

BONITRON

Bonitron, Inc.



**Regenerative Energy Created by Rapid Decelerations and multiple VFDs overhauling within the process**



## DC Bus Over-voltage in Centrifuges

- Centrifuges are used in many processes where particles or material is separated from a solution and waste or non-usable material is discharged from the centrifuge so usable material can be recycled
- Centrifuge motors that run the process stages are controlled by VFDs
- During the centrifuge process the VFD can be required to go through several rapid motion changes and overhauling conditions, creating regenerative energy or a VFD DC bus over-voltage condition that can trip drives

## Two Main Types of Processing That Use Centrifuges



Alpha Laval Olive Oil



Flottweg Beverage



Ferrum Shipment



Heinkle Waste Water



CES

## Batch Processing

- Particle Separation or mixing is accomplished by high velocity spin.
- Regenerative Energy is Created due to Rapid Decel between batches
- Drive DC Bus Over-voltage is created by the rotational inertia during decel of the centrifuge
- Can take long periods to coast to stop creating long periods of nonproductively between batches

## Continuous Processing

- Process that has material feed to centrifuge continuously
- Several Process Stages During Cycle
- Regenerative Energy Created by Rapid Deceleration During the Stages and overhauling drives in the process



## Batch Processing and Regenerative Energy

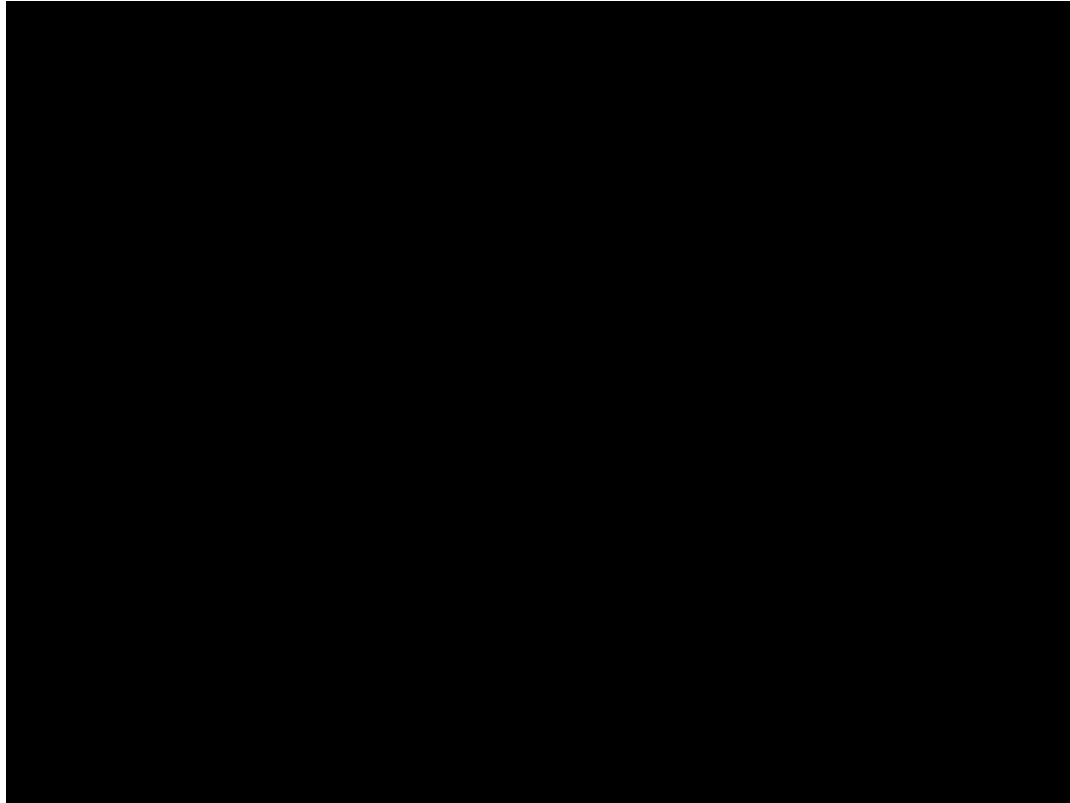
- Batch processing is where particles or material is separated from a solution and waste or non-usable material is discharged from the centrifuge for a single batch.
- Centrifuge motors that run the process are controlled by VFDs that must preform at high duty cycles during deceleration .
- Upon completion of the process the batch is collected in a holding tank and the VFD is required to preform a high speed stop that exceeds the time constant of a braking resistor.
- 100% braking duty resistors must be specified even though the process does not present constant braking duty

Centrifuges have been used in the beverage industry for almost a century. They perform a wide variety of functions, including:

- Clarification of raw and depectinized fruit juices; cloudy juices and other beverages.
- Clarification of high-solids juice and other beverages.
- Citrus juice clarification and depulping.
- Essential oil recovery from citrus fruits such as oranges, lemons, tangerines and limes.
- First stage peel oil concentration.
- Second stage peel oil polishing.

Dairy Centrifuges are used in milk clarification, hot milk separation, whey clarification, cold milk separation, whey separation, and bacto-fugation

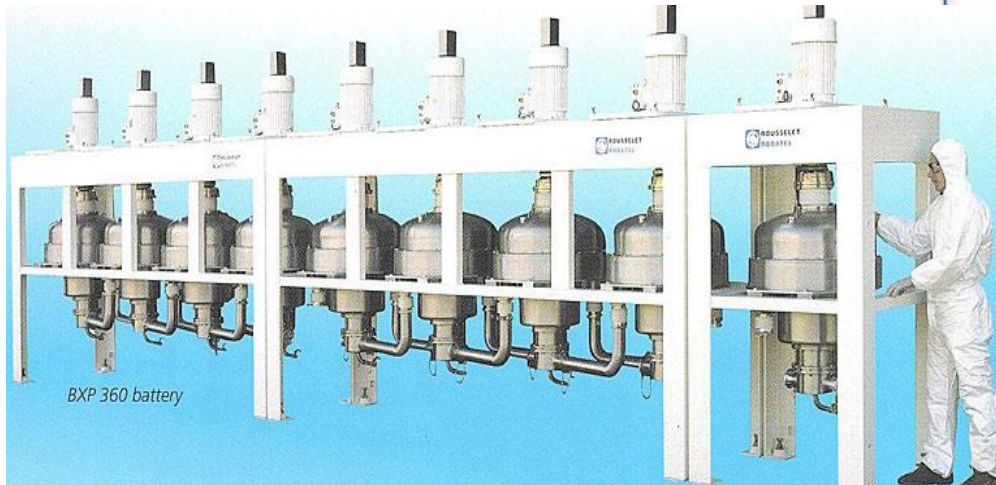






Multiple VFDs Can Be Common Bused for Cost Effectiveness

## Batch Processing



- Single motor and VFD for a single centrifuge
- Several batch process VFDs could be common bussed
- Energy created from a stopping centrifuge can be used to power/start other centrifuges
- VFDs can be common bussed to use one regen or brake for Multiple Centrifuges
- Common bus and regenerative energy solution must be sized to cover all the VFDs on the common bus



Unique drive system: The backdrive motor acts as a generator and generates power back to the DC bus, a result of resistance to flow from the fluid being moved through the centrifuge and the common solids being augered out. The power is then being used by the entire system.

The combination of our high efficiency motors, exhane Polyrad power cords and backdrive regeneration system reduce (total) amperage draw from the electrical source. This gives our system added economic and mechanical efficiency.



## Food Processing

- Extraction

## Pharmaceuticals

- Compound Separation

## Chemical Processing

- Separating Compounds

## Oil Refining

- Separating different viscosities



- Batch Centrifuges in Sugar Mills
- Fives Cail centrifugals handle more than 25 million metric tons of sugar every year worldwide, offering a complete range covering all applications : beet, cane and refining.



Fives, an industrial engineering Group, designs and supplies machines, process equipment and production lines for the world's largest industrial groups in the aluminium, steel, glass, automotive, aerospace, logistics, cement and energy sectors.

Decanter centrifuges are used to extract (de-water) solid materials from liquids when they are mixed together in slurry. Decanter centrifuges are used in many industrial applications such as:

1. Oil /solids separation (oil well drilling, refining, de-watering)
2. Industrial and biological wastewater treatment
3. Food processing (olive oil, wine, fruit juice)
4. Fish processing (fish meal, fish oil)
5. Chemical slurry

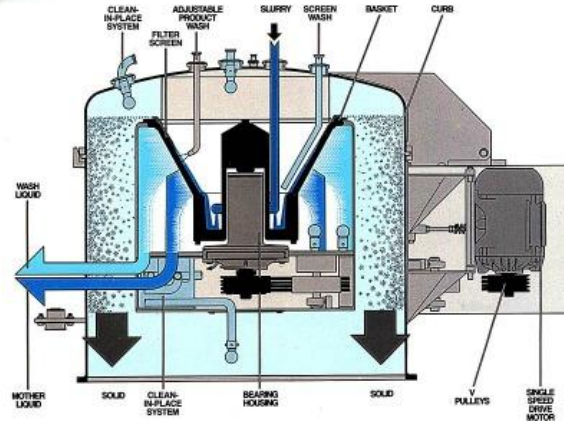


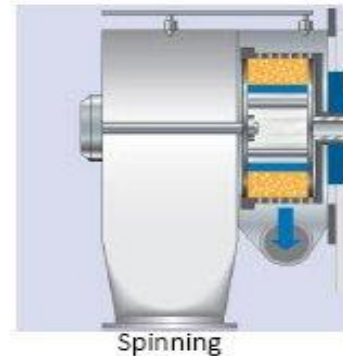
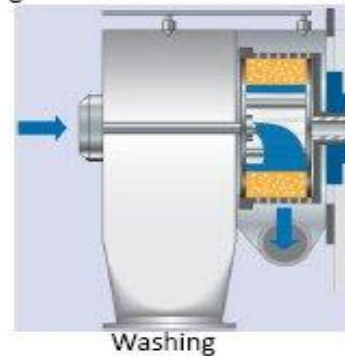
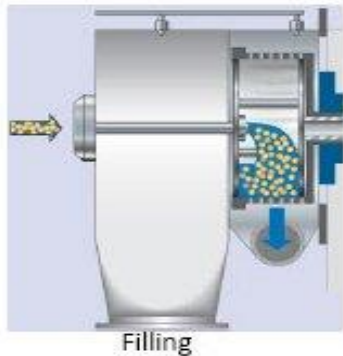
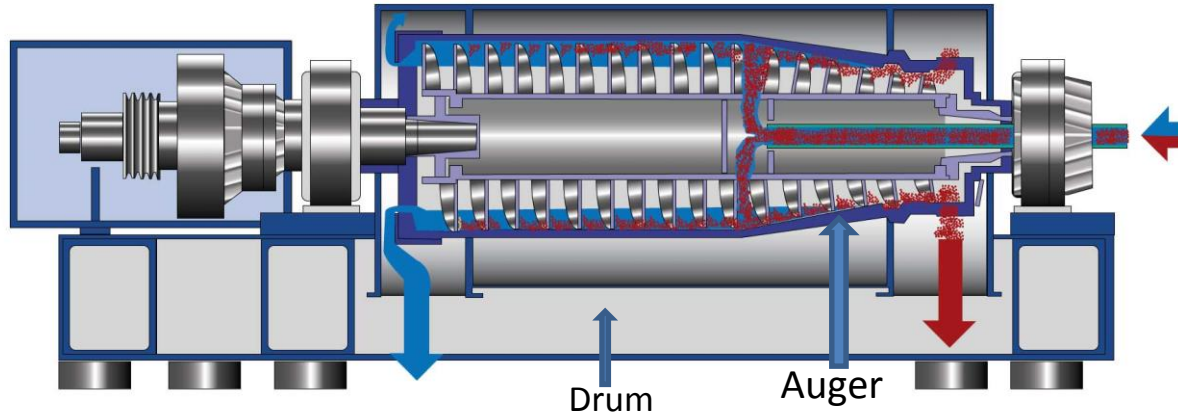
A main drive motor supplies power to turn the centrifuge. AC drives are commonly used to power the main drive motor. There are several different types of decanter centrifuges, such as: Vertical, horizontal, or scroll (conveyor)



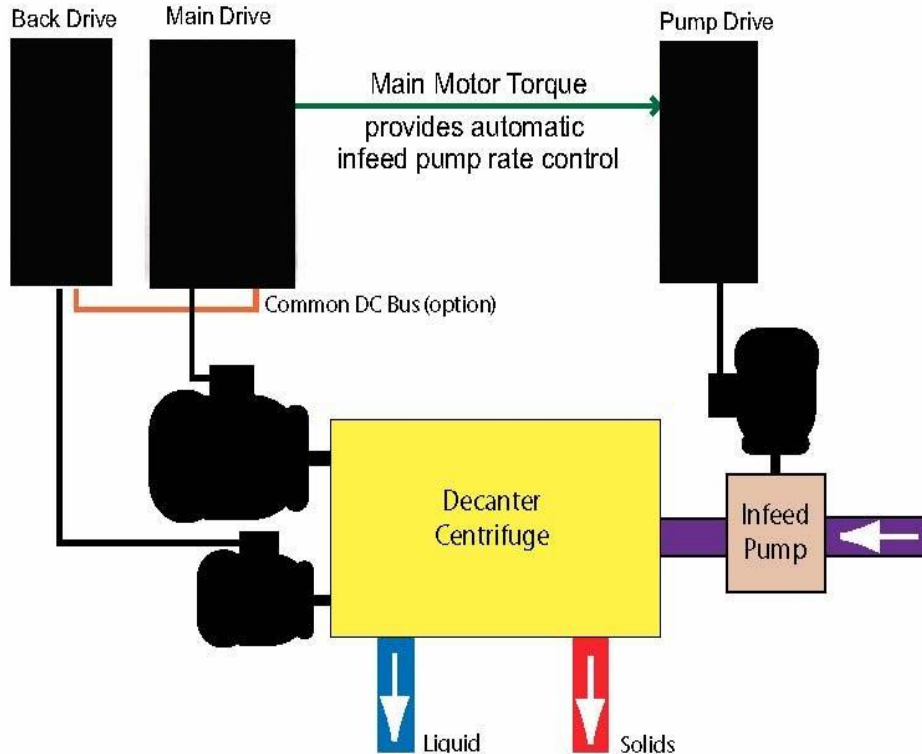
## Continuous Process

- 100% Regenerative
- The drum spins faster than the augur
- Augur regenerates
- Generally 50-100Hp VFDs are used









## The Continuous Process

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- Auger regenerates
- Generally 50-100Hp VFDs are used

### Water/Wastewater

- Separating Waste From Solutions

