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CENTRIFUGES IN THE POTATO INDUSTRY

BACKGROUND

Since the early installations in this sector, due to excellent co-operation with our clients, we have extracted considerable data from on-site tests. Attached is a list of reference plants, which have been installed over the last 15 years.

The majority of the centrifuges installed are of our low speed type decanters. These machines can operate at less than 2,000 x G, for this is quite often adequate to produce the desired results.

APPLICATIONS

The centrifuges are installed on the premises of chip producers, French-fry producers and potato packers. The applications fall into 4 groups: -

1. Starch Dewatering
2. Effluent Treatment
3. Potato Meal
4. Wash water cleaning (mud dewatering)

GROUP ONE - STARCH DEWATERING

The first units were installed to recover starch from the wash water used in the slicing process of a chip manufacturer.

We found that each 100 tons of potatoes processed produced approximately 2-3 tons of starch, and a cake of 60% dry solids could be recovered, with a value around \$180. This proved to be a significant advance in comparison with the traditional system, which involved hydro cyclones and trucking away the slurry at 25 - 30 % dry solids. The reduction in process area and transport costs is also a factor, which must be attractive. Whether or not the purchaser of the starch re-slurries the material for further treatment is irrelevant, but it is important to move the starch within a few days of production especially in hot weather (alternatively cold storage) to prevent deterioration of the product. As a result of the success of these first machines, we approached the French-fry manufacturers.

Naturally, the starch yield is less in the case of straight cut French-fries and we believe that approximately 0.3 - 0.5 % of the potato being processed represents starch which can be recovered at 60 % dry solids.

Wear Characteristics

No signs of wear to the bowl and screw conveyor.

Process Problems

Gelatinized starch produced by the blanching process or by steam peeling, caused us some concern. During trials carried out at one customer factory, we identified two products discharging from the centrifuge solids outlet.

- (a) Starch 57 - 60 % dry solids.
- (b) Gelatinized (slimy) starch at 25 % dry solids.

We exhausted all possible machine design changes and still we were seeing two different products. However, our client modified the potato fiber screen and the gelatinized starch was removed before it reached the decanter.

Conclusion

The Centriquip centrifuge is admirably suited for starch dewatering. Where some manufacturers accept the starch as part of the effluent, there are several incentives to remove the starch before wastewater treatment

- 1) To sell the dewatered starch
- 2) To reduce effluent costs
- 3) Recycle centrate to the pre-wash area
- 4) Reduction of fresh water requirement

GROUP TWO - EFFLUENT TREATMENT

Prior to our involvement the effluent treatment program was a typical system with grit removal followed by a primary clarifier. The underflow from the clarifier was thickened from 5% to 20% in a cone thickener prior to land disposal by tanker.

The centrifuge was installed to replace the thickener and cakes of up to 40 % were easily achieved without flocculent addition. The product was saleable to farmers as an animal feed additive. Suspended solids in the water discharged to the city was reduced from 1200 ppm to less than 300 ppm.

When steam peeling is used instead of abrasive peelers, gelatinized starch affects the cake and the dry solids content will not be as high. Nevertheless the resultant cake at 20 - 25 % is still stackable and a saleable product.

Wear Characteristics

After approximately 10,000 hours, we disassembled our first effluent centrifuge and found that there was some wear on the conveyor and in the feed chamber. We now use extra wear protection on the flights and a comprehensive tungsten carbide (or a similar material) protection liner in the feed chamber, to extend the conveyor life beyond 12,000 hours.

Conclusion

The low speed decanter centrifuge is ideally suited for effluent derived from the potato process. Clients who have used belt presses have complained of high maintenance costs in comparison with our centrifuges.

It is to be noted that one case our centrifuge has replaced a rotary vacuum filter for similar reasons.

GROUP 3 - POTATO MEAL

Potato peel, reject potatoes, and substandard products can be pulverized into slurry. At this point water is added and the slurry can be centrifuged to produce a cake of approximately 40 % dry solids. This commands a higher price than the waste in its original form.

The proportion of cooked potato in the feed largely influences the dryness of the cake.

GROUP 4 - POTATO WASH WATER CLEANING

Use of the decanter centrifuge on a closed loop to the potato pre-washer or potato flume/transport water leads to the continuous removal of earth, mud, soil, potato debris etc. from the washing water.

The solids are discharged as a stackable cake at up to 50% ds.

The cleaned liquid discharge is returned to the washer for reuse thus reducing the amount of water used at plant and allowing the washer to be run for extended periods before emptying. The addition of a flocculent is not normally required but may be used to improve the superfine capture if needed, and achieve a centrate of < 100 ppm suspended solids.

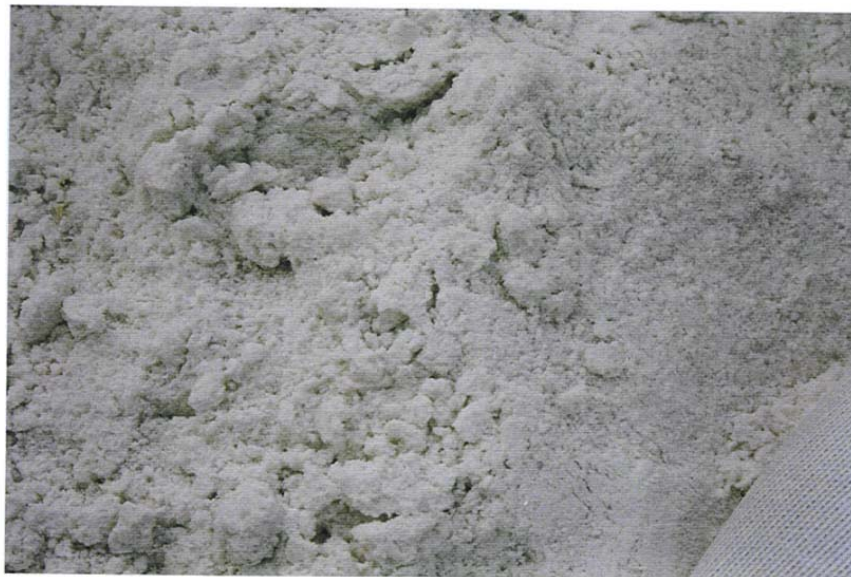
Wear Characteristics

In order to minimize wear, the bowl speed is kept low. The welded wear protection on the conveyors operates for 15,000 to 20,000 hours before attention. Tiled conveyors can be used to extend conveyor run times. No significant wear is found on any of the other parts.

POTATO PROCESSING INDUSTRY
REFERENCE LIST OF INSTALLATIONS

	<u>Machines Installed</u>	<u>Starch Recovery</u>	<u>Effluent Treatment</u>
Advance Foods (WCF)	1		*
PAS Grantham Ltd.	2	*	*
Warrell Morton, Braintree, Essex	1		*
Garden Isle Frozen Foods Ltd.	3	*	*
Walkers Crisps Ltd., Peterlee	3	*	*
Ross Foods Ltd., North Walsham	1		*
Ross Foods Ltd., North Thoresby	1		*
Everest Frozen Foods Ltd.	4	*	*
Frigoscandia Ltd.	2	*	*
Golden Wonder, Hunters Foods Ltd.	3	*	*
Golden Wonder, Scunthorpe	1	*	
Humpty Dumpty Snack Foods, Brampton	2	*	*
Humpty Dumpty Snack Foods, Hartland	1	*	
Hitchen Foods	1		*
I&K Distributors, Ohio	2		*
W C F Foods	2	*	*
Largo Foods Ltd., Dublin	2	*	*
Tayto Foods Ltd., Dublin	2	*	*
Tayto Foods Ltd., Tandragee (NI)	2	*	*
Ballymoney Foods (NI)	1	*	
The Snack Factory, Skelmersdale	2	*	*
Bensons Crisps, Preston	1	*	
Birds Eye Walls, Lowestoft	1	*	
Jepson Potatoes, Sandbach	1		*
Super Pufft, Brampton, Canada	2	*	*
Highlander Snacks	2	*	*

Centrifuged Potato Starch @ 62% DS
Recovered from Potato Processing Factory



Cake and Centrate Produced by Centrifuging Potato Effluent
35% DS



500 ppm DS

