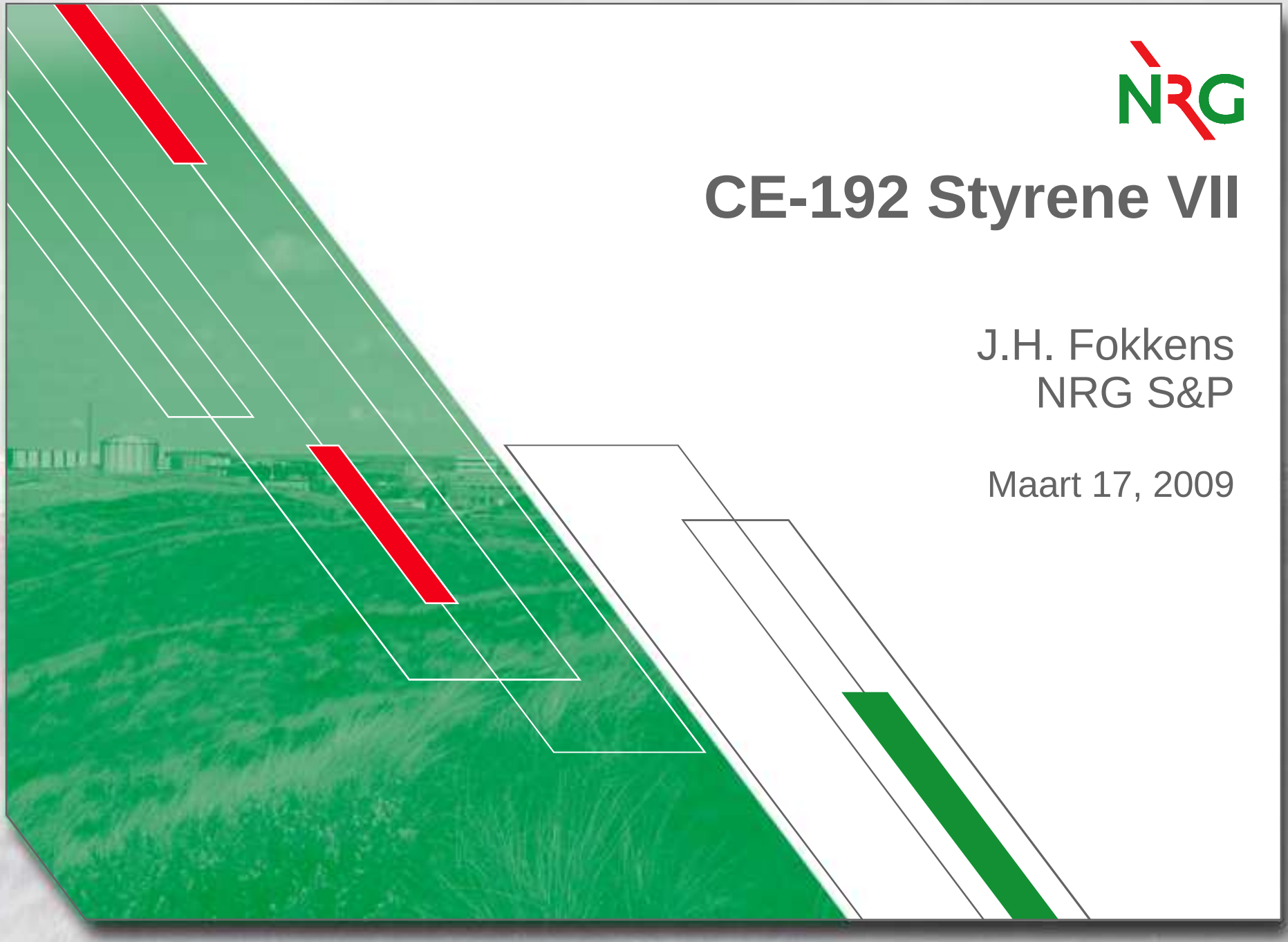


CE-192 Styrene VII

J.H. Fokkens
NRG S&P

Maart 17, 2009

Probleemstelling

SIC in lassen rond stoominlaat nozzle van Interstage Heat Exchanger

- Bepaling van de minimum wanddikte bij de lassen van de stoominlaat nozzle

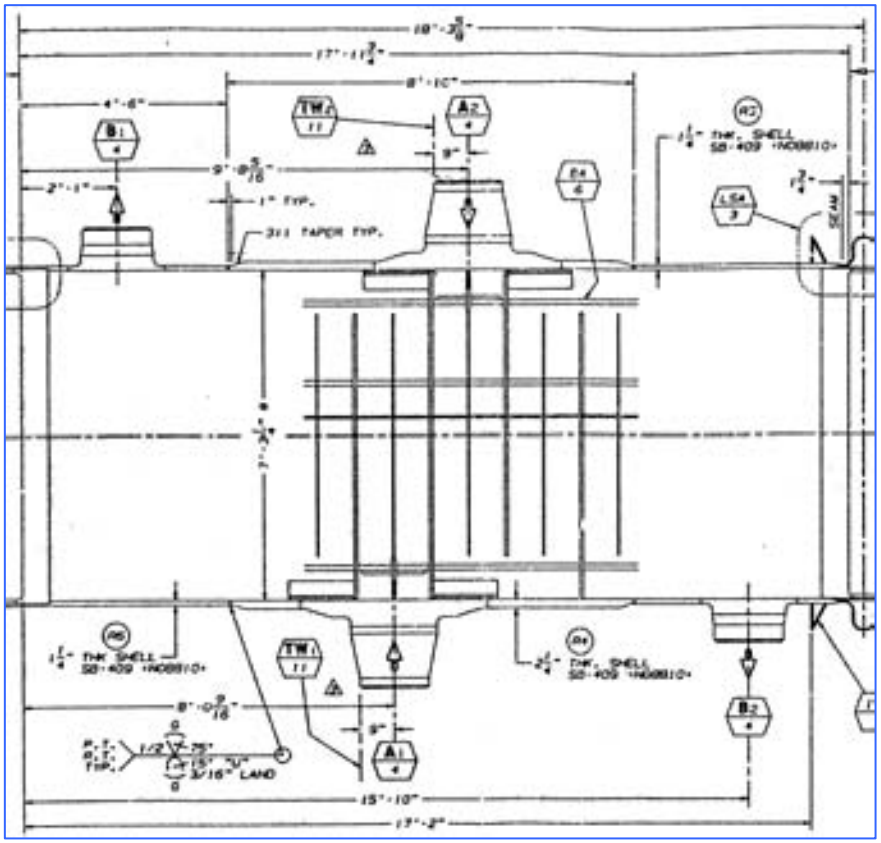
- Thermo-mechanische analyses voor de In-Situ PWHT van de Interstage Heat Exchanger

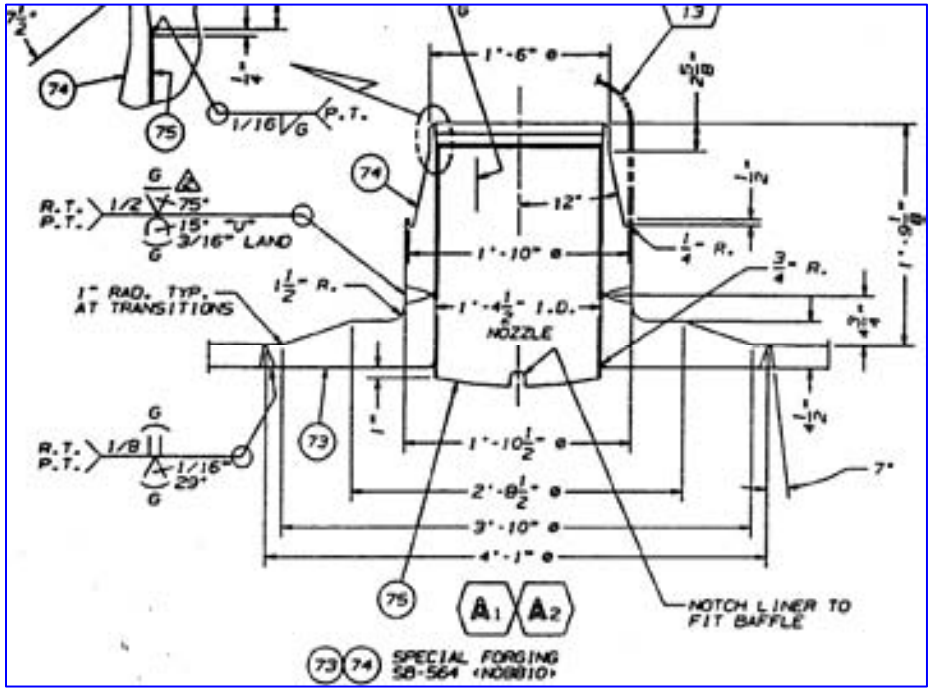
Doelstelling

Bepaling van:

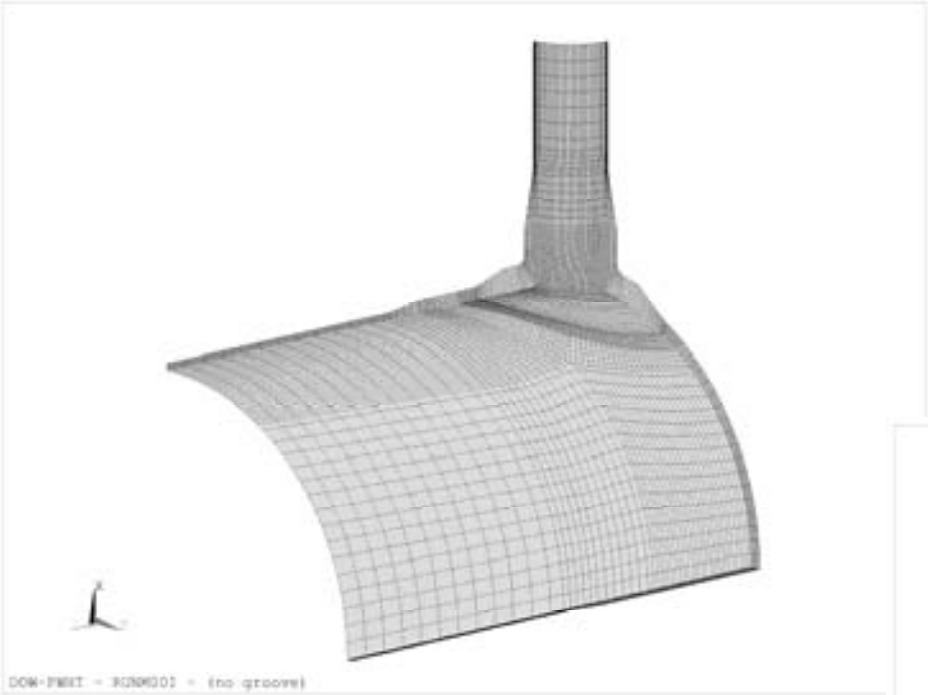
- Verbeterde start-up transient ter reductie van de thermische spanningen in het SIC gevoelige materiaal
- Uitvoerbaarheid van een In-Situ PWHT
- Warmteinbreng van de heater matten voor het bereiken van en het houden op de PWHT temperatuur

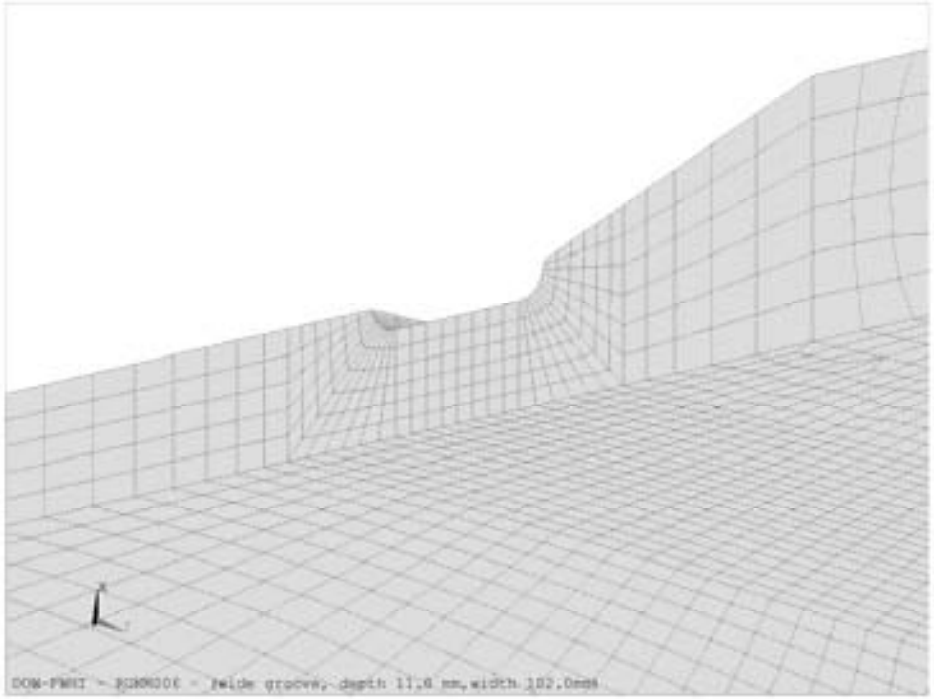
Geometrie




1'-6" ø
12"
1'-10" ø
1" RAD. TYP. AT TRANSITIONS
1'-4½" I.D. NOZZLE
1'-10½" ø
2'-8½" ø
3'-10" ø
4'-1" ø
NOTCH LINER TO FIT BAFFLE
SPECIAL FORGING SB-564 <N08810>

Eindig elementen model

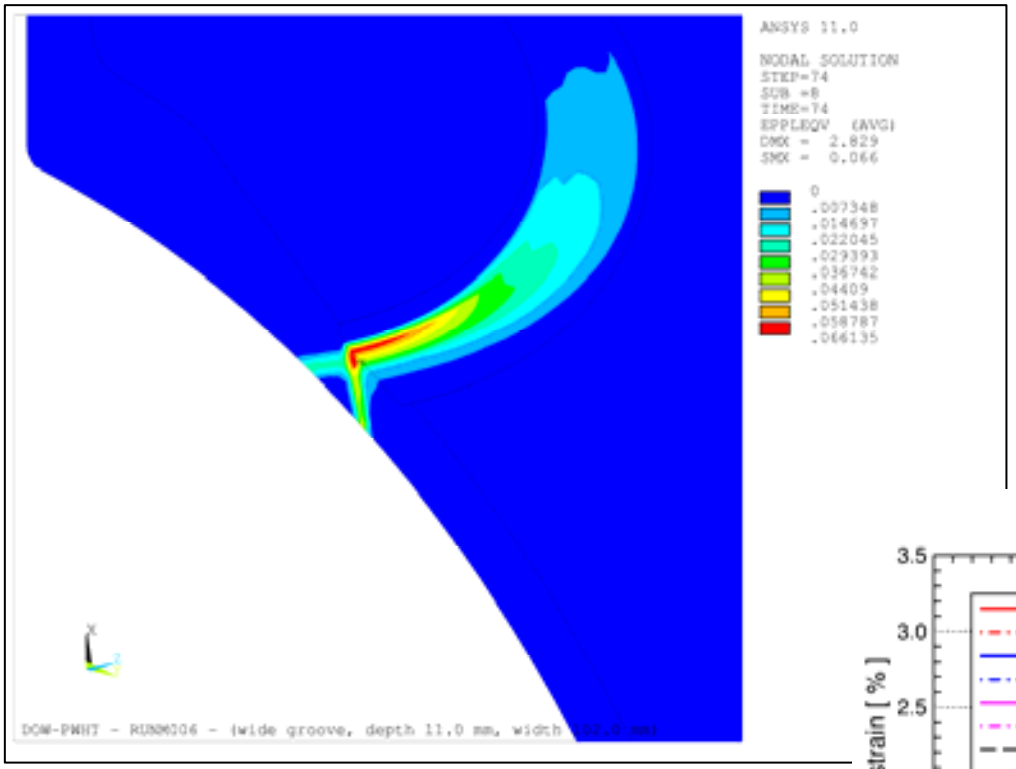


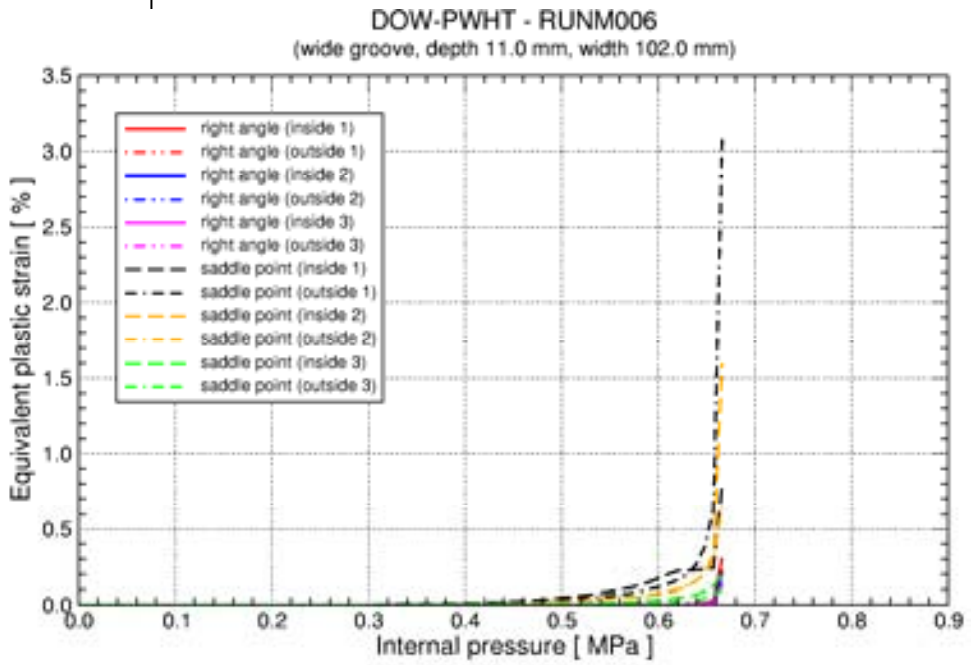


Resultaat limit load berekeningen (1)

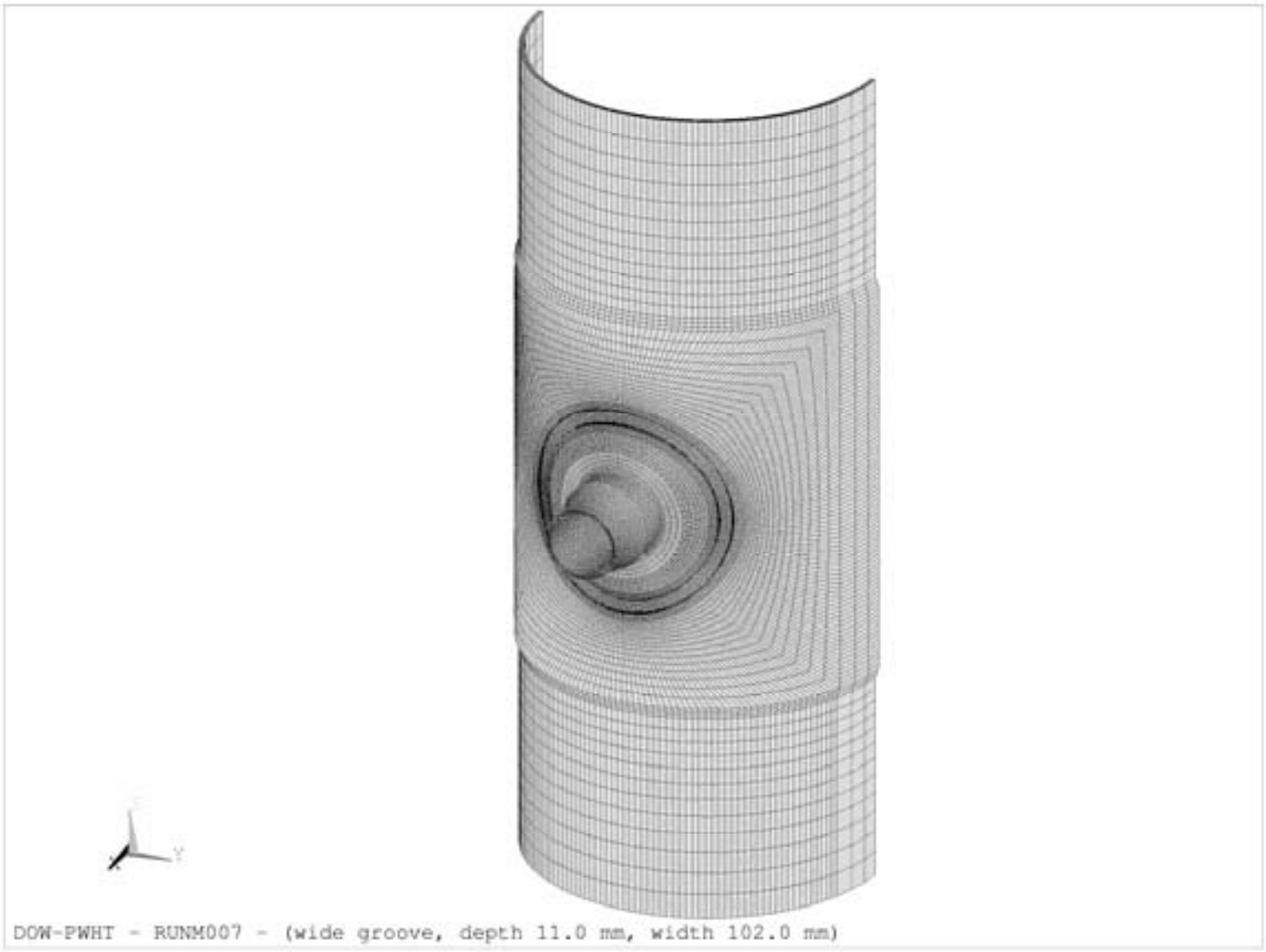
Geometrie	diepte	breedte	limit load
	[mm]	[mm]	[MPa]
no groove	-	-	0.765
semi-elliptical	10.2	43.3	0.704
semi-elliptical	20.2	56.9	0.596
small groove	12.0	56.0	0.677
wide groove	12.0	102.0	0.656
wide groove	11.0	102.0	0.667

Resultaat limit load berekeningen (2)





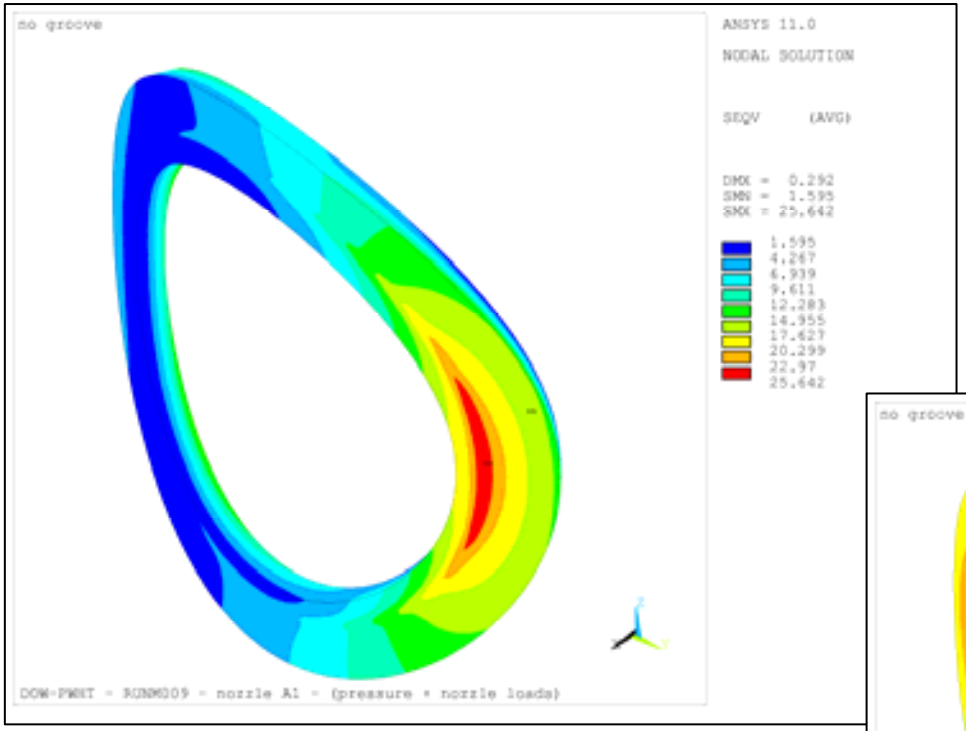
Eindig elementen model

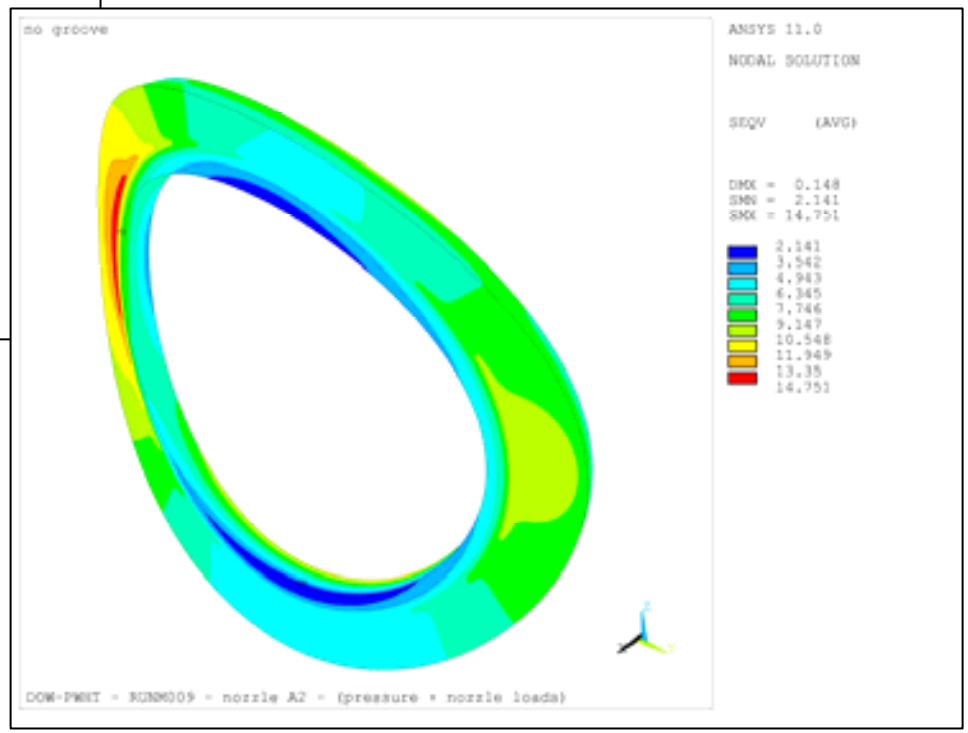


Resultaat nozzle belastingen (1)

Belasting	Groove	Nozzle A1	Nozle A2
	[mm]	[MPa]	[MPa]
internal pressure	11.0	25.5	25.5
internal pressure + nozzle loads	11.0	50.8	31.7
internal pressure	-	11.3	11.3
internal pressure + nozzle loads	-	25.6	14.8

Resultaat nozzle belastingen (2)



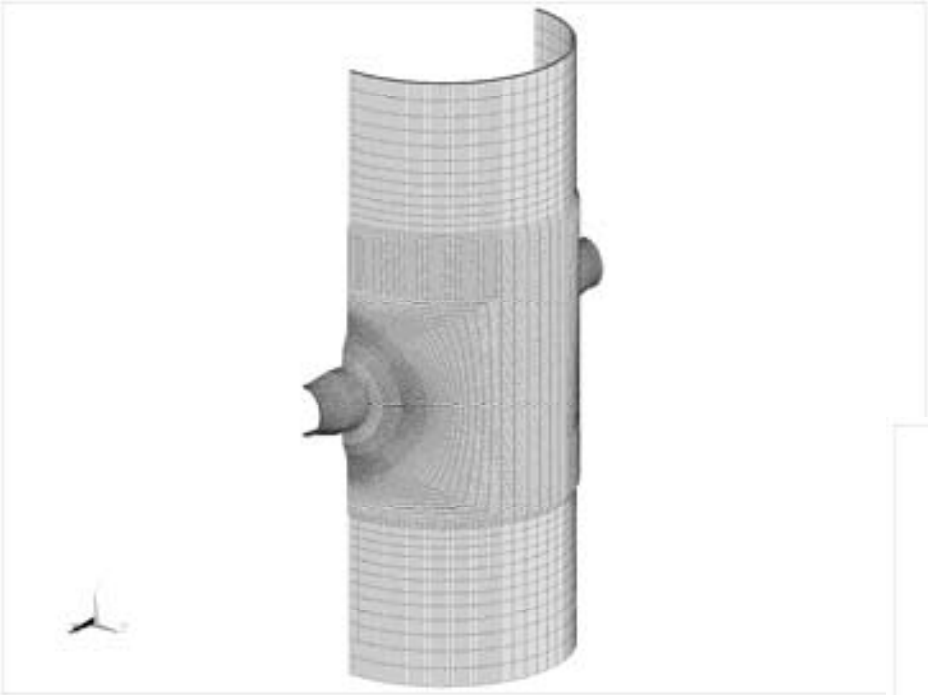


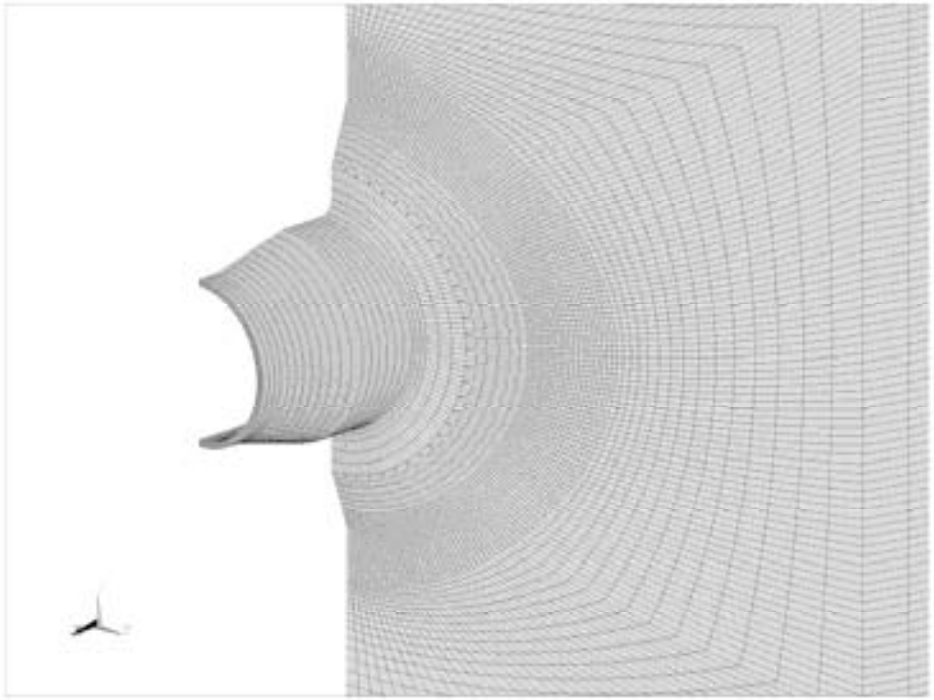
Conclusie limit load

Conclusie:

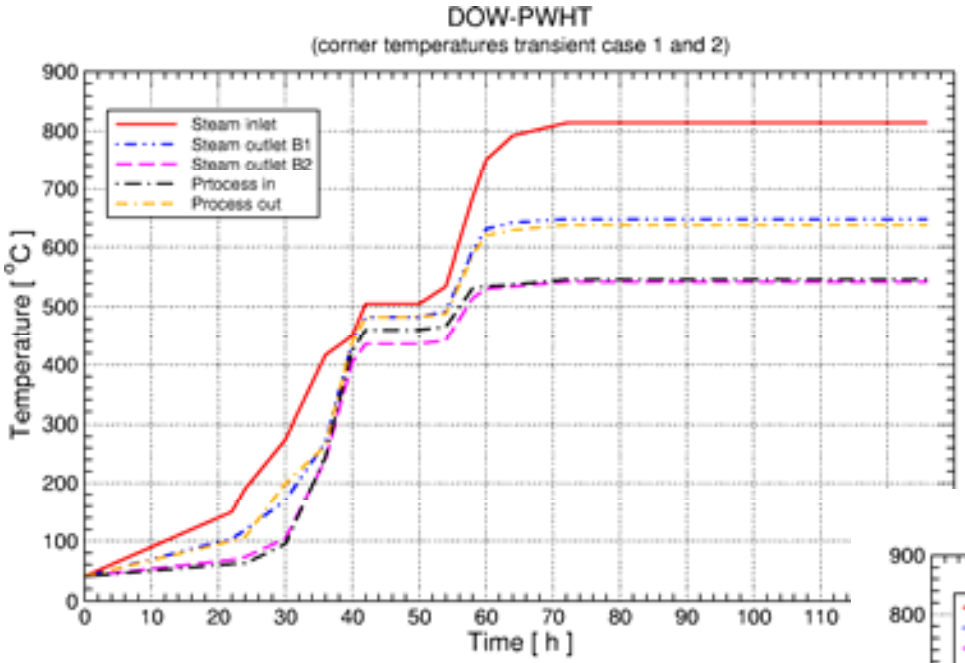
Er kan geen wanddikte reductie toegepast worden
bij de lassen rond de stoominlaat nozzles

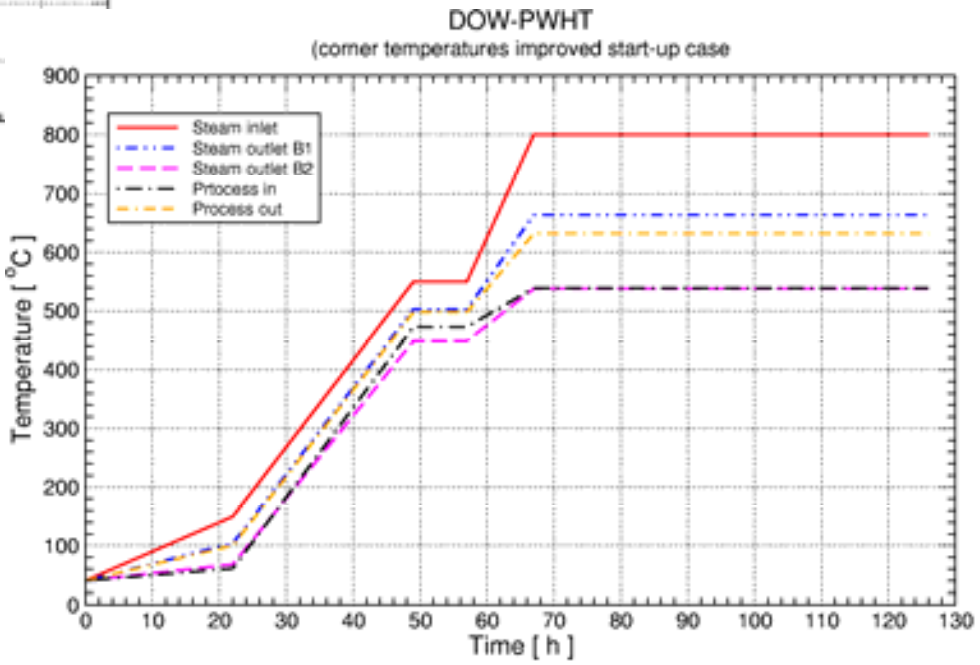
Eindig elementen model



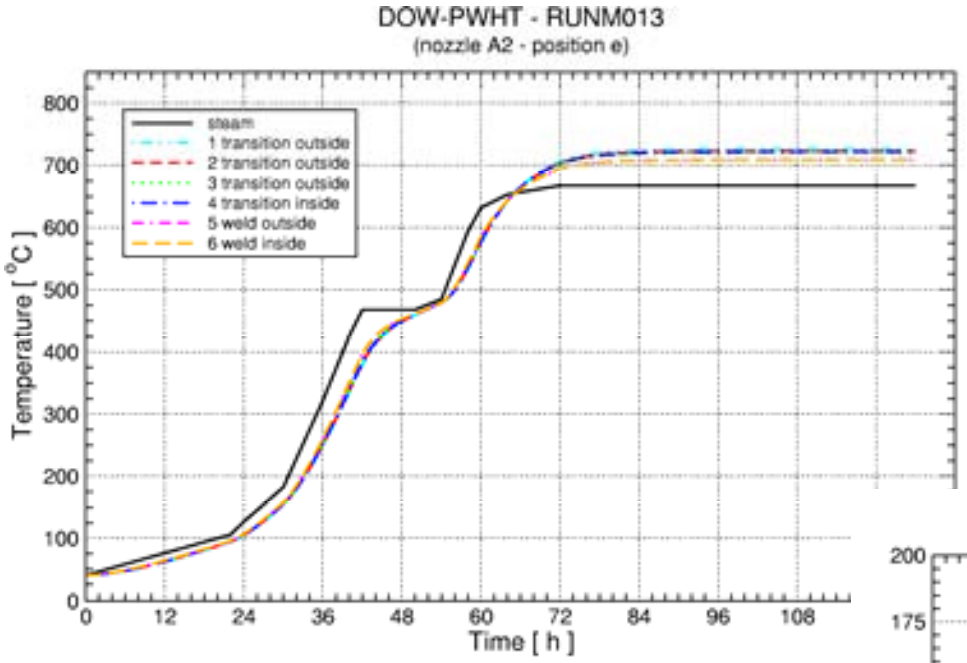


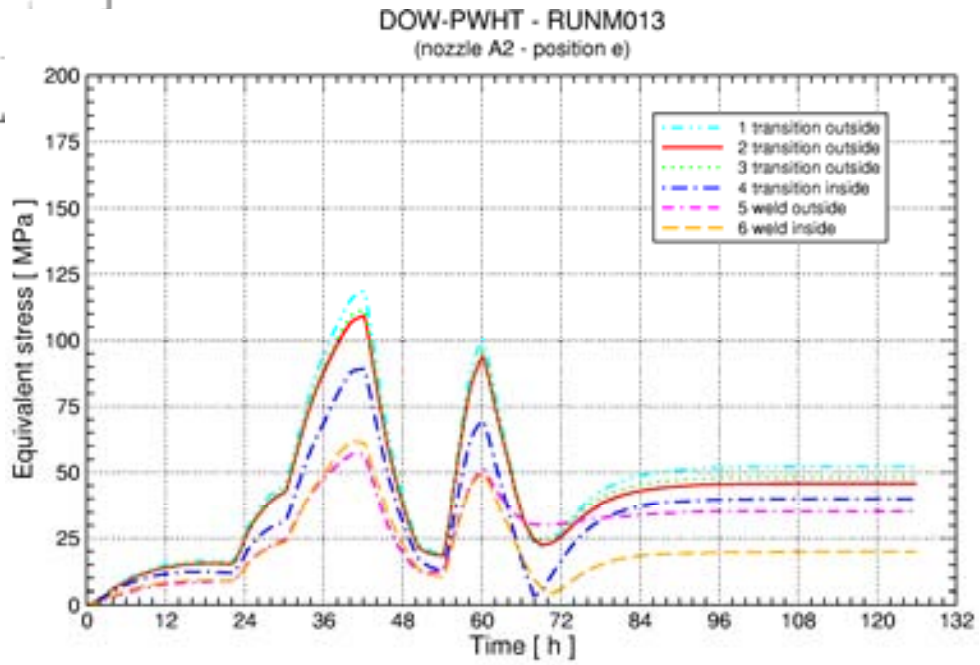
Start-up transient (1)



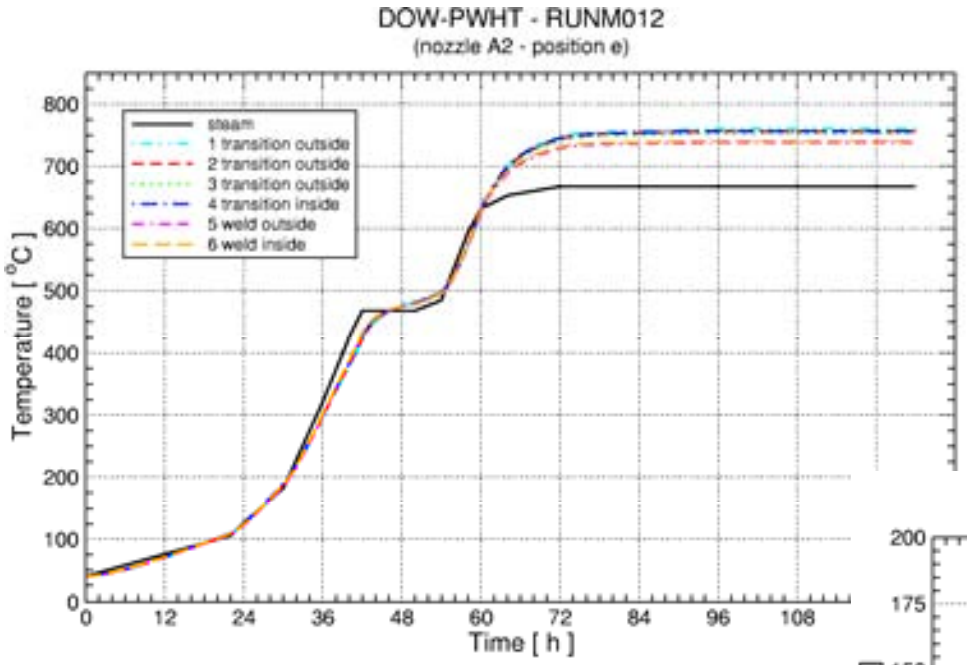


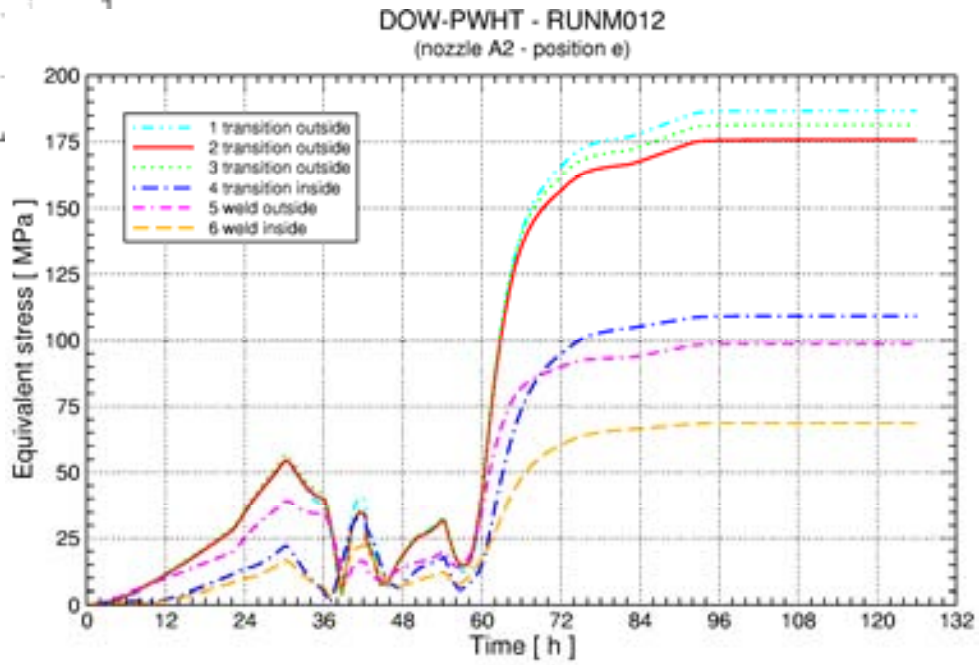
Resultaat start-up transient (1)



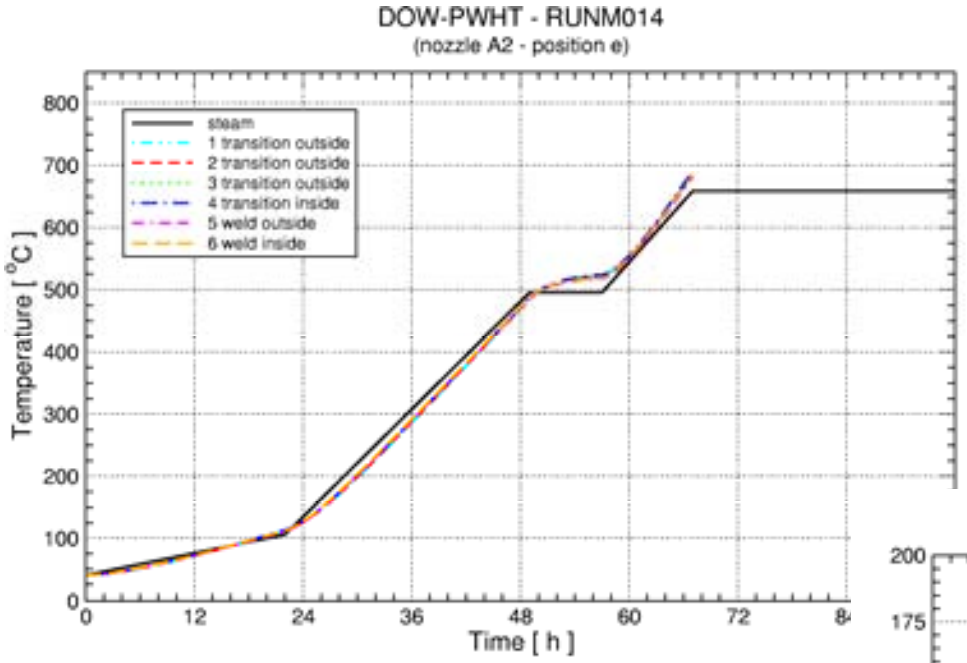


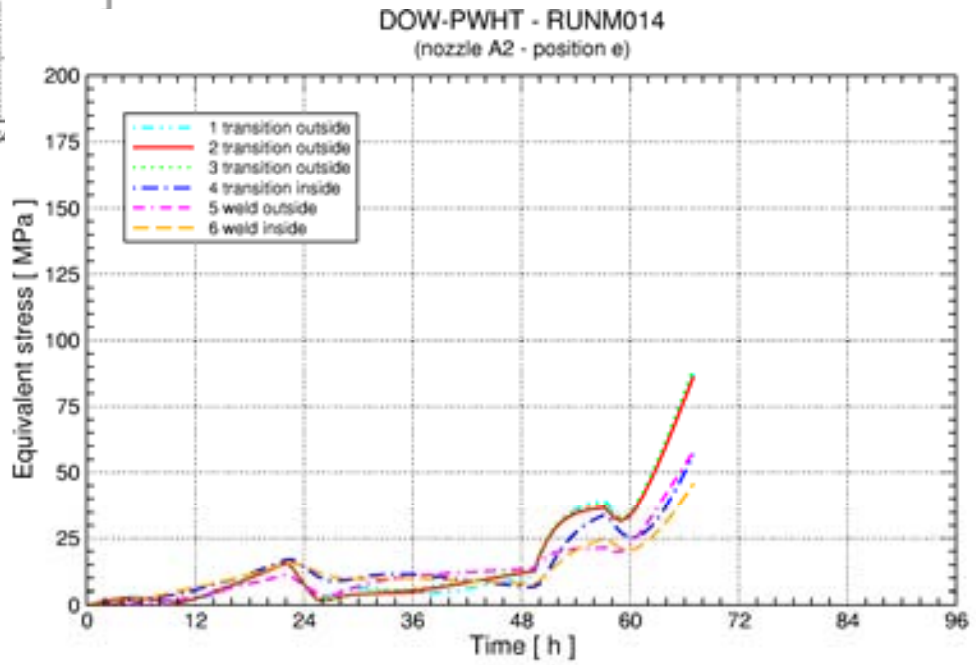
Resultaat start-up transient (2)



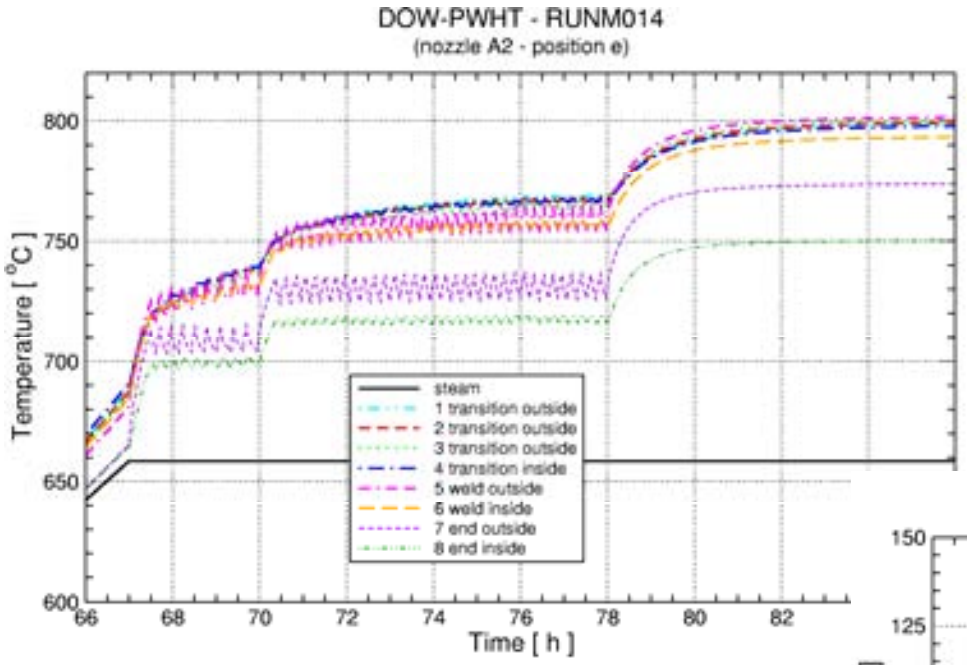


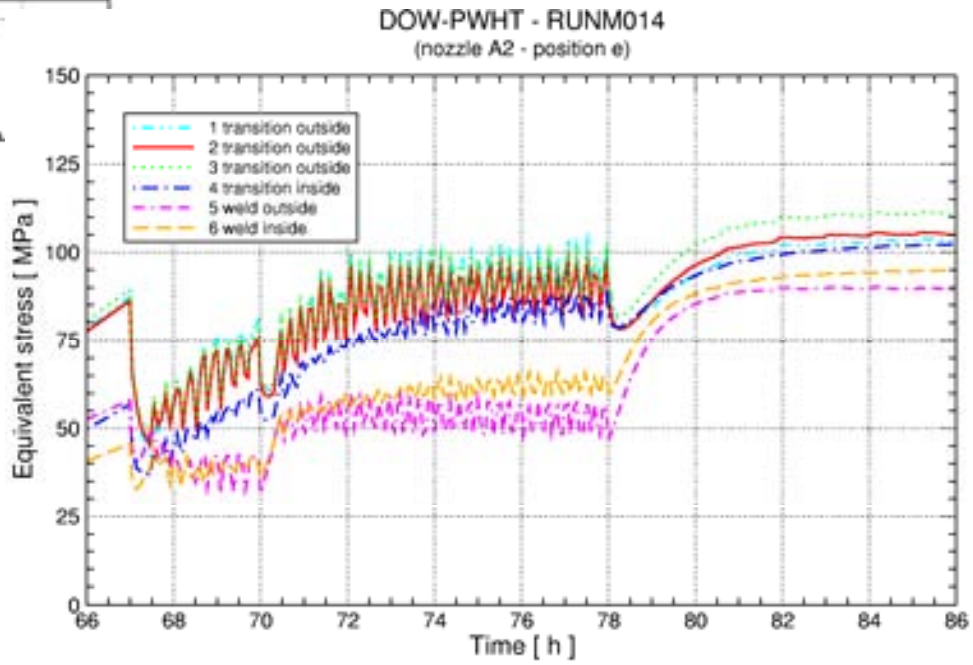
Resultaat start-up transient (3)





Resultaat start-up transient (4)





Conclusies start-up transient

- Verbeterde start-up transient reduceert de thermische spanningen in het SIC gevoelige materiaal
- Met heater matten kan de SIC temperatuur range van 550 tot 700 ℃ snel doorlopen worden
- In-situ PWHT is mogelijk
- Warmteinbreng van de heater matten is voldoende voor het bereiken van en het houden op de PWHT temperatuur