

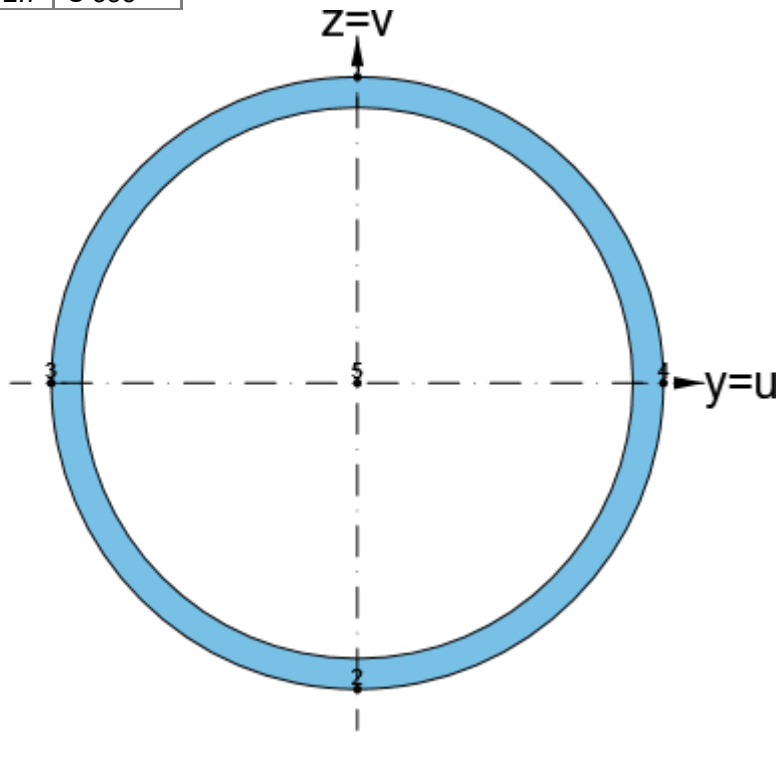


Comparison of Cross-Sections

Cross-Section and Stress Analysis for Original Tubular Section

Cross-section components

Id	Name	Material
1	CHS254,12.7	S 355



Stress points

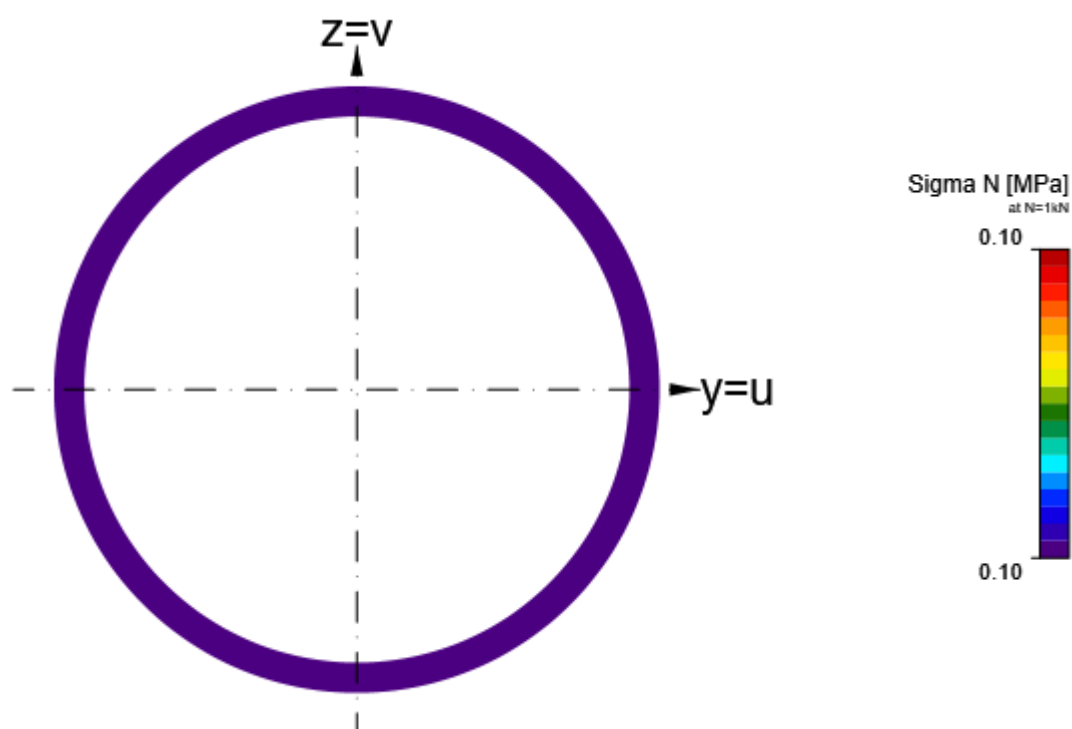
Id	Component	y [mm]	z [mm]	Type	[°]
1	CHS254,12.7	0.0	127.0	Section	90.0
2	CHS254,12.7	0.0	-127.0	Section	90.0
3	CHS254,12.7	-127.0	0.0	Section	0.0
4	CHS254,12.7	127.0	0.0	Section	0.0
5	CHS254,12.7	0.0	0.0	Point	0.0

Properties of transformed section

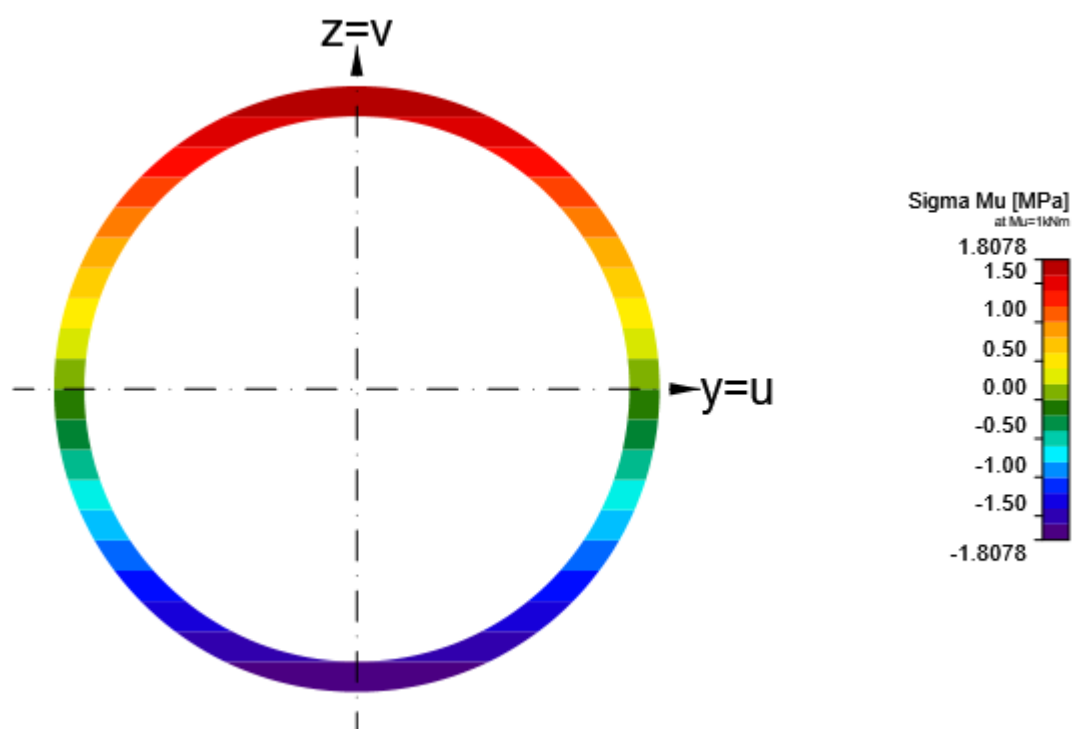
	x	y	z	u	v
A [mm ²]	9627.5			4836.5	4836.5
I [mm ⁴]		7.0251E+07	7.0251E+07	7.0251E+07	7.0251E+07
I _{yz} [mm ⁴]	-15.286				
I _t [mm ⁴]	1.405E+08				
S [mm ³]		0.18141	-0.4505		
W _{el} [mm ³]				5.5316E+05	5.5316E+05
W _{pl} [mm ³]				7.3901E+05	7.3901E+05
C _g [mm]		-4.679E-05	1.884E-05		
I _w [mm ⁶]	80.047				
i [mm]		85.42	85.42	85.42	85.42
y ₀ , z ₀ [mm]		-0.0002274	-0.0001501		
α [°]	0.0				
Painting surface [m ²]	0.80				

Stress in points at force 1kN or moment 1kNm

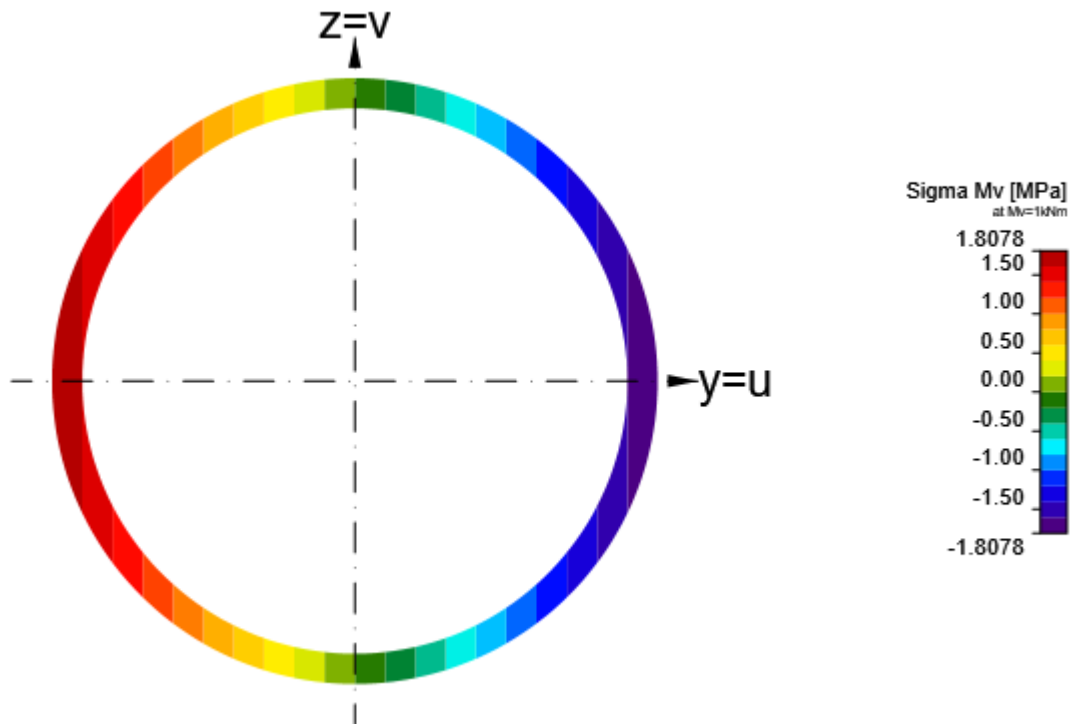
Id	Sigma N [MPa]	Sigma M _u [MPa]	Sigma M _v [MPa]	Sigma ω [MPa]	Tau V _u [MPa]	Tau V _v [MPa]	Tau M _x [MPa]	Tau ω [MPa]
1	0.104	1.81	-6.66E-07	-1.62E+06	0.207	0.000663	0.902	1.44E+04
2	0.104	-1.81	-6.66E-07	-1.78E+06	0.207	0.000638	0.902	9.51E+03
3	0.104	-2.68E-07	1.81	-1.37E+06	0.000664	0.207	0.902	1.81E+03
4	0.104	-2.68E-07	-1.81	-1.41E+06	0.000632	0.207	0.902	2.23E+03
5	0	0	0	0	0	0	0	0



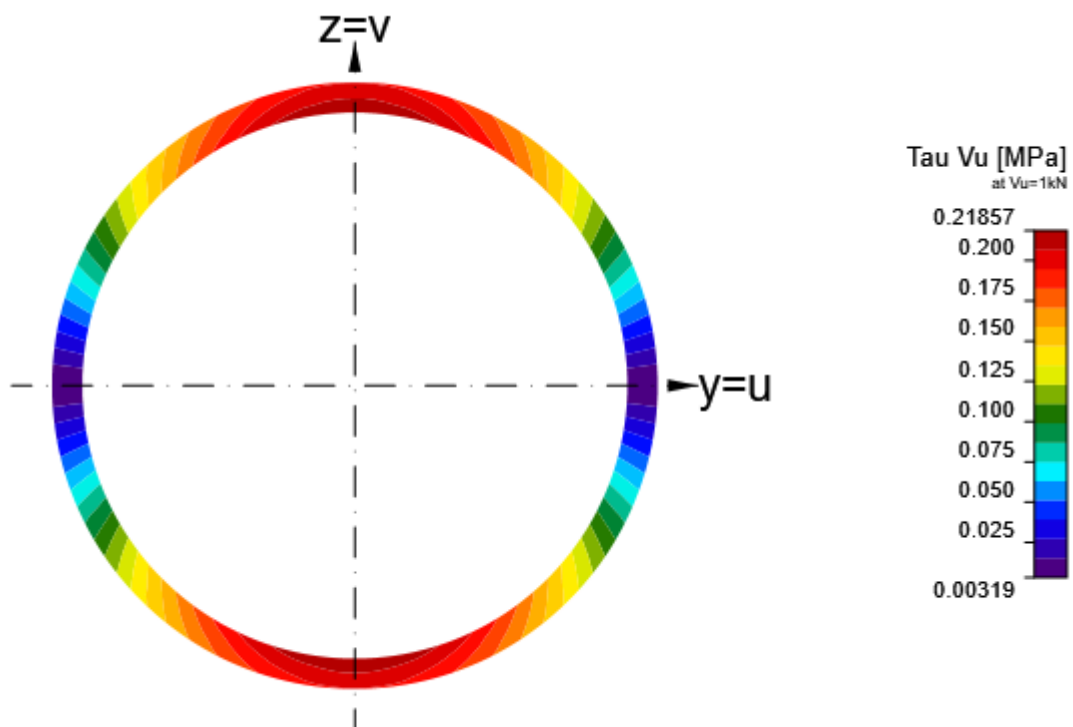
at N=1kN



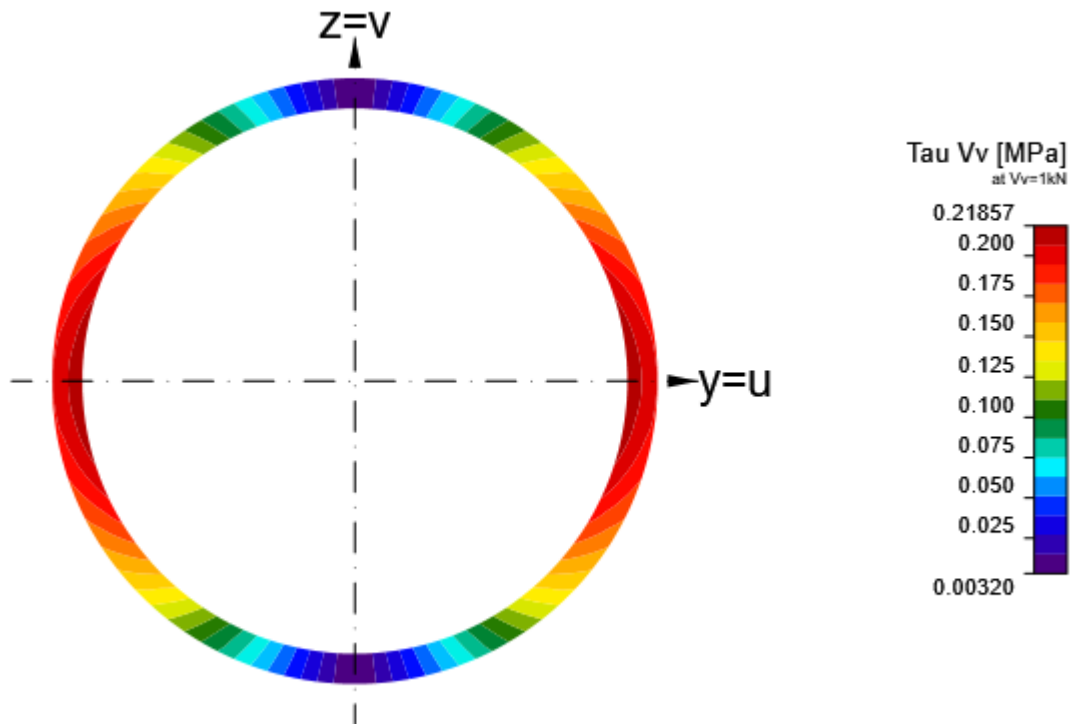
at Mu=1kNm



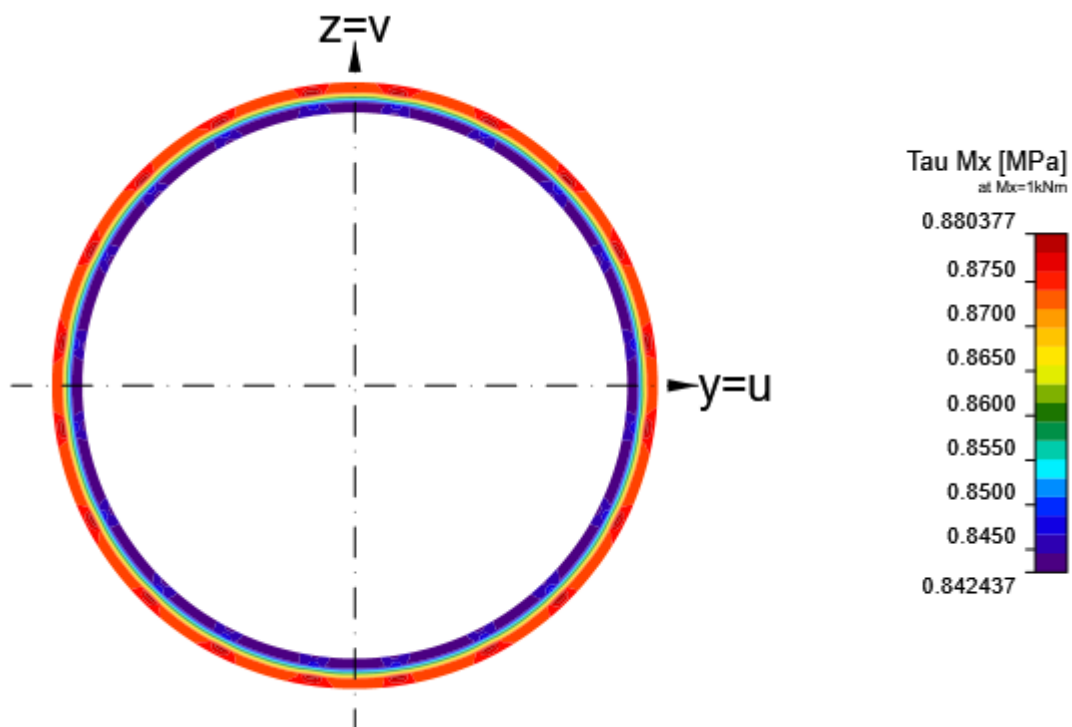
at $M_v=1\text{kNm}$



at $V_u=1\text{kN}$



at Vv=1kN

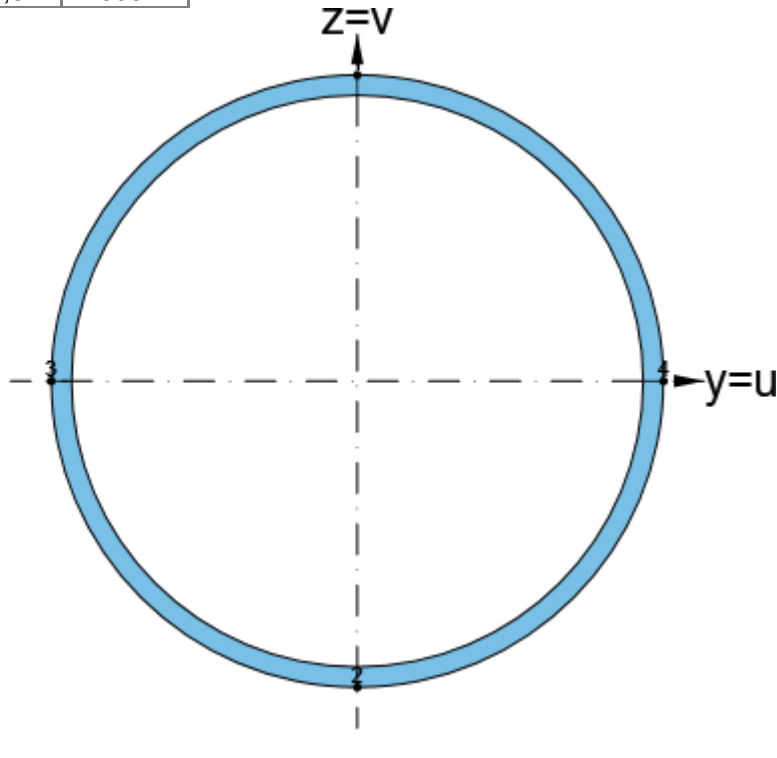


at Mx=1kNm

Cross-Section and Stress Analysis for Corroded Tubular Section

Cross-section components

Id	Name	Material
1	CHS244.8,8.1	S 355



Stress points

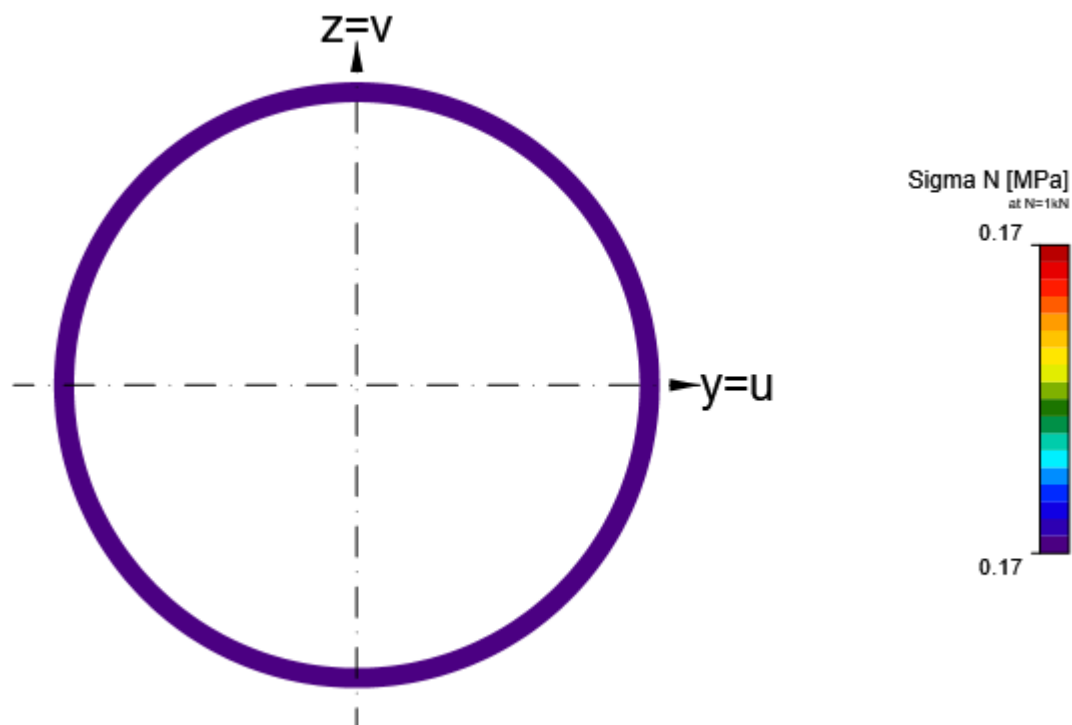
Id	Component	y [mm]	z [mm]	Type	[°]
1	CHS244.8,8.1	0.0	122.4	Section	90.0
2	CHS244.8,8.1	0.0	-122.4	Section	90.0
3	CHS244.8,8.1	-122.4	0.0	Section	0.0
4	CHS244.8,8.1	122.4	0.0	Section	0.0

Properties of transformed section

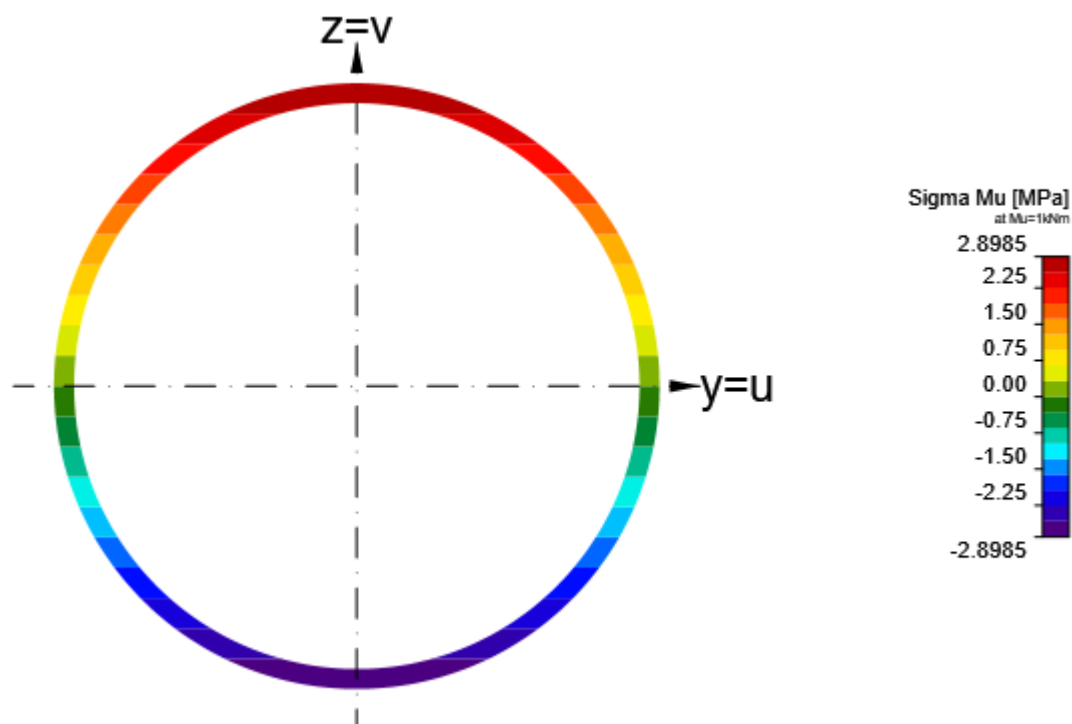
	x	y	z	u	v
A [mm ²]	6023.3			3017.7	3017.7
I [mm ⁴]		4.2229E+07	4.2229E+07	4.2229E+07	4.2229E+07
I _{yz} [mm ⁴]	35.24				
I _t [mm ⁴]	8.4458E+07				
S [mm ³]		-0.34084	-0.015083		
W _{el} [mm ³]				3.4501E+05	3.4501E+05
W _{pl} [mm ³]				4.5337E+05	4.5337E+05
C _g [mm]		-2.504E-06	-5.659E-05		
I _w [mm ⁶]	6.7273				
i [mm]		83.73	83.73	83.73	83.73
y ₀ , z ₀ [mm]		2.51E-05	4.73E-05		
α [°]	0.0				
Painting surface [m ²]	0.77				

Stress in points at force 1kN or moment 1kNm

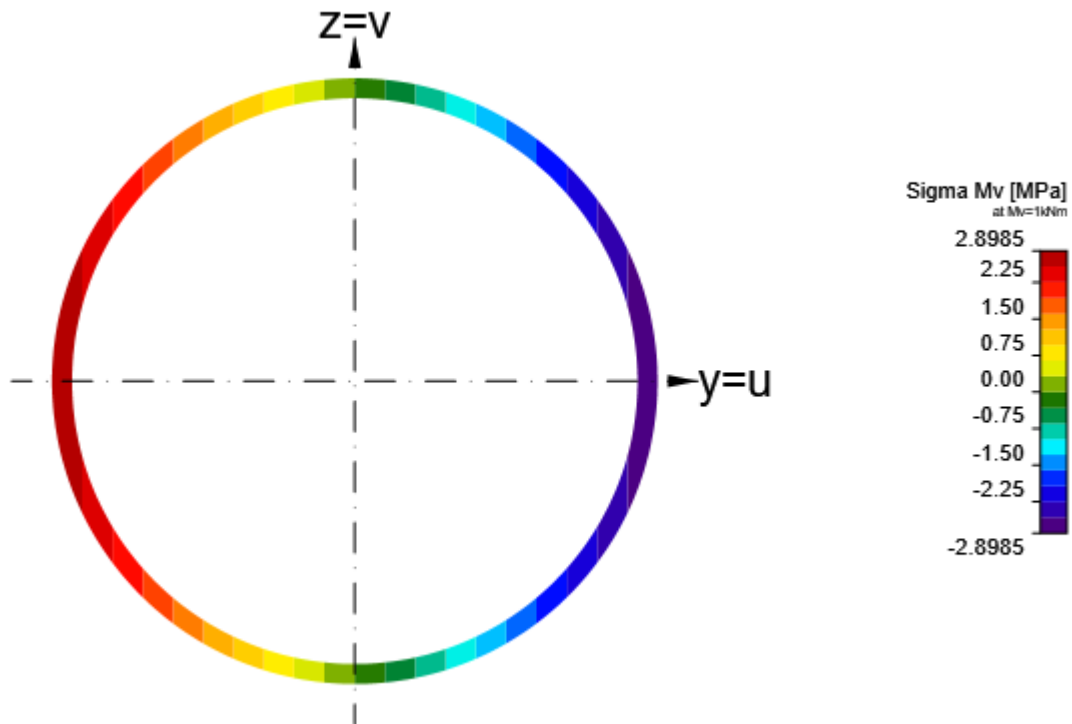
Id	Sigma N [MPa]	Sigma M _u [MPa]	Sigma M _v [MPa]	Sigma ω [MPa]	Tau V _u [MPa]	Tau V _v [MPa]	Tau M _x [MPa]	Tau ω [MPa]
1	0.166	2.9	-5.93E-08	-2.09E+06	0.332	0.0037	1.45	6.5E+04
2	0.166	-2.9	-5.93E-08	-1.69E+06	0.332	0.0037	1.45	4.56E+03
3	0.166	1.34E-06	2.9	-1.02E+06	0.00371	0.332	1.45	1.73E+04
4	0.166	1.34E-06	-2.9	-1.78E+06	0.0037	0.332	1.45	4.68E+03



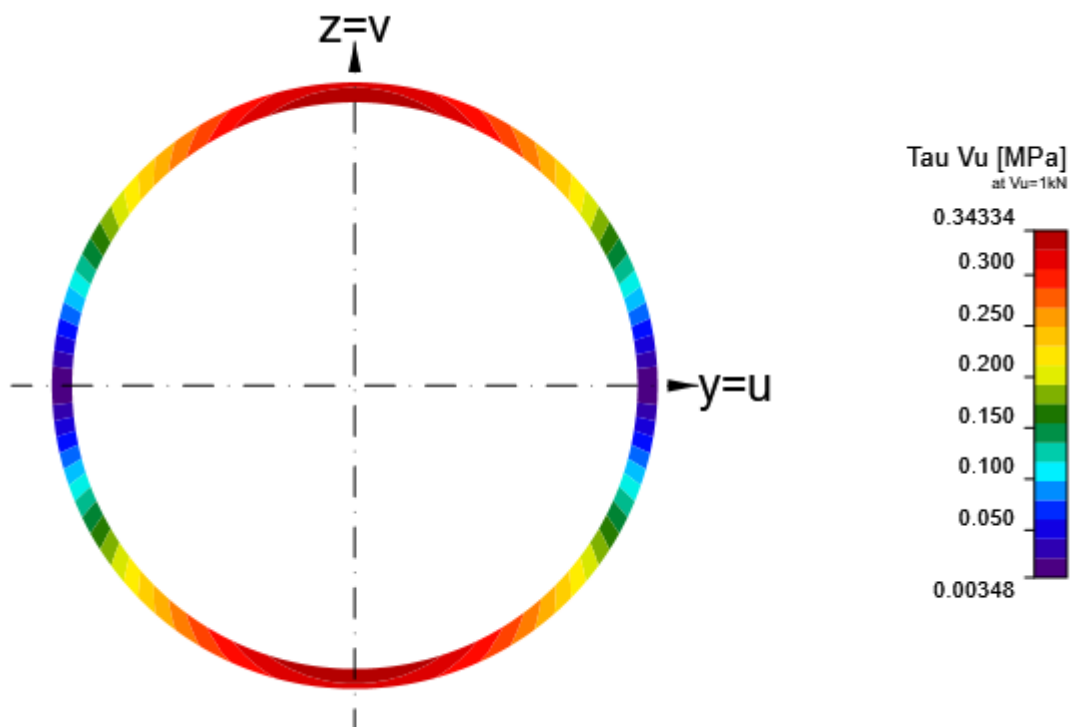
at N=1kN



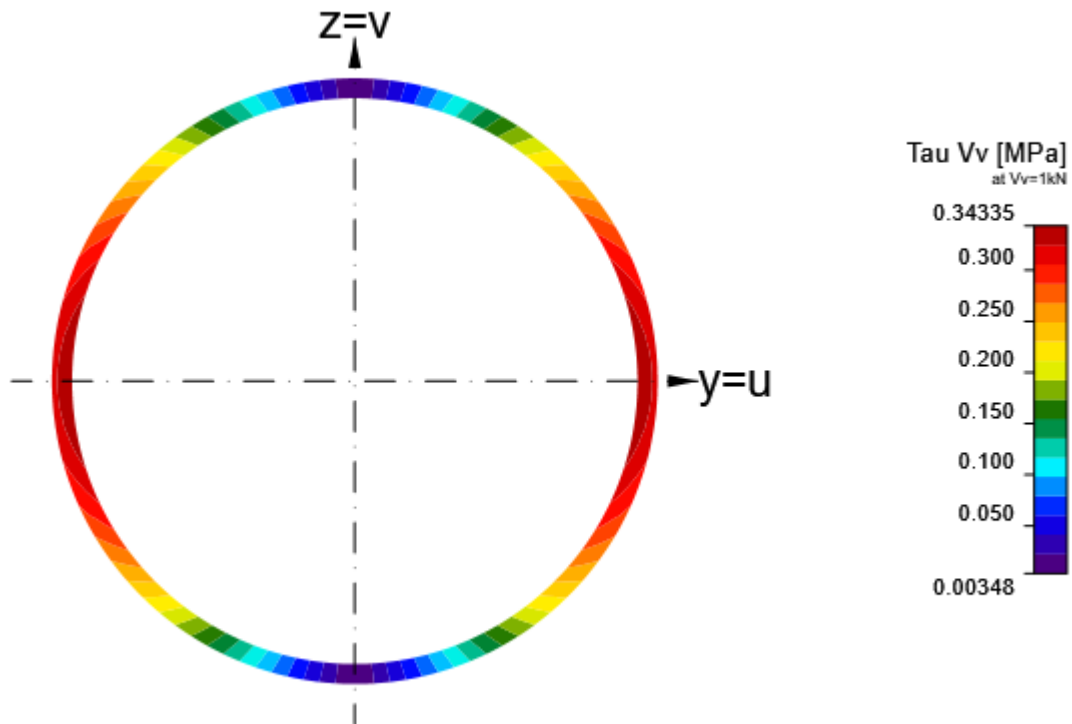
at Mu=1kNm



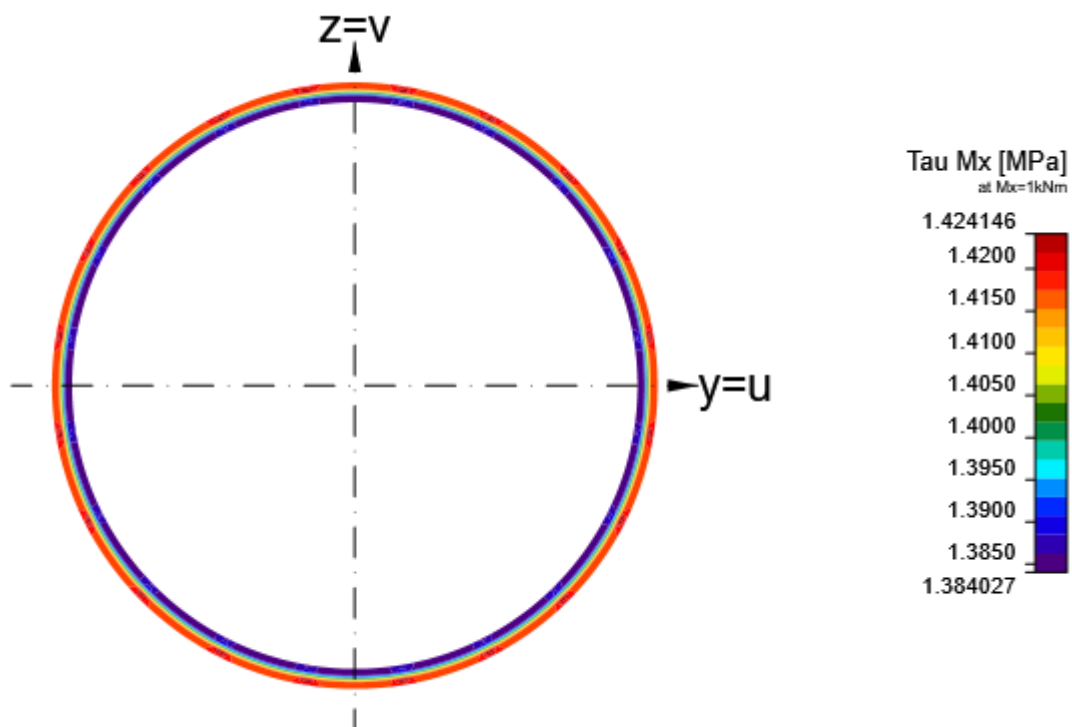
at $M_v=1\text{kNm}$



at $V_u=1\text{kN}$



at Vv=1kN

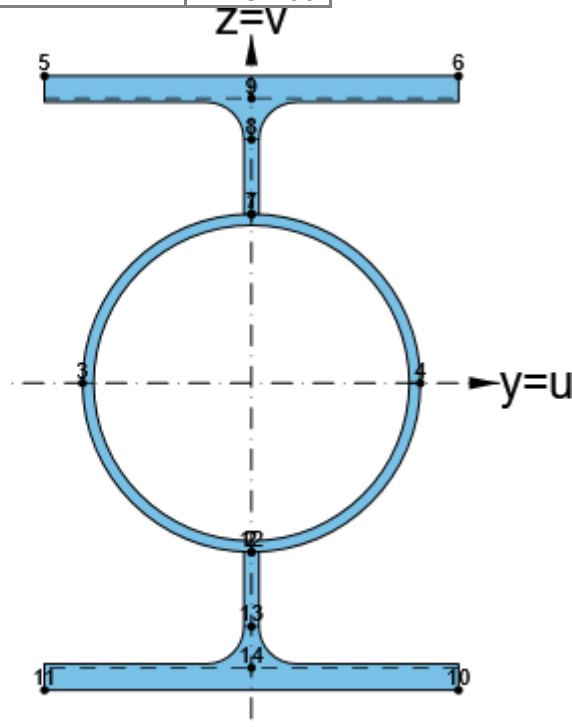


at Mx=1kNm

Cross-Section and Stress Analysis for Built-up Section

Cross-section components

Id	Name	Material
1	Tube 244.8 X 8.1 (CHS244.8,8.1)	AISC-A36
2	T(HEB300)	AISC-A36
3	T(HEB300)	AISC-A36



Stress points

Id	Component	y [mm]	z [mm]	Type	[°]
1	Tube 244.8 X 8.1 (CHS244.8,8.1)	0.0	122.4	Section	90.0
2	Tube 244.8 X 8.1 (CHS244.8,8.1)	0.0	-122.4	Section	90.0
3	Tube 244.8 X 8.1 (CHS244.8,8.1)	-122.4	0.0	Section	0.0
4	Tube 244.8 X 8.1 (CHS244.8,8.1)	122.4	0.0	Section	0.0
5	T(HEB300)	-150.0	222.4	Point	0.0
6	T(HEB300)	150.0	222.4	Point	0.0
7	T(HEB300)	0.0	122.4	Point	0.0
8	T(HEB300)	0.0	176.4	Section	0.0
9	T(HEB300)	0.0	206.1	Section	0.0
10	T(HEB300)	150.0	-222.4	Point	0.0
11	T(HEB300)	-150.0	-222.4	Point	0.0
12	T(HEB300)	0.0	-122.4	Point	0.0
13	T(HEB300)	0.0	-176.4	Section	0.0
14	T(HEB300)	0.0	-206.1	Section	0.0

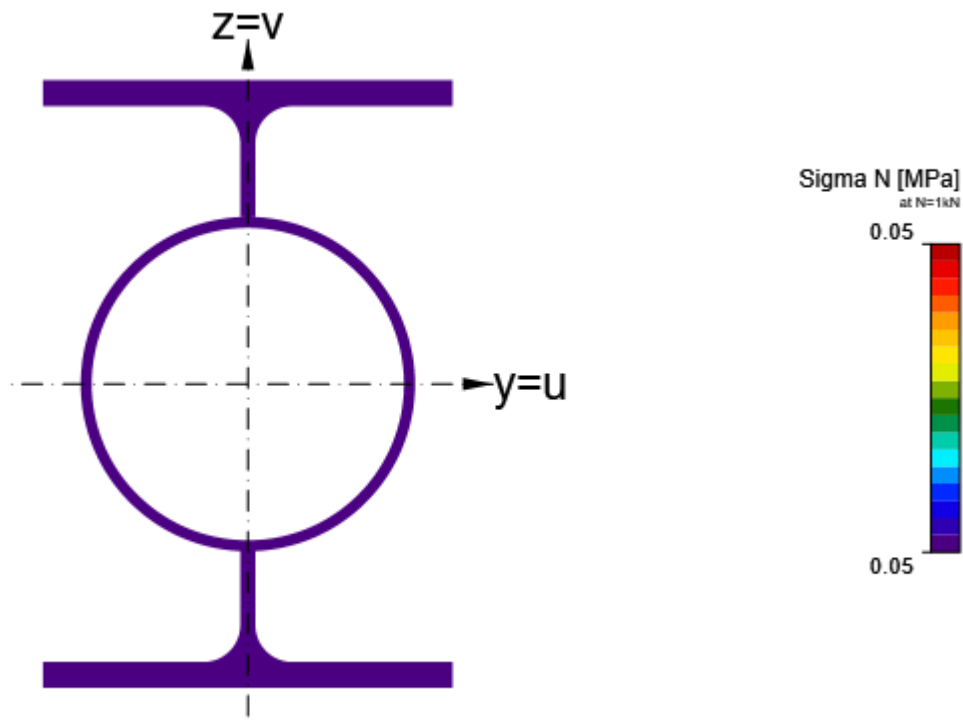
Properties of transformed section

	x	y	z	u	v
A [mm ²]	19838			12563	4725.4
I [mm ⁴]		6.322E+08	1.2785E+08	6.322E+08	1.2785E+08
I _{yz} [mm ⁴]	-2044.9				
I _t [mm ⁴]	8.6551E+07				

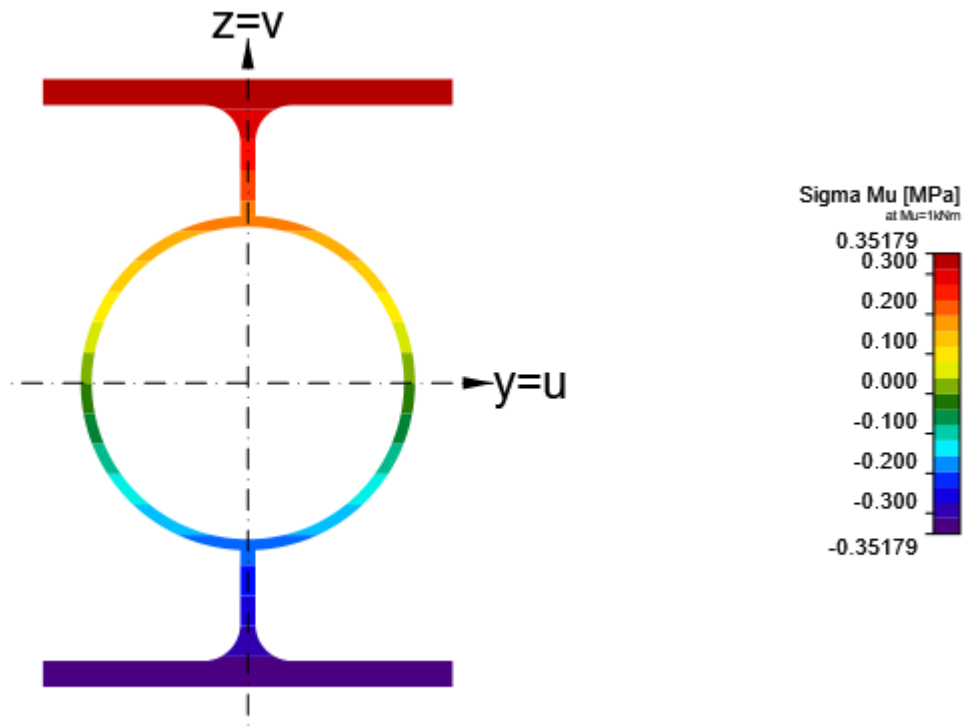
S [mm ³]		0.082871	-4.3802		
Wel [mm ³]				2.8426E+06	8.5233E+05
Wpl [mm ³]				3.2947E+06	1.3205E+06
Cg [mm]		-0.0002208	4.177E-06		
Iw [mm ⁶]	3.8194E+12				
i [mm]		178.5	80.28	178.5	80.28
y0, z0 [mm]		0.0001366	0.0001351		
α [°]	0.0				
Painting surface [m ²]	2.32				

Stress in points at force 1kN or moment 1kNm

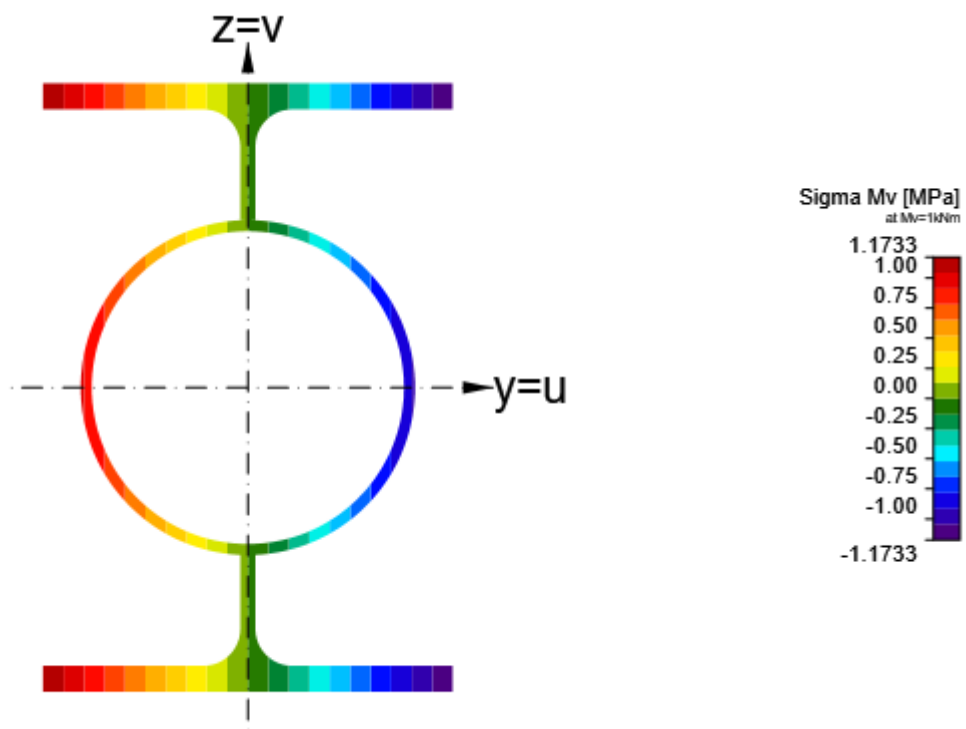
Id	Sigma N [MPa]	Sigma M _u [MPa]	Sigma M _v [MPa]	Sigma ω [MPa]	Tau V _u [MPa]	Tau V _v [MPa]	Tau M _x [MPa]	Tau ω [MPa]
1	0.0504	0.194	-5.61E-06	-0.0023	0.0923	0.144	1.26	0.000648
2	0.0504	-0.194	2.15E-06	-0.00229	0.0923	0.144	1.26	0.000648
3	0.0504	7.78E-07	0.957	-3.83E-05	0.00123	0.161	1.42	0.000465
4	0.0504	-7.92E-07	-0.957	-4.92E-05	0.00122	0.161	1.42	0.000463
5	0.0504	0.352	1.17	-7.97	0.00213	0.000617	0.0393	0.0151
6	0.0504	0.352	-1.17	7.97	0.00213	0.000617	0.0393	0.0151
7	0.0504	0.194	-5.61E-06	-0.0023	0.0549	0.233	0.725	0.000659
8	0.0504	0.278	0.000141	-0.000823	0.000721	0.192	0.108	0.00648
9	0.0504	0.326	-0.000418	0.00295	0.0581	5.63E-05	0.177	0.372
10	0.0504	-0.352	-1.17	-7.97	0.00213	0.000617	0.0393	0.0151
11	0.0504	-0.352	1.17	7.97	0.00213	0.000617	0.0393	0.0151
12	0.0504	-0.194	2.15E-06	-0.00229	0.0509	0.243	0.658	0.000635
13	0.0504	-0.278	0.000203	0.00114	0.00072	0.192	0.108	0.00643
14	0.0504	-0.326	-0.00164	-0.0113	0.0581	5.63E-05	0.177	0.369



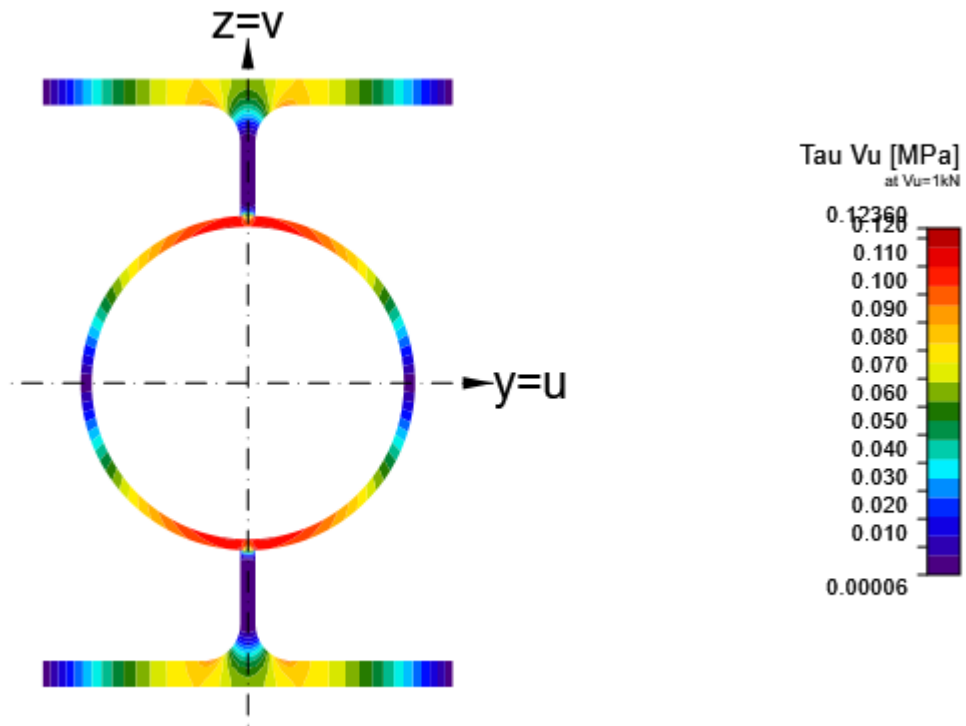
at $N=1\text{kN}$



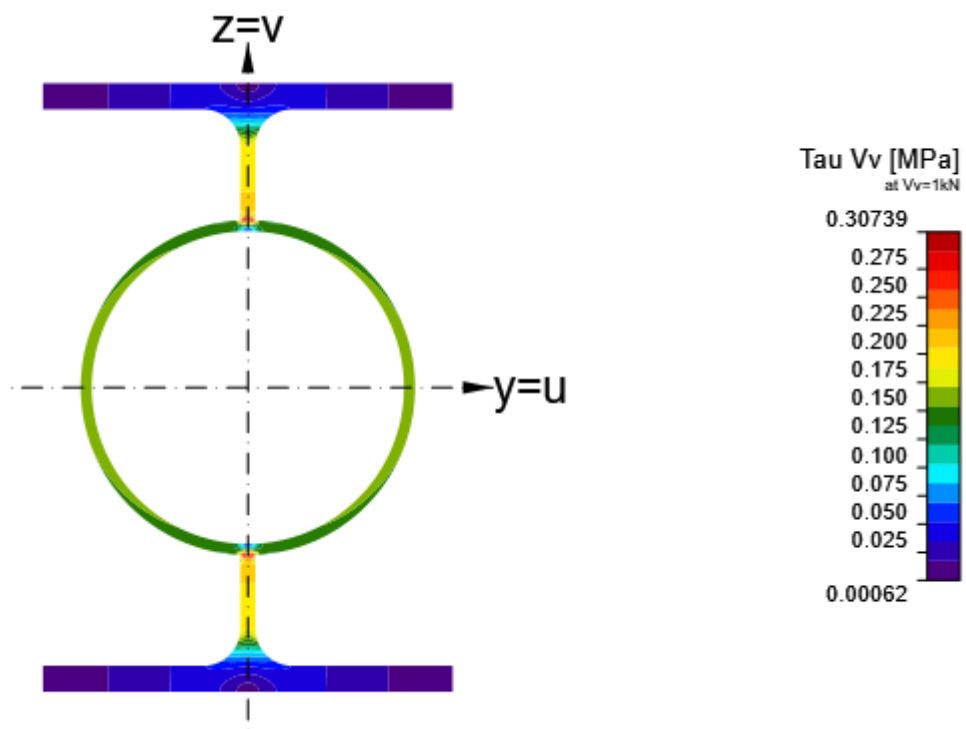
at $\mu=1\text{kNm}$



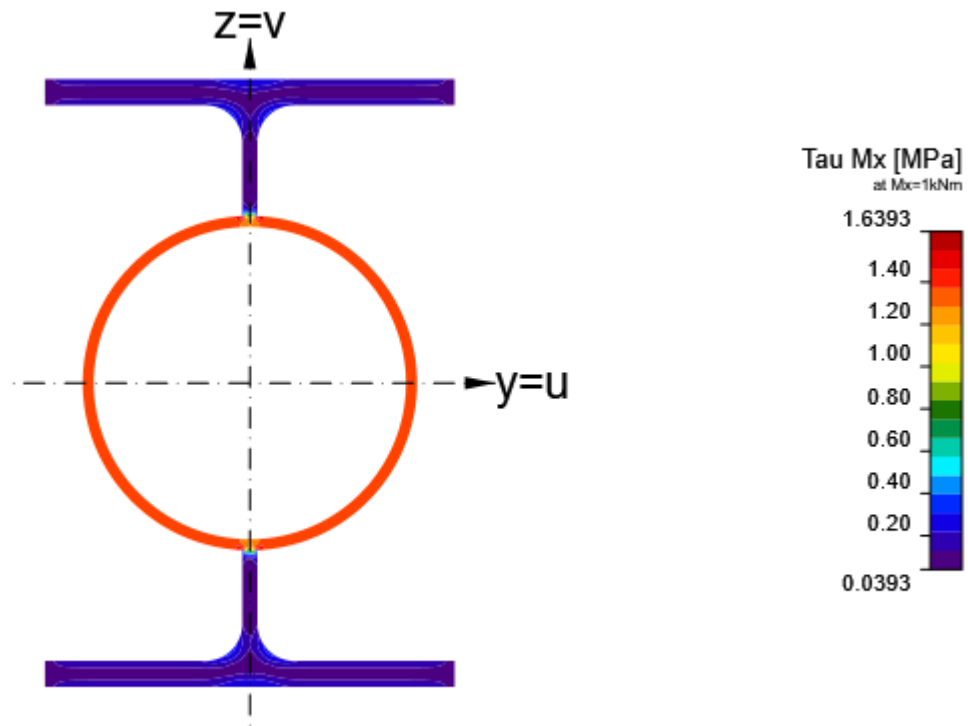
at $M_v=1\text{kNm}$



at $V_u = 1\text{ kN}$



at $V_v = 1\text{ kN}$



at $Mx=1\text{kNm}$