

Thermo-mechanical analysis of front plate supported horn

Revision of temperature induced stress level –
update information

Jan Bielski

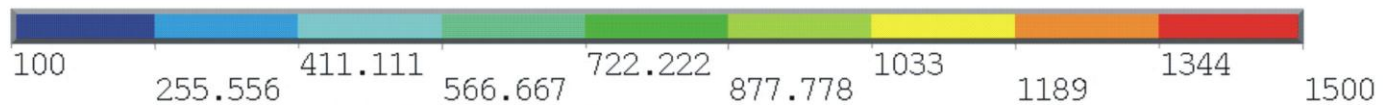
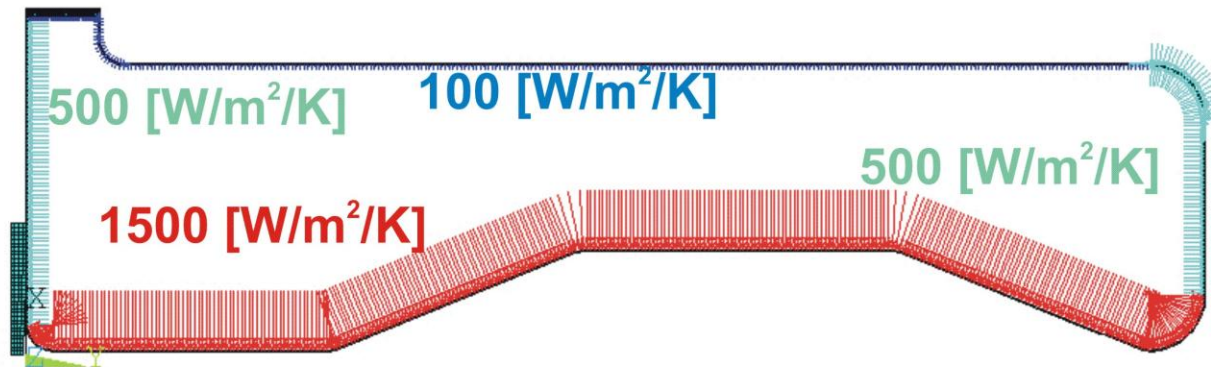
1

ELEMENTS

CONV-HCOE



Assumed convection
coefficients due to internal
spray system



Load: 350kA + particle; 1 inner spray set

1

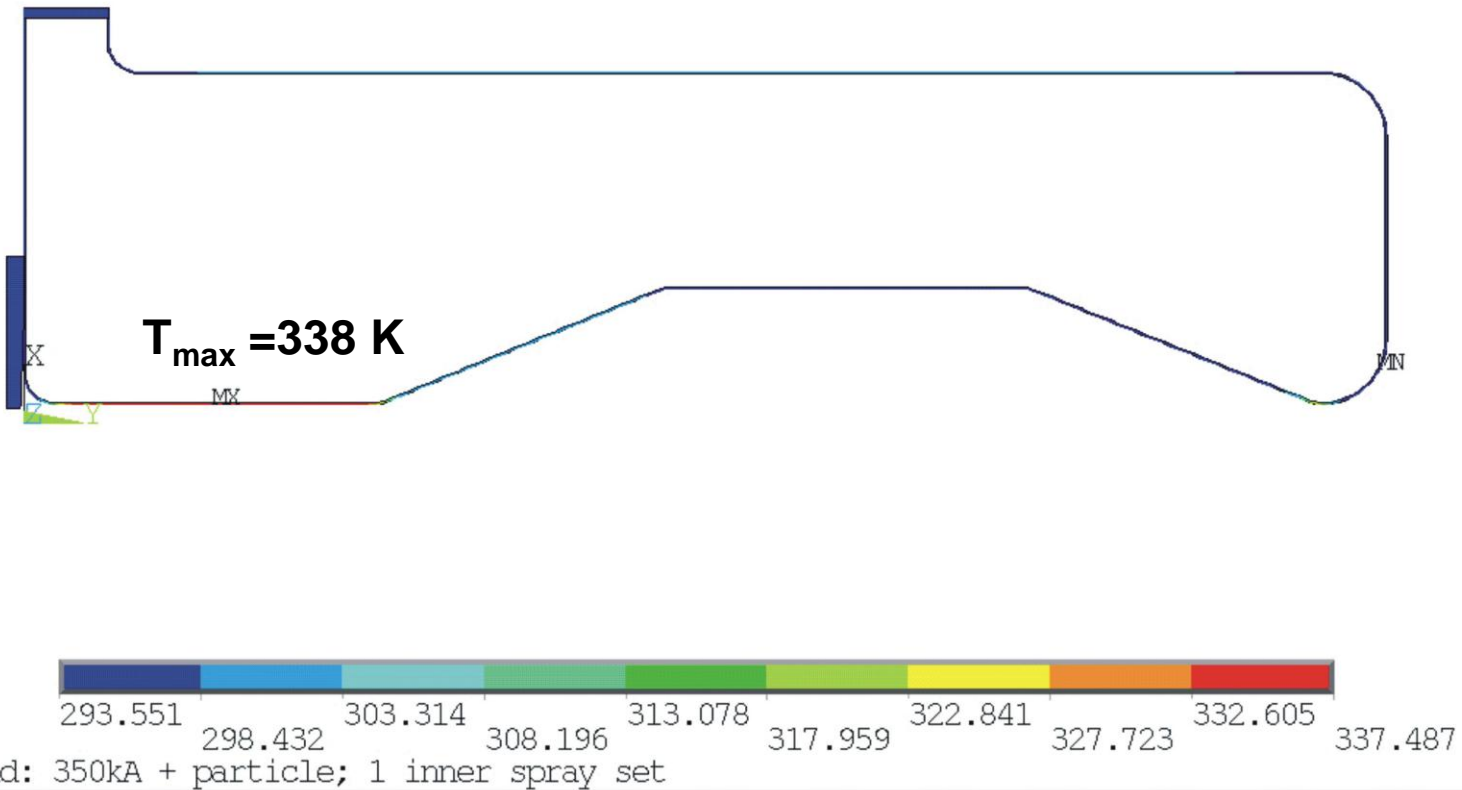
NODAL SOLUTION



Temperature distribution in horn wall

Target temperature 500 [K]

NO convection in air inside horn



Temperature distribution due to current impulse
of 350kA + secondary particle energy

1

NODAL SOLUTION

STEP=1

SUB =1

TIME=1

/EXPANDED

TEMP (AVG)

RSYS=0

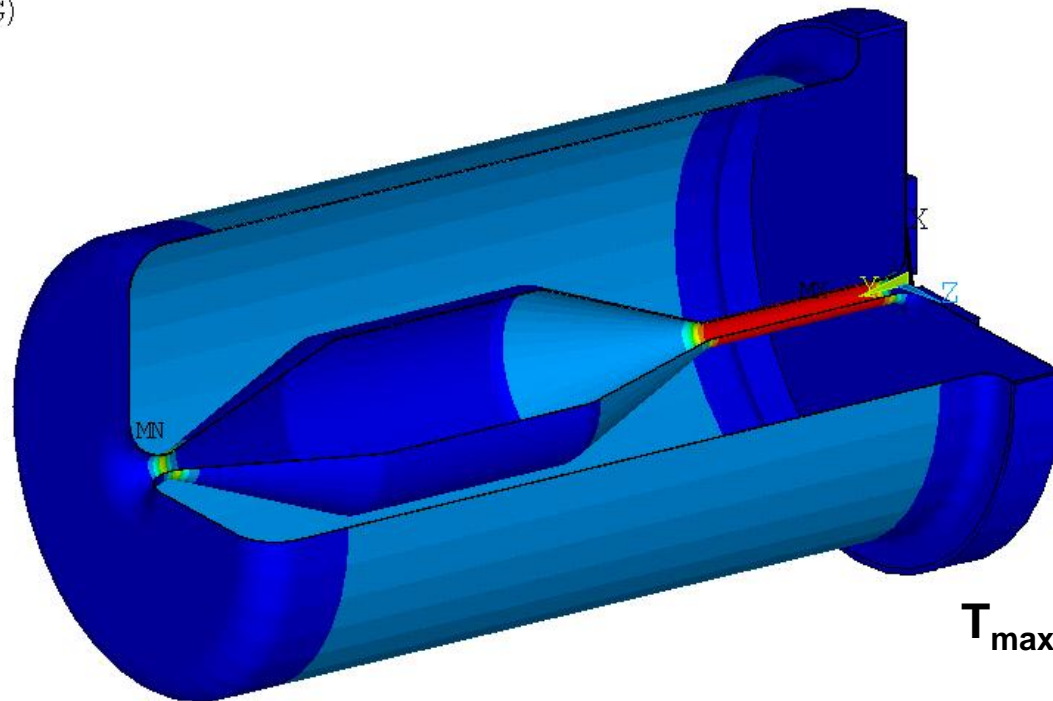
SMN =293.551

SMX =337.487

FEB 6 2012

13:43:40

PLOT NO. 1

**T_{max} =338 K**

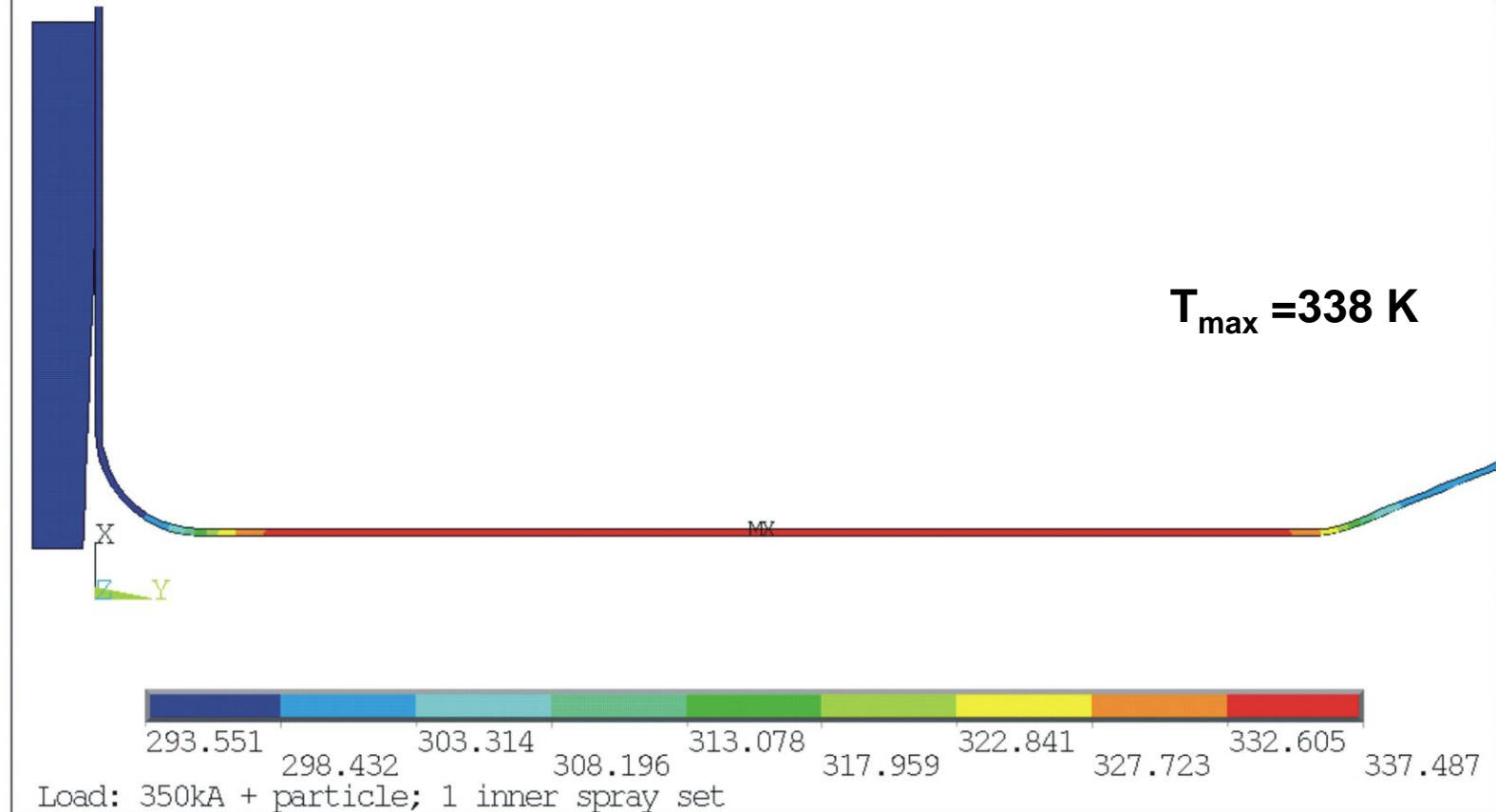
Load: 350kA + particle; 1 inner spray set

Temperature distribution due to current impulse
of 350kA + secondary particle energy

Temperature distribution in horn wall - detail 1

Target temperature 500 [K]

NO convection in air inside horn



Temperature distribution due to current impulse
of 350kA + secondary particle energy

NODAL SOLUTION

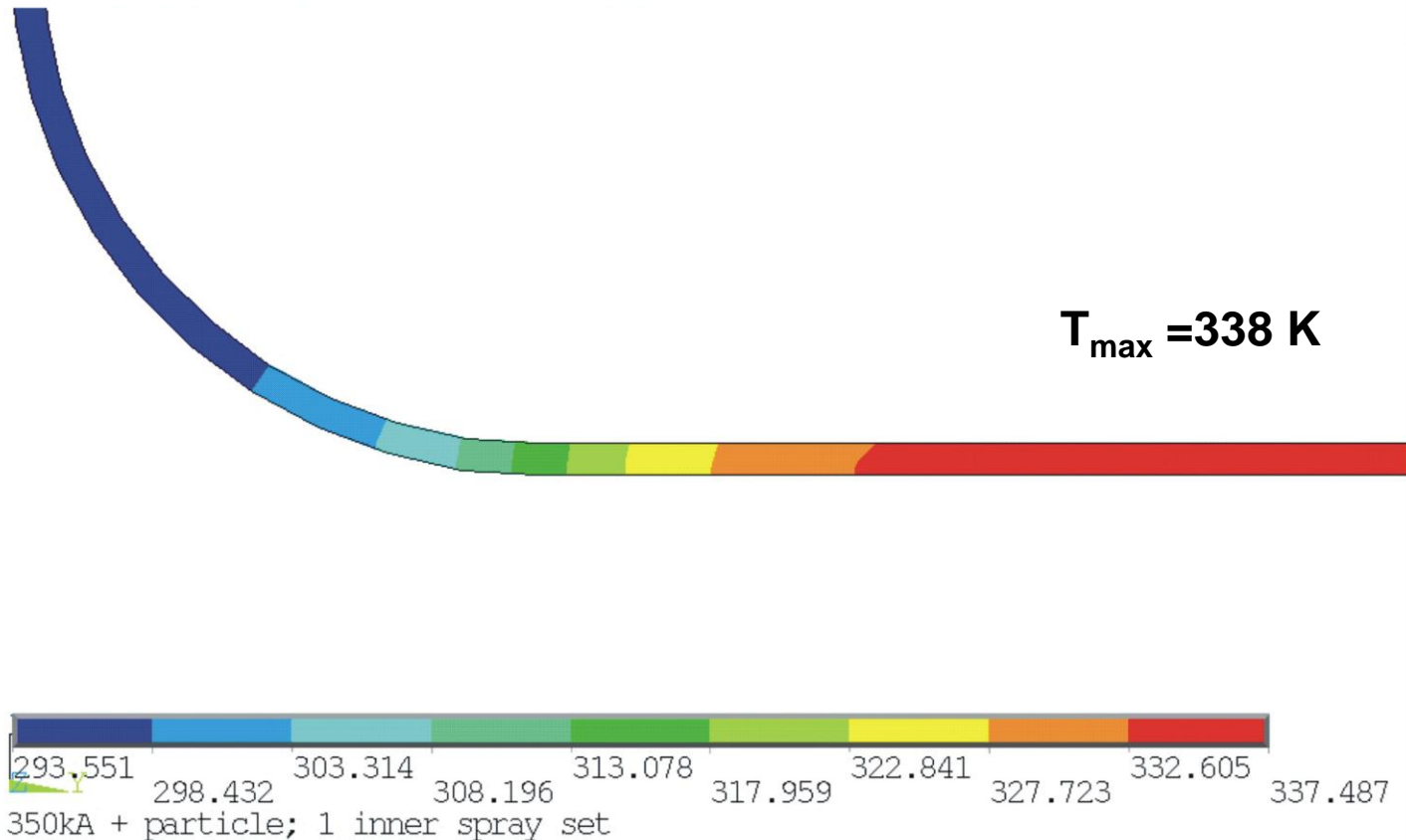


STEP
SUB
TIME
TEMP
RSYS
SMN
SMX

Temperature distribution in horn wall - detail 2

Target temperature 500 [K]

NO convection in air inside horn



Temperature distribution due to current impulse
of 350kA + secondary particle energy

1

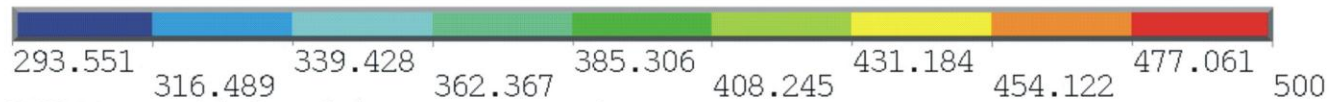
NODAL SOLUTION



Temperature distribution near target surface

Target temperature 500 [K]

NO convection in air inside horn



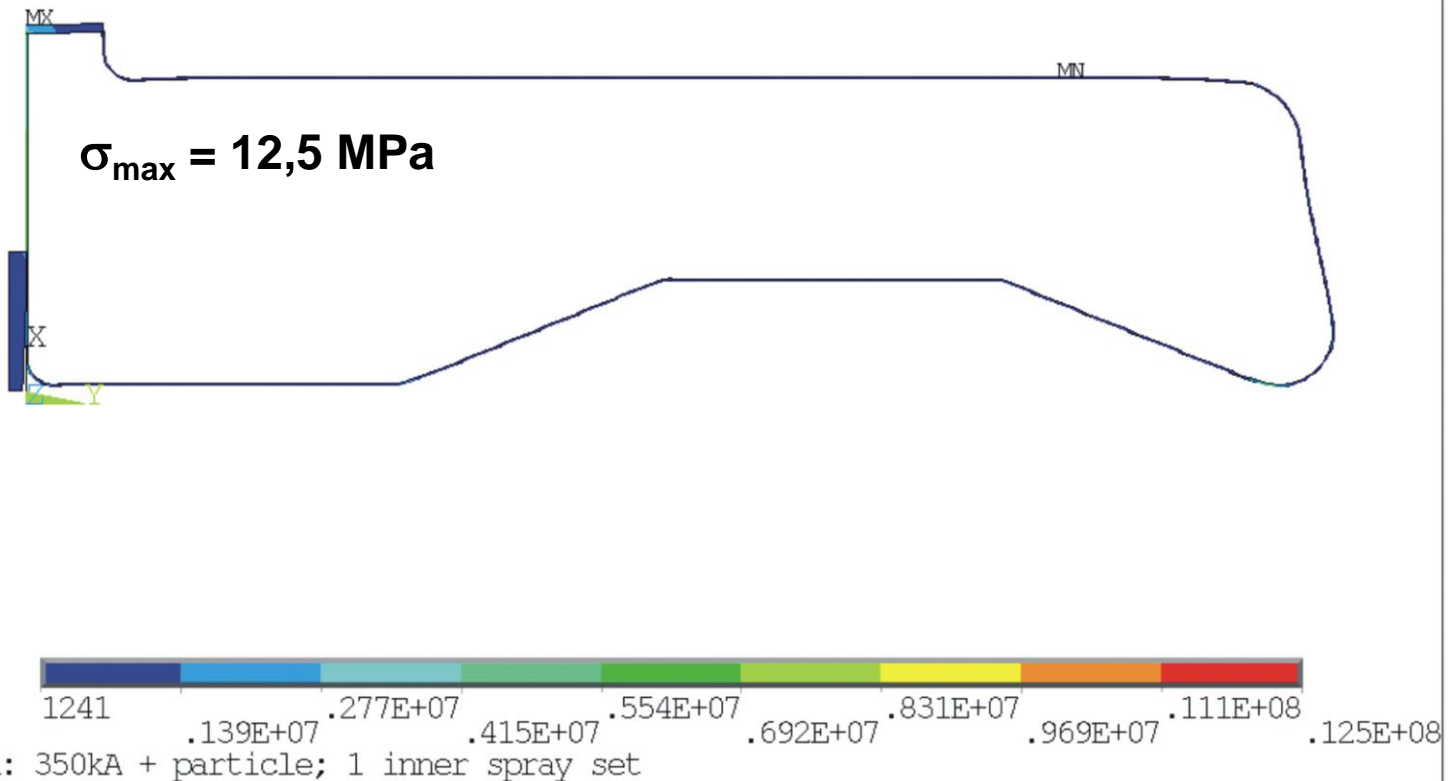
Load: 350kA + particle; 1 inner spray set

Temperature distribution due to current impulse
of 350kA + secondary particle energy

stress distribution in horn wall

Target temperature 500 [K]

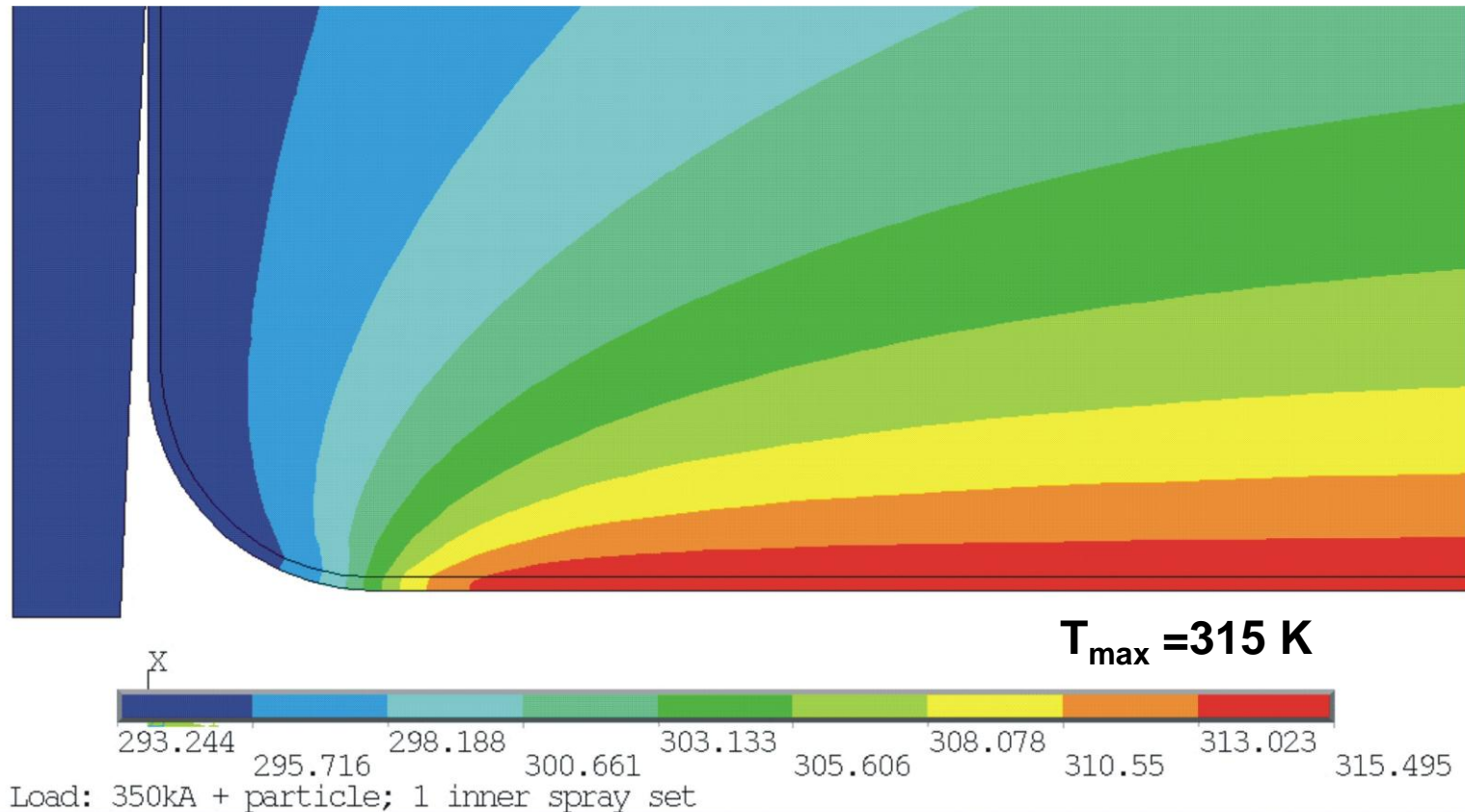
NO convection in air inside horn



Equivalent thermal stress distribution due to current impulse of 350kA + secondary particle energy

Temperature distribution in horn wall and air inside - detail

Target temperature 500 [K]
heat convection in air inside horn

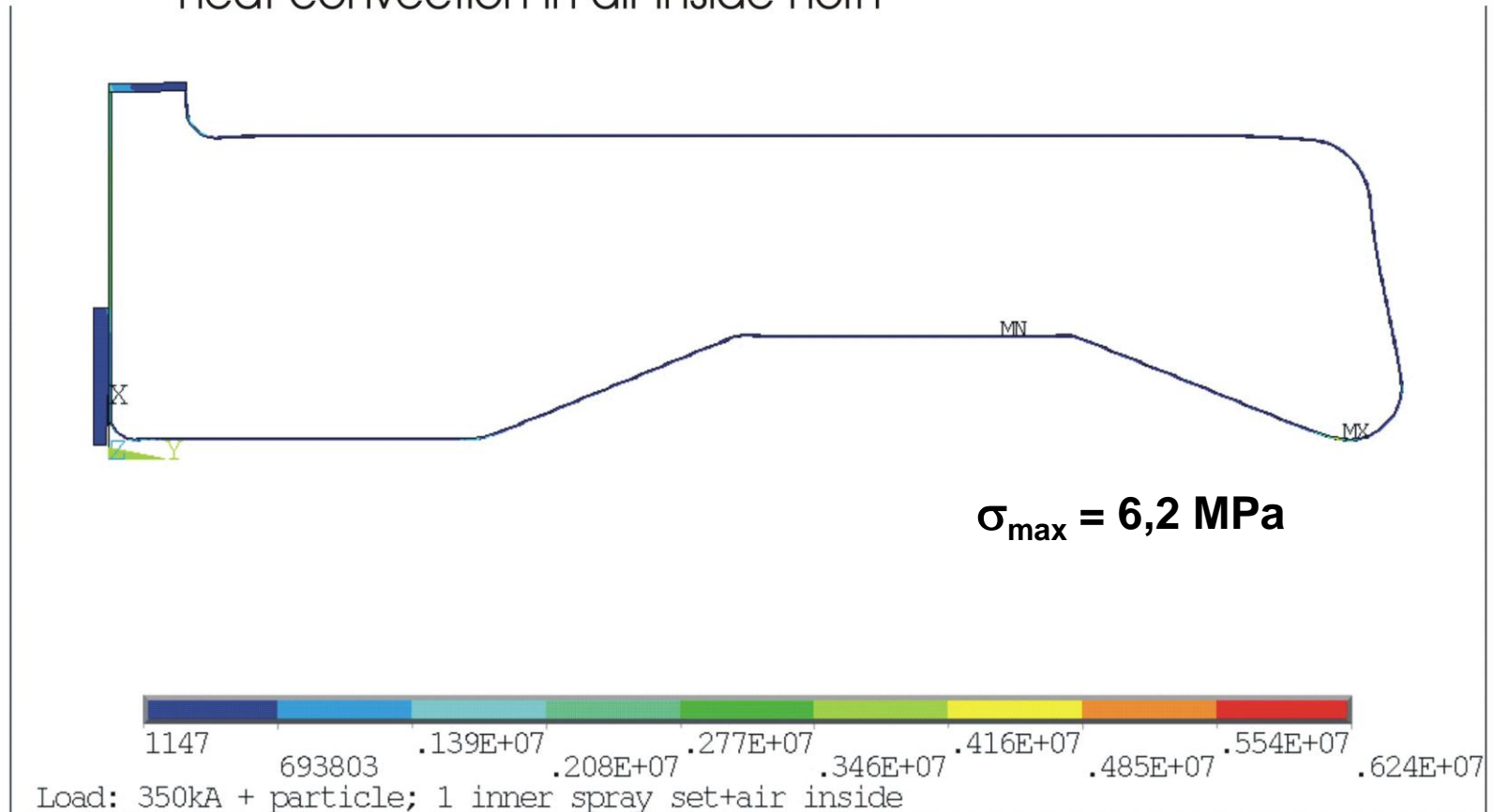


Temperature distribution due to current impulse
of 350kA + secondary particle energy

stress distribution in horn wall

Target temperature 500 [K]

heat convection in air inside horn



Equivalent thermal stress distribution due to current impulse of 350kA + secondary particle energy

	Air inside horn	NO air inside horn
Maximal temperature in horn wall	315 K	338 K
Maximal equivalent thermal stress in horn wall	6.2 MPa	12.5 MPa

$T_{\max} < 380 \text{ K}$; $\sigma_{\max} < 240 \text{ MPa}$