

HUBER pre-treatment systems for optimised operation of Kronospan's wastewater treatment plant

Kronospan AG is a company of the Krono Group, Switzerland. Its products are marketed under the trade name KRONOSWISS. The family-owned business is a holding company and one of the most important market players in the field of manufacture and finishing of timber products.

Kronospan AG, like all other Krono Group companies, is run as an independent profit centre. Their production facilities located at Menznau in the beautiful natural hinterland of Lucerne were erected in 1966. The timber products manufactured there are of Swiss quality and marketed worldwide.

What are MDF fibreboards? MDF boards are medium density fibreboards that consist of glued wood fibres. It today seems impossible to do without fibreboards in the field of furniture and internal construction. The production of fibreboards comprises of three main process steps:

During chipping the wood is moulded into the desired shape. After this process, chips still display different sizes. Smaller parts end up in the top layer of the board while larger bits go into the core. The chips must not be damp for the next steps involved in the manufacturing process. For this reason, drum dryers extract moisture from the wood. This is followed by the sifting process where rough and fine chips are separated; sorting plants then remove any sand or metal particles. During the pressing process, glue is added to the chips. The materials are mixed and form a so-called "chip cake". At 250 °C and under high pressure, a press ensures the required composition. The panels are then allowed to cool in large star coolers.

In the process of MDF fibreboard production, wastewaters with high pollution loads are generated at different places. Most innovative wastewater treatment technology is applied to treat the wastewater as perfectly as possible to make it available to be reused in the MDF



ROTAMAT® Screw Press RoS 3 units and HUBER Dissolved Air Flotation Plant HDF 5 with chemical treatment stage

production process or for exhaust air cleaning. Approximately half of the total wastewater is generated in washing processes and during pressing of the chips before these are introduced into the drum dryer. The other half of the wastewater is generated in the exhaust air treatment process that consists of a wet electric filter with integrated washer and a biofilter. Normally, the exhaust air from the drum dryers is treated in this way.

Kronospan AG contacted our subsidiary Picatech Huber AG to urgently solve their problems with their wastewater treatment plant. Their previous biological treatment plant was no longer able to cope with the ever increasing requirements and production volumes. The very high solids concentration of 4,000 mg/l and the COD load of approximately 12,900 mg/l give proof of Kronospan's problems. Under these high loads their biological treatment stage was no longer able to achieve the required effluent values. In addition, the energy consumption of the aeration system for COD reduction was very high. They wanted us to drastically reduce COD and solids loads to ensure a stable plant operation and save energy for the biological treatment stage.

From December 2007 to January 2008 pilot tests were carried out to convince Kronospan AG of the efficiency of our machines. For the first test series, a HUBER HDF pilot plant was installed, but unfortunately turned out to have been overloaded with solids. The plant is designed for a throughput of 5 m³/h but could only be fed with 2 m³/h because the generated flotage sludge could no longer be removed. Due to the high load of very fine particles in the wastewater also the consumption of precipitants (PAC) was much too high with 3 litre effective substance per m³. We therefore tried to find a solution how to reduce the majority of solids even prior to flotation.

Fortunately, our RoS 3 test unit was available at that time and could immediately be installed at Kronospan for additional tests. The tests soon showed that pre-screening with the RoS 3 with the addition of flocculants is very well suitable to efficiently remove the solids from the wastewater. The RoS 3 press reduced the COD to 7,200 mg/l and solids to 1,500 mg/l. The filtrate could be treated in the Dissolved Air Flotation Plant without an increase in precipitant consumption. Impressed by the high efficiency of our machines Kronospan AG ordered at the end of May two RoS 3 units for pre-screening and a HDF 5 plant for filtrate treatment.

After installation and successful start-up in July 2008, the plant has proven its efficiency in achieving the required guarantee values. Each of the RoS 3 units is presently operated with a wastewater throughput of 10 - 15 m³/h. The inlet DR of about 0.4 % is increased to an outlet DR in excess of 30 %. The filtrate from the screw presses is collected in a 160 m³ storage tank prior to being feed to the HDF flotation plant with chemical treatment stage.

The feed is constantly 25 m³/h. The effluent from the flotation unit has a COD as low as 3,400 mg/l and is almost free of solids (below 100 mg/l). The flotation plant effluent is finally treated in the customer's biological treatment stage which now can be operated with increased stability due to the significantly reduced loads.

In June 2009, Kronospan AG decided to test another HUBER solution. The basic idea was to reuse treated wastewater as boiler feed water. Our VRM® test unit 20/36 with 108 m² membrane surface was installed to further treat the flotation effluent in order to achieve the water quality necessary to be fed into the boilers. The VRM® unit achieved a solids concentration below 1 mg/l in the permeate effluent. The inlet and outlet parameters are listed in the table below.

The effluent from the VRM® unit (permeate) is treated in a subsequent reverse osmosis plant to prevent an increase of salinity in the process water. With its semi-permeable

	Unit	COD	DS	P _{total}	N _{total}
Inlet	mg/l	6247	100	6.5	480
Outlet Permeate	mg/l	346	< 1	2	30
Reduction	%	94 %	> 99 %	69 %	94 %

membrane and through a pressure increase this physical treatment method is able to separate molecules. The generated concentrate (retentate) has to be vaporised prior to disposal. The effluent from the reverse osmosis plant can be returned to the water cycle. With this additional treatment step it would now be possible to recycle virtually 100 % of the process water flows.

Due to our extensive experience in the treatment of industrial wastewater we have been successful in implementing another reference project at Kronospan AG, Switzerland in addition to our multiple other reference installations.

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