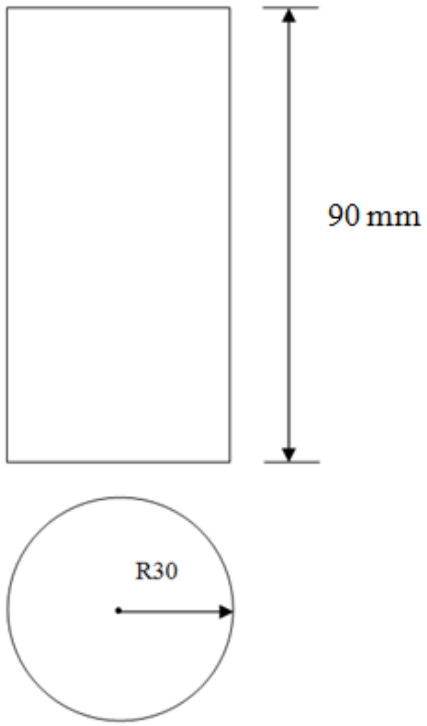
HEAT TRANSFER ANALYSIS OF CYLINDRICAL BRICK WITH SPECIFIED TEMPERATURE AND CONVECTIVE BC



PROCEDURE

1 Create cylindrical volume

Menu : Geometry → Volume → Create → Cylinder

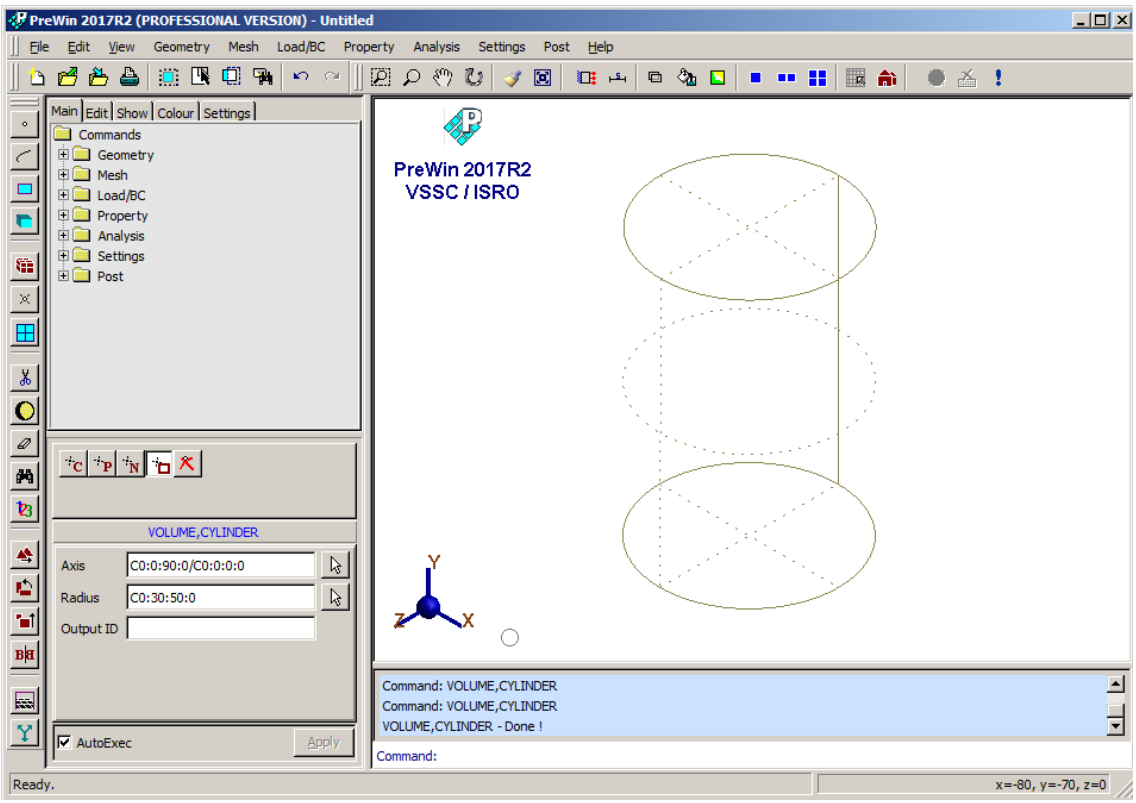
Commands : VOLUME,CYLINDER

Parameters : (To be filled by the user)

Axis	C1:0:90:0/C1:0:0:0
Radius	C1:30:50:0
Output ID	1

After filling the parameters click *apply* button. If apply button is not active then you press *ctrl+enter* key.

At the end of the above operations, your screen looks like this.



2 Meshing using brick elements

Menu : Mesh → FE Mesh → HEXASwept

Command : FEM,HEXASWEPT

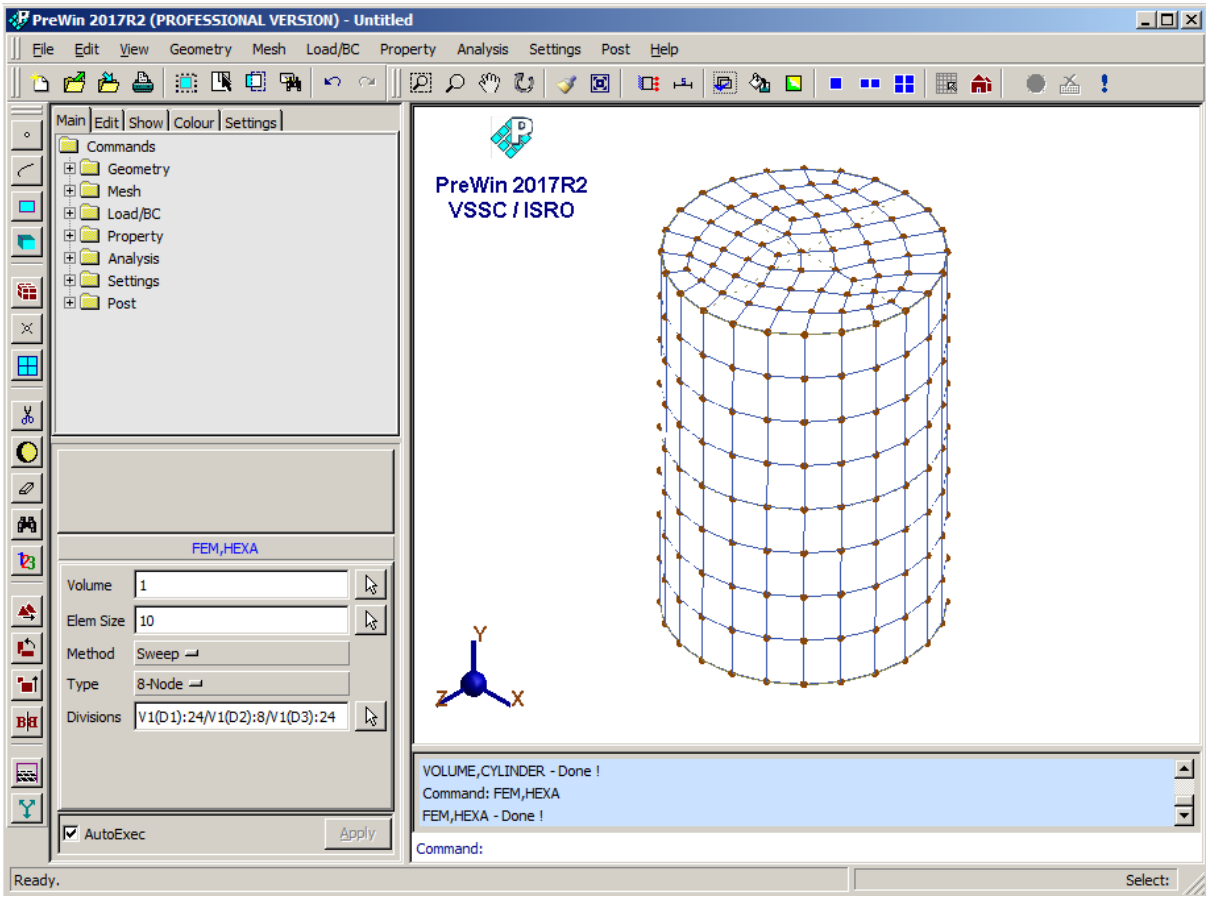
Parameters :

Volume	Use mouse to select the volume
Initial size	10
Method	Sweep
Type	8-node
Divisions	V1(D1):24/V1(D2):8/V1(D3):24

Note:

Divisions along each edge can be varied by selecting the corresponding edges and right/left clicking the mouse point to adjust the subdivisions. Eg: V1(D1)/24 shows 24 sub divisions along edge1, V1(D2)/8 shows 8 sub divisions along edge2 of volume1 & V1(D3)/24 shows 24 sub divisions along edge3 of volume1.

At the end of the above operations, your screen looks like this.



3 Set the analysis type

Menu : Analysis → Analysis Type

Command : ANTYPE, SET

Analysis Type	HT-Steady State

4 Specify heat transfer boundary conditions

Menu : Load/BC → Heat Transfer BC → Nodal Temperature → Add

Command : HTTEMP, ADD

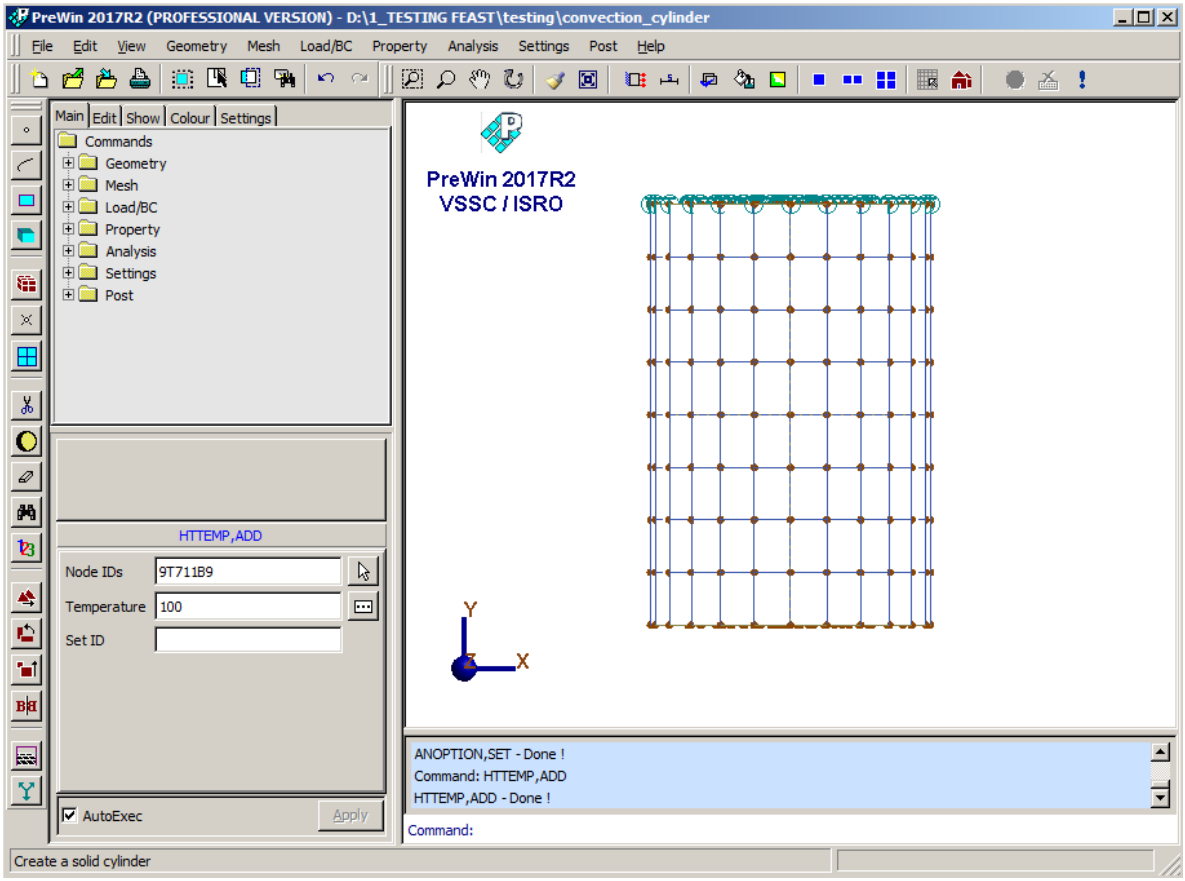
Parameters :

(i) Nodal Temperature

Node IDs	Select top edge nodes

Temperature	100

At the end of the above operations, your screen should look like this.



(ii) Convection

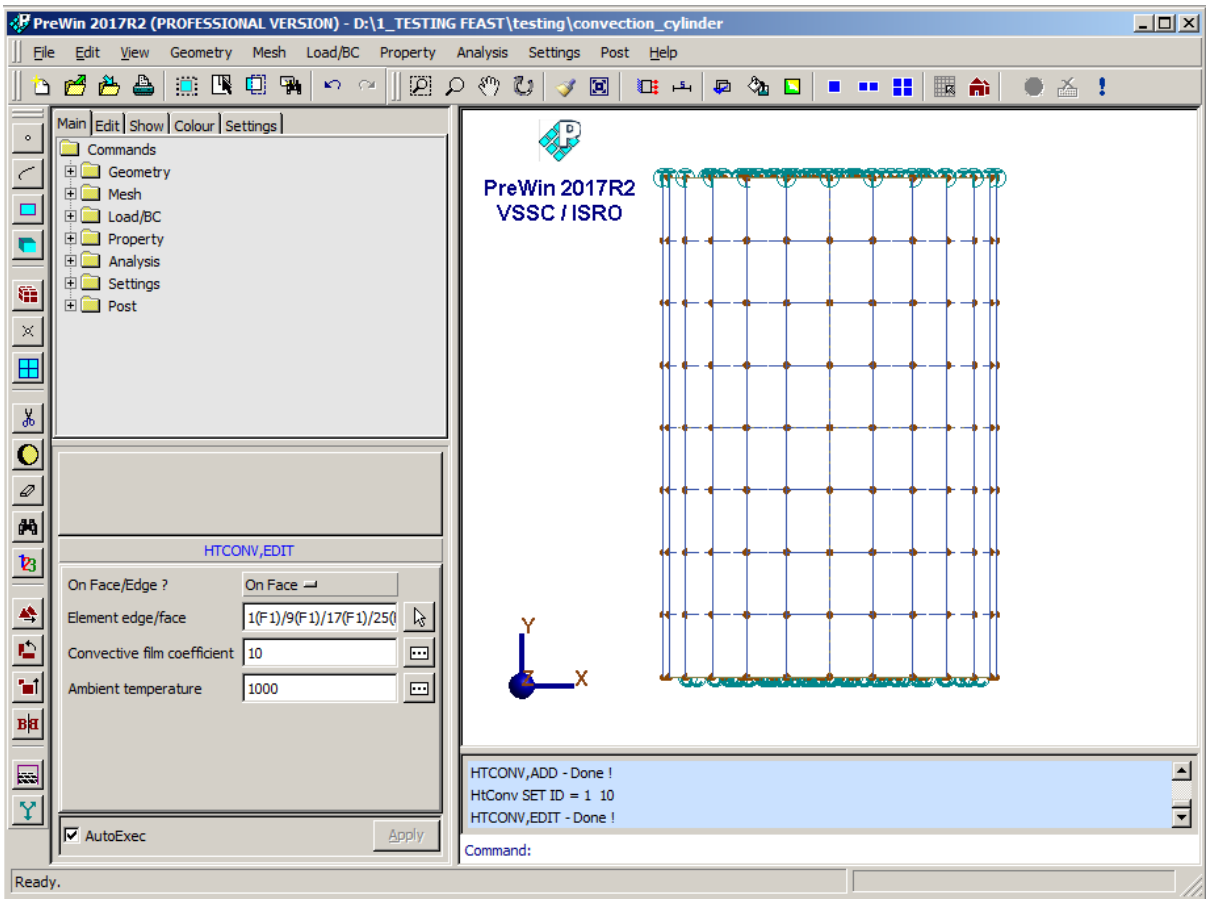
Menu : Load/BC → Heat Transfer BC → Convection → Add

Command : HTCONV, ADD

Parameters :

On Face/Edge	On face
Element edge/face	Select the bottom face elements.
Convective film coefficient	10
Ambient Temperature	1000

At the end of the above operations, your screen should look like this.



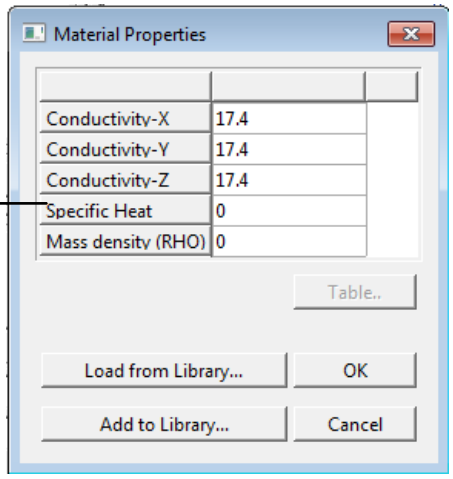
5 Specify material properties

Menu : Property → Material → Thermal → Add

Command : MATERIAL, THERMAL

Parameters :

Element IDs	All
Material Data	17.4/17.4/17.4/0/0
Material ID	1



6 Save the project model

Menu : File → Save

7 Submit the job into FEAST

Menu : Analysis → Run Solver

After the solution is completed the message *"successfully completed"* appears in the *message box.*

8 Perform post processing

a) Contour

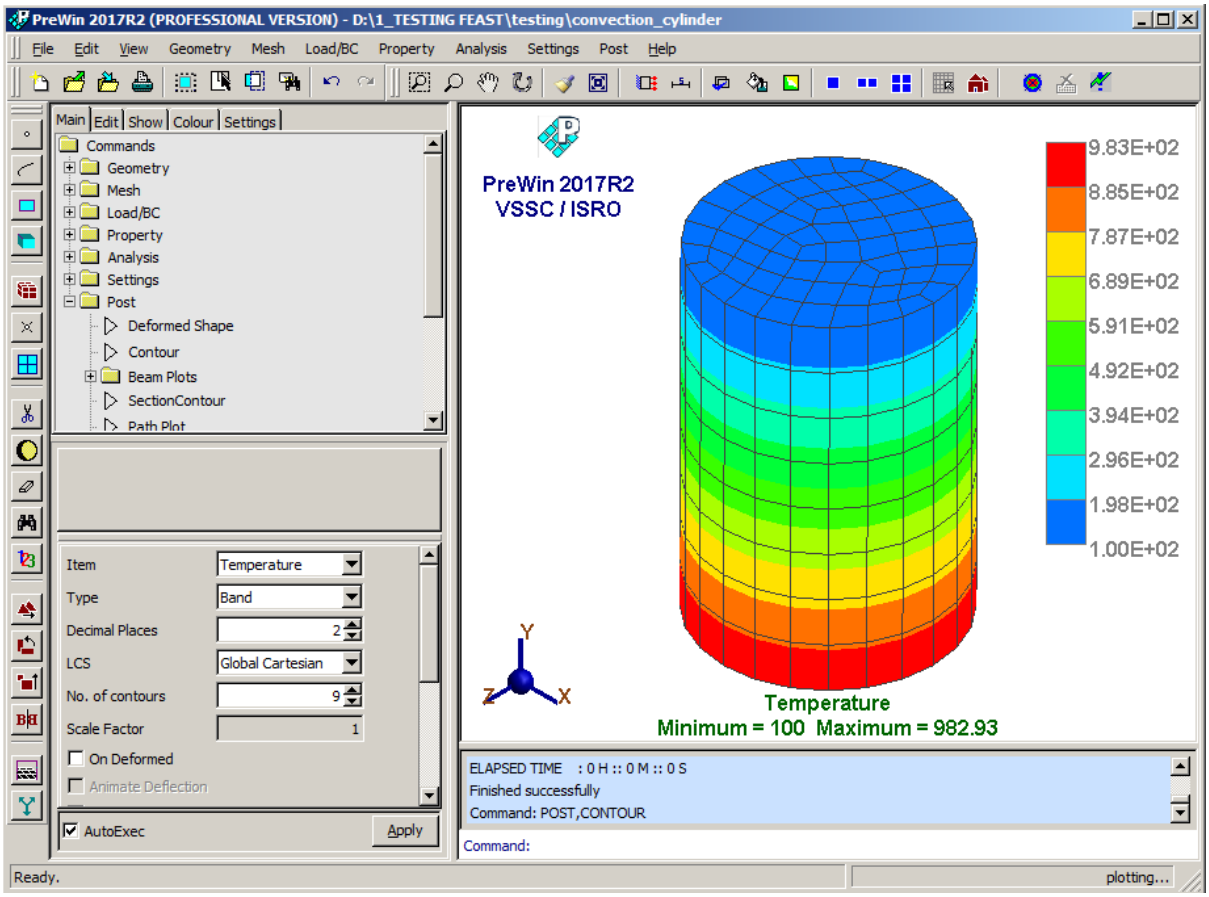
Menu : Post → Contour

Command : POST, CONTOUR

Parameters :

Item	Temperature
Type	Band
Decimal Places	2
LCS	Global Cartesian
No. of contours	9
Scale Factor	1

At the end of the above operations, your screen should look like this.



b) Output file can be seen in *.OUT

TRANSIENT HEAT TRANSFER ANALYSIS OF RECTANGULAR PLATE WITH SPECIFIED CONVECTIVE BC

PROCEDURE

STEP

1 Create 2 points at (0,0,0) (1,1,0)

Menu : Geometry → Key point → Create → By X/Y/Z

Commands : POINT, ADD

Parameters : (To be filled by the user)

Coordinate Data	0/0/0
Coordinate Type	0
Entity ID	1

After filling the parameters click *apply* button. If apply button is not active then you press *ctrl+enter* key.

2 Create rectangular surface on two points

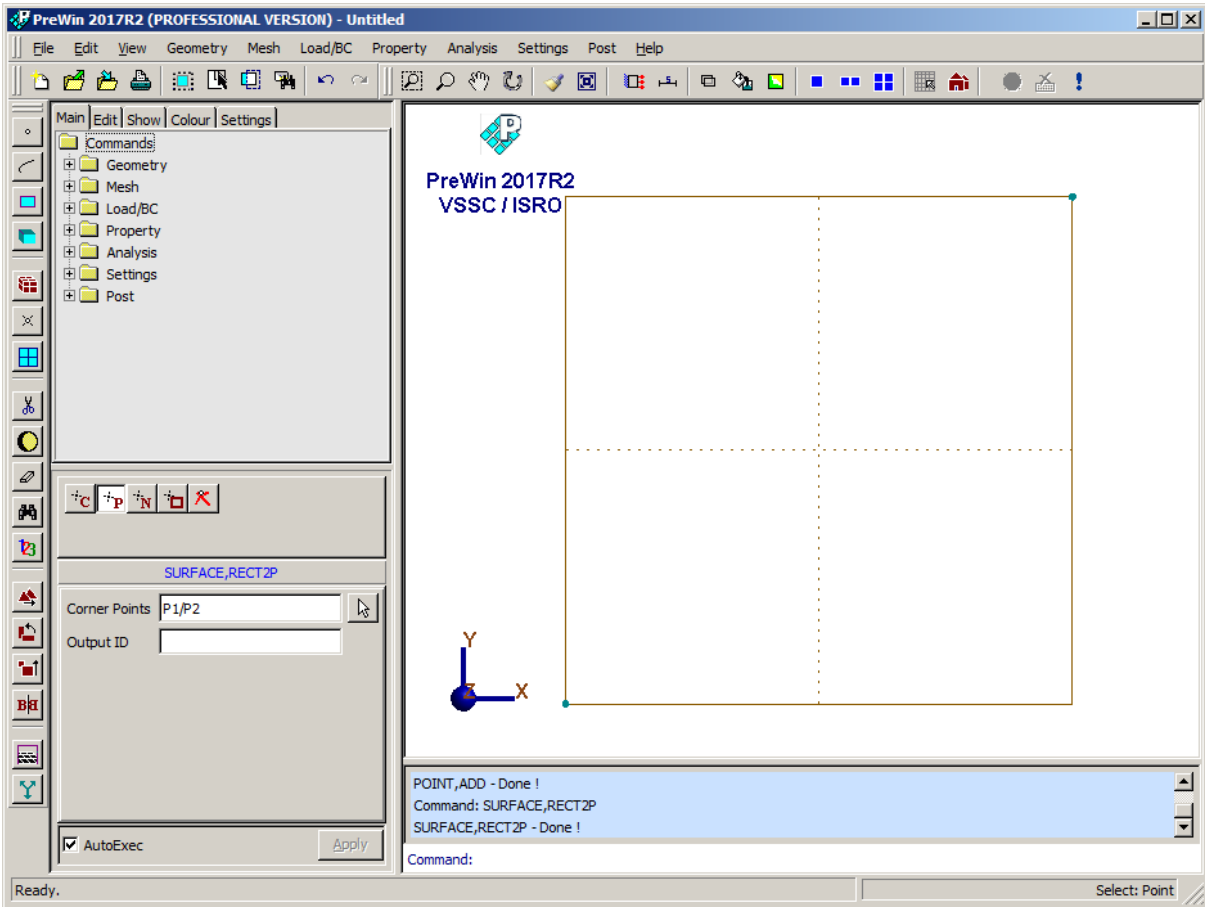
Menu : Geometry → Surface → Create → Rect2P

Command : SURFACE, RECT2P

Parameters :

Point Data	Use mouse to pick the two points
Entity ID	1

At the end of the above operations, your screen should look like this.



3 Meshing using quadrilateral elements

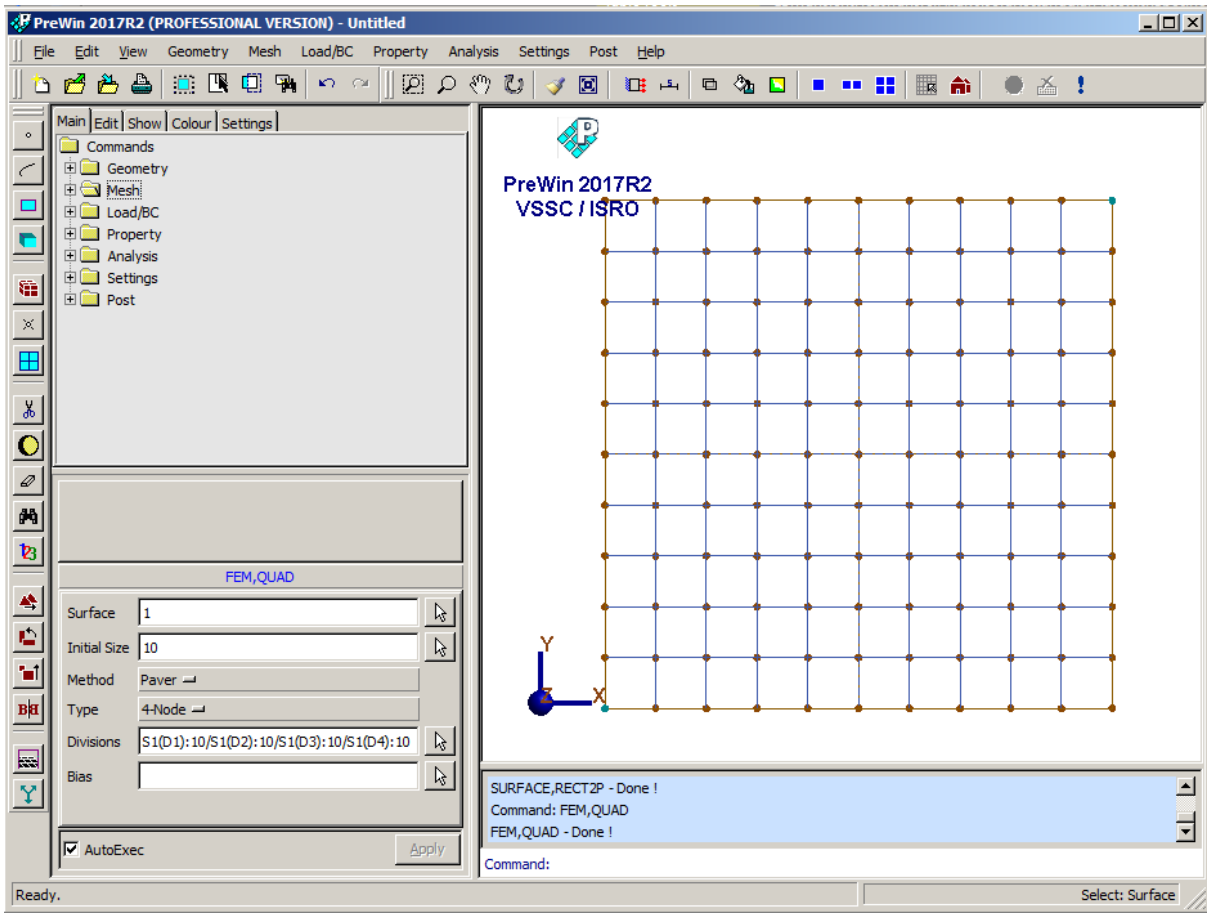
Menu : Mesh → FE Mesh → QUAD

Command : FEM,QUAD

Parameters :

Surface	Use mouse to select the surface
Initial Size	10
Method	Paver
Type	4-node
Divisions	Click on the each edges to make it 10 divisions each
Bias	1

At the end of the above operations, your screen should look like this.



4 Set the analysis type

Menu : Analysis → Analysis Type

Command : ANTYPE, SET

Analysis Type	HT-Transient

5 Specify heat transfer boundary conditions

(i) Convection

Menu : Load/BC → Heat Transfer BC → Convection → Add

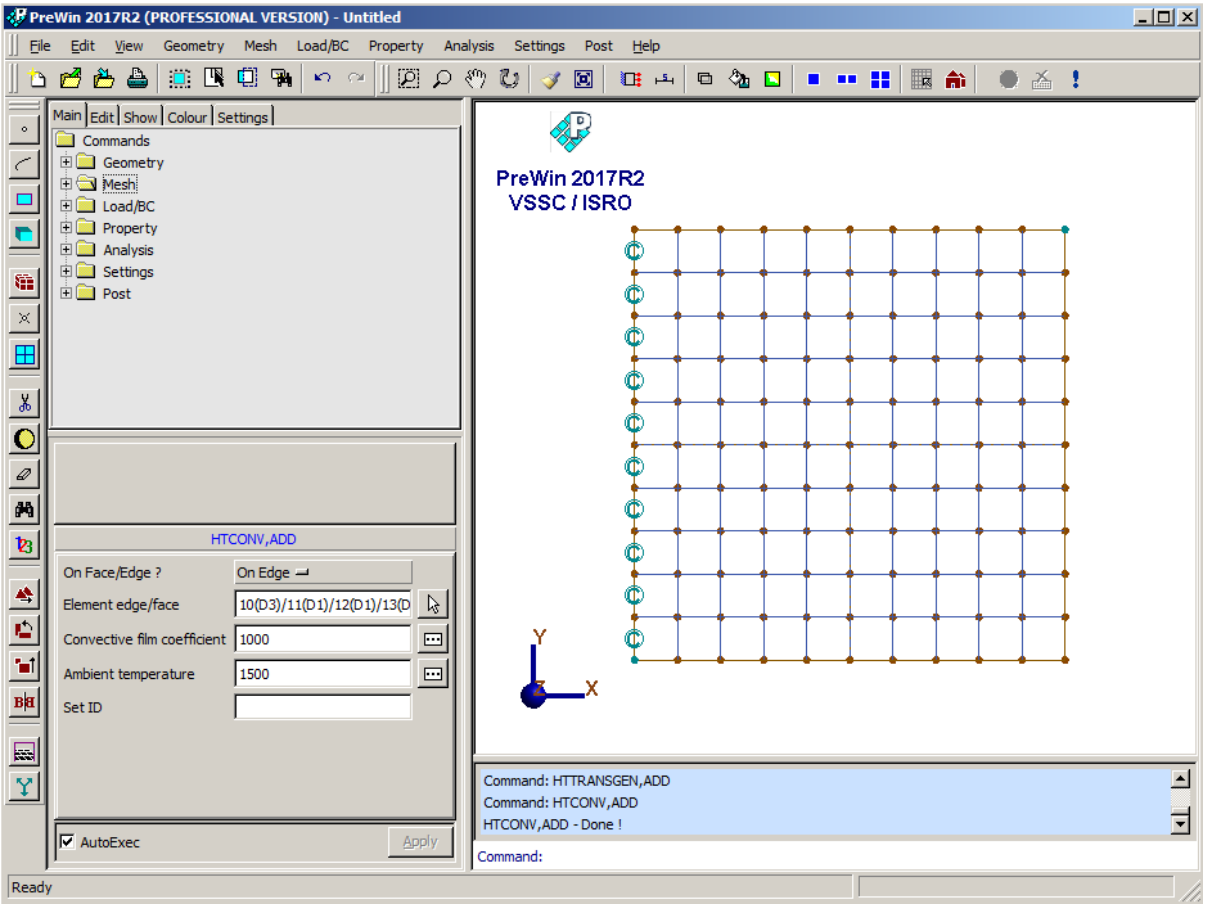
Command : HTCONV, ADD

Parameters :

On Face/Edge	On Edge

Element edge/face	Select the left side edges
Convective film coefficient	1000
Ambient Temperature	1500
Set ID	1

At the end of the above operations, your screen should look like this.



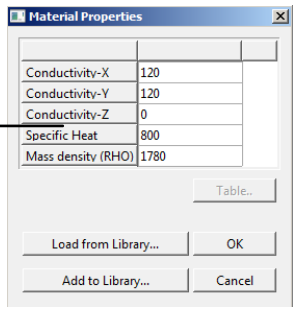
6 Specify material properties

Menu : Property → Material → Thermal → Add

Command : MATERIAL, THERMAL

Parameters :

Element IDs	All
Material Data	120/120/0/800/1780
Material ID	1



7 Specify transient general data

Menu : Analysis → HT- Transient→ General→ Add

Command : HTTRANSGEN,ADD

Parameters :

Initial temperature	300
Total Time	25
Time Increment	1
Theta	0.67

8 Save the project model

Menu : File → Save

9 Submit the job into FEAST

Menu : Analysis → Run Solver

After the solution is completed the message *"successfully completed"* appears in the *message box.*

10 Perform post processing

a) Contour

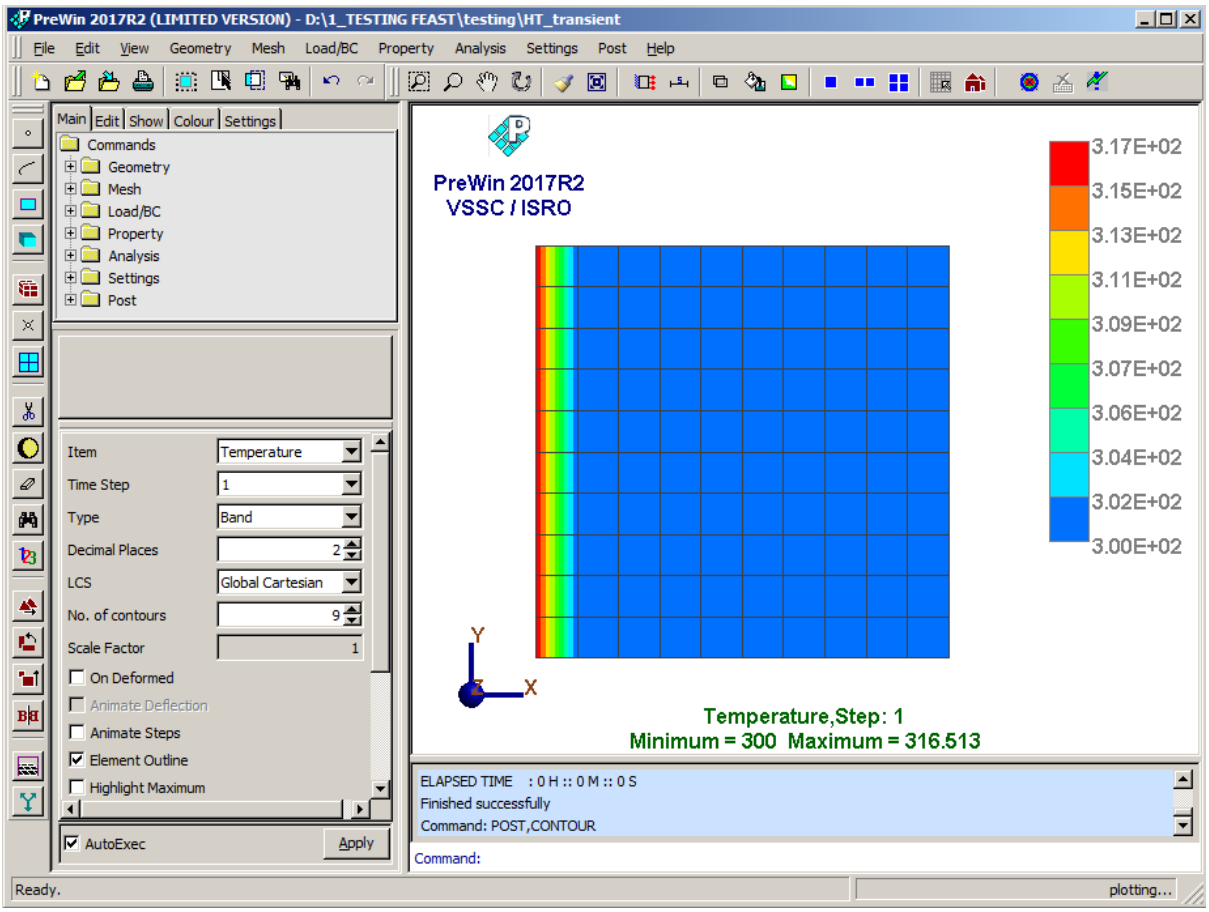
Menu : Post → Contour

Command : POST, CONTOUR

Parameters :

Item	Temperature
Time Step	1
Type	Band
Decimal Places	2
LCS	Global Cartesian
No. of contours	9
Scale Factor	1

At the end of the above operations, your screen should look like this.



b) Path Plot

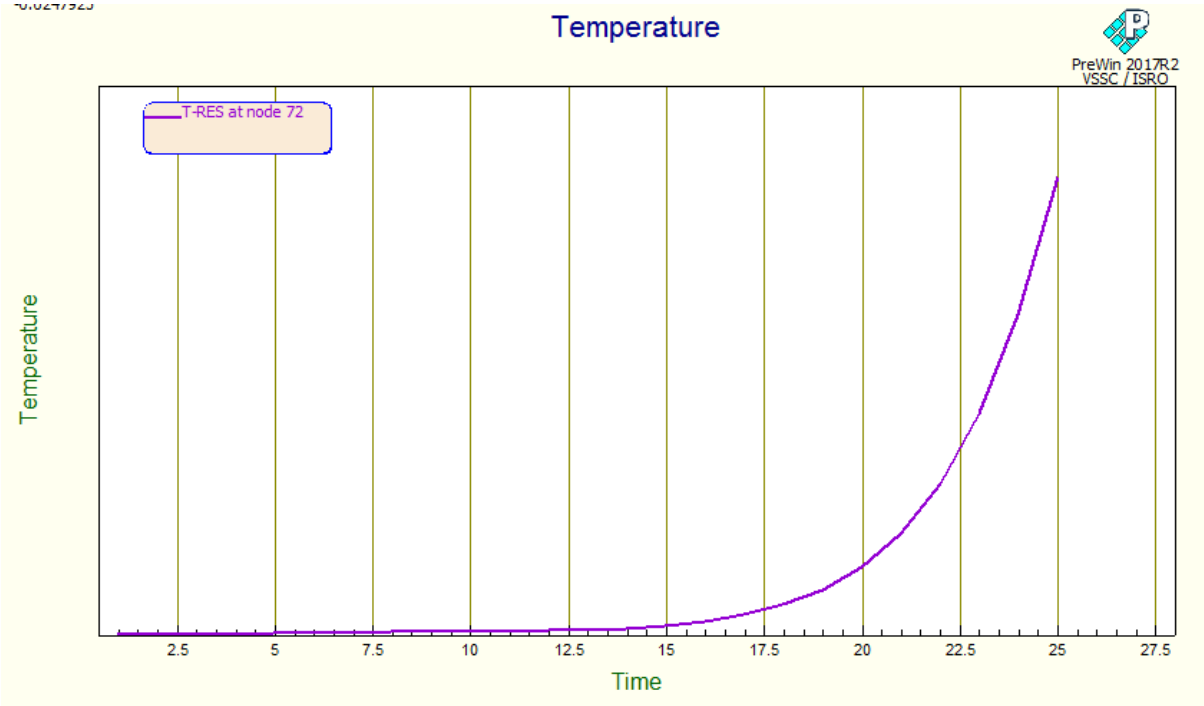
Menu : Post → History Plot

Command : POST, HISTORYPLOT

Parameters :

Item	Temperature
Nodes	72

At the end of the above operations a graph as shown appears in the viewport



Output can be seen in *.OUT file