

# HOM coupler: use of elastic interfaces

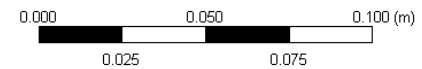
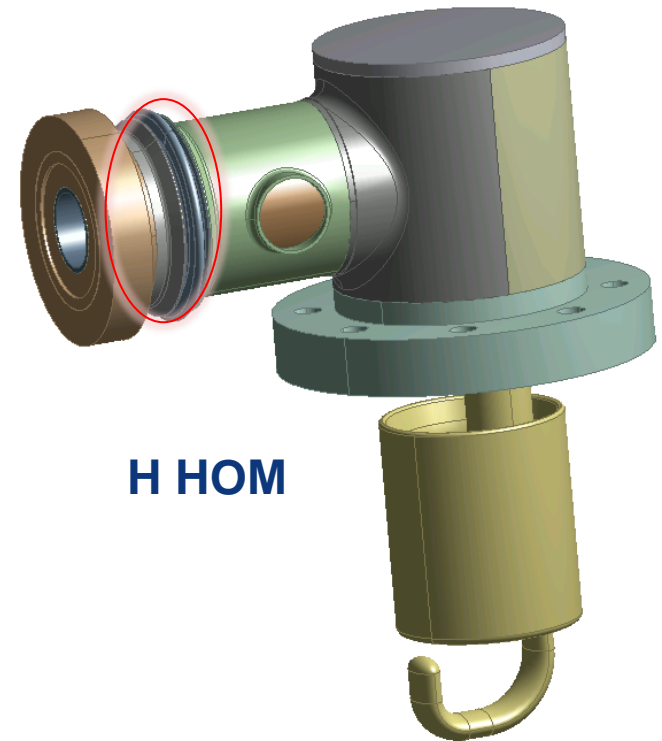
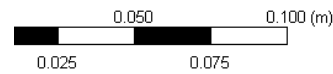
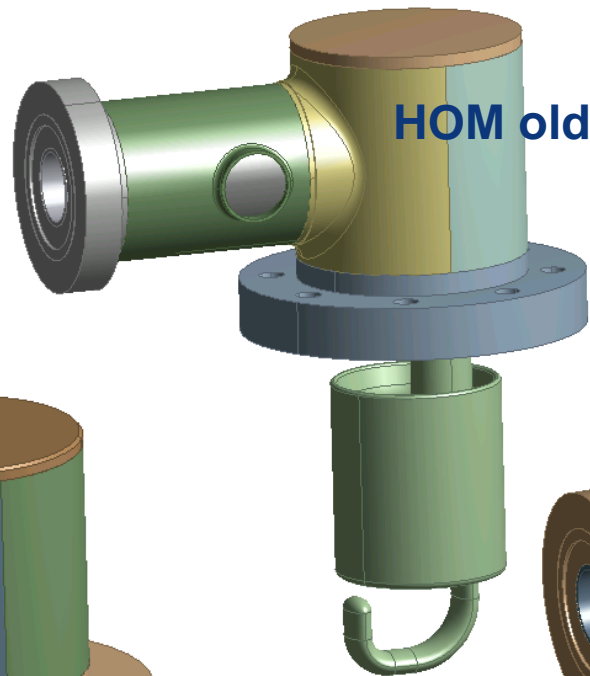
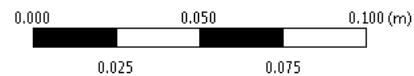
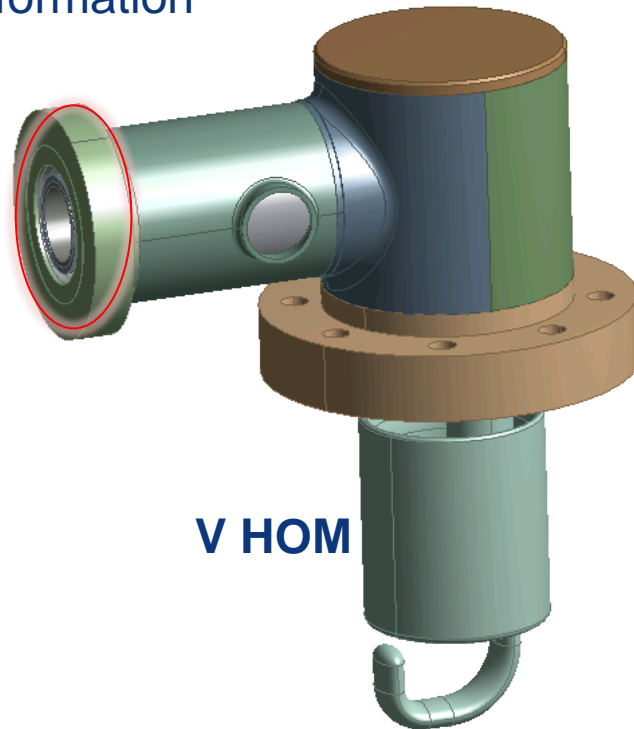
Carlo Zanoni EN/MME



# Goal

Comparison  
(same mesh and defeaturing)

- Stress
- Deformation



# Loads

- Temperature (22 C to -271.15 C)
- Pressure: 0.18 Mpa
- Boundary:
  - Remote displacement of the bolts of the horizontal flange

# Materials properties

		Material	
		Niobium	Stainless Steel 316LN
293 K	Poisson's ratio [1]	0.38	0.27
	Elastic modulus (GPa) [1]	103	196
Properties	Integrated thermal contraction $\frac{\Delta L}{L}_{RT \rightarrow 4K}$ [2]	$1.43 \cdot 10^{-3}$	$3 \cdot 10^{-3}$
	Coefficient of thermal contraction $\frac{\Delta L}{\Delta T L}_{RT \rightarrow 4K}$ (1/K)	$4.91 \cdot 10^{-6}$	$1.03 \cdot 10^{-5}$
2 K	Yield strength $R_{p0.2}$ (MPa) [3]	480 ÷ 520	850 ÷ 1050
	Max allowable stress $R_{p0.2}/1.5$	320 ÷ 347	567 ÷ 700

[1] D. Vaucoiret, Materials and Ansys Library for Design Office, EDMS 1291793.

[2] H. Kaiser, Ge. Meyer, H.B. Peters, and G. Weichert, "Helium Vessel for the TTF Cavity," TESLA Collaboration Report 94-26, October 1994.

[3] Information provided by Ignacio.

# Results: old design

E: Static Structural

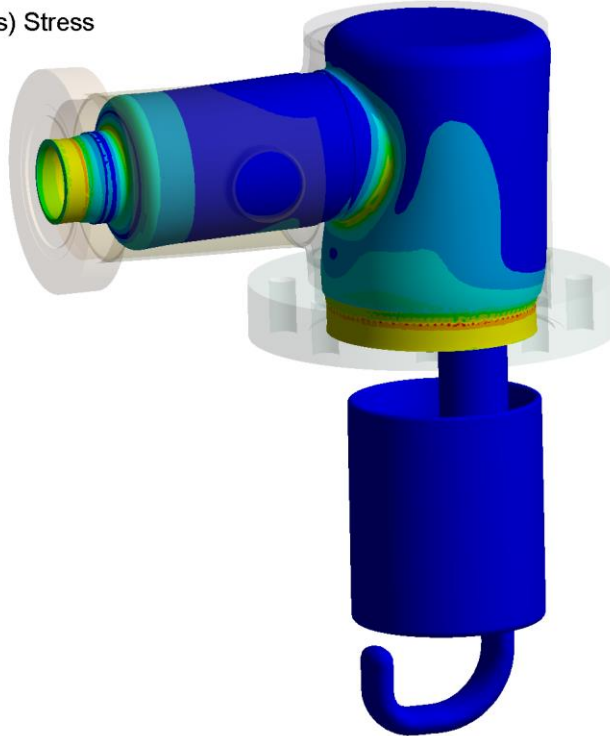
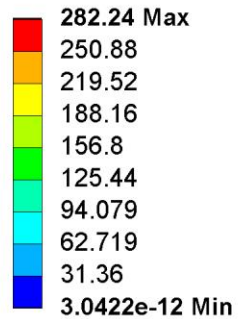
Figure

Type: Equivalent (von-Mises) Stress

Unit: MPa

Time: 1

04/12/2014 10:52



E: Static Structural

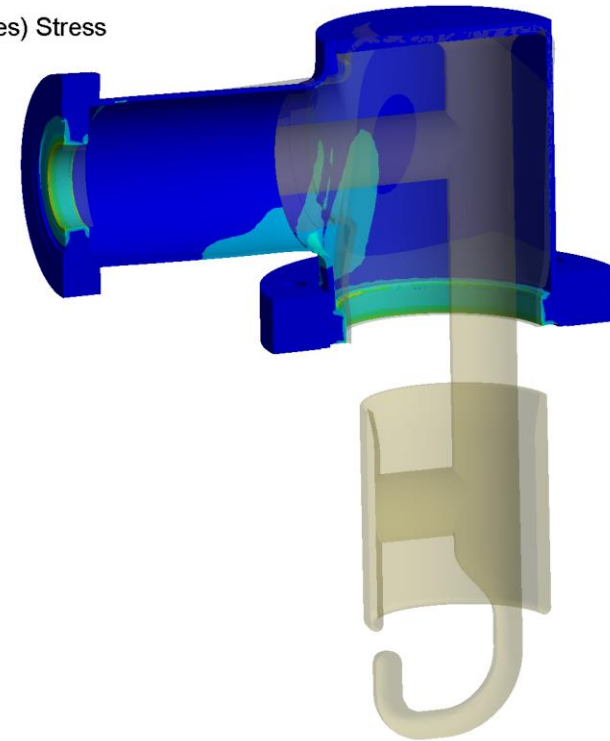
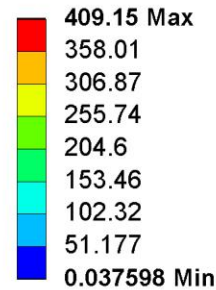
Figure

Type: Equivalent (von-Mises) Stress

Unit: MPa

Time: 1

04/12/2014 10:52



# Results: H HOM (horizontal bellow)

E: Static Structural

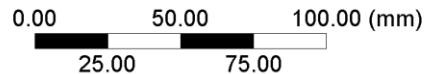
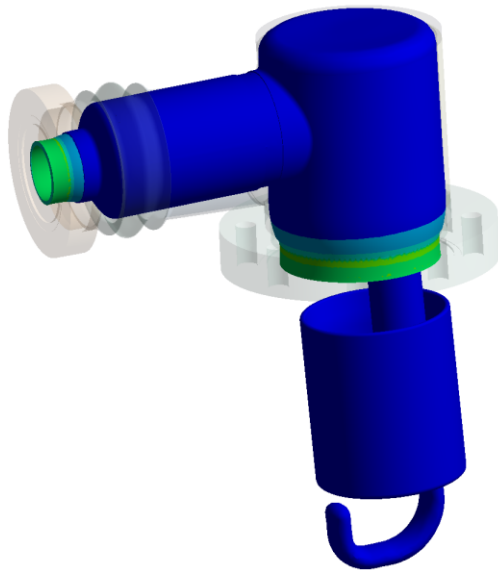
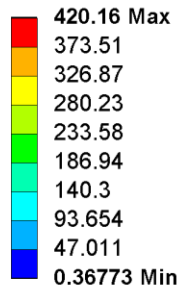
Figure

Type: Equivalent (von-Mises) Stress

Unit: MPa

Time: 1

04/12/2014 10:38



E: Static Structural

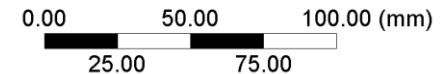
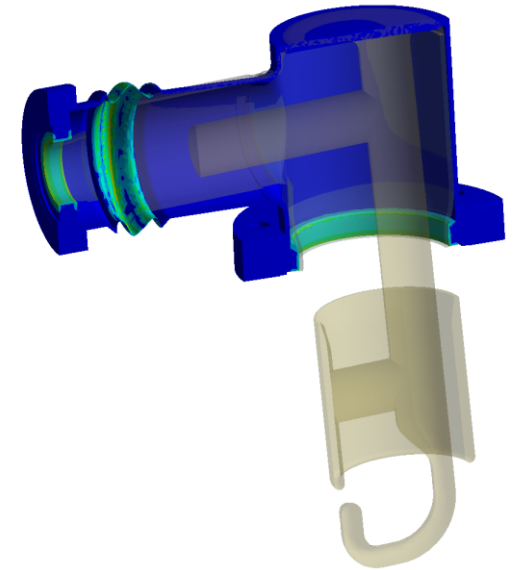
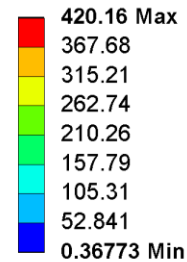
Figure

Type: Equivalent (von-Mises) Stress

Unit: MPa

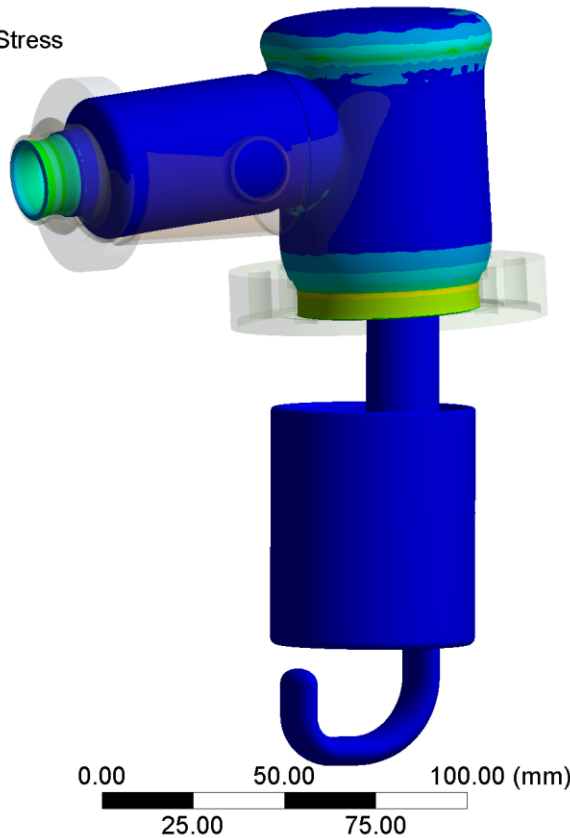
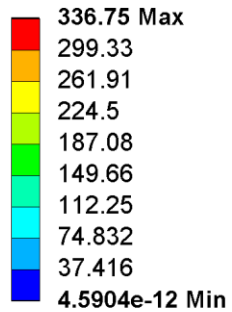
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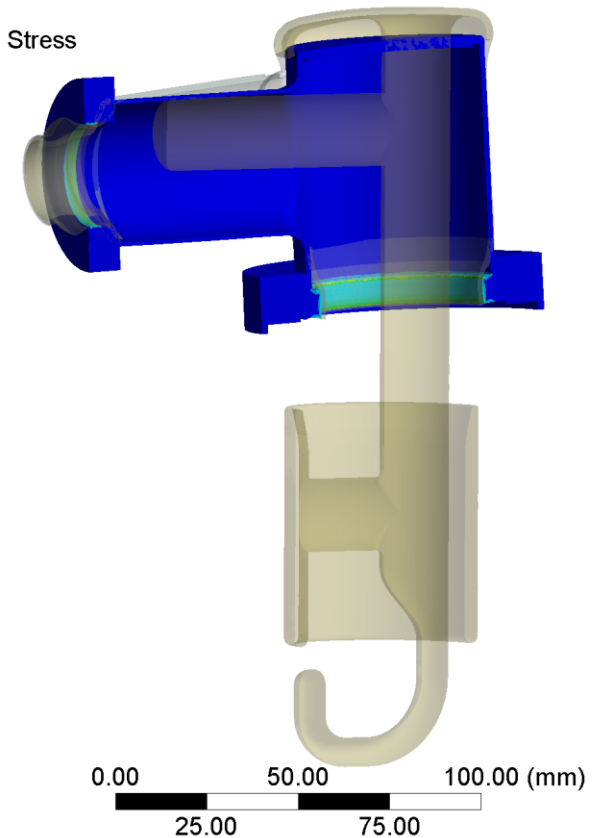
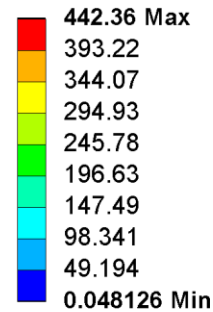


# Results: V HOM (radial bellow)

E: Static Structural  
Figure  
Type: Equivalent (von-Mises) Stress  
Unit: MPa  
Time: 1  
04/12/2014 10:45

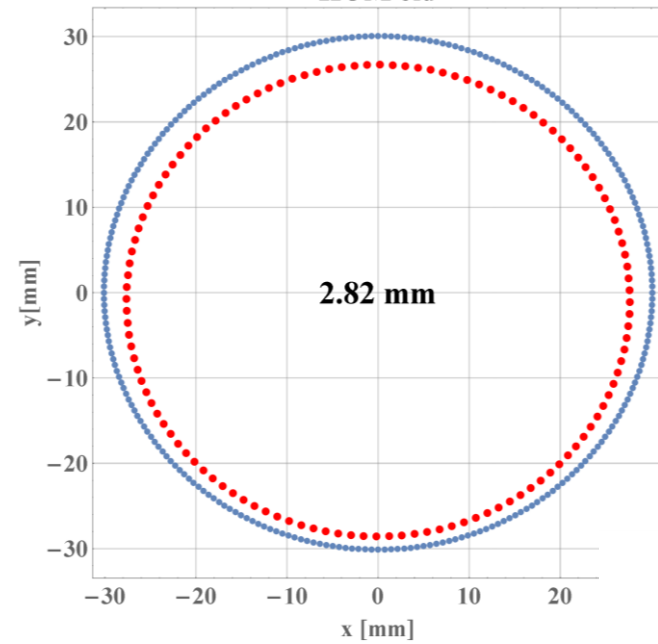


E: Static Structural  
Figure  
Type: Equivalent (von-Mises) Stress  
Unit: MPa  
Time: 1  
04/12/2014 10:45

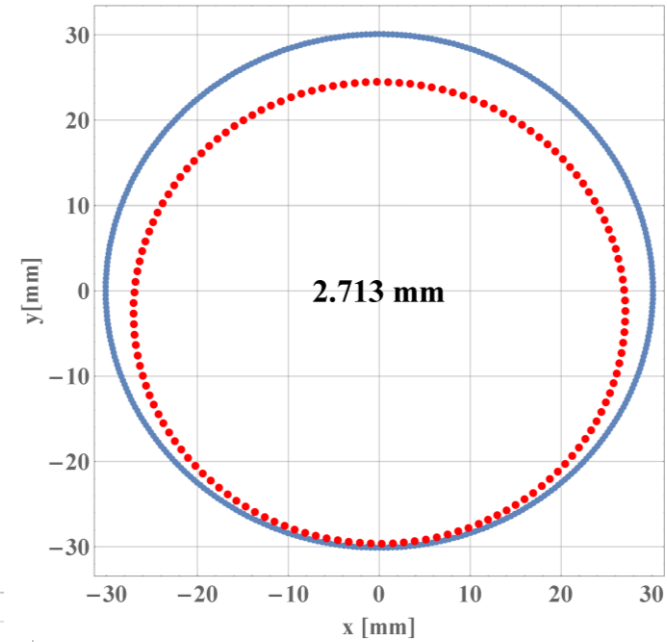


# Comparison, Deformation

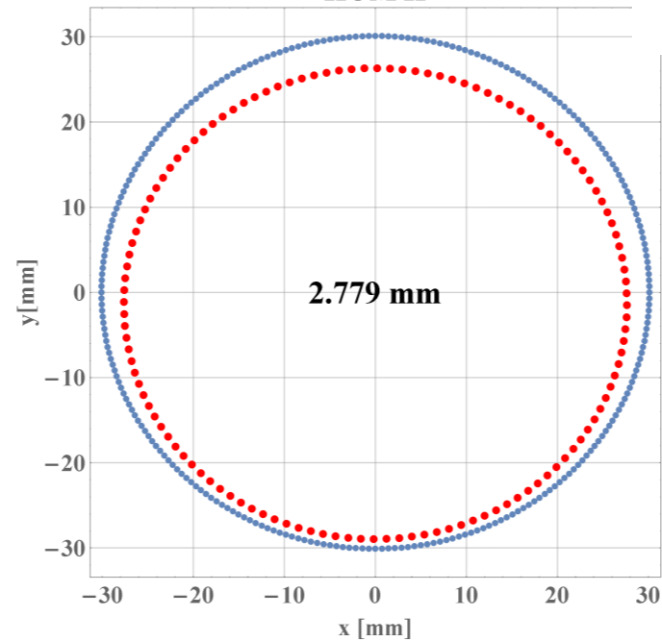
HOM old



HOM V

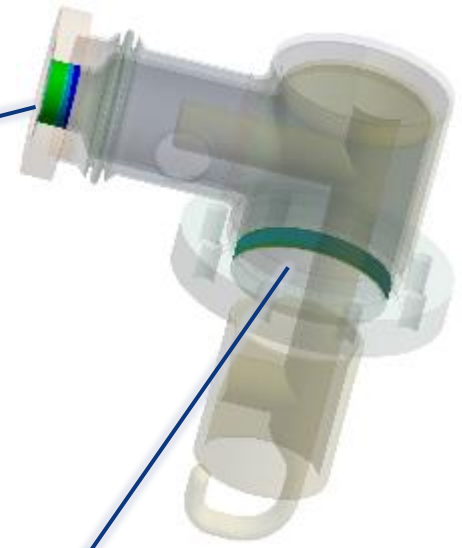


HOM H

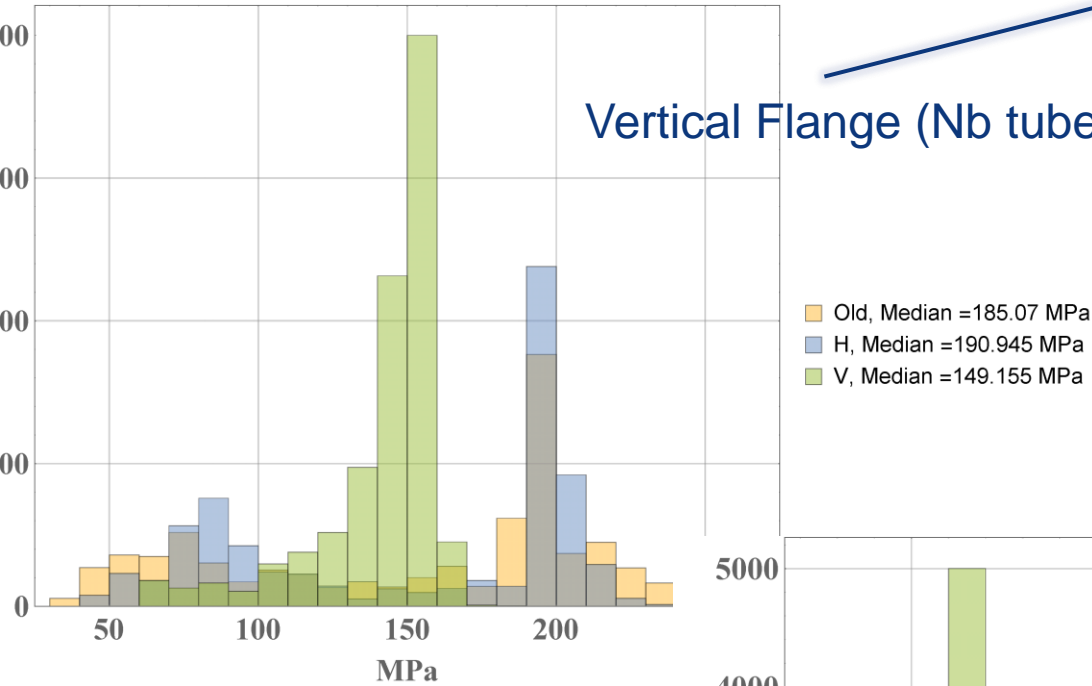




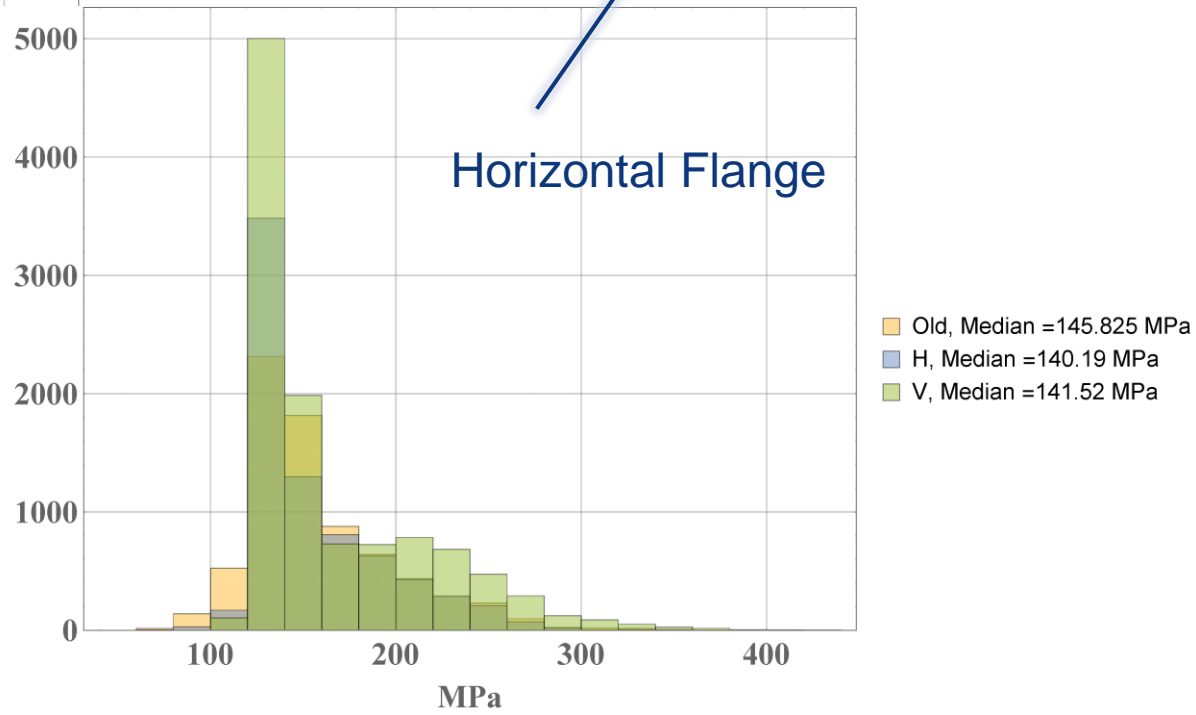
# Comparison, Stress



Vertical Flange (Nb tube)



Horizontal Flange





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