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Case Study

Fertilizer Plant Saves Time and Money With Large Format Metal Mesh Filters

A fertilizer plant was experiencing excessive downtime, maintenance and utility costs related to contamination of the platinum catalyst in their nitrogen fertilizer production process. They saved time and money by switching to large-format stainless steel metal mesh filters provided by Filter Products Company.

Customer Issue

A fertilizer manufacturing facility in Dodge City, Kansas was using an under-sized and improperly designed particulate filter in the compressed nitrogen gas stream prior to the catalyst, which led to catalyst contamination and production downtime.

The existing filter had three problems:

1. **Performance** - The filtration performance was inadequate, even under ideal conditions,
2. **Size** - The filter was under-sized for the flow-rate of the application, and
3. **Materials** - The materials of construction were suboptimal for the application. The process used a fiberglass depth filter which was a purely consumable item and led to potential problems like shedding of fiberglass media or catastrophic failure of the filter leading to catalyst contamination.

Filter Products Company Solution

Filter Products Company worked with team members at the Dodge City facility, an engineering firm contracted by the facility, and Porvair Filtration to develop a set of 12 large-format stainless steel metal mesh filters that addressed all of the design shortcomings of the original filtration system.

1. **Performance** - The media was designed and tested to filter down to 1-micron at 99.5% efficiency, functionally eliminating atmospheric contamination from the compressed nitrogen gas stream.
2. **Size** - The set of 12 filters collectively provided ample surface area for the application, and less than 1 psi pressure drop in the clean state.
3. **Materials** - All components of the new filter elements are made from 300-series stainless steel and all joints are welded to withstand the operating conditions. Two sets of filters are employed, with one set on stand-by. The filters are designed to be cleaned in an ultrasonic bath when they are removed from service. Once cleaned they are ready to be returned to service.

The first set of 12 filters remained online for 9 months. At the end of 9 months, and aligned with a planned maintenance shut-down, the differential pressure across the filters was well below the designed change-out point of 3.5 psi.

Once removed from service, a second set of 12 filters was installed. Meanwhile, Filter Products Company worked with the Dodge City facility to have the first set of filter elements cleaned, tested, and made ready for re-installation. The first set of filters were outside of the Dodge City facility being cleaned for less than 5 weeks – far shorter than the shortest maintenance interval. The filters are tested after cleaning to ensure they perform at the rated efficiency. Cleaning of the metallic filter elements is a service provided by Filter Products Company.

Customer Result

The new filters that are certified for performance with every change-out have yielded significant cost savings for the fertilizer production facility:

1. **Catalyst Protection** - Though the filter sets are not cheap, the client realizes significant cost savings relative to the cost of cleaning or replacing a polluted platinum catalyst.
2. **Cost savings of reusable filters** - The cleanability and long service life of the metal mesh filters offset the initial purchase.
3. **Reduced energy cost** - The low differential pressure of this filter array lowers energy costs by reducing the shaft horsepower required by the compressor to move the process air.

Services Used

Consulting and Design Services