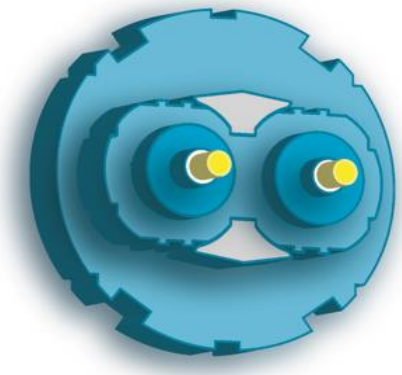


High Luminosity LHC

Crab – RFD SPS Test:
Production Status Update

L Prever-Loiri with contributions from all

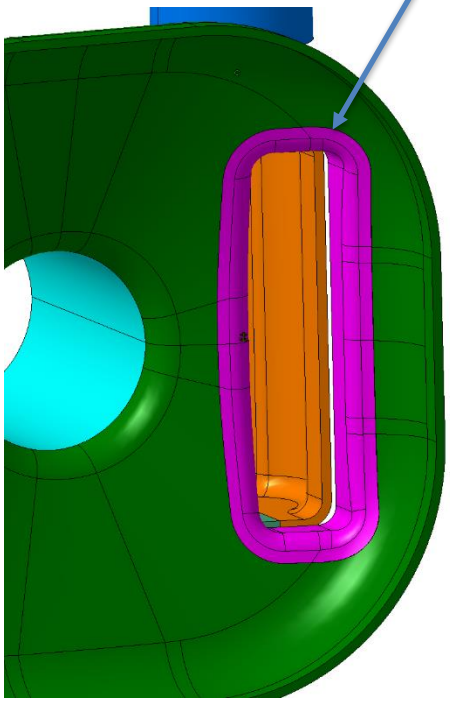
14th July, 2017

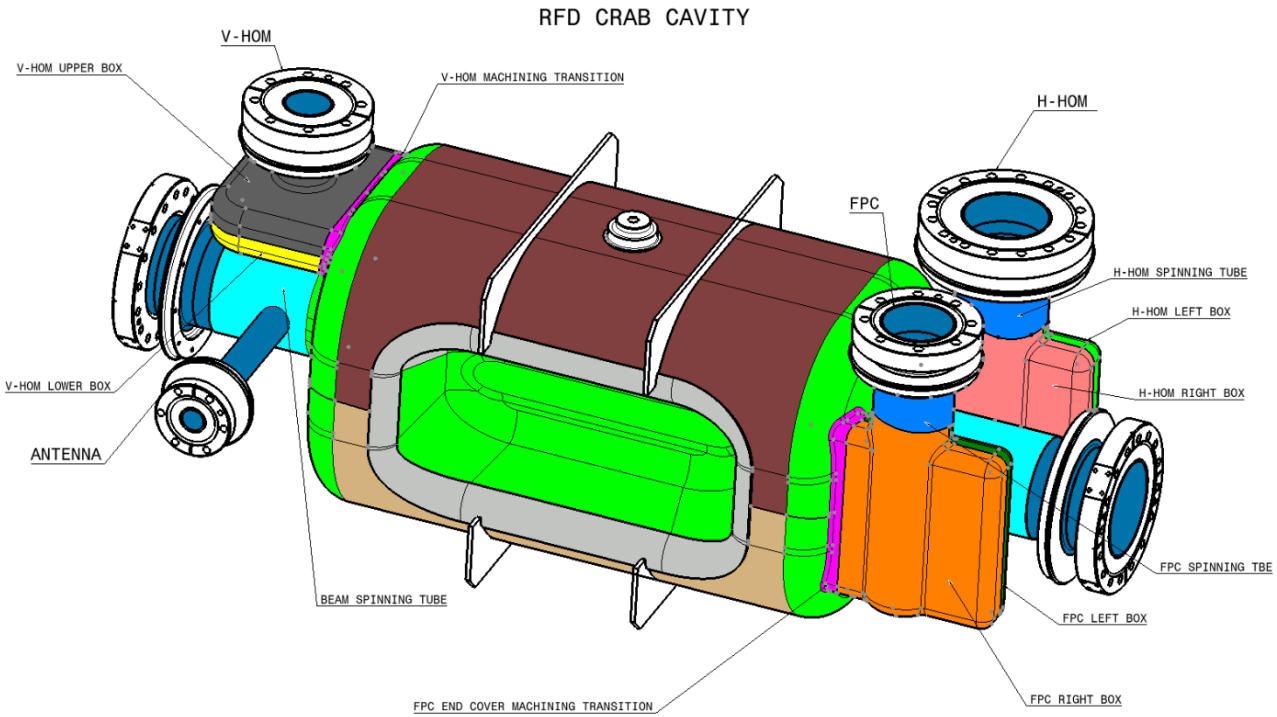
The HiLumi LHC Design Study is included in the High Luminosity LHC project and is partly funded by the European Commission within the Framework Programme 7 Capacities Specific Programme, Grant Agreement 284404.

RFD

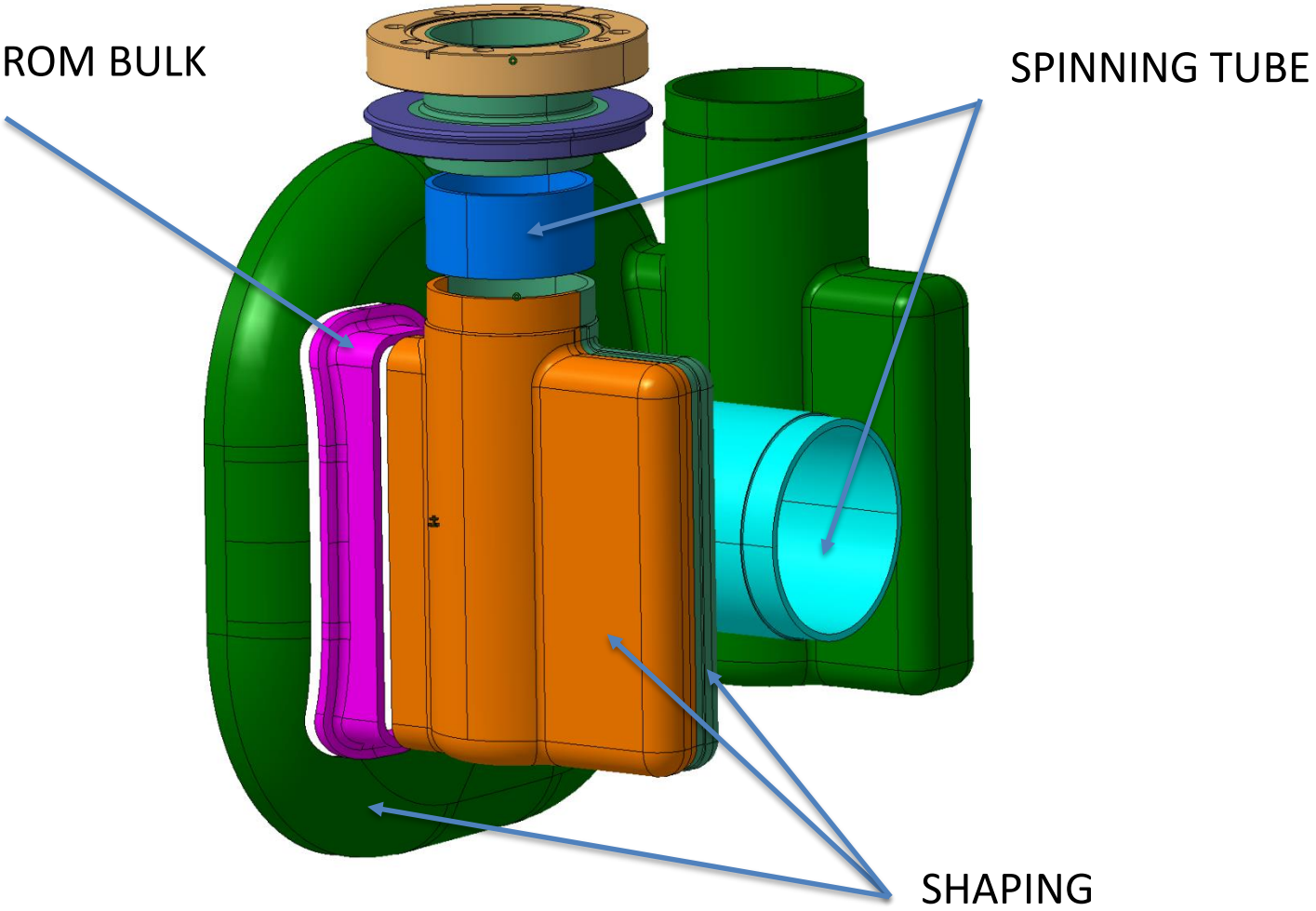
- Initial feasibility study closed (cut-out & technologies)
- Major Differences (w.r.t. US):
  - Machining of transitions end cover/box from bulk
  - Welding interface of waveguide on cavity sides

Internal welding



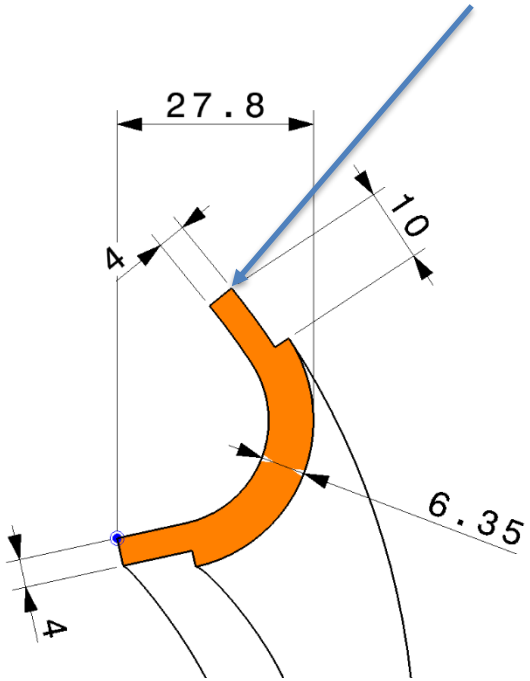


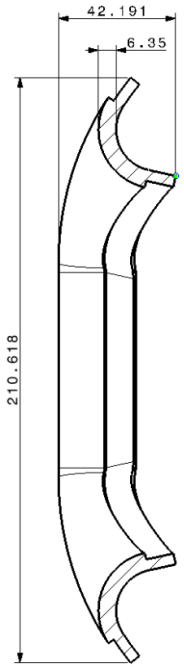
RFD: Processes

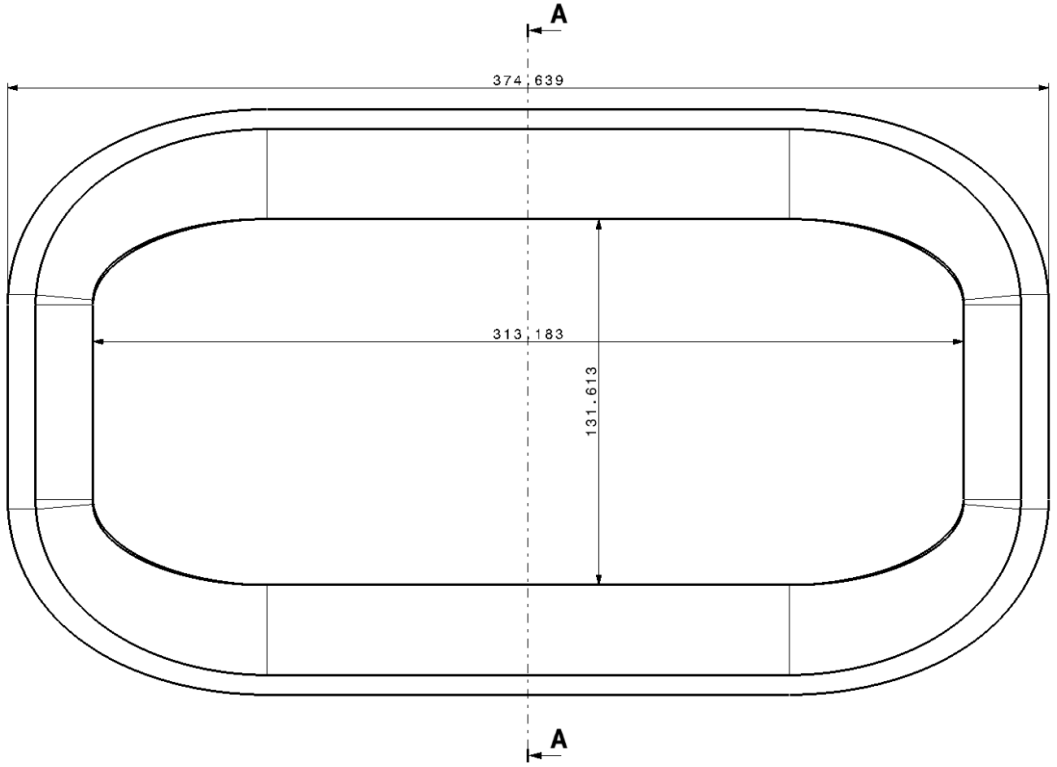


RFD CORNER

Butt weld welding seam







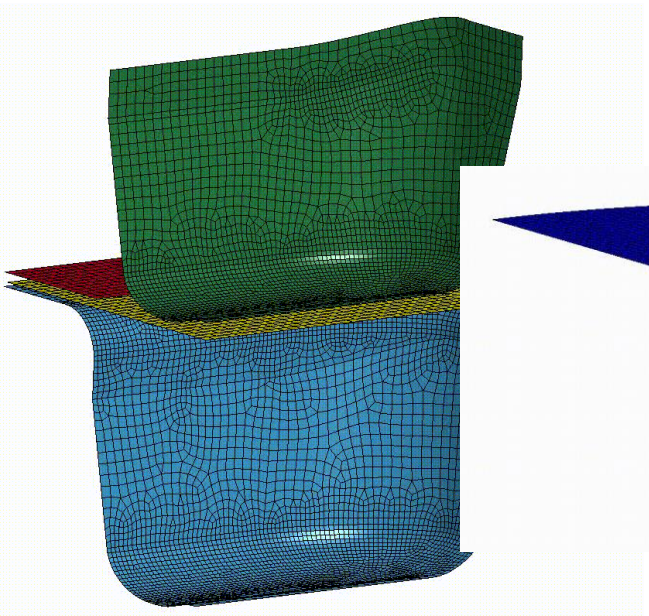
Corner transitions

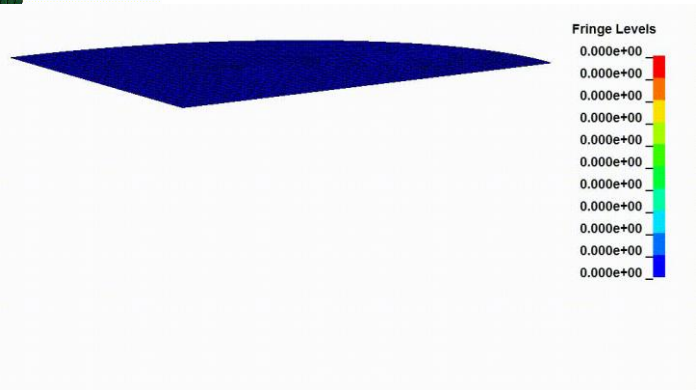
RFD-Shaping

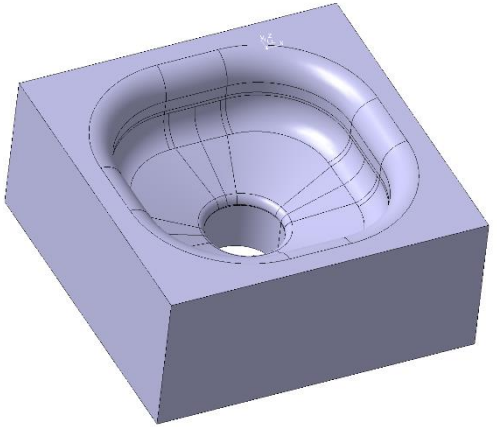
- Shaping philosophy & draft tools finished (thanks to DQW experience)
- Initial FE analyses started (max stress strain, indicative sheet size, pleating, forces...)

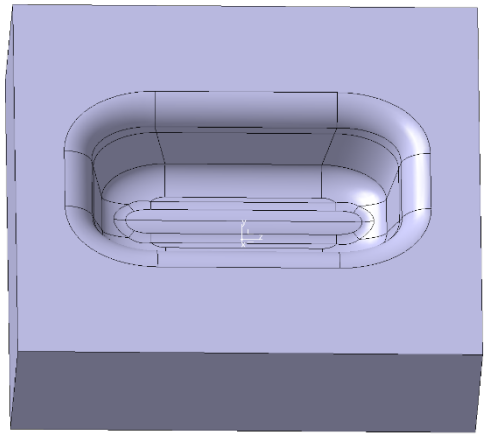
BOWL: deep drawing + coining

End cap:
Deepdrawing (w. central hole)
Trimming
Extrusion
coining



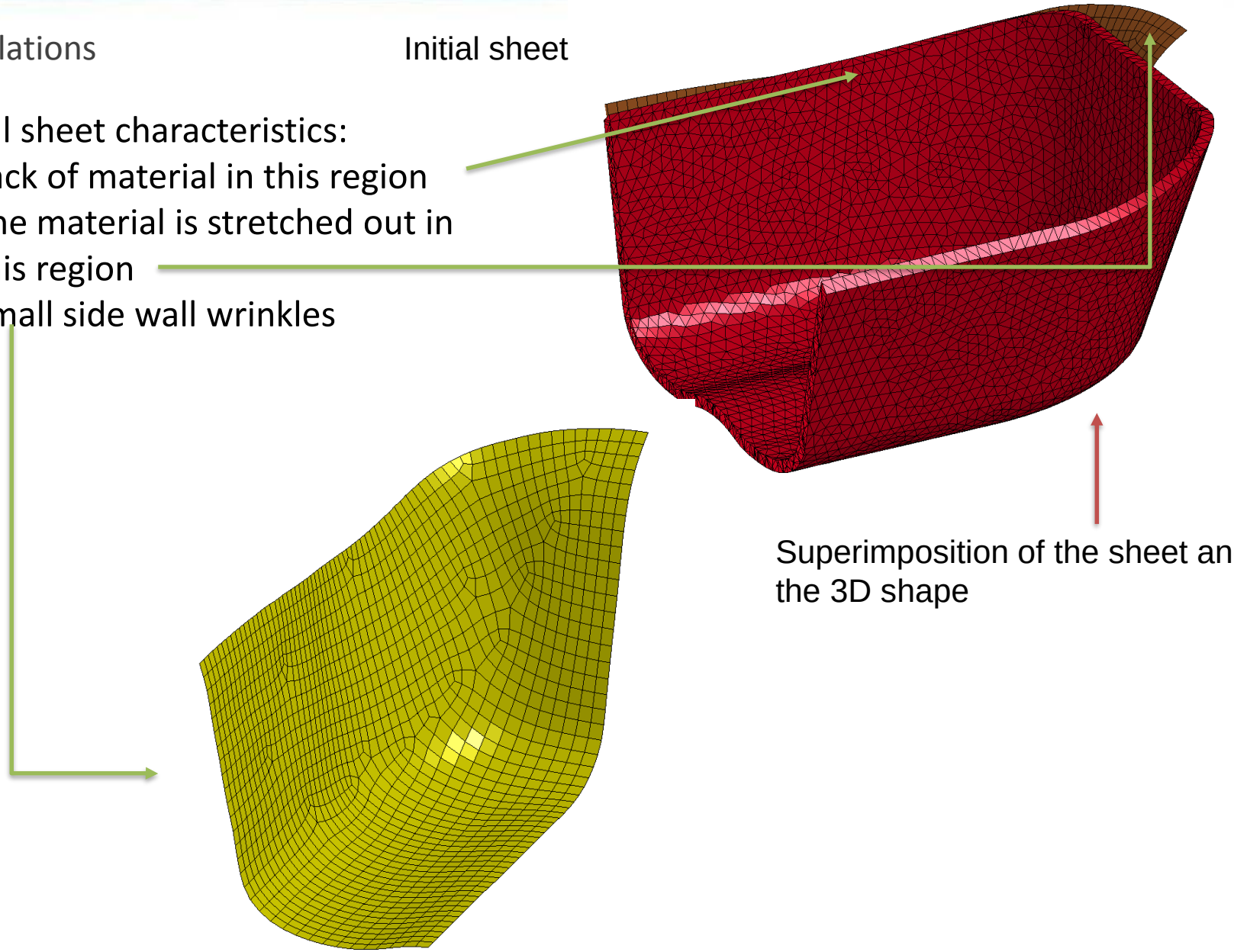






Initial sheet characteristics:

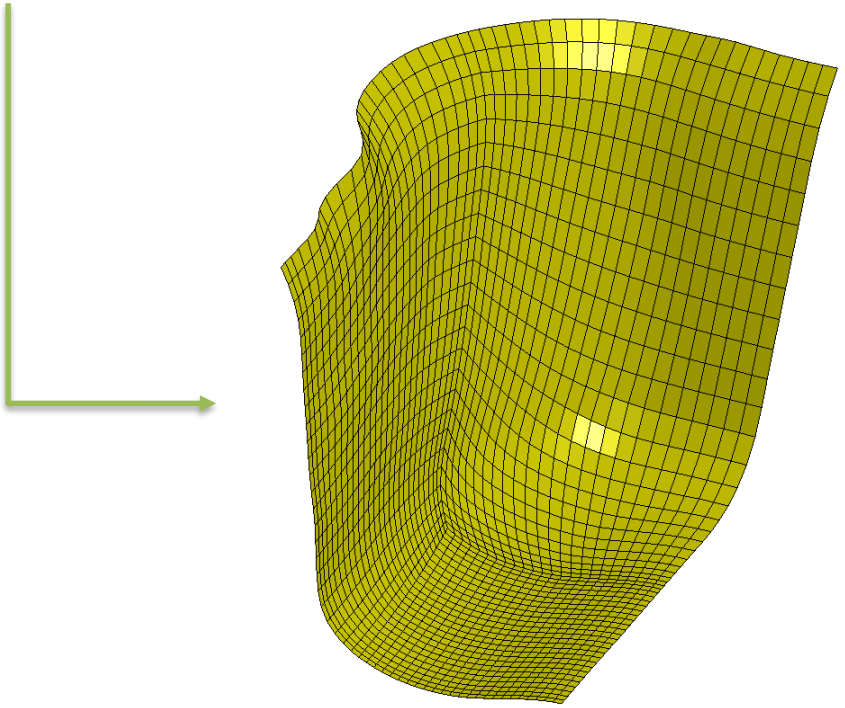
- Lack of material in this region
- The material is stretched out in this region
- Small side wall wrinkles

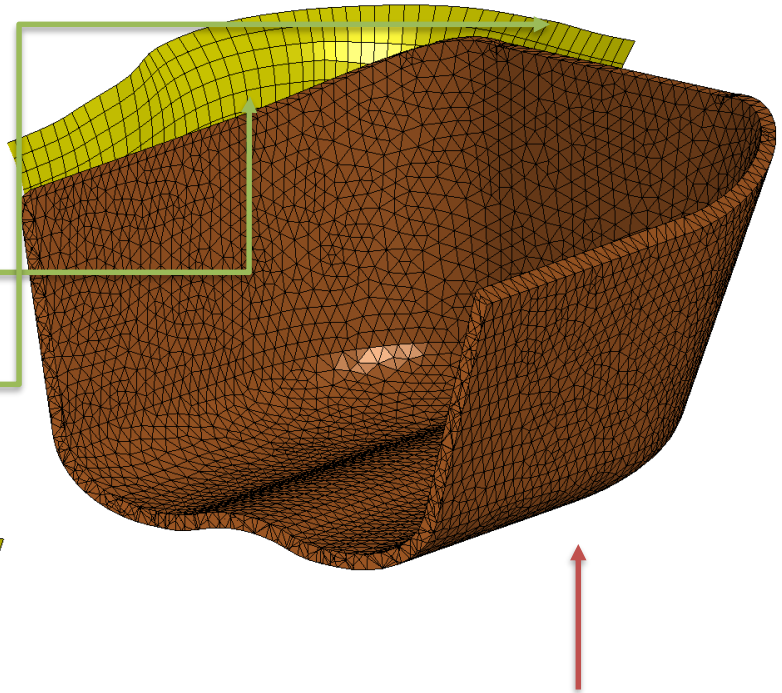


First iteration sheet

First iteration sheet characteristics:

- No more lack of material in this region
- The material is still stretched out in this region
- Wrinkles dimension increased



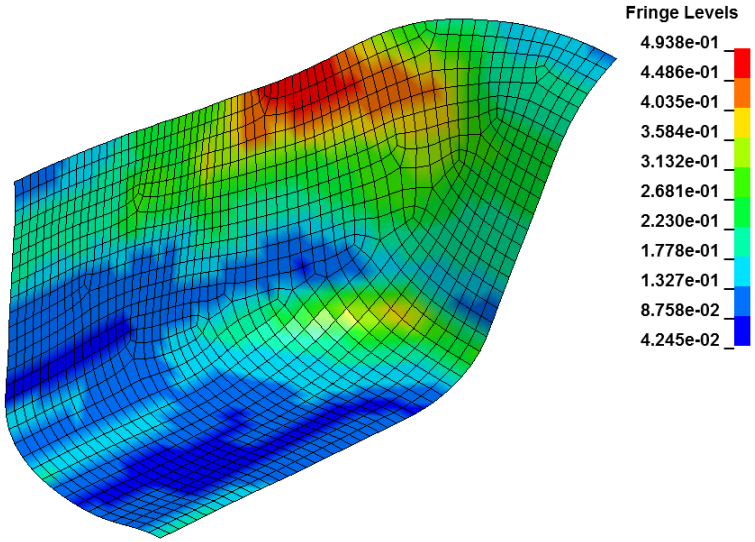


Superimposition of the sheet and the 3D shape

Comparison between the initial sheet and a first iteration sheet

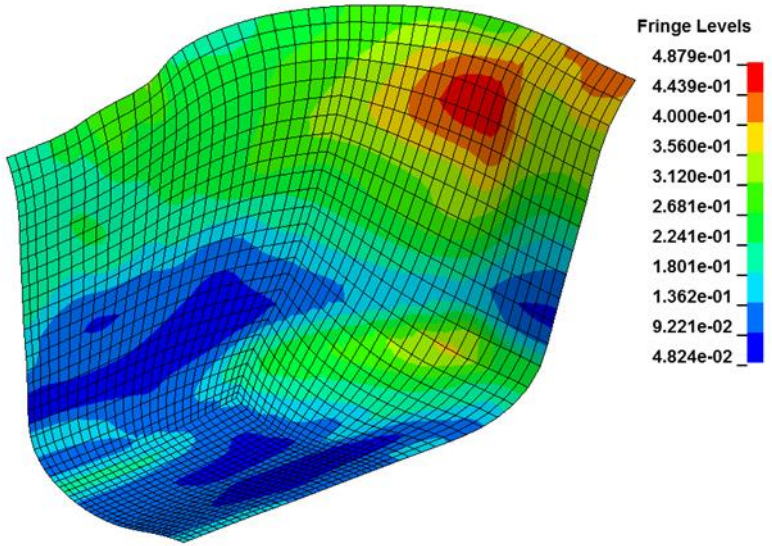
Initial sheet

Effective plastic strain



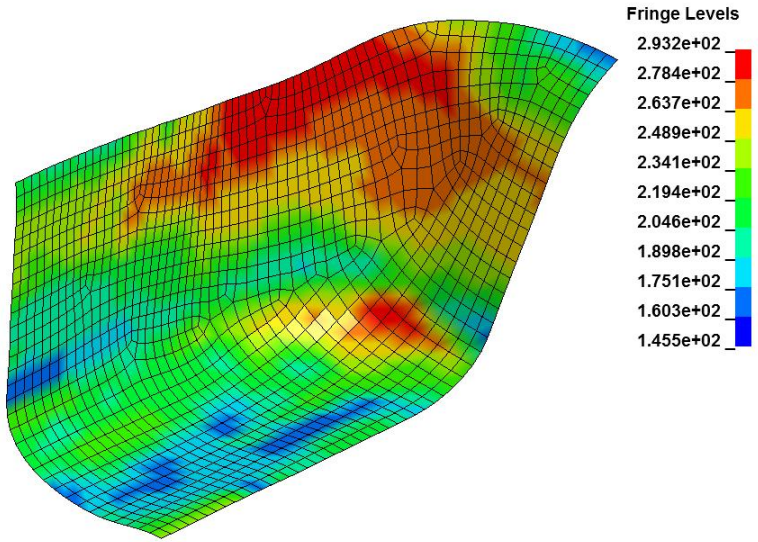
First iteration sheet

Effective plastic strain

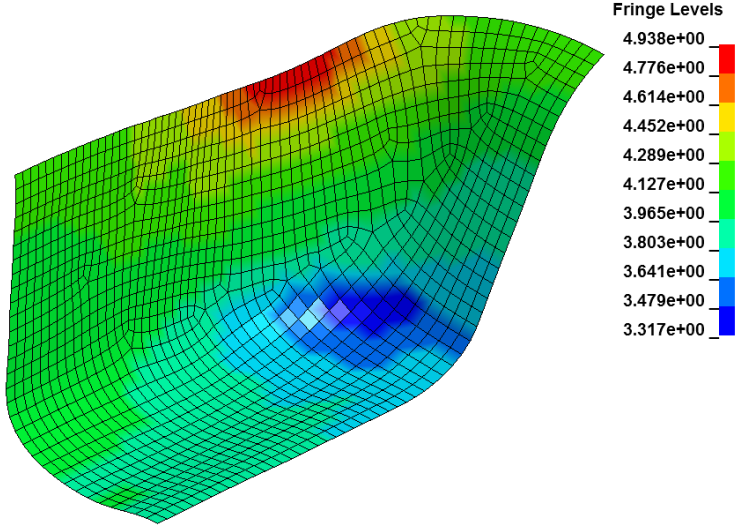


Initial sheet

Von mises stress

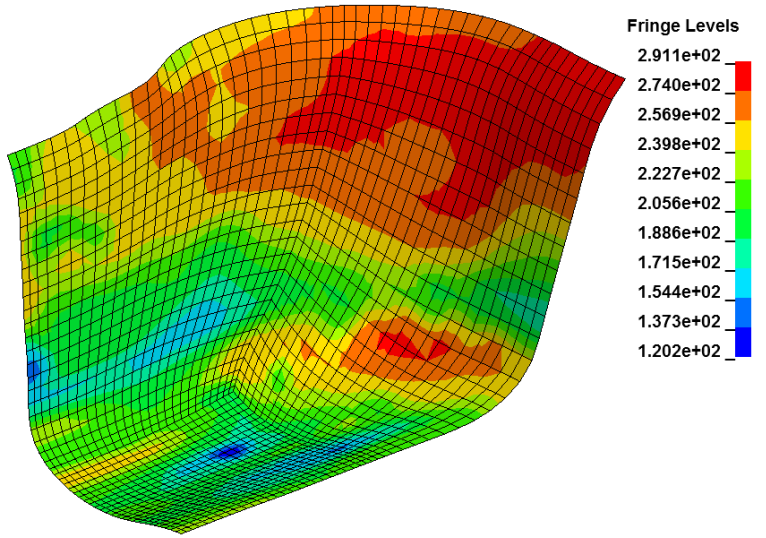


Thickness

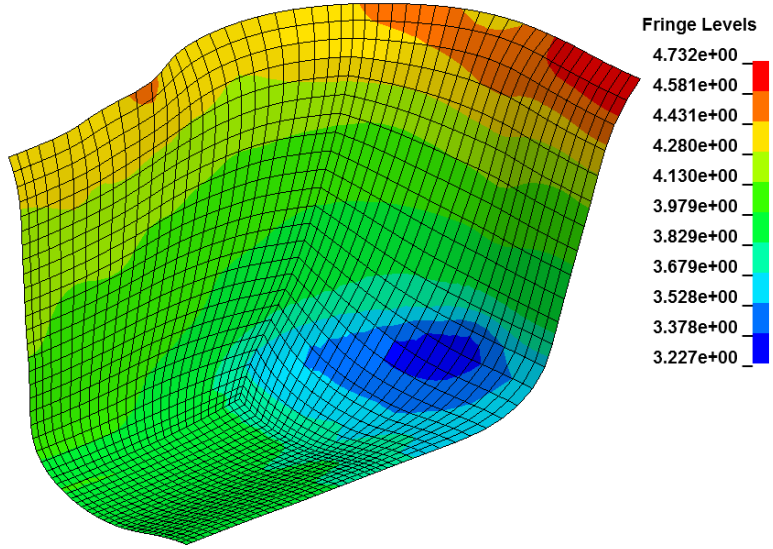


First iteration sheet

Von mises stress



Thickness



RFD Conclusions

- Initial feasibility well advanced (cut-out & technologies)
- Shaping:
  - Philosophy of tools finished (1x per shape, thanks to DQW experience)
  - Initial FE analyses started (max stress strain, indicative sheet size, pleating, forces...)
- NEXT: Purchase Nb + launch ‘standard’ manufacturing (extremities)