



## Converting Waste into Energy

### Energy Recovery from Paper Sludge

#### SAICA, Spain

As part of a complete new power plant installation in Zaragoza, Haarslev Industries has been selected to supply the drying facility in order to turn waste (paper sludge) into useful bio fuel. Previously the big volumes of both fibre sludge and bio sludge were used as landfill, which both is related to economical as well as environmental costs.

The Rotadisc dryer makes it possible to use trouble waste as valuable energy source.

By integrating the Haarslev Rota-Disc Dryer, TST, into the CHP plant, SAICA uses low pressure steam for drying and hereby reduces cooling water for condensing of steam after the low pressure turbine. Further,

heat is recovered from the dryer vapours for pre heating the boiler feed water. This results in a significantly overall increase of the total efficiency of the power plant of approx. 10%.

#### Advantages

Superior energy efficiency as up to 75% of the energy input can be recovered for pre heating of boiler feed water.

- High energy recovery rate
- Environmental impact is reduced to a minimum
- Risk of dust explosions is minimised
- Automatic control
- Low maintenance costs
- High availability

#### Process Description

At the Zaragoza plant (El Burgo de Ebro) recycled paper is used for the production of corrugated paper. During the purification of the recycled paper a fraction of the fibres are separated and classified as waste.

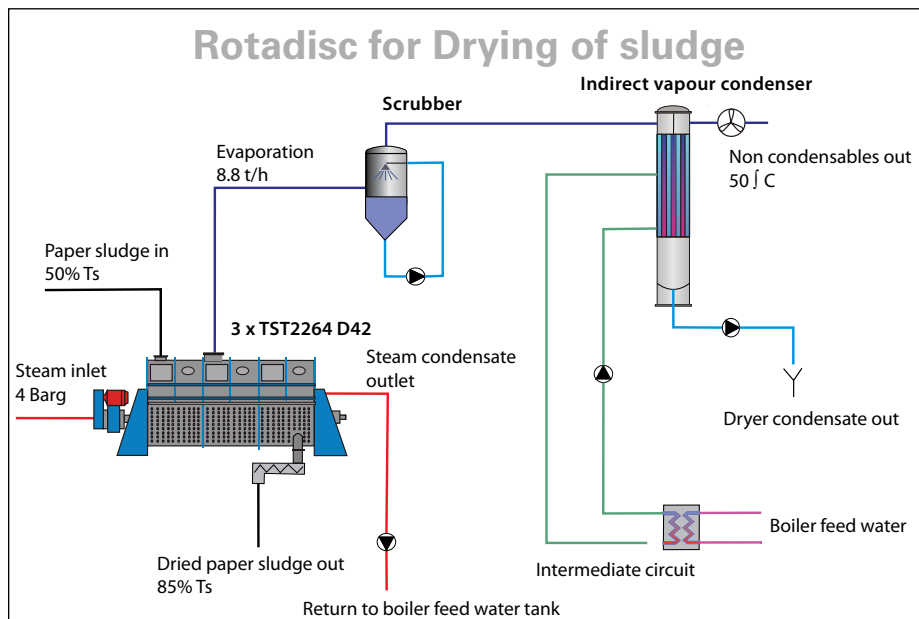
This fraction mixed with biological sludge from the waste water treatment plant is now used as fuel in the new CHP plant.



However, a part of the water in the sludge has to be removed before it is used in the furnace. This water removal is done in two steps. First by mechanical dewatering up to 50% moisture, and afterwards through thermal drying in the Haarslev disc dryer.

As heat source for the dryer, low pressure steam from the turbine is used indirectly in the dryer. The condensate is returned to the boiler feed water tank. As the heat is transferred from the steam to the product by contact no heat carrier like air is used.

The result is vapours with a very high wet bulb temperature. This has several advantages which are used for optimising the efficiency of the plant. First of all a high degree of the heat input to the dryers can be recovered, in this case for pre heating the boiler feed water.



Secondly the volume of residual gases after the condenser is very low which makes it possible to burn the vapours in the furnace and thus having no smell, no dust and no VOC emitted to the surroundings.

Last but not least the atmosphere inside the dryer has a low oxygen content, which practically eliminates the risk of fire and dust explosions.

### Technical Data For The Sludge Handling System

Input capacity	22 t/h wet sludge
Annual operation time	> 8,000 hours
Evaporation capacity	8,800 kg/h
Dry substance	
- In:	50 %
- Out:	85 %
Steam consumption	7.6 MW (12.9 t/h at 4 barg)
Heat recovery	5.5 MW
Dryer	3 x TST 2264D42
Installed motor power	200 kW each
Start-up	2011

As paper sludge contains approx. 35% ashes a heavy duty machine like the TST is required. The TST has throughout more than half a century proven to be the working horse for drying of difficult substances, providing low maintenance costs and high availability. Further the simple and automatic control offers a minimum of operator attention.

Haarslev Industries reserves the right to make changes.



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