

Lithium processing technology

Indirect rotary cooler



Optimize your beta spodumene cooling

Spodumene phase conversion is an energy intensive process that requires temperatures up to 1100°C in the rotary kiln. With such high energy input, it is essential that measures are taken to recover and reuse as much of this energy as possible.

The unique design of our Indirect Cooler enables our customers to recover a significant portion of the sensible heat in the hot beta spodumene, and by doing so, lower the specific fuel consumption and associated carbon footprint by up to 30% compared to other cooler designs.

The FLSmidth advantage

We have more than 20 years' experience providing market-leading lithium processing solutions. We have thousands of pyroprocessing references worldwide in the mining industry where product heat recovery is incorporated to minimize the process fuel consumption and carbon emissions. Bringing all this expertise to bear, we have developed a new beta spodumene indirect rotary cooler with heat recovery.

Key benefits

- No fines returned to the kiln
- Reduces fuel consumption by 20-30%
- No direct water consumption
- Low solids temperature ~ 100°C
- Optimize residency time
- Prevent air leakage and dust emissions
- Low-maintenance, high-reliability

How does it work?

Direct heat recovery from beta spodumene is challenging because direct air contact with the spodumene entrains the fine fraction of the material and recycles it back into the rotary kiln.

This fines entrainment in the secondary air compromises process stability, adversely impacts conversion, promotes sintering behavior, and reduces overall rotary kiln system efficiency. We've eliminated these issues with the introduction of our unique and robust indirect rotary cooler design.

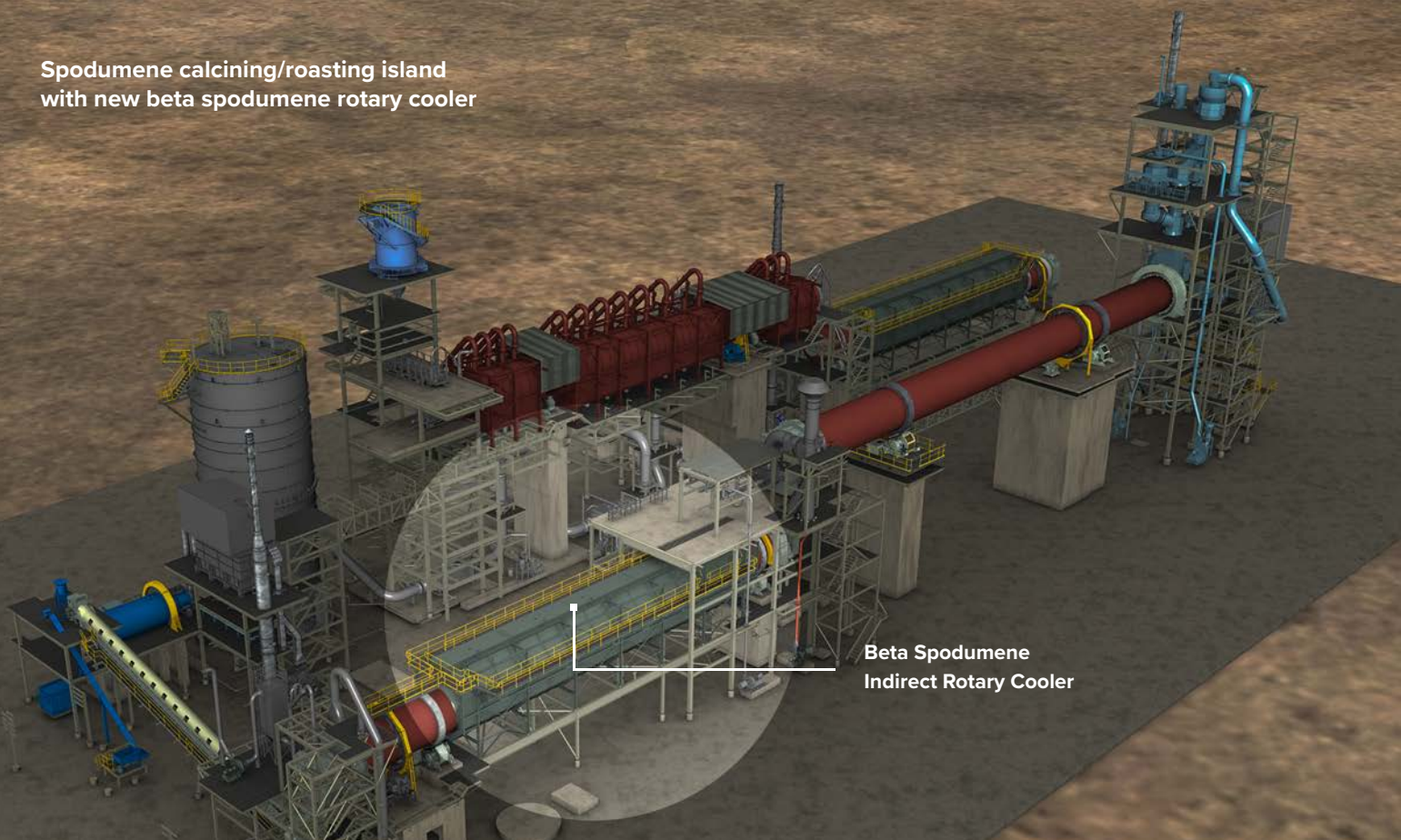
This cooler allows for the indirect transfer of energy from the hot beta spodumene to the secondary air stream producing clean preheated secondary air and avoiding any entrainment of beta spodumene fines. The result is reduced fuel consumption and recovery of all beta spodumene in the process.

Sustainable lithium

With lithium demand set to soar on the back of demand for batteries in electric vehicles and energy storage systems, improving the sustainability of lithium production is vital.

Designed specifically for the lithium market, our innovative cooler captures waste heat from cooling spodumene and returns it to the kiln. In doing so, it reduces energy consumption in the rotary kiln by up to 30%. That not only lowers your fuel costs – and therefore boosts your bottom line – it is also a key step in improving the sustainability of your spodumene processing operation.

**Spodumene calcining/roasting island
with new beta spodumene rotary cooler**



**Beta Spodumene
Indirect Rotary Cooler**

Designed for optimal spodumene cooling

Heat recovery isn't the only benefit of our spodumene cooler. From inlet to outlet, we've designed it for highly controllable, efficient and reliable operation.

Solving the fine spodumene challenge

To overcome the challenge posed by those beta spodumene fines, our cooler is designed for indirect heat exchange. As the hot beta spodumene flows through the cooler, heat is transferred into a secondary air stream flowing through pipes inside of the cooler. Flowing in a counter current to the spodumene, the secondary

process air is heated to between 500°C and 600°C before exiting the cooler, when it is ducted to the firing hood on the rotary kiln. This indirect cooling eliminates the risk that fine beta spodumene will be returned to the kiln.



Reduces fuel consumption of the process by 20-30%

Some 40% to 50% of the spodumene sensible heat is transferred to the secondary air stream – dramatically improving the efficiency of the thermal process, reducing kiln fuel consumption and reducing the carbon footprint of the kiln system.

Eliminates direct water consumption for product cooling

Indirect water cooling via external water cooling of the cooler shell allows cooling water to be recycled and re-used in a closed-loop system. This reduces the water intensity of spodumene processing – another sustainability win, particularly in areas of high water stress, like Australia, where much of the world’s spodumene is mined.

Dual cooling for low final product temperatures

The combination of indirect air and water cooling ensures spodumene exits the cooler at a guaranteed final temperature of around 100°C.

Optimize spodumene residency time in the cooler

Entering at about 1075°C, the hot beta spodumene will generally take 30 – 40 minutes to flow through the cooler. Variable speed control allows for maintaining the optimum residence time required for solids cooling.

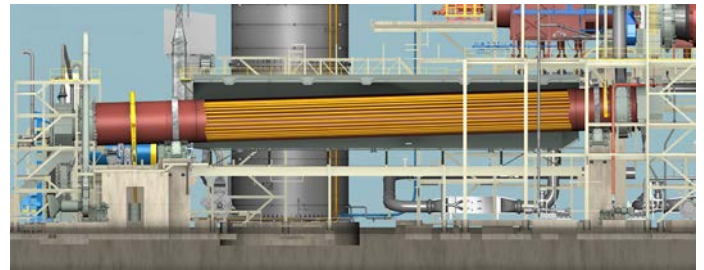
Prevent air leakage

The cooler features low-maintenance carbon contact seals between the rotating shell and hoods, preventing air leakage and dust emissions. Meanwhile, an isolation airlock at the cooler feed inlet prevents process gas transfer from the rotary kiln and into the rotary cooler.

Designed for low-maintenance, high-reliability operation

Internal tumblers manage the flow of spodumene through the cooler, greatly reducing shell and pipe wear – and the need for maintenance. We have also designed easy access to the air pipes to reduce the complexity and time for replacement.

The result is a cooler that will operate with high availability and reliability, leaving you free to focus on other areas.



Indirect rotary cooler - cutaway showing internal air pipes



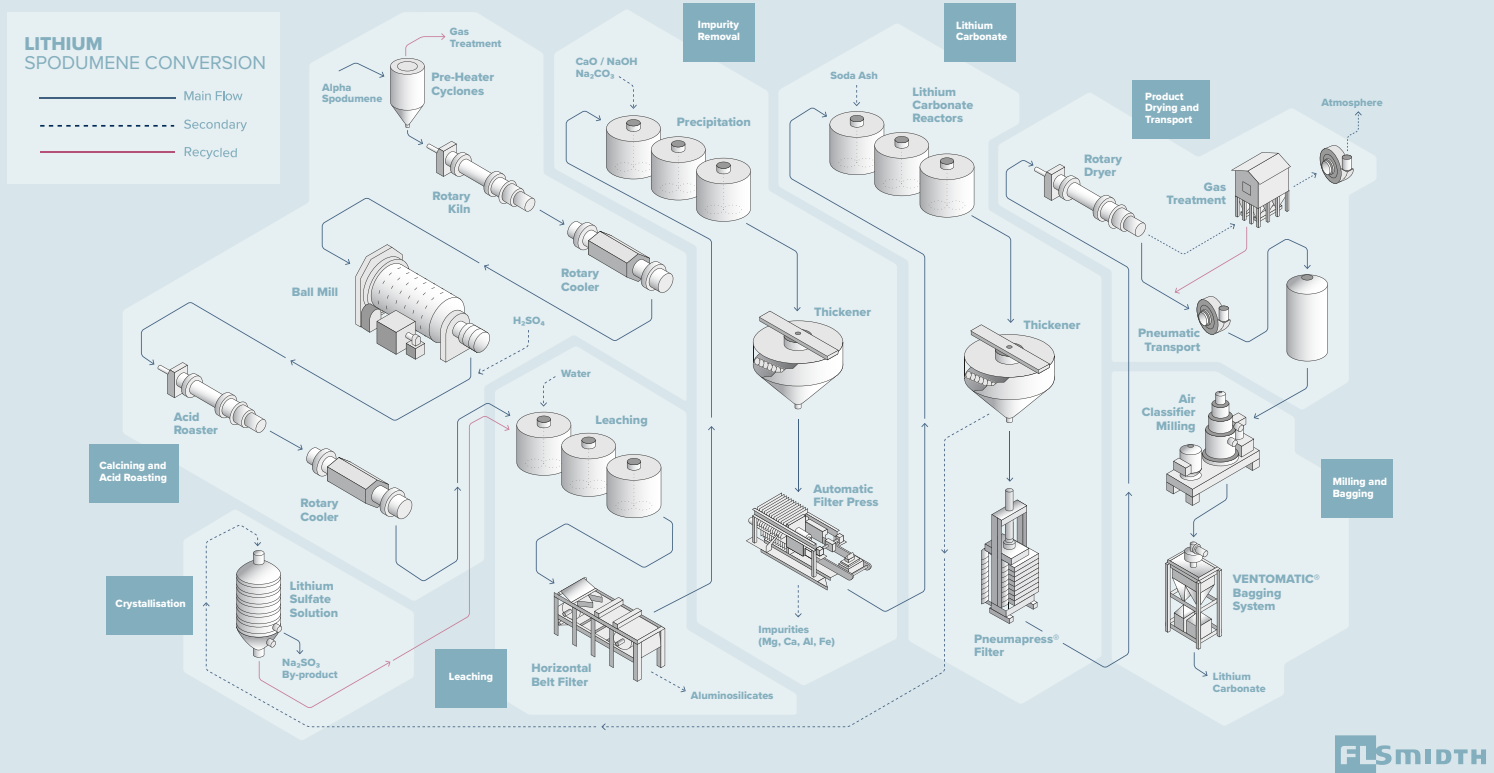
Completed rotary cooler awaiting transport to a new lithium refinery



Internal air pipes

A complete solutions provider

Our indirect spodumene cooler is just one element of our complete spodumene processing solutions. From initial roasting of the alpha spodumene concentrate, through sulphating of the beta spodumene, to refining and bagging of the final lithium carbonate, we have everything you need.



Partner with the process experts

We're more than just an equipment supplier, however. We offer a range of expert testing and engineering services too.

Testing

We have a number of best-in-class testing centres for spodumene ores, including mineralogical and process testing facilities.

Engineering services

Our full-time engineering team offer process flowsheet, plant layout and design to achieve best-possible performance of your spodumene processing operation.

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Mission Zero

TOWARDS ZERO EMISSIONS IN MINING



Zero water
waste



Zero
emissions



Zero energy
waste

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