

Blasch Precision Ceramics Case Study

VectorWall™ Mixing Checkerwall

Tessengerlo Kerley, Inc. Reduces Fuel Gas Usage in Claus SRU by 50%

Company Facts

- Founded in 1947
- World's largest producer of sulfur-based thiosulfate fertilizers

Challenges

- Sulfur deposits in the downstream equipment
- Increased soot formation
- Increased corrosion

Product Used

- VectorWall™ Mixing Checker Wall

Benefits

- Reduced fuel gas requirements
- Elimination of almost all sulfur carryover
- Elimination of sulfuric acid condensation



In 2009, Tessengerlo Kerley's mid-continent facility, the Claus sulfur recovery unit (SRU), was looking to achieve optimal incinerator efficiency over a wide range of operating conditions. The company performs over the fence sulfur recovery operations for a number of refineries.

Challenges

One of the Claus SRU incinerators was faced with high variability of incoming feed volume from the SRU due to refinery gas volume swings and the incinerator had experienced repeated mechanical failures of its traditionally constructed combustion chamber checker

wall. Furthermore, even if the checker wall was in good repair, it did not always provide the necessary mixing and turbulence needed for complete combustion of the sulfur bearing gases exiting the Claus SRU, especially under low gas flow scenarios.

With incomplete combustion of sulfur bearing gases in the Claus tail end incinerator, several operational issues were noted:

- Increased volumes of elemental sulfur exiting the incinerator, leading to sulfur deposits in the downstream equipment
- Increased soot formation during process upsets

- Incinerator operated with higher volumes of excess oxygen to maintain complete combustion
- Operated incinerator with higher volumes of fuel gas to maintain complete combustion, thus increasing operating costs
- Lower than optimal outside skin temperature, leading to increased corrosion from acid condensation, increasing maintenance costs

The Solution

In 2009, TKI had installed Blasch hex head ferrules for its Claus burner and Claus off gas incinerator. Since they were pleased with the reliability and performance of the ferrules, TKI approached Blasch to assist with the checker wall issue. Engineers from both Blasch and TKI worked closely together to design a custom VectorWall using interlocking hex blocks (Fig. 1) to increase reliability of the wall and turbulence in the incinerator combustion chamber.

Key to the hex block design was a deflector tile that directed gas flow in a pattern to increase gas mixing and therefore, turbulence. The deflector tile



Figure 1: Hex block

performed extremely well in increasing gas mixing and turbulence in the incinerator combustion chamber. During the Claus unit's 2009 turnaround, the old checker wall was



Figure 2: Newly installed hex block VectorWall

removed and the new VectorWall was installed (Fig. 2).

Results

Results of the conversion have been very positive for plant operation and maintenance. Since the conversion, the incinerator operating history has shown:

- Reduced fuel gas requirements; fuel gas usage has been cut by almost 50%

- Elimination of almost all sulfur carryover; downstream equipment no longer has residual sulfur buildup
- Lower excess oxygen required to maintain complete combustion; excess oxygen cut by 2%
- Increased incinerator skin temperature to optimal temperatures of above 500°F, eliminating sulfuric acid condensation
- After five years of service, visual inspections have shown the VectorWall has not cracked or deteriorated.



Figure 3: VectorWalls with the flow vectoring inserts clearly visible