Experience Report No. 033-00

Theme: **Bath maintenance of pre-treatment equipment**

Client: **Radson bv, Zonhoven (Belgium), radiator manufacturer**

Problem

At Radson b.v., Zonhoven (Belgium), radiators are de-greased and phosphatised in an Eisenmann conveyor spray booth station before immersion painting.

The conveyor line includes two active zones, each with a storage volume of 13,500 l, and completes a full rotation 18 times per hour. Approx. 6,000 m²/h surface are processed every day.

The product used is a combination de-greasing and ferric phosphatising substance (pH value approx. 5.0 and average temperature approx. 40° C).

The problem of the existing installation was the relatively short operating life of the processing liquid, which had to be completely replaced after about 3 weeks of two-shift operation. The reason for this short life were the tramp oils that were attracted (approx. 200 l/day) and the concentration of phosphate sludge (approx. 35 l/day).

Solution / Realization

In 1999, STA installed a combination bath maintenance system consisting of 4 S-15 centrifugal separators (2 in each active bath area) for separation of solids and a DPS-1050 tramp oil removal system at bath zone 1, each connected to the baths by the bypassmethod.

4 S-15 centrifugal separators installed at active zones 1 and 2

Result

Up to 32 – 40 kg of compact, cake dry phosphate sludge is separated from both active zones per shift and approx. 80 – 100 l tramp oil is separated from the main phase, in used oil quality.

Sludge insert from the centrifugal separator, filled with cake dry phosphate sludge

When the baths were replaced at the end of December 1999 no significant sludge deposits were found in either of the active zones. The nozzle fittings in the spray booths were free from solid deposits, with the result that maintenance expenses were minimal.

The bath replacement intervals could be extended from 3 weeks to their current length of 5 to 6 months, performed as part of the semi-annual preventive maintenance program. Some of the existing liquid is reused for priming the new baths.

This resulted in the following savings:

- Reduced personnel costs as cleaning costs are reduced considerably
- Savings over previous costs for bag filter inserts
- Reduced costs of sludge disposal due to lower weight of sludge (compact sludge with low residual moisture, see illustration)
- Reduced disposal costs resulting from bath rejection
- Low costs of chemicals and fresh water for new bath priming

The investment cost of approx. 107,000 € was recovered after 18 months.

Furthermore, the measure brought the following advantages:

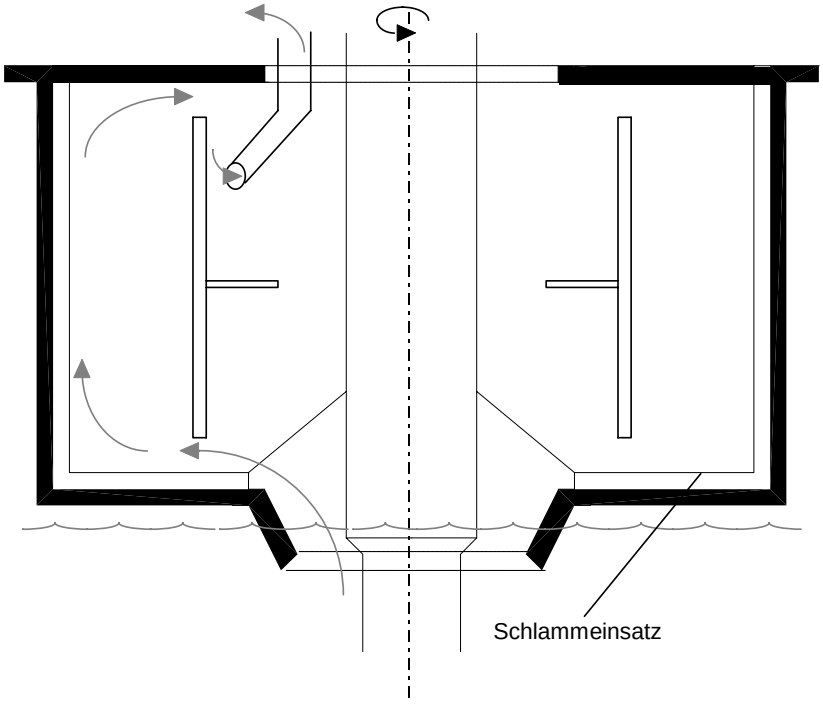
- Better working hygiene due to continuous separation of harmful substances, such as mold, bacteria, sludge flocs and other residues
- Reduced annoyance caused by bad odors through constant aeration of the liquid

STA-Separator, Model S-15
General Process and Functional Description

The model S-15 separator is self-sucking. Vertical wings situated in the aperture at the bottom of the rotor drum function like a vacuum pump, drawing the liquid from the inflow shaft of the centrifuge and accelerating it to the angular velocity of the drum.

A fixed separation nozzle projects through a concentric aperture and removes the cleaned liquid. When the machine is stopped, the processing liquid that is still in the drum drains down and out of the drum. As a result, the sludge is deposited with low residual moisture and may even be suitable for immediate dumping.

The acceleration to 1,950 g (or 2,400 g at 60 Hz) enables extremely fine filtration and high flow rates; for example, particles as small as 1 µm can be separated with a flow rate of about 5 l/min.



STA DPS De-oiling Device
General Process and Functional Description

Three-phase separators use the effects of gravity and coalescence to separate liquids of differing densities by mechanical-physical means and solids without the use of chemicals. Three-phase-separators are used more and more because of increasingly strict requirements, e.g. for separating mineral oils from waste water, emulsions and de-greasing baths. They can be run at very low operating cost, are extremely versatile and available in a range of sizes.

The medium is fed directly into the three-phase-separator by means of a positive displacement pump (e.g. eccentric screw pump or pneumatic diaphragm pump). Here the liquid mixture is passed through parallel corrugated plates with a greatly increased cross section. Gravitation and coalescence effects cause the light phase to collect on the plate surface and combine to form larger drops. These drops rise through the rising openings in the plates to the surface of the liquid. There they are discharged continuously by a skimmer in free overflow

The cleaned heavy phase flows out of the bottom of the device over baffle plates into an accumulation area and drains over a skimmer border. The cleaned liquid is returned by a positive displacement pump, installed downstream of the outlet.