CASE STUDY

Lower than Expected Energy Costs and VOC Compliance for Wood Cabinet Finishing

CECO ENVIRONMENTAL

CASE STUDY: Wood Cabinet Manufacturer

LOCATION: Washington

SOLUTION DATE: In service since 2005

THE CHALLENGE: With a new 534,000-ft.^{2} wood cabinet finishing and spray booth coating facility set to begin operation, a major Washington state wood cabinet manufacturer needed a volatile organic compound (VOC) abatement system that would enable compliance with U.S. Environmental Protection Agency maximum achievable control technology (MACT) regulations.

THE SOLUTION: After evaluating various regenerative thermal oxidizer (RTO), concentrator, and carbon technologies for air compliance, the facility chose CECO Environmental's dual-chamber RTO system because of its ability to abate VOCs at high levels without the costly downtime or maintenance required by many rotary concentrator systems.

Pre-filtration was designed for each spray booth, and each of the two RTO modules have a "bakeout" feature that removes any organics or paint residue that can condense on the cold face of the heat transfer media over time. Organic and particulate buildup is monitored by routine checking of pressure drops across the RTO beds through the integral, custom-designed telemetry data logging system.

The solution has reduced utility costs for the manufacturer by over $300,000 annually.

THE RESULTS: The low-pressure-drop dual-chamber RTO design has saved more than 120 fan motor horsepower, equating to more than $72,000 in annual electric cost savings, compared to other high-pressure-drop RTO designs initially considered. Flameless natural gas injection (NGI) operation, which does not require the combustion air blower or open flame to operate, has also saved more than $235,000 per year in natural gas costs. The flameless operation also provided nitrogen-oxide-free operation for regulatory compliance.

Additionally, cooperation with the cabinet manufacturer and its spray booth supplier to optimize VOC capture, ductwork, and PLC control system design led to the implementation of a proprietary spray booth flow rate reduction design that further minimized the system's energy costs. By cascading the manned spray booth exhaust with ultra-low VOC loadings into the unmanned spray booths in accordance with National Fire Protection Association (NFPA) standards, the maximum flow rate was reduced from 185,000 scfm to 120,000 scfm. This allowed the manufacturer to reduce natural gas input by $8,800 per month to destroy VOCs.

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