Booster Jaw Bar Thermal Model

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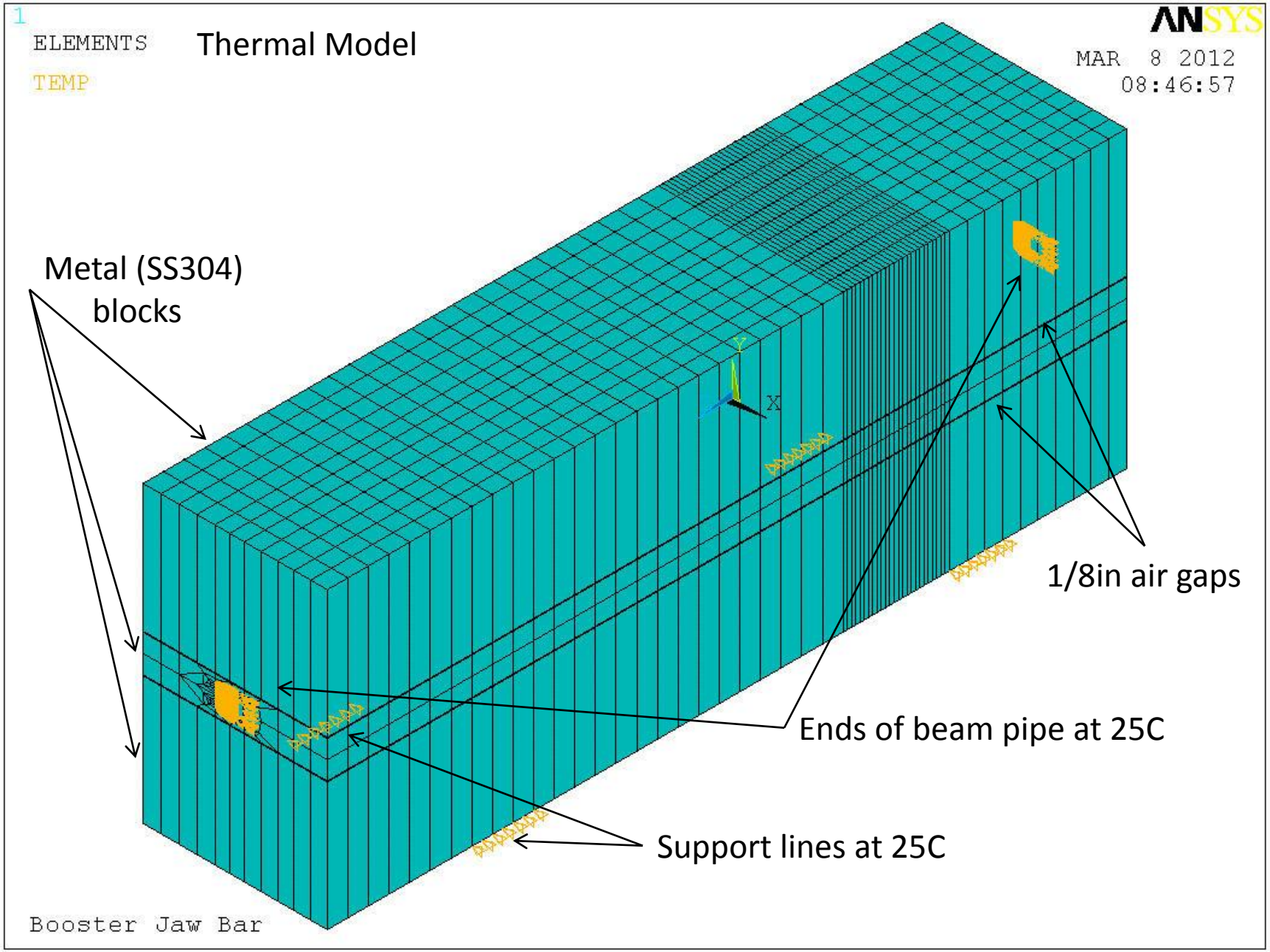
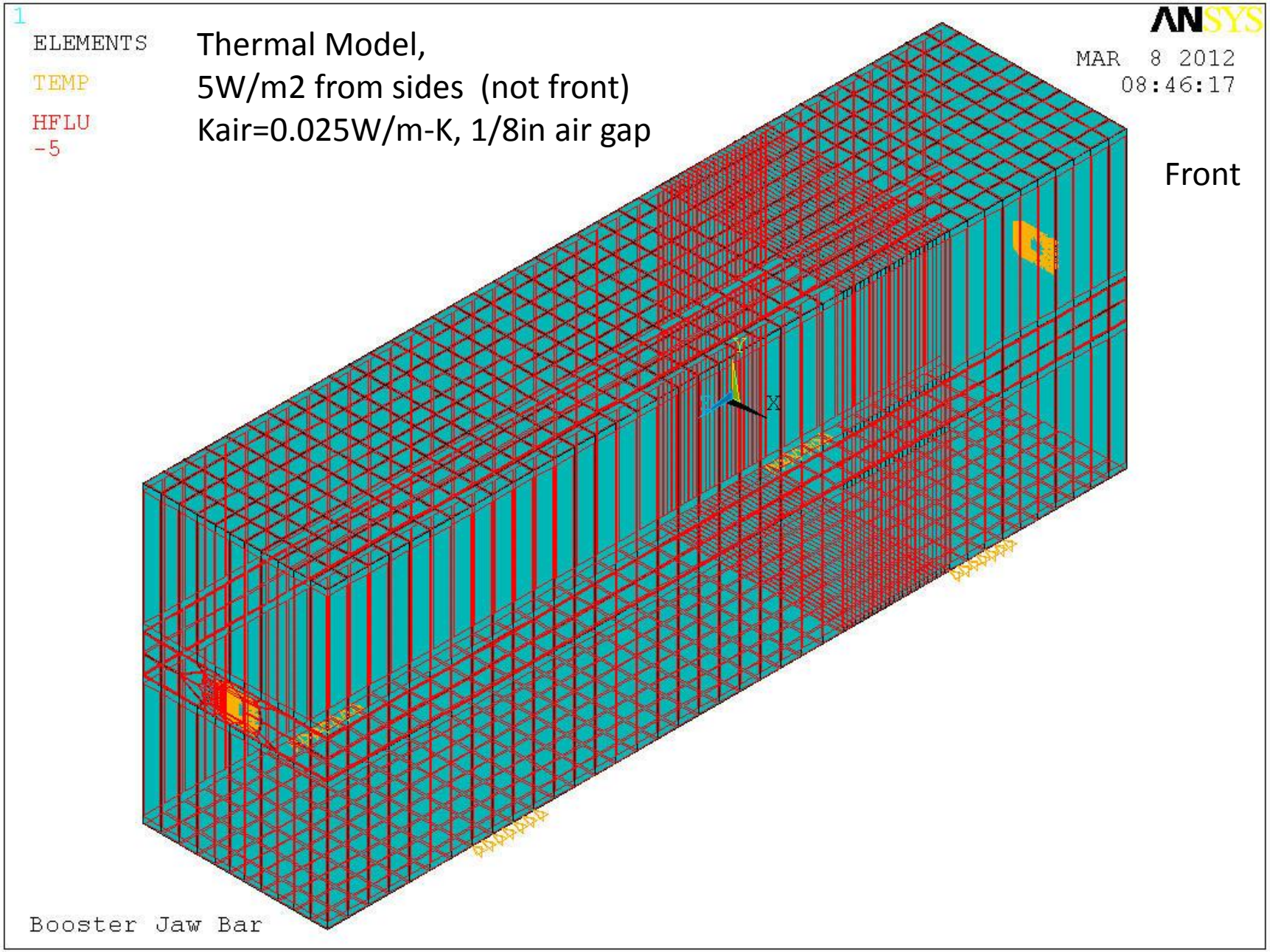
8-3-2012

Material properties

```
c*********
c********* material properties
c********* Metals for FE AISI 304 from MatWeb
c*********
!
alro=7.870          !density        , g/cc

kxx,1,16.2          ! Thermal conductivity W/m-K  16.2
dens,1,alro*1e3     ! Density             kg/m3
alpx,1,17.3e-6      ! CTE                 1/K
c,1,500             ! Specific heat       J/kg-K  450-500
ex,1,200e9
!
kxx,2,16.2
dens,2,alro*1e3
alpx,2,17.3e-6
c,2,500
ex,2,200e9
```


1
ELEMENTS
TEMP
Thermal Model
ANSYS
MAR 8 2012
08:46:57
Metal (SS304) blocks
1/8in air gaps
Ends of beam pipe at 25C
Support lines at 25C
Y
X
Booster Jaw Bar


1
ELEMENTS
TEMP
HFLU
-5
Thermal Model,
5W/m2 from sides (not front)
Kair=0.025W/m-K, 1/8in air gap
ANSYS
MAR 8 2012
08:46:17
Front
Y
X
Booster Jaw Bar

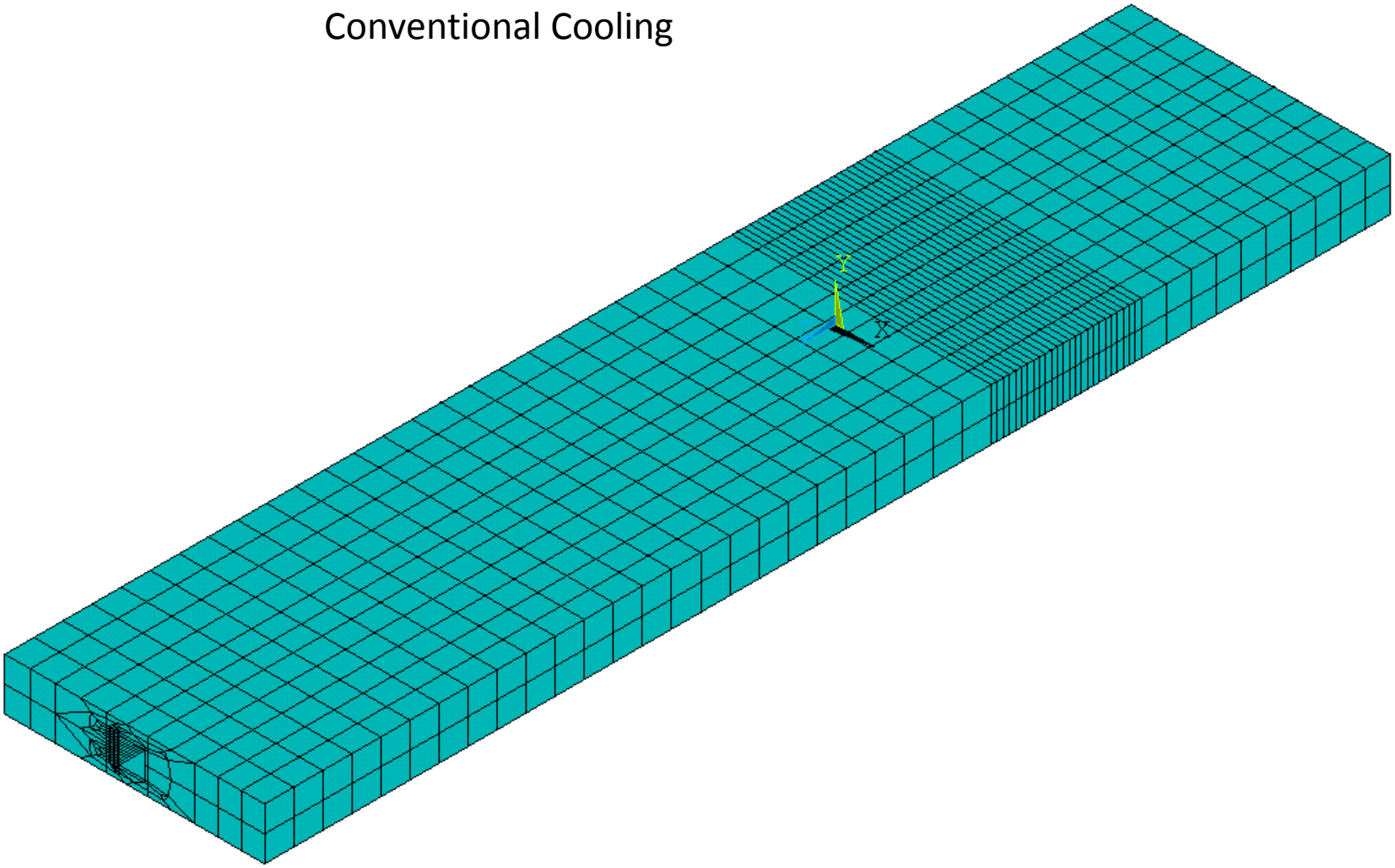
1

ELEMENTS

Thermal Model With ED and Conventional Cooling

ANSYS

FEB 26 2012
13:35:05



Booster Jaw Bar

1

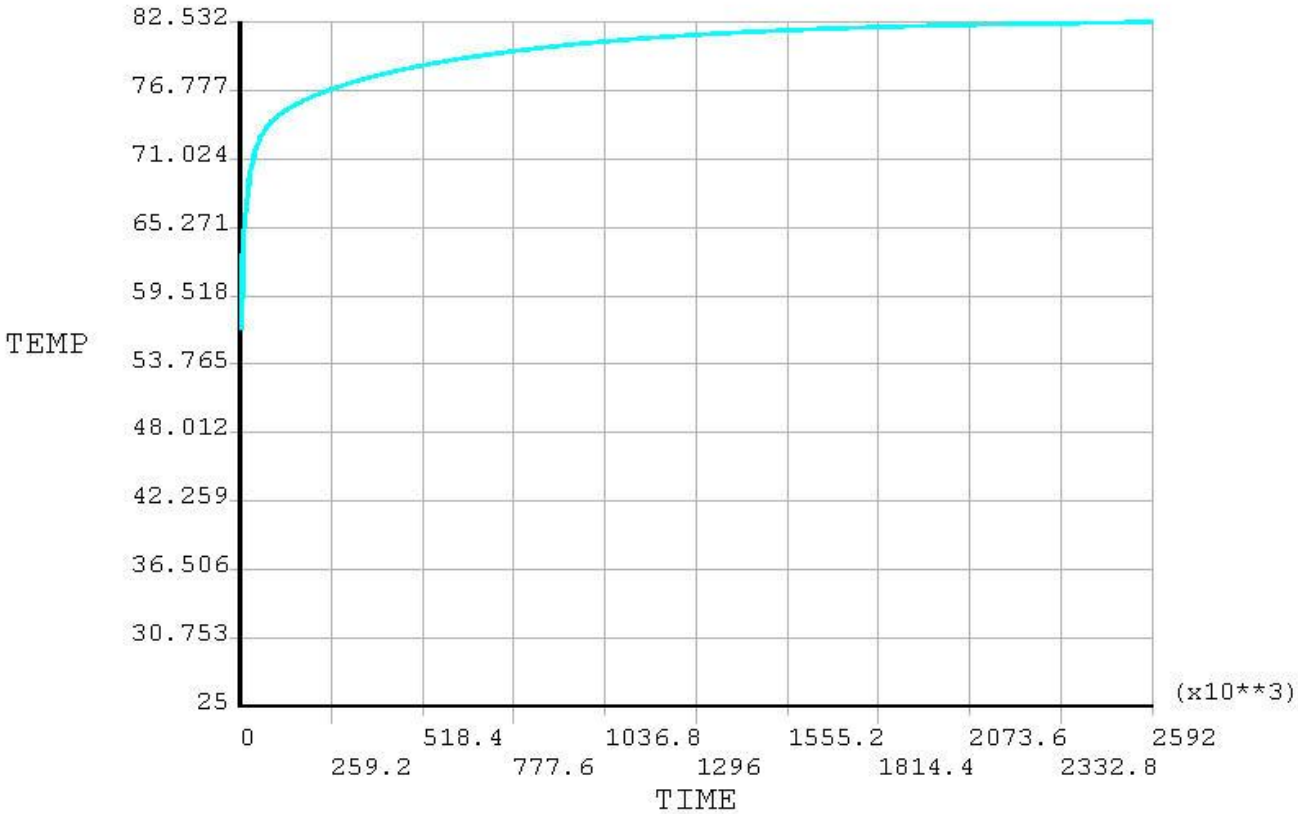
POST26

TEMP

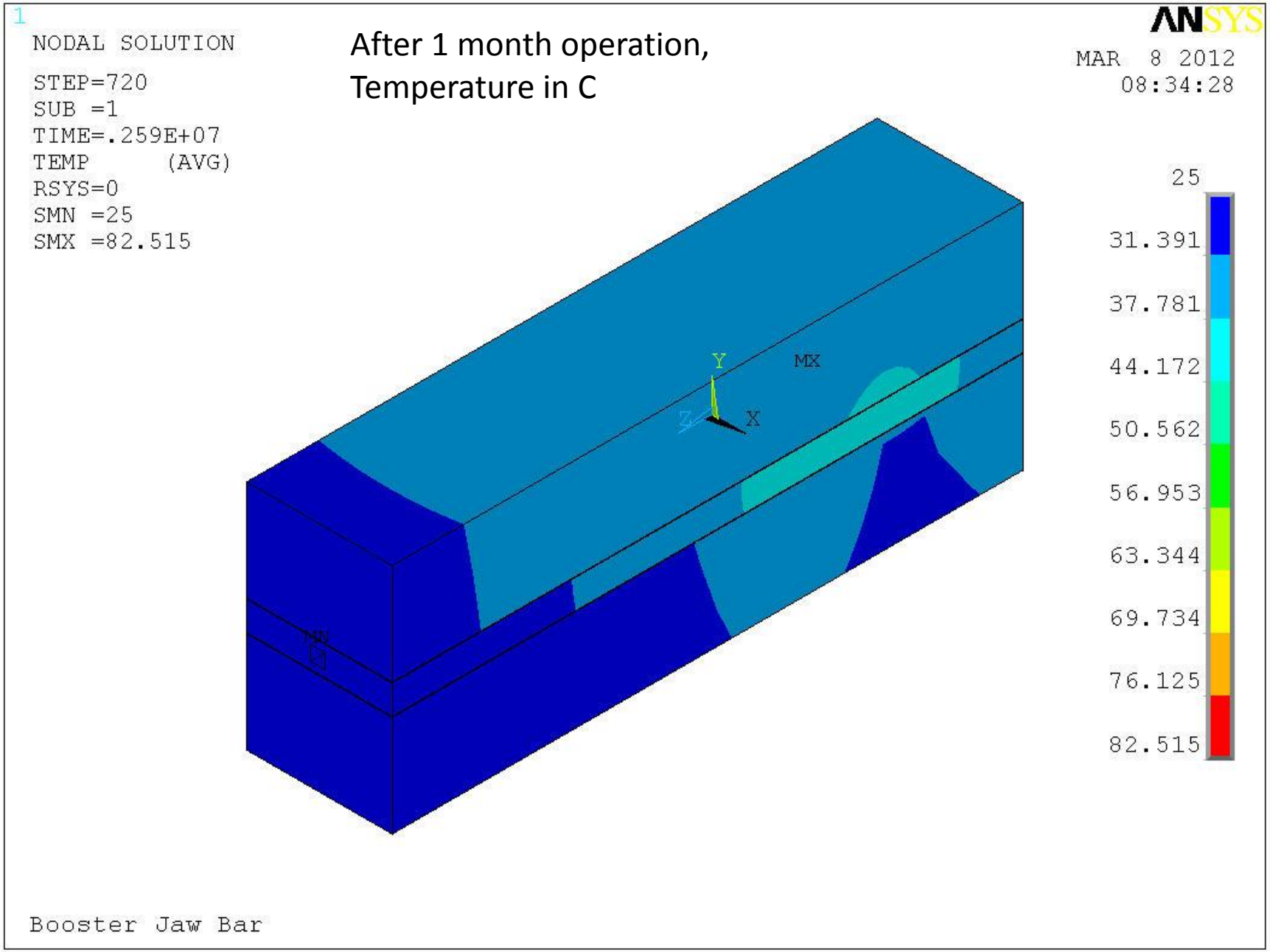
After 1 month operation,
Temperature in C, Time in sec

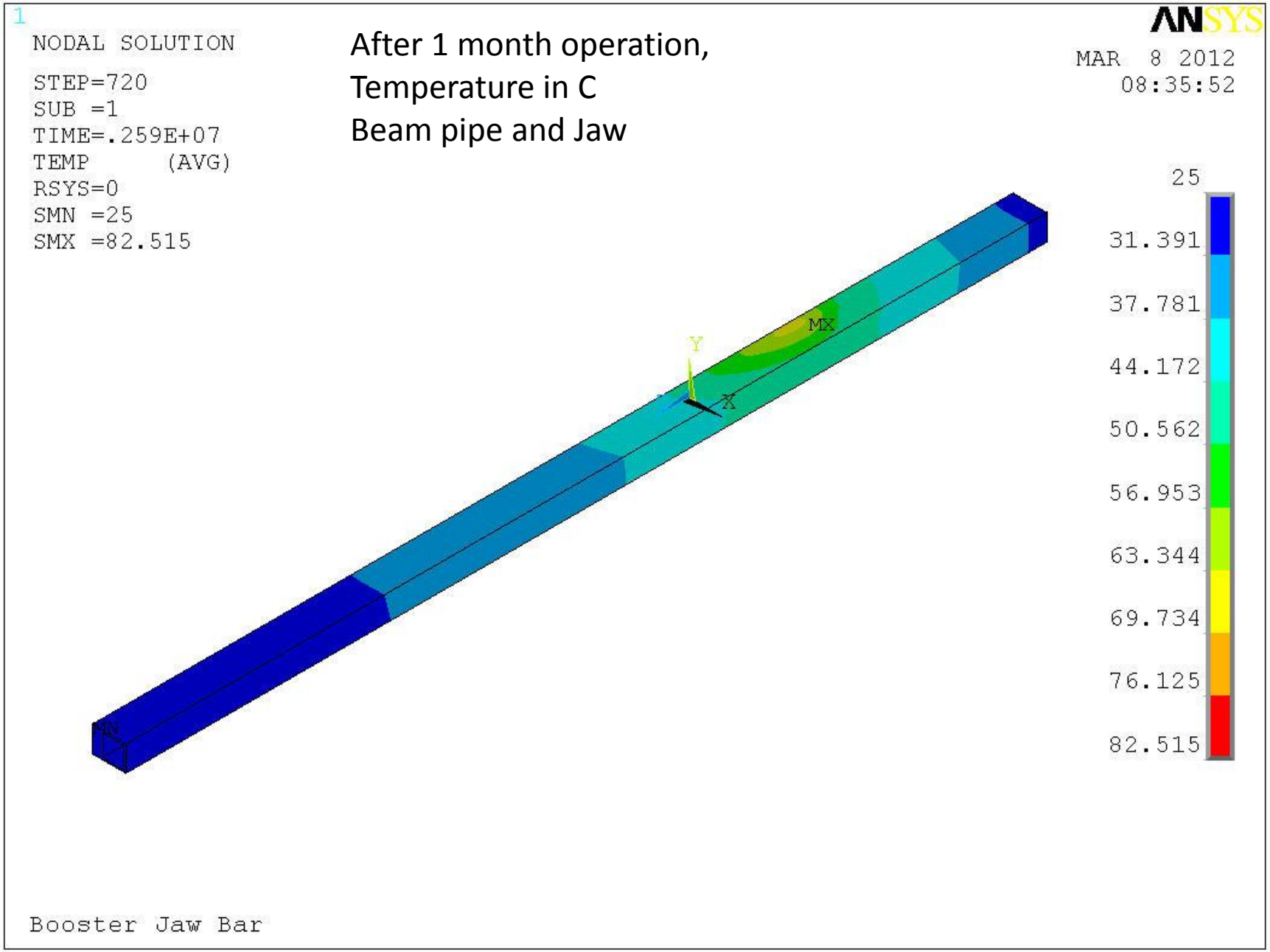
ANSYS

MAR 8 2012
08:33:37



Booster Jaw Bar


1
NODAL SOLUTION
STEP=720
SUB =1
TIME=.259E+07
TEMP (AVG)
RSYS=0
SMN =25
SMX =82.515
After 1 month operation,
Temperature in C
ANSYS
MAR 8 2012
08:34:28
25
31.391
37.781
44.172
50.562
56.953
63.344
69.734
76.125
82.515
Y
X
Z
MX
MN
Booster Jaw Bar


1
NODAL SOLUTION
STEP=720
SUB =1
TIME=.259E+07
TEMP (AVG)
RSYS=0
SMN =25
SMX =82.515
After 1 month operation,
Temperature in C
Beam pipe and Jaw
ANSYS
MAR 8 2012
08:35:52
25
31.391
37.781
44.172
50.562
56.953
63.344
69.734
76.125
82.515
MX
MN
Y
X
Booster Jaw Bar

After 1 month operation,
Temperature in C
Beam pipe and Jaw

1

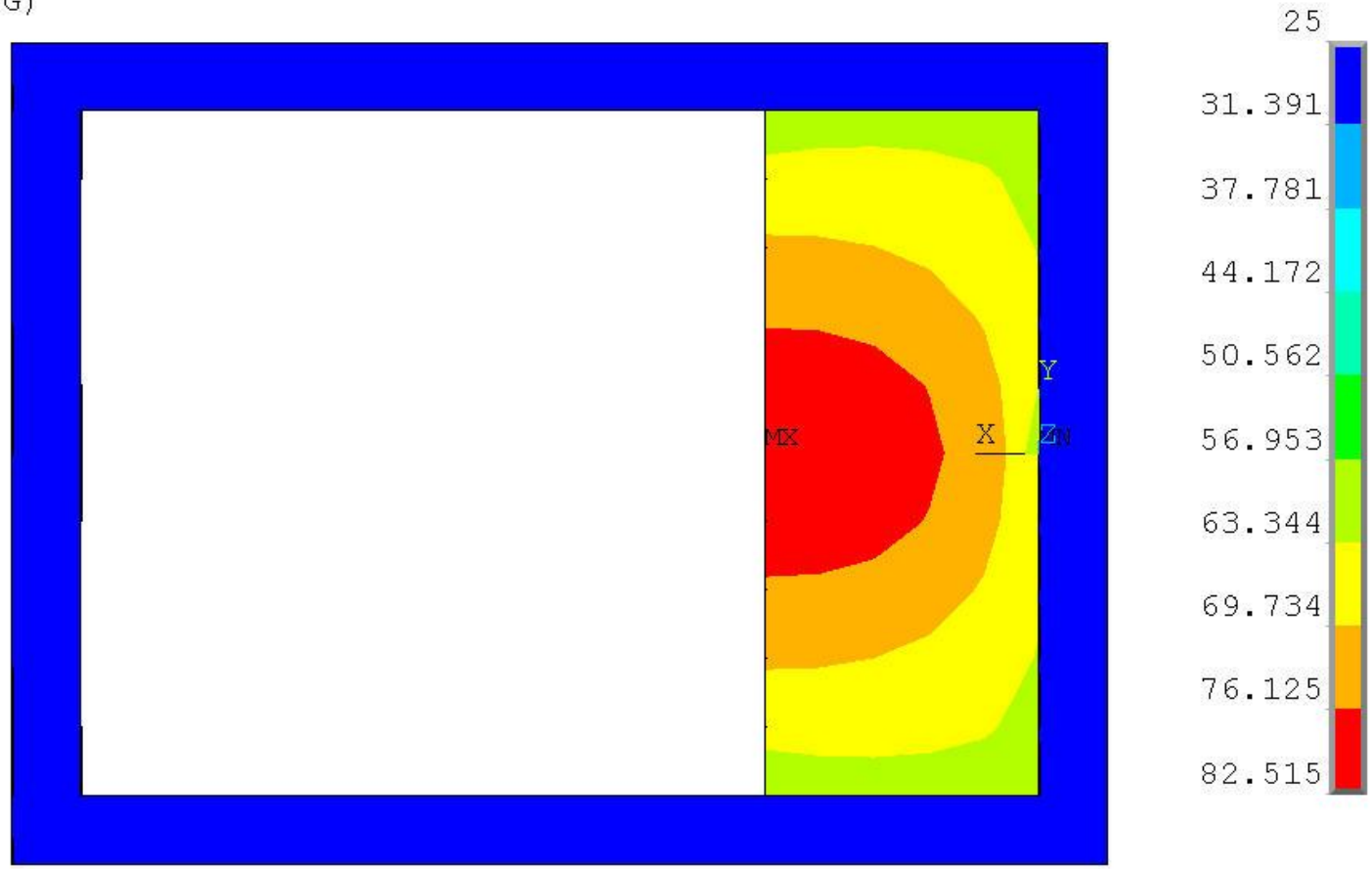
NODAL SOLUTION

STEP=720
SUB =1
TIME=.259E+07
TEMP (AVG)
RSYS=0
SMN =25
SMX =82.515

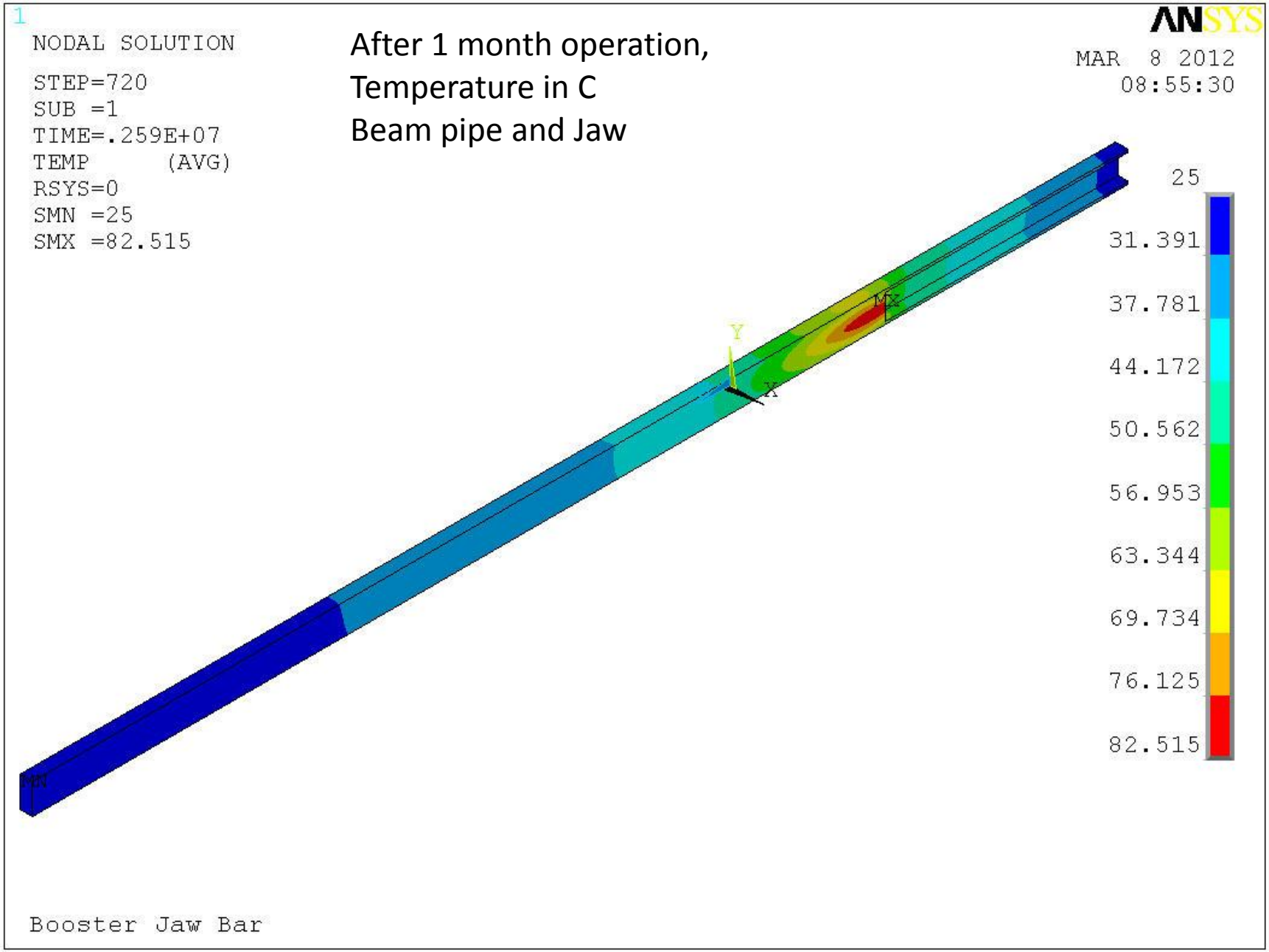
After 1 month operation,
Temperature in C
Beam pipe and Jaw

ANSYS

MAR 8 2012
08:36:31



Booster Jaw Bar


1
NODAL SOLUTION
STEP=720
SUB =1
TIME=.259E+07
TEMP (AVG)
RSYS=0
SMN =25
SMX =82.515
After 1 month operation,
Temperature in C
Beam pipe and Jaw
ANSYS
MAR 8 2012
08:55:30
25
31.391
37.781
44.172
50.562
56.953
63.344
69.734
76.125
82.515
MX
MN
Y
X
Booster Jaw Bar

1

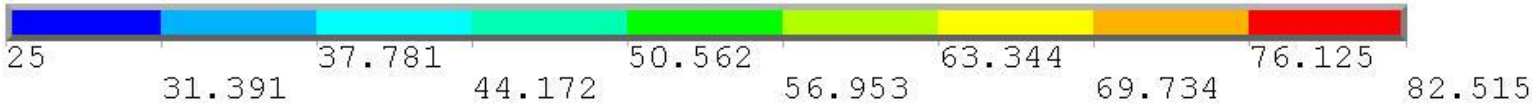
NODAL SOLUTION

STEP=720
SUB =1
TIME=.259E+07
TEMP (AVG)
RSYS=0
SMN =25
SMX =82.515

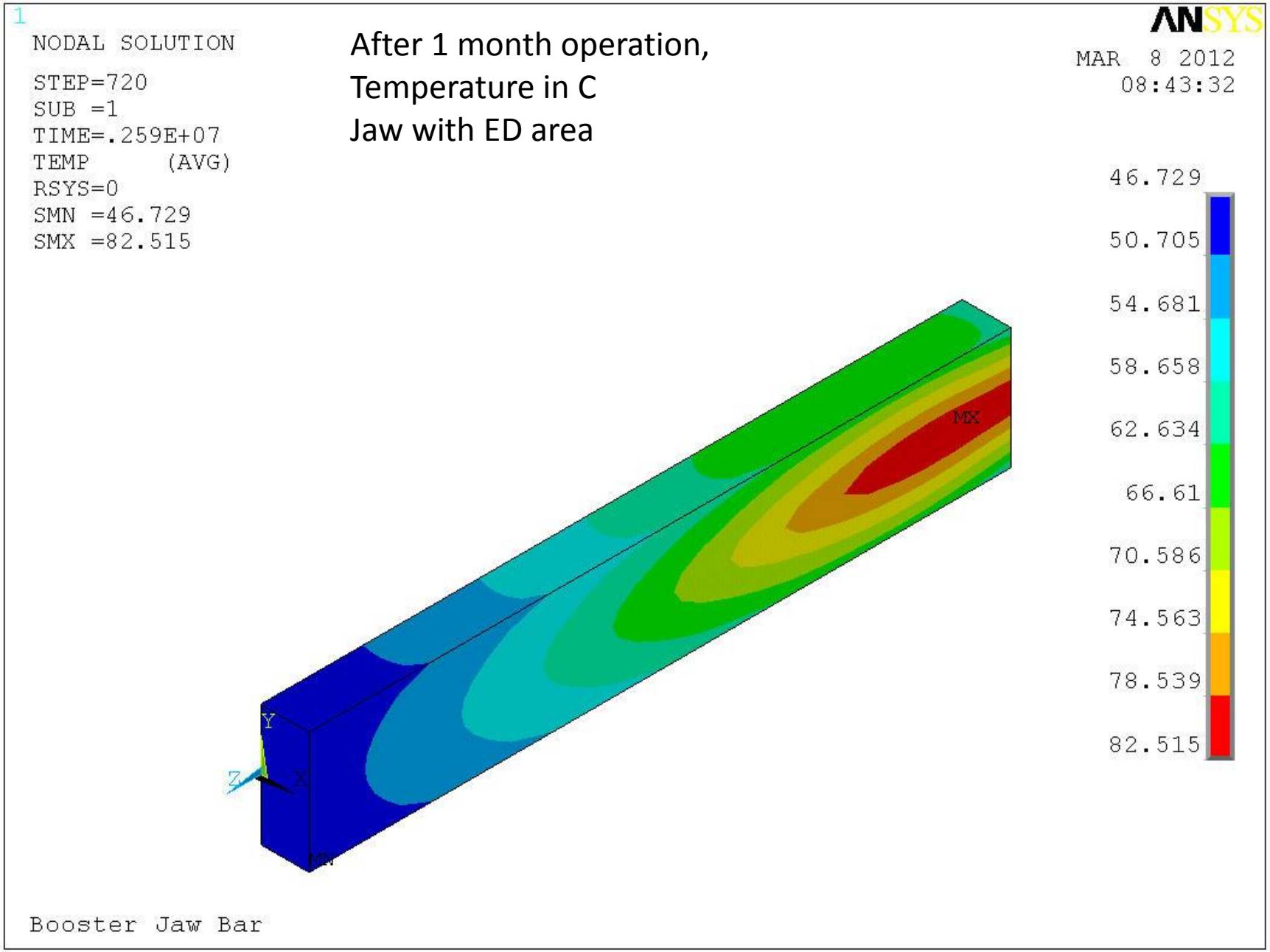
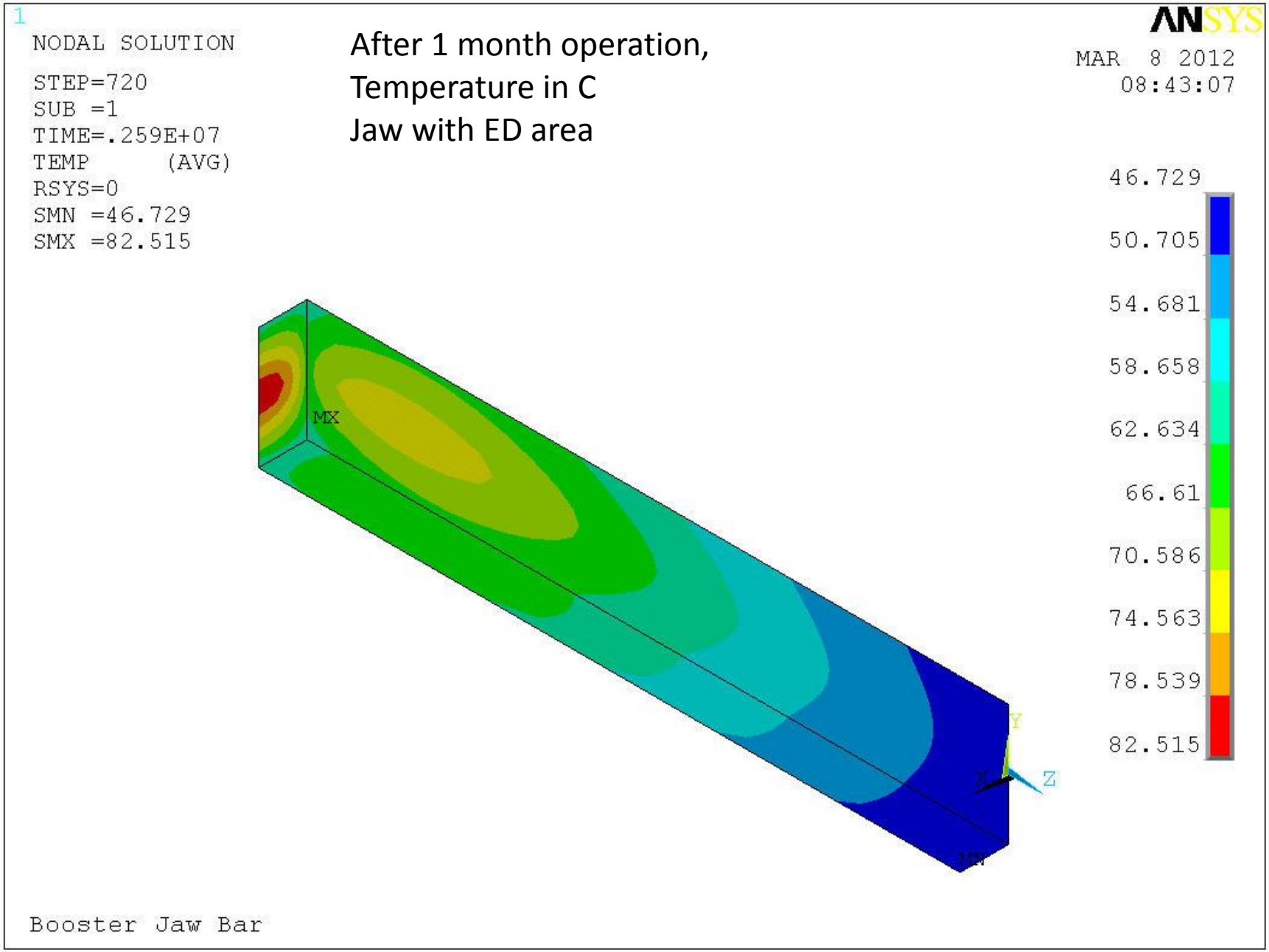
After 1 month operation,
Temperature in C
Beam pipe and Jaw

ANSYS

MAR 8 2012
09:18:54



Booster Jaw Bar


1
NODAL SOLUTION
STEP=720
SUB =1
TIME=.259E+07
TEMP (AVG)
RSYS=0
SMN =46.729
SMX =82.515
After 1 month operation,
Temperature in C
Jaw with ED area
ANSYS
MAR 8 2012
08:43:32
46.729
50.705
54.681
58.658
62.634
66.61
70.586
74.563
78.539
82.515
MX
MN
Y
Z
X
Booster Jaw Bar

After 1 month operation,
Temperature in C
Jaw with ED area