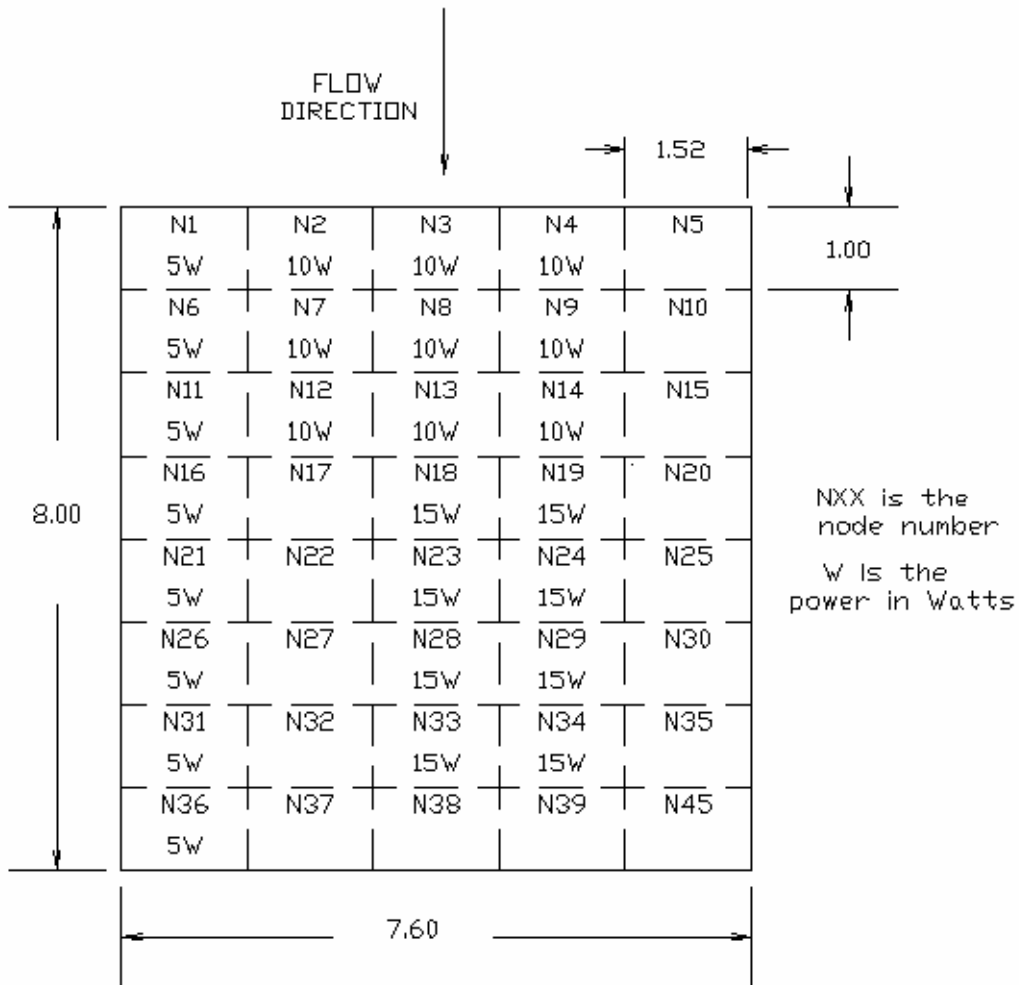
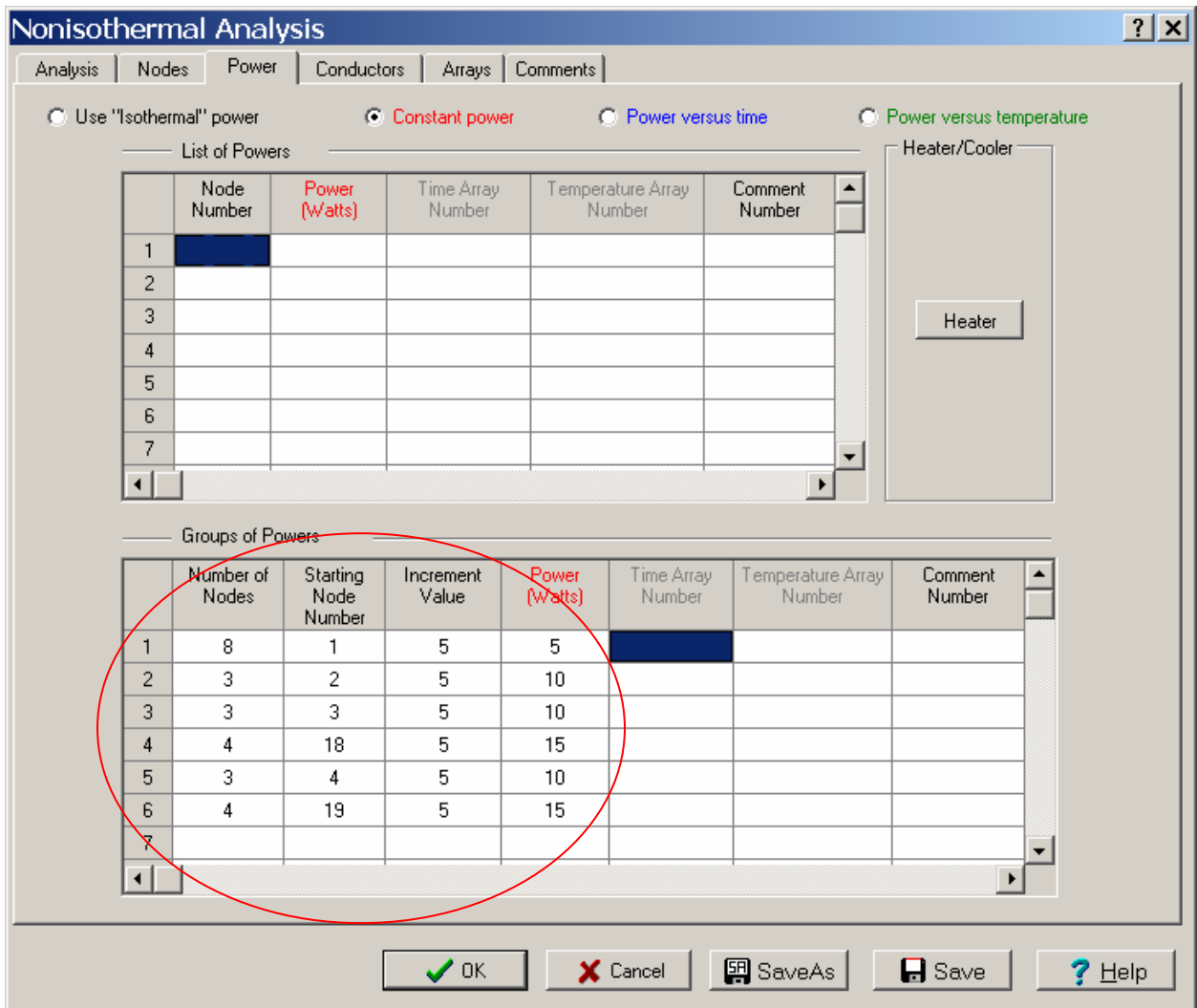


Non-isothermal Analysis Example with Non-uniform Power

This example builds on the Non-isothermal Analysis Example. In this example, the 250 Watts of power is distributed according to the table below. A color contour plot is generated to display the temperature at each node.



The power is assigned to the nodes on the Power tab as shown below. Note that this was all that had to be added to the mode to convert it from the uniform power model.



The isothermal results are shown below, they are always calculated prior to calculating of non-isothermal results.

```
#####
HEATING ON ONE SIDE ONLY

***** VARIABLE INPUTS *****
THE TYPE OF FINS SPECIFIED ARE:                RECTANGULAR
FIN HEIGHT, INCHES                            0.500
BASE THICKNESS, INCHES                        0.062
FIN THICKNESS, INCHES                         0.0060
FIN DENSITY, FINS PER INCH                    8.0
STATIC INLET FLUID TEMPERATURE, DEG C        55.0
INLET PRESSURE, LBS/IN2                       14.70
VOLUME FLOWRATE, FT3/MIN                     50.00
THE POWER APPLIED TO ONE SIDE ONLY, WATTS    250.00
THE COOLING FLUID IS:                          AIR

***** INTERMEDIATE CALCULATED PARAMETERS *****
FREE FLOW CROSS SECTIONAL AREA, IN2          3.62
HYDRAULIC DIAMETER, INCHES                   0.192
COLDPLATE WEIGHT, LBS                        0.75
TOTAL MASS FLOWRATE, LBS/MIN                 3.31
COLD PLATE MASS FLOWRATE, LBS/MIN            3.31
COLDPLATE VOL FLOWRATE, [GAL/MIN] FT3/MIN [ 374.0] 50.00
COLDPLATE VELOCITY, FT/SEC                   33.17
REYNOLDS NUMBER                              2644.
EQUIVALENT FRICTION LOSS COEFFICIENT, KFRICITION 1.67
INLET LOSS COEFFICIENT, KINLET                0.82
EXIT LOSS COEFFICIENT, KEXIT                 -0.73
FILM COEFFICIENT, [BTU/(HR-FT2-F)] W/(IN2-C) [ 8.22] 0.0301
THE FIN EFFICIENCY WITH HEAT ON ONE SIDE ONLY IS 0.796

***** PRESSURE *****
INLET PRESSURE, [LB/IN2] INCHES-H2O          [ 14.700] 407.077
INLET PRESSURE DROP, INCHES-H2O              0.196
ACCELERATION PRESSURE DROP, INCHES-H2O      0.013
FRICTIONAL PRESSURE DROP, INCHES-H2O        0.363
EXIT PRESSURE DROP, INCHES-H2O              -0.182
TOTAL PRESSURE DROP, INCHES-H2O              0.390
EXIT PRESSURE, [LB/IN2] INCHES-H2O          [ 14.686] 406.687
DENSITY RATIO TIME PRESSURE DROP, INCHES-H2O 0.3375

***** THERMAL RESISTANCE *****
THERMAL RESISTANCE FROM INLET FLUID TO COLDPLATE, C/W 0.090
THERMAL RESISTANCE FROM LOCAL FLUID TO COLDPLATE, C/W 0.068

***** TEMPERATURES *****
STATIC INLET FLUID TEMPERATURE, DEG C        55.0
STAGNATION FLUID TEMP RISE ALONG COLDPLATE, DEG C 9.9
TOTAL STAGNATION FLUID TEMP RISE, DEG C      9.9
STATIC EXIT FLUID TEMPERATURE, DEG C         64.9
ISOTHERMAL COLDPLATE TEMPERATURE, DEG C     77.4
MAXIMUM COLDPLATE TEMPERATURE, DEG C        81.9
```

The predicted cold plate and fluid temperatures as well as the power at each node are shown below

INLET FLUID TEMPERATURE= 55.0 C					
V					
CP TEMP	FLD TEMP	POWER	NODE NO.		
V					
74.6	81.0	82.6	79.3	65.8	
(56.3)	(56.8)	(56.9)	(56.7)	(55.7)	
5.00W	10.00W	10.00W	10.00W	0.00W	
N 1	N 2	N 3	N 4	N 5	
74.9	81.2	83.7	80.5	66.5	
(57.6)	(58.4)	(58.7)	(58.3)	(56.5)	
5.00W	10.00W	10.00W	10.00W	0.00W	
N 6	N 7	N 8	N 9	N 10	
75.0	80.2	85.5	82.8	67.7	
(58.8)	(59.9)	(60.5)	(59.9)	(57.2)	
5.00W	10.00W	10.00W	10.00W	0.00W	
N 11	N 12	N 13	N 14	N 15	
74.6	75.5	89.1	87.3	69.1	
(59.9)	(61.0)	(62.5)	(61.8)	(58.0)	
5.00W	0.00W	15.00W	15.00W	0.00W	
N 16	N 17	N 18	N 19	N 20	
74.6	74.3	90.6	89.3	70.2	
(60.9)	(61.9)	(64.4)	(63.7)	(58.9)	
5.00W	0.00W	15.00W	15.00W	0.00W	
N 21	N 22	N 23	N 24	N 25	
74.8	73.9	90.4	89.3	70.5	
(61.8)	(62.7)	(66.2)	(65.4)	(59.7)	
5.00W	0.00W	15.00W	15.00W	0.00W	
N 26	N 27	N 28	N 29	N 30	
75.0	73.2	87.6	86.6	70.1	
(62.7)	(63.4)	(67.6)	(66.9)	(60.4)	
5.00W	0.00W	15.00W	15.00W	0.00W	
N 31	N 32	N 33	N 34	N 35	
75.1	72.2	79.0	78.0	68.9	
(63.6)	(64.0)	(68.4)	(67.6)	(61.0)	
5.00W	0.00W	0.00W	0.00W	0.00W	
N 36	N 37	N 38	N 39	N 40	
FLUID TEMPERATURE OUT= 64.9					
V					
AVERAGE COLDPLATE TEMP.=	78.0	V			
POWER DIRECTLY ON CP=	250.00				
NO. OF ITERATIONS REQUIRED=	20				
ALLOW. NO. OF ITERATIONS=	1000				
TEMP. RELAXATION CRITERIA=	.00100				
PERCENT ENGERY BALANCE=	0.0014				
V					

A color contour plot of the cold plate temperatures is shown below.

