New SteamMax™ Nozzles and Injectors Help Petrochemical Producer Increase Efficiency – Result in 15-Day Payback Period

Problem:

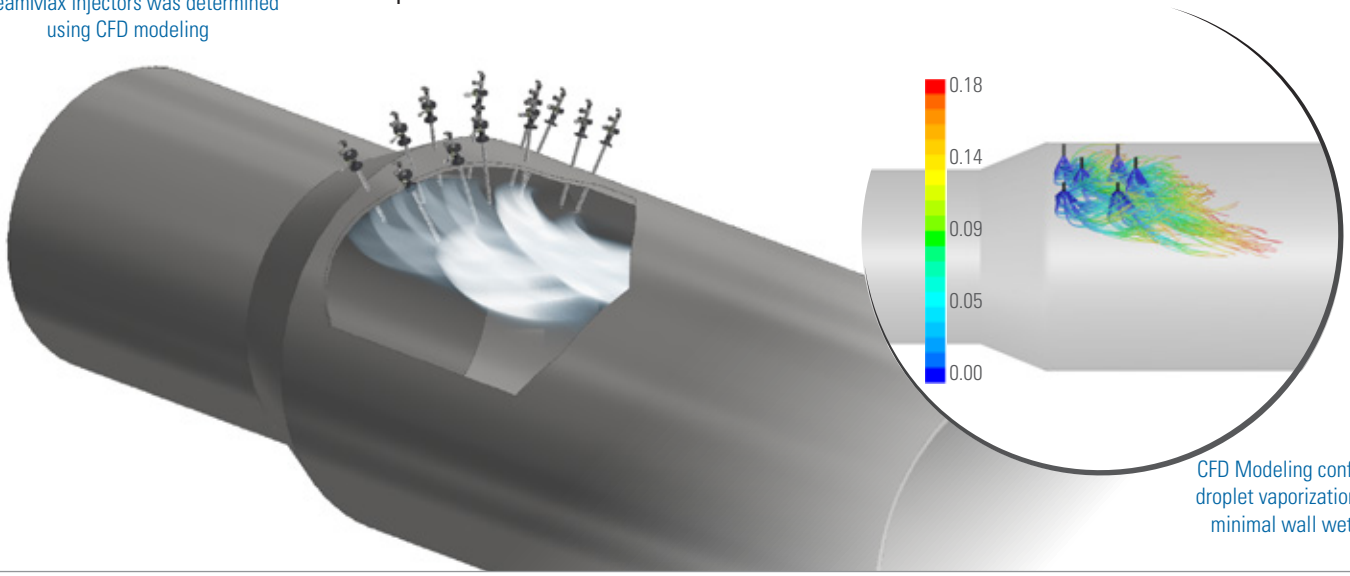
Saudi International Petrochemical Co. (SIPCHEM), a Middle Eastern petrochemical producer, wanted to increase production but one of the limitations was the capacity of the spray injectors installed in its thermal oxidizer. Waste acid, a normal by-product of SIPCHEM's manufacturing processes, is burned off by spraying it into the thermal oxidizer's combustion chamber.

The previously used spray injectors could not support the desired production increase. The nozzles were not designed for use with steam as the atomizing medium and atomization was poor. This affected the combustion reaction and led to higher emissions at times. In addition, to protect the nozzles from the high operating temperatures (over 900°C/1650°F) in the thermal oxidizer, the injectors barely protruded into the combustion chamber inside of the refractory-lined oxidizer shell. As a result of this positioning, waste acid was being sprayed on the surface between the refractory and the shell, creating large holes in the thermal oxidizer shell and causing the refractory material to fall inside the oxidizer.

Solution:

Twelve steam-jacketed injectors with SteamMax™ SM 10B nozzles were installed as part of a complete overhaul of the thermal oxidizer. The SteamMax nozzles, designed specifically for use with steam, are made of 310 stainless steel to withstand the high temperatures in the thermal oxidizer, providing flexibility for optimal placement. Using computational fluid dynamics (CFD) modeling, Spraying Systems Co. determined the optimum number, placement and orientation of the injectors. The new arrangement consists of six staggered pairs of injectors that project 13.4 inches (340 mm) into the combustion chamber and provide full droplet vaporization with minimal wall contact.

The optimal location for the SteamMax injectors was determined using CFD modeling



CFD Modeling confirmed droplet vaporization with minimal wall wetting

New SteamMax™ Nozzles and Injectors Help Petrochemical Producer Increase Efficiency – Result in 15-Day Payback Period – Continued

Results:

SIPCHEM has been able to waste 35% more acid with no performance problems and downtime has been reduced by 6%. In addition, steam consumption used for atomization has been reduced by 20%. The improved production efficiency resulted in a 15-day payback period.

A CLOSER LOOK AT THE SYSTEM

SteamMax™ nozzles use steam rather than compressed air to atomize fluids and slurries and produce the very small drops needed for cooling and quick evaporation. They feature a simple three-piece design – nozzle body, nozzle inserts, and gaskets – for quick and easy assembly and maintenance

Spray injectors optimize system performance. We can help ensure precision in your critical injector spraying applications by assisting with nozzle selection and placement, injector placement in the gas stream and design requirements including connection types, materials and maintenance features. We also often recommend validating performance using Computational Fluid Dynamics (CFD) modeling and proprietary drop distribution studies to eliminate unforeseen problems

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Experts in Spray Technology

North Avenue and Schmale Road, P.O. Box 7900, Wheaton, IL 60187-7901 USA

Tel: 1.800.95.SPRAY Intl. Tel: 1.630.665.5000
Fax: 1.888.95.SPRAY Intl. Fax: 1.630.260.0842
www.spray.com

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