Reduce VOCs, Aid the Environment

Many industrial processes use solvent based paint, ink, and coatings in their manufacturing process. When these solvents dry, volatile organic compounds (VOCs) are emitted which are damaging to the environment and can be harmful to health. Legislation, such as the Solvent Emission Directive in the EU and Clean Air Act in the USA, means that something must be done to remove or destroy the VOC prior to exhausting any process air to atmosphere.

A common system for the destruction of VOCs is oxidation, where the solvent is heated in the presence of oxygen until it breaks down. The wrong selection of pollution abatement technology can result in the over-use of energy to destroy the VOC — burning fossil fuels to heat the process air and emissions creates even more greenhouse gasses, not to mention that natural gas is not free. With carbon footprints and energy efficiency being high on the current agenda, it is important that any air pollution control device address these issues.

This was the situation faced by Sunderland, UK-based Interflex. The company supplies flexible packaging to the bakery and snack food sectors, operating a number of flexographic printing lines. Part of the process involves removing solvent from the ink applied to the packaging.

Interflex was no stranger to efficient pollution abatement systems — their catalytic oxidizer system was one of the best available technologies when it was installed in the ’90s. The system used a catalyst to reduce gas consumption by allowing the

oxidation reaction to occur at a lower temperature, and an integrated metal heat exchanger recovers a proportion of the energy which is used to preheat incoming contaminants. Unfortunately, the catalyst had degraded on the aging catalytic system, and it was costing a lot of money to operate. Gas and maintenance costs were only part of the problem — the system was also struggling to achieve the required destruction efficiency.

Seeking a solution, Interflex approached Spooner Anguil. Formed through a partnership between Spooner Industries (UK) and U.S.-based Anguil Environmental systems, Spooner Anguil has the combined expertise and knowledge to provide a tailored solution that addressed all the required process and emissions issues.

Spooner Anguil replaced the catalytic oxidizer with a high-efficiency regenerative thermal oxidizer (RTO), which uses the proper mix of temperature, residence time, turbulence, and oxygen to convert pollutants into carbon dioxide and water vapor while reusing the thermal energy generated to reduce operating costs.

The VOC- and HAP-laden process gas is pushed into the inlet manifold of the oxidizer via a system fan. Flow control or poppet valves then direct this gas into energy recovery beds where it is preheated. The process gas and contaminants are progressively heated in the ceramic media beds as they move toward the combustion chamber.

Once oxidized in the combustion chamber, the hot purified air releases thermal energy as it passes through the media bed in the outlet flow direction. The outlet bed is heated and the gas is cooled so that the outlet gas temperature is only slightly higher than the process inlet temperature. Poppet valves alternate the airflow direction into the media beds to maximize energy recovery within the oxidizer. The high-energy recovery within these oxidizers reduces the auxiliary fuel requirement and saves operating cost.

The new Interflex oxidizer has the following features:

- A two-chamber design that processes up to 30,000 Nm^3/hr of air, achieving >99 percent destruction efficiency without visible emissions.
- A self-sustaining operation at low solvent-loading conditions, meaning that once the oxidizer is at operating temperature and receiving process airflow it requires no additional fuel for emission destruction, releasing very little CO2 and NOX.
- A 95 percent heat recovery that ensures an energy-efficient operation, reducing gas consumption and carbon footprint.
- An intelligent bake out feature cleans the RTO of condensable organics without internal fires or safety concerns.
- A control panel with a large operator screen, built-in maintenance manual, and troubleshooting guide.

Despite the higher operating temperature compared to the previous catalytic unit, this new RTO system has reduced the gas bill at Interflex by over £100k per annum. In addition to this financial saving, this equates to a reduction in greenhouse gas emissions of approximately 13 tons a week.

For more information, please visit www.spooner.co.uk *[1].*

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