Application: Decanter Centrifuge

We find decanter centrifuges in many industrial applications and they are designed to extract (dewater) solids from liquids when mixed in a slurry. Common industries that use centrifuges are:

Oil and Gas: To separated water from oil.
Wastewater treatment: To separate solids from water (Sludge dewatering)
Food Processing: Wine, olive oil, orange and other fruit juices
Chemical Plants: Dewatering and refining
Mining: Dewatering of kaolin, phosphate and other minerals.

System overview:

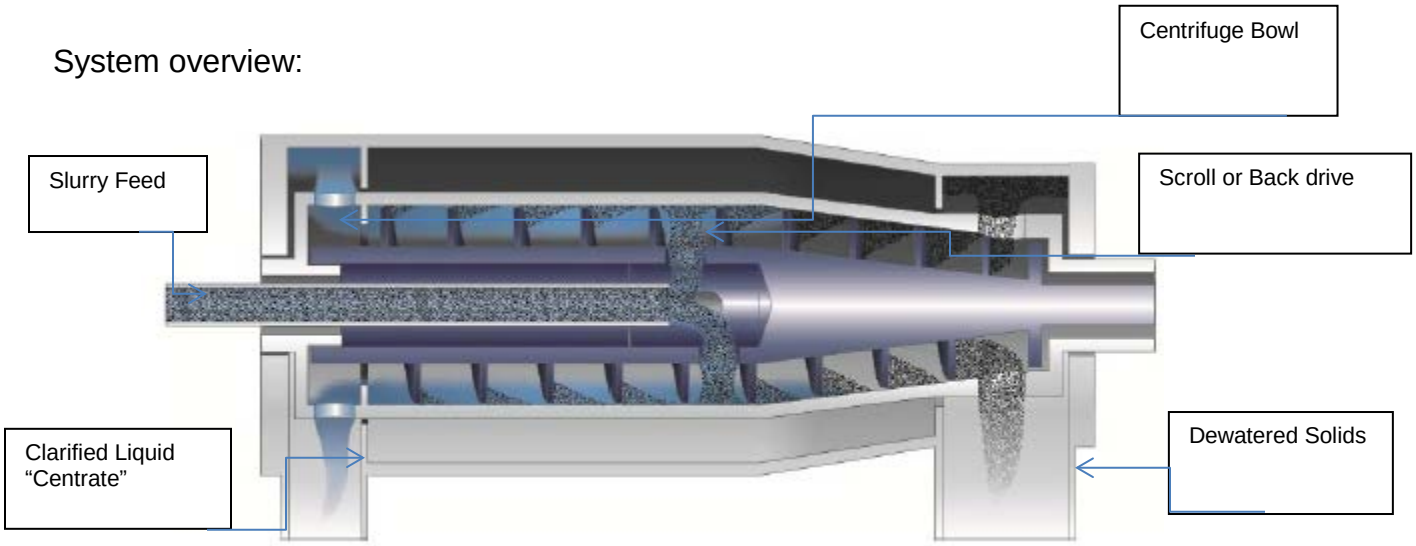

Fig. 1

The main drive motor supplies the power to turn the centrifuge "bowl", the solid container that rotates inside of the bowl housing. The Scroll or conveyor rotates in the opposite direction but runs at a differential speed and is powered by various means, sometimes a gearbox is belted to the main drive motor, or a different system is used to drive the scroll. The bowl has to run at a high speed and the scroll inside the bowl runs at a differential lower speed. Higher differential allows for cleaner centrate and more GPMs. Lower differential gets drier solid or 'cake'.

The slurry is fed through a pipe connected to the scroll or screw conveyor. It is forced into the bowl where centrifugal force causes the material to separate. The scroll moves the solids to the tapered end where they are discharged and clear liquid or centrate flows out the opposite end.

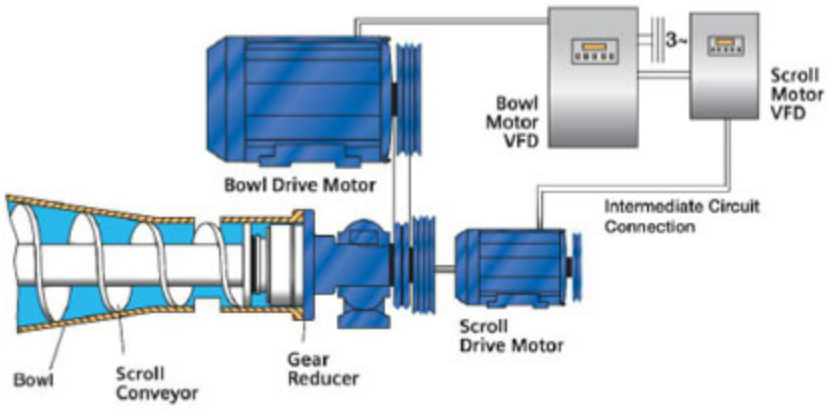

Fig 2

Adjustable frequency drives are commonly used in this application due to high inertia loads and the AFD's ability to control the acceleration time to minimize the motor current draw. When two motors and drives are used, one for the bowl and one for the scroll, the bowl has a very high reflected inertia and the scroll drive can be run in continuous regeneration, as it runs slower than the bowl and is pulled by the reflected inertia.

Eaton has successfully applied industrial drives in this application for several generations of drives. One successful application of the SPX drive family uses this configuration:

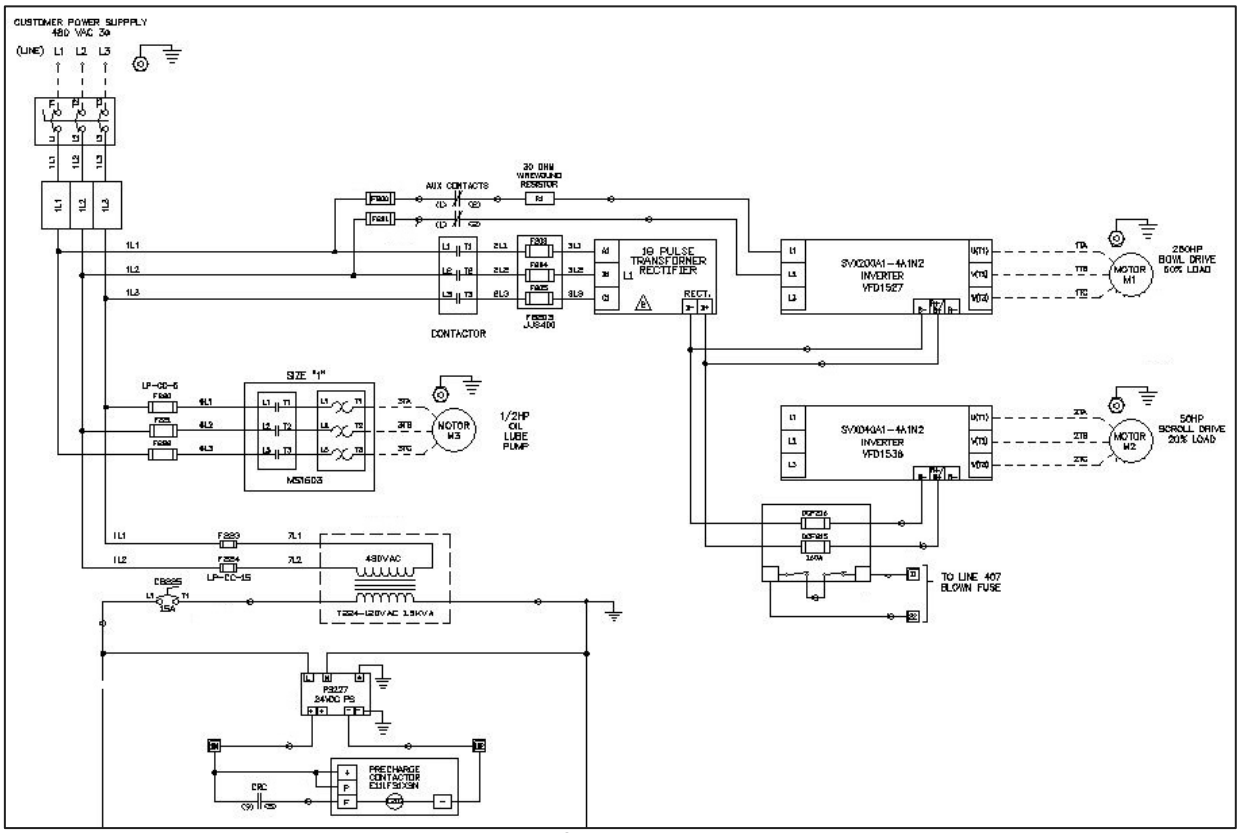

Fig 3

By connecting the scroll drive's DC bus to the DC bus of the bowl drive, we are able to use the regenerated current and share this with both drives, successfully applying the drive to run the system. We do this by sizing the drives based off the load they will be handling. The scroll drive will be sized smaller with a smaller load percentage to compensate for the Bowl drive being sized larger with a larger load percentage. In addition with power drives with buses it is also possible to added in additional line supplied drives or starters for additional motor pumps required.

Settings in the drive will initially require setting of the motor nameplate information along with the control scheme for start/stopping and providing the reference. From there depending on what the desired consistency required there will be adjustments made to the acceleration/deceleration time 1 for the time it takes for the loads to get up to speed typically these would be extended out to minutes. Once this is set it would be advised to run and ID Run for the drive to read out advanced motor information that the drive uses for better torque control. Then the drive can adjust the speed for the bowl or scroll motors with multiple source options. In this application it would typically be used in open loop speed control mode which has a +/- 0.5% accuracy and if more accuracy is required closed loop can be used as an option. There is also the possibility to maintain a torque level with the drives with switching to open loop torque control mode, with this a torque reference is given and the speed of the drive is adjusted to maintain the calculated torque level.

FIG 1 Image from: Webinar Centrifuge 101 Decanter Centrifuges Municipal Sludge Dewatering; Downloaded from http://www.weat.org/events/2012ToddMarshallSteveWaldenAndritzCentrifuge.pdf on August, 7, 2014.

FIG 2 Image from Hiller Separation **DecaDrive® Mechanical / Electrical Scroll Drive solution using frequency converters and electric motors; downloaded from** http://hiller-us.com/equipment.php **on August 7, 2014**

Additional Help

In the US or Canada: please contact the Technical Resource Center at 1-877-ETN-CARE or 1-877-386-2273 option 2.

All other supporting documentation is located on the Eaton web site at www.eaton.com

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