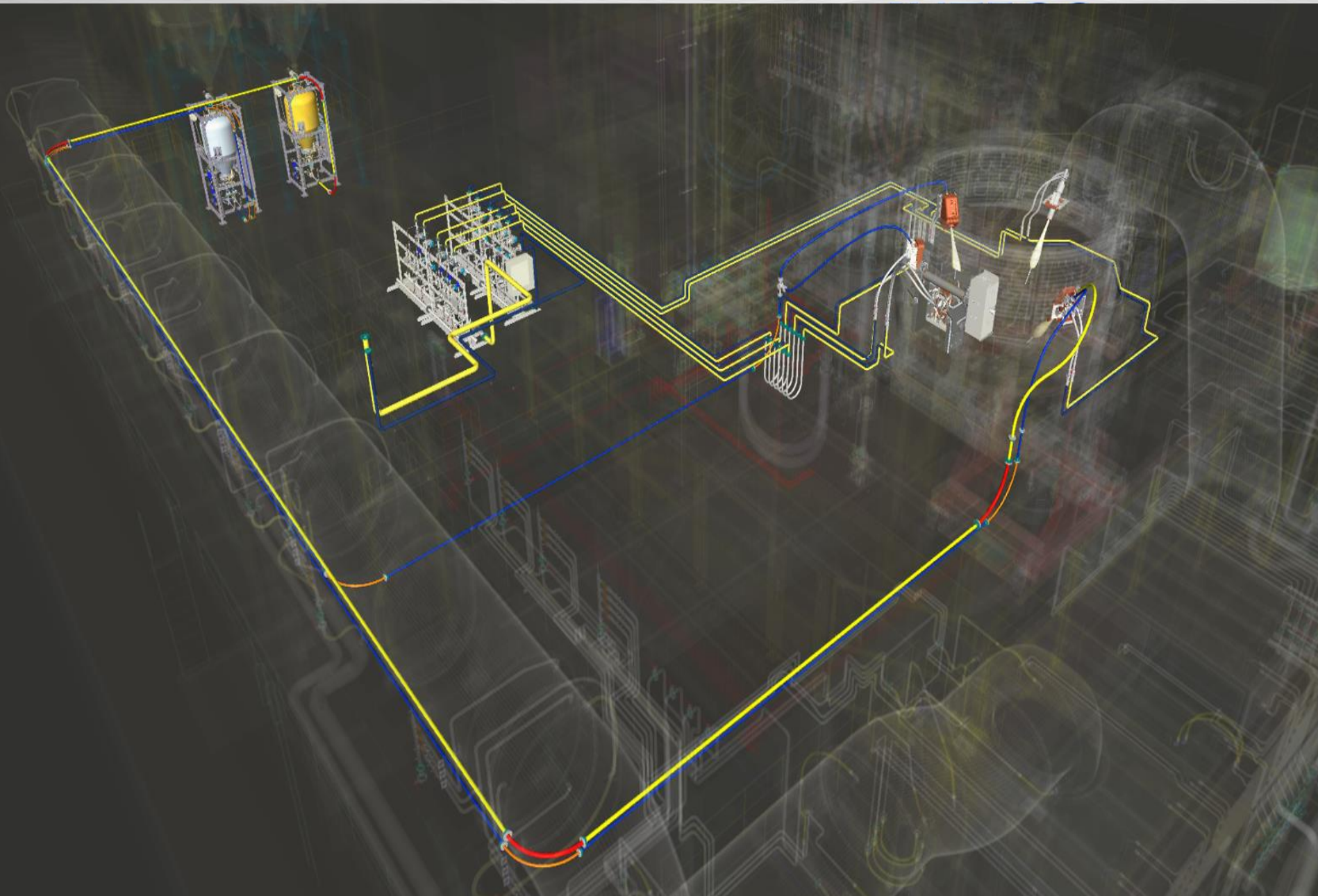


PTI Product Portfolio...



History of PTI

Process Technology International (PTI)

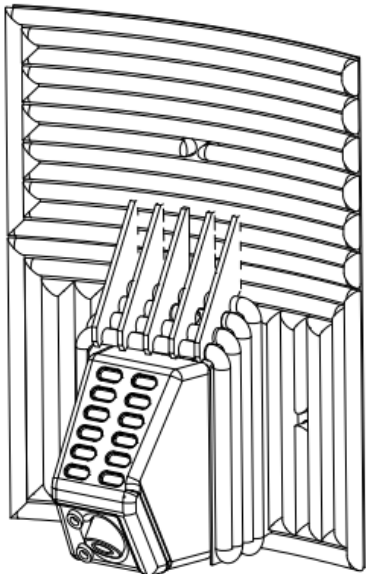
- PTI is US company and was founded by in the mid of 1990's by Val Shver
- Thanks to Nucors, PTI took over EAF chemical energy market quickly
- Expanded to Carbon and Lime injection systems
- Developed EAF Swingdoor system
- Expanded into Ladle and Tundish dryers and preheater systems
- All technological developments were driven by customers' demand on Safety enhancement, reliability and efficiency

Chemical Energy



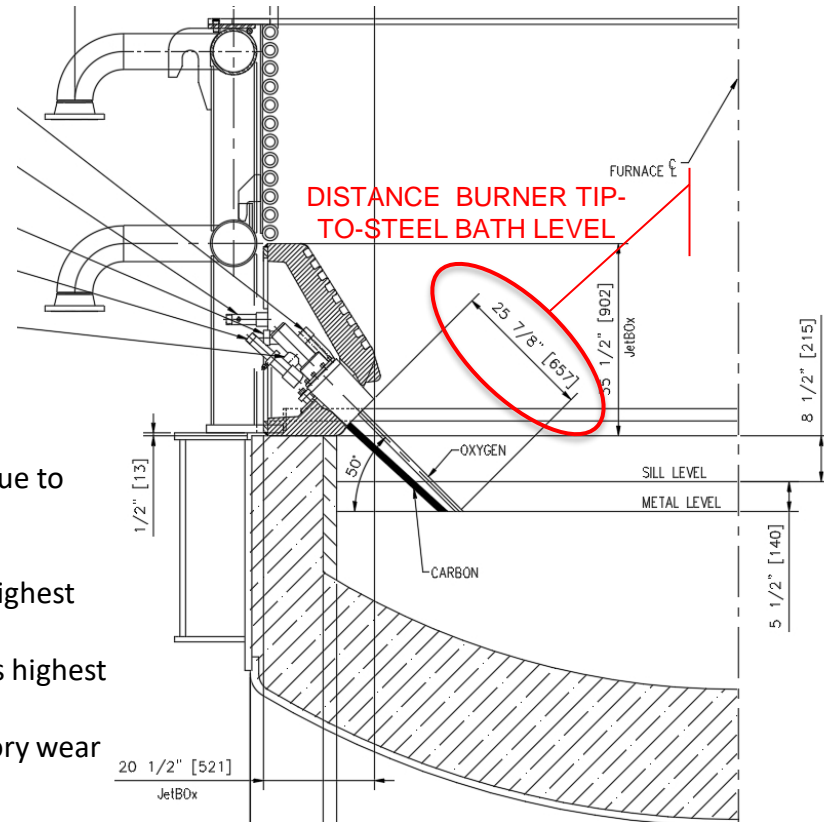
Main Features

- Robust reliable system fitting both panel and spray cooled shells
- Installed at the lowest level possible like stadium brick or furnace split
- Proximity to steel provides Highest oxygen utilization which means highest oxygen efficiency in the industry
- Highest scrap preheating capability in burner mode



Main Features

- No nozzle clogging at the lowest distance due to IP combustion chamber technology
- Dual material injection port design
- Lime injection through side port provides highest dissolution of lime
- Carbon injection through side port provides highest foamy index
- Designed to have lowest impact on refractory wear

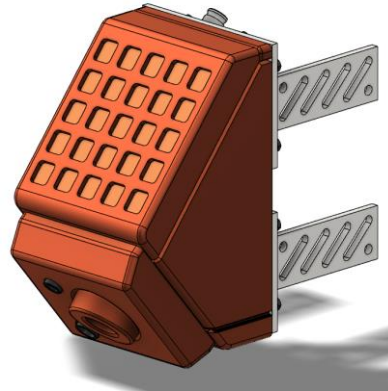


JETBURNER / JETBOX features

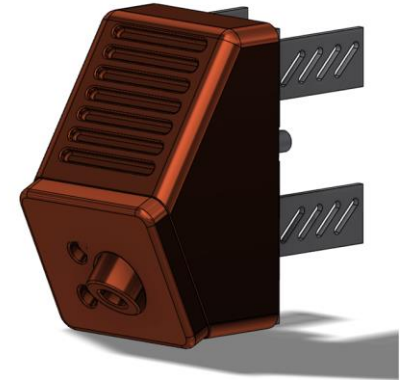
FULL SIZE CAST JETBOX



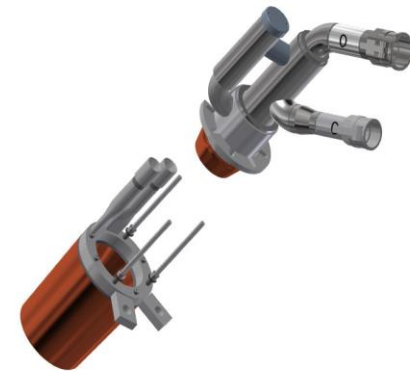
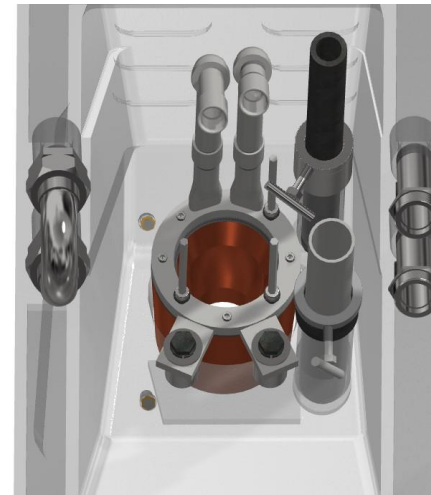
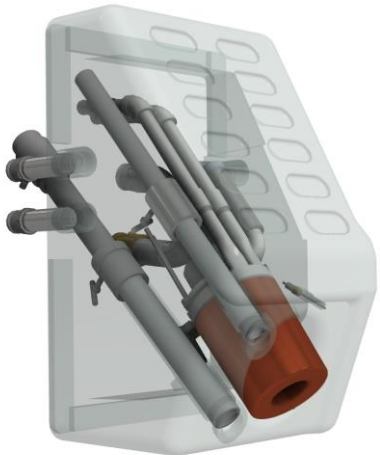
**FULL SIZE OR MINI FORGED
COPPER JETBOX
(FRONT FACE REPLACEABLE CAPABILITY)**



**FULL SIZE HYBRID JETBOX
(CAST HOST AND FORGED FRONT
FACE REPLACEABLE)**

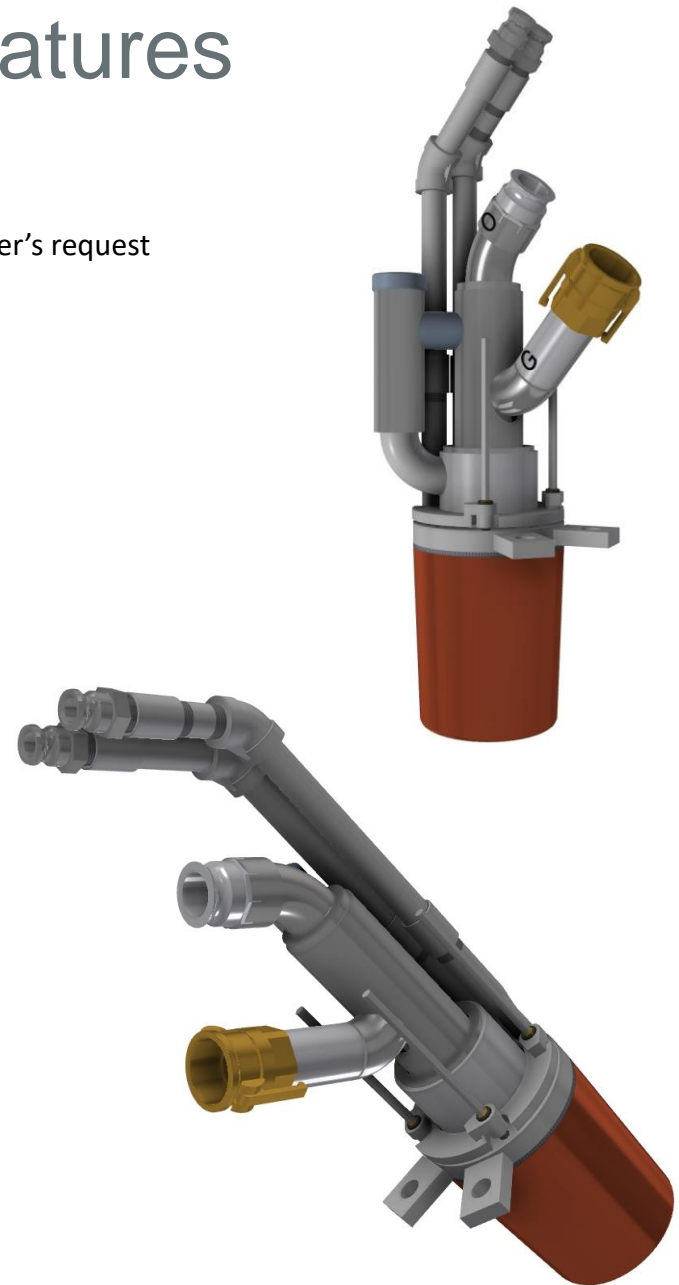
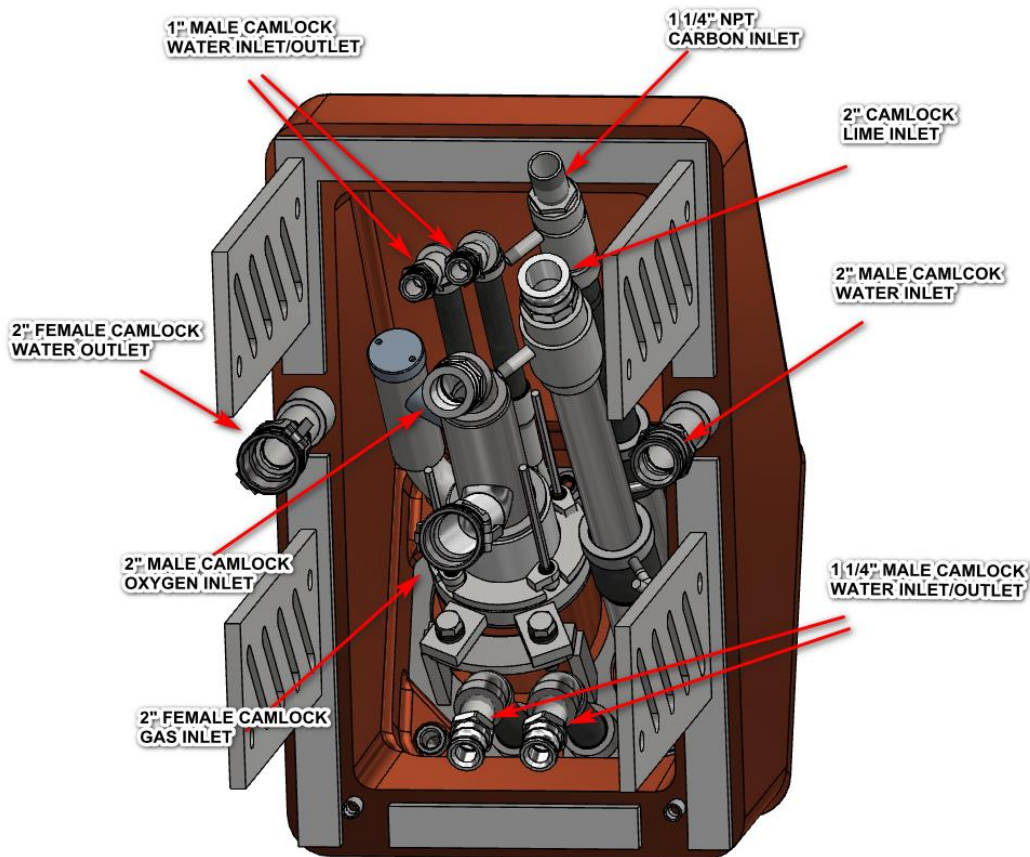


BURNER INSTALLATION IN JETBOX



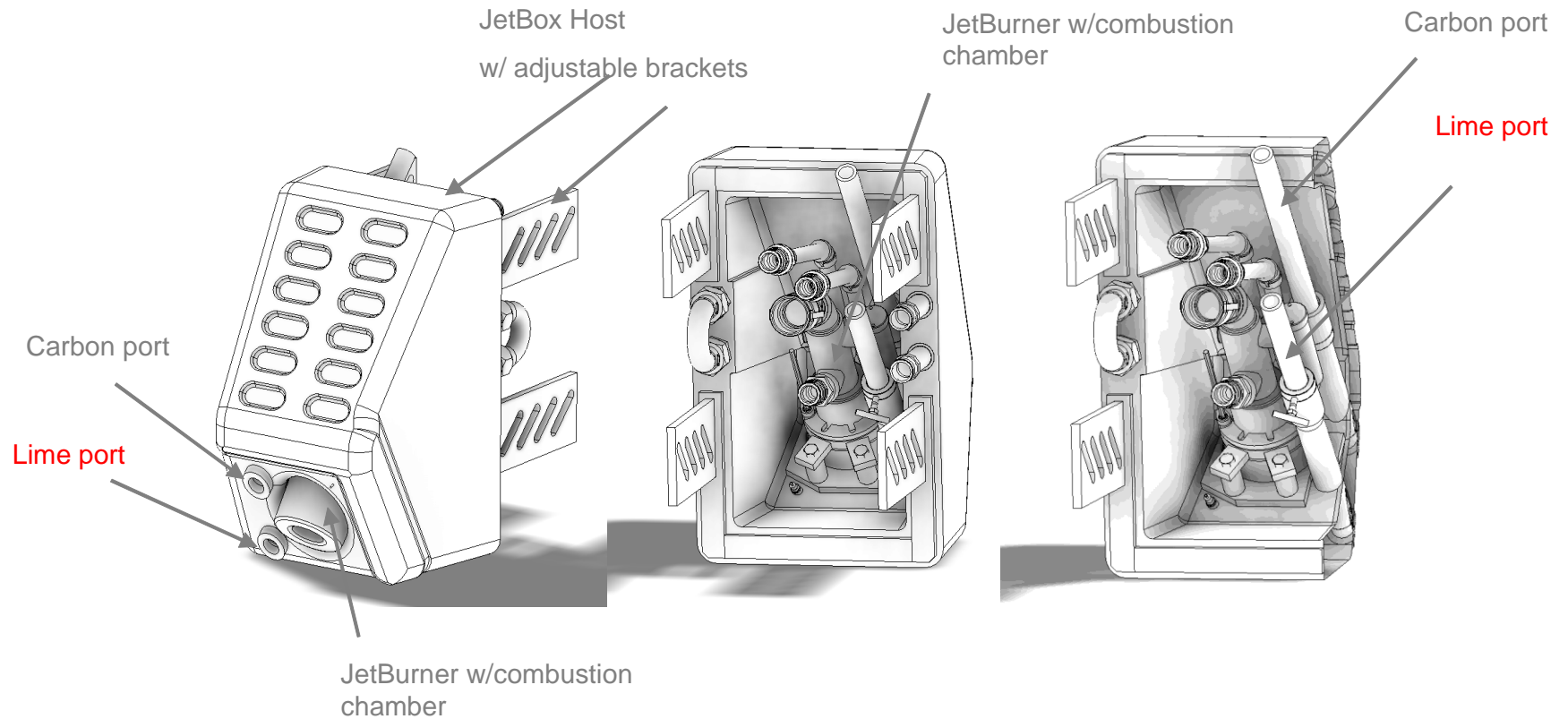
JETBURNER / JETBOX features

Connection points like coupling type and dimensions will be adjusted per customer's request



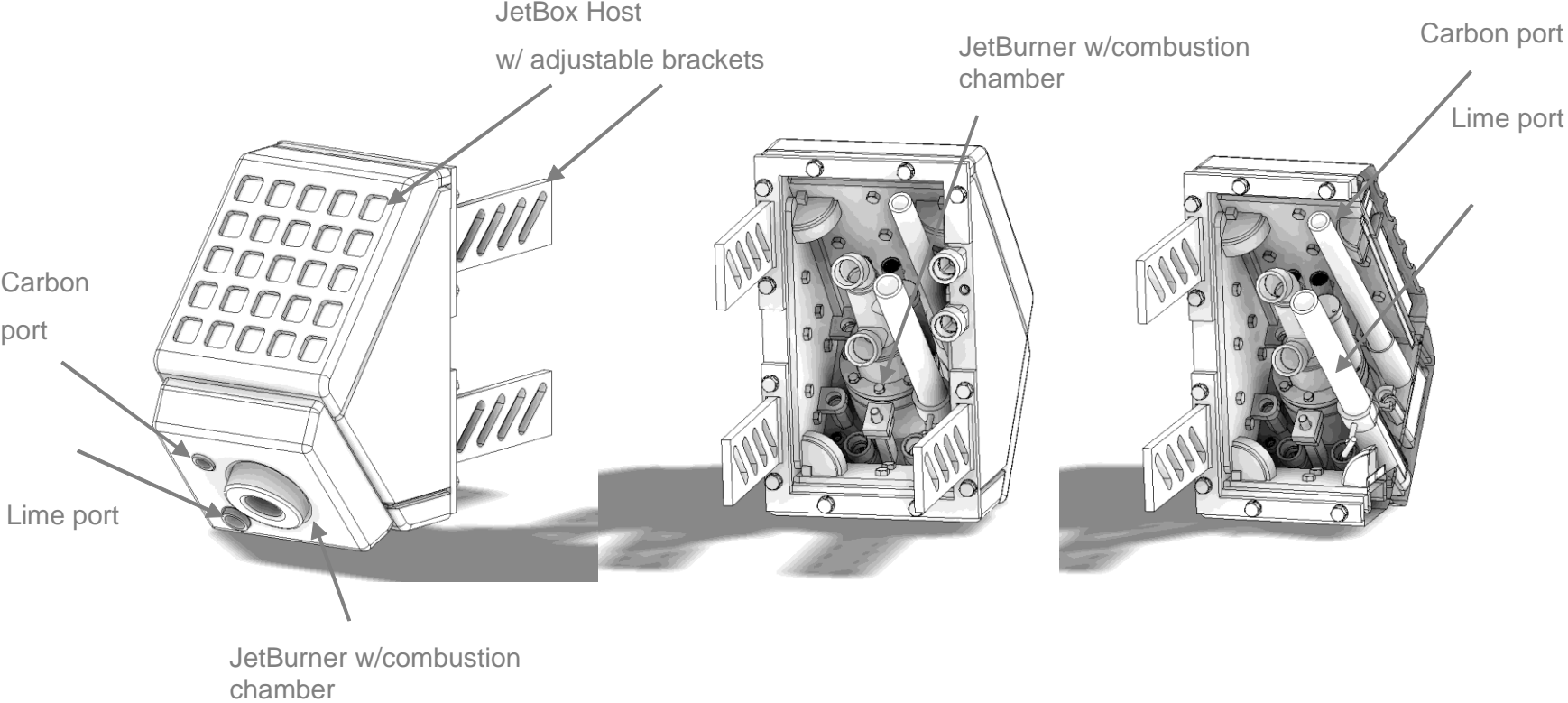
JETBURNER / JETBOX features

Main: Cast JetBox Full Size



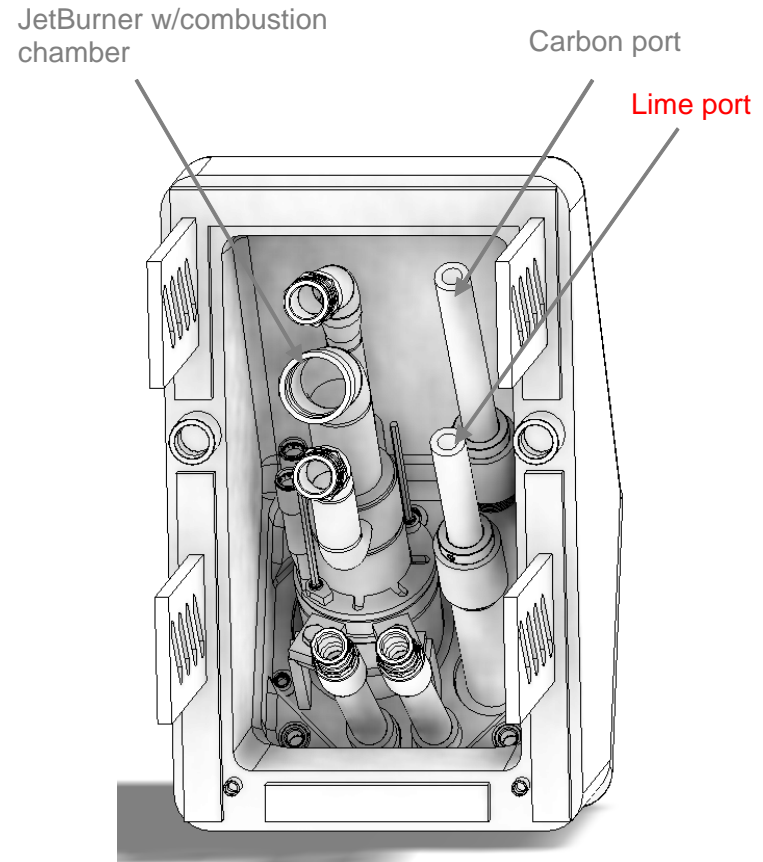
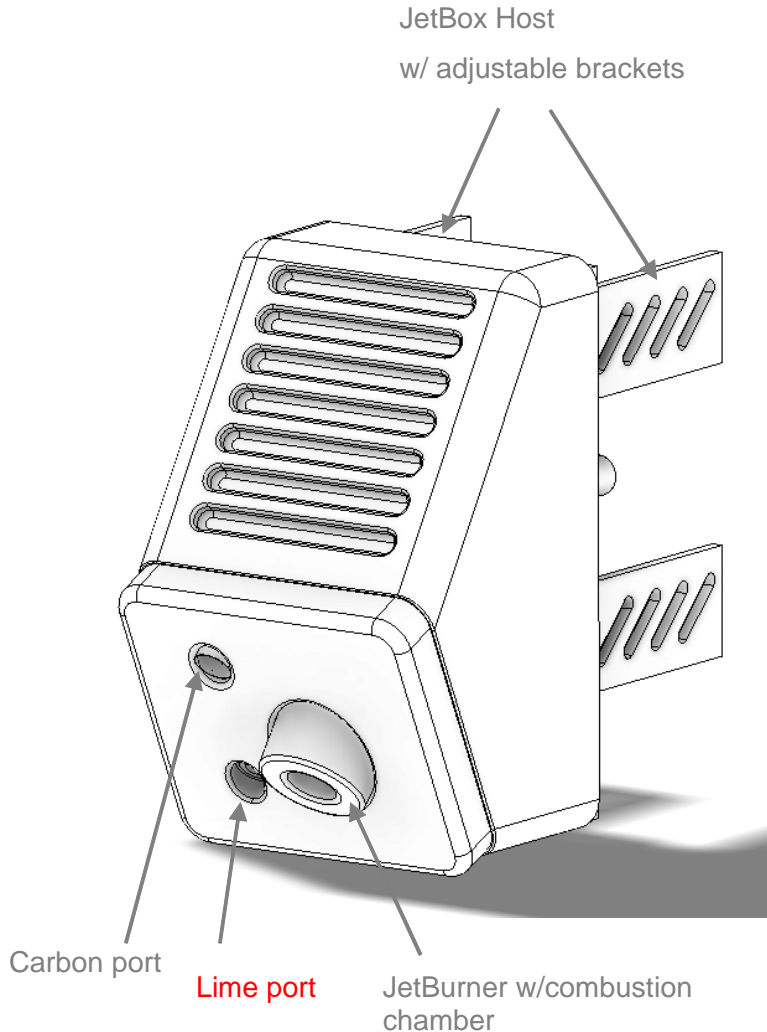
JETBURNER / JETBOX features

Machine Forged Copper JetBox Full Size and Mini

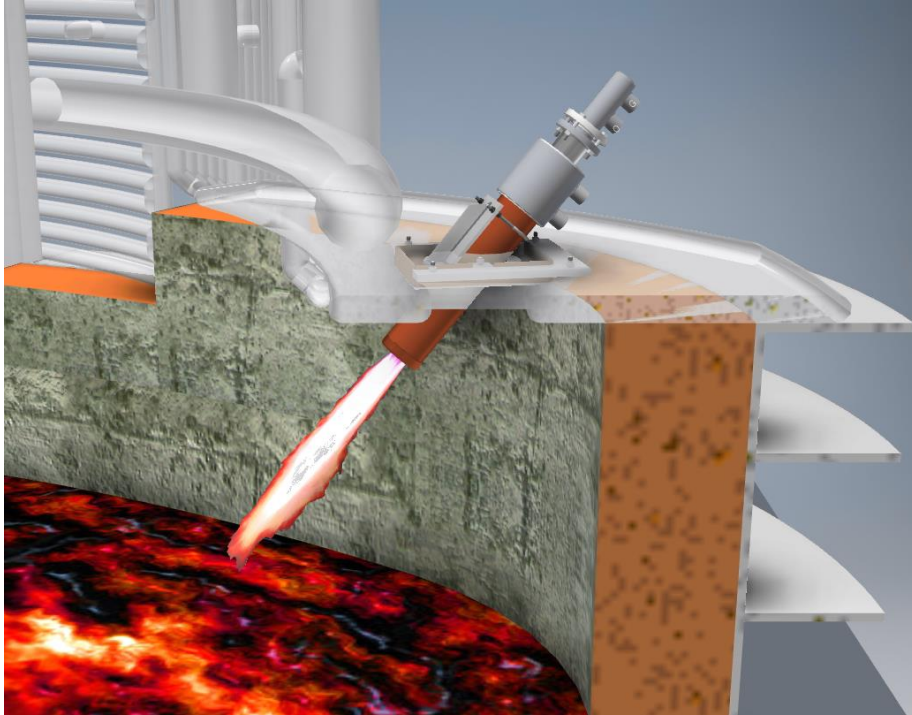


JETBURNER / JETBOX features

Option: Cast JetBox host and forged front face replaceable with 2 injection ports

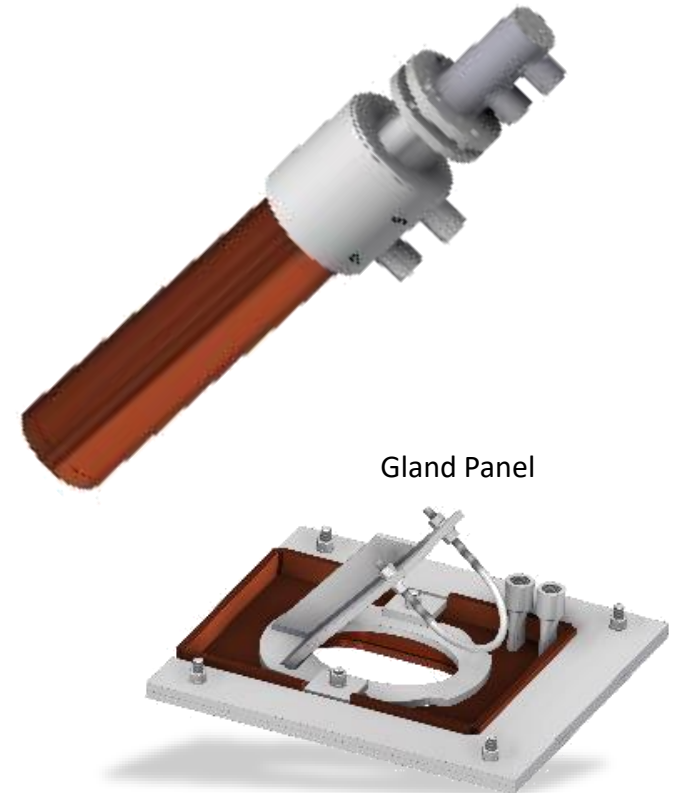


EBT Burner



Main Features

- Robust reliable system installed in its gland panel for the panel EAFs and directly in the box in most spray cooled shells
- Eliminates cold spot in the EBT area
- Custom tailored burner length

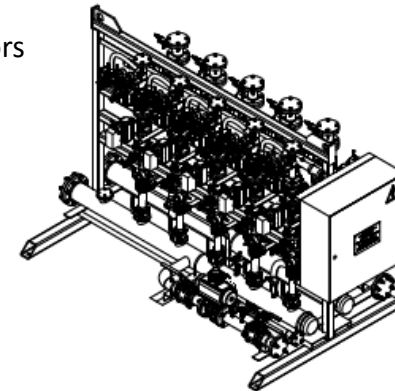
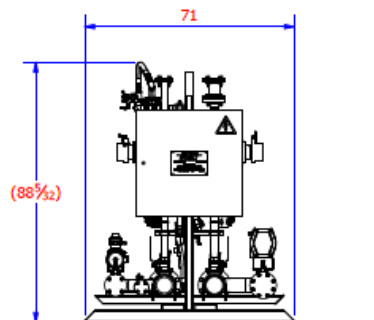
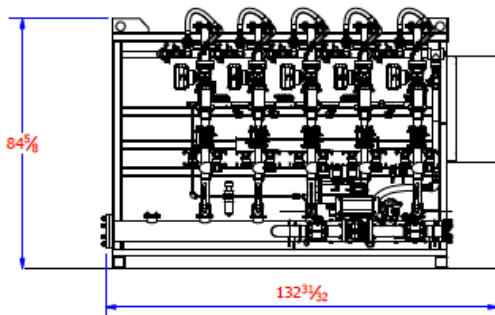
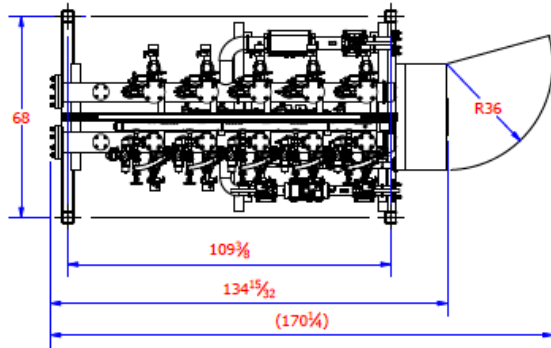


VALVE TRAINS



Valve Train Safety Features

- Compact 1 frame design – single oxygen line as the main option and dual oxygen lines
- The valve trains are traditionally built on a single skid and are delivered completely pre-assembled, pre-wired and fully tested.
- Lockable Manual Isolation Valves on inlet and all branches to comply with LOTO procedures
- Valve Proving mechanism with dual Fuel Safety Shutoff Valves, bleed and monitoring
- Dual contact Emergency Stop Safety System interlocked with safety shutoff valves
- Pressure Switches Low and High limits
- Gas Pressure Sensors with Back Pressure monitoring
 - Plug Detection Alarming
 - Line break detection
- Flow Deviation alarms
- Check Valves at Valve train exit and local to Burner application
- Temperature Sensors
- Gas monitoring Sensors

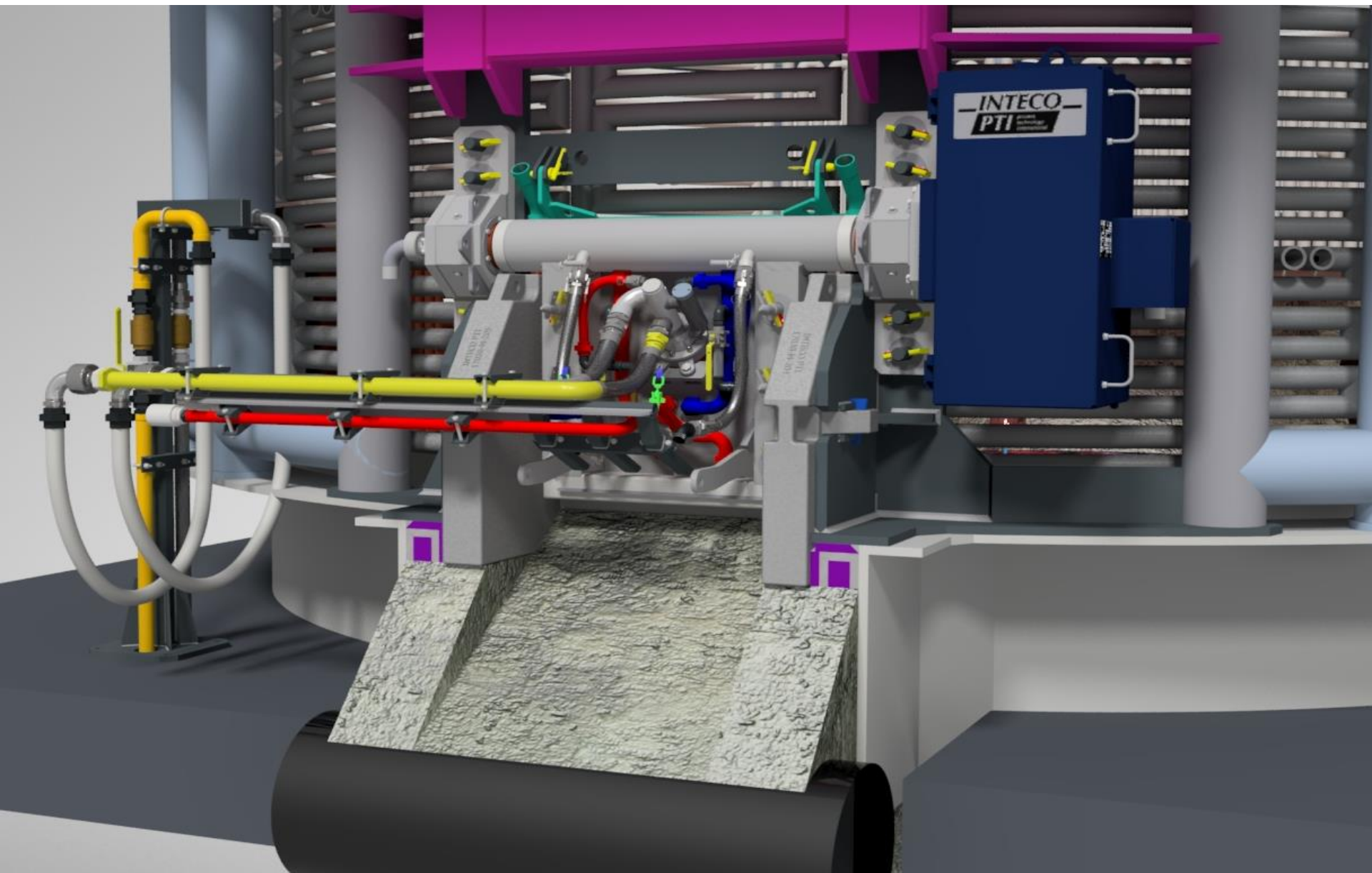




**Safety
First**

SWINGDOOR™ SYSTEM

SWINGDOOR™ SYSTEM



SWINGDOOR

SwingDoor™ creates

ENHANCED SAFETY!

SCRAP PUSHING IS ELIMINATED

IMPROVED METALLIC YIELD

IMPROVED INJECTION CARBON
CONSUMPTION

IMPROVED ARC STABILITY

IMPROVED LIME CONSUMPTION

IMPROVED ELECTRICAL ENERGY
CONSUMPTION

IMPROVED REFRACTORY
PERFORMANCE

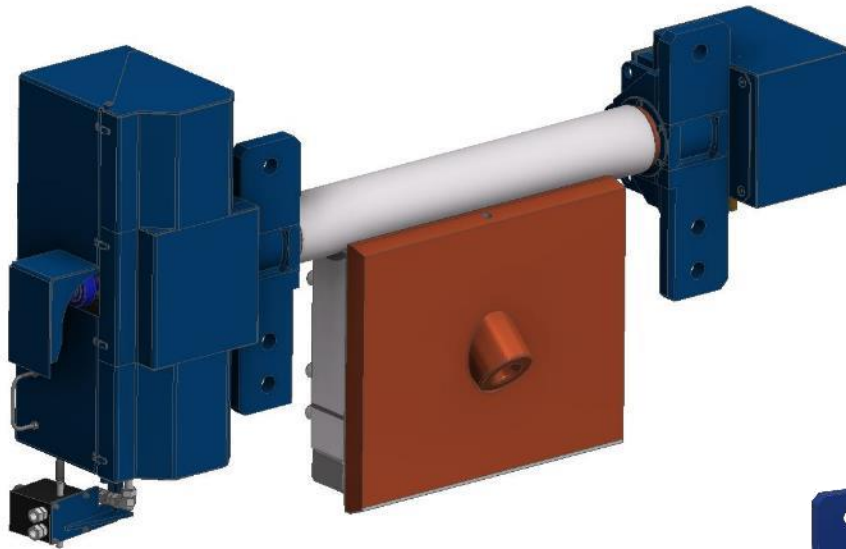
- a Safer EAF Operation
- Improved Control of EAF De-slagging. Reported Metallic yield improvements are 0.5%-1.5%
- Improved EAF Operation Efficiency by eliminating air infiltration through the Slag Door opening
- a reduction in power-on time by usage of additional burner/injector in the Slag Door area
- Removal Operator from Slag Door area on operating EAF
- Elimination of the Slag Door tunnel and Scrap Pushing procedure
- Achieve of low-to-no maintenance for the SwingDoor™ system



SWINGDOOR™ DESIGN

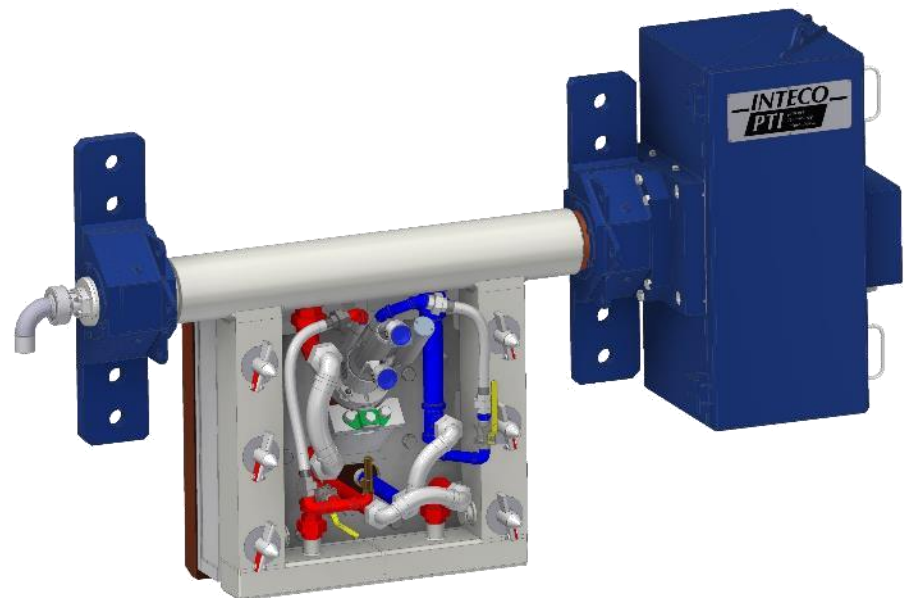


SWINGDOOR™ DESIGN

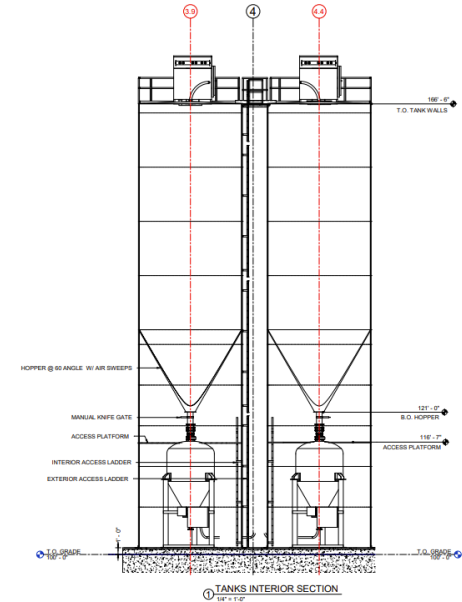
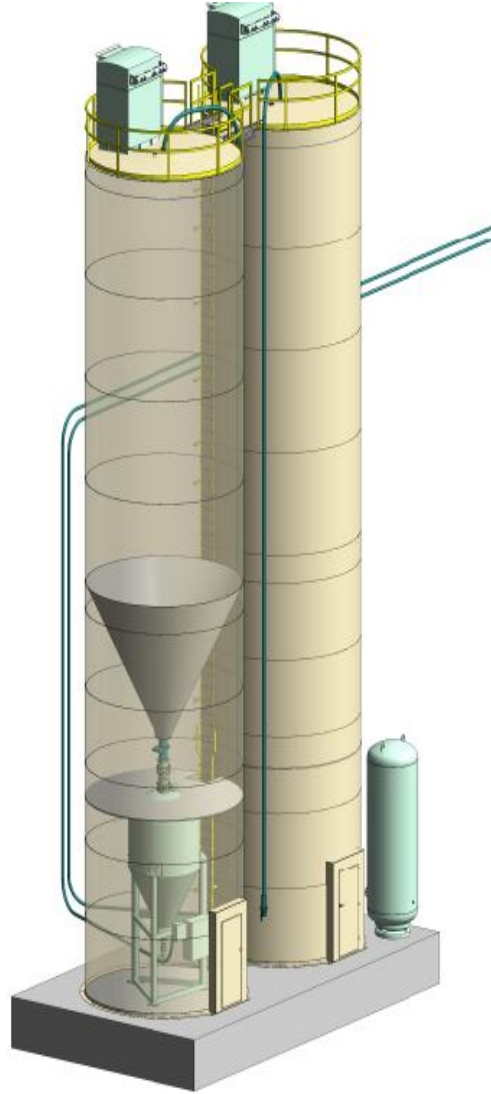
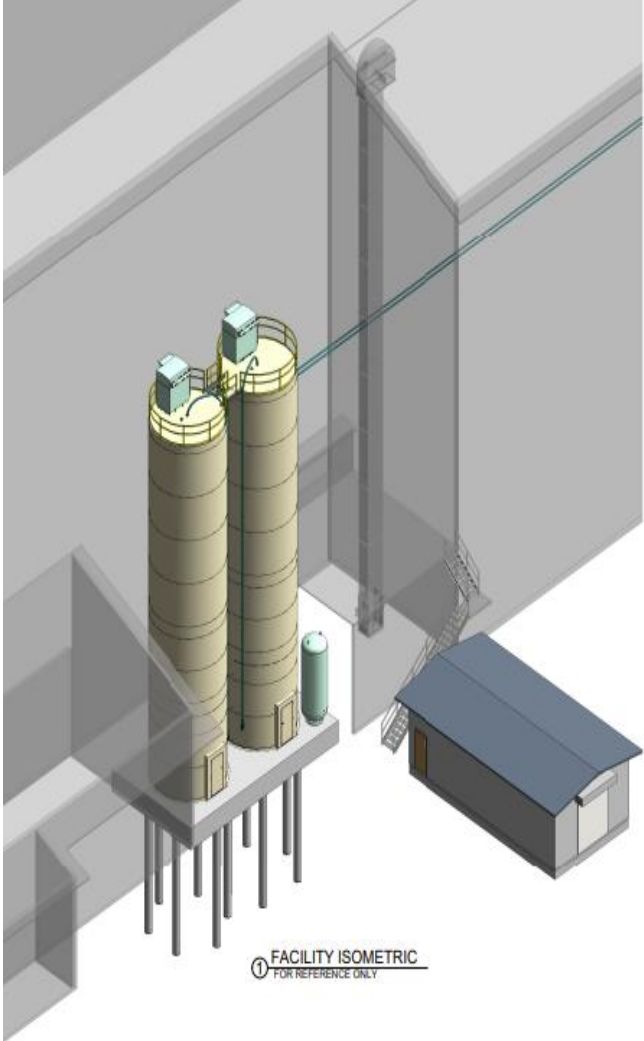


- Hydraulic actuated
- Angle adjustable
- Water cooled

- Copper door panel
- Door burner
- Mounted on upper shell



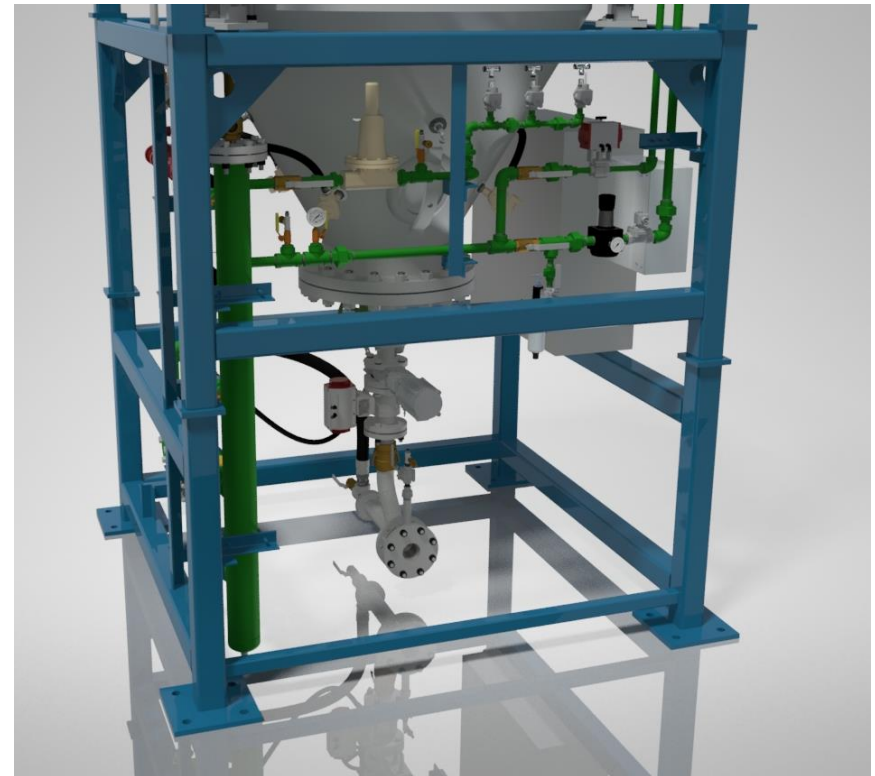
MATERIAL INJECTION



LIME INJECTION



Single Outlet



LIME INJECTION

ENVIRONMENTALLY CLEAN

REDUCES HOUSEKEEPING PROBLEMS

REDUCES LIME CONSUMPTION

**ANTI-PLUGGING TECHNOLOGY
DELIVERS CONTINUOUS LIME FLOW**

REDUCES LIME LOST TO BAGHOUSE

**INTEGRATES WITH EXISTING
OPERATION SYSTEMS**

**INJECTS UP TO 100% OF EAF LIME
NEEDS**

**DESIGNED TO INJECT THROUGH
INTECO PTI JETBOX**

PROCESS OPTIMIZATION

INTECO PTI's Lime injection system is designed to balance your lime distribution while minimizing your lime consumption. By injecting lime directly to the molten bath, the lime dissolves into the slag almost instantly. As a result, the removal of phosphorus occurs earlier in the process. The Lime Injection system saves you money by reducing lime usage, reducing the amount of housekeeping required in the melt shop, and reducing the amount of lime lost to the baghouse.

SINGLE INJECTION POINT

Each Lime vessel injects material into a single point on the EAF. Most processes need two injection vessels: One vessel for High Calcium Lime and one vessel for Dolo Lime.

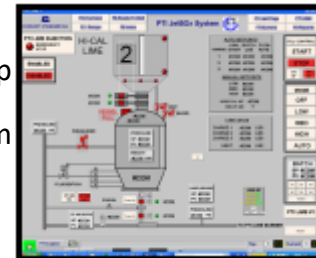
<u>Transport Pipe</u>	<u>Max Flow</u>	<u>Typical Flow</u>
3" Pipe	1,000 lb./min	300-500 lbs./min
DN 80 Pipe	275 kg/min	135-225 kg/min

AUTOMATED MAINTENANCE

The Lime system is self-diagnostic. Features within the vessel help minimize lime plugging and ensure an even and consistent lime flow. Robust and built with quality components, INTECO PTI's Lime System will make your lime injection process virtually maintenance free

AUTOMATION

INTECO PTI's Lime System is PLC controlled. To fit your needs, the PLC may be mounted directly on the vessel structure or located remotely. INTECO PTI can customize its vessel automation systems to integrate with your current systems to reduce redundant operator displays.



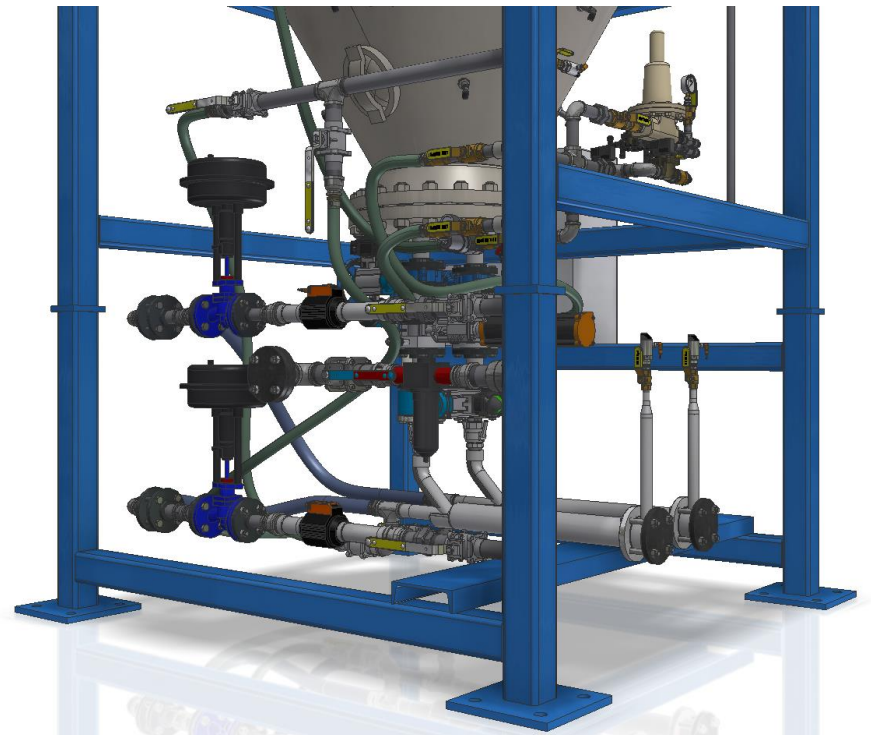
CLOSED LOOP FLOW CONTROL

The lime flow rate is regulated by closed loop control of the vessel pressure and transport air flow. Lime flow is not interrupted by the opening and closing of the cycling lime feed valve. With virtually no moving parts during the injection process, your Lime System will last longer and require less maintenance. Less lime usage, reduced maintenance and a cleaner shop makes the INTECO PTI Lime system a "no brainer" for your melt shop!

CARBON INJECTION



Dual Outlets



CARBON INJECTION

ENVIRONMENTALLY CLEAN

FULLY INTEGRATED AND
AUTOMATED

DEEP PENETRATION INTO
SLAG/METAL INTERFACE

ANTI-PLUGGING TECHNOLOGY
DELIVERS CONTINUOUS FLOW

PREVENTIVE DIAGNOSTICS

LOW MAINTENANCE

DESIGNED TO INJECT THROUGH
INTECO PTI JETBOX

IMPROVED SLAG CONTROL AND
CHEMISTRY

REDUCED CARBON USE

TECHNOLOGY

Carbon Injection pressure vessel dispenser has two outlets
Feed rate to EAF is controlled by

- Vessel pressure
 - Transport air flow
- Injector automatically adjusts operating parameters to control to desired set point
PLC Control Equipment
Robust design
- Reduces down time
 - Increases process utilization

SYSTEM DESIGN

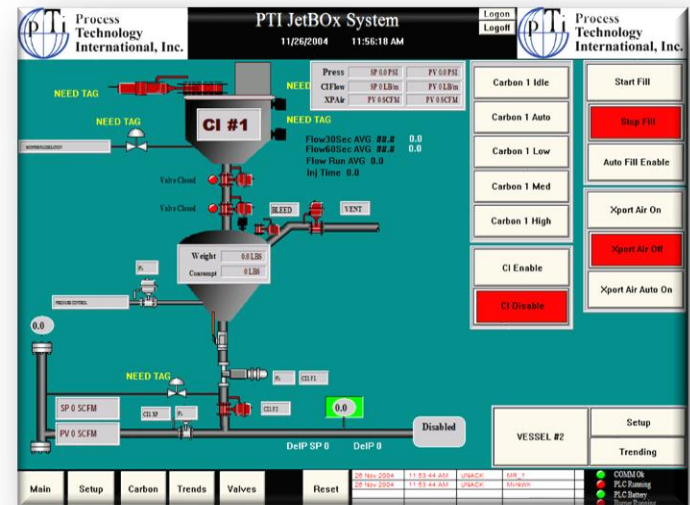
Eliminates Valve Wear
Reduced System Blockage
Not Sensitive to Material Sizing
High Reliability
Improved Process Stability
Closed Loop Control

CONTROLS

Active vessel pressure control is adjusted to the process requirements.
Pressure feedback is used to detect potential plugging before a blockage occurs
Transport Air flow control is adjusted to the process requirements.
Control allows energy savings during idle operation.

INTEGRATING INTO THE EAF SYSTEM

Material flow rates and control can be integrated into current process control screens
System is stand alone and can be set up and programmed from panel mounted on pressure vessel structure
Remote system monitoring is available
Carbon injection timing is linked to MW Input



Ladle & Tundish Preheaters/Dryers

- › The Inteco PTI Ladle Preheating/Drying System should be considered by steelmakers who:
 - › Require efficient ladle drying and preheating
 - › Want to minimize capital investment
 - › Want to lower utility consumption
 - › Need to improve their ladle refractory life
 - › Require low maintenance operation



Ladle & Tundish Preheaters/Dryers

The PTI Preheating/Drying System has the following advantages:

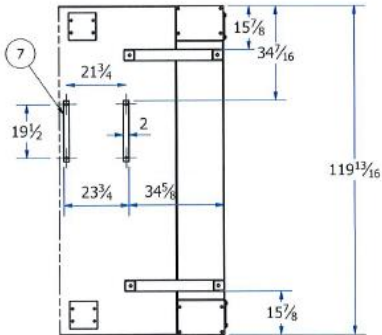
- › **1. Low Operational Cost**
 - › Individual flow control provides the optimum amount of fuel at any moment of the preheating and drying cycles
 - › Unique Combustion Air control uses 50% less energy.
 - › Innovative ladle lid design reduces cold air infiltration which increases the efficiency of operation
- › **2. Longer Ladle and Tundish Refractory Life**
 - › A long, luminous flame on high and low firing rates, a large volume of correctly mixed combustion gases, and a reliable seal preventing cold air infiltration
 - › Cycling between short and long flame structures provides uniform heat distribution
- › **3. Low Maintenance Cost**
 - › Innovative lid design for ladle preheaters/dryers, including positioning pads and replaceable refractory modules, saves on maintenance
- › **4. Self Diagnostics**
 - › The system is designed to reduce downtime
 - › Using redundant thermocouples allows scheduled maintenance rather than emergency maintenance
 - › The PLC is programmed to monitor all instrumentation for proper response thru every stage of operation and give the operator extensive feedback on the HMI screen if anything needs maintenance. This includes step by step troubleshooting guides as well as screen shots of wiring diagrams. No more guessing what went wrong, The HMI will tell you instantly what used to take hours or days to figure out.

Ladle Preheaters/Dryers

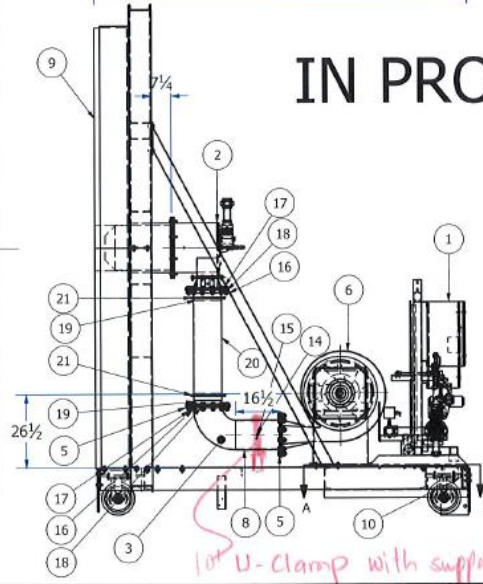
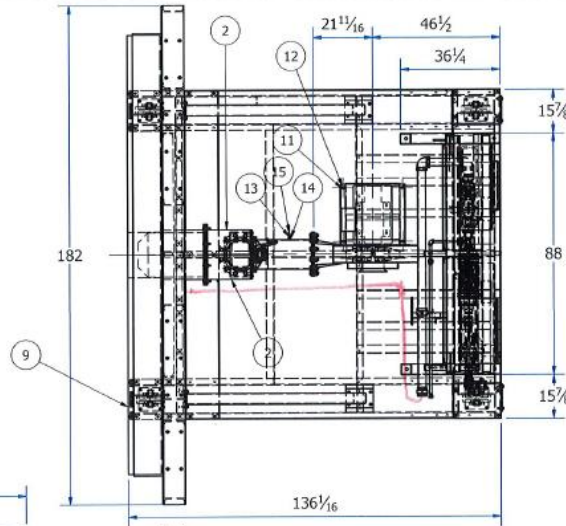
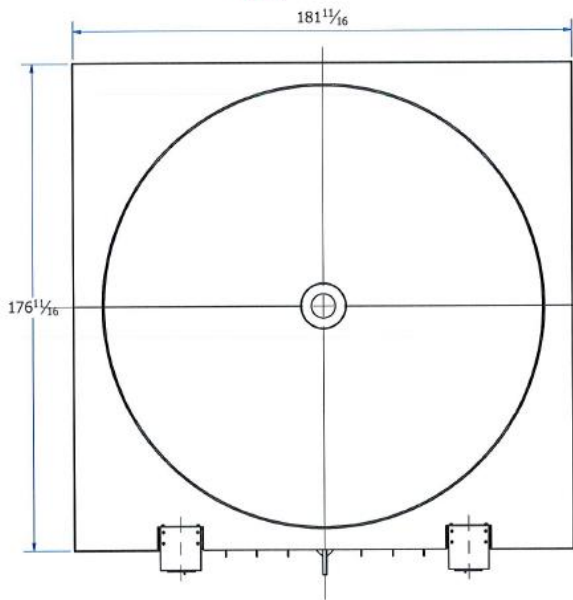


Horizontal Ladle Preheaters

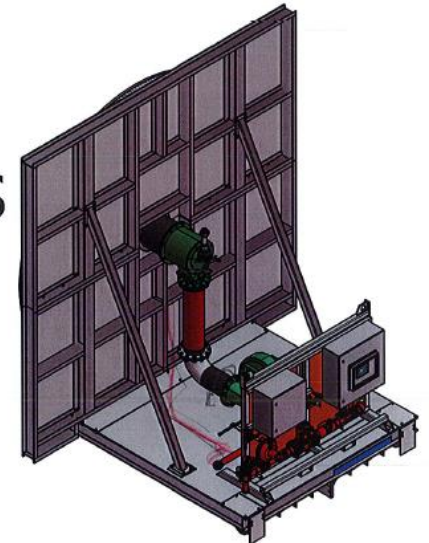
REVISION HISTORY			
REV	REVISION DESCRIPTION	DATE	BY
A.0	ISSUED FOR SHOP ASSLY	5/27/2021	SG



SEC- A-A SHOWING LOCATION OF ITEM 7
1 / 30



IN PROGRESS



PARTS LIST					
ITEM	ITEM QTY	PTI Description	Mas 90 #	Drawing #	LENGTH
1	1	VALVE TRAIN		1521-10866-V-802	
2	1	Burner	P392077	1521-10866-P-605	
3	1	10" sch10 BW 90° Elbow SR CS	P340477		
5	2	10" 150 lb SO Plate Flange	P340191		
6	1	BLOWER 20W10, TYPE TBNA, CCW BHD	P380035		
7	2	1/2" x 2" CS Flat Bar	P100010	1078-11170-F-109	
8	1	10" Sch 20 CS A53 GR-B ERW BLK PIPE x 16-1/2"	P160065		
9	1	PH Assembly		1521-10866-P-600	
10	6	Billet 5 1/2 x5 1/2x40	P100193		
11	4	1/2-13 x 1 CS GS Bolt	P970335		
12	4	1/2 CS GS Lockwasher	P970034		
13	1	MALE CONNECTOR PARKER 4-4 FTX-5	P360011		
14	1	1/4" SS THREEDOILET	P351027		
15	1	13991N-4-4 Hose Fit JIC SW 90	P360002		
16	36	7/8-9 CS GS Nut	P970067		
17	36	7/8-9 x 2 1/2 CS GS Bolt	P970164		
18	36	7/8 CS GS Lockwasher	P970162		
19	2	SPOOL PIECE FOR HOSE		1521-10866-P-608	
20	1	10" HIGH TEMP FLEX DUCT	P460177		
21	2	10" WORM-DRIVE HOSE CLAMP WITH NON SLIP SCREW	P970310		

All welding must be in accordance with AWS D1.1 latest revision.

INTECO
PTI

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DATE: 5/18/2021
DRAWN BY: SG
CHECKED BY: CCC

DATE: 5/18/2021
DRAWN BY: SG
CHECKED BY: CCC

DATE: 1/7/30
DRAWN BY: JFL
CHECKED BY: JFL

1521-10866-P-100 TOP ASSLY
SUN-2020

CUSTOMER
**PROCESS TECHNOLOGY INTL
TUCKER, GA**

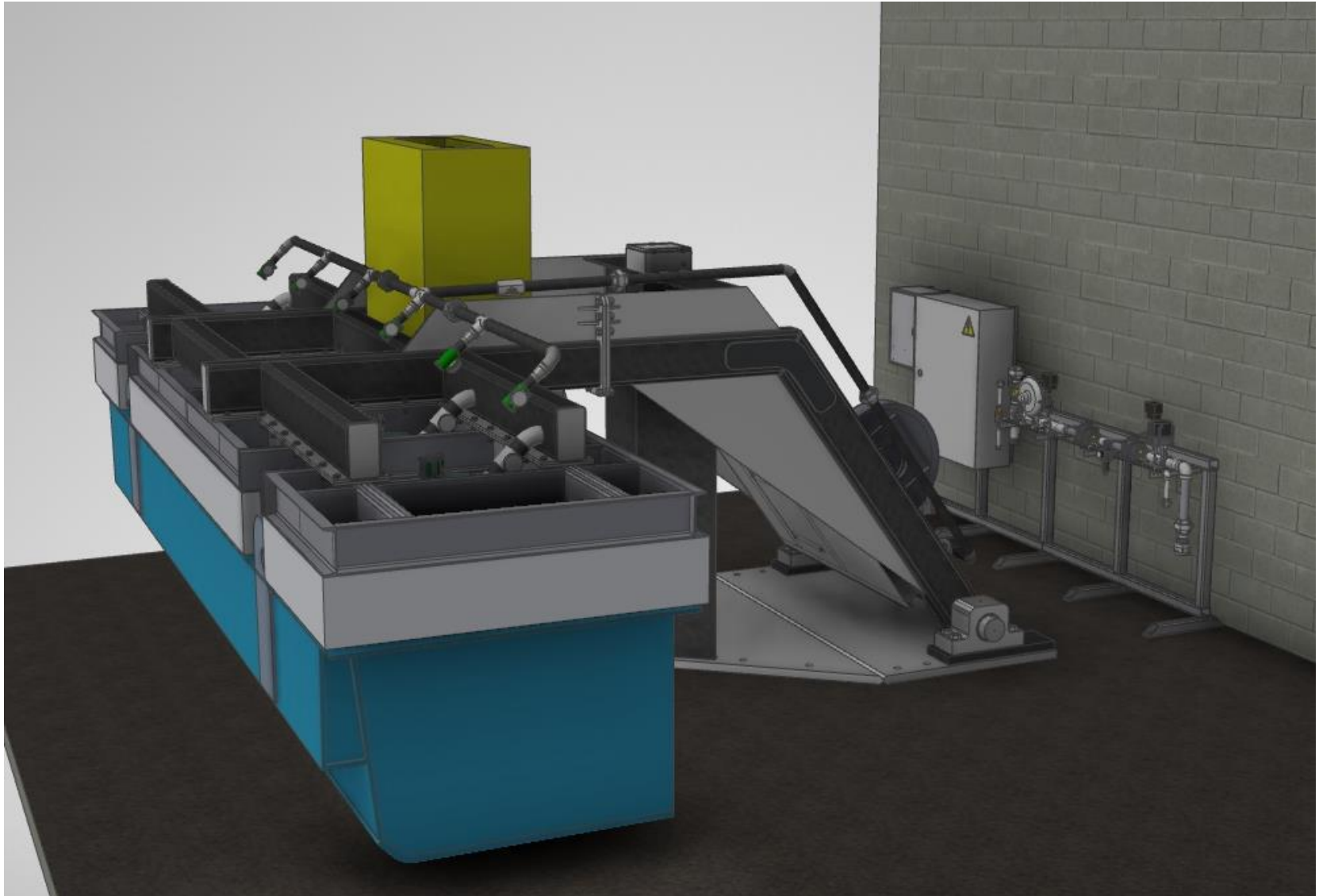
PROJECT
**Horizontal Pre Heater
Top Assembly**

DRAWING NUMBER
1521-10866-P-100

REVISION
A.0

10" U-clamp with support

Tundish Preheaters

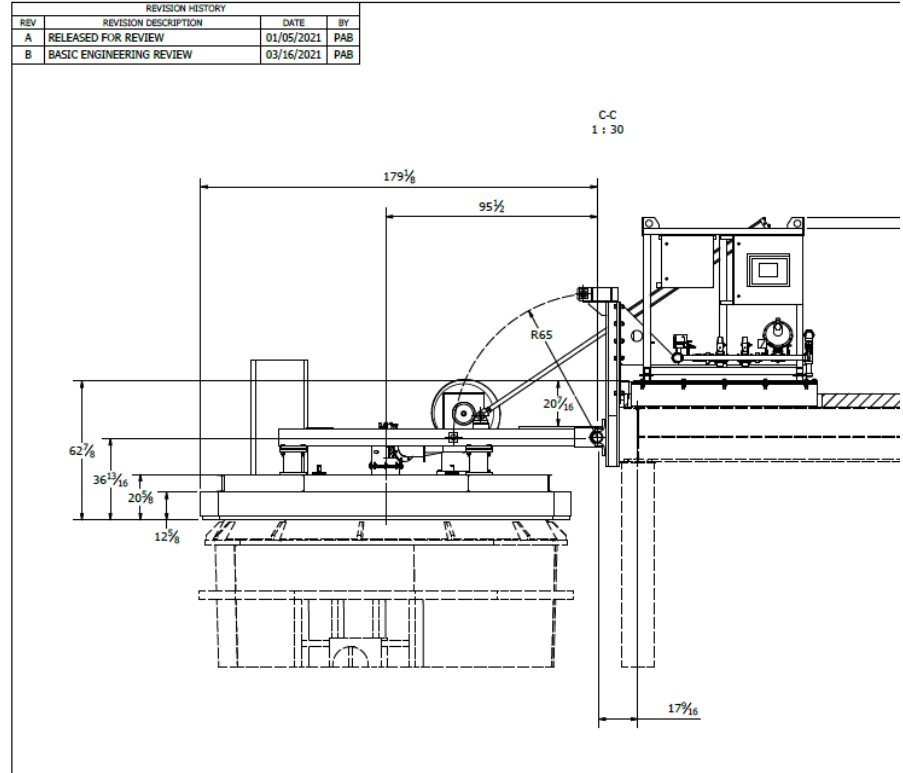


Custom Preheaters

Bridge Type Design
US Steel Fairfield, AL



LMF Preheater
Nucor Brandenburg, KY



Preheaters Upgrades

> When ladle preheaters reach old age (> 10 years) they often develop issues that result in inefficient operation, poor reliability, and high maintenance requirements. Some examples of these issues are

1. Instruments and controls do not operate properly due to age and improper adjustment. This results in “off-ratio” operation, i.e., gas and air flow improperly balanced which causes poor heating performance and wasted gas.
2. Preheaters can become difficult to light. This is caused by poorly maintained or inoperable ignition systems. As a result, preheaters are often left running when not in use to avoid the difficulty of lighting them only when needed. This practice wastes large amounts of gas.
3. Ratio regulators are often used to control gas flow in preheaters. The dirty air in steel mills will collect in the operating mechanisms of these units and lead to poor performance, often in the form of supply too much gas. This is a prime example of point 1 above.
4. The combination of constantly running preheaters (Point 2) and poorly functioning ratio regulators (Point 3) results in excessive gas consumption. Depending on operating practices of the preheaters, it’s possible to double gas consumption unnecessarily.
5. Many preheaters use old style valve operators that employ complex operating shafts, arms, and linkages. Proper adjustment of these devices requires specific training which many maintenance personnel do not have. When there is a problem, it is tempting to adjust these devices. These attempts may improve the immediate problem but often result in poor overall operation of the system.

