

CALAMBIO – HAZARDOUS WASTE INCINERATION

1 GENERAL

Calambio has designed and built a couple of incinerators based on hazardous waste from specialty chemicals and petrochemical industries.

Typical installations are

- 3 MW_{th} (Hazardous liquids)
- 15 MW_{th} (Up to 4,4 t/h hazardous liquids)
- 4 x 30 MW_{th} (Gases and liquids combined)

The first unit produces superheated steam for turbine operation while the two last produces saturated steam for industrial use.

Incinerators confirms to the European directives for waste combustion.

2 WASTE HANDLING

For the 15 MW plant a complete handling system was included in the project. The waste was sourced from several different plants in Europe and transported to site. The waste was stored in four local tanks as well as in existing permanent tanks.



Figure – Receiving station for hazardous waste.



Figure – Storage tanks for hazardous waste. Several different types can be mixed simultaneously.

3 BURNER

All waste is burned in one common waste burner.

In order to control combustion temperature it was in this case chosen to utilize a refractory lined incinerator. The temperature can be controlled within $\pm 20^{\circ}\text{C}$. For other types of wastes the furnace may be integrated in the heat recovery boiler.

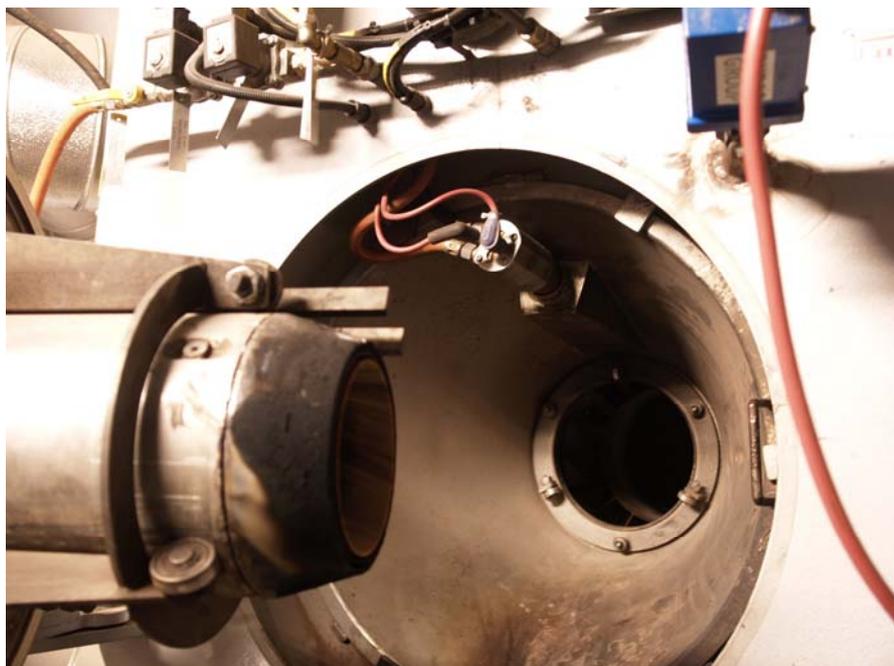


Figure – Burner installation.

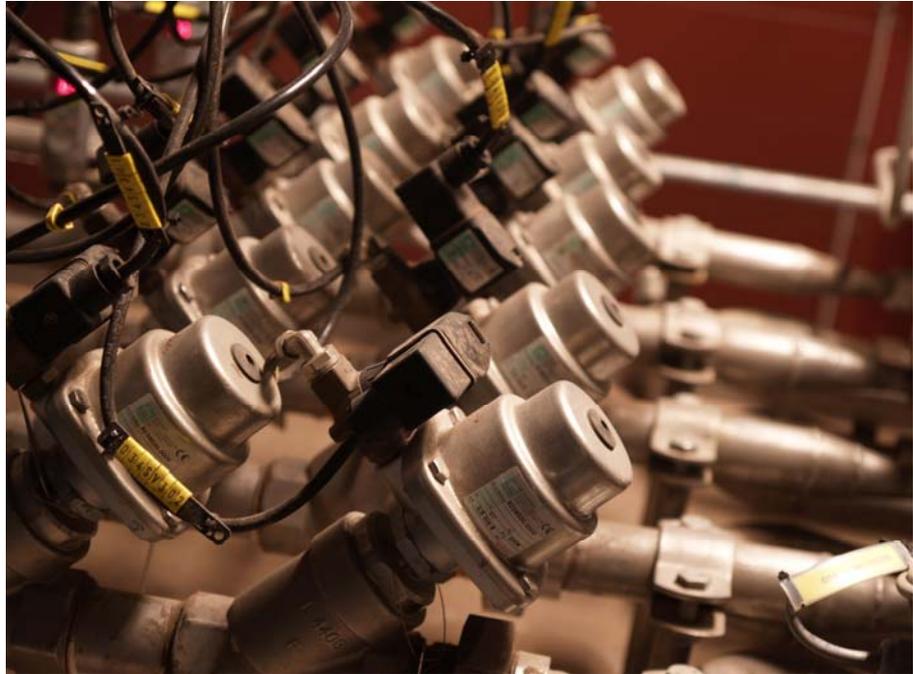


Figure – Valve ramp for mixing of up to 5 different hazardous wastes simultaneously.

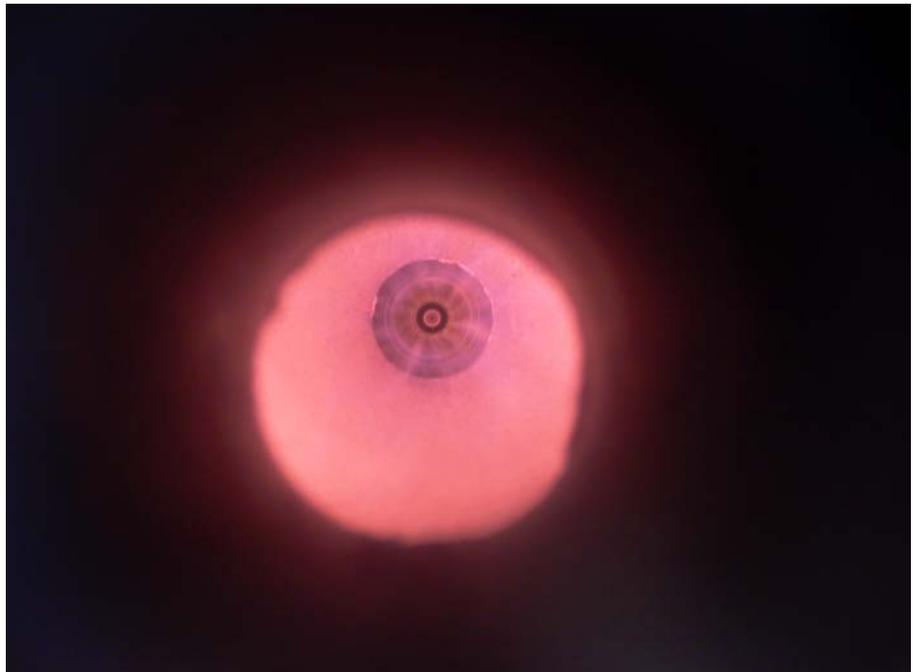


Figure – Incinerator burner in operation.



Figure – refractory lining of adiabatic incinerator.

4 HEAT RECOVERY BOILER

We prefer water tube boiler designs. The design will vary a lot depending on application.



Figure – Erection of 30 MW_{th} boiler for saturated steam. In this case it is an outdoor installation (Stenungsund)

5 FLUE GAS CLEANING

For flue gas cleaning of hazardous wastes with a limited amount of solids we recommend a scrubber system combined with a wet electrostatic precipitator.

In this kind of system removal of most pollutants is very effective. In the 15 MW plant it is also possible to burn 40 MW_{th} of heavy fuel oil as a backup. The SO₂ emissions are possible to keep below 5 ppm.

For large amounts of ashes an upstream bag filter must be evaluated.

Condensate from the scrubber system may be used for recovery of low temperature heat but this is not necessary.

The condensate is usually cleaned in a 6 stage process.



Figure – Exterior of combine scrubber and wet electrostatic precipitator. This unit is built in GRP/ epoxy and is 65 meters high but can be built lower (Perstorp)



Figure – Interior from wet electrostatic precipitator.

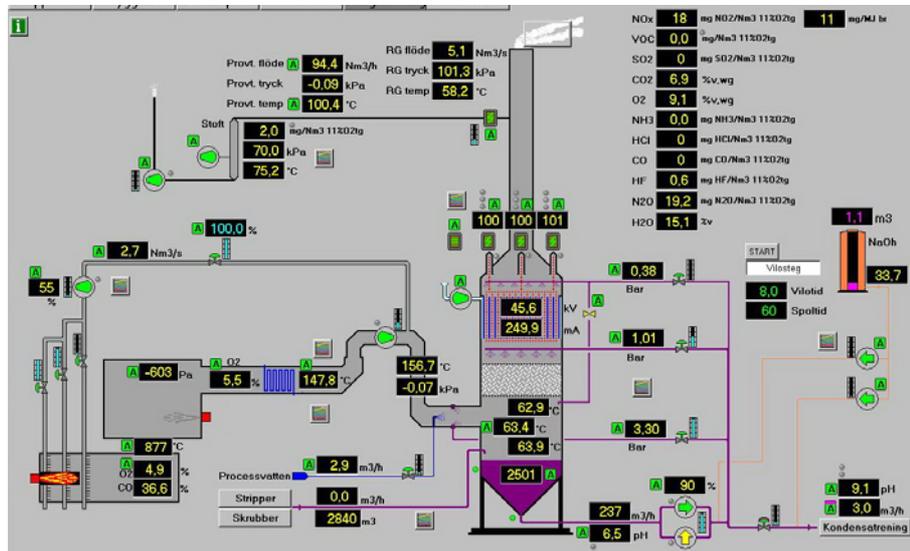


Figure –Flue gas cleaning based on a combined scrubber and wet electrostatic precipitator for 15 MW_{th} incinerator for specialty chemicals hazardous waste. This unit can cooperate with a 40 MW_{th} heavy fuel oil firing system. Please note extremely low emissions.



Figure – Pats of condensate cleaning system.

6 TURBINE OPERATION

A hazardous waste incinerator heat recovery boiler may be designed for saturated steam or superheated steam for turbine operation. The possible live steam data depends on the waste composition.

For a 15 MW_{th} plant a typical electrical output would be in the region of 3MW_{el} depending on turbine type and detail design. The turbine may be back pressure or condensing depending on client needs.

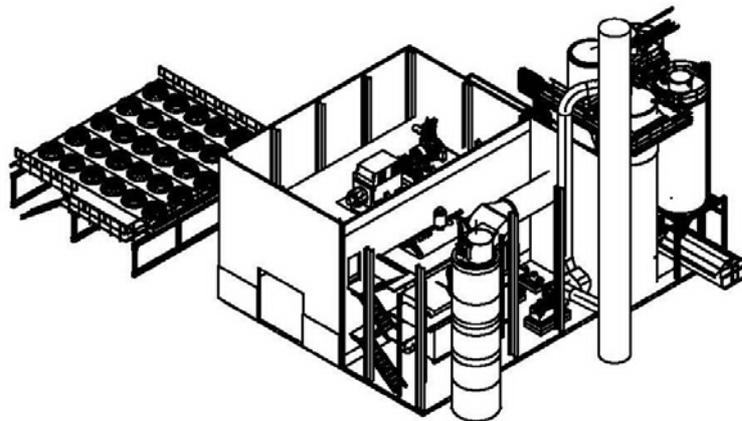


Figure- Concept for small incinerator for residues from synthetic oil manufacturing with turbine installation.



Figure – Typical small turbogenerator installation (Nybro)

7 CONTACTS

For further information please contact:

Calambio Engineering AB

Pär Stenberg

Södra Strömgatan 9

S-441 30 Alingsås

Sweden

Phone +46 322 63 92 93

Cell +46 70 56 17 248

E-mail stenberg@calambio.se

www.calambio.se