Waste Heat as a Benefit of VOC Destruction with a Thermal Oxidiser

Technology for a Sustainable Future

Application

Although many look at the energy used to destruct VOCs as an unnecessary waste, Dickinson Legg (now Garbuio Dickinson), the world leader in the design and manufacture of Primary Tobacco Processing Plants saw it as an opportune way to supplement the heat required in their client's tobacco refining process – in very different ways.

Garbuio Dickinson chose an ERG owned company as their supplier as they needed to be confident that the process achieved 100 % thermal oxidation of any toxic components, that they were maximising the energy efficiency of the process and that they were maintaining maximum operation flexibility for their client's process.

ERG's Beverley Environmental range of high temperature thermal oxidisers integrated with waste heat recovery technology gave them all three.

System Descriptions

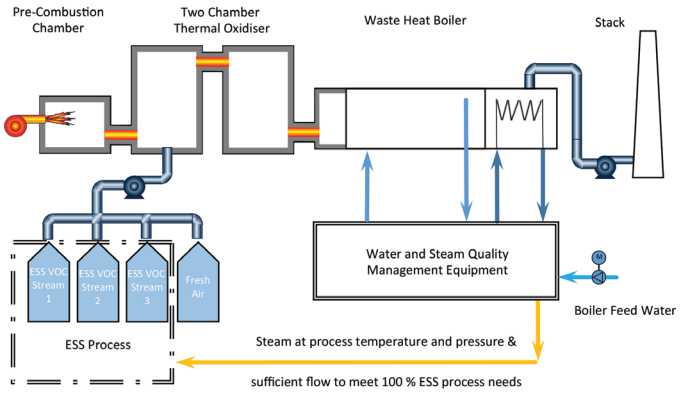
The ESS expander is the heart of the Dickinson process. The ESS process removes a significant quantity of volatiles from the product and this is discharged in the exhaust from the expander – with significant oscillation in volumetric flow rates.

Greece and China

At Thessalonica in Greece and Xuzhou in China, Garbuio Dickinson wanted a thermal oxidiser and waste heat boiler to provide an energy-efficient solution, effectively treating the exhaust and generating the entire process stream - steam requirement using waste heat from the thermal oxidiser.

In Thessalonica, while there was ample height available for the project equipment, floor space was at a premium, ERG Beverley were able to design and supply their thermal oxidiser – in two vertical sections. In addition there was a risk that the inert nature of the stream would quench the gas flame to extinction – so a gas fired horizontal pre-combustion chamber was supplied.

The waste heat from the oxidisation chamber passed through a waste heat recovery unit – incorporating a super heater bank and shell and tube design boiler (the project supply included the water conditioning plant).



The system was specifically designed to allow periods of standby operation between shifts (6/24 h) without the need for cold starts and was able to tolerate intermittent emissions of particulate matter without causing long term damage to the plant.

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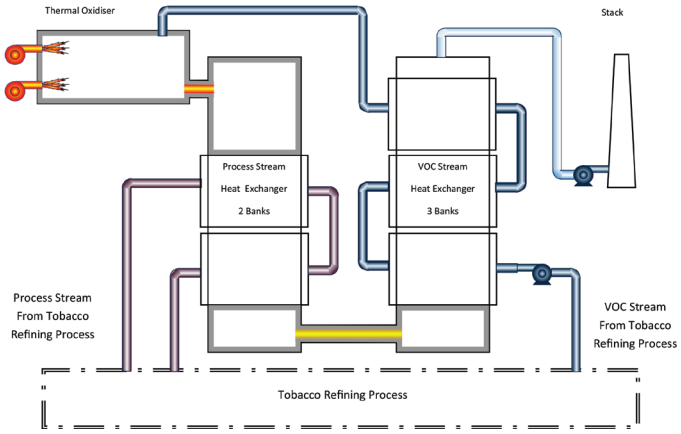
In Xuzhou, a similar design was supplied but with higher throughput and the oxidiser was supplied as one chamber.

Zevenaar Holland

At Zevenaar in Holland, Garbuio Dickinson wanted a thermal oxidiser that could provide their client with heat to an additional process stream and preheat the exhaust stream before entry to the thermal oxidiser.

Their process exhaust varied in flow rate by 3:1 while the heat required by the additional process remained constant. A flexible and reactive thermal oxidiser design was required that could cope with continuously changing temperature gradients.



ERG Beverley were able to design and supply a thermal oxidiser – a vertical chamber – with a horizontal combustion chamber firing natural gas. The heat exchangers that were sourced from Beverley's partner company in the Czech Republic were of the tube bank design and incorporated significant thermal cycling design allowance.

Benefits

The equipment described above met the following performance criteria.

	Greece	Holland	China	Units
Flow	3000	2600 - 7800	4000	kg / hr
Burner Output	3540	2 x 4000	3900	kW
Sec Flow	-	18800	-	kg / hr
CO	100	100	100	mg / Nm^3
VOC (as HC)	20	20	20	mg / Nm^3
NO_x	200	200	200	mg / Nm^3

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