CONDUCTION ANALYSIS OF RECTANGULAR PLATE WITH SPECIFIED TEMPERATURE

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

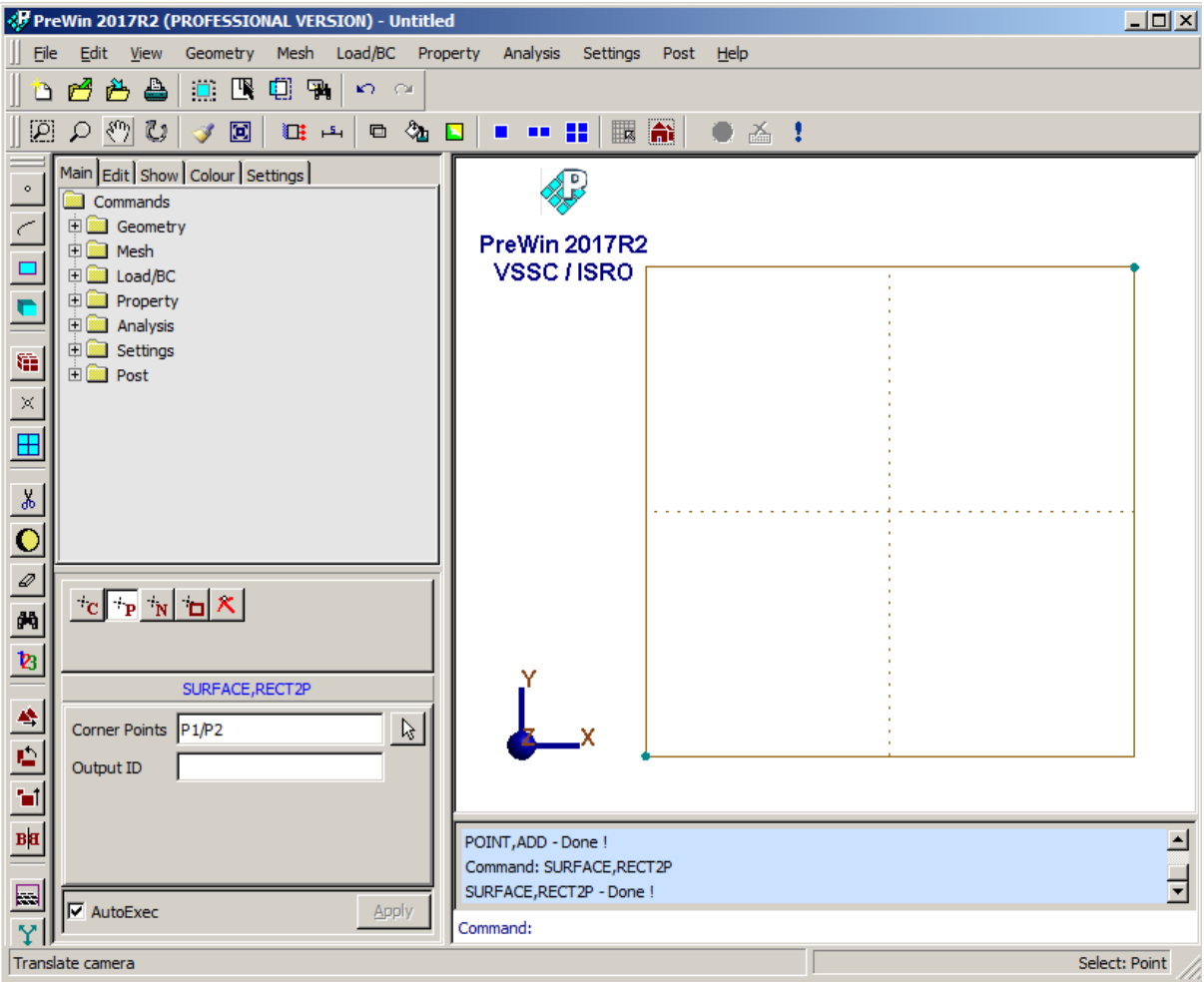
Menu : Geometry → Surface → Create → Rect2P

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

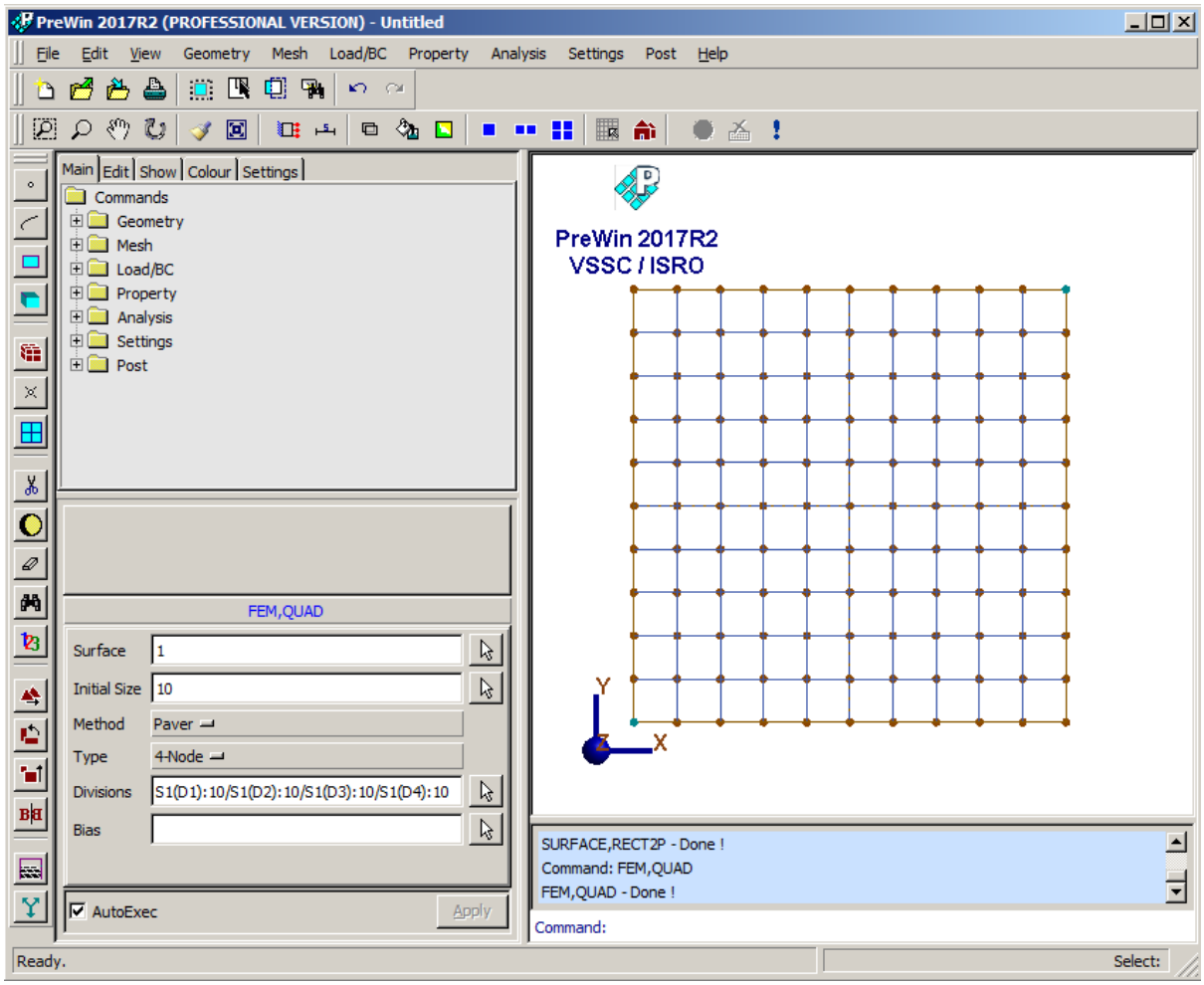
Menu : Mesh → FE Mesh → QUAD

Command : FEM,QUAD

Parameters :

Surface IDs	Use mouse to select the surface. Here the surface id is 1
Element size	10
Divisions	S1(D1):10/S1(D2):10/S1(D3):10/S1(D4):10
Bias Factors	

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-Steady State

5 Specify heat transfer boundary conditions

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

Command : HTTEMP, ADD

Parameters :

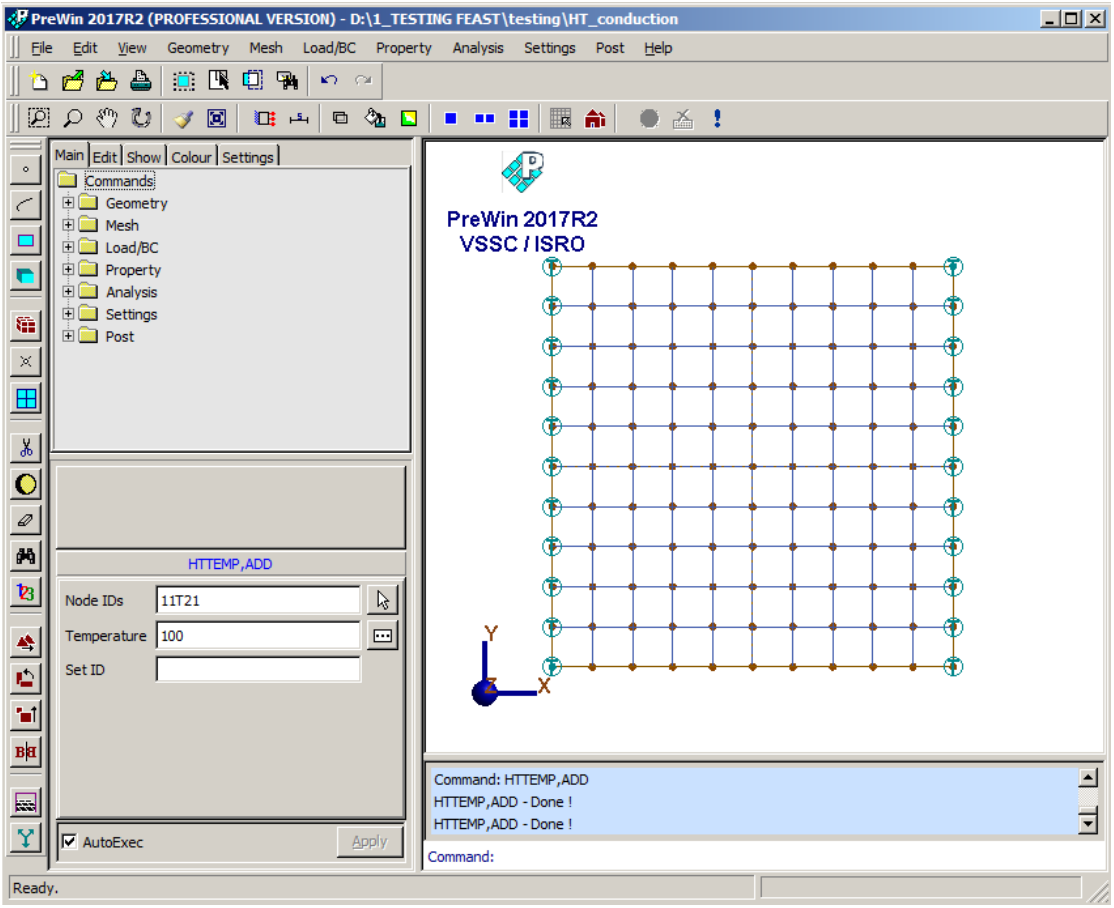
(i) 0^0C at right side boundary nodes

Node IDs	Select right side nodes. 1/31/32T40
Temperature	0
Set ID	1

(ii) 100^0C at left side boundary nodes

Node IDs	Select left side nodes. 11T21
Temperature	100
Set ID	2

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



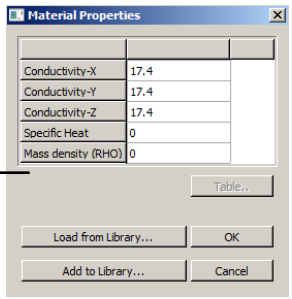
6 Specify material properties

Menu : Property → Material → Thermal → Add

Command : MATERIAL, THERMAL

Parameters :

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



7 Save the project model

Menu : File → Save

8 Submit the job into FEAST

Menu : Analysis → Run Solver

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

9 Perform post processing

a) Contour

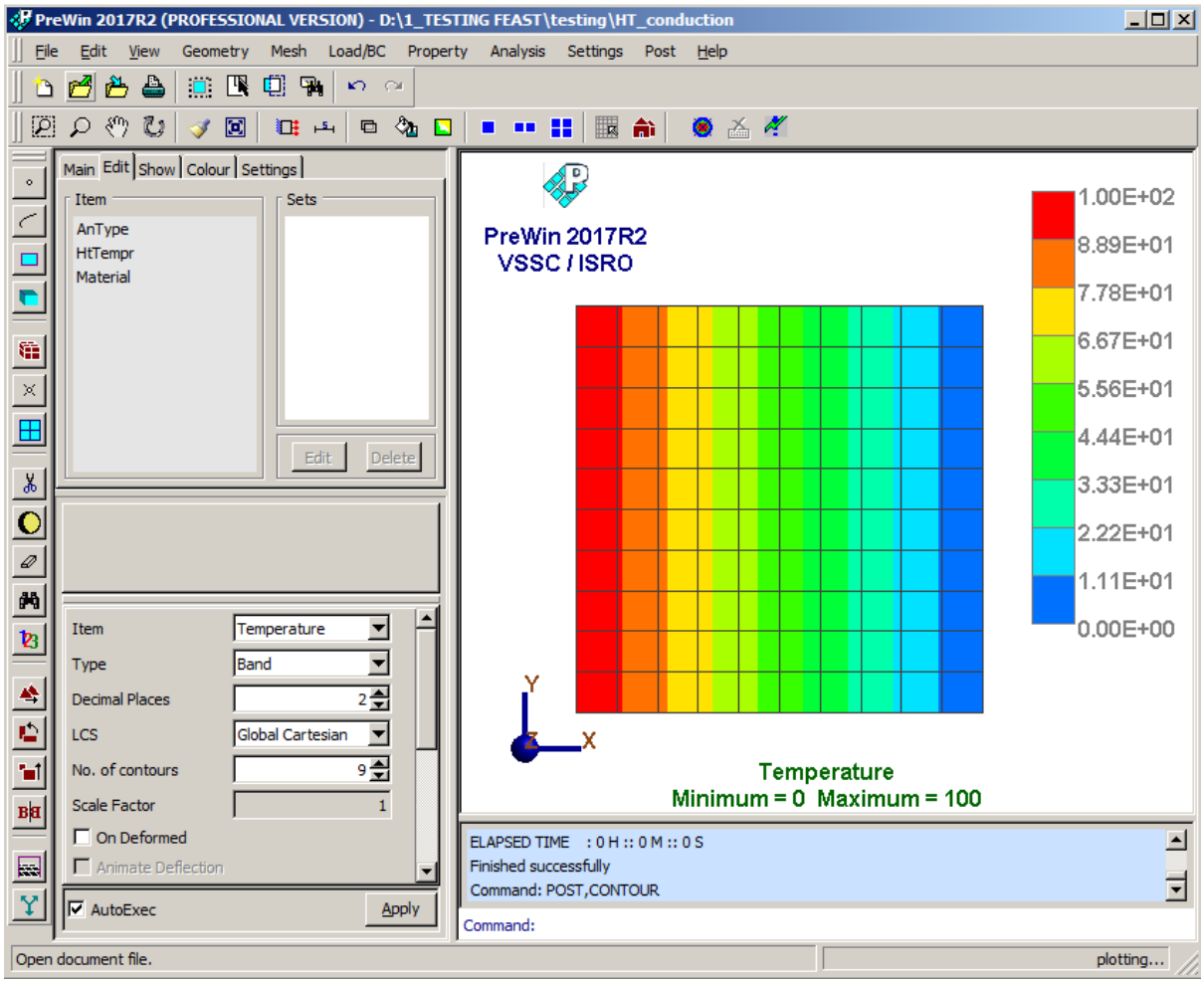
Menu : Post → Contour

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) Path Plot

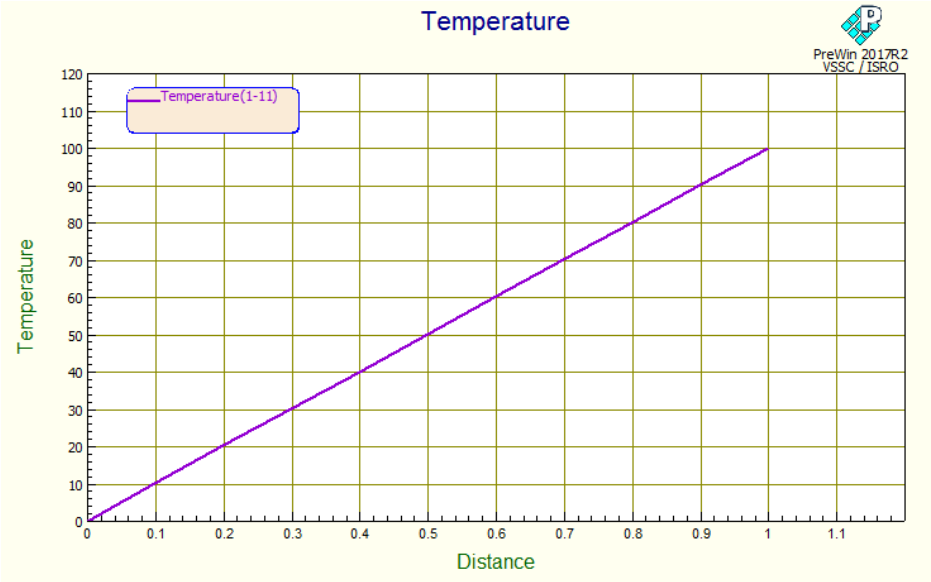
Menu : Post → Path Plot

Command : POST, PATHPLOT

Parameters :

Item	Temperature
Nodal Path	1T11

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



c) Output file can be seen in *.OUT

HEAT TRANSFER ANALYSIS OF AXI-SYMMETRIC PLATE WITH CONVECTIVE AND RADIATIVE BC

Property	Value
Geometry	0.05*m* X 0.1*m*
Mesh	2D Axisymmetric
Mesh size	5 X 1
Thermal conductivity (Kx)	1*W/K*
Thermal conductivity (Ky)	1*W/K*
Convective boundary condition	H=30 T_{α}=373*K*
Radiative boundary condition	E=0.9 T_{α}=300 *K*

PROCEDURE

1 Create key points at (3,0,0) and (3.05,0.1,0)

Commands : POINT, ADD

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

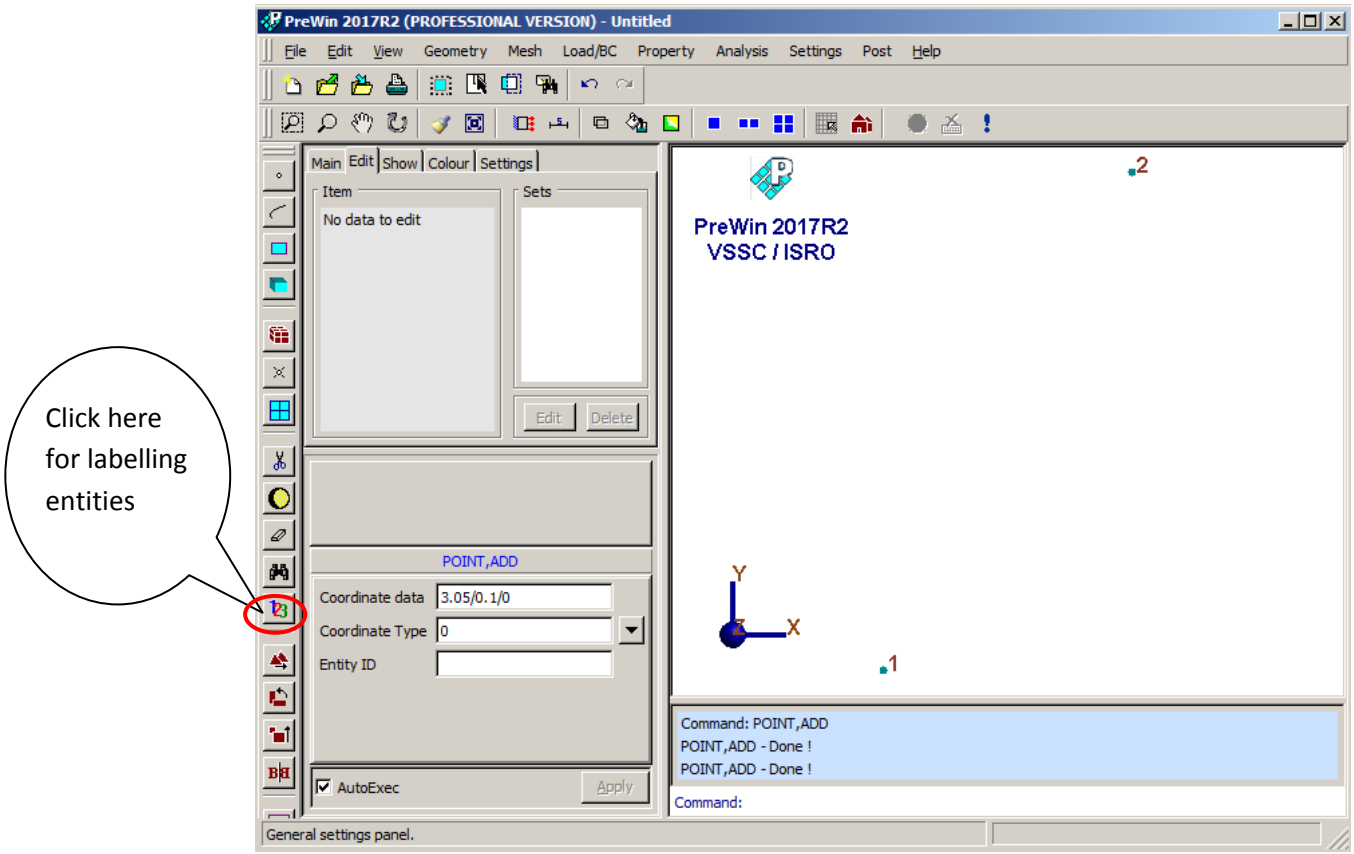
Parameters : (To be filled by the user)

Coordinate Data	3/0/0
Coordinate Type	0
Entity ID	1

Coordinate Data	3.05/0.1/0
Coordinate Type	0
Entity ID	2

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 Create quadrilateral surface on two diagonal points

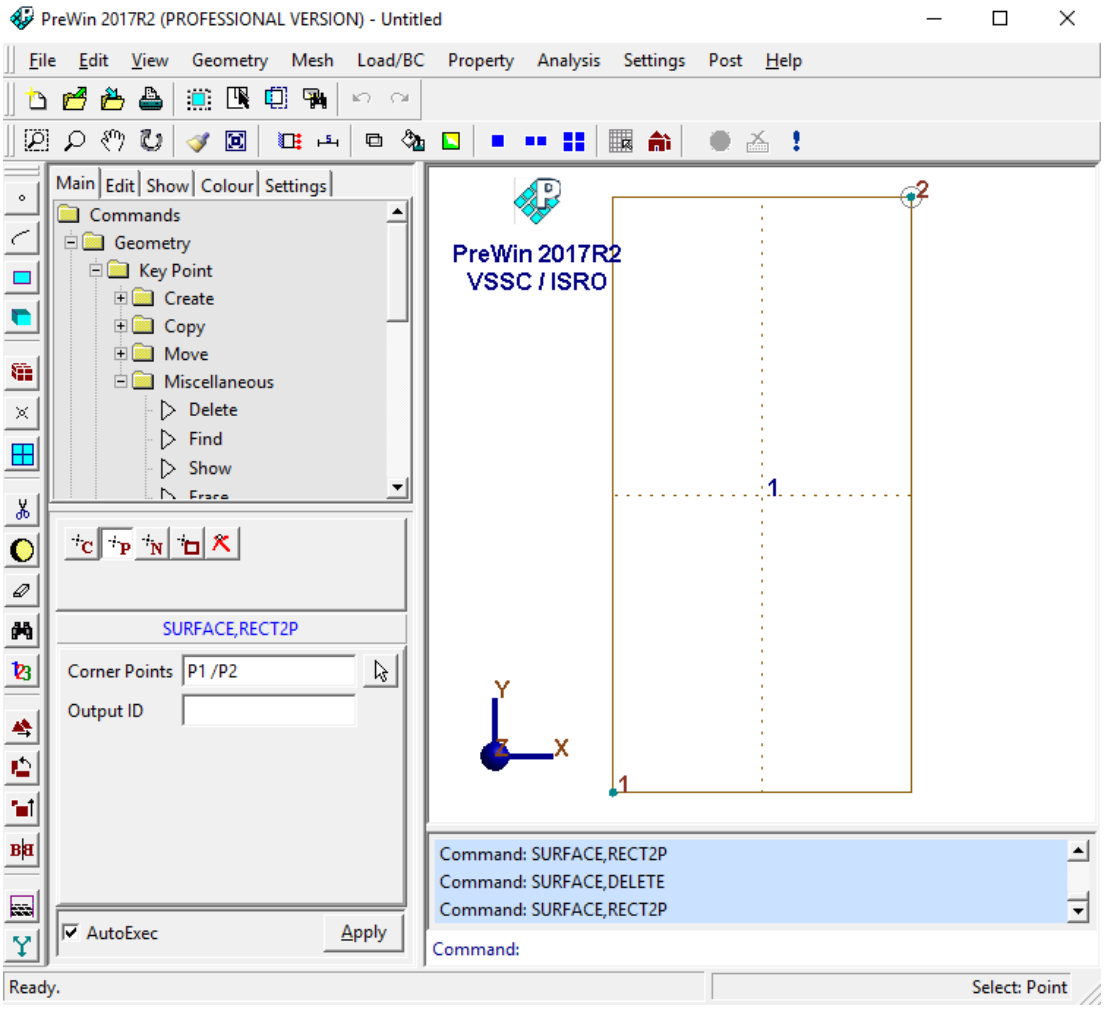
Command : SURFACE,RECT2P

Menu : Geometry → Surface → Create → Rect2P

Parameters : (To be filled by the users)

Point Data	Use mouse to pick the points. P1/P2
Entity ID	1

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



3 Meshing using quadrilateral elements

Menu : Mesh → FE Mesh → QUAD

Command : FEM,QUAD

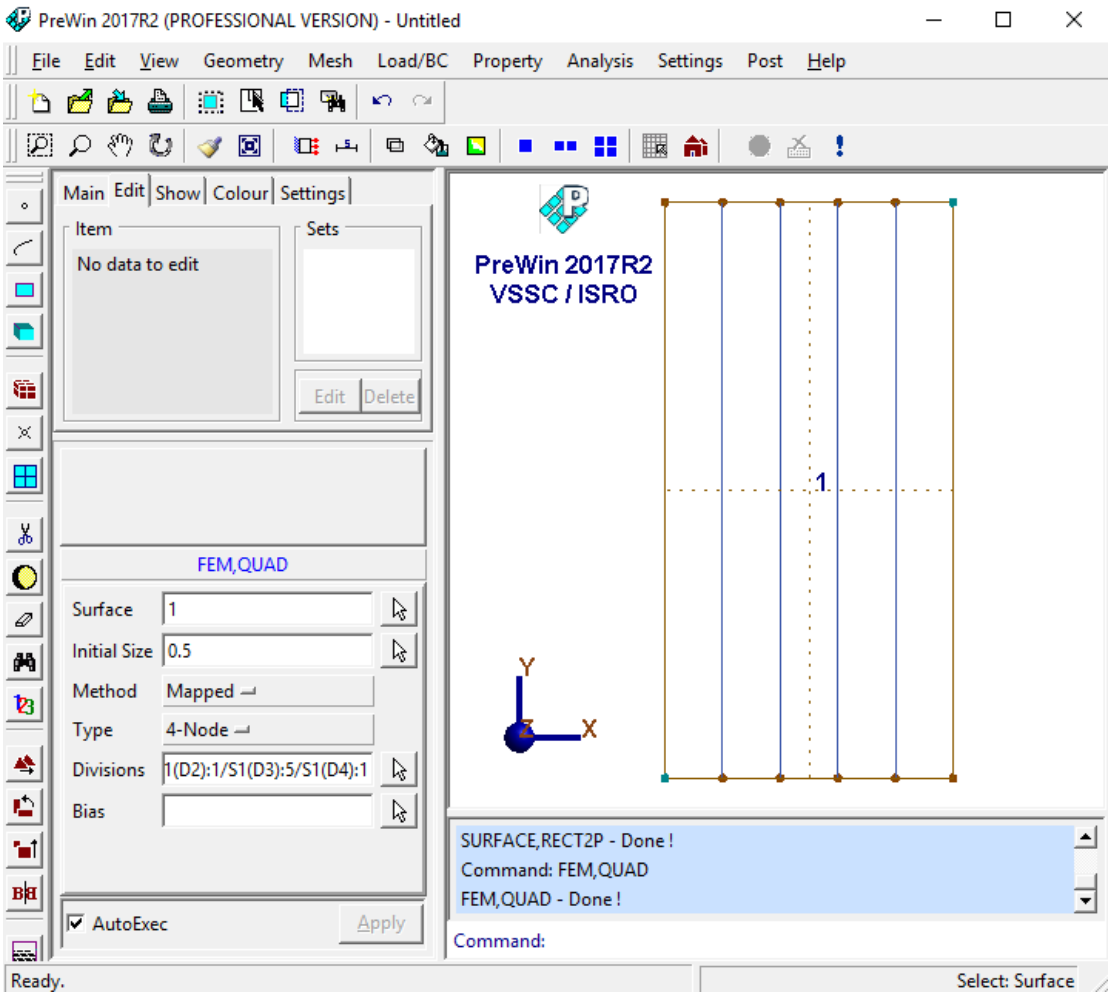
Parameters :

Surface	Use mouse to select the surface
Initial size	0.5
Method	Mapped
Type	4 node
Divisions	S1(D1):5/S1(D2):1/S1(D3):5/S1(D4):1
Bias	

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: S1(D1):5 shows 5 sub divisions along edge1, S1(D2):1 shows 1 sub division along edge2 of surface1.

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



4 Convert the QUAD4 elements to QUAD8 element

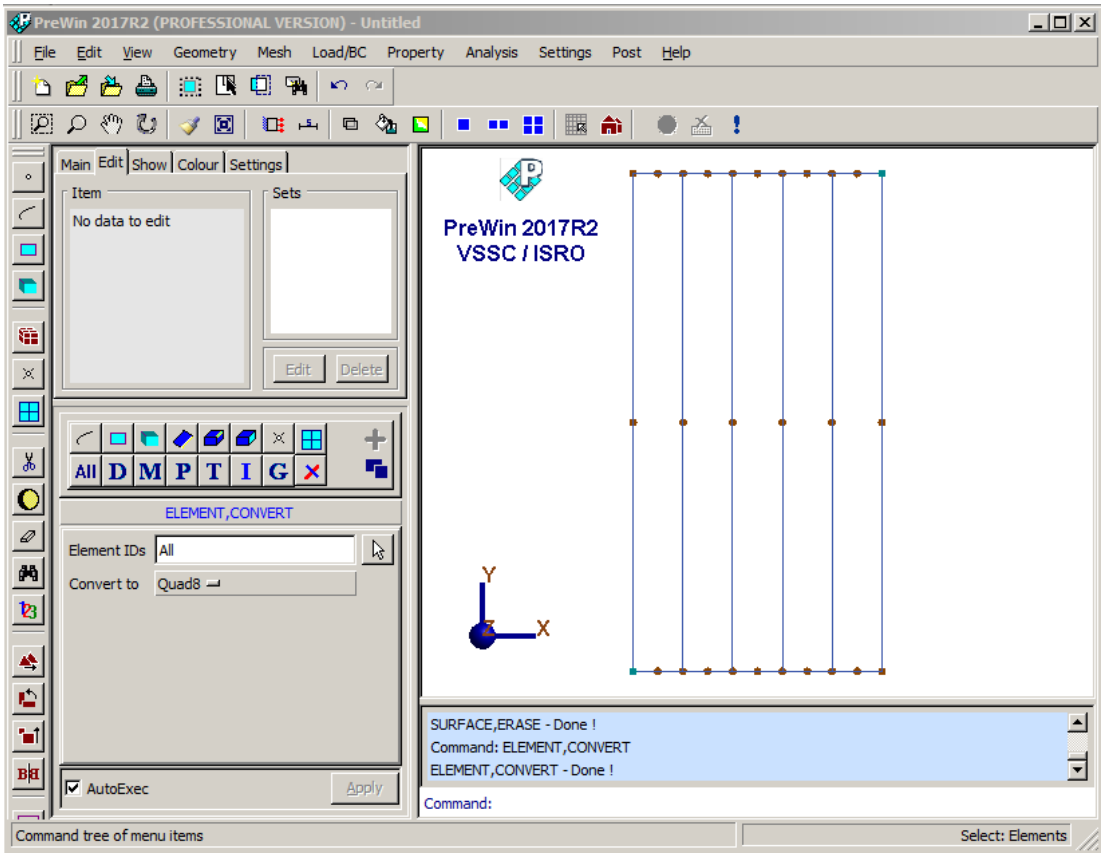
Command : ELEMENT,CONVERT

Menu : Mesh → Element → Modify→ Convert

Parameters :

Element IDs	All
Convert to	QUAD8

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



5 Change the element type

Command : ELEMENT,TYPE

Menu : Mesh → Element → Modify→ Type

Parameters :

Element IDs	All
Element Type	Axisymmetric

6 Set the analysis type

Menu : Analysis → Analysis Type

Command : ANTYPE, SET

Analysis Type	HT-Steady State

7 Specify heat transfer boundary conditions

1) Convective boundary condition

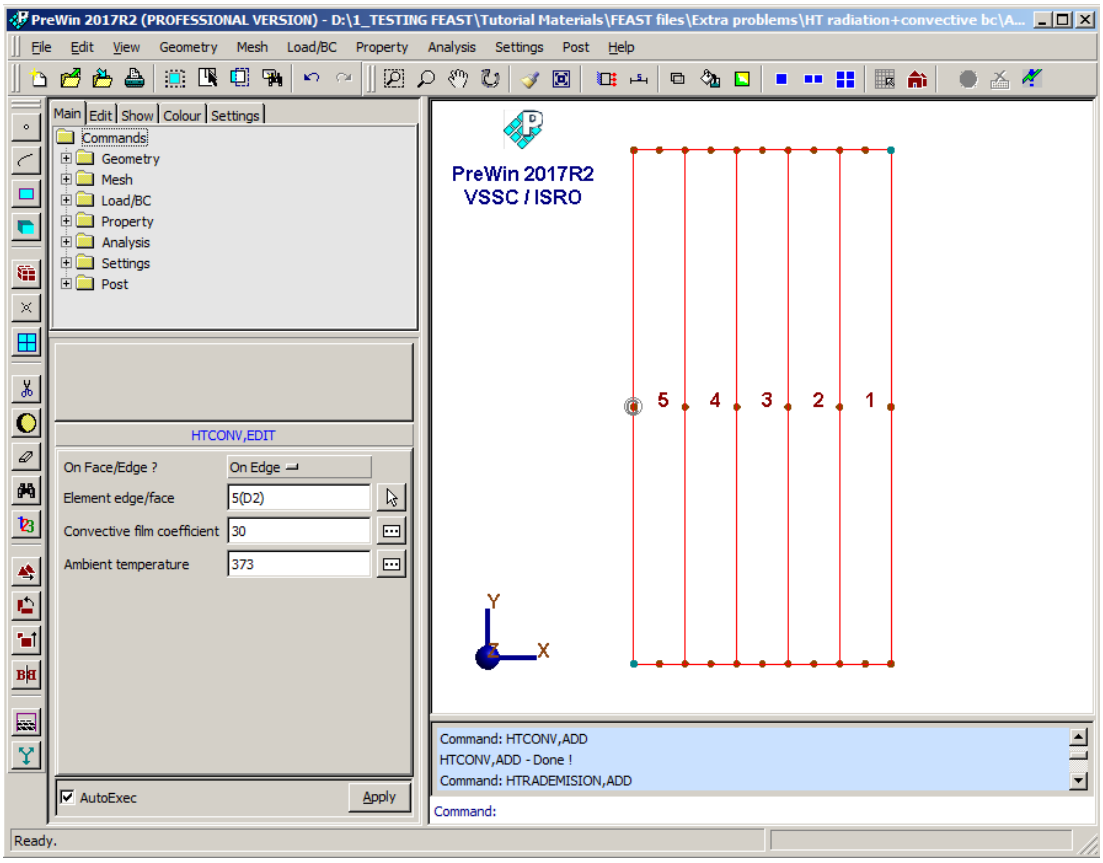
Menu : Load/BC → Heat Transfer BC → Convection → Add

Command : HTCONV, ADD

Parameters :

On Face/Edge	On edge
Element edge/face	Select edge2 of element five / (5D2)
Convective film coefficient	30
Ambient Temperature	373*K*

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



2) Radiative boundary condition

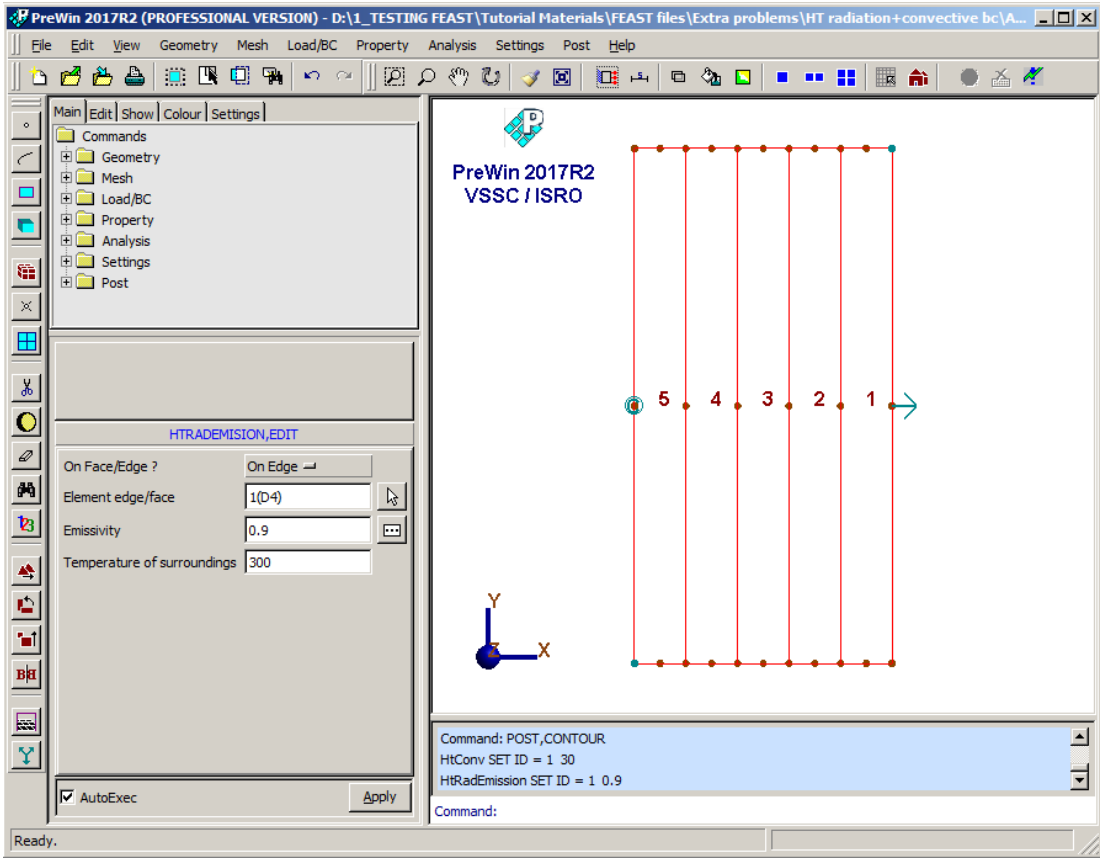
Menu : Load/BC → Heat Transfer BC → Radiative Emission → Add

Command : HTRADEMISION,ADD

Parameters :

On Face/Edge	On edge
Element edge/face	Select edge4 of element one / (1D4)
Emissivity	0.9
Temperature of surroundings	300*K*
Set ID	1

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



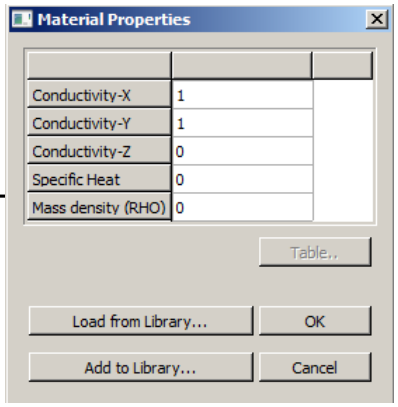
8 Specify material properties

Menu : Property → Material → Thermal → Add

Command : MATERIAL, THERMAL

Parameters :

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



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Menu : File → Save

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Menu : Analysis → Run Solver

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a) Contour

Menu : Post → Contour

Command : POST, CONTOUR

Parameters :

Item	Temperature
Type	Band
Decimal Places	2
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No. of contours	9
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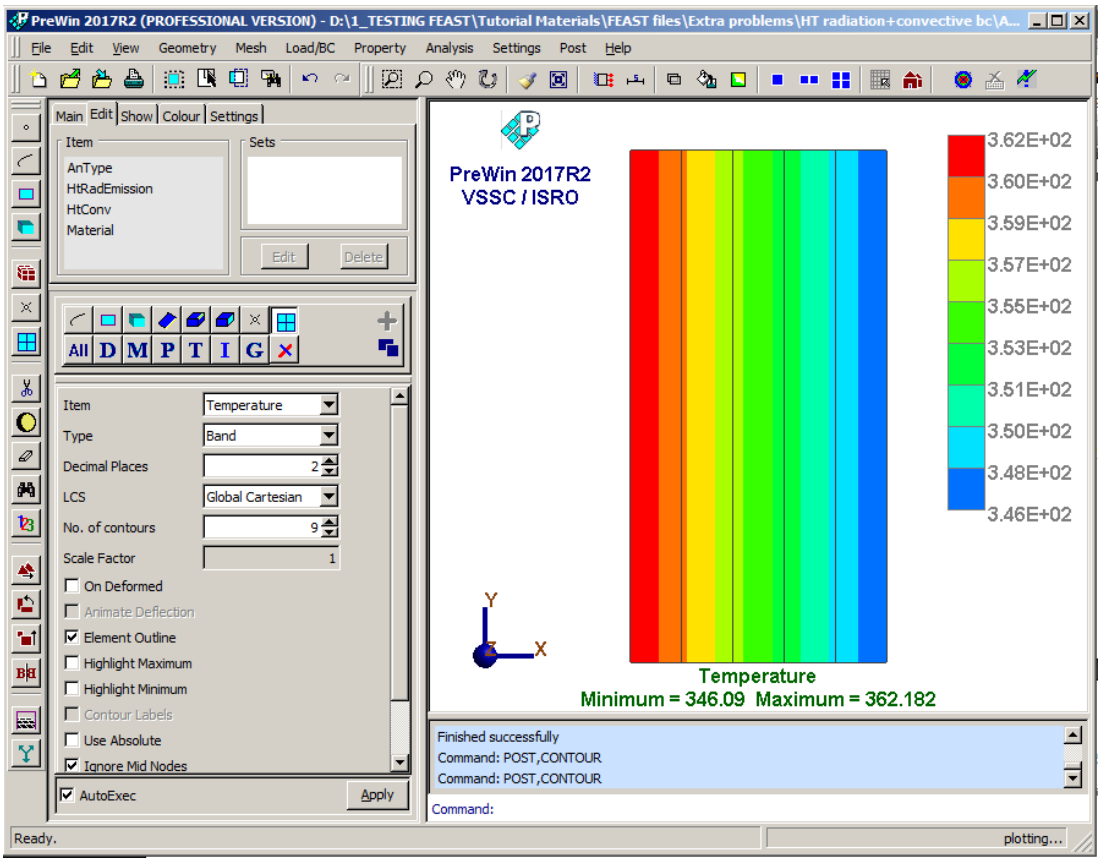

b) Output file can be seen in *.OUT