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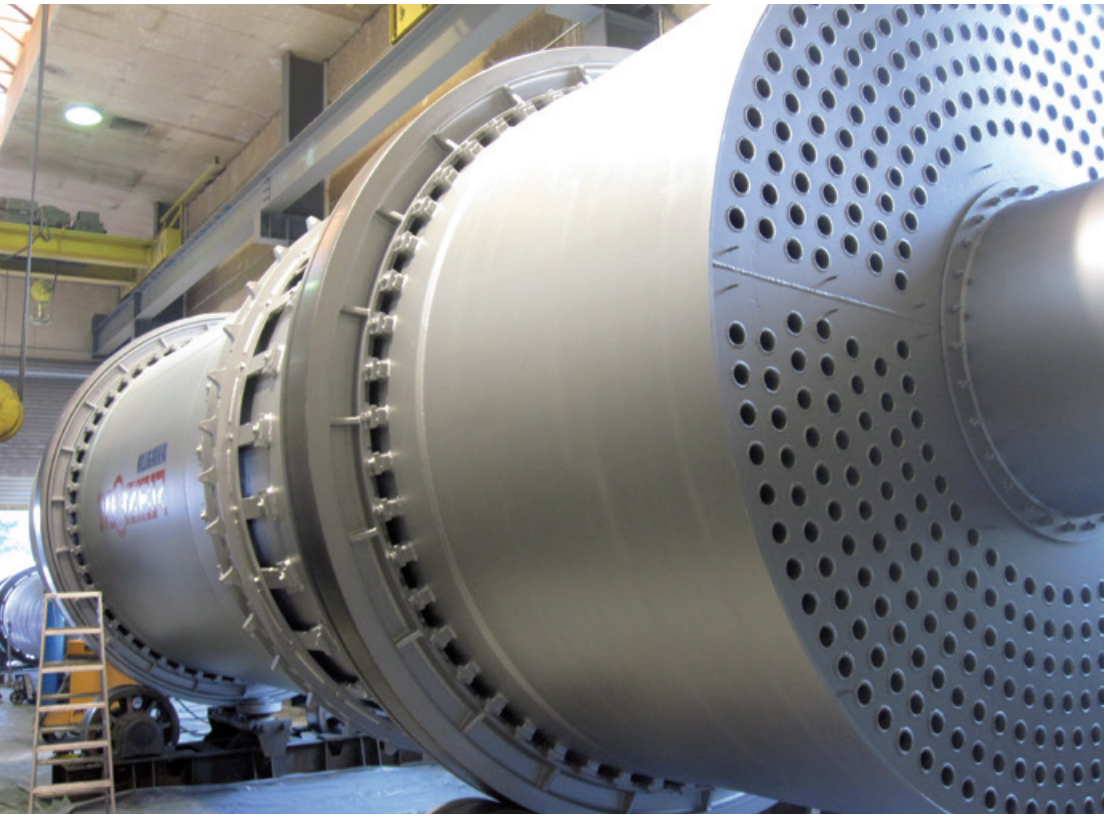
Indirect Rotary Drum Coolers

Cooling hot bulk materials



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Cooling hot bulk materials with indirect rotary drum coolers

The application

Many bulk materials such as powdery or granulated products have to be cooled before further processing, either due to the limited:

- temperature resistance of the downstream equipment or the
- silos and packaging containers or for
- heat recovery from the hot product.

The hot products can be cooled convectively by contact with air (or other process gases, e.g. nitrogen). In this process, the cooling air flows around or through the products in direct contact. The fine solid constituents that are carried along in the cooling air must consequently be removed from the cooling air by means of waste air filtering systems, in order to either:

- recover the transported solid materials, or
- meet air purity requirements, or
- process the hot waste air for use in other processes steps, or
- return it to the cooler.

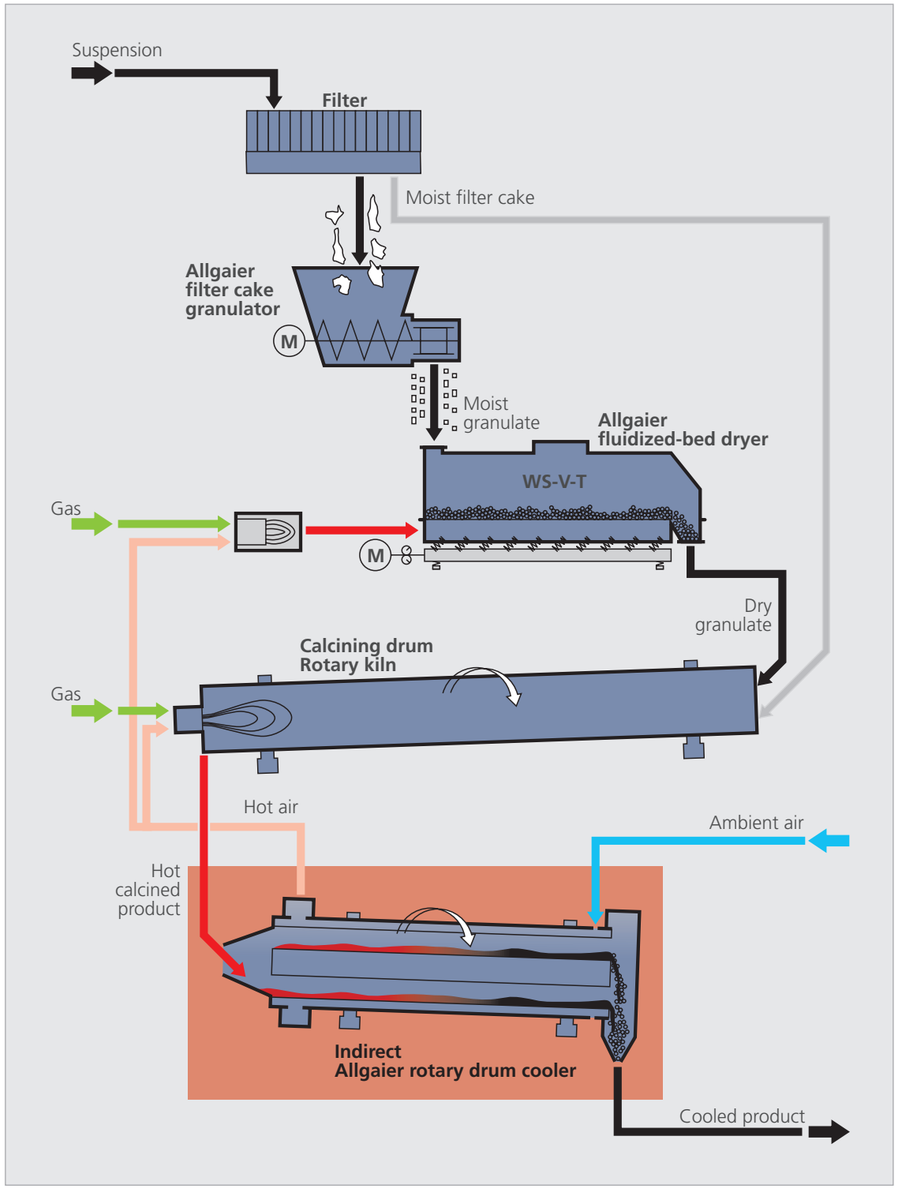
Indirect cooling represents a very effective alternative for direct product cooling with air.

In this case, the hot solid material is moved on one side of a separating wall, while the air cools the wall from the other side without coming into direct contact with the bulk material.

Indirect coolers offer the following advantages:

- No need for filter systems for subsequent treatment of the hot air from the cooler
- The cooling air moves in a counter-flow direction, even with very fine products, which provides for a very effective exchange of heat
- The solid material is separated from the cooling air, which allows for inert operating mode of the cooler, if required.

Heat recovery provides for the added benefits of reduced fuel consumption and energy costs, and also protects the environment.



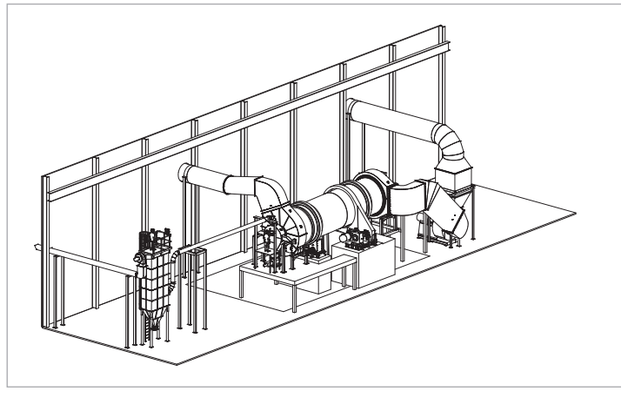
Sample application for an indirect rotary drum cooler

High evaporative capacity in a small area

Two solutions

The type RKT rotary drum cooler is suitable for very hot products, ≤ 1100 °C (2000 °F), such as those found in the calcining processes from rotary kilns. Other applications include the manufacturing of titanium dioxide, hydroxides and fillers, and pigments. As a rule, the solid materials are cooled down to temperatures of approx. 150 °C (300 °F).

The type KTR rotary drum cooler is primarily used for cooling hot, powdery products that are ≤ 300 °C (570 °F), gypsum or ground slag. In this case, the solid materials are cooled down to temperatures of approx. 80 °C (175 °F).



High-temperature cooler type RKT for high-temperature applications

In the high-temperature cooler type RKT, the very hot solid material is loaded through a rotating loading funnel into several cooling tubes in a planetary arrangement. The inclination and rotation of the cooler moves the hot product through the cooling tubes and towards the outfeed housing. The ambient air used for cooling is guided around the tubes in a counter-flow manner within the cooler housing. Due to the high temperature differences, there is a very effective heat transfer from the hot product through the walls of the cooling tubes into the cooling air. This cools the solid material and heats the air, without the two media being in direct contact with one another.

The temperature of the hot air from the cooler, heated by the process, ranges from 150 to 250 °C (300-480 °F) and is free from dust. Ideally, it can be used as preheated combustion air for the burners of the rotary kiln, for drying damp materials or other heating purposes, which significantly reduces fuel consumption and cost.

And the high rate of heat recovery, 200 kWh per ton of cooled solid material, provides for a very short pay-back time on the investment – which can be less than once year in some cases.

Furthermore, the RKT cooler is extremely robustly built in order to meet the exacting requirements on process reliability and service life.

Rotary drum cooler type KTR for the medium temperature range

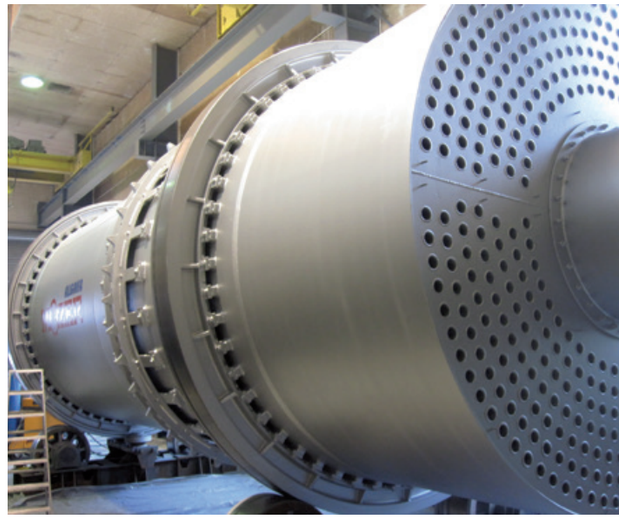
In the rotary drum cooler type KTR, the cooling air is channeled through a large number of small-diameter tubes and the hot, powdery solid material is cooled as it trickles in between the tubes while the drum rotates. At the same time, the hot material moves from the drum's infeed towards the outfeed due to the inclination of the drum. The large number of cooling tubes creates a very large heat exchanger surface area, which is why the KTR rotary drum cooler can also be used very effectively for cooling hot products in the 250- or 300 °C (480-570 °F) range.

Typical applications for this type of cooler involve cooling gypsum or processing ground slag in the cement industry.

Your benefits

Allgaier indirect rotary drum coolers offer a wide range of benefits for your production process:

- Heat recovery from the hot solid material
- Primary energy and fuel savings
- Short pay-back time on the investment
- Robust design with a long service life
- Dust-free waste air from the cooler for use in other process stages
- Elimination of waste air filter systems



For retrofit applications, Allgaier supplies indirect tube-bundle heat exchangers for cooling hot bulk materials in various temperature ranges. In high-temperature applications, the solid material to be cooled moves within in the tubes and the cooling air is channeled around them. In medium-temperature applications, however, the solid material trickles around the cooling tubes.

Both cooler solutions permit heat to be recovered from the hot products, and due to the indirect heat transfer, they do not require any filter systems for the hot air discharged from the cooler. And because of heat recovery, these coolers reduce production costs and offering short pay-back times.

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