

# RFD tank: mass reduction and preliminary results

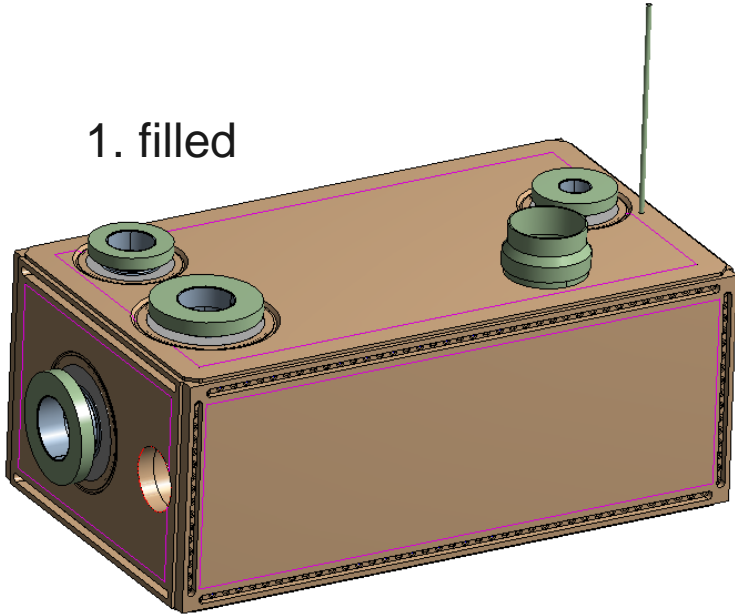
Carlo Zanoni and Norbert Kuder EN/MME



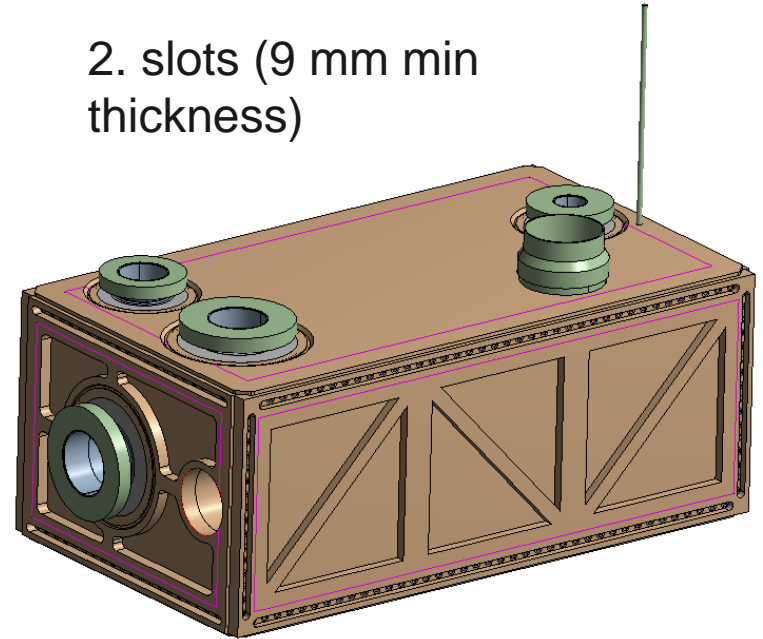
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# Geometries

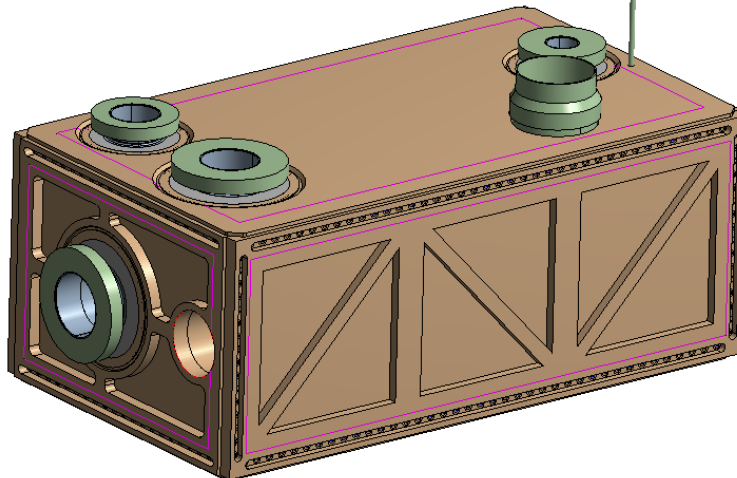
1. filled



2. slots (9 mm min thickness)



3. slots (7 mm min thickness)



# Results comparison

	Max axial [N]	Max shear [N]	Max bending [Nmm]	Max stress bolts [MPa]	Max stress cavity [MPa]	Mass [kg]
1) filled	4731.5	835.61	4270	815	100.1	183
2) slots 9 mm	4723.4	825.51	4209.2	809	100.3	165
3) slots 7 mm	4755.1	828.93	4236.9	814	100.3	162

## Results:

- RFD tank design is always very stiff
- Main reason for not reducing weight more is the minimum thickness (do not want to go below 7 mm)
- Bolts assessment not performed (model: simple beam)
- Anyway stress in the bolts appears high (with worst-case assumptions)

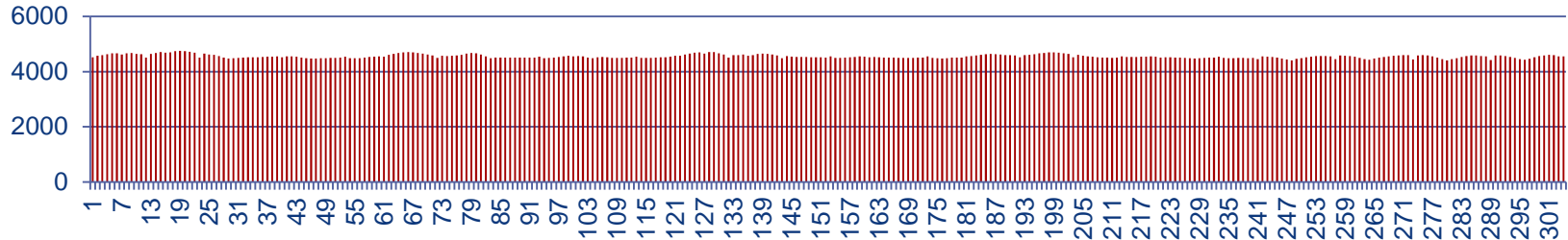
## Notes:

- Welds not modelled (worst case stress in bolts)
- Top and bottom plates are already machined inside

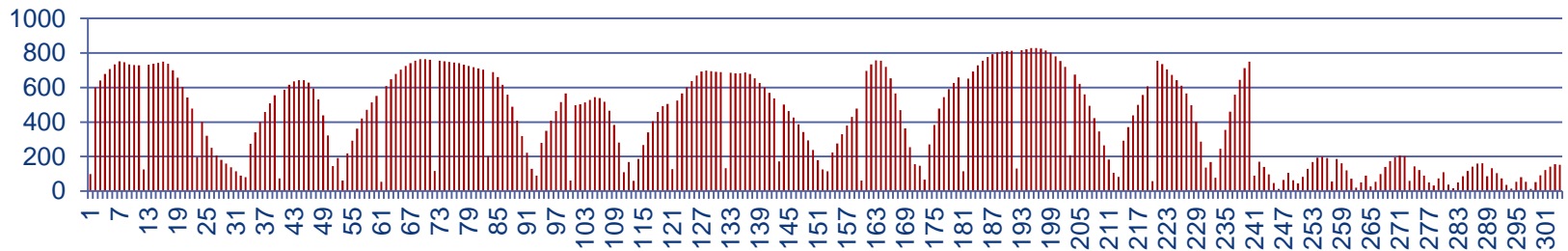
# With or without welds

max stress: 814 MPa

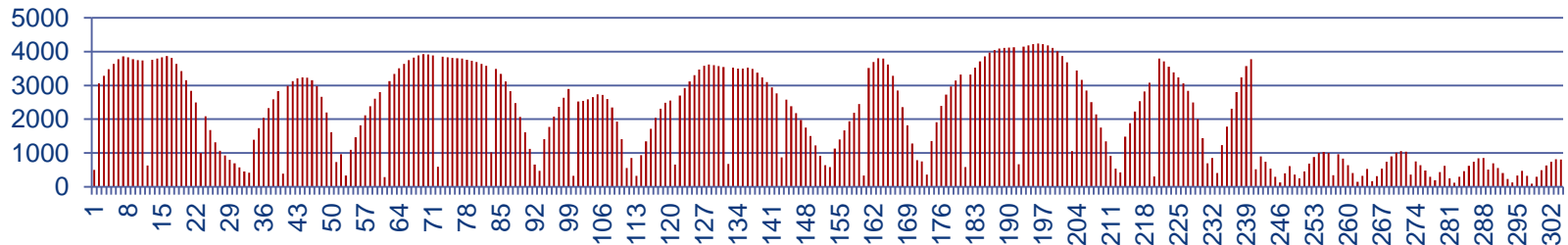
## Axial Force [N]



## Shear [N]



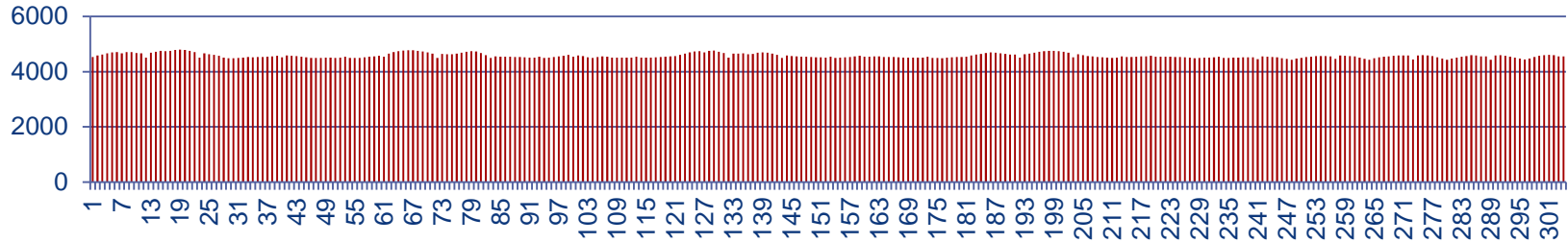
## Bending [Nmm]



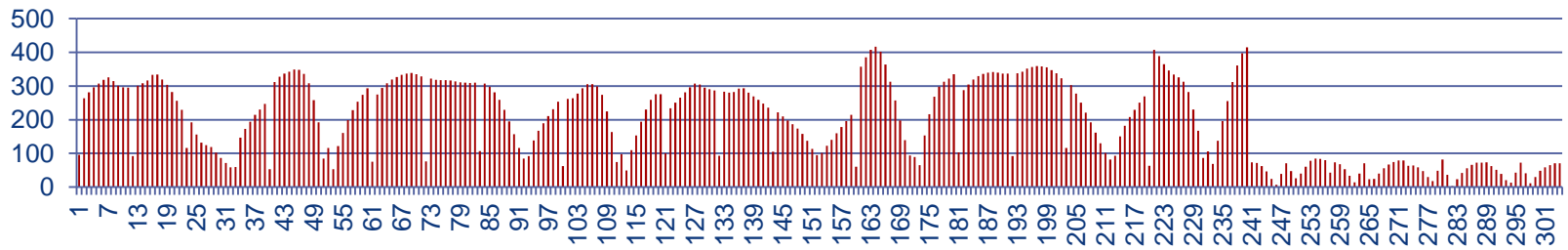
# With or without welds

max stress: 548 MPa

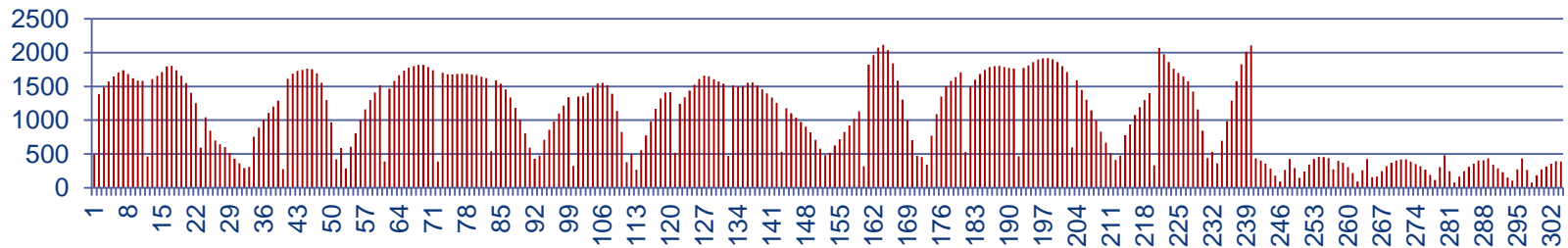
## Axial Force [N]



## Shear [N]

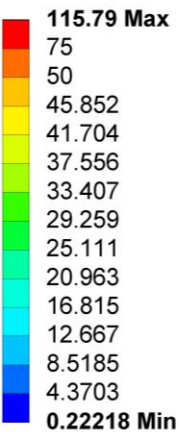


## Bending [Nmm]

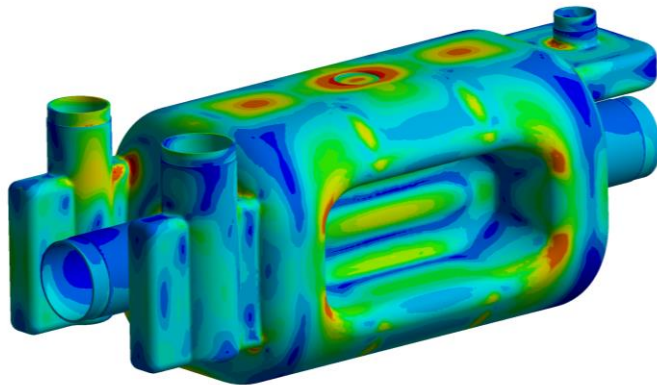


# Stress in fine mesh model (with welds)

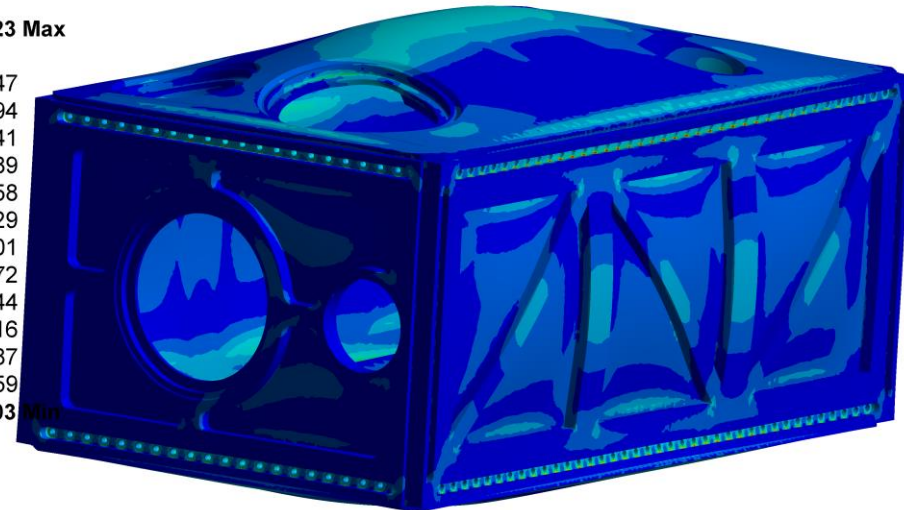
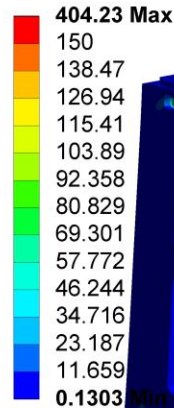
**Figure**  
Type: Stress Intensity  
Unit: MPa  
Time: 2  
22/06/2015 10:38



Peaks to be investigated



**Figure**  
Type: Stress Intensity  
Unit: MPa  
Time: 2  
22/06/2015 10:39





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