

Optimization in Filter Press Feeding Process

In order to maintain or improve competitiveness, it is crucial to optimize one's own processes, particularly production processes. A North German company that specializes in the production of edible oils contacted the Swiss pump manufacturer, Emile Egger, with the goal of improving the production processes, in particular for the filter press feeding of raw edible oils with filtration aids and of oils for the production of biodiesel.

Egger has worked intensively on the design of filter press feeding and can already look back on great success in both the paint sector of the automotive industry and in mechanical process technology in the chemical industry. In the chemical industry there are a wide range of mechanical separation processes such as hydrocyclone and decanter feeding, as well as filtration processes of all kinds. The greatest challenge here is frequently posed by the feeding of chamber filter presses.

High demands The edible oil producer and Egger as pump manufacturer defined the following demands in the common requirement specification:

- Improvement in the availability of the machine
- Energy saving
- Improved filter cake build-up
- Simple discharge of the filter cake after opening of the press
- Identical pump technology and shaft seals as far as possible to minimize spare part stocking and ensure maximum interchangeability of the feeder pumps.

The company originally used standard centrifugal pumps or positive displacement pumps (eccentric screw pumps)

for filter feeding. The abrasive filtration additives in particular, such as pearlite, dicalite or fuller's earths, resulted in a service life of only a few days for the hydraulics or shaft seals.

A crucial aspect for the filter feeding is the gentle conveying of the solids to be filtered and of the filtration additives with efficient feeding of the filter cloths. From the beginning an efficient filter cake has to be built up in the filter frame over a large area with large quantities and low pressure and largest possible solid particles; the filter cake then reaches an optimum during the filtration process by increasing the feeding pressure. This filtration process naturally has to be adapted to each process.

The demands on such a feeder pump are very complex:

- The solids and filtration additives have to be transported gently and with the least possible shear stresses.
- The pump must be able to cover a wide operating range from approx. 5-65 m³/h and be able to generate pressures from 2.0 to 8.0bar.
- The conveying principle, the materials and the shaft seal must be selected so as to achieve high availability and a long service life.

Control concept using pump speed control Egger uses its Turo® free-flow pump with four-stage hydrodynamic shaft seal very successfully for such applications. The unique free-flow hydraulics with completely retracted impeller and a design without sealing gap guarantees gentle transport without any shearing or grinding of the delicate structures. In combination with a control con-



Figure 1: Filter press feeding with a horizontal Egger Turo® free-flow pump

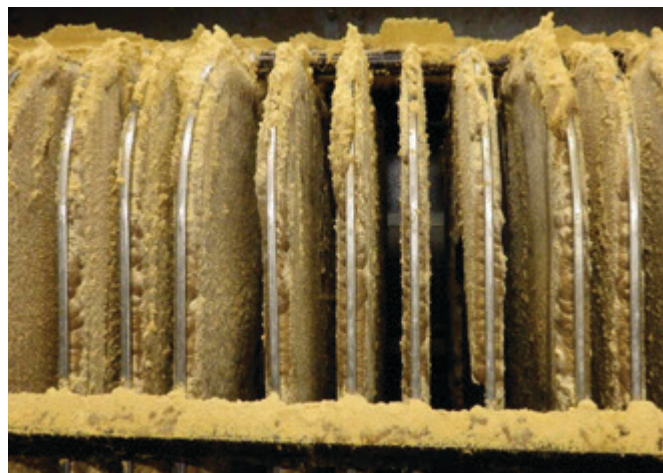


Figure 3: Oily filter cake after opening the chamber filter press

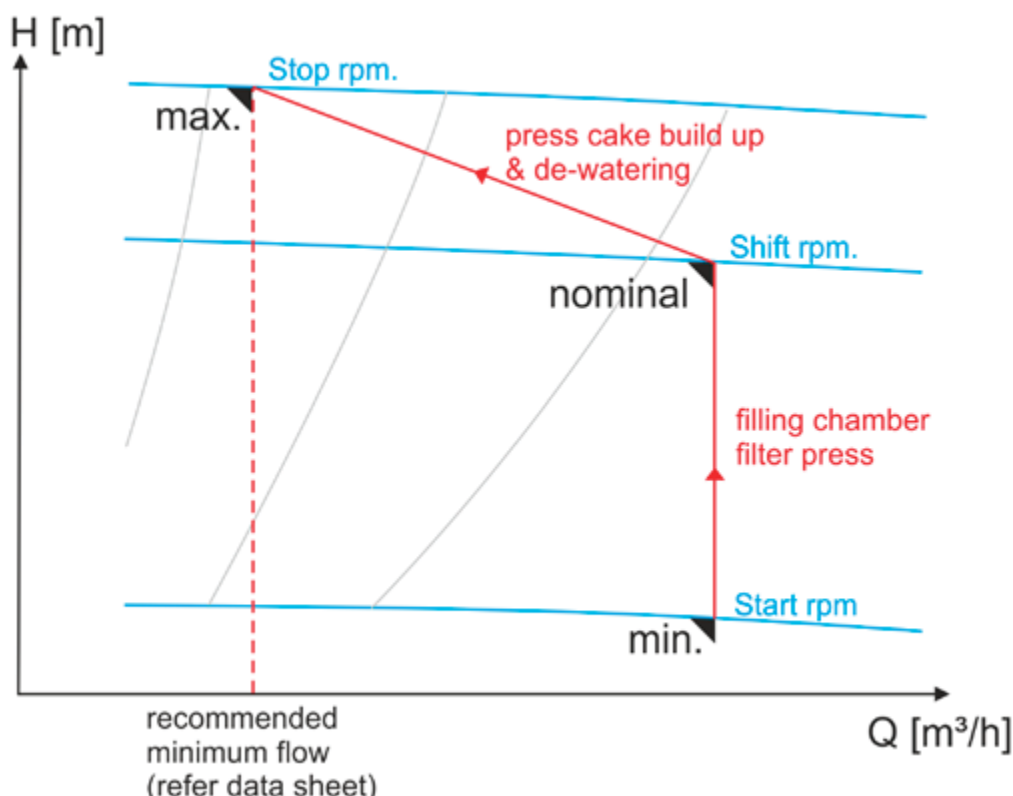


Figure 2: Control concept for the feeding of a filter press

cept using pump speed control, all these demands are perfectly satisfied.

The North German edible oil producer currently has four filter press feeders equipped with the Egger control concept. Despite the widely differing demands of the filtration, Egger has managed to cover all the feeding applications with the same pump mechanism.

In summary, after five years of cooperation with Egger, the edible oil producer has achieved the following process optimization:

- The filtration result (filter cake) has been improved by 20%.
- The personnel costs have been significantly reduced as the filter cake can be removed more easily from the cloths after the filtration process.
- The service life of the feeder pumps and in particular of the shaft seals has been increased from, in some cases, a few days to over three years.
- The spare part costs have been reduced by approx. 15%.
- The energy consumption has been reduced by 12% thanks to the intelligent control concept.

Since these process optimizations are seen as a great success, the North German edible oil producer together

with the Swiss pump manufacturer Egger are looking positively to the future. The internal production processes are continuously being evaluated for similar improvement measures.

Conclusion The process optimization has not only significantly improved the processes and production operation thanks to the new control concept and the modified pump technology, but has also had a very positive impact financially for the edible oil producer. The plant availability has been significantly increased thanks to the longer service life of the pumps, and the annual maintenance costs have been reduced by figures in the five digit euro range. The higher productivity per unit of time and the significantly improved filtration result now allow the company to develop new products and to generate additional turnover in the six digit euro range.

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