PVS Chemicals upgrades its Belgium acid operation

PVS Chemicals Belgium recently marked its one-year anniversary producing sulfuric acid using upgraded SO₂ conversion and heat recovery systems. In February of 2021, the company's sulfuric acid operation started up with a new four-pass converter and steam generation equipment. Since that time, PVS Belgium has increased uptime while creating green energy.

About PVS

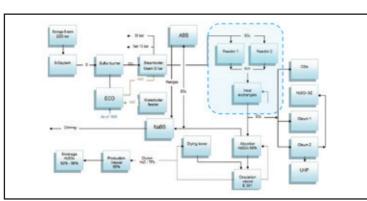
PVS Chemicals Belgium NV is located on the canal in Port of Ghent, Belgium. The company specializes in manufacturing and distribution of sulfurbased specialty chemicals, with a focus on high-purity products. Products include chlorosulfonic acid, oleum, and other high purity sulfuric acids such as ultra pure. chemically pure, and technically pure grades; along with ammonium bisulfite, sodium bisulfite, and sodium bisulfate. The variety of offerings serve diverse industries from batteries and electronics to food, fertilizers, and water treatment.

Within both the industrial grade and high purity acids, PVS Belgium produces many customized variations. Food-grade sulfuric acid is customizable from between 1 and 98 percent solution. The same is true for high-purity acids, such as chemically pure sulfuric acid used in pharmaceuticals; electronic grade sulfuric acid used in the manufacture of printed circuit





Fourth beds of aging twin converters. Converter 2 (bottom) shows bed three falling through.



Process flow prior to replacing old converters and heat exchangers.

boards; and ultra-high pure sulfuric acid used in the production of microchips, semiconductors, and pharmaceutical and photovoltaic applications.

The company's size, about 40 employees, with multiple integrated specialty units and a state-of-the-art onsite laboratory, enables flexibility in fulfilling custom orders. This flexibility sets PVS Belgium apart from other suppliers and has made the company successful in the European sulfuric acid market and beyond.

PVS Chemicals Belgium is owned by PVS Chemicals, Inc., which was founded in 1945 under the name Pressure Vessel Service (PVS). Headquartered in Detroit, the parent company is a global manufacturer, distributor, and marketer of chemicals and transportation services with operations in Asia, Europe, and North America.

Aging equipment & downtime

Prior to the upgrade, the plant was equipped with two parallel converter trains with air coolers between passes. The converters were at the end of usable life and the plant was experi-



New MECS[®] four-pass converter replaced aging twin converters.

encing multiple shutdowns, both planned and unplanned, resulting in production losses and costly repairs.

Several repairs had to be made to the converters, heat exchangers, and ducting. Additionally, the equipment was housed inside a building, which made access for maintenance and repairs extremely difficult.

The solution

In a preliminary study that began in April 2018, MECS[®] technology experts worked with PVS plant managers on a design that replaced the failing twin converters and provided an efficient heat recovery process to produce steam. The design featured a single stainless steel four-pass converter, three waste heat boilers, and an economizer.

"Though the upgrade would increase capacity from 220 TPD to 300 TPD, main drivers for the project were to improve operational reliability and generate green energy," said Omar Sinaph, Managing Director of PVS Chemicals Belgium.

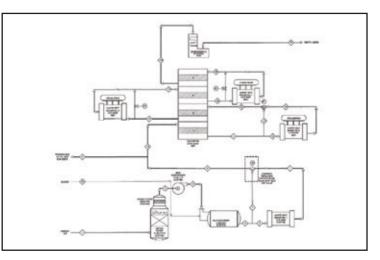
The new converter was designed to be used with MECS[®] GEAR[®] catalyst. Because of its shape and size, less GEAR[®] catalyst is required than MECS[®] XLP[®] catalyst to achieve the same conversion. This in turn translates to a smaller converter and thus reduced capital cost.

Two types of catalyst were loaded. GEAR[®] 310, the smaller of the two and more active, was installed in beds 2, 3, and 4. The slightly larger GEAR[®] 330 was used in bed 1 for better dust management.

The new economizer and the four new waste heat boilers allow for heat recovery of up to 5



New economizer (left) and waste heat boilers (center) saves roughly the same amount of $\rm CO_2$ annually as planting 195K trees per year.



Schematic of new converter and heat recovery process at PVS Chemicals Belgium.

MM Kcal/hr. This saves approximately 11,700 TPA CO_2 and is roughly equivalent to planting 195,000 trees per year.

Installation & startup

"The Covid pandemic created some delays at the fabrication workshop for the steaming equipment," Yves Herssens, MECS[®] Technology representative, said, "but accurate monitoring of their progress was put in place to limit the impact for our customer."

The old converters remained in service during construction. The indoor location that for so long frustrated maintenance efforts became an advantage during the transition. "The new equipment is located outside the building but close enough so that it could be connected to the rest of the plant. This allowed us to install and load the new converter while the old equipment was still operating," said Sinaph.

Cold shutdown for final tiein and startup was completed in three weeks despite snow and freezing temperatures. Commissioning and startup were completed on time in February 2021. Since that time, the plant has performed stably, producing high quality acid per design, and delivering a regular supply of high pressure steam for internal use and for its industrial neighbor.

"Uptime has significantly improved," said Herssens, "which allows PVS to serve more clients reliably and in predictable timeframes. Saturated steam output has almost doubled."

"The intensive support from the MECS® technology experts for the commissioning and start-up was of great help," said Sinaph. "Reliability of the plant has significantly improved. And steam production is highly beneficial, especially since the cost of energy has dramatically increased."

For more information, please visit www.pvschhemicals.com or www.elessentct.com.