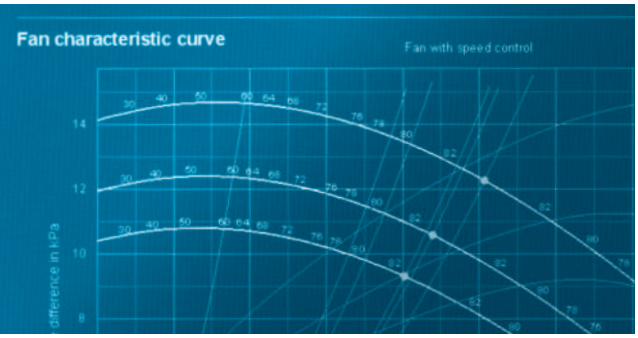
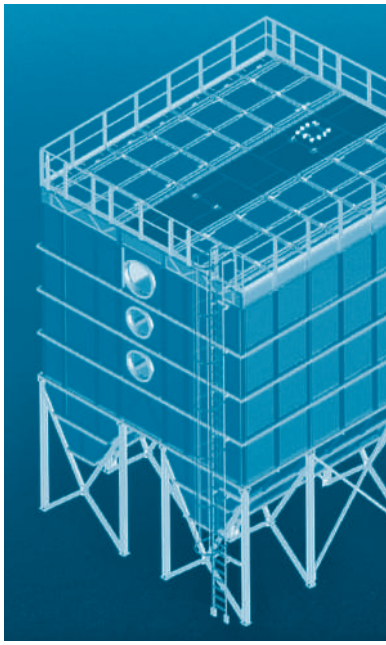
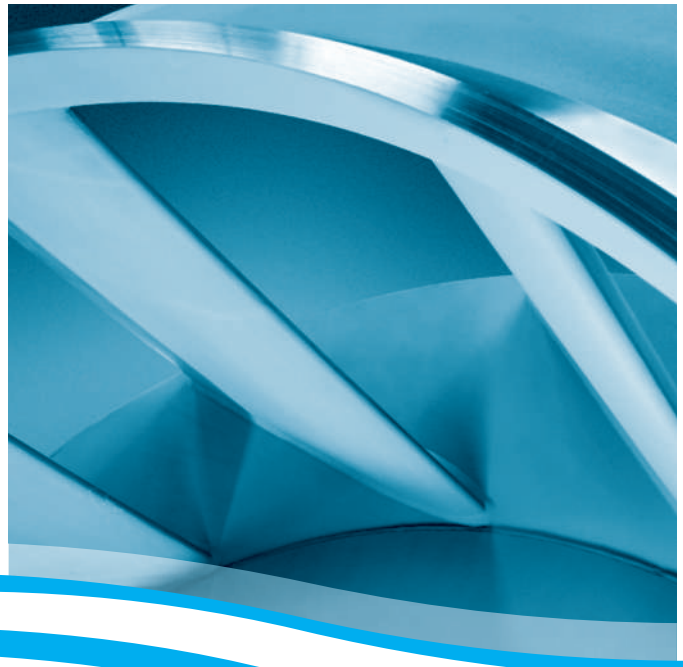
Innovations from Venti Oelde

"From Waste to Profitable Material"

Recovery of cellulose fibers and superabsorbents improve profitability







Venti Oelde

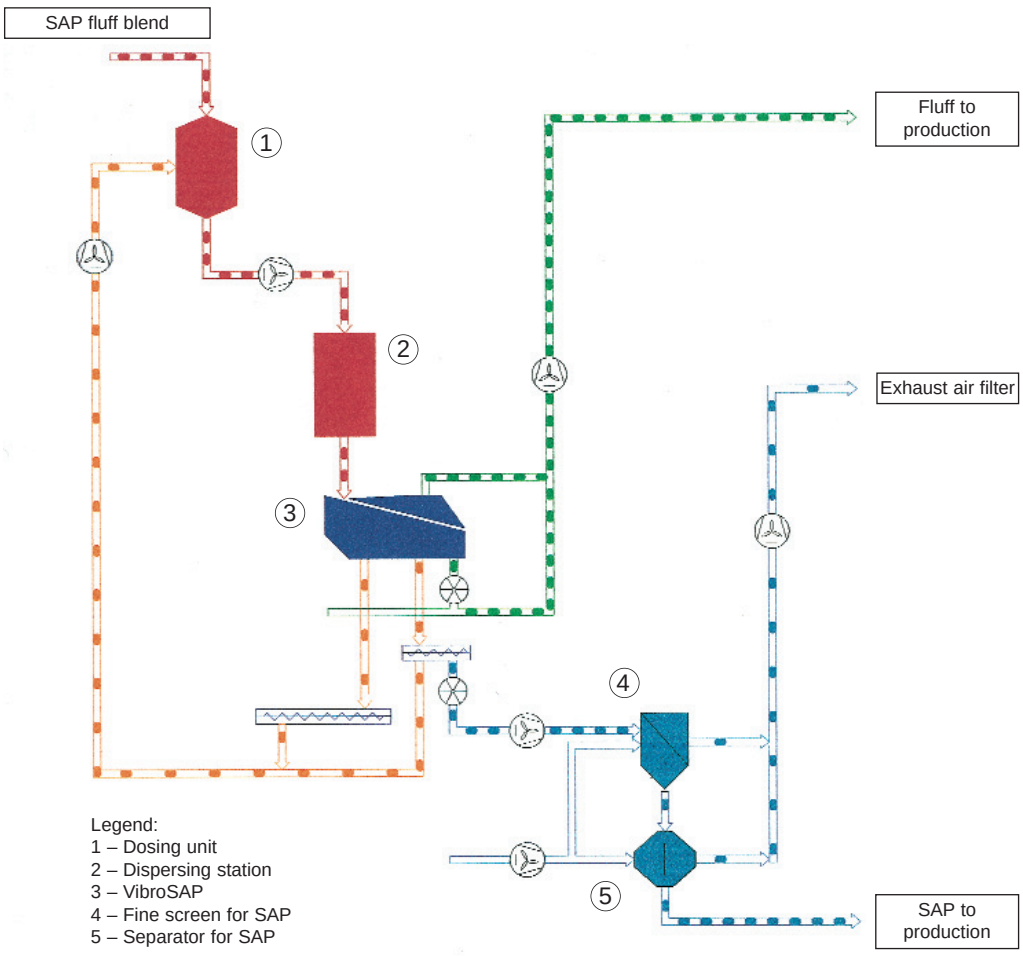
From Waste to Profitable Material

Recovery of cellulose fibers and superabsorbents improve profitability

During the manufacture of hygienic products, such as baby diapers, feminine hygiene products, incontinence products, etc. there is a reject percentage of about 2 - 4 which represents waste to be disposed of.

Reuse of this valuable material was not possible in economically relevant amounts until now because the separation of the cellulose fibers and the superabsorbent polymers (SAP), which form a homogeneous compound in the rejects and filter residue, proved extremely difficult. The available solutions with grinding and tearing machines, followed by screening did not prove particularly successful.

Overall view of plant layout



Legend:
1 – Dosing unit
2 – Dispersing station
3 – VibroSAP
4 – Fine screen for SAP
5 – Separator for SAP

Process flow diagram

Hygienic product manufacturers had to content themselves with an unsatisfactory separating and reclaiming efficiency of below 50 % so as at least to be able to use part of the rejects. A particularly promising concept, developed and successfully tested by the plant constructor, Venti Oelde, for a well-know hygienic product manufacturer, has now entered the field.

Objectives

Liberating the cellulose fluff/fiber from the compact, wadding-type mass presented the main problem.
The profitability of the process mentioned in the introduction is without doubt questionable. Even worldwide research aimed at optimizing a special system with a high separation efficiency did not get past the initial stages. The aim of an effective solution must be the achievement of a definite separation of cellulose fluff/

Part of a production line

fibers and SAP with good cleaning, so that the components can be returned in precisely metered amounts to the process without impairing product quality.

Starting point

The first requirement for good separation is a complete liberation of the compacted reject product, after mechanical removal of the plastic film lining. Contrary to methods used until now, liberation is effected in the Vibro-SAP system (patent applied for) with air. After dry mechanical separation and pneumatic removal from the dispersing station, the cellulose fibers are separated in a vibrating-separating unit, using controlled airstreams, while the material is moved via vibrating decks arranged in stages. The reclaimed fibers pass through a rotary airlock back into the production process. The fine particles of the superabsorbent material and any residual cellulose fibers, where superabsorbents are possibly present, pass through the perforated plates into the collecting tanks of the decks. They are then pneumatically conveyed via a further separating stage, the vibrating troughs, to an intermediate store. From here they reach a screening process and then the counter-flow separator (process flow diagram).

Finally after additional cleaning and separating the superabsorbent, freed from all residual cellulose fluff, is in a re-useable state and is stored until required for the production process.

The actual amount of waste and reject product when using the Vibro-SAP system is extremely low. Efficient filters clean the dust-laden process air and remove the dust produced during the recycling process.

The process is controllable and can be used for input materials with a high SAP concentration (up to about 30 %) particularly effectively and, as a result of the good separation efficiency, very profitably.

Here are preliminary figures as an aid to comprehension:

- Material input volume 200 kg (consisting of cellulose fluff/fibers and superabsorbents as a compacted product)
- This contains weight per centages of fluff/fibers of 70 to 75 %; superabsorbents of 30 to 35 %.
- Recovered fluff volume with a purity of 93 to 95 % weight percentage
- Recovered SAP amount with a purity of more than 98 %

Planning criteria

Planning was based on the following criteria:

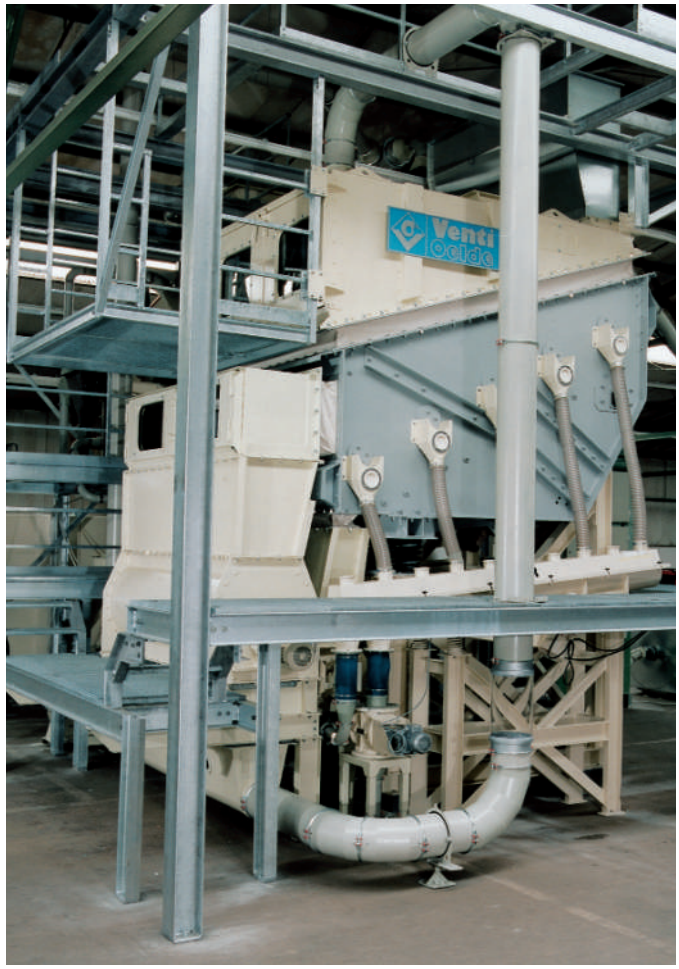
- Composition of the material, with cellulose fluff/fiber and superabsorbent content
- Material input and feed
- Throughput volume
- Bulk weight
- Ambient plant conditions (temperature, relative air humidity)
- Further handling of the separated fluff/fibers
- Further handling of the SAP
- Location (area, sound requirements, air-conditioning)
- Can any existing filter plants be used? (The calculation basis is a flow volume of about 10,000 m^3/h at a throughput of 200 kg/h).
- Information about integration of the separating system [independent operation/integration]

If these planning criteria are known, the plant can be relatively easily integrated into existing production lines.

Advantages of the System

Reclaiming the reject product where it is produced, with direct integration into the process, ensures maximum efficiency. The excellent separation of the components “fluff and superabsorbents”, means that there can be precise metering back to process with a high reclaim efficiency. Because the compacted material is liberated by using air dispersing technology, the problematical separation using mechanical tearing can be replaced by an economical and efficient method. Good operating safety and the elimination of fire hazards, caused by overheating of tearing units, are further positive aspects of the new design. Individual adjusting of the various stages to existing production parameters permit a wide product range to be processed without problem. The multistage configuration means that there is direct optimization of cleaning efficiency. The compact plant (8 x 6 x 6 m = L x W x H) can be easily integrated into existing production lines. The enclosed system includes noise reduction measures and, if required, can even be air-conditioned.

Vibro-SAP needs little maintenance and is userfriendly as it does away with complicated tearing elements. Low operating costs as a result of high availability, the productivity of the plant and also low energy and maintenance costs make the pay-back time, when using the plant to full capacity, about two years.



Vibrosap

Since there is a determination to conserve raw materials and to minimize waste, this innovative project is being supported by a Eurolife grant from the European Union.

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