

Subject: Decanter Overview	Product: A1000 and G7 Drives	Doc#: AO.AFD.65
Title: Decanter Centrifuge		

Decanter Centrifuge

Application Overview

Decanter centrifuges are used to extract (dewater) 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)

Application Challenges:

- Minimize the need for gears or belts to drive the centrifuge.
- Control and maintain speed during the decanting process.
- Develop high torque at very low speeds.
- Two motor applications, one for the bowl and one for the scroll.
- The bowl has a very high-reflected inertia.
- The scroll is usually in continuous regeneration, as it runs at a slower speed than the bowl and is pulled along.
- Torque limiting on the scroll is very important.
- Some configurations require zero-speed operation of the scroll (differential gearbox).
- Dynamic braking or regenerative modules may be required if the bowl is NOT driven by a drive.
- Explosion-proof environments.

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Yaskawa Products:

Product	Feature	Benefit
A1000 or G7 Drives	Frequency Detection Speed Agree	Both Frequency Detection and Speed Agree signals can interlock with primary and auxiliary machinery as well as safety equipment while the machine is operating.
	Overtorque or Undertorque Detection	It is possible to notify the user of an impending fault before it occurs based on the Overtorque or Undertorque Detection settings.
	Multi-Step Frequency Reference	Analog inputs are not required due to 17 possible Multi-Step Speeds. Operating speed can be adjusted for optimum performance.
	<ul style="list-style-type: none"> • Dwell Function • Stall Prevention • Feed Forward Function 	For accelerating high inertia loads, the user can increase the Dwell Function setting and tune Stall Prevention. The Feed Forward function can also be used to assist in acceleration.
	<ul style="list-style-type: none"> • DC Injection Braking • High Slip Braking 	Although the stop time is generally long due to a large inertia moment, it is still possible to quickly stop the drive without a braking resistor by using the DC Braking or the High Slip Braking function.
	<ul style="list-style-type: none"> • Accel/Decel Times • Intelligent Stall Prevention 	Fast acceleration and deceleration times are possible by adjusting Accel/Decel times and using Intelligent Stall Prevention. This can reduce overall process time.
	Fault Restart	The drive can automatically start after being shut off by using the Fault Restart function.
	Flux Vector Motor Control	Provides high starting torque and good speed regulation.
	Standard Motor Used	Standard NEMA B design motor can be used, to eliminate specially designed motors.
	Energy Saving Mode	Energy saving operation can be implemented at full speed, during light loads.

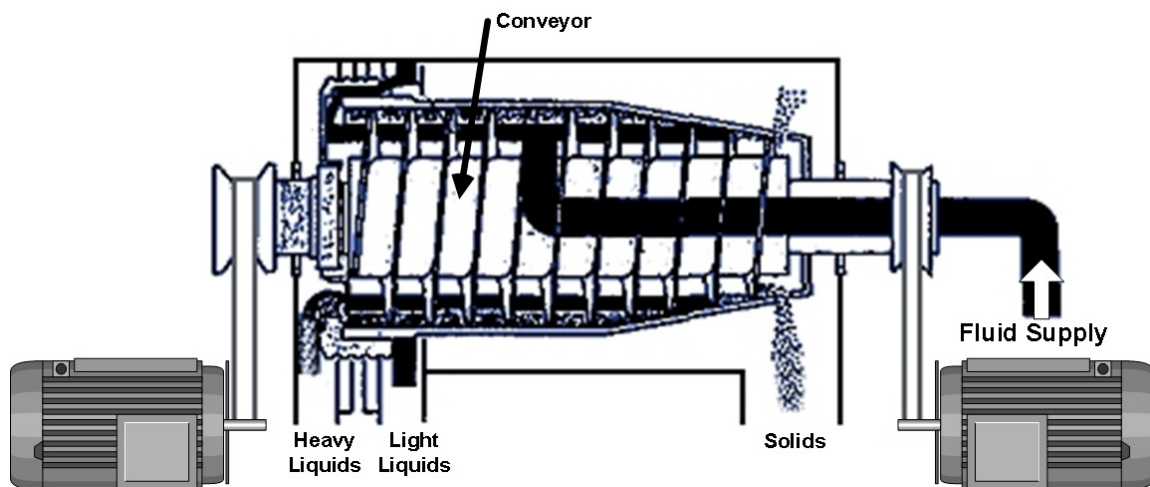
Application Details:

Decanter centrifuge design consists of a solid container, called a bowl, which rotates at high speed. Inside the bowl tube, a screen conveyor rotates in the same direction, but at a slightly different speed. A differential gear is typically used to adjust speed.

1. The decanter centrifuge slurry is fed through a stationary pipe, which is inside a hollow shaft connected to a screw conveyor or scroll.
2. The slurry enters a feed compartment located inside of the conveyor and is forced through

- discharge nozzles to the bowl section.
3. Once inside the bowl, centrifugal force causes the material to separate.
 4. The screw conveyor moves the solids to the tapered end where they are discharged.
 5. Clear fluid flows out the other end.

This type of centrifuge is common in the wastewater treatment plants. It is considered a continuous flow machine



because it will run hours at a time.

Some decanter centrifuges are powered by a motor and gearbox combination. The gearbox provided the correct speed and torque to drive the centrifuge. Since this is a mechanical type of configuration, it is subject to frequent preventive maintenance and mechanical failures. An AC drive can provide the required torque with greater efficiency and reliability.

Yaskawa AC drives have a full set of features designed to protect centrifuge operation. Overtorque and Undertorque protection are used to detect impending faults and help prevent machine downtime. Integrated electronic dynamic braking is used to bring the centrifuge to a stop without the need for brake pads.

Yaskawa AC drive features such as, Dwell, Stall Prevention and Feed Forward work together to develop required torque and speed required to power a centrifuge filled with dense slurry. Fully adjustable Acceleration and Deceleration times, together with Intelligent Stall Prevention, can also be employed to reduce processing time.