

Mining Company Improves Surge Control Efficiency with Conditioning Orifice Plate

RESULTS

- Accurate and repeatable measurement in short piping installation
- Improved response time for compressor surge control
- Improved process control and efficiency



APPLICATION

Air flow measurement to the blowers during copper smelting

CUSTOMER

South American Mining Company

CHALLENGE

In the mining industry, the smelting phase is a difficult process to control due to the various gases and concentrates used for this process. Blowers utilize oxygen enriched air that is provided to the furnace. During the smelting phase, the converter is continuously loaded with copper concentrate and silica (quartz) for fusion-conversion. In the fusion-conversion process, slag is separated from the white metal which is the heaviest phase (containing 70% - 75% copper) and oxygen enriched air is introduced allowing the oxidation of the different minerals. Significant amounts of energy are consumed during this fusion-conversion process.

A precise control of air flow is very important due to the fusion-conversion process requiring a specific air-to-oxygen ratio depending on the furnace loading. This enables the plant to maintain an accurate pressure signal in order to prevent surging of the blowers. The air-to-oxygen mixture is then sent to the furnace during the process of copper extraction.

The additional challenge consisted of limited space for an accurate flow measurement. Previously a 24-in. (600 mm) venturi flowmeter was installed with less than the recommended piping lengths, which resulted in poor performance. Because of the large size, the piping could not be changed or replaced due to the associated costs for replacement.

The Rosemount 1595 Conditioning Orifice Plate requires less straight run, significantly reducing material, labor and procurement costs.

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EMERSON[™]
Process Management

In the mining process, flow measurement technology is important from an accuracy and repeatability standpoint, but durability and response time are also essential. The one possible location for a flowmeter installation did not require reducing the pipe size or adding existing piping for adequate straight pipe lengths, but it did have to perform accurately after an upstream flow disturbance with limited downstream piping.

SOLUTION

For the service of measuring the air flow to the blowers with reduced piping, Emerson provided the Rosemount 1595 Conditioning Orifice Plate along with the Rosemount 3051S MultiVariable™ Transmitter. The required installation was only two pipe diameters (2D) after a 90-degree elbow with limited downstream piping of only two and a half pipe diameters (2½D). Generally under these conditions, a flowmeter installed after a single elbow with limited downstream piping does not perform as accurately as needed for this precise measurement. The previous installed venturi proved to be inaccurate in this installation.

The Rosemount 1595 Conditioning Orifice Plate requires less straight run, significantly reducing material, labor and procurement costs. It delivers ±0.5% accuracy after an upstream flow disturbance and requires only 2D upstream and 2D downstream of piping. Thus, the Conditioning Orifice Plate offered a more economical installation compared to other flow measurement technologies due to the limited straight piping.

The combination of the 1595 Conditioning Orifice Plate along with the Rosemount 3051SMV Transmitter provided a very accurate measurement and actually showed the facility operators that their compressors were not as efficient as they had thought. The engineering operators said that “The 1595 Conditioning Orifice Plate and 3051SMV transmitter performed with preciseness, fast response and a very repeatable measurement.”

Now, the customer is looking to replace all of their existing flowmeters that are performing poorly due to installation restraints and inadequate piping with this conditioning orifice plate flowmeter combination.

RESOURCES

Rosemount 1595 Conditioning Orifice Plate

<http://www.emersonprocess.com/rosemount/products/flow/m1595.html>

Rosemount 3051S MultiVariable™ Mass Flow Transmitter

<http://www2.emersonprocess.com/en-US/brands/rosemount/Pressure/Pressure-Transmitters/MultiVariable-Transmitters/3051S-MultiVariable/Pages/index.aspx>

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Figure 1. 3051S MultiVariable™ transmitter and Rosemount 1595 Conditioning Orifice Plate

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