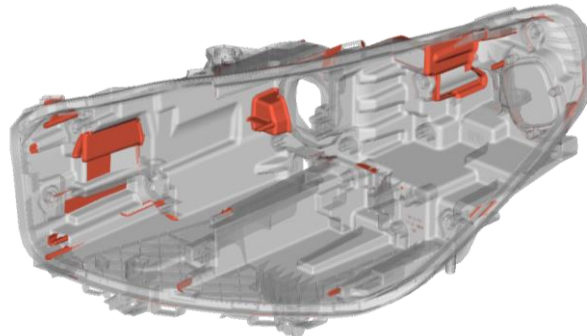


Figure 2 – Design changes between two different design versions of the BMW's closures department headlight housing that was used in the benchmark

4. BENCHMARK RESULTS

The results of the benchmark showed:

1. Great reduction of Middle Meshing time when ANSA tools are used
 2. Significantly improved quality of Middle Mesh
 3. Middle Mesh quality independent from the user
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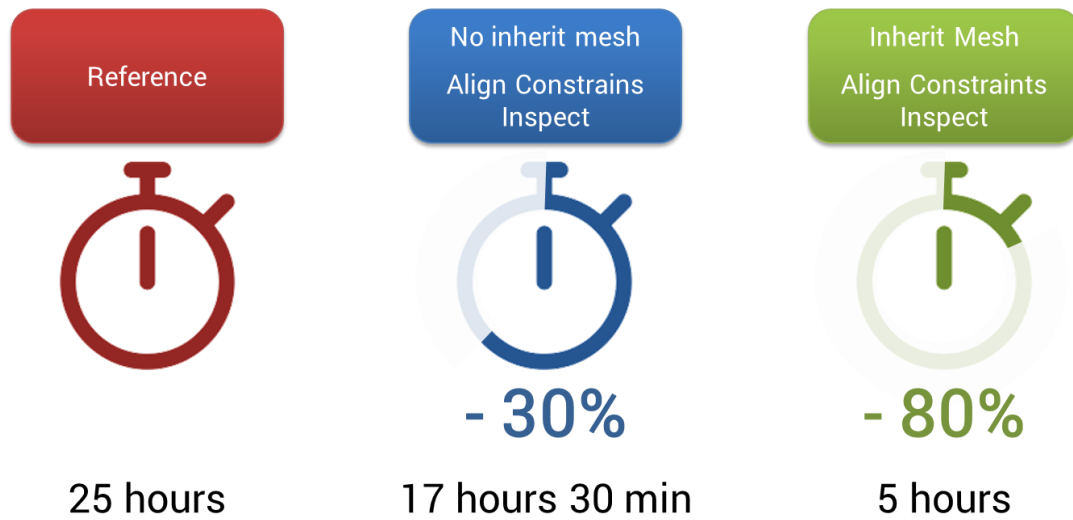


Figure 3 – Comparison of meshing effort

5. CONCLUSIONS

There are some clear benefits when the tools ANSA has to offer are used. In particular:

1. The cost for Middle Meshing is reduced, since the time needed for Middle Meshing is reduced.
2. The comparability of the simulation results between different design versions is greatly improved due to the efficient inheriting of the mesh. Same mesh means same results.
3. An opportunity to mesh and simulate more design version is given. This, cause of the reduced cost and time for meshing each design version.
4. The changes between two different design versions are easily and effectively recognized. No changes slip through the cracks
5. The quality of the final result does not depend on the user and his/hers familiarization level with the part that he/she is middle meshing.
6. The quality of Middle Mesh results can be evaluated and different results can be compared.