Salt Partners

ALUSAL® technology recycles flux salt from aluminium smelting slag economically

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EuSalt General Assembly and Conference, 22-24 May 2019, Hotel Nhow, Rotterdam, Netherlands

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How did the MD Recycling story go

- 1.6.2007: Email from Mike Gill, MD Recycling, Tennessee;
- 18.2.2008: Aluminium Slag Salt Recovery Test Report presented;
- 10.6.2008: Supply contract signed;
- 6.10.2008: Engineering Design Package delivered;
- 15.8.2009: Plant tested and Acceptance Certificate signed.

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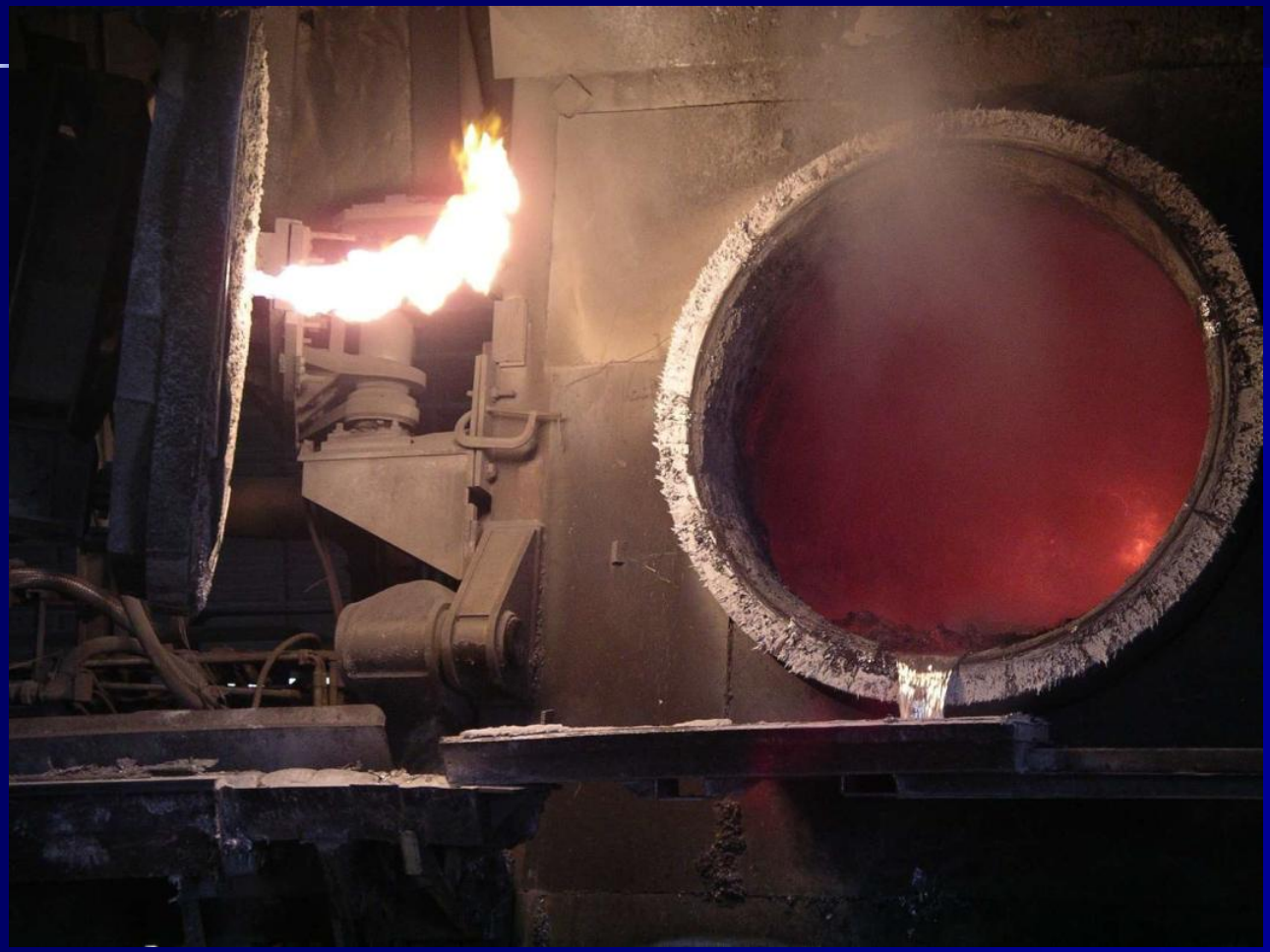
Molten aluminium discharge from rotary furnace



Molten aluminium is covered by molten flux salt, a mixture of salt (NaCl), potash (KCl) and sodium hexafluoro-aluminate (Na3AlF6, cryolite) to prevent oxidation

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Molten aluminium pours to ingot forms

Molten aluminium pours to ingot forms on a carrousel to cool down and solidify

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Hot dross – salt cake – is discharged to steel containers

Dross consists mainly of salt and aluminium oxide but it contains a significant percentage of aluminium, still pouring from the rotary furnace.

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Hot dross is cooled in dross cooler and aluminium is recovered

Dross cooler is on the right.

At the back is a crusher, a ball mill, metal separator, rotary screen, bucket elevator and a salt cake silo.

Big bags with crushed dross are on the right.

The piping belong to the de-dusting system.

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Site of the future flux salt recovery plant

Dross disposal is expensive. When wet, it forms smelly gasses. It must be stored dry.

At the same time, it contains valuable flux salts.

It makes a lot of sense to recover the salts.

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Signing of contract

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On 10.6.2008, MD Recycling signed a contract with Salt Partners for supply of HYDROSAL ® flux salt recovery plant.

The technology was later registered under the Trade Name ALUSAL®

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What is ALUSAL®?

ALUSAL® is a flux salt recovery and recycling technology.

ALUSAL® consist of:

- **Dross crushing, milling, screening and metal aluminium separation;**
- **HYDROSAL® dross desalting and near saturated brine production by counter-current hydroextraction;**
- **Evaporation and crystallisation of flux salts;**
- **Drying, handling, packing, etc., of the products.**

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What is HYDROSAL®?

HYDROSAL® is a counter-current process for separation of more soluble components from less soluble components by hydroextraction.

The less soluble components can be salt crystals or other solid particles.

The more soluble components can be magnesium salts present in sea salt or flux salts present in dross.

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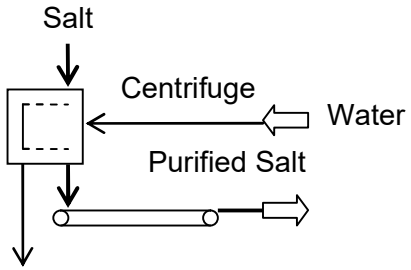
Conventional Process

Centrifuge or filter separates solids and brine

Conventional washing with water in the centrifuge or on the filter



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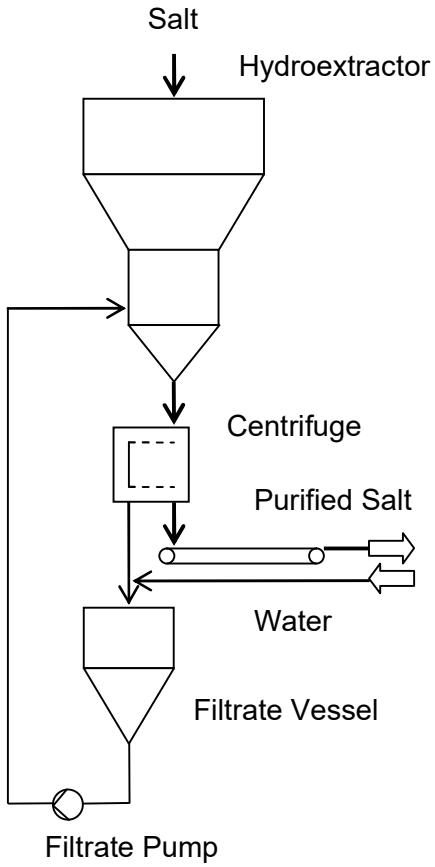
HYDROSAL Process

Dissolving of salt fines in water and using this pure brine to remove impurities from salt in the hydroextractor in counter-current flow



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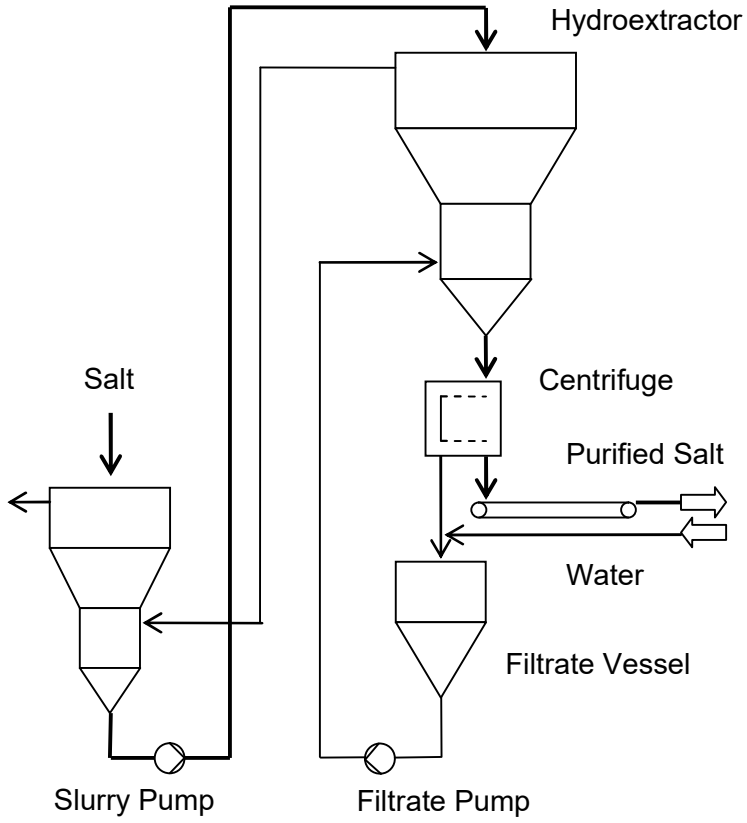
HYDROSAL Process

Hydraulic transport of salt or dross to the hydroextractor and return of the transport brine to the elutriator



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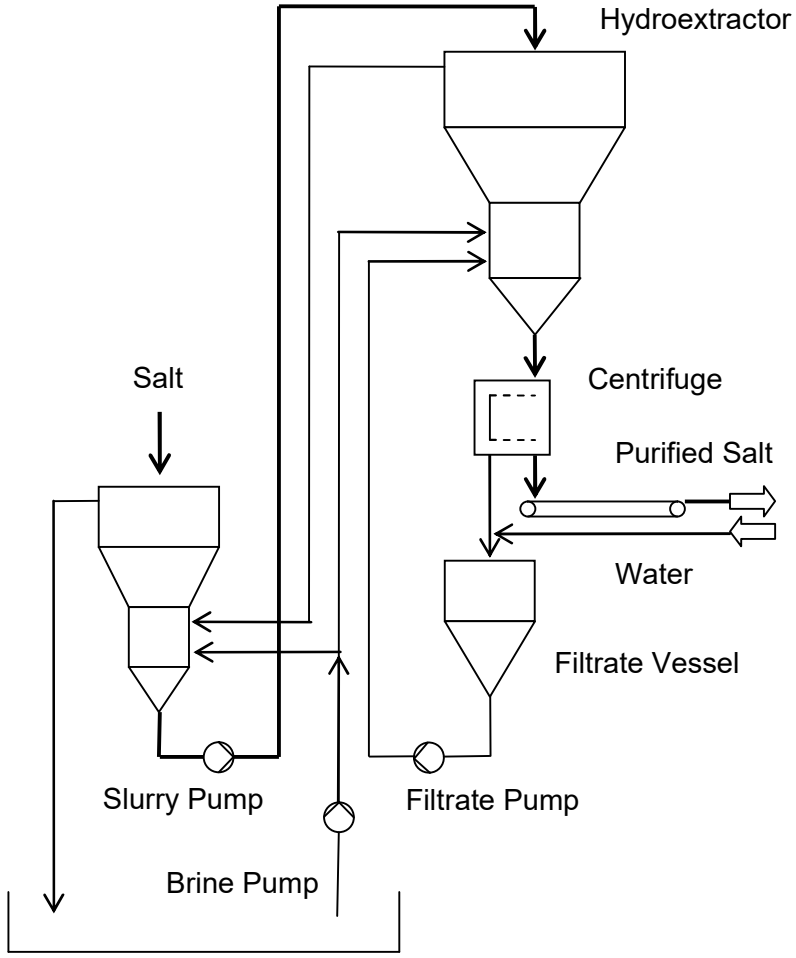
HYDROSAL Process

Circulation of impure and near saturated brine to control hydroclassification and elutriation efficiency.

Recovery of fines by settling or filtration.



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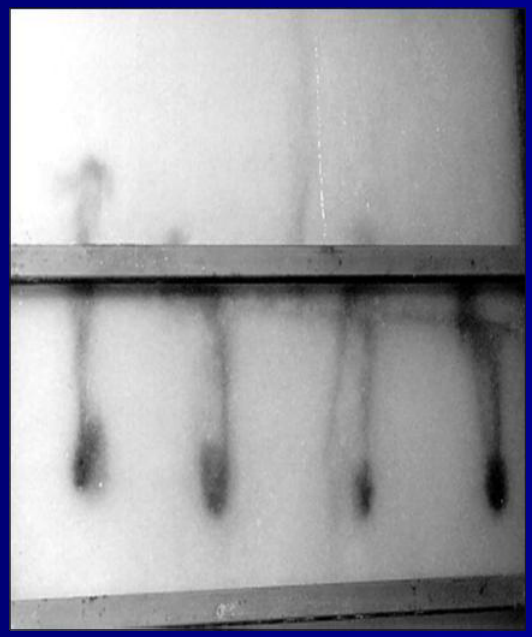
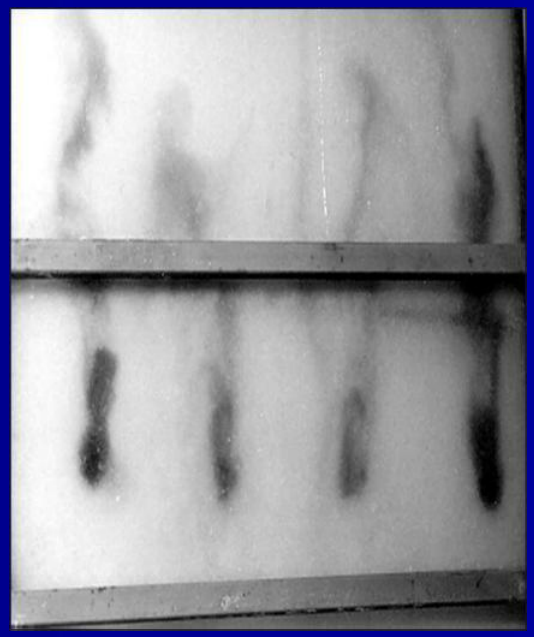
Hydroextraction with counter-current flow

Picture 1: Injection of black ink into brine flowing upwards through salt flowing downwards in plug flow



Picture 2: Black ink flows upwards with brine in counter-current flow



Picture 3: Second black ink injection. There are no traces of black colour in the salt flowing downwards in plug flow

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Flux salt recovery plant completed, ready for commissioning

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After only 10 months, the plant components were procured, fabricated, delivered and the plant was erected.

From left to right:

- **Crystalliser**
- **Cooler / boiler**
- **Brine tanks**
- **Hydroextractor**
- **Filtrate vessel**
- **Filter**

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Hydroextractor

View from the floor

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Hydroextractor

Examining the level of the solids in the hydroextractor to determine the correct operating conditions

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Rotary filter

Rotary filter for the desalted aluminium oxides (slag)

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Flux salt recovery plant, brine section

Tanks holding the near saturated brine recovered from the dross.

Filtrate vessel in the front.

Desalted slag screw conveyor on the left.

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Flux salt recovery plant

Evaporator / crystalliser in the background, brine tank in the front, hydroextractor on the right.

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Evaporator / crystalliser

- Single stage
- External circulation
- Large elutriation leg
- Vapour condenser on the left

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Flux salt recovered from the dross

Flux salt dewatering on a vibrating screen

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People who made it possible

Mike Gill

General Manager

Cleaning blocked holes of elutriator distributor

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People who made it possible

Dale Haberny

Chief Erector and Fabricator

Industrial Furnace Technician

If You See Me Running, Try To Keep Up

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Day of plant acceptance

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To whom it may concern

Acceptance Certificate

regarding

Supply of basic engineering services for a HYDROSAL slag desalting plant by Salt Partners Ltd., Zurich, Switzerland, www.salt-partners.com to MD Recycling Inc., Midway, Tennessee, USA.

We herby certify that Salt Partners Ltd. completed the captioned basic engineering services in accordance with the Agreement dated 9. June 2008 to our full satisfaction and the slag desalting plant has been accepted by MD Recycling Inc. as of the date hereof. We recommend Salt Partners to any interested party for carrying out similar basic engineering work in the future.

MD Recycling Inc.

Michael Gill
General Manager / COO

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Why not turn your salt cake into gold?

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