



BURNERS

FLARES

THERMAL OXIDIZERS

VAPOR CONTROL

RENTALS

AFTERMARKET



ZEECO

Burner Engineered Solutions

Technical Solution

Burner Engineered Solutions



- Replacements for existing equipment
- Burner retrofits / revamps
- Engineered solution case study (burner retrofit)

Replacement of Existing Equipment



➤ Process, boiler & incineration burners (Zeeco & other vendors)

- Gas tips
- Diffusers / cone
- Replacement pilot components
 - Pilot tips
 - Insulators
 - Mixers
 - Orifice spuds
 - Flame & ignition rods
 - Feedthroughs
- Complete replacement pilots
- Replacement burner tiles
- Complete replacement burners



Burner Retrofits / Revamps



Redesigned gas tips



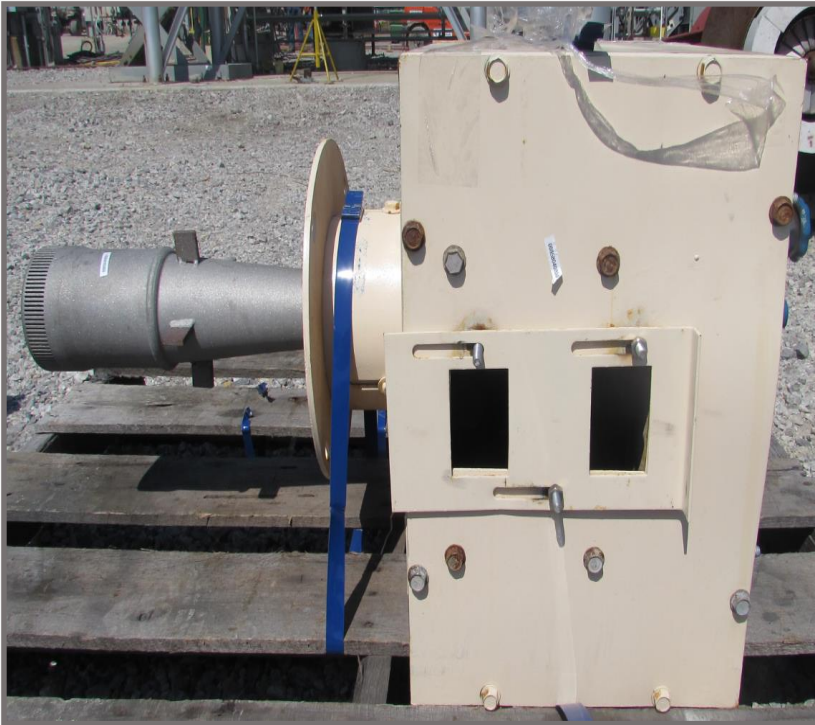
Modified air registers



Burner Retrofits / Revamps



Radiant wall inserts



Burner Retrofits / Revamps



Pilot upgrades



Burner Retrofits / Revamps



Complete burner replacements



Burner Retrofits: Common Questions



- Can we increase the burner heat release?
 - It depends – often times we can get another 5-15% if the conditions are right.
- Does the customer need to modify the existing heater?
 - Generally no. We will do everything we can to make installation as painless as possible.
- Can the customer re-use the burner tile?
 - RW burners we can often use the existing tile. Other burners generally require new tiles be supplied.
- Will a new burner reduce emissions?
 - Yes, almost always we have a burner option available that will produce fewer emissions.

Burner Retrofits: What Do We Need?



- Drawings of existing equipment
 - Burners and heaters
- Data sheets for existing equipment
 - Burners and heaters
- Up to date fuel compositions
 - Average and “extreme” operating cases
- Requirements and specifications, if any
 - Emissions, fabrication, flame lengths, etc.

Burner Retrofits: What Do We Need?



- Send RFQ's for burner retrofits to:
 - Retrofit_Inquiry@zeeco.com
- This e-mail goes to the AE's on the Retrofit Team and to Admin personnel
- Using the e-mail address will make sure any RFQs are entered in a timely fashion

Engineered Solution Case Study



- A Refinery on the Gulf Coast approached Zeeco with a problem furnace.
 - Original burner rotary registers were frozen. They could not control the excess air in the furnace.
 - Even after breaking free the rotary registers, they only rotated for a short period of time before freezing back in place.
 - Operations personnel spent a large amount of time working on the burners with no long term solution.

Engineered Solution Case Study



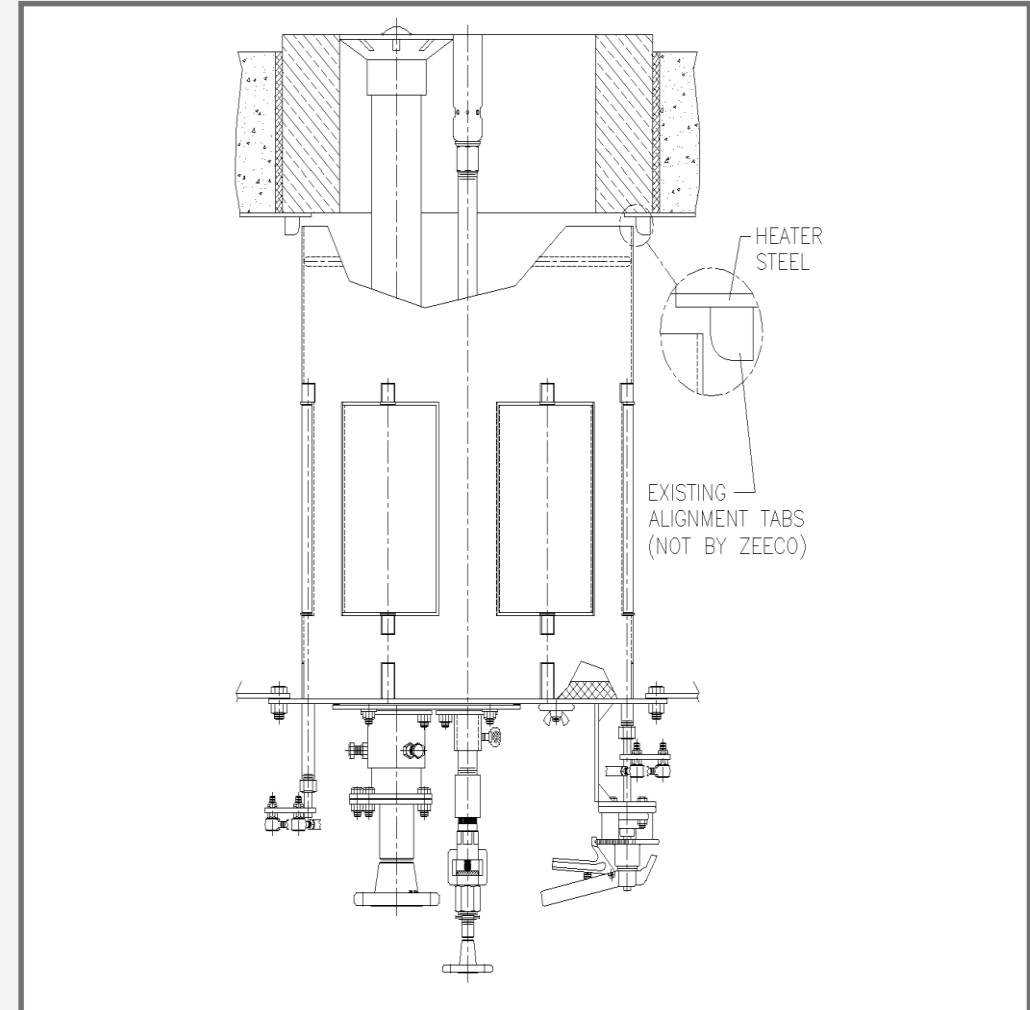
- Objectives of the burner retrofit.
 1. Burner register would mount in a common air plenum.
 2. Register material must resist rusting in the Gulf Coast atmosphere.
 3. Burner register must operate for the foreseeable future without freezing.
 4. Burner must fit into existing furnace floor openings without refractory modifications.
 5. Easy to operate and maintain the new burners.
 6. Provide some NO_x reduction versus the existing conventional emissions burner.

Engineered Solution Case Study



Zeeco selected our GB Single Jet Burner

- Inlet Vane Register (No rotor and stator cylinders)
- 304 SS Construction
- Single Damper Handle for ease of operation
- Larger OD tile to fit existing floor refractory opening.

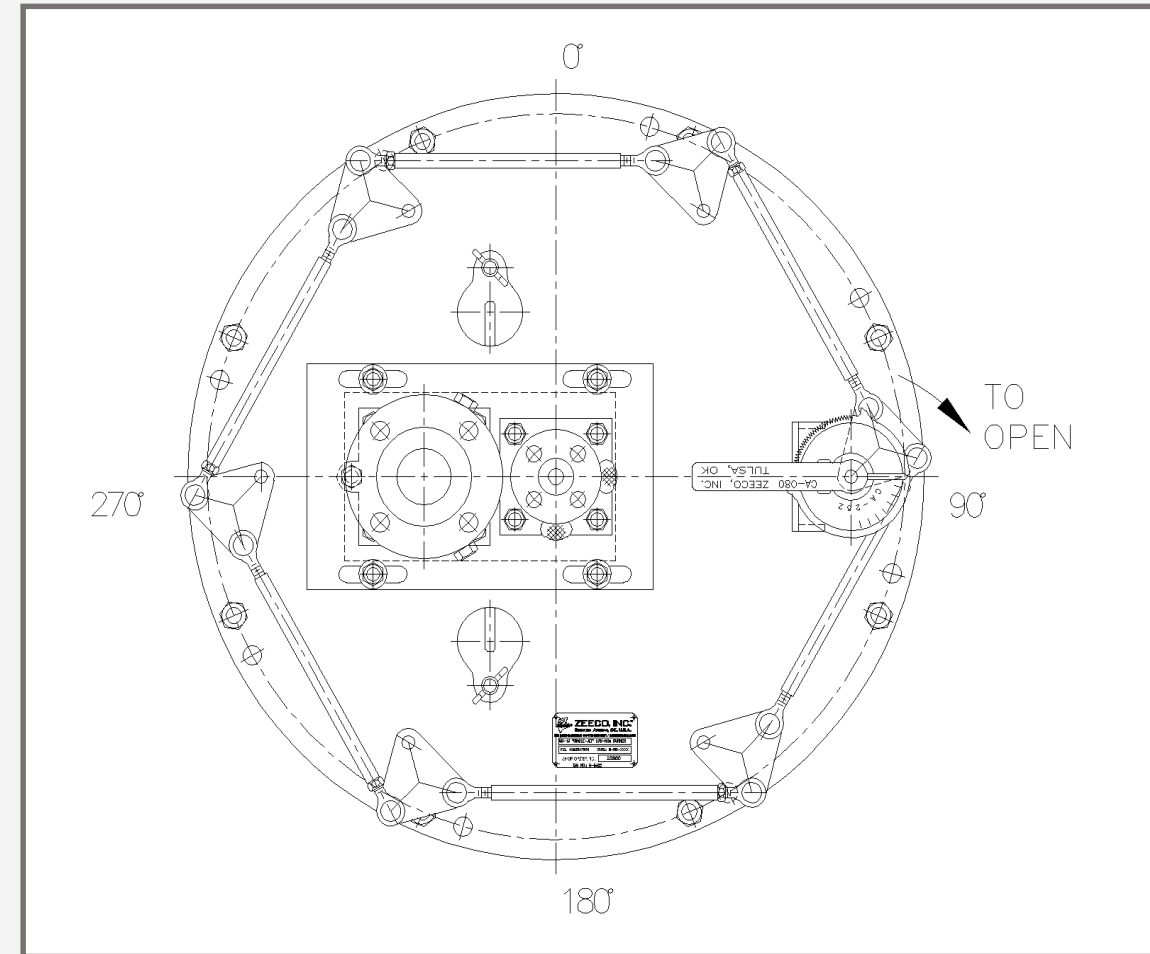


Engineered Solution Case Study



Burner front plate

- Single gas tip
- All vanes connected to a single damper handle
- Adjustable gas tip and pilot tip

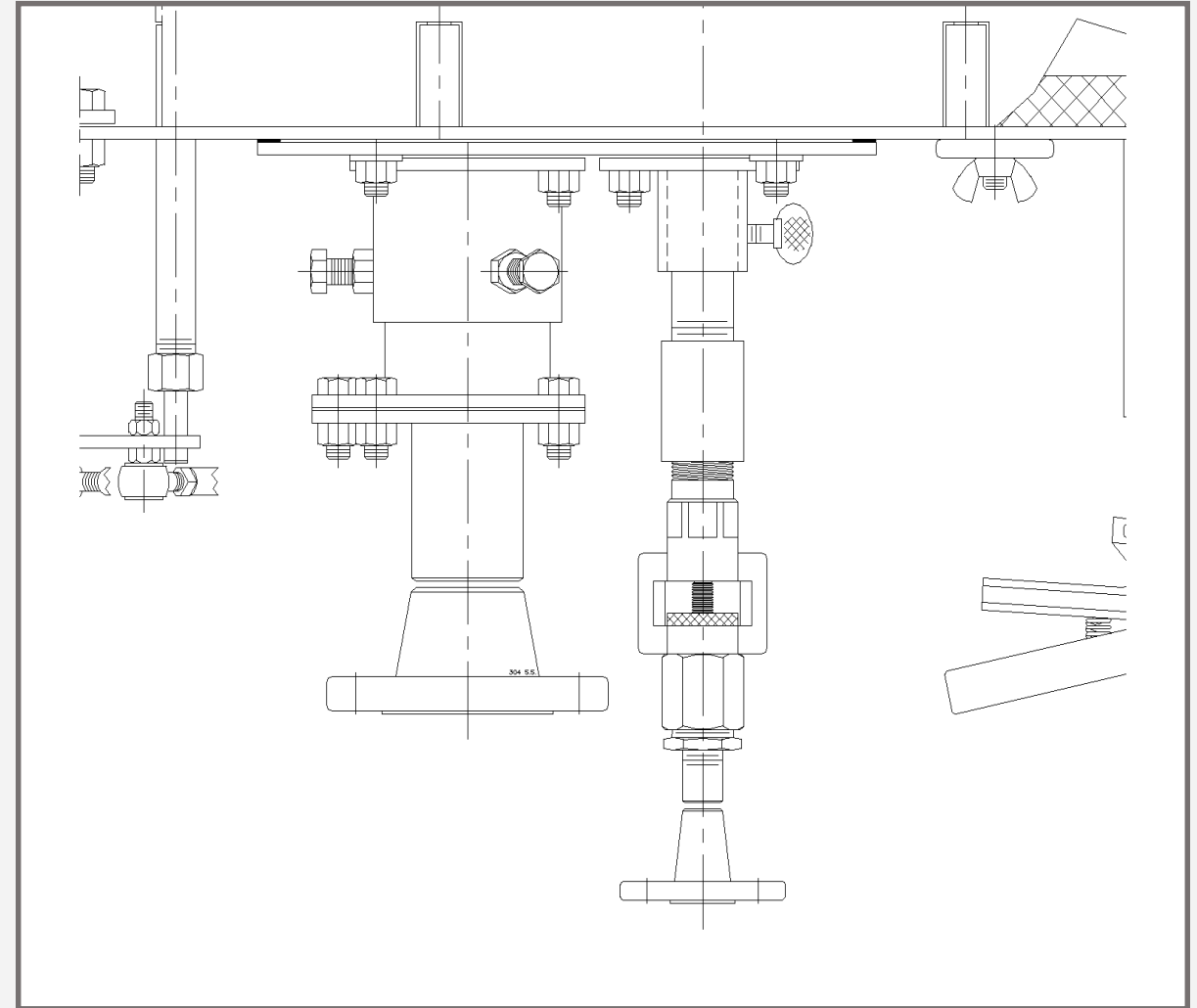


Engineered Solution Case Study

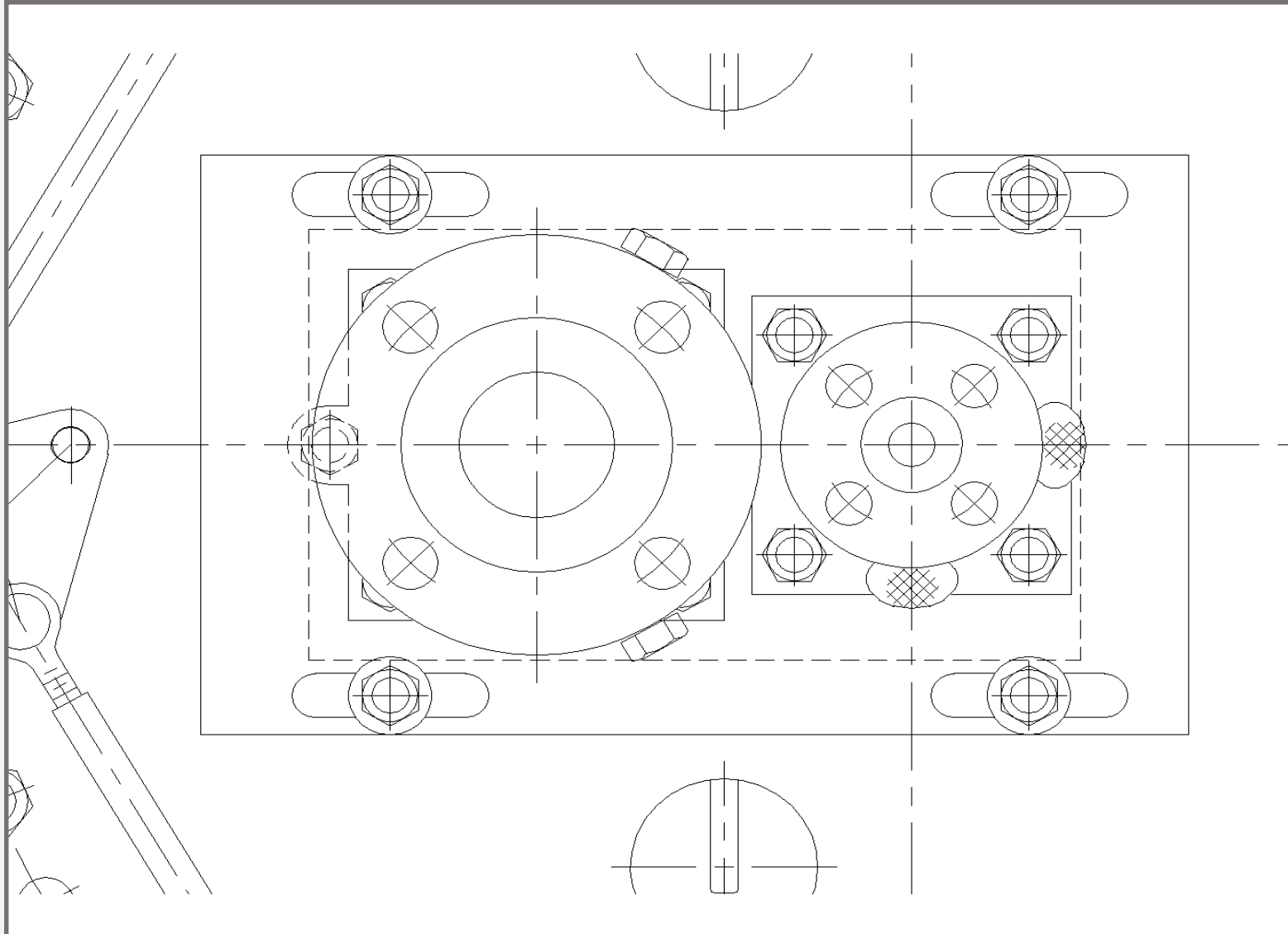


Adjustability

- Gas tip and pilot can be moved toward ID of tile
- Mounting hubs allow gas tip and pilot tip to move up and down
- Custom fit each burner for exact furnace conditions



Engineered Solution Case Study

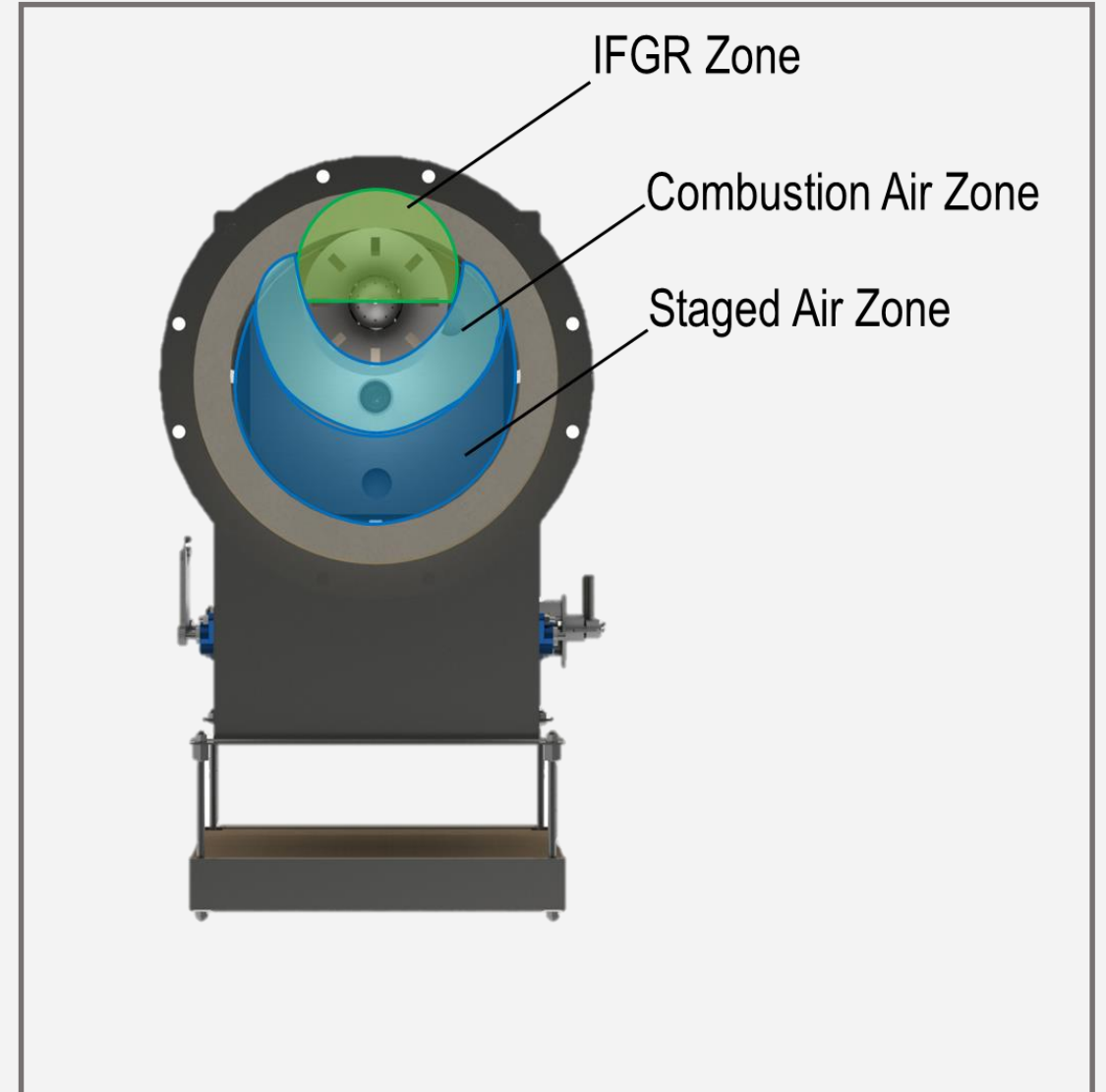


Engineered Solution Case Study



Reduced NOx emissions

- Single gas tip using internal flue gas recirculation
- Greatly reduce peak flame temperature
- Significant reduction in NOx emissions using simple design



Engineered Solution Case Study



Conclusions and lessons learned

- Retrofit was carried out in late 2016.
- 19 Day turnaround – Burner retrofit completed in 17 days
- Inlet Vane Registers still functioning properly
- NOx was reduced by approximately 50% from existing conventional burners
- Burner is easy to clean and maintain with a single gas tip



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