



# Specialists in Thermal Applications



Continuous Reheat Application Software – 2D performs simulation in continuous Walking Beam and Pusher furnaces to determine optimum setting during reheating operations. The software also predicts product quality (Temperature, Scale, & Decarburization) during reheating.

The screenshot displays the FurnXPERT software interface with several key components:

- Furnace Configuration:**
  - Furnace Details:** Furnace Type: Pusher; Heating Type: Top and Bot. Fired; Width: 13 m; Length: 14 m; Wrap Around Option: No Wrap.
  - Charge Rolls:** # of Rolls: 10; Diameter: 0.3 m; Width: 0.6 m; Loss Factor charge: 0.2.
  - Discharge Rolls:** # of Rolls: 0; Diameter: 0 m; Width: 0 m; Loss Factor discharge: 0.1-1.0.
  - Other Specification:** Charge Door Area: 0.09 Sq. m; Discharge Door Area: 0.09 Sq. m; Bot. Zone Screen Input: 0 J/sec; Top Zone Screen Input: 0 J/sec; Q Misc. factor: 0.
- Zone Details:**

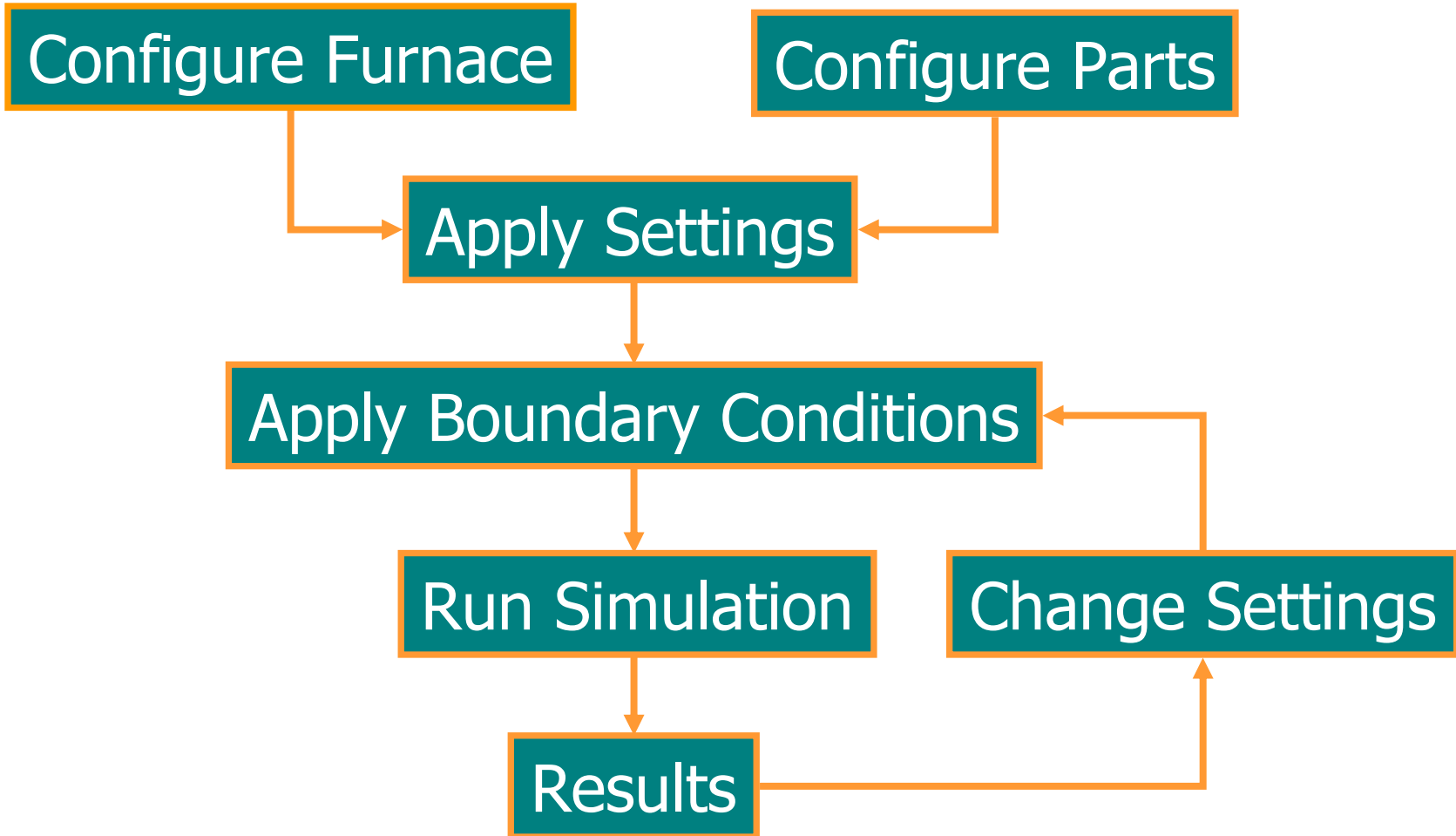
Top Zone	Top Dist. m	Bot. Zone	Bot. Dist. m
1	3.82	1	3.82
2	9	2	9
3	14		
- Heat Balance (SANKEY DIAGRAM):**
  - Gross Heat Input (G): 29,968,290.00 J/sec
  - Net Heat Input (N): 28,564,464.00 J/sec
  - Available Input (A): 25,600,430.00 J/sec
  - Net Heat to Air: 6,697,839.50 J/sec
  - FLUE LOSS: 10,176,671.00 J/sec
  - Combustion Air Temp: 797 Deg C
  - RECUOPERATOR
  - Losses: Door Loss (28,712.25 J/sec), Roll Loss (55,022.44 J/sec), Heat to Steel (17,794,172.00 J/sec), Refractory Loss (7,501,126.50 J/sec), Water Loss (212,422.88 J/sec), Slot Loss (0.00 J/sec).
- Temperature Curve Inside Furnace:**

COMPUTED TEMPERATURE PROFILE

Graph showing Temperature (Y-axis, 0 to 1400) vs. Distance in m (X-axis, 0 to 8.4). Multiple curves represent different zones and temperatures.
- Charge Details:**
  - Charge Shape & Dimension: Shape: Billet; Diameter (D): cm; Thickness (H): 13 cm; Length (L): 10 m; Width (W): 13 cm.
  - Other Details: Grade: 1008 GRADE; Charge Temperature: 250 Deg C; View Factor Top: 0.8; Target Temperature: 1151 Deg C; View Factor Bot: 0.5; Target delta T: 10 Deg C.
- Legend:**
  - Zone Temp -- Top
  - Zone Temp -- Bot
  - Charge Temp -- Top
  - Charge Temp -- Center
  - Charge Temp -- Bot
- Charge Condition:** Charge Temp: 250 Deg C; Prod. Rate: 99 MT/Hr; Res. Time: 87 min.
- Actual:** Discharge Temp: 106; Discharge Delta T: 106.
- Charge Size:** Length: 10.00 m; Width: 13.00 cm; Thickness: 13.00 cm.
- Target:** Discharge Temp: 1151; Discharge Delta T: 1151.

- ❑ Builds Furnaces data with Zone/Furnace Dimensions, Furnace Insulation, Burner Type, Fuel etc.
- ❑ Creates Furnace Profile from Setpoints
- ❑ Calibrates Furnace Profile from Setpoints and Distance-Temperature Data
- ❑ Provides ability to vary process parameters such as Zone Setpoints, Push/Walk Rate and production rate.
- ❑ Creates Charges from basic shapes (Billets, Ingots, Slabs, Rounds) by entering dimensions and material properties (provided with the software).
- ❑ Property Data: Comes with a entire database of Steel Grades, Fuel types, and Refractory materials.
- ❑ Provides capability to create new Steel Grades, Refractory materials and fuel types
- ❑ Results include
  - ❑ Charge Temperature profile during reheating and at exit – Can be ported to Mill Program
  - ❑ 2 D skid marks for slab heating furnaces
  - ❑ Scaling/Decarburization depth
  - ❑ Zone wise thermal loading
  - ❑ Zone wise fuel and air inputs
  - ❑ Fuel Consumption and Furnace efficiency
- ❑ Calculates heat to part, refractory loss, heat to gases, and heat and energy/power consumed in different zones, Heat loss through the flue, fuel consumption and furnace efficiency. The results are displayed in a Sankey diagram.
- ❑ Results from each calculation can be displayed in report format. The results can be directly printed, saved as a PDF format or exported to an Excel spread Sheet.

- ⇒ Minimizes process design time
- ⇒ Reduces the requirements for test runs
- ⇒ Provides opportunity to quickly investigate multiple furnace designs
- ⇒ Enables viewing reheating process virtually
- ⇒ Offers platform for improved design accuracy
- ⇒ Bridges the gap between the furnace suppliers and furnace users
- ⇒ Can be used as a presentation tool to demonstrate process and product quality



# FurnXpert Functions

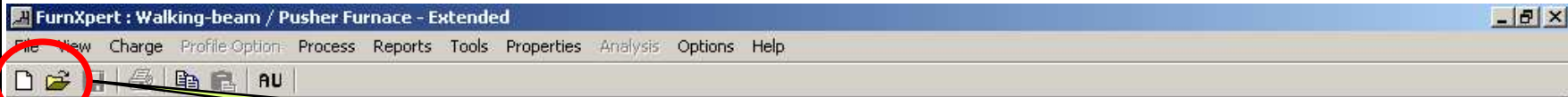
The screenshot shows the main interface of the FurnXpert software. On the left is a vertical toolbar with icons for various functions. The main area contains a central window with a 'furnXPERT' logo and some text. At the bottom, there is a status bar with several fields.

- CONFIGURE NEW FURNACES**: Callout pointing to the 'Furnace' icon in the toolbar.
- CREATE FURNACE TEMPERATURE PROFILE**: Callout pointing to the 'Profile' icon in the toolbar.
- CREATE PARTS/CHARGES**: Callout pointing to the 'Create Charge' icon in the toolbar.
- PROVIDE ADDITIONAL DATA FOR THE PARTS/CHARGES**: Callout pointing to the 'Charge Detail' icon in the toolbar.
- PLACE CHARGES ON THE FURNACE**: Callout pointing to the 'Place Charge' icon in the toolbar.
- CHANGE SETTINGS**: Callout pointing to the 'Settings' icon in the toolbar.
- RUN SIMULATION**: Callout pointing to the 'Run' icon in the toolbar.
- HEAT AUDIT & SANKEY DIAGRAM**: Callout pointing to the 'Heat Audit' icon in the toolbar.
- CREATE AND PRINT REPORTS**: Callout pointing to the 'Reports' icon in the toolbar.
- HELP**: Callout pointing to the 'Help' icon in the toolbar.

UNIT SYSTEM: Default      FURNACE CREATED BY: None      CONTRACT NO: None      JOB NAME: None



# Select New Furnace



Create a New Furnace file or use a Furnace File already created



SETUP  
FURNACES  
SIMULATE  
FURNACES

**furnXPERT**®

CompAS Controls, Inc.  
P O Box 61825  
Sunnyvale, CA 94085  
Ph: (724) 388-0577  
info@furnxpert.com

www.furnxpert.com

Single User License

FurnXPERT is a desktop software that simplifies the job of SETTING UP and SIMULATING industrial furnaces. The software has been developed to aid process engineers and furnace operators configure their furnaces, select parts, and run what-if analysis to determine the best furnace operating parameters.

Copyrights CompAS Controls, Inc. 2006. Evaluation copy, not to be distributed, copied or sold without express written permission of CompAS Controls, Inc.

UNIT SYSTEM: Default

FURNACE CREATED BY: None

CONTRACT NO: None

JOB NAME: None

# Select New Furnace

Select Unit System From Drop Down Menu

The screenshot shows the FurnXpert software interface. On the left is a vertical toolbar with icons for Furnace, Profile, Create Charge, Charge Detail, Place Charge, Run, Heat Audit, Sankey Dgrm, Reports, Help, and Exit. The main window displays a 'SETUP' dialog box with the following settings:

Parameter	Unit
Length	ft
Time	min
Temperature	Deg F
Weight	lbs
Velocity	in/min
Energy	Btu
Production Rate	lbs/hr
Power	Btu/hr
Energy Consumption	Btu/lb
Flow	Cfh

At the bottom of the main window, there is a status bar with the following information:

- UNIT SYSTEM: Default
- FURNACE CREATED BY: None
- CONTRACT NO: None
- JOB NAME: None



# Enter Refractory Data

- INPUT WALL SPECIFICATION**
- Refractory Factors (Zone Wise)
  - Wall Area & Insulation details
  - Skid Parameters and Insulation
  - Slot Information

**FurnXpert : Walking-beam / Pusher Furnace - Extended**

File View Charge Profile-Option Process Reports Tools Properties Analysis Options Help

**Furnace Configuration**

**Furnace Details** | **Wall & Skid Details**

**Wall Specifications**

**Refractory Factors**

Single    Side Walls: 1  
 Multi    Roof: 1  
 Multi    Details    Hearth: 1

**Wall Area**

Top: 18    Sq.ft / ft    **Calculate**  
 Bottom: 9    Sq.ft / ft    **Calculate**

**Skid Parameter**

Xover:  Yes     No

**Shielded Area**

Skid: 2.3    Sq.ft / ft    **Calculate**  
 Riser: 1.8    Sq.ft / ft    **Calculate**  
 Xover: 1    Sq.ft / ft    **Calculate**

**Diameter ( ft )**

Skid: 0.5    Riser: 0.5  
 Xover: 0.5

**Custom Insulation**

Layers	#	in	-1-	-2-	-3-	-4-
Walls	2	FB	6	IB	6	
Roof	2	FB	6	BI	6	
Hearth	2	FB	6	IB	6	

**Skid Insulation**

Layers	#	in	1	2	
Skid	2	ST	1	IB	6
Riser	2	ST	1	IB	6
Xover	2	ST	1	BI	6

**Coverage**

Skid: 90 %    Riser: 90 %

**Slot Level**

Slot area: 0.6    Sq.ft / ft    **Calculate**  
 View factor: 0.5

**Skid Insulation Dialog:**

Number of Layers: 2

Layer 1: Material: Steel, Thickness: 3 cm  
 Layer 2: Material: Insulating Brick, Thickness: 4 cm  
 Layer 3: Material: [Empty], Thickness: [Empty] cm  
 Layer 4: Material: [Empty], Thickness: [Empty] cm

**Buttons:** Save As, Ok, Cancel, Apply

UNIT SYSTEM: Default

FURNACE CREATED BY: kjkjlkj

CONTRACT NO: kkjkj

JOB NAME: brnbnbn

# Enter Fuel & Burner Data

**Furnace Configuration**

**Furnace Details**

**Combustion Details**

Single Input  Multi Zone Input

**Fuel Specification**

Type of Fuel  
PRODUCER GAS - LURGI COMMERCIAL

Xs Air (%)

Comb. Air Temp.  Deg F

Fuel Temp.  Deg F

**Type of Burner**

Regenerative  Conventional

Flue Extraction (%)

**Fuel Properties**

PRODUCER GAS - LURGI COMMERCIAL

**Type of Fuel**

Gaseous  Liquid

**Heating Value [ in Btu / Cu.ft ]**

HHV  LHV

**Ratio [ in Cu.ft / Cu.ft ]**

Air/Fuel  Flue/Fuel

**FUEL & BURNER DATA – Zone wise input available.**

- Type of Fuel
- Percent of Excess Air
- Combustion Air Temperature
- Fuel Temperature
- Type of Burner (Conventional/Regenerative)

**Fuel Type to use.**

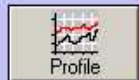
**Can select between conventional and Regenerative Burner**

Save As Ok Cancel Apply

# Enter Profile

FurnXpert : Walking-beam / Pusher Furnace - Extended  
File View Charge Profile Option Process Reports Tools Properties Analysis Options Help

AU



**Profile**  
**Temperature Profile**

Select Profile Type  
 Set Points  Distance vs Temperature

Operating Parameters  
Max. Distance: 100  
Max. Bottom Zone Temperature: \_\_\_\_\_ Deg F  
Print Interval Along Furnace Length: 2,000 ft  
# of Print Interval Along Furnace: 50  
Production Rate: 100 Ton/Hr

Furnace Zone Information

Top Zone #	Top Dist. ft	Zone #	Bot. Dist. ft
1	15	1	15
2	50	2	50
3		3	75
4		4	100

Set Points

Top Zones			Bot Zones		
TC Location	Temperature		TC Location	Temperature	
ft	Deg F		ft	Deg F	
PH			PH		
1	32.5	1800	1	32.5	1850
2	62.5	2215	2	62.5	2180
3	87.5	2200	3	87.5	2261

Number of Distance vs Temperature

# entries - Top Zone			# entries - Bot Zone		
Point #	ft	Deg F	Point #	ft	Deg F
1	0	1400	1	0	1500
2	5	1500	2	5	1600
3	10	1700	3	10	1780
4	15	1750	4	15	1820
5	30	1800	5	30	1850
6	45	1800	6	45	1850
7	50	1800	7	50	1850
8	60	2000	8	60	2100
9	65	2050	9	65	2120

Close Apply

Enter Setpoints

Enter Production Rate

Enter Dist-Temp Data for setpoint calibration if necessary.

# Enter Profile

FurnXpert : Walking-beam / Pusher Furnace - Extended  
File View Charge Profile Option Process Reports Tools Properties Analysis Options Help

AU

- Furnace
- Profile
- Create Charge
- Charge Detail
- Place Charge
- Settings
- Run
- Heat Audit
- Help
- Exit

**Temperature Profile**

Select Profile Type  
 Set Points  Distance vs Temperature

Operating Parameters  
Max. Distance

Print Interval Along Furnace Length  ft  
# of Print Interval Along Furnace   
Production Rate  Ton/Hr

Furnace Zone Information

Top Zone #	Top Dist. ft.	Bot. Zone #	Bot. Dist. ft.
1	25	1	25
2	50	2	50
3	75	3	75
4	100	4	100

**Enter Setpoints only**

**100** Ton/Hr

**Enter Production Rate**

**Set Points**

Top Zones			Bot Zones		
TC Location ft	Temperature Deg F	PH	TC Location ft	Temperature Deg F	PH
1	37.5	2000	1	37.5	2050
2	62.5	2280	2	62.5	2270
3	87.5	2242	3	87.5	2230

**Number of Distance vs. Temperature**

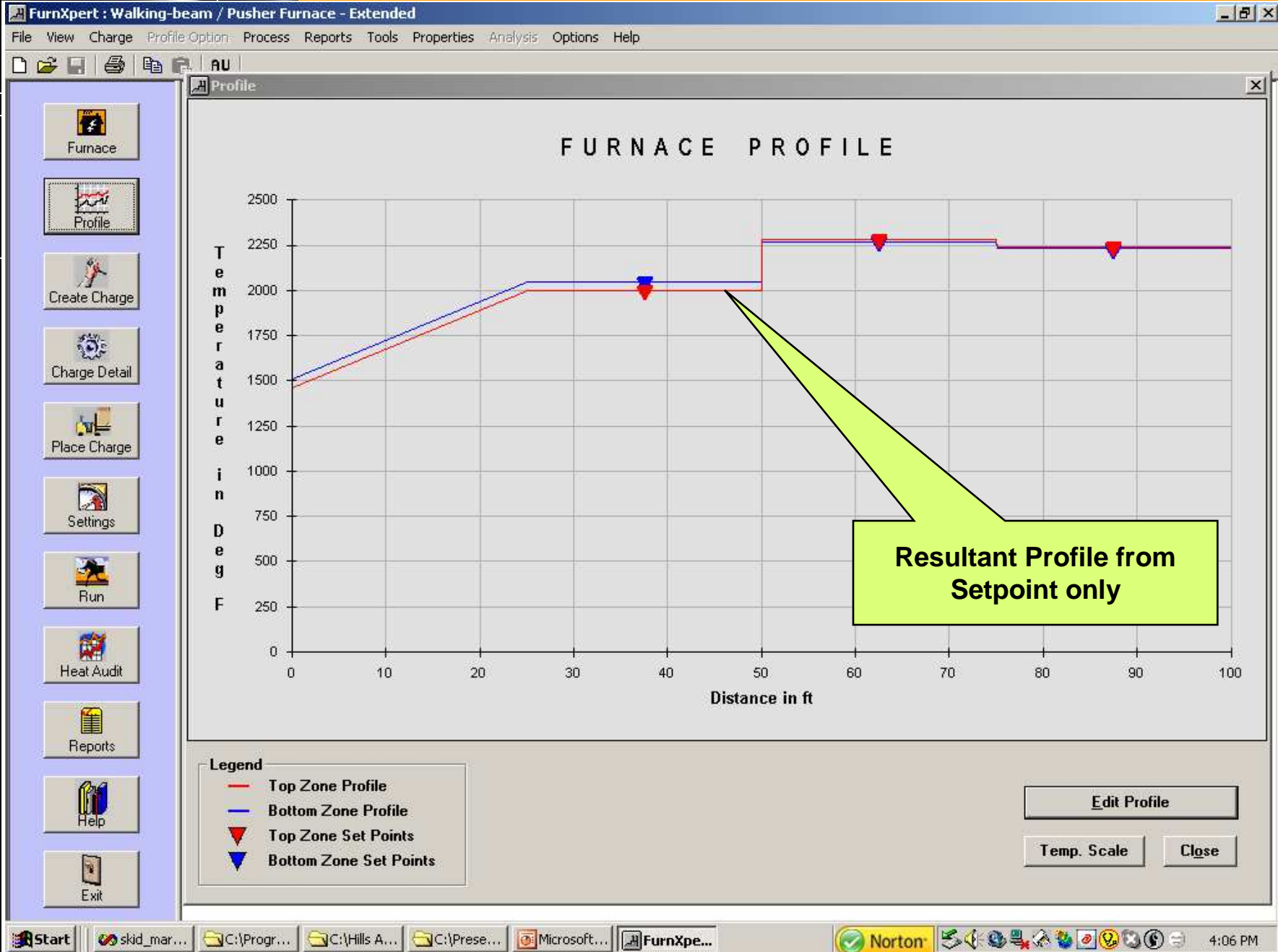
# entries - Top Zone  # entries - Bot Zone

Point #	ft	Deg F	Point #	ft	Deg F

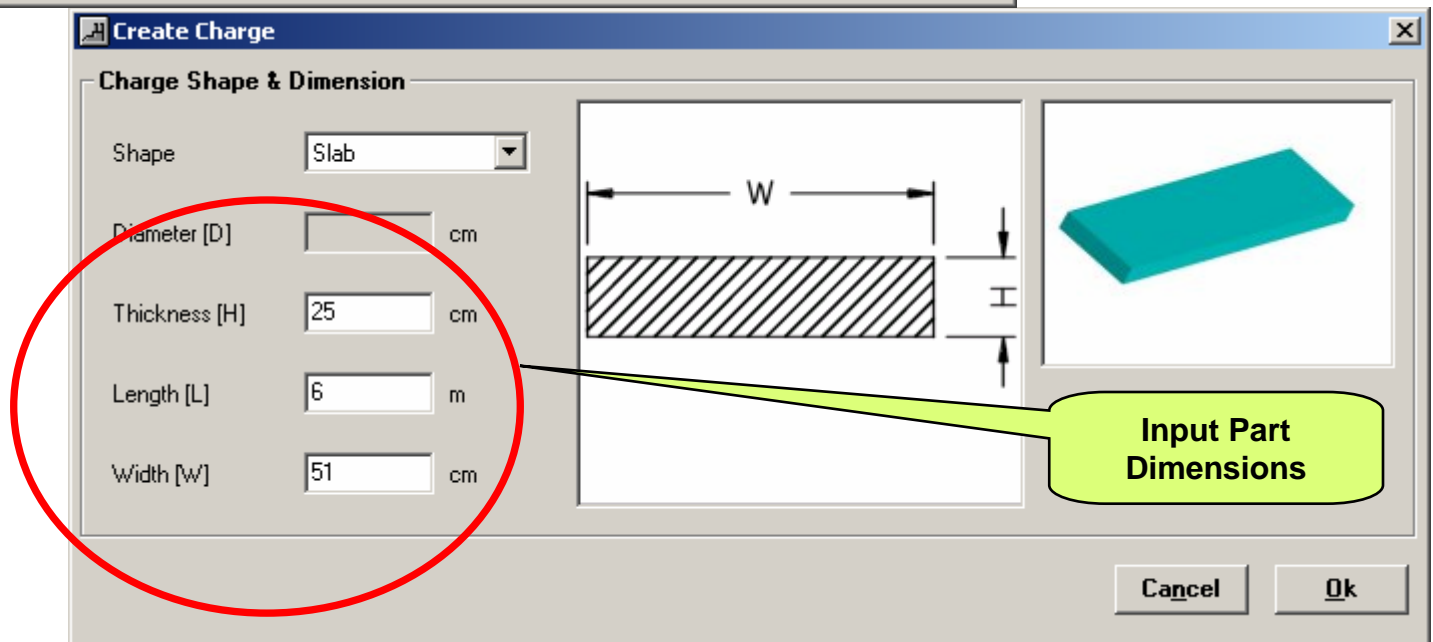
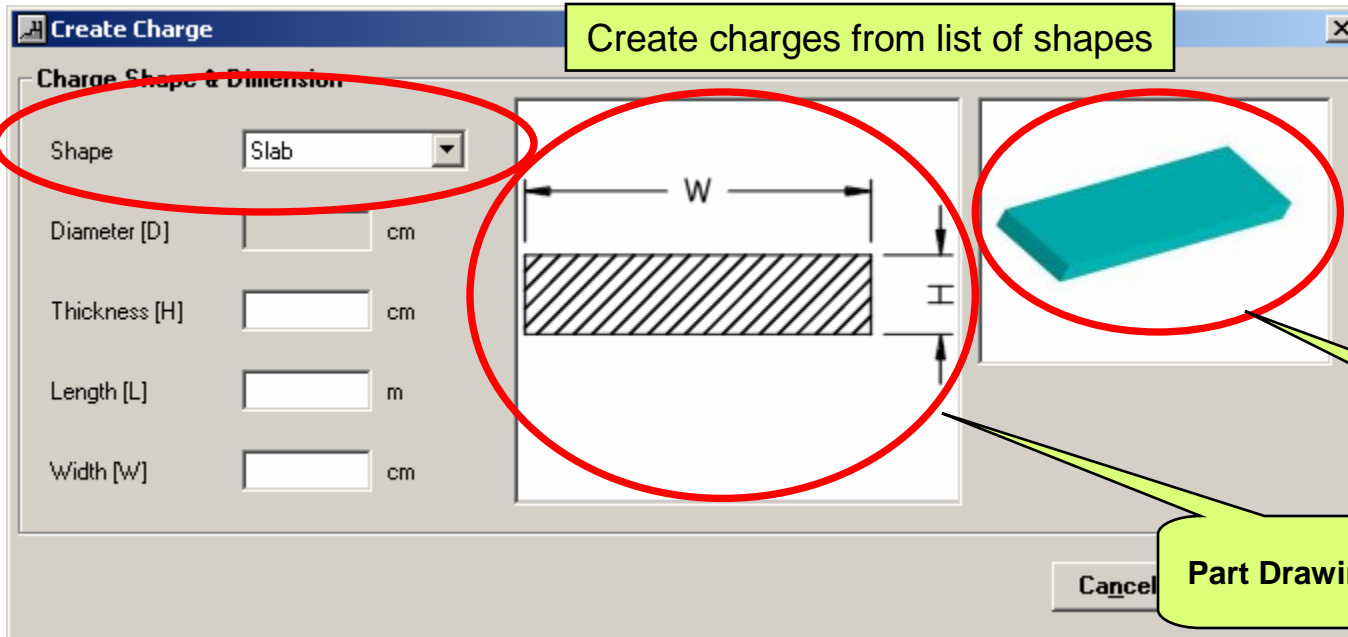
Close Apply

UNIT SYSTEM: Default FURNACE CREATED BY: kijklk CONTRACT NO: kkj JOB NAME: bnbnb





# Charge Creation



# Charge Details

**Charge Details**

**Charge Shape & Dimension**

Shape: Round

Diameter [D]: 12.25 in

Thickness [H]: in

Length [L]: 16 ft

Width [W]: in

**Edit Dimensions**

**Other Details**

Grade: 1080 GRADE

View Factor Top: 0.8

View Factor Bot: 0.6

Target Temperature: 2300 Deg F

Target delta T: 25 Deg F

**Charge Temperature**

Node 1: 70 Deg F

Node 2: 70 Deg F

Node 3: 70 Deg F

Node 4: 70 Deg F

Node 5: 70 Deg F

**Cancel** **Default** **Ok**

**Edit Dimensions**

Select from a list of material

Input Initial nodal Temperature

Input View Factors

**Other Details**

Grade: 1080 GRADE

View Factor Top: 0.8

View Factor Bot: 0.6

Target Temperature: 2300 Deg F

Target delta T: 25 Deg F

**Charge Temperature**

Node 1: 70 Deg F

Node 2: 70 Deg F

Node 3: 70 Deg F

Node 4: 70 Deg F

Node 5: 70 Deg F

**Cancel** **Default** **Ok**

# Charge Placement - Across

**Placement of Charge**

Center to Center Spacing  in

**Alignment**

Across  Along

# of charges placed across the furnace

**Skid Details**

Cancel Default Ok

Enter Center to Center Distance

Click here to enter skid details

# Settings - Skid Data

Enter Skid Data for stationary and moving skids.

FurnXpert : Walking-beam / Pusher Furnace - Extended

File View Charge Profile Option Process Reports Tools Properties Analysis Options Help

Furnace Profile Create Charge Charge Detail Place Charge Settings Run Heat Audit Reports Help Exit

### Skid Details

Number of Nodes

Length: 25  
Height: 5

	Left	Right
Distance from the slab center line ( in )	20	90
Separation from Steel bottom face ( in )	2	2
Diameter of cold Wear Bar ( in )	3	3
Diameter of Upper Insulated Pipe ( in )	4	6
Diameter of Lower Insulated Pipe ( in )	4	6
Center to Center Separation between Upper and Lower Pipe Skid ( in )	8	8
Separation of Insulated Part and Slab in contact position ( in )	4	3
Thermal Resistance from Wear Bar to Coolant ( Hr-Deg F/ BTU )	0.1	0.2
Skid Coolant Temperature ( Deg F )	100	100
Time of contact between Slab and Skid ( Seconds )	10	30
View Factor from wear bar to furnace	0.6	0.6

Ok Cancel Apply

UNIT SYSTEM: Default

FURNACE CREATED BY: kjkjkj

CONTRACT NO: kkjkj

JOB NAME: brnbnbn

# Change Settings

FurnXpert : Walking-beam / Pusher Furnace - Extended

File View Charge Profile Option Process Reports Tools Properties Analysis Options Help

Profile : Set-points

### FURNACE PROFILE

Temperature in Degrees Fahrenheit

Distance in ft

Set points	PH	1	2	3	5	6	7	8	10	11	12	13	14
Top ° F		2000	2280	2242									
Bot ° F		2050	2270	2230									

Legend

- Top Zone Profile
- Bottom Zone Profile
- ▼ Top Zone Set Points
- ▼ Bottom Zone Set Points

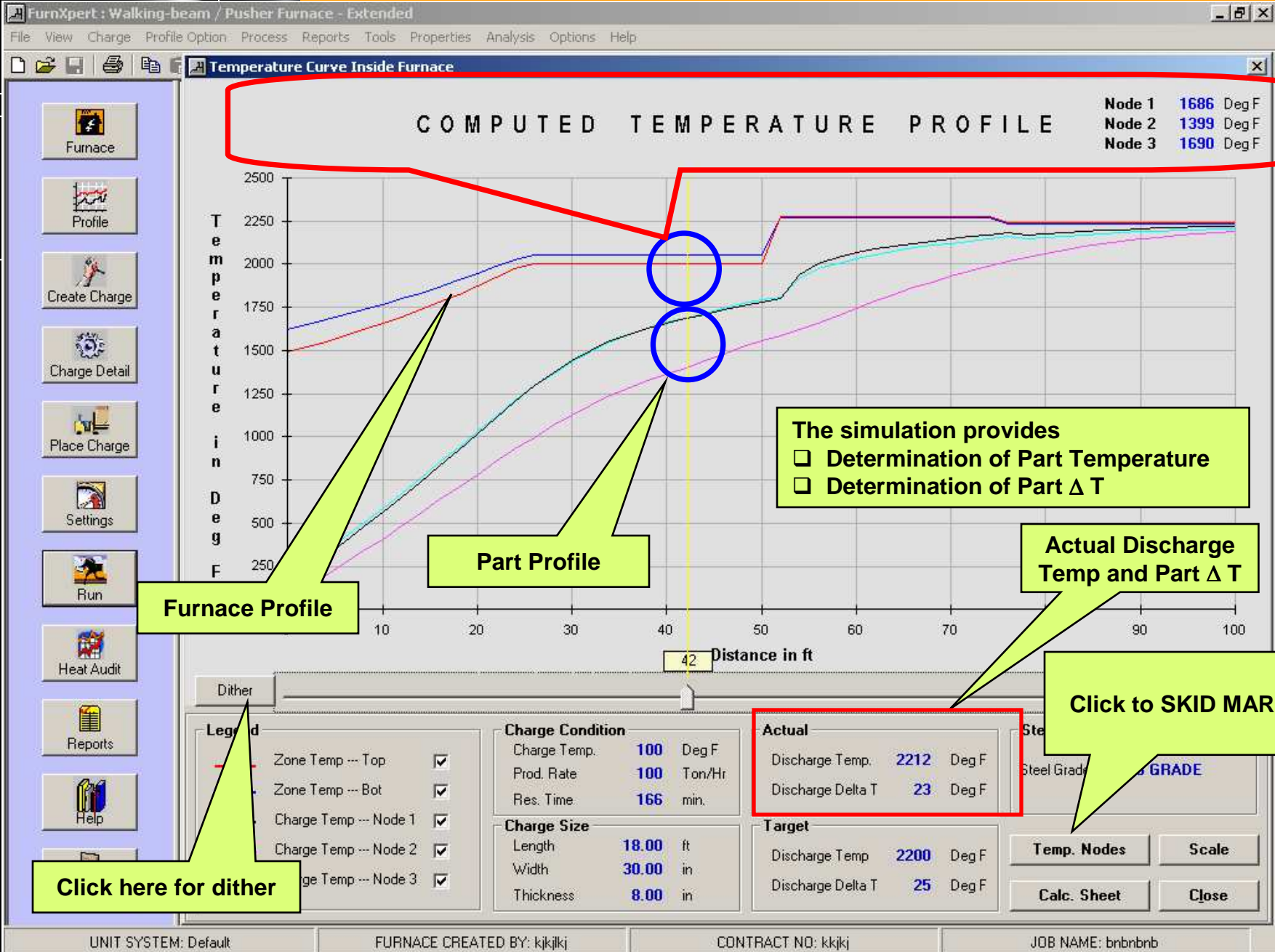
Rates

Production Rate: 100 Ton/Hr

Walk/Push Rate: 0

Original Apply Close

# Simulated Results



Furnace Profile

Part Profile

The simulation provides  
 Determination of Part Temperature  
 Determination of Part  $\Delta T$

Actual Discharge Temp and Part  $\Delta T$

Click to SKID MARK

Click here for dither

# SKID MARK Temperature – 2 D Grid Temp

FurnXpert : Walking-beam / Pusher Furnace - Extended

File View Change Profile Option Process Reports Tools Properties Analysis Options Help

Nodal Temperature Distribution

2208	2207	2203	2198	2192	2192	2198	2203	2207	2209	2211	2212	2212	2212	2211	2210	2207	2204	2198	2192	2189	2198	2212	2225	2237
2172	2170	2162	2150	2136	2136	2150	2162	2170	2175	2178	2180	2180	2180	2178	2175	2171	2163	2151	2137	2129	2150	2179	2207	2232
2156	2152	2142	2122	2095	2096	2122	2141	2152	2159	2163	2165	2166	2166	2164	2160	2154	2143	2126	2100	2083	2117	2161	2197	2230
2163	2159	2146	2119	2077	2078	2120	2145	2158	2166	2170	2172	2173	2173	2171	2167	2161	2150	2130	2093	2057	2109	2161	2198	2229
2191	2187	2174	2143	2076	2080	2145	2173	2186	2192	2196	2198	2199	2198	2197	2194	2189	2180	2161	2113	2047	2124	2180	2208	2228

Temperatures  
 Nodes  
 Demarcation

**Distance :** 92 ft  
**Time :** 152 min.  
**Furnace Temp (Top) :** 2242 Deg F  
**Furnace Temp (Bottom) :** 2230 Deg F

**Wear Bar Temperature**  
**Left :** 1610 Deg F  
**Right :** 1731 Deg F

**Selected Nodes**  
 Node 1 : 1  
 Node 2 : 51  
 Node 3 : 101

Dither  
Close

2D GRID Temp

Wear Bar Temperature

SKID MARK DITHER

Legend  
Max: 2238  
Min: 2047

1008 GRADE

Scale  
Close

```

report.RPT - Notepad
File Edit Format Help

FurnXpert - CompAS Controls Inc.

FurnXpert -- RE-HEAT version
CompAS Controls, Inc
-----

*** MATERIAL SPECIFICATIONS ***

THICKNESS = 250. mm      WIDTH = 510. mm      DIAM = 0. mm
LENGTH = 6000. mm      SPACING = 540. mm   GAP = 30. mm
MATERIAL = 1008        INIT TEMP = 49.9 DEG C

*** FURNACE SPECIFICATIONS ***

WALKING BEAM                PRODUCTION RATE = 72.7 MTons/Hr
TOP AND BOTTOM FIRED
FURNACE LENGTH = 39999. mm  FURNACE WIDTH = 12000. mm
CHARGE DOOR AREA = ***** SQ mm
DISCHARGE DOOR AREA = ***** SQ mm
TOP WALL AREA = 2500. SQ mm/mm  BOT WALL AREA = 2500. SQ mm/mm
REFRACTORY PERFORMANCE FACT: SIDEWALL > 1.00 HEARTH > 1.00 ROOF > 1.00

**** FUEL AND COMBUSTION SPECIFICATION ****

NATURAL GAS
FUEL HEATING VALUE : HHV = 9133.1 kcal/cum
FUEL HEATING VALUE : LHV = 8054.9 kcal/cum
FUEL TEMPERATURE = 99.9 DEG C
COMB AIR TEMPERATURE = 499.9 DEG C
PERCENT EXCESS AIR = 10.0

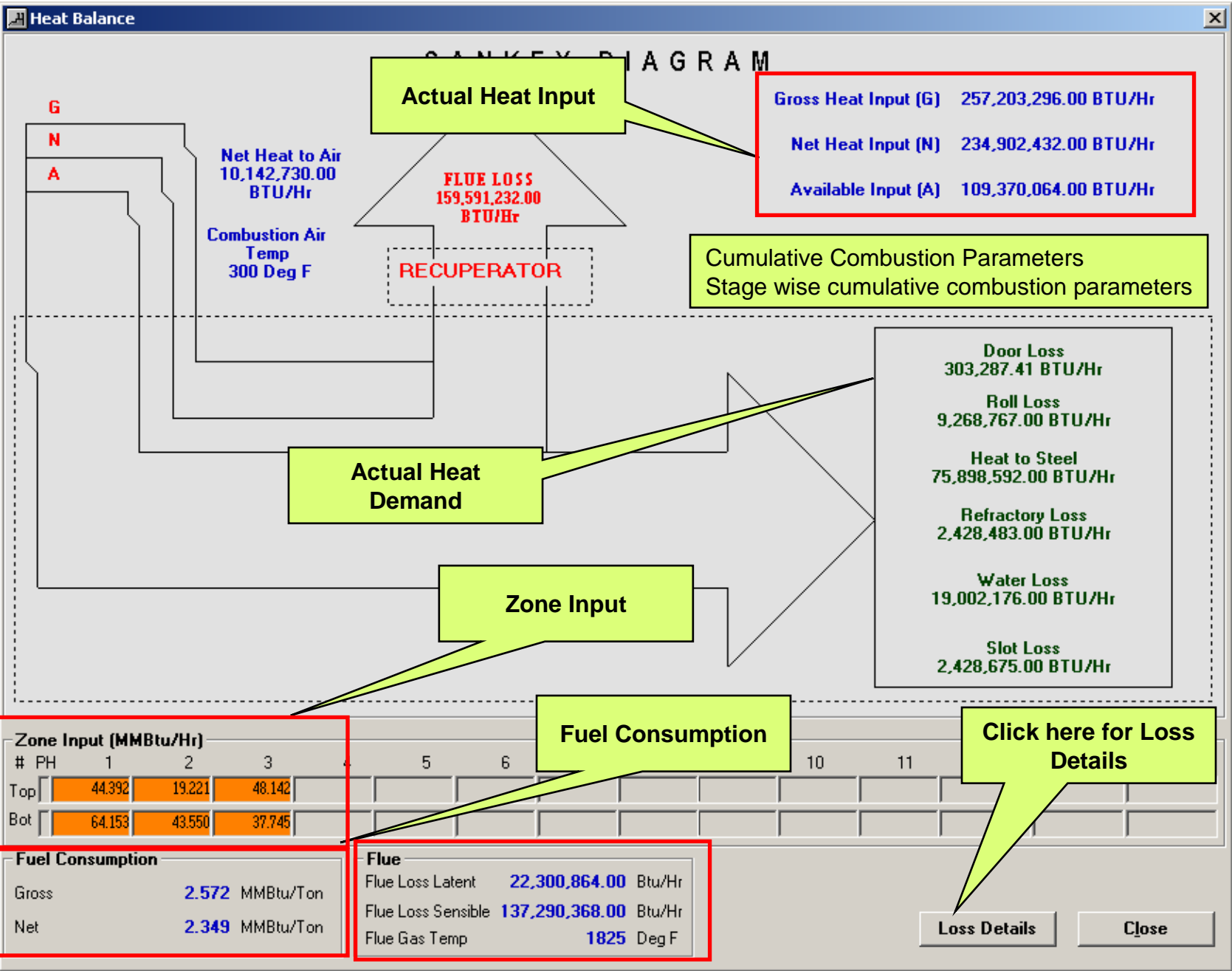
**** SKID SPECIFICATION ****

SKID PIPE SHIELDED ARE 1859. SQ mm/mm OF FURNACE LENGTH
RISER PIPE SHIELDED ARE 82. SQ mm/mm OF FURNACE LENGTH
PERCENT INSUL COVERAGE ON SKID = 90.0 %
PERCENT INSUL COVERAGE ON POSTS = 90.0 %
INSULATION TYPE :
WALKING BEAM SLOT AREA = 45. SQ mm/mm
WALKING BEAM SLOT VIEW FACTOR = 0.8

DIST FURNACE TEMP.      MATERIAL TEMPERATURE      KCL/kg  DECARB  SCALE  TIME
[MM] TOP BOT TOP CNTR BOT AVG [MM] [MM] min
0. 538. 578. 50. 50. 50. 50. 0. 0.000 0.000 0.0
1600. 576. 617. 108. 81. 105. 90. 5. 0.000 0.000 13.4
3200. 620. 660. 159. 126. 156. 138. 10. 0.000 0.000 26.8
4801. 669. 708. 220. 178. 215. 192. 17. 0.000 0.000 40.2
6401. 728. 761. 293. 238. 285. 257. 25. 0.000 0.000 53.5
8001. 796. 820. 380. 309. 366. 331. 36. 0.000 0.000 66.9
9601. 879. 886. 488. 390. 462. 417. 48. 0.000 0.000 80.3
11201. 1190. 1200. 791. 521. 728. 587. 81. 0.000 0.011 93.7
12802. 1190. 1200. 953. 675. 899. 776. 113. 0.002 0.060 107.1
14402. 1190. 1200. 1021. 776. 982. 859. 136. 0.005 0.125 120.5
    
```

**Calculation sheet is generated giving the overall results**

# Sankey Diagram



**FurnXpert** File View Charge Profile Option Process Reports Tools Properties Analysis Options Help

AU

**Heat Audit**

## HEAT AUDIT

Top Zones			Bottom Zones						
Zone #	Heat to Steel MKcal/Hr	Ref. Heat Loss MKcal/Hr	Total MKcal/Hr	Zone #	Heat to Steel MKcal/Hr	Ref. Heat Loss MKcal/Hr	Water Loss MKcal/Hr	Slot Loss MKcal/Hr	Total MKcal/Hr
1	2.190	0.198	2.378	1	1.960	0.200	3.683	0.015	6.060
2	6.131	0.763	6.894	2	5.801	0.772	13.182	0.133	19.888
3	0.117	0.386	0.503	3	0.196	0.391	6.652	0.069	7.308
<b>Total</b>	<b>8.438</b>	<b>1.337</b>	<b>9.775</b>	<b>Total</b>	<b>7.957</b>	<b>1.363</b>	<b>23.719</b>	<b>0.217</b>	<b>33.256</b>

**Close**

info@comp-as.com  
WWW.COMP-AS.COM

Copyrights CompAS Controls, Inc. 2002. Evaluation copy, not to be distributed, copied or sold without expressed written permission of CompAS Controls, Inc.

**UNIT SYSTEM: MKS**      **FURNACE CREATED BY: HKN**      **CONTRACT NO: 1234**      **JOB NAME: WB**

The simulation provides

- Heat Audit to determine zone wise heat losses

**Unit System**

Heat: MMBtu/Hr. Dimension: Special  
Temperature: Deg F Fuel Consumption: MMBtu/Ton

**R E P O R T**

Furnace Created By: kjkjlkj  
Contract: kjkjkj  
Job: bnbbrnb

**Click to print the report**

**Click to make PDF File**

**Profile**

2 pages of reports are printed  
 Reports can be directly printed  
 PDF file of the report can be made  
 Shows date and time stamp  
 Provides all the inputs and outputs

**Furnace Specification**  
Furnace Type: Walking Beam  
Heating Type: Top and Bottom fired  
Furnace Length: 100 ft  
Furnace Width: 20 ft  
Charge Door Area: 2 Sq.ft  
Discharge Door Area: 3 Sq.ft  
Top Wall Area: 8 Sq.ft / ft  
Bottom Wall Area: 9 Sq.ft / ft  
Production Rate: 100 Ton

**Charge Specifications**  
Charge Shape: Slab  
Steel Grade: 1008 GRADE  
Charge Length: 18 ft  
Charge Spacing: 32 in  
Charge Gap: 2.00 in  
Initial Charge Temp: 100

**Skid Specification**  
Insulation Type: Custom  
Skid Pipe Shielded Area: 2.3 Sq.ft / ft  
Riser Pipe Shielded Area: 1.8 Sq.ft / ft  
Insulation Coverage on Skid: 90%  
Insulation Coverage on Posts: 90%  
Slot Area: 0.6 Sq.ft / ft  
Slot View Factor: 0.5

**Refractory Fact.**  
Side Wall: 1  
Hearth: 1  
Roof: 1

**Fuel & Comb. Spec.**  
Fuel: PRODUCER GAS - LURGI COMMERCIAL  
Comb. Air Temp.: 300  
Fuel Temp.: 100  
Excess Air: 10%

**Discharge Temp**  
Avg. Temp.: 2212  
Delta T: 23

**Temperature Profile Graph**  
Y-axis: Temperature (0 to 2250)  
X-axis: Distance in ft (0 to 100)  
Legend:  
- Charge Temp - Node 1 (Black line)  
- Charge Temp - Node 2 (Magenta line)  
- Charge Temp - Node 3 (Cyan line)  
- Zone Temp - Top (Red line)  
- Zone Temp - Bot (Blue line)

Click to print the report

Unit System

Heat : MMBtu/Hr. Dimension : Special  
Temperature : Deg F Fuel Consumption : MMBtu/Ton

# R E P O R T

Furnace Created By : kjkjlkj  
Contract : kkjkj  
Job : bnbnb

## Top Zone Heat Input

Zone	Steel	Wall Loss	Total
PH	14.903	0.194	15.097
1	12.925	0.241	13.166
2	9.487	0.284	9.771
3	2.007	0.278	2.285
<b>Total</b>	<b>39.322</b>	<b>0.997</b>	<b>40.319</b>

## Bottom Zone Heat Input

Zone	Steel	Wall Loss	Water Loss	Slot Loss	Total
PH	14.079	0.295	4.094	0.380	18.848
1	12.462	0.346	4.650	0.551	18.009
2	8.307	0.400	5.176	0.771	14.654
3	1.729	0.390	5.082	0.727	7.928
<b>Total</b>	<b>36.577</b>	<b>1.431</b>	<b>19.002</b>	<b>2.429</b>	<b>59.439</b>

Zone Inputs

## Fuel Consumption

Flue Gas Temp.: 1825  
 Tot.Fuel Input-Gross: 257.203  
 Tot.Fuel Input-Net : 234.902  
 Gross Fuel Consump.: 2.572  
 Net Fuel Consump.: 2.349

## Available Heat

Heat to Steel : 75.899  
 Heat to Wall : 2.428  
 Water Loss : 19.002  
 Slot Loss : 2.429  
 Door Loss: 0.303  
 Roll Loss : 9.269  
 Total Heat Available : 109.330

## Flue Gas Loss

Recuperated Heat : 10.143  
 Flue Gas Latent : 22.301  
 Flue Gas Sensible : 137.290  
 Total Flue Gas Loss : 159.591

The screenshot shows the 'FurnXpert Continuous Reheat WB/Pusher' software interface. On the left, a help menu is open, with 'Create Furnace' highlighted. A red box highlights the 'Contents' tab and the 'Create Furnace' item. A green callout bubble points to the 'Create Furnace' item with the text 'User Manual is included in Help'. The main window displays the 'Create Furnace' help topic, which includes a description of the furnace selection process and a screenshot of the 'Furnace Configuration' dialog box. The dialog box is divided into three tabs: 'Furnace Details', 'Wall & Skid Details', and 'Fuel & Burner'. The 'Furnace Details' tab is active, showing various parameters for furnace configuration.

## Create Furnace

Selecting **Continuous Reheat WB/Pusher furnace** from furnace selection will take you to the Continuous WB/Pusher furnace analysis. With the selection of WB/Pusher furnace the screen shown in figure 7 appears.

The 'Furnace Configuration' dialog box is shown with three tabs: 'Furnace Details', 'Wall & Skid Details', and 'Fuel & Burner'. The 'Furnace Details' tab is active and contains the following sections:

- Furnace Parameter:**
  - Furnace Type: Walking Beam
- Heating Type:**
  - Top Fired
  - Top and Bot. Fired
  - Width: 22.33 ft
  - Length: 100 ft
- Wrap Around Option:**
  - Wrap
  - No Wrap
- Charge Rolls:**
  - Charge Rolls
  - # of Rolls: 6
  - Diameter: 1.02 ft
  - Width: 2 ft
  - Loss Factor charge (0.1 - 1.0): 1
- Discharge Rolls:**
  - Discharge Rolls
  - # of Rolls: 6
  - Diameter: 1.02 ft
  - Width: 2 ft
  - Loss Factor discharge (0.1 - 1.0): 0.5
- Other Specification:**
  - Charge Door Area: 1 Sq. ft
  - Discharge Door Area: 1 Sq. ft
  - Bot. Zone Screen Input: 0 MMbtu/Hr
  - Top Zone Screen Input: 0 MMbtu/Hr
  - Misc. Factor Input
  - Misc. factor

The 'Zone Details' section on the right contains a table with columns for Top Zone, Top Dist., Bot. Zone, and Bot. Dist. The table is populated with the following data:

Top Zone	Top Dist.	Bot. Zone	Bot. Dist.
1	28	1	28
2	70	2	70
3	100	3	100

Buttons at the bottom of the dialog include 'Save As', 'OK', 'Cancel', and 'Apply'.

Figure 7: Configure Reheat Batch Furnace

The screen above (Figure 7) displays a configured furnace. The inputs are divided into 3 categories and they are placed under 3 tabs. The 3 categories and the subcategories under each category are shown below:

### Furnace

- Furnace Parameters
- Roll Parameters
- Other Specification
- Zone Distance

### Wall & Skid Details

- Wall Specification

User Manual is included in Help

# Data creation - Material

**Material Data**

Material Name: 1008 GRADE

Units:  English Unit  Metric Unit

Density: 7851.597 Kg/cu.m % Carbon: 0.08

Temperature: Deg C Sp. Heat: J/gm-K

Emissivity: 0.85

**Material Data**

Material Name: 1008 GRADE

Density: 1008 GRADE

Emissivity: HI CARBON (1.22%) GRADE

Conductivity: 2330 GRADE

Specific Heat: T1/T4 TOOL GRADE

3435 GRADE

5130 GRADE

304SS GRADE

Units:  English Unit  Metric Unit

Temperature: Deg C Sp. Heat: J/gm-K Conductivity: Watt/m-Deg C Density: Kg/cu.m

**Conductivity**

Temperature Deg C	Conductivity Watt/m-Deg C	Temperature Deg C
1 16	59.34479	10 482
2 38	59.04548	11 538
3 93	57.99775	12 593
4 149	55.603	13 649
5 204	53.05856	14 704
6 260	50.21483	15 732
7 316	48.86777	16 760
8 371	47.25047	17 816
9 427	44.67695	18 871

**Specific Heat**

Temperature Deg C	Specific Heat J/gm-K	Temperature Deg C	Specific Heat J/gm-K	Temperature Deg C	Specific Heat J/gm-K
1 16	0.4594	10 482	0.66735	19 927	0.92885
2 38	0.46819	11 538	0.71086	20 982	0.93303
3 93	0.48953	12 593		21 1038	0.93722
4 149	0.51212	13 649		22 1093	0.93931
5 204	0.53555	14 704		23 1149	0.6481
6 260	0.55354	15 732		24 1204	0.65061
7 316	0.57153	16 760	0.99	25 1260	0.66442
8 371	0.58952	17 816	0.88533	26 1316	0.71295
9 427	0.60751	18 871	0.88701		

Buttons: Reset, **New**, Ok, Save

List of existing Insulation

Create New Data

- Module to enter material data
- Density and emissivity
  - Conductivity as a function of temperature
  - Specific Heat as a function of temperature

**Fuel Data**

Name: NATURAL GAS - 8897 Gross kcal/cu.m

Type of Fuel:  Gaseous  Liquid

Ratio (in Cu.m / Cu.m): Air / Fuel: 9.44, Flue / Fuel: 10.46

Heating Value (in KCal / Cu.m): HHV: 9122.5, LHV: 8045.6

Product of Combustion (as fraction 0 - 1): CO<sub>2</sub> [Dry]: 0.11, H<sub>2</sub>O: 0.186, N<sub>2</sub>: 0.71

Fuel Composition (%):

N <sub>2</sub>	5	O <sub>2</sub>	0	CO <sub>2</sub>	0
H <sub>2</sub>	0	H	0	O	0
OH	0	NO	0	NO <sub>2</sub>	0
SO	0	SO <sub>2</sub>	0	SO <sub>3</sub>	0
CH <sub>4</sub>	90	C <sub>n</sub> H <sub>n</sub>	5	H <sub>2</sub> S	0

Buttons: Reset, **New**, Ok, Save

List of existing Insulation

Create New Data

- Module to enter fuel data
- A/F, A/FI, HHV, LHV
  - POC - CO<sub>2</sub>, H<sub>2</sub>O, N<sub>2</sub>
  - Fuel Composition

**Entry Data**

**List of existing Insulation**

**Create New Data**

Temperature Deg F	Conductivity kcal/m-hr-degC	Specific Heat Kcal/Kg-DegC
38	0.0533	0.203
538	0.0856	0.203
816	0.0856	0.203
1093	0.0856	0.203
1371	0.0856	0.203

- Module to enter insulation data
- Density
  - Conductivity as a function of temperature
  - Specific Heat as a function of temperature