



Altair Technology Conference

Israel 2019



Development of A new vehicle front sub-frame using Altair Inspire topology optimization

Edan Lazerson, 30/10/2019



Altair

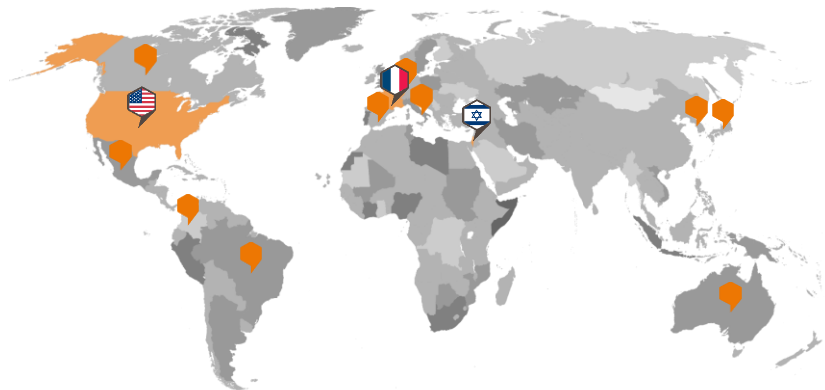
About Plasan



Israel 2019



About Plasan



- 800 Employees
- International company with R&D and manufacturing facilities in Israel, US, and France plus broader partner network
- World's leading designer and supplier of lightweight composite/ metal-composite vehicle bodies
- World's leading supplier of Class A carbon fiber automotive parts



Israel 2019



Outline

- One slide historical background.....
- Design from scratch
- Optimization results
- Manufacturability
- Final design
- Test Drive
- Summary

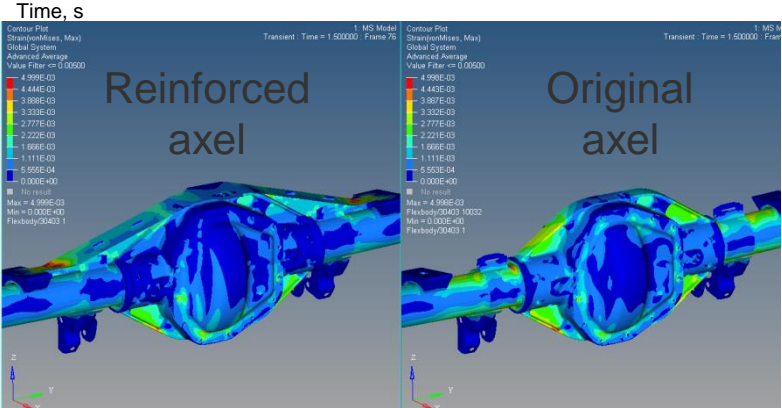
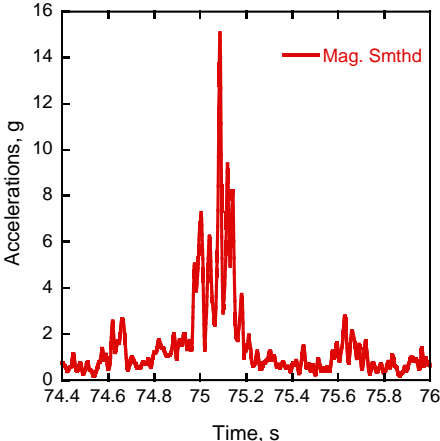
One slide historical background.....

**2018 Global
Altair Technology
Conference**

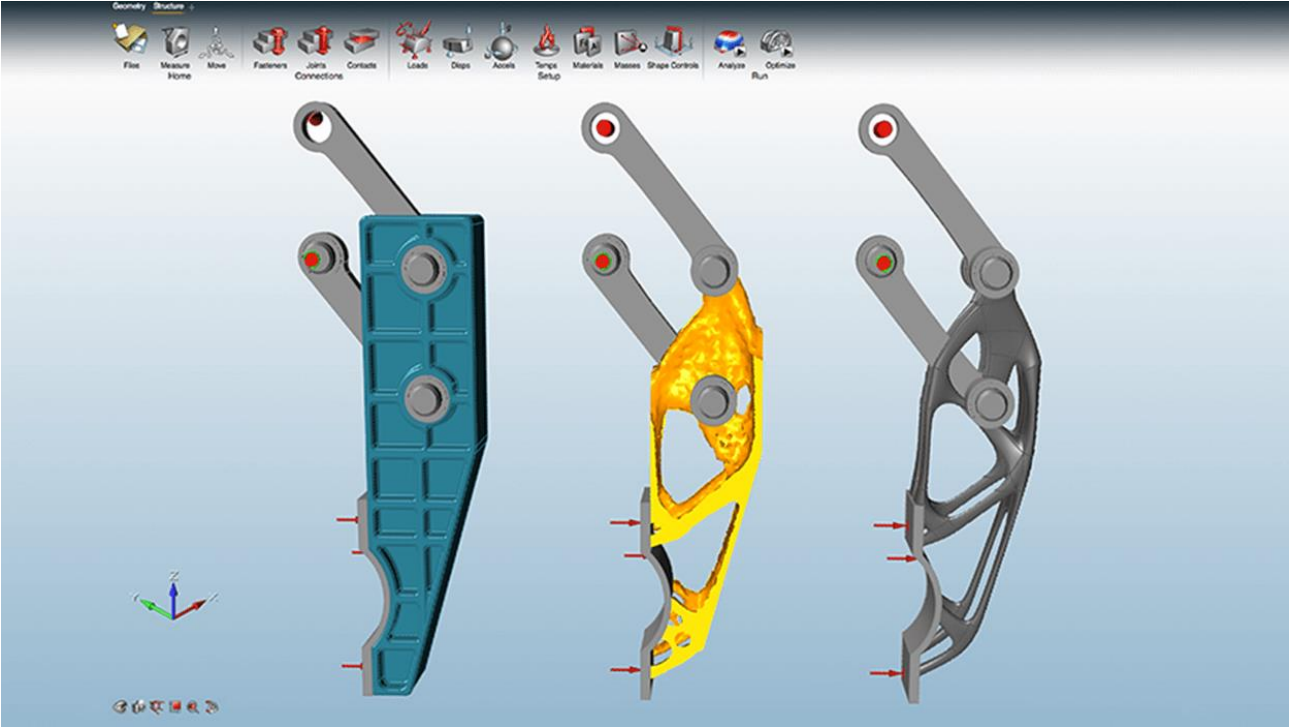
An Improvement of
the Strength of
Armored Vehicle,
Axle using Mixed
Multibody and FEA
Approach

V. Favorsky, Z. Asaf, I.
Kuchuk-Katalan

Irish Bridge Crossing Test, 45km/h

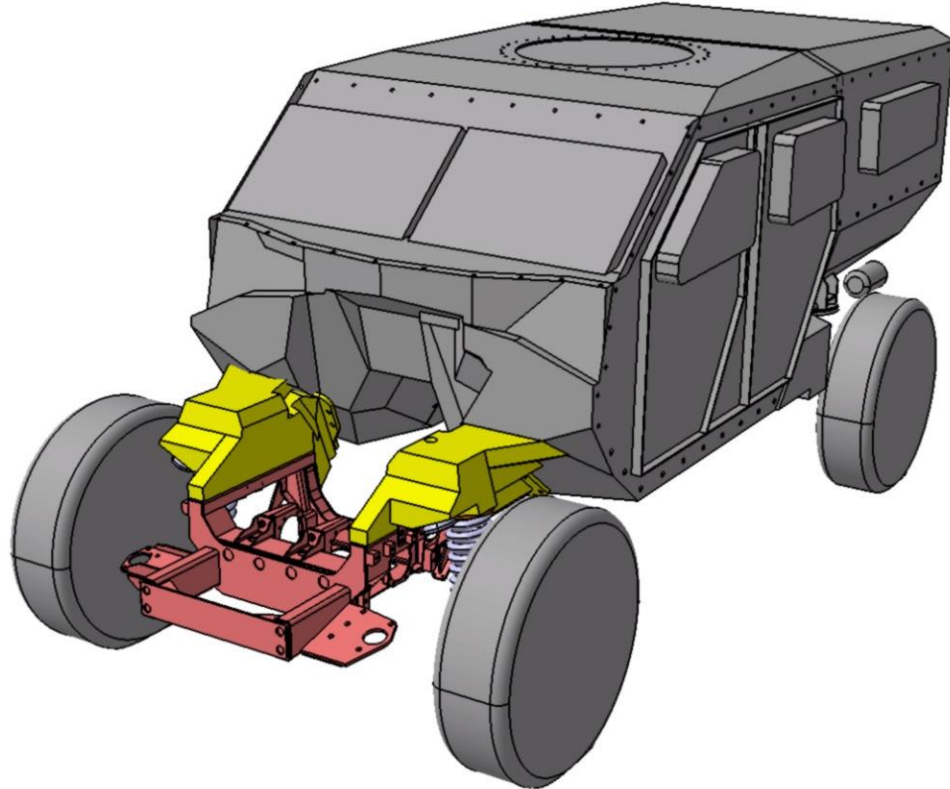


Design from scratch – Inspire Topology optimization tool

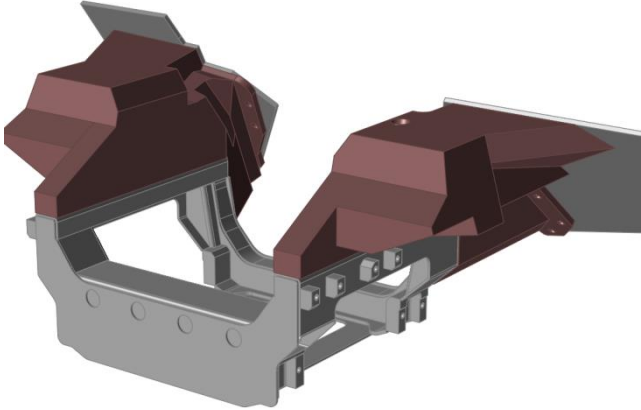


Design from scratch – The Solution Space

- Wheel base
- Front suspension
- Capsule
- Engine and drive train



Design from scratch – Design space, loads and constrains



Mass Constrain
Not more than 100kg for sub-frame

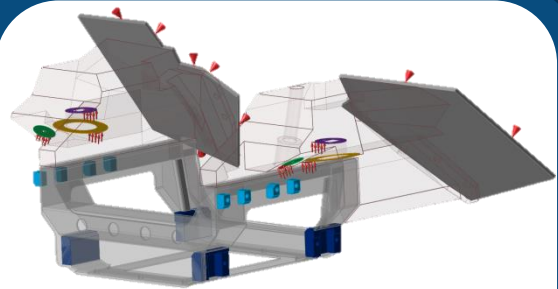
Spring

Bump Stop

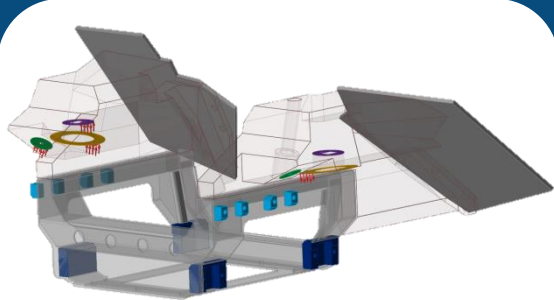
Damper

Top Triangle

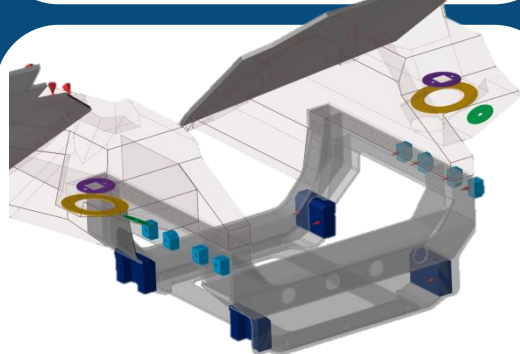
Bottom Triangle



Case 1 - 11g



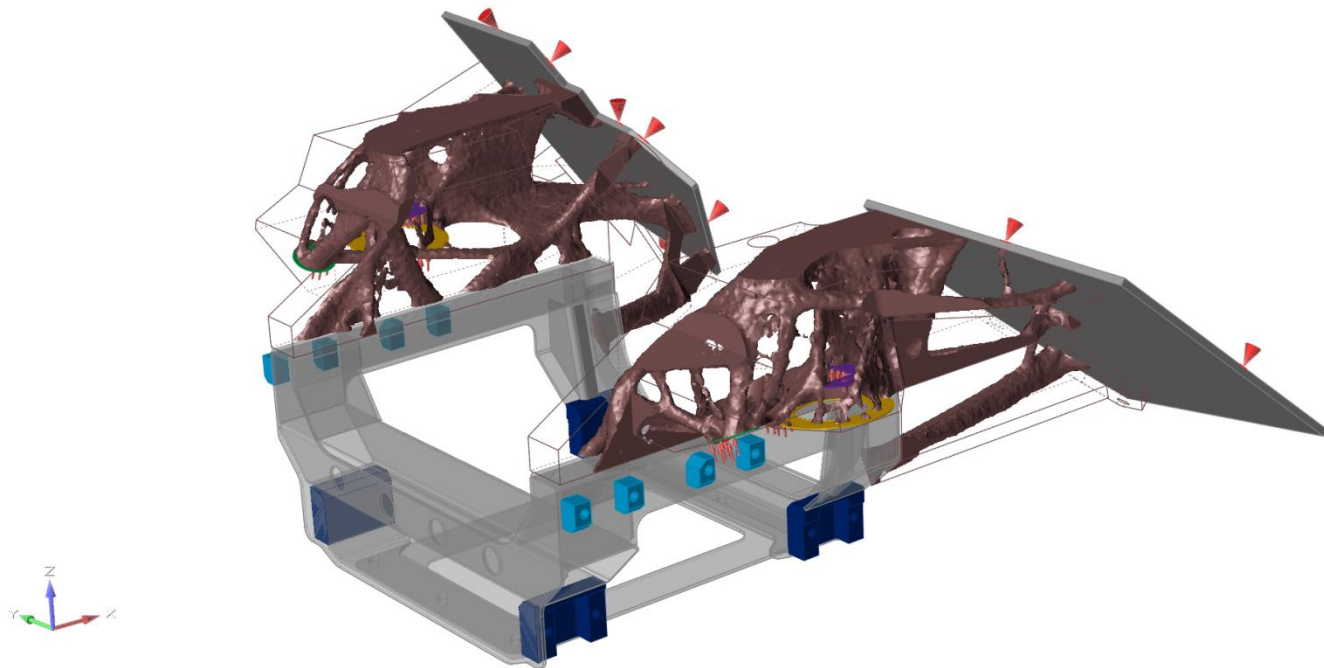
Case 2,3 - 4g Cross L/R



Case 4,5 - 2g Side Load

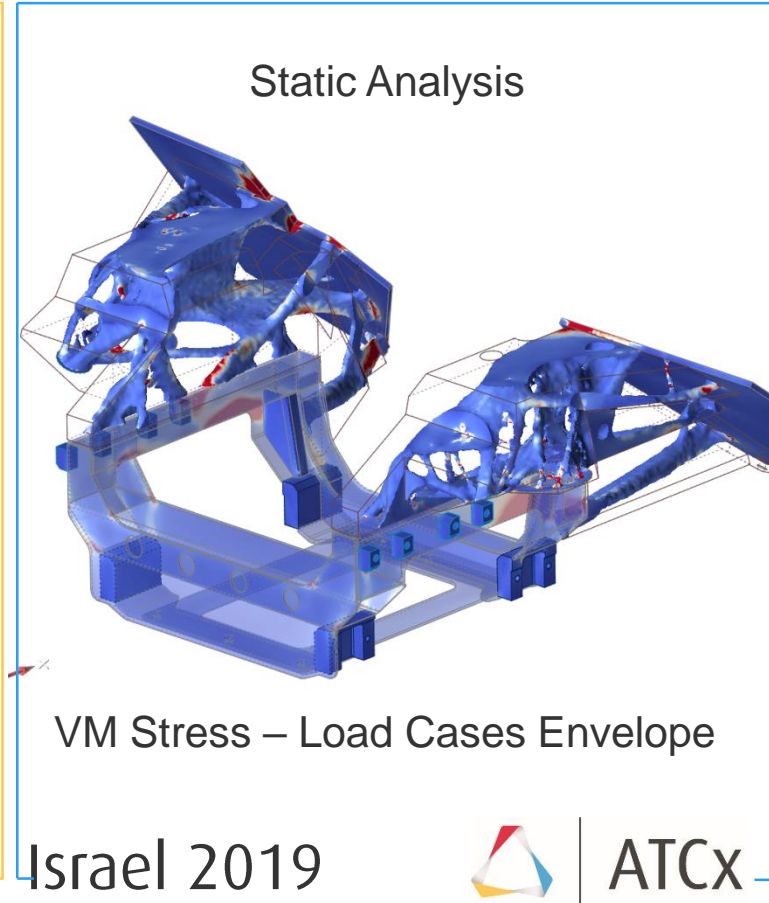
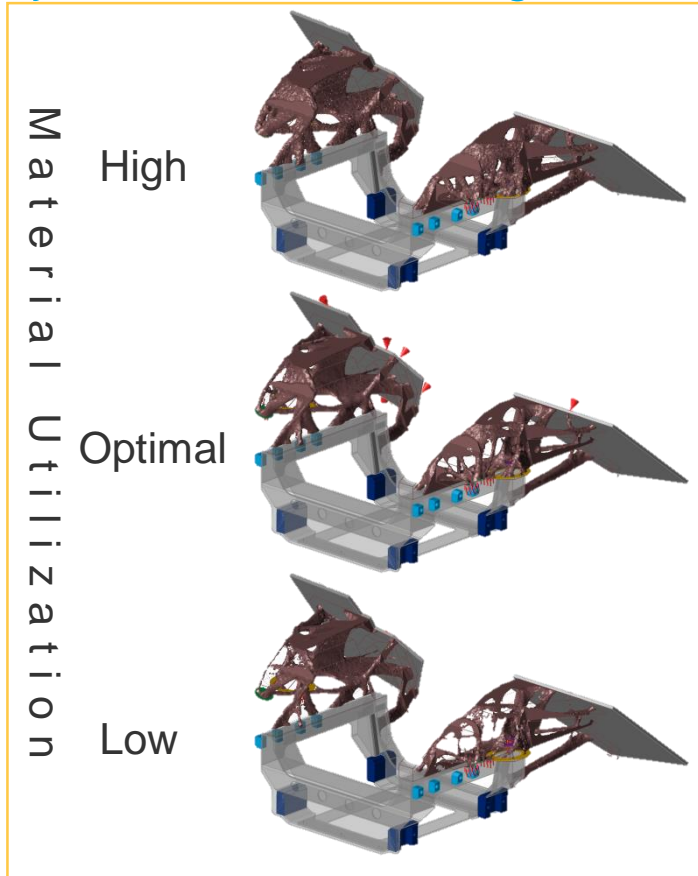
Optimization results

Ready For Production ?

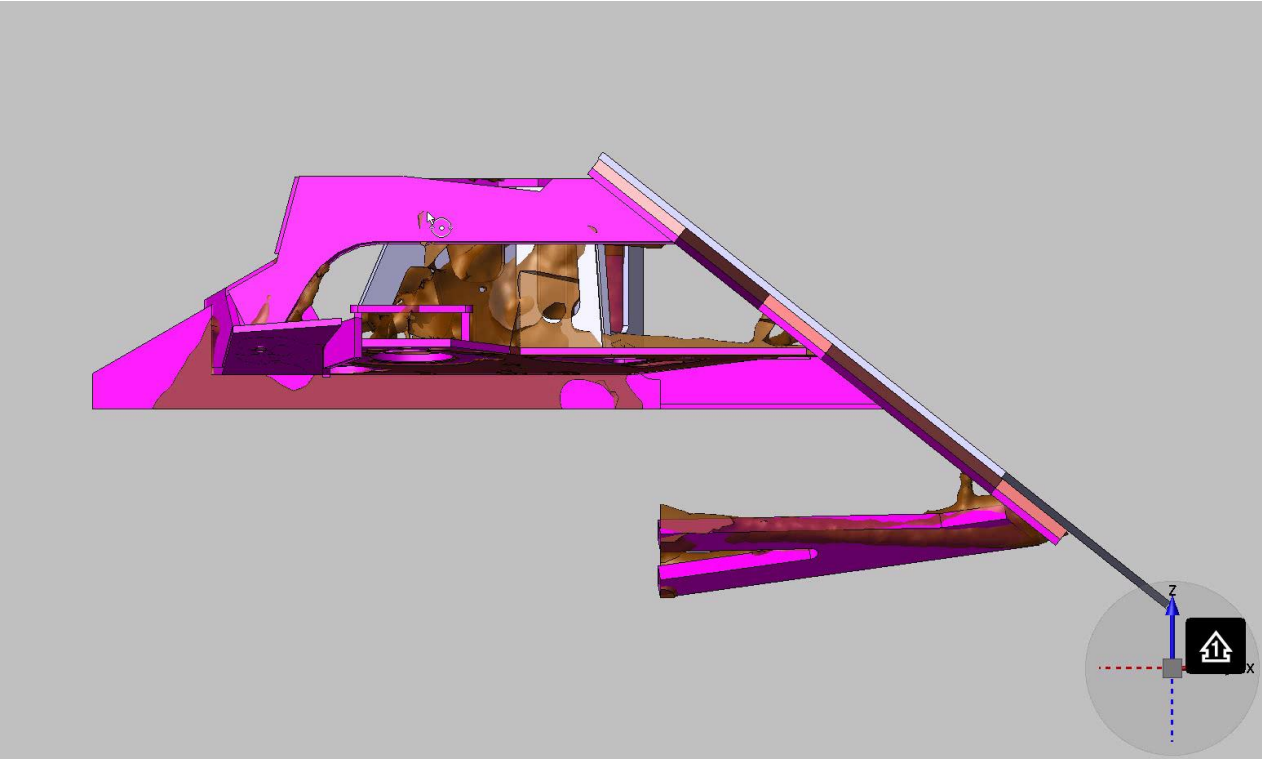


Manufacturability – The new challenge

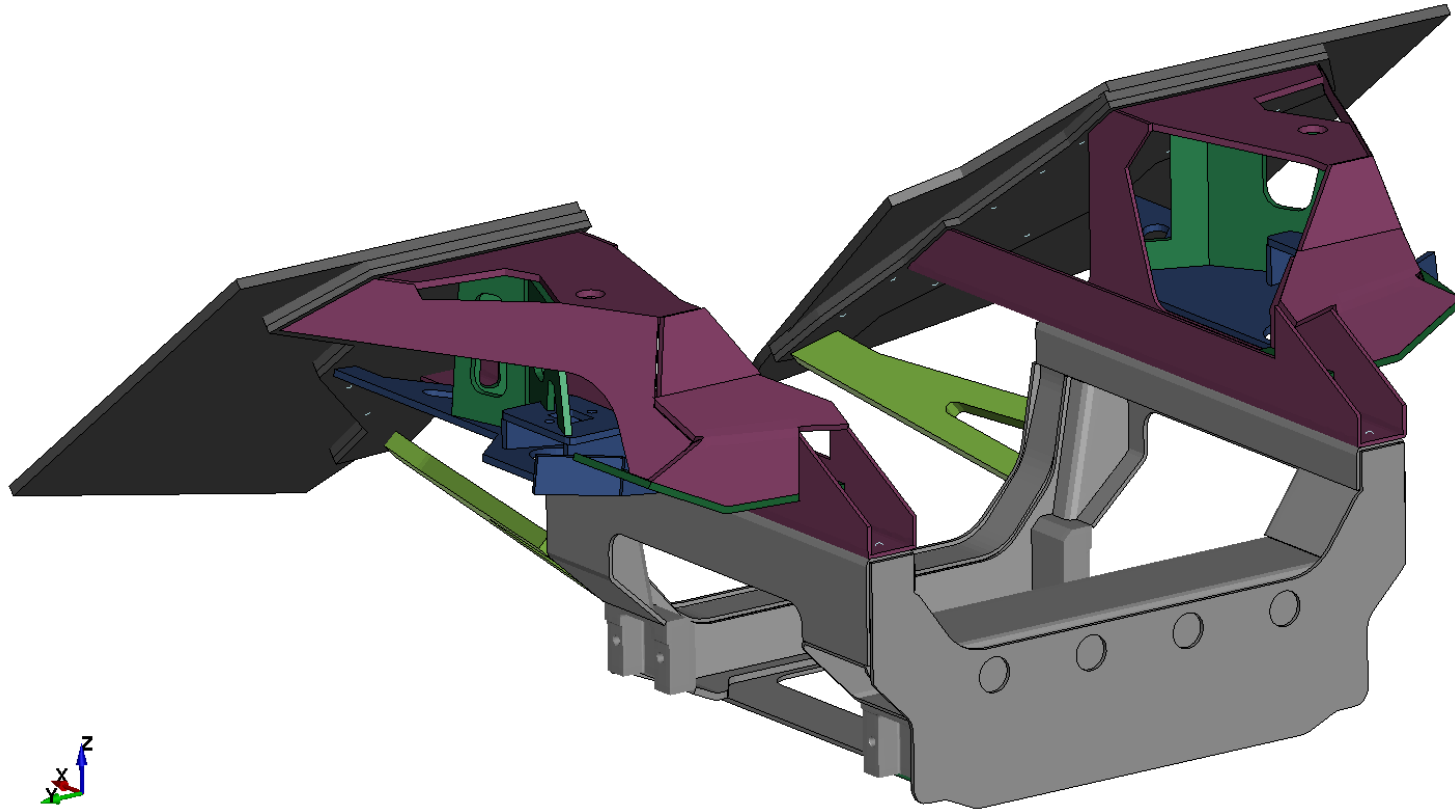
- Some Inspire tools used to evaluate the importance of features
- Welded tubs and bended metal sheets were considered
- Metal sheets were selected



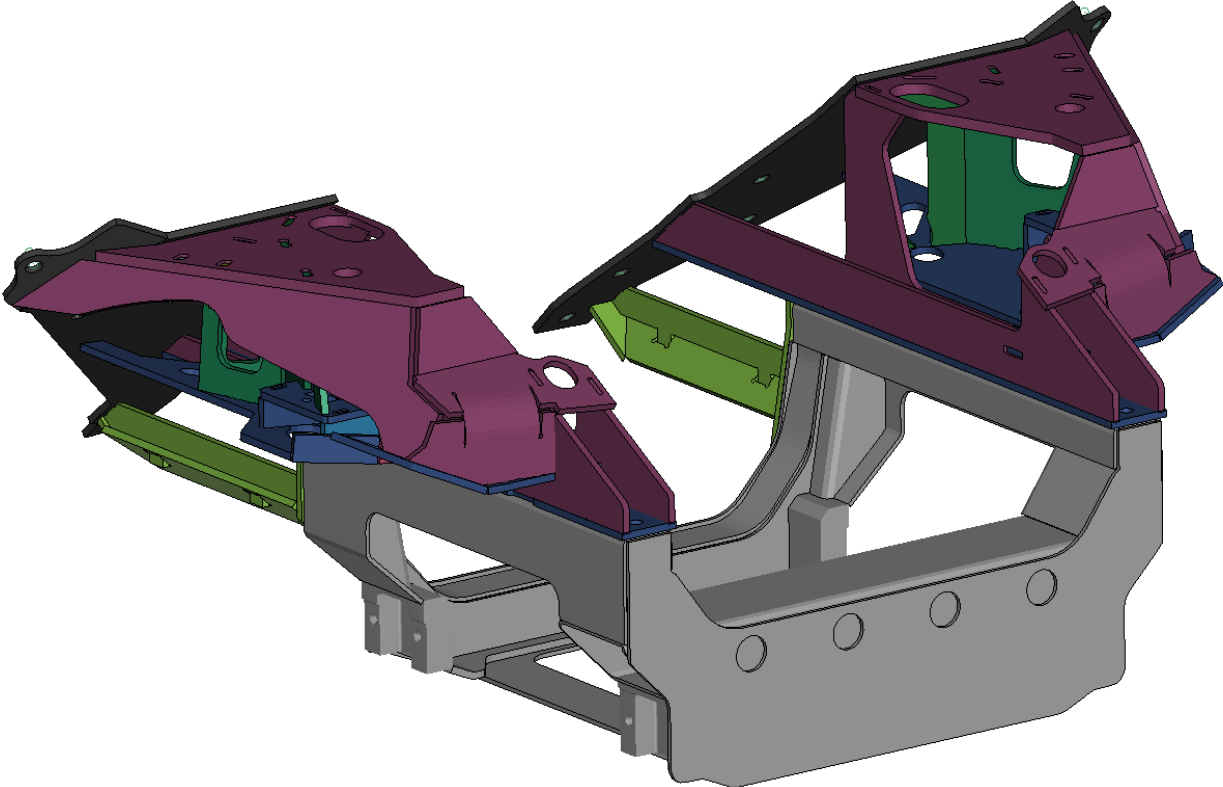
Manufacturability – The new challenge



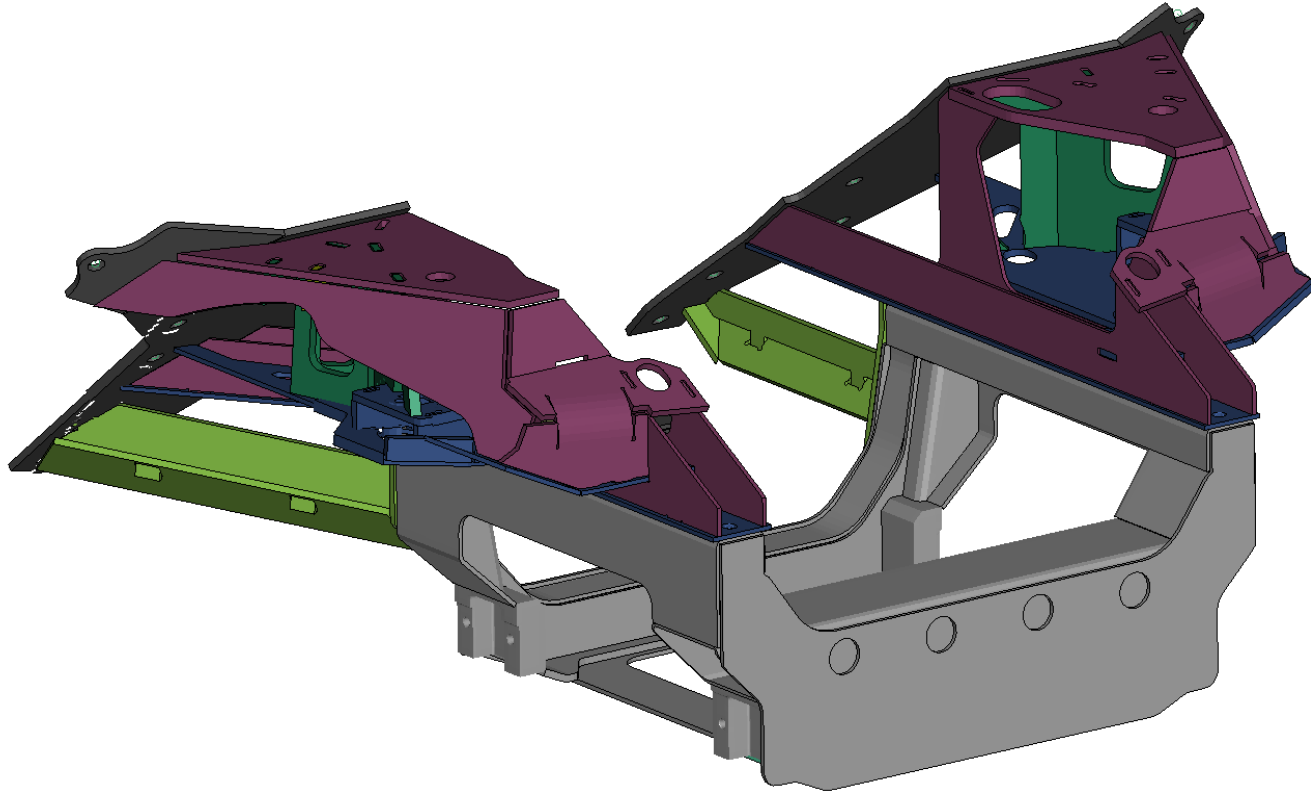
Manufacturability – Tuning the Design



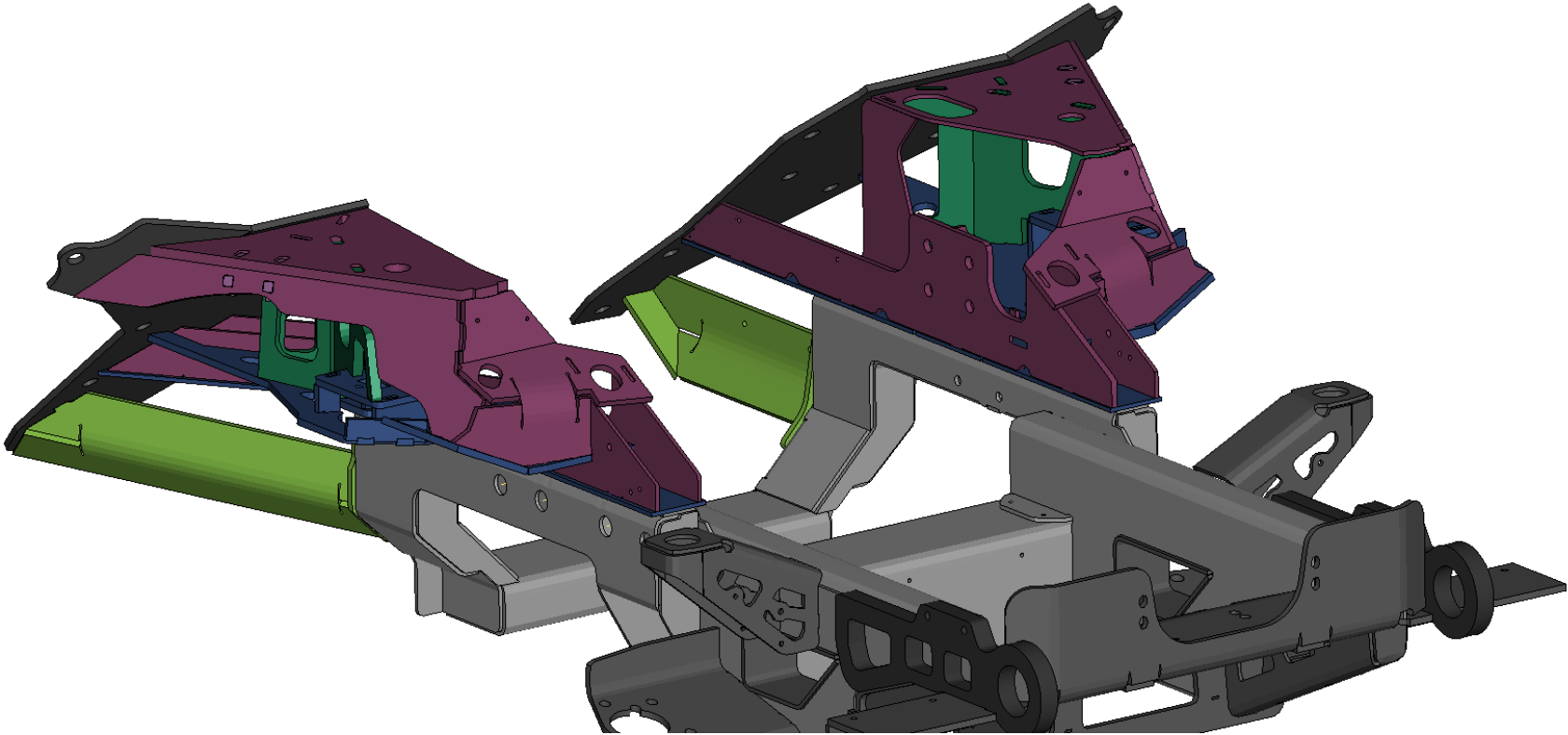
Manufacturability – Tuning the Design



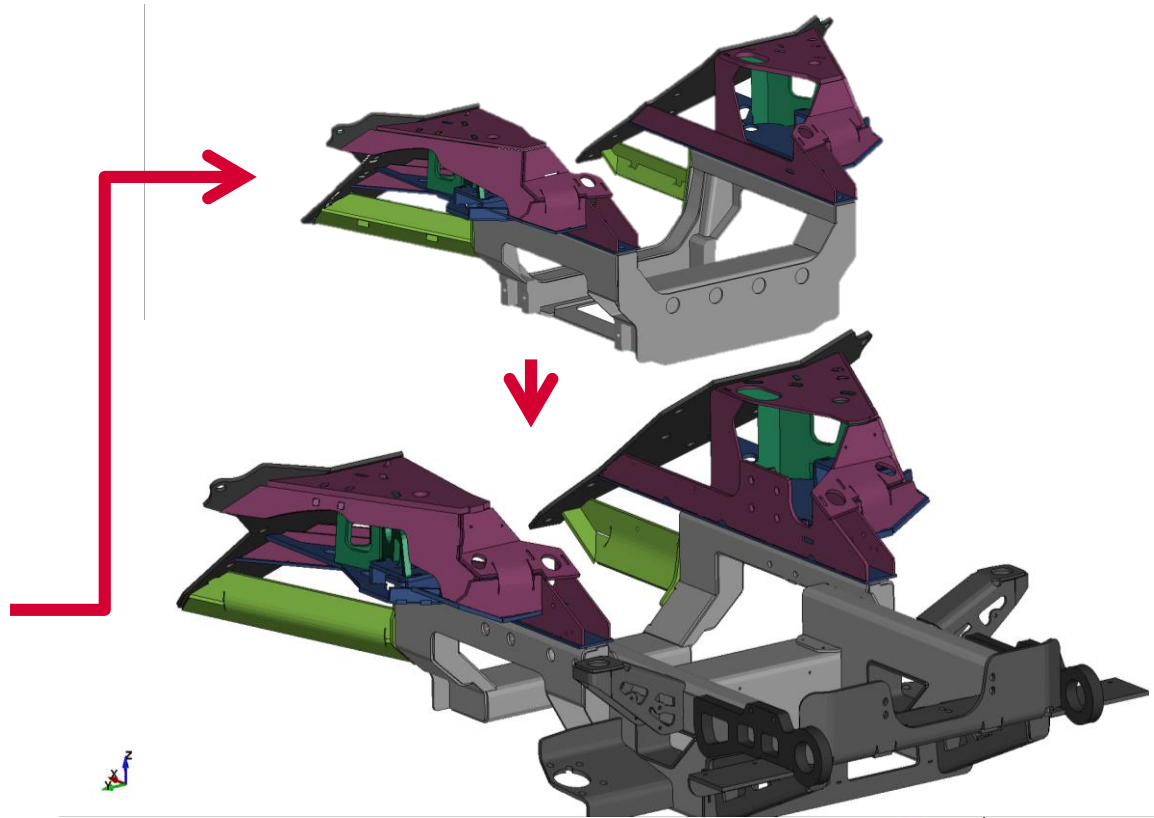
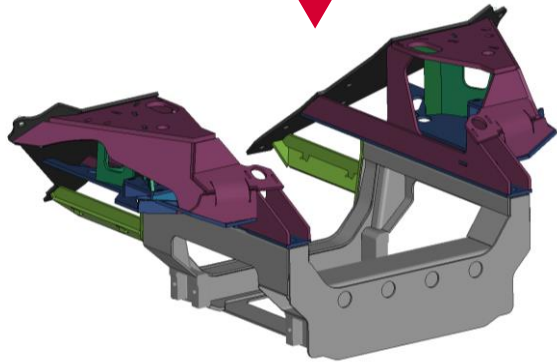
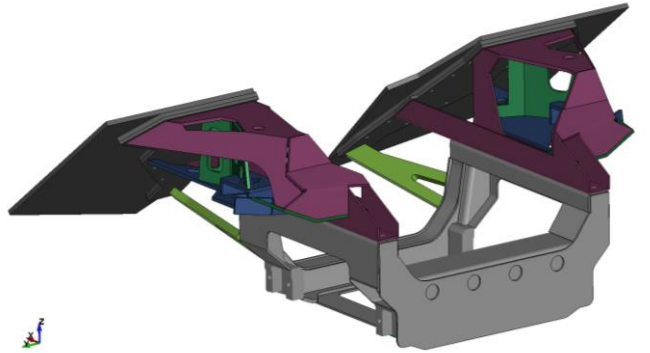
Manufacturability – Tuning the Design



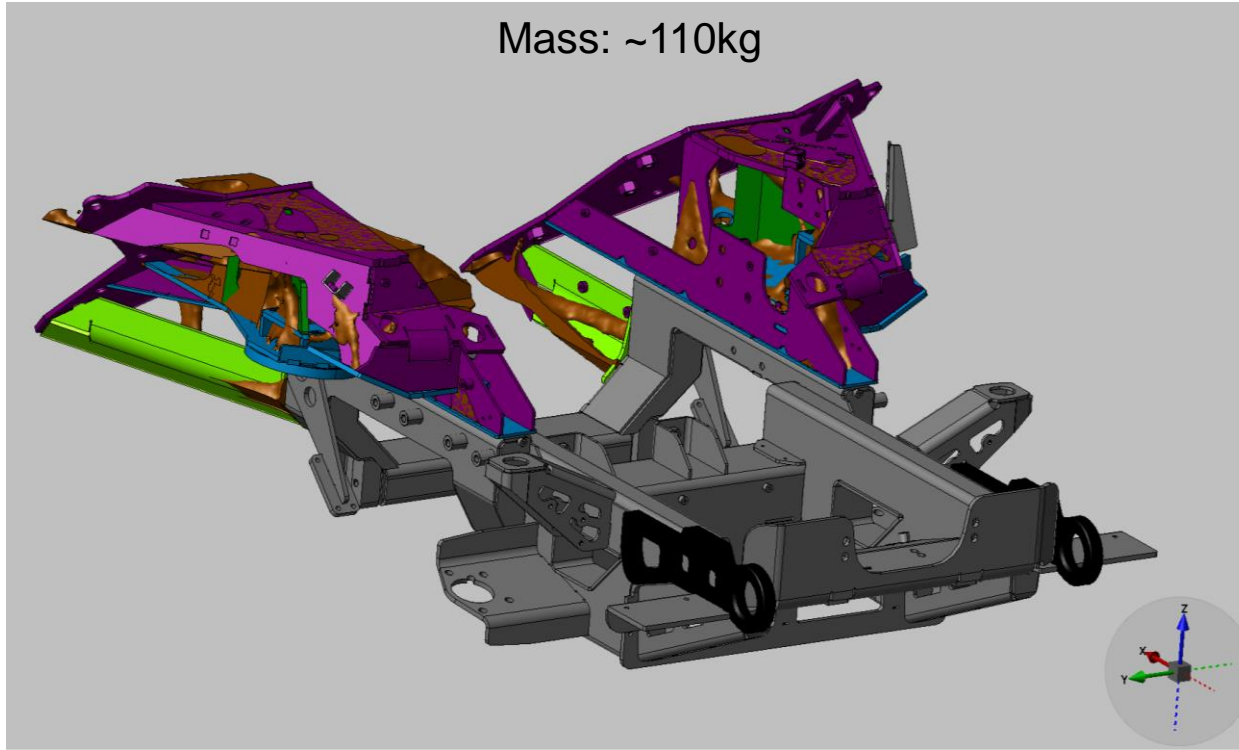
Manufacturability – Tuning the Design



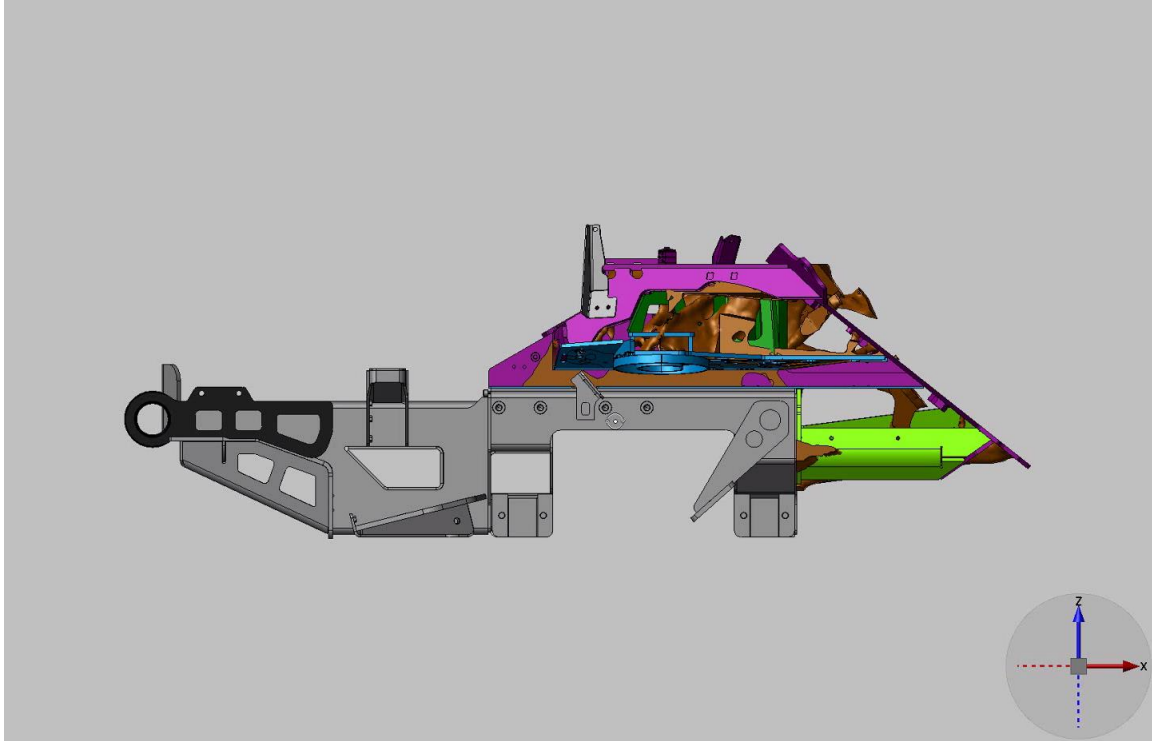
Final Design



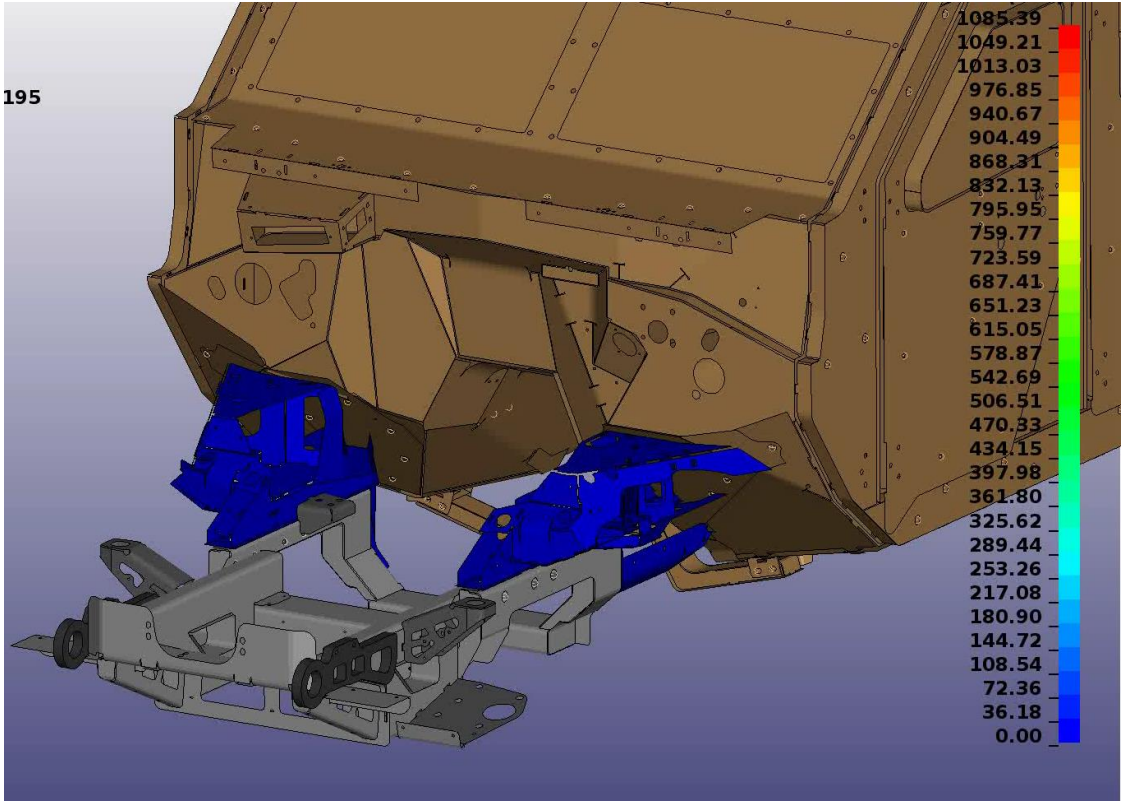
Final Design – Compared to Inspire design



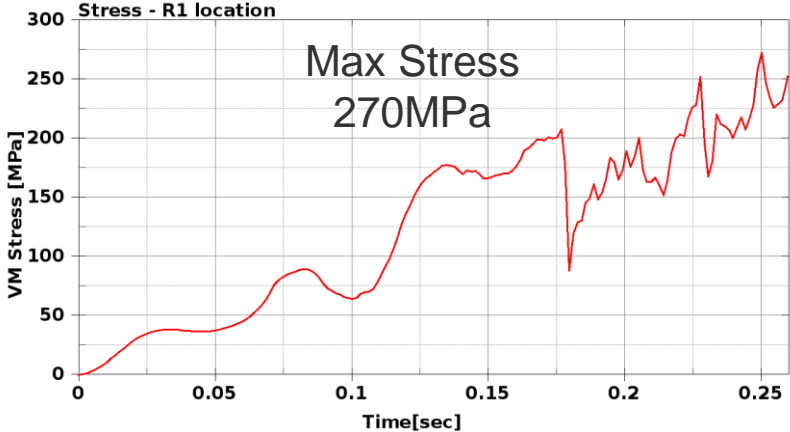
Final Design – Compared to Inspire design



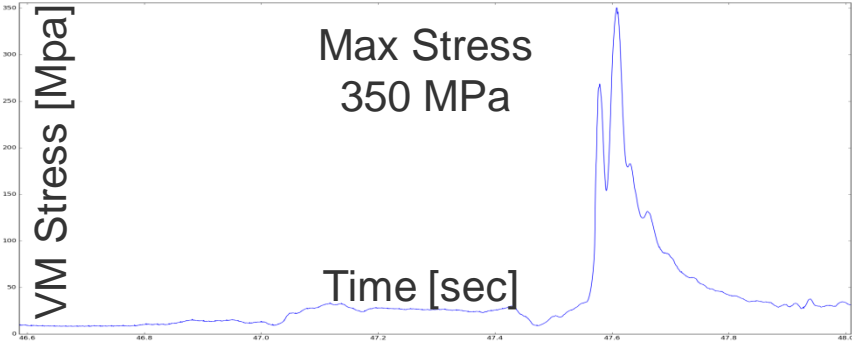
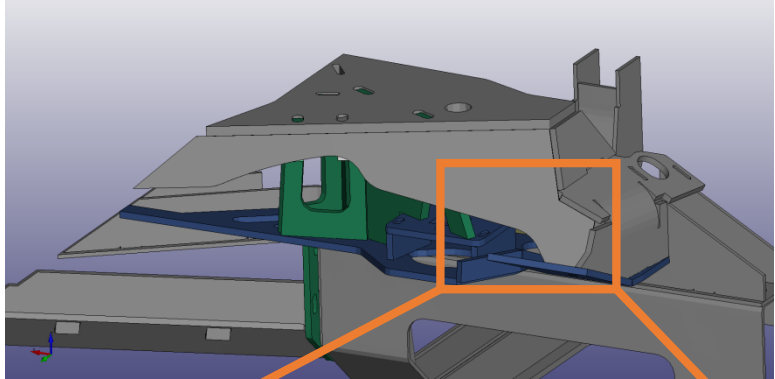
Final Design – Simulation



Test Drive – Irish bridge, 50km/h



Simulation



Test Drive



Test Drive – Irish bridge, 50km/h



Summary

- Using Altair's Inspire is simple and fast
- Optimization tool in early design stage, reduce development time and help meeting all constrains, in "one shot"
- Transferring the optimization results to a manufacturable design is not trivial and require understanding of stress, manufacturing process, space claim, and more.
- The more you know in the early stage; the better and more suitable results you will get form the optimization.





Thank You

