Chinese Company Saves Energy While Improving Air Quality

To comply with stringent air-pollution control regulations in China, a coatings producer needed to find a maximum achievable control technology (MACT). **Controlled Environment Equipment**, was selected to provide a twin-bed regenerative thermal oxidizer with energy recovery system, designed to achieve compliance while generating auxiliary heat for in-plant process heating.

CEE selected the twin-bed regenerative oxidizer "for energy-efficient operation between zero and 26% lower explosive-limit (LEL) solvent concentrations", said David Swinehart, VP of engineering at **CEE**. In addition, "the system provides 99% volatile organic compound (VOC) and hydrocarbon control for the entire range of coatings formulations, as well as loadings and flow rates from 1,000 to 12,000 standard cubic feet per minute."

A variety of solvent vapors, including xylene, methyl ethyl ketone, heptane, phenolics, aromatics, toluene and alcohols, are oxidized in the combustion chamber of the oxidizer system at 1,600°F to 2,000°F with a one-second retention time.

The flow of VOCs is automatically cycled through a twin bed of ceramic heat-transfer media, where it is preheated before reaching the combustion chamber. At that point, the British thermal units (BTUs) of solvents are released to preheat the second bed and the now-purified exhaust exits the stack as harmless water vapor and carbon dioxide. The purified and preheated exhaust is then diverted into multiple air-to-air heat exchangers where the waste heat recovered is then directed to the process treaters.

"The higher the solvent loading, the more waste heat recovered", says Swinehart. "At VOC inlet loadings of approximately 245 pounds per hour, three million BTUs/hour are generated from the waste heat recovery and purified exhaust without any auxiliary energy input. At approximately 600 pounds per hour of inlet solvent loading, the secondary waste heat recovery system generates in excess of 5.8 million BTUs/hour of recovered heat."

The air-pollution control and energy-recovery system only requires auxiliary fuel input at initial, cold startup for the burner. Since the twin heat exchanger beds are composed of durable, high temperature, inert ceramic media it provides 95% primary heat recovery and fuel-free operation at 3%LEL, as well as greater LEL inlet solvent loading. The system provides low operating costs combined with extremely high VOC/hydrocarbon destruction to meet both current and future environmental air-pollution control regulations.

David Swinehart
VP of Engr
Controlled Environment Equipment Corp.
262-968-6565
Dswinehart@cee-corp.com