FEM simulations of MDF100 and MF130

Consulting project for SteelWall ISH GmbH

Hamburg, November 2023

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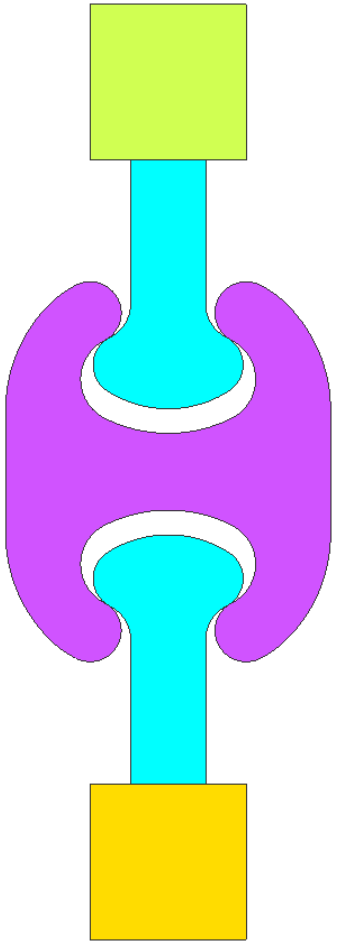
SteelWall®
Schlossprofile für Stahlspundwände



MDF100 = DF + 2x M35

HEXAGON

MDF100 = DF + 2x M35

Problem description

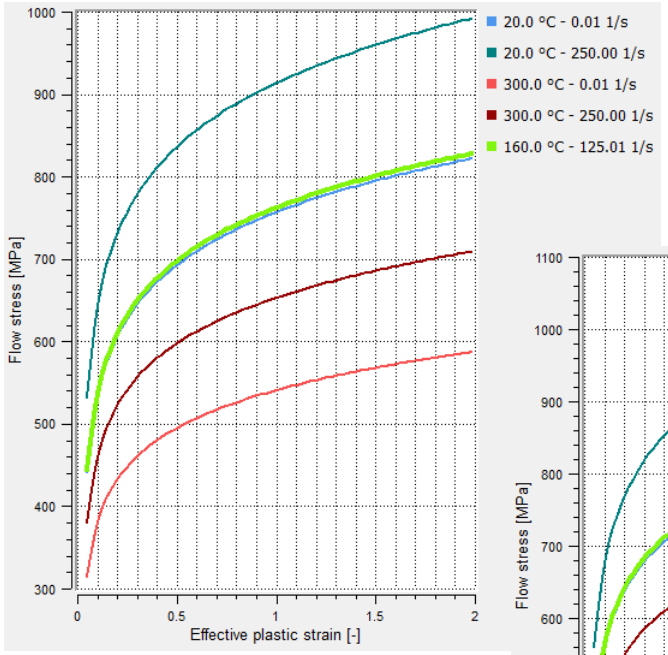
- A simulation study of ideal straight and symmetric tensile loading was conducted for MDF100 clutch bar consisting of the components DF and 2x M35.
- The simulations were set up as 2d planar analysis assuming a plane strain state using a die velocity of 1 mm/s.
- Coulomb friction with a friction coefficient of $\mu = 0.5$ was assumed after discussion with the customer.
- The components have only been stacked together. Weld seams have not been considered between the two components.
- The main focus of the post processing was the evolution of the forces over the stroke as well as the distribution of the equivalent v. Mises stress.

MDF100 = DF + 2x M35

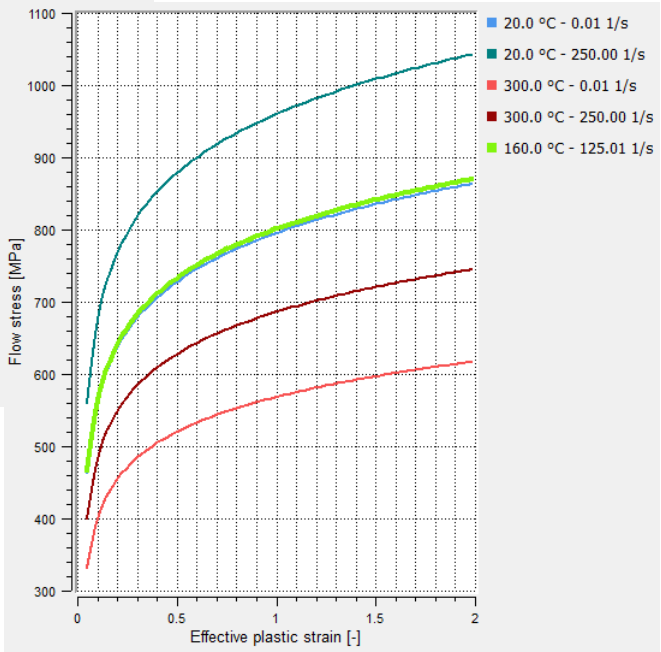
Material data

- Sheet piles are made of S355J2 (M35) and S430GP (DF). It was assumed that the plastic deformation behaviour is similar to S355GP.
- Assumed / researched characteristics:

Mechanical properties			Chemical Distribution				
Material	Min. yield stress	Min. tensile strength	C	Si	Mn	P	S
	MPa	MPa	%	%	%	%	%
S355GP	355	480	0,27	0,6	1,7	0,055	0,055
S430GP	430	510	0,27	0,6	1,7	0,055	0,055



S355J2



S420GP

- The similar materials S355J2 and S420GP from the Simufact Forming material database were used in the simulation.

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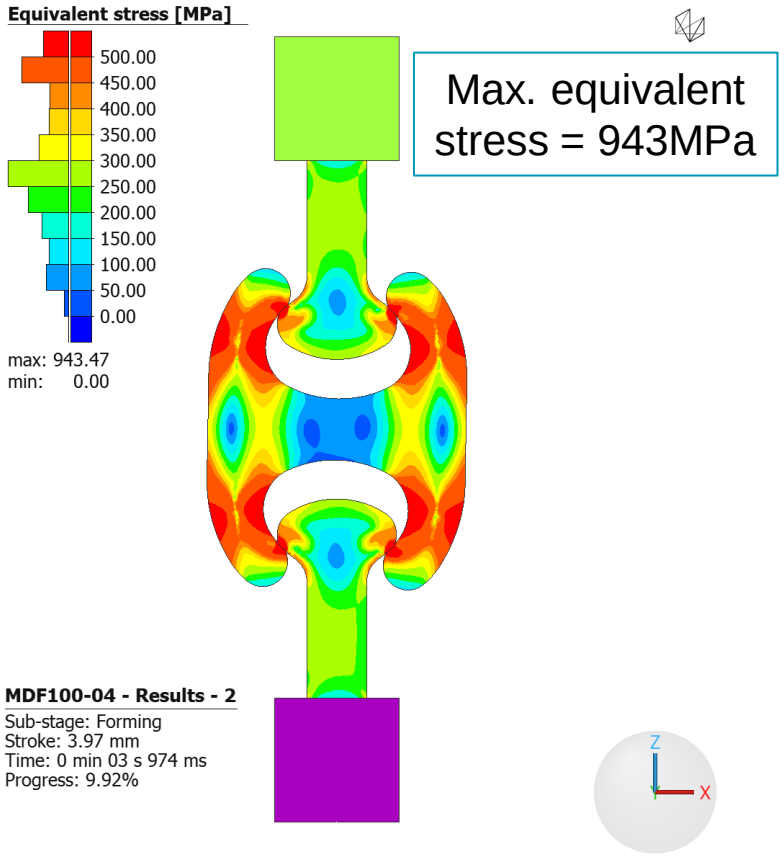
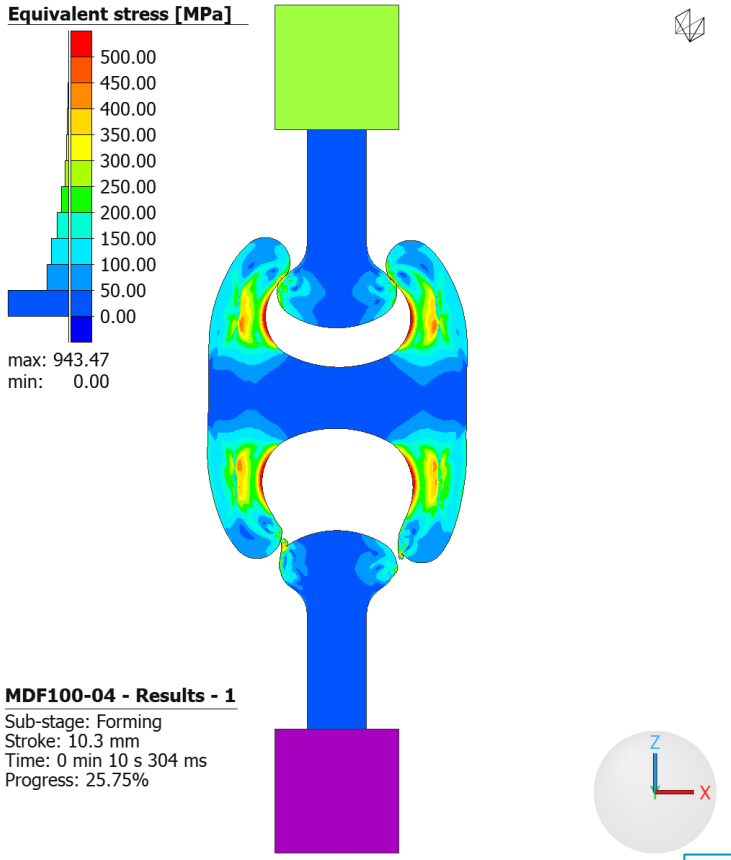
MDF100 = DF + 2x M35

Simulation results

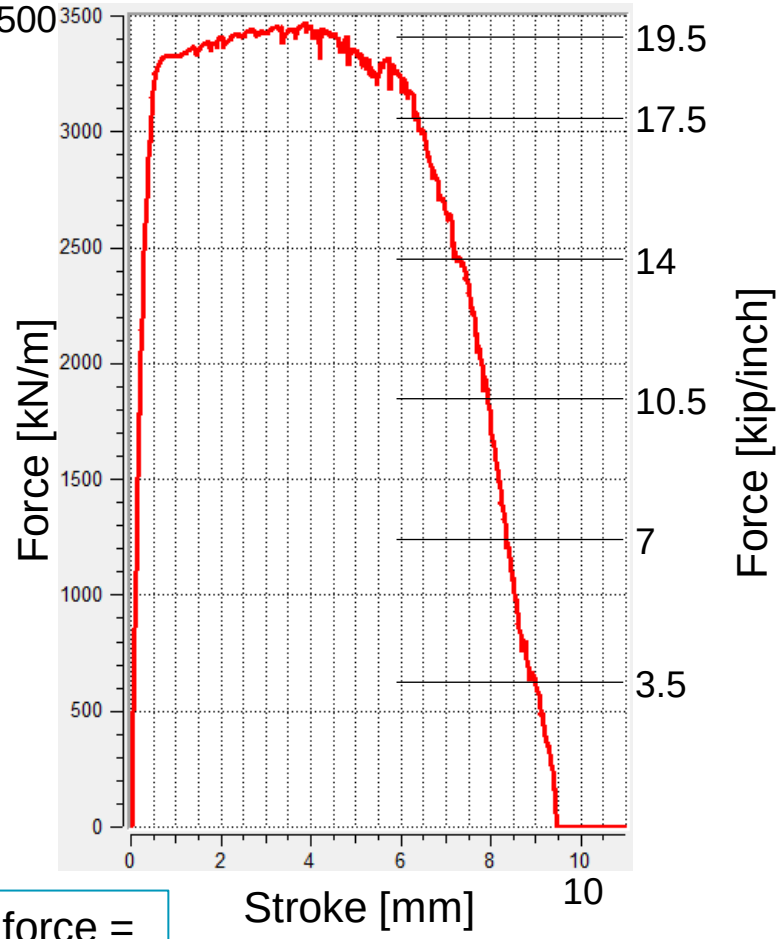


Max. equivalent stress = 943MPa

Equivalent stress at maximum force



Equivalent stress after release



Max. force = 3464kN = 19.78 kip/inch

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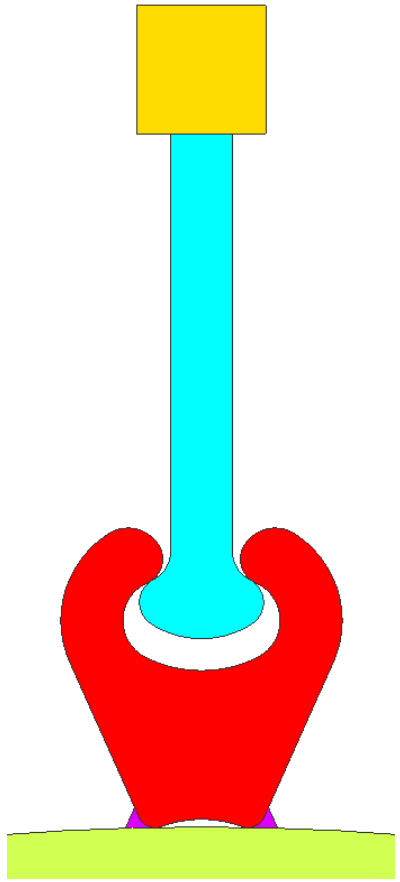

MF130 = F40 + M90

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MF130 = F40 + M90

Problem description

- A simulation study of ideal straight and symmetric tensile loading was conducted for MF130 clutch bar consisting of the components F40 and M90.
- The simulations were set up as 2d planar analysis assuming a plane strain state using a die velocity of 1 mm/s.
- Coulomb friction with a friction coefficient of $\mu = 0.5$ was assumed after discussion with the customer.
- The components have only been stacked together. Weld seams have not been considered between the two components.
- F40 was welded on a rigid tube with a diameter of 1m. The weld seam was considered with a>6mm.
- The main focus of the post processing was the evolution of the forces over the stroke as well as the distribution of the equivalent v. Mises stress.

MF130 = F40 + M90

Material data

- Sheet piles are made of S355J2 and S430GP.
  It was assumed that the plastic deformation behaviour is similar to S355GP.
- Assumed / researched characteristics:

Mechanical properties			Chemical Distribution				
Material	Min. yield stress	Min. tensile strength	C	Si	Mn	P	S
	MPa	MPa	%	%	%	%	%
S355GP	355	480	0,27	0,6	1,7	0,055	0,055
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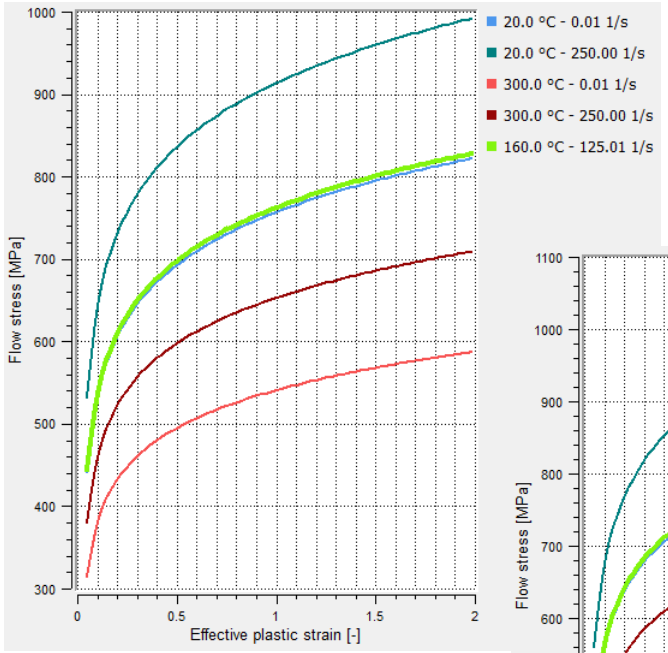
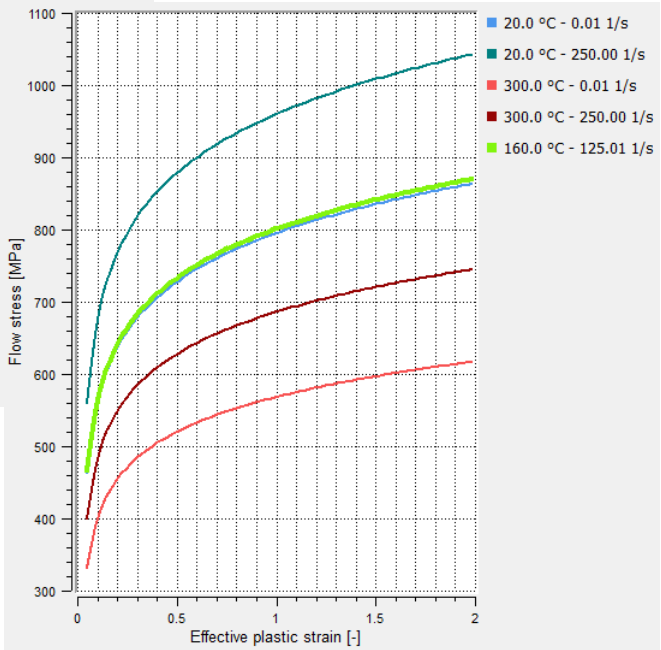
- The similar materials S355J2 and S420GP from the Simufact Forming material database were used in the simulation.



S355J2



S420GP

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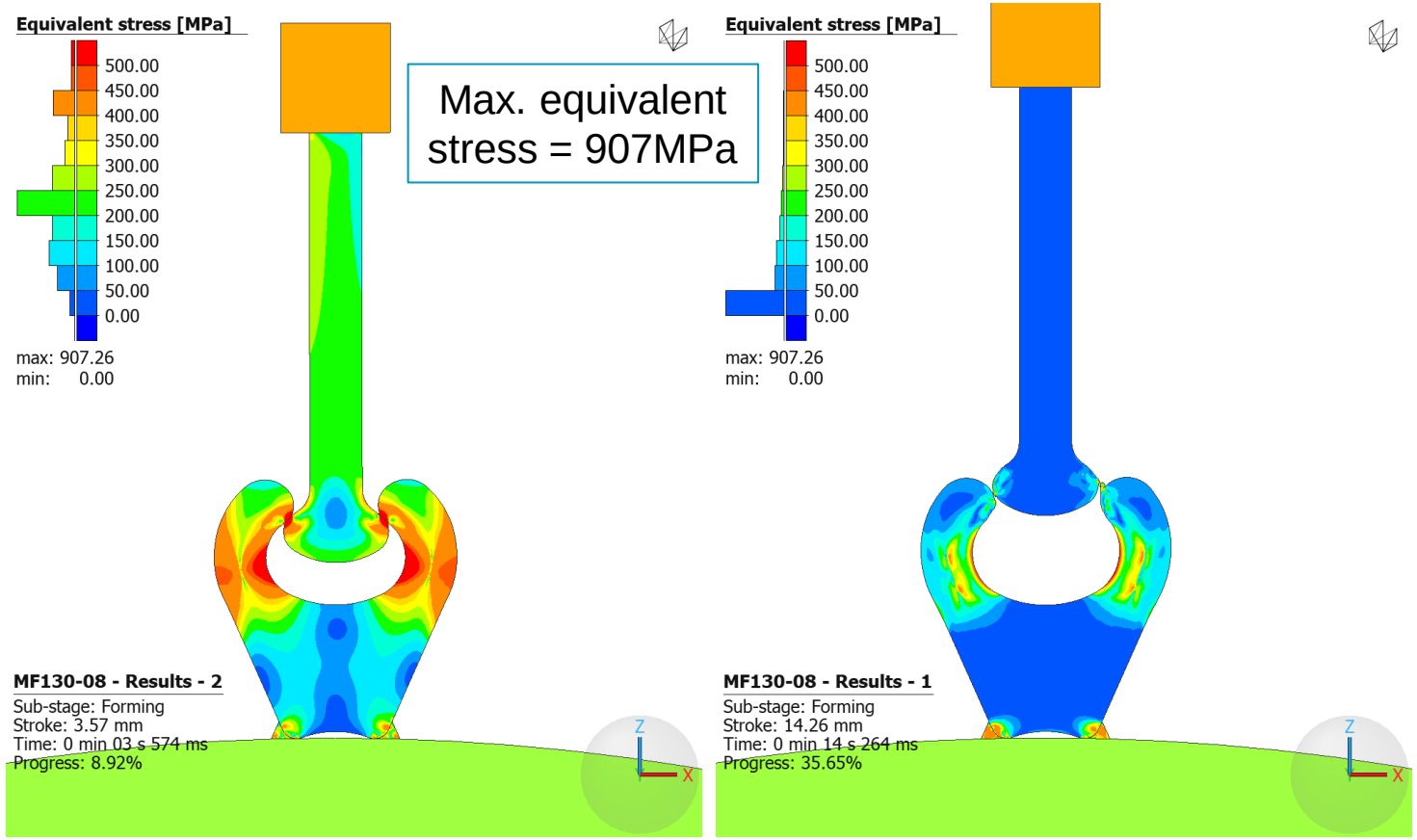
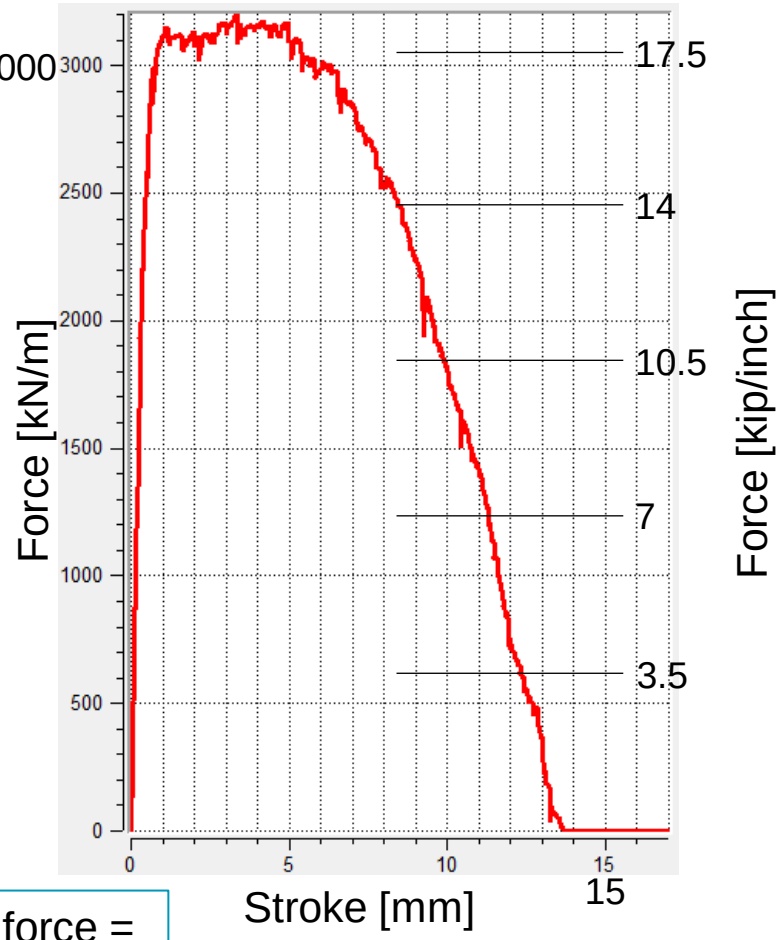
MF130 = F40 + M90 – S355J2

Simulation results



Equivalent stress at maximum force

Equivalent stress after release



Max. force = 3199kN = 18.27 kip/inch

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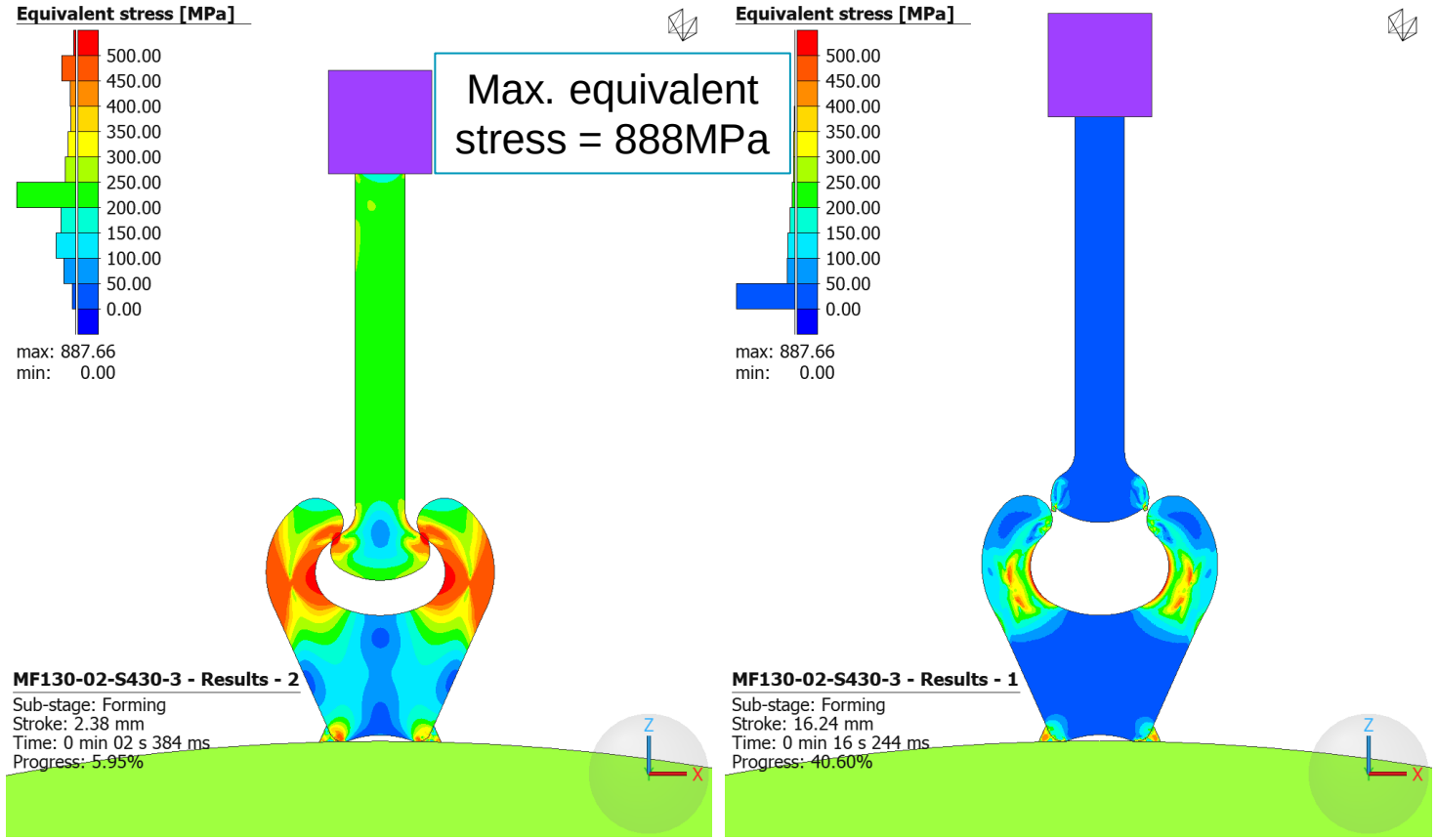
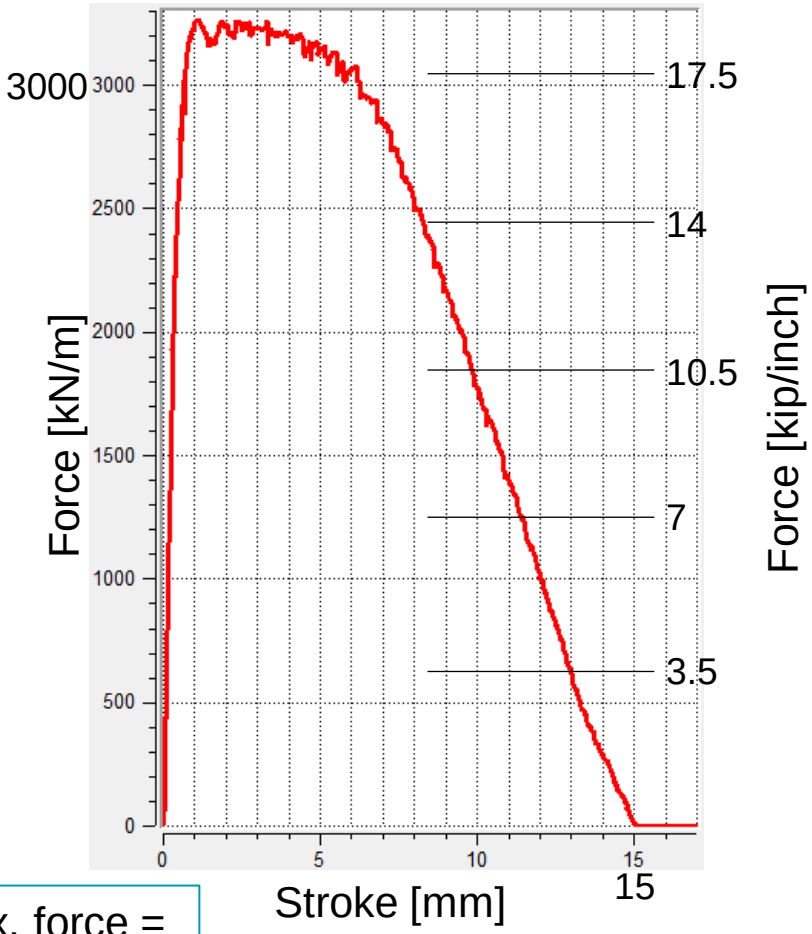
MF130 = F40 + M90 – S420GP

Simulation results



Equivalent stress at maximum force

Equivalent stress after release



Max. force = 3260kN = 18.62 kip/inch

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