LATEST EXPERIENCES WITH THE BUCHER PRESS WITH INDUSTRIAL SLUDGE DEWATERING

Krauss, W. and Huppert, M.
Bucher Unipektin AG, Switzerland
Corresponding Author Tel. 0041 44 857 2385 Email Werner.Krauss@bucherunipektin.com

Abstract

The production of leather from hides generates waste water which contains fat, proteins and chemicals. The waste water must be biochemically treated in a subsequent waste water treatment plant. The disposal of the biomass as a mixture of primary and waste activated sludge is burdened with high cost for Cr removal or incineration with on-line CrO4-scrubbing. A benefit of high dry solids dewatering is that if the solids content in the filter cake exceeds DS > 40 % the incineration could run without additional external fuel.

The evaluation of bench marking showed, that the Bucher press system achieves the best drainage / dewatering results and the minimum of filter cake for reworking and disposal. The economic analysis showed a short return on investment and the installation of the Bucher system was approved.

The new technology was implemented into the tannery's infrastructure with the usual minor adaptations which were solved in cooperation with customer's and supplier's staff at acceptable cost.

Initial position

To ensure production of the tannery, the waste water must be cleaned in an extensive process. Often these tanneries form agglomerations and cooperate with a large public waste water treatment plant. In the case of Wollsdorf Leather in Austria, the factory is located in a rural area and could not be connect with its 150'000 PE load to a municipal system with a capacity of 25,000 PE.

The in-house water treatment plant for sludge dewatering reached the 2009's operational capacity and usability.

The decision was made to replace the manually operated filter press (ChFP), operated in two shifts with correspondingly high labour costs by a modern system. The amount of filter cake disposal in 2009 was approximately 7'000 tons with 30% solids, corresponding to 2'300 t DS.

Process evaluation

The costs of solid-waste separation and sludge disposal were compared by adding operating and maintenance costs, depreciation and external cost for disposal. The external disposal costs are quantity-dependent to the filter cake and were a dominant contributor in the cost analysis.

A pre-selection of the possible different types of installation was made and compared afterwards:

- Decanters (centrifuges) on an industrial scale
- Filter Press and
- Bucher press as a demo version.

Table 1: The results of the comparison were significant:

Process	DS thin sludge	DS filter cake	Consumption AS
Chamber Filter Press	2.5 – 5 %	30 – 36 %	~ 10 kg/t DS
Decanting Centrifuge	2.5 – 5 %	28 – 34 %	8 – 9 kg/t DS
Bucher HPS 207	2.5 – 5 %	40 – 55 %	9 – 10 kg/t DS

AS = active substance of Polymer

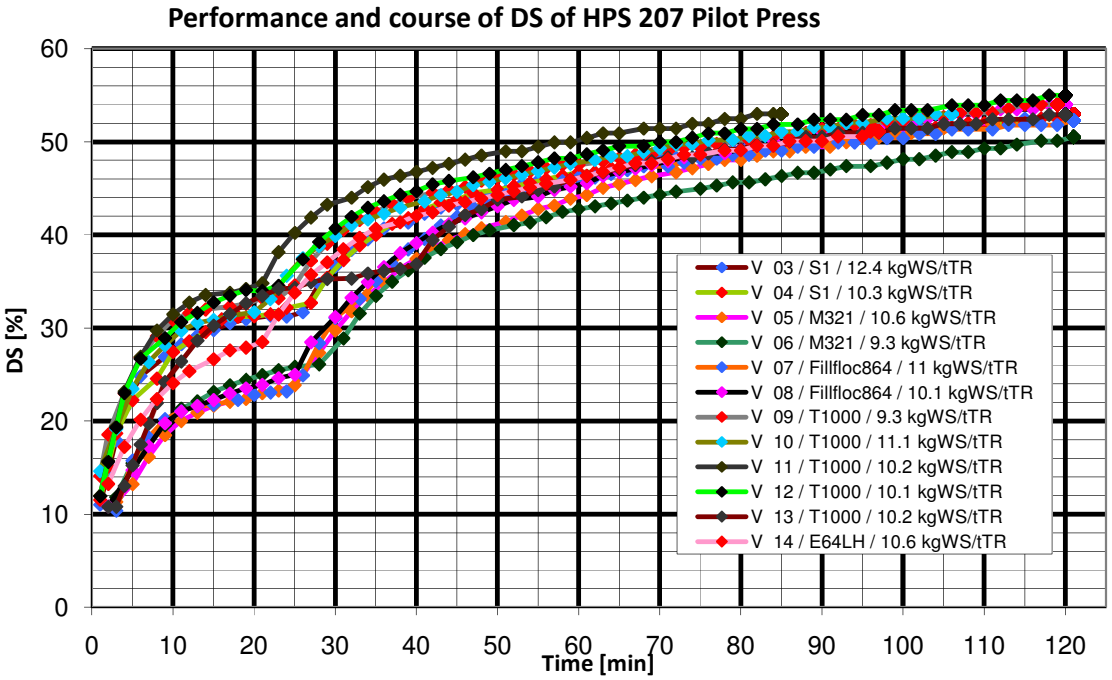

Figure 1: Performance and course of DS of HPS 207 pilot press

The graph shows that depending on flocculant's type and dosage the filling cycle ended after 25 minutes, and a filter cake with DS up to 32 % can be achieved. The best results of the ChFP and the decanter, with 34 – 36 %, could be exceeded already after 40 minutes of batch time. Finally a DS of 50-55% was achieved.

This provides flexibility for daily fluctuating production with varying amounts of throughput and requirements. Appropriate increase of polymer dosage and significantly reduced batch times, resulted in a maximum of DS with lower volume of filter cake, compensating for high production rates.

The results from the pilot plant even had been exceeded from the industrial plant.

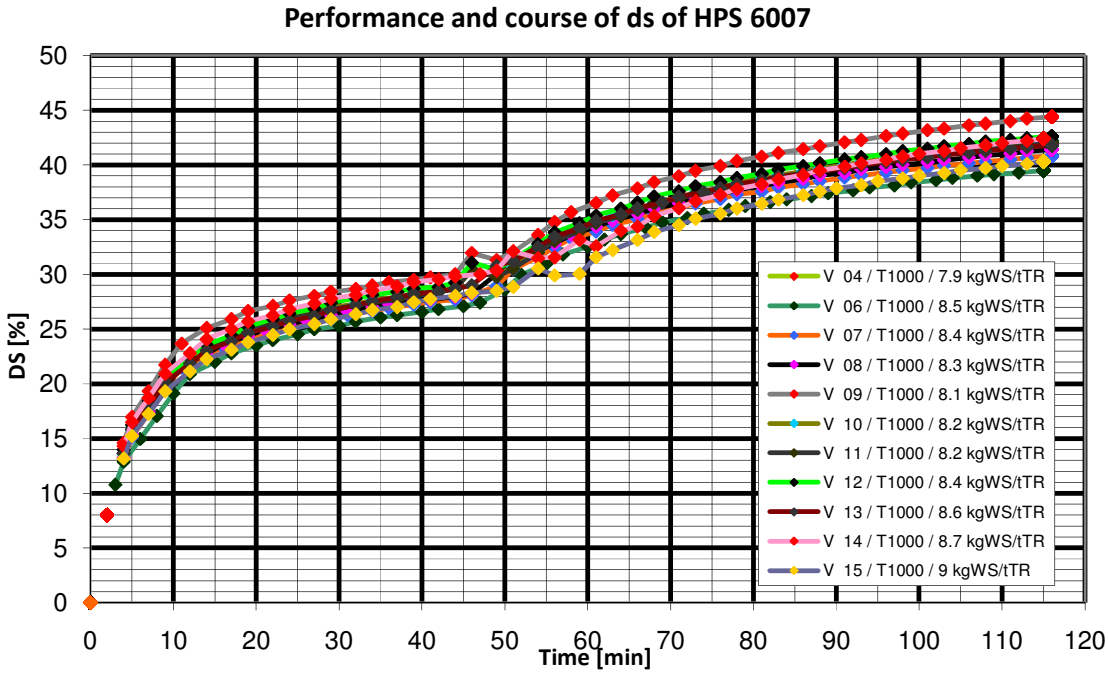

Figure 2: Performance and course of DS of HPS 6007 press

The systems comparison…

…also shows advantages for the Bucher technology.

- Revision and continuation with the existing FP → relatively expensive and old system
- New MFP with automatic discharge → relatively expensive and lower DS as HPS
- Decanter → cheap investment, but poor method for DS content
- Bucher HPS → high investment, high DS, but new application in a tannery

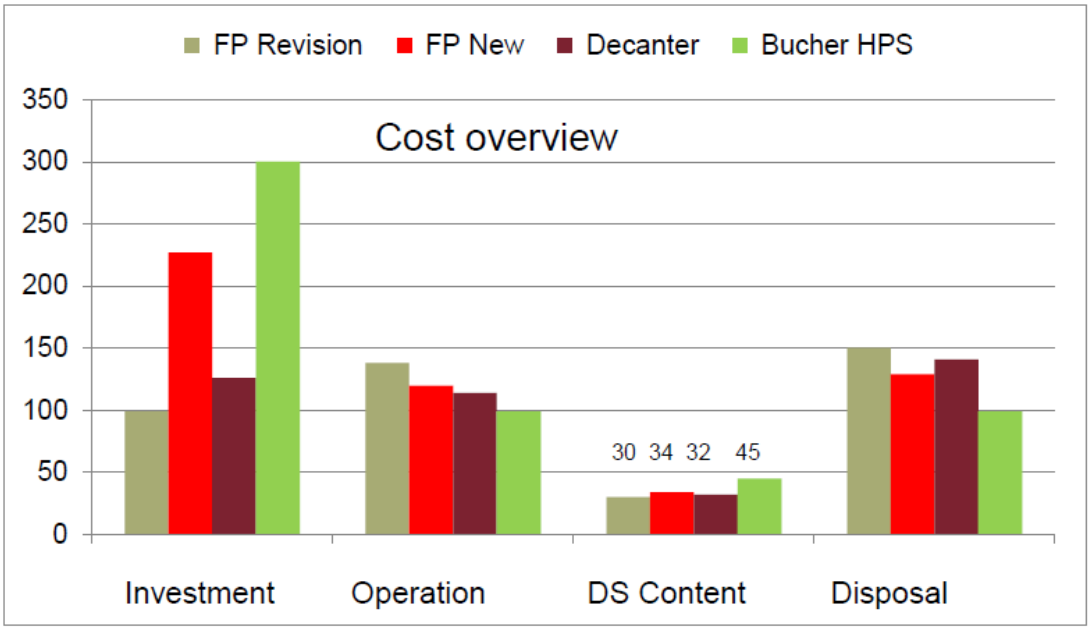

Figure 3: Cost Comparison between different technologies

Commissioning and fine tuning

After installation of the press, the piping, wiring and installation of the discharge system was carried out by local suppliers. As a part of the scope of delivery, after dry run the supplier's engineers performed the commissioning and the training of the operator's staff.
According to the expectations, within two weeks the automatic operation started. The fine tuning and adjustments to the local physical sludge properties and specific requirements happened within a few month.

Experience

DS probe

Strong variations of the input with DS 2.5 – 8 % caused, together with the uncertainties in the DS measurement itself, incorrect dosages of polymer and changes in operating performance. By changing the measurement principle of the METSO probe, a sufficient stability could be reached. This is now calibrated once a week by laboratory measurement. Tracing of the DS values in the feed makes sense in terms of achieving the maximum end DS content.
Finally the installation of a belt pre-thickener increased process stability and performance.

Polymer

The commissioning was performed with the polymer used in the pilot phase. Depending on throughput and input DS, the dosage had been optimized to only 9 - 12 kg / t DS linear polymer to save cost. Further savings are realized by changing to powder polymer with a dosage of less than 8 kg / t DS.

Filter fabric

The fabric type during pilot tests did not provide sufficient durability during continuous operation. A first cleaning (CIP) after 800 hours of operation increased the durability to 1,400 hrs. Filter socks with a modified fabric structure increased the service life to > 2'000 hrs with one CIP after respectively 400 hrs each. Changing a complete set of drainage elements can be performed within 5 hours if a readily prepared second set is on stock.

Man power requirement

In principle, the machine requires no supervision. The solids waste increased through the expansion of production now to approx. 3'500 t / yr and the press was running 12 months (50 weeks) for 7'000 hrs = 140 hrs / week.

A modern remote control monitoring via iPad enables the operators to optimize the process between:
- Maximum DS at lower throughput at DS ~ 52% for 400 kg DS / hr throughput
- Maximum throughput at lower DS > 36% for 800 kg DS / hr

The additional installation of the belt pre-thickener helps to achieve best performance.

Sludge discharge

The flow properties of the filter cake with crumbly consistency of DS = 38 - 52% are good, abrasions cannot be observed.
The required performance had been achieved with the design and the three provided sludge containers are loaded reliably with the pre-determined amount of solids.
An annual average of DS > 47 % is achieved in spite of different throughputs (400 > throughput < 800 kg / hr).

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