

Energy recovery from rotating flow

A decanter centrifuge is a separation machine consists of a rotating bowl, a solids discharge port and at least one clarified liquid discharge port and a screw conveyor disposed coaxially within the rotating bowl. The conveyer is rotating in the same direction as the bowl with a differential rotational speed (usually 4-50 rpm) where a feed suspension to be separated is introduced through a central feed pipe into a ring-shaped space

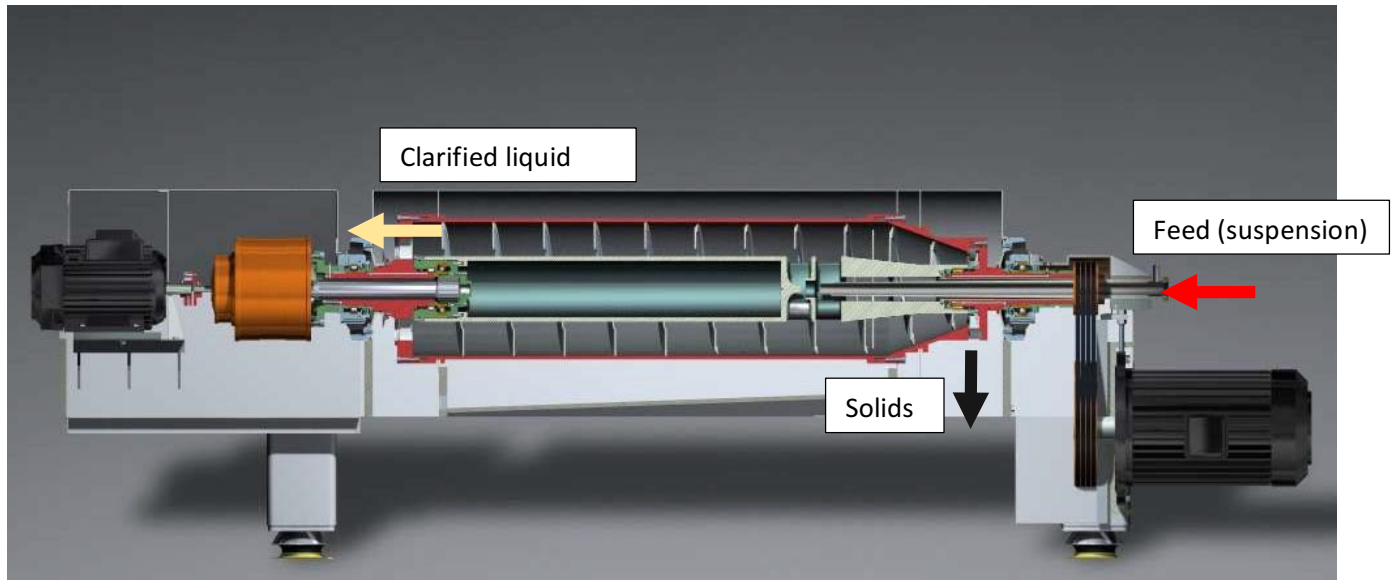


Figure 1 - Decanter, general view

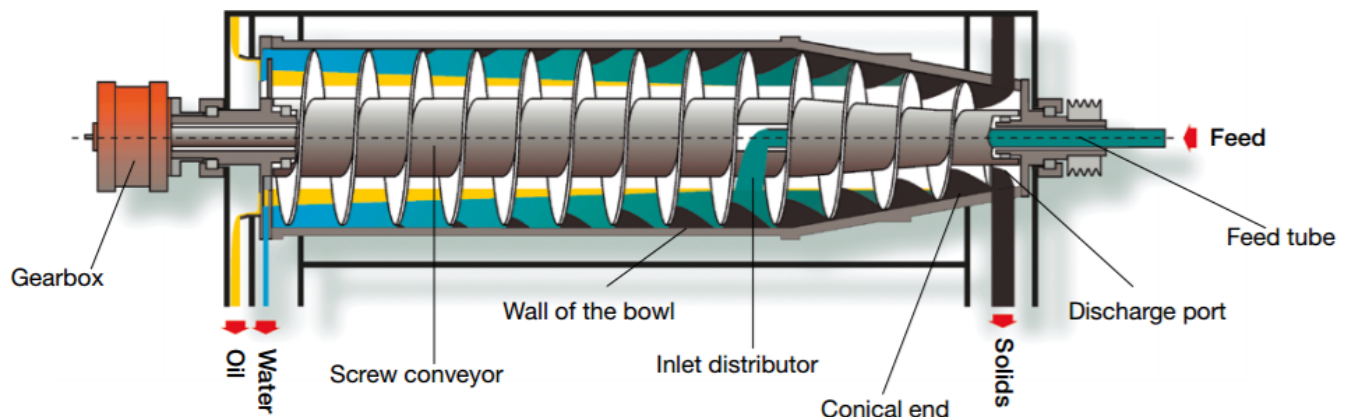


Figure 2 - Decanter Architecture

The task is to recover kinetic energy stored in fluid flow coming from the bowl. Decanter works as a continuous separation machine and the fluid proceeds through the bowl. At discharge port it leaves rotating assembly with a high kinetic energy (accelerated to 50m/s). With an open window as an outlet fluid flow loose its velocity impacting a wall opposite to the discharge port. This dissipated energy could be used to introduce an additional acceleration on the hub with liquid discharge.



Figure 3 - Velocities at the liquid discharge

The fluid flow from outlets could be employed using different schemes:

- By directing the flow outwards
- By directing it to higher diameter (outside separation room) and discharge it backwards/outwards
- By directing the flow to energy-generating device (i.e. turbine)
- Etc.

Participants are free to investigate the listed schemes, or propose a new scheme to recover energy from liquid discharge.