

Everest Sciences Case Study

Suction Air Chilling — TradeMark Nitrogen

Increasing Nitric Acid Production

Increased and consistent production of Nitric Acid enables the increased production of higher value fertilizer products. The TradeMark Nitric Acid plant was de-bottle necked by chilling the inlet to the plant's suction air compressor. Everest Sciences patented hybrid indirect evaporative chilling system was installed due to its low operating costs and modular design minimizing the site installation time and cost.



Figure 1 — ECOChill® Solution at Trademark Site

Investing in de-bottlenecking existing high value assets, such as Nitric Acid and Ammonia plants, allows asset owners to dramatically improve their profitability dramatically and quickly. The TradeMark equipment was delivered in twenty (20) weeks and benefited from incremental production in twenty-six (26) weeks.

For all locations in the Americas, suction air chilling will add incremental production. This incremental **full year** production ranges from four percent (4%) in the mid-west to almost ten percent (10%) in the south, the site equipment can impact this range. A key value added is the consistent

production throughout the year, as shown in Figure 2. For the TradeMark facility, the annual full year production increase is expected to be over seven percent (7%). Since the installation earlier this year, the production improve is tracking as expected.

TradeMark Nitrogen Daily Nitric Acid Production (tons)

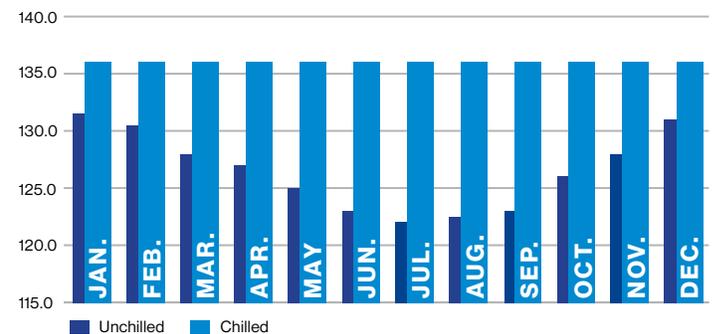


Figure 2 — Monthly Production

Chemical Manufacturing companies that produce Ammonia and Nitric Acid are benefiting from low natural gas costs and a continued demand for fertilizer that exceeds North America production capacity. These factors position the industry well against imports which have higher raw material in addition to the cost of transportation. The de-bottlenecking of existing facilities is a very effective method to fill this need for additional product in the short term, with low technical and commercial risk. The costs and benefits of suction air chilling vary for each plant, but Everest Sciences sees that paybacks range from less than one to just about three years, for equipment with a twenty-year life expectancy.

Trademark Monthly Dry Bulb Data

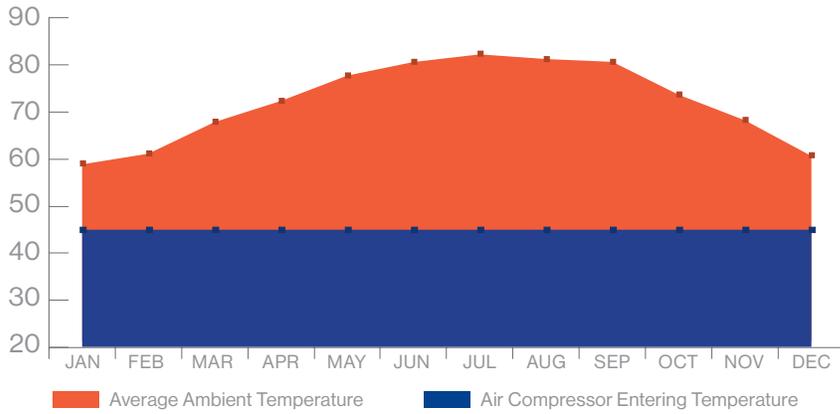


Figure 3 — Trademark Monthly Dry Bulb Data

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For TradeMark's production enhancement project, the modular ECOChill solution was factory-packaged and tested, then delivered to site in Tampa for installation in January of 2016 and started up in March 2016. This particular ECOChill solution is the first to utilize Everest Sciences design improvements, which allow the same customer-committed air flow in a 40% smaller footprint. A key benefit of ECOChill is the automated and reliable operations of the chilling solution, providing a consistent inlet temperature and thus system production increase even as the ambient temperature varies.

TradeMark Nitrogen Corp. of Tampa, FL is a wholesale manufacturer, seller and distributor of bulk commodities for industrial and agricultural customers

throughout the U.S.A. The company has a strong commitment to safety and reliability, and in addition has sought to improve performance of the plant when it has had the opportunity. TradeMark approached Everest Sciences of Tulsa, OK in 2015 about ways it could de-bottleneck its Ammonia production using suction air chilling, and after a detailed design review selected Everest Sciences' ECOChill™ hybrid system for production enhancement.

For an Ammonia producer like TradeMark, the important metric of success for a project like this is demonstrable increases in production. The ECOChill system was installed in late Winter, so full Summer operation has not been assessed. But even with warm weather, Ammonia production is

tracking an increase of XX%, versus unchilled production. As warmer Spring and Summer months bring higher temperatures, these increases are expected to be even higher.

Everest Sciences specializes in modular, high efficiency cooling systems for the Chemical Manufacturing and Midstream Gas markets. Our patented Everest Cycle™ uses a highly efficient hybrid indirect evaporative and chilling technology to cool process air to large air compressor and gas turbine inlets. This cycle can operate with minimal or no usage of water. Our modular systems are designed to operate reliably in hazardous areas; install quickly and integrate with our customer's control systems. For more information, please visit www.everestsciences.com.

