

4th European HTC – Altair

*Towards a 'right-at-first-time' Product/Process Solution  
using the Altair's FEA Software in the Interior Parts  
Design Phase*



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Versailles, October 29th, 2010

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present, day after day



# Introduction

“ Mecaplast Group & our products

## MECAPLAST Group

One of the European leaders in automotive equipment

Founded in 1955  
by Charles Manni in Monaco

Designs, develops & manufactures plastic parts and complete systems for vehicle Body and Engine

5800 employees in 14 countries

4 technical centres

11 technical offices



think global, act local

# Problem Definition

“ Shorter development with additional specifications +



**Average time of development:**

**8 months**

**from the B-surface delivery to the tool kick-off**

**Severe technical requirements:**

**up to the residual deflection, climatic cycle & creep tests**

**Weight reduction:**

**has to meet customer technical specifications**

**has to be moulded with good aspect & no over-cost**

“ 2006: towards a more efficient Finite Element Mesher, HyperMesh

+

## CAE team

involved in the very early beginning of the development

gives guidelines

using structural (static & dynamic) and process finite element analysis (FEA) to a 'right-at-first-time' design

## HyperMesh

important time savings thanks to its automatic mid-surface extraction & implemented mesh quality index



## “ Integration of HyperWorks suite

**HyperWorks software platform :**  
historical FEA software replaced by  
**RADIOSS implicit for static analyses**  
**RADIOSS explicit for dynamic analyses**

### Advantages :

- ☑ unique interface
- ☑ allows us to be quick to react
- ☑ full expertise in structure and injection moulding with the Moldflow user interface



## “ Example of a C-Pillar

+

The meshing of a C-Pillar has been divided by 3



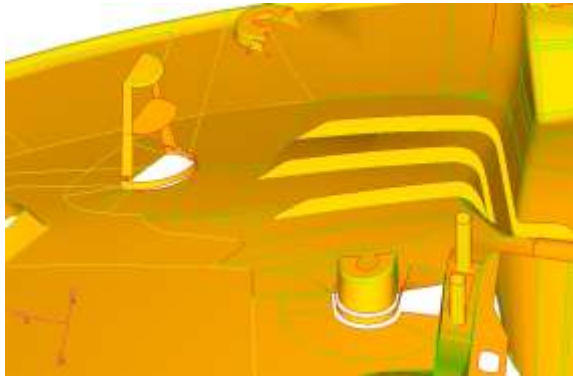
The different steps of meshing include:

- ☑ CAD-file import
- ☑ Geometry clean-up
- ☑ Automatic mid-surfaces extraction
- ☑ Automatic & manual meshing
- ☑ Clean-up of the elements in accordance with the customer's mesh criteria

# Discussion



## Clean-Up of the mid-surface

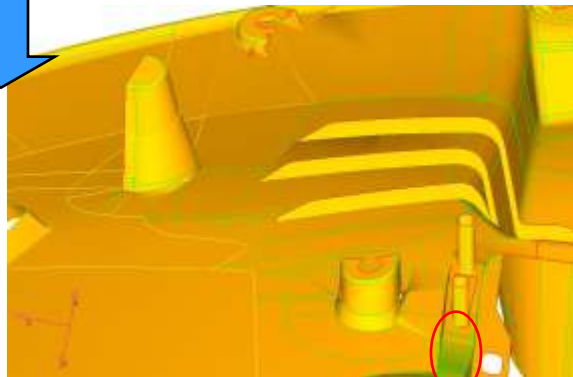


Once the mid-surface is extracted  
takes less than 1 hour with HyperMesh

hole filling

& facet optimization

to delete small surfaces

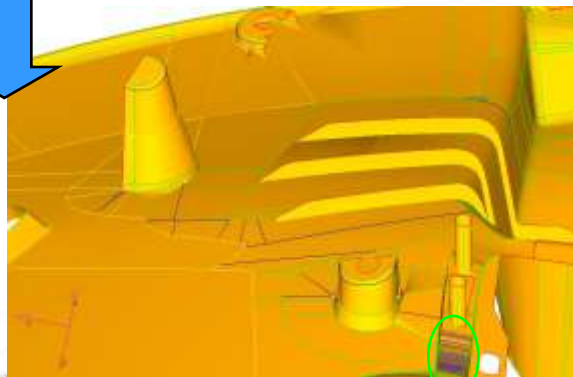


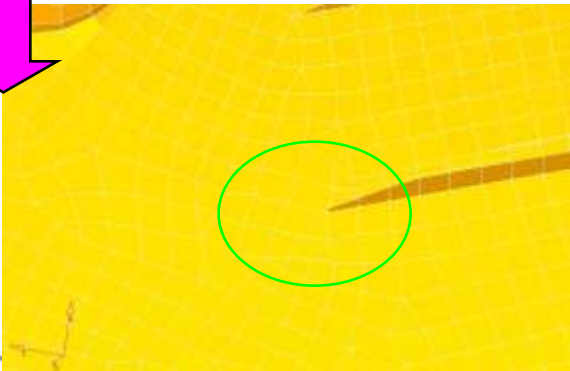
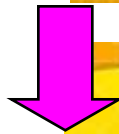
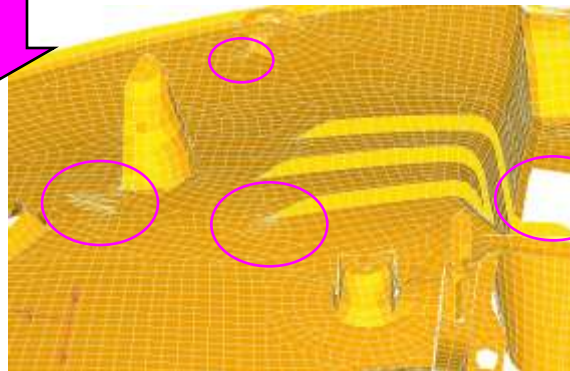
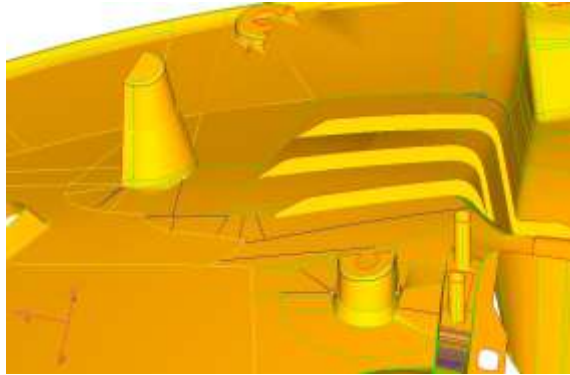
With the previous mesher:  
no extraction

inner or outer surfaces were selected to  
build up the skin of the part

the ribs were linked to this skin

could take hours or even a day for more  
complex geometries





Automatic meshing & manual  
Clean-Up of the elements

+

**After the automatic meshing:**

**local re-meshing**

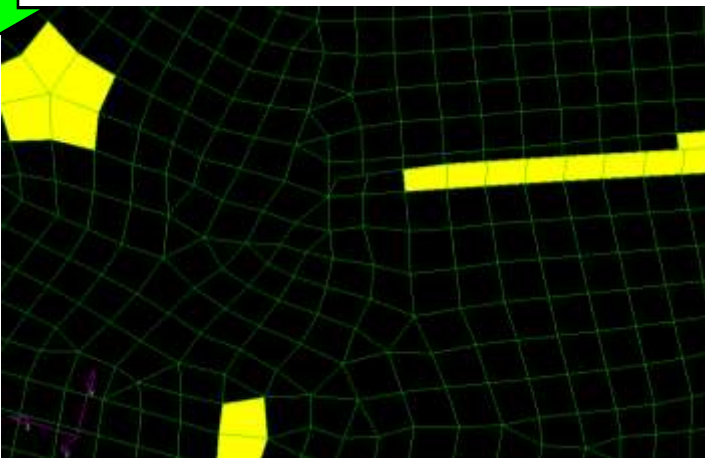
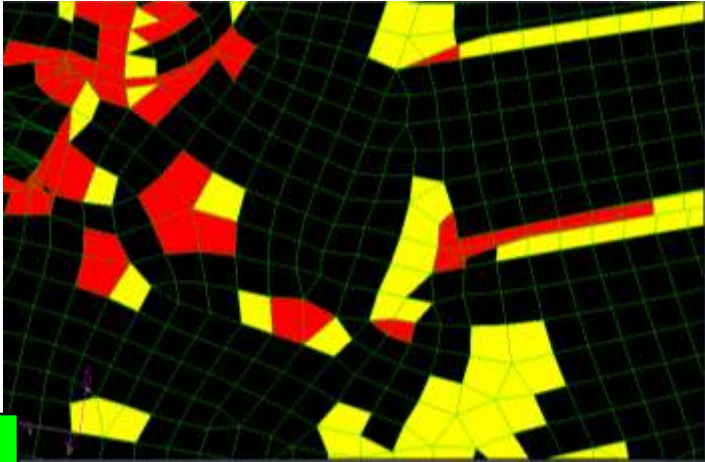
**manual meshing**

**This step can take 1 up to 4 hours**

**With the former mesher:**

**more than one day with a**

**degraded quality of the elements**



“ Mesh in accordance with the customer quality criteria

About 3 hours to modify the failed (**red**) and acceptable (**yellow**) elements according to the quality criteria given by the customer

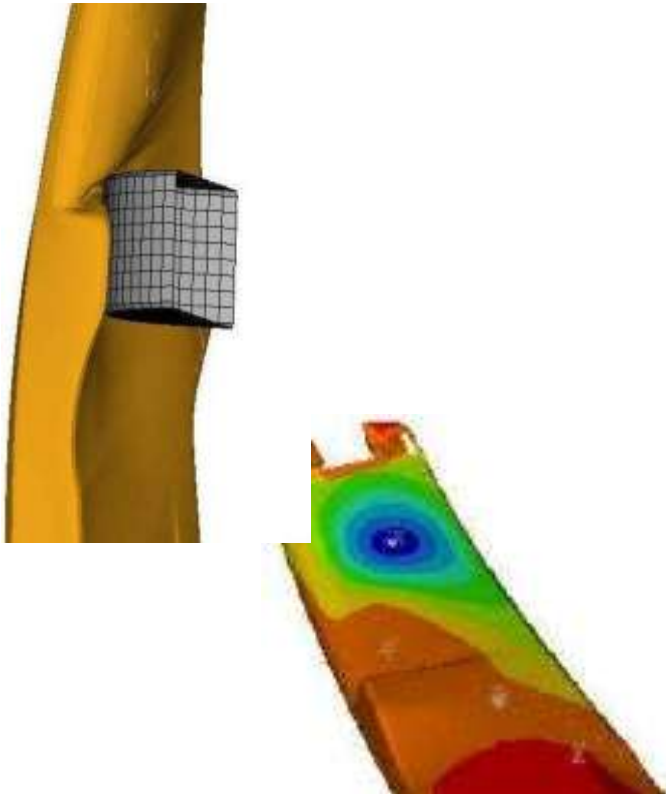
**1 day of work with HyperMesh vs 3 days with the former mesher**



# Discussion



A unique interface for all the customer's technical requirement



**Static linear & non-linear simulations with RADIOSS Implicit for:**

- Rigidity
- Stress analysis
- Plasticity & Fracture
- Thermal analysis
- Vibration

**Dynamic analysis with RADIOSS Explicit for Crash simulations**



# Conclusion

“ Mecaplast/Altair, the 'Level A' partnership



**HyperWorks suite :**

- ✓ the best response to Mecaplast Group
- ✓ allows FEA engineers to perform several loops of simulations given guidelines & final validation for a 'right-at-first-time' solution





| Thank you for your attention!

