Product and chemical recovery in mining and minerals

Separate value from waste with Alfa Laval's decanter centrifuges

In mining there are many challenges – cyclical mineral prices, increasing operational costs, falling demand and continuously implementing cost-cutting strategies to remain competitive. One such strategy, the recovery of product or chemicals from process residue and waste, improves productivity and reduces operational costs.

Process overview

The hydrometallurgical processing of mineral ore to obtain marketable products involves a series of physical and chemical processes that include extraction, concentration, purification and metal recovery – see process flow chart on the next page.

Extraction and concentration

Depending on the type of ore, the ore slurry will undergo either leaching/digestion or flotation process to separate the mineral from the ore.

In the leaching/digestion process, the mineral is extracted from the ore by reacting with an acid or base. The pregnant liquor that contains the mineral is then sent to a precipitation circuit to precipitate the mineral, after which it undergoes thickening and filtration processes to produce high-grade concentrate.

In the flotation process, a high-grade concentrate is produced after the product is separated from the tailings and undergoes thickening and filtration stages.

Valuable product- in this case a nickel solution - recovered as liquid phase from a decanter centrifuge.

Purification and metal recovery

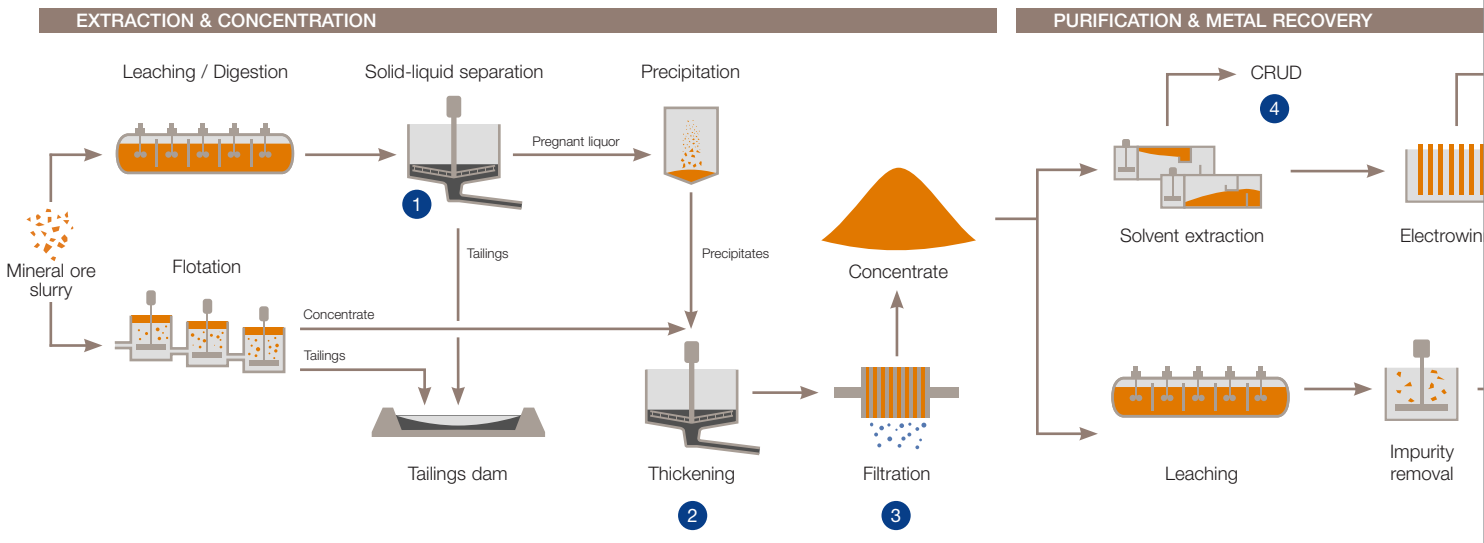
The metal in the concentrate can be recovered either by a solvent extraction and electrowinning process (SX/EW) or leaching/impurity removal and metal recovery processes such as precipitation, cementation, solvent extraction and reduction.

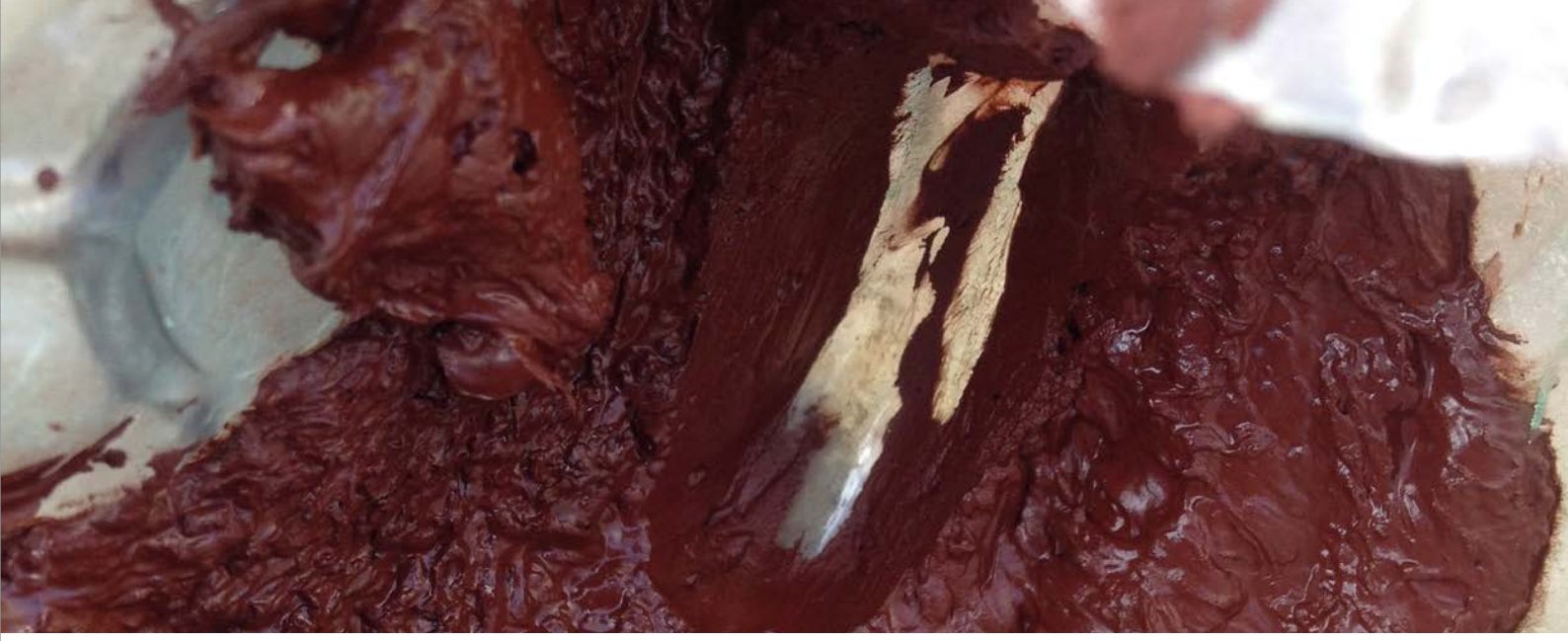
These processes normally leave behind a residue or waste that must be treated before recycling or disposal. For example, process residue in the form of slurry is generated from metal impurity removal, whereas the solvent extraction and

Key benefits:

- Solutions for all mineral and mining applications with our P2 and P3 decanter ranges
- Both ranges offer a cost-effective, high-performance solution with low power consumption
- High-grade material designed to last in a harsh environment where withstanding abrasive sludge and corrosion is crucial
- Unmatched separation efficiency achieved through our special deep pond technology
- A solution to meet your exact requirements – whether you are looking for a dry solids fraction or a clean liquid phase
- Compact design and small installation area
- Test units are available on all continents to carry out tests at your site to optimize your specific process
- Easy to scale-up capacities from test results to find the optimum decanter centrifuge.

Opportunities throughout your process





An example of the solids fraction from a decanter centrifuge. Process residue (iron hydroxide) separated from the product as shown in the picture on the left.

electrowinning process generates waste such as crud and anode slimes. These residues and wastes contain a significant amount of product or chemicals, making the re-covery process a profitable opportunity.

Efficient recovery reduces operational costs

With 100 years of experience, Alfa Laval brings you cleaner, more efficient solid-liquid separation. We offer cost-effective solutions for recovery of products and chemicals from process residue and waste by using decanter technology. This improves overall productivity and reduces the operational costs.

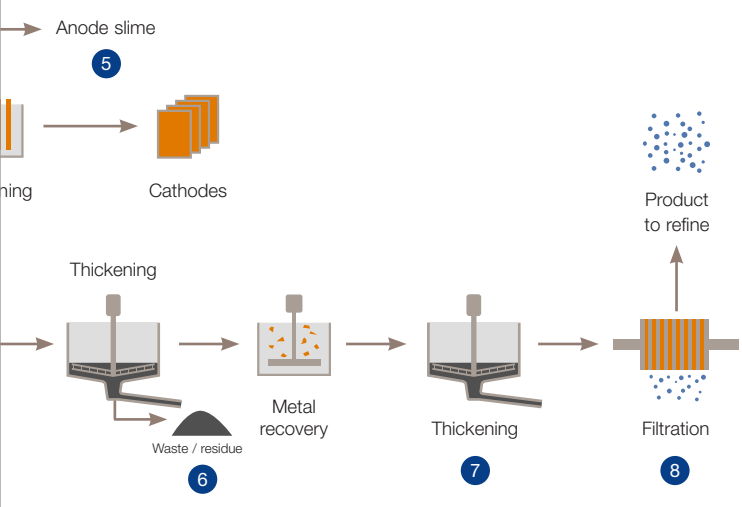
Alfa Laval's decanter centrifuges are the perfect choice if you want to recover your liquid chemicals in a fast, continuous process and ensure the removal of solids as a dry easy-to-handle fraction.

High separation capacity

Alfa Laval decanter centrifuges are designed based on decades of research and development in challenging industry applications to create solutions for product and chemical recovery. By combining unique bowl geometries, exceptional solids handling rates and an innovative separation configuration, we have set new standards for decanter centrifuge capacities. We provide machines for both 2-phase and 3-phase separation.

Application-specific materials

We offer a wide range of stainless steel grades and duplex materials, which ensures a fit-for-purpose material is selected that can maximize protection against corrosion to secure the longest possible lifetime of your equipment. We protect against abrasion by adding tungsten carbide to all surfaces exposed to abrasive materials. Different types of tile can be added to protect the conveyor and, if required, we can also provide machines for explosion proof areas.



Potential decanter applications

1. Solid-liquid separation and washing (replacement of thickeners / washers)
2. Thickening of concentrate (thickener replacement)
3. Concentrate dewatering (filter replacement)
4. CRUD treatment to recover organic solution
5. Anode slime dewatering to recover solution / recover valuable metals from sludge
6. Waste / residue dewatering to recover product / dry waste disposal
7. Product thickening (thickener replacement)
8. Product dewatering (filter replacement)

A typical example of an Alfa Laval decanter centrifuge installed on a refinery plant. A fully covered process, continuously running and with a limited need for operator surveillance. Here shown in a duty/standby installation that gives a maximum flexibility during operation.

Automatic cleaning

Our decanter centrifuges feature automatic Cleaning-in-Place (CIP) programs specially adapted for your application including programs for cleaning out deposits on the bowl and the cover. The bowl is automatically cleaned inside and outside in a special step-by-step sequence. The entire cleaning process takes place in an enclosed environment, independent of operator action.

Accurate control

The 2Touch control system automatically adjusts operation of the decanter according to changing conditions, such as variable flow rates and solids concentration. This guarantees high dryness of the solid fraction, stable operation, the lowest possible energy consumption and minimum wear and tear.

Maintenance and service

Wherever you are, support from Alfa Laval is never far away. Our worldwide network of sales companies, service organisation and field service engineers are ready to provide assistance, rapid support and ongoing optimization. Our close cooperation with customers in nearly 100 countries is a source of valuable feedback for our research and development team, giving us an edge in the development of market-leading technology.

Selected references

Alfa Laval has full-scale references worldwide for different applications and has also carried out extensive testing and laboratory analysis on numerous types of slurry.

Country	Decanter	Year	Application
Australia	P2-505	2016	Nickel refinery
Madagascar	P2-705	2015	Nickel refinery
Congo	P1-200	2015	Copper refinery
Chile	P2-325	2012	Copper refinery
Australia	P2-520	2010	Copper refinery

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com.