

Thermal Treatment of Spent Bleaching Earth, Filter Aids, Destillates, Gums and Soapstock: The HelioSolids[®] fluidised bed reactor and the Cinclus[®] thermal oxidizer

Marcel Goemans, BioSolidAir NV

Herent (Leuven), Belgium

Waste management issues concerning the treatment or disposal of residues from refineries become more problematic in many places in the world. Existing routes - such as adding bleaching earth to the meal - become increasingly more difficult to maintain while disposal costs are increasing.

An economic alternative to the existing treatment or disposal options is on-site thermal treatment of those residues:

- Spent bleaching earth can be subjected to thermal treatment in a HelioSolids fluidized bed reactor to remove the oil from the earth.
- Gums and soap stock can be used as an alternative fuel in a Cinclus multifluids boiler to cover the plant's steam requirements
- Filter aids, spent activated carbon, rejects and other minor waste streams can be co-treated with either bleaching clay or gums/soap stock in both a HelioSolids fluidized bed reactor or a Cinclus multifluids boiler.

In a HelioSolids fluidized bed reactor, the residues are injected in a hot mass of sand at 650°C. The sand mass is fluidized by ambient air. Fatty matter and other organic compounds are gasified in the sand bed and are completely oxidized at 850°C in the oxidation chamber above the fluidized sand. The energy is recovered in a heat recovery boiler to produce steam at the required pressure and temperature. Alternatively, the heat can be used to evaporate brines from the process water – waste water cycle.

In a Cinclus multifluids boiler, the pumpable residues or by-products are injected at high velocity in an oxidation chamber. The jet is dispersed by pressurized air (700 mbar). Ambient air or VOC contaminated air is injected as combustion air. The Cinclus process creates an internal recirculation of combustion gases in the oxidation chamber, resulting in an extremely efficient combustion process with very low CO and NOx values. The hot gases are cooled in a proprietary boiler, designed to accept high phosphore loadings.

A soap stock – w/wo gums – fired Cinclus multifluids boiler can often satisfy the steam requirements of the refinery, thus eliminating the cost for fossil fuel. The investment in a soap stock splitting – and associated operating costs such as acid consumption, wastewater treatment and disposal of the interphase – can also be eliminated. When additional residues or by-products are co-fired with soap stock, waste management costs are reduced to an absolute minimum.