

Are your operation maintenance-free with no need for element replacement?

CASE STORY · ALUMINUM SLAB HEATING BEFORE ROLLING · KANTHAL® AIR HEATING CASSETTES

Norsk Hydro is an industrial company based on the use of natural resources, producing energy, materials and food products. The company's aluminum activities, organized into four divisions, are fully integrated – from raw materials through primary metal production to fabrication, to end products manufactured for complex aluminum applications.

THE CHALLENGE

Hydro Aluminium Rolled Products has two rolling mills in Norway and offers a unique combination of recycling-based, thin strip cast and surface critical special products.

Hydro Aluminium in Holmestrand, Norway, is the center for rolling with its own smelting shop and hot and cold rolling of aluminum slabs down to a thickness of 0.2 mm (0.008 in).

The total number of employees is 800 with about 250 in hot rolling.

Heating of 7-ton slabs before rolling

Preheating before hot rolling takes place in an electrically heated pusher type convection furnace originally built by Heurtey Italiana in 1985. The temperature is 590–600°C (1090–1110°F). The 7-ton slabs are produced at the smelting shop at Holmestrand and stored at the furnace. Production is continuous, stopping only for a couple of weeks at summertime for annual maintenance.



The pusher furnace at Hydro Aluminium Holmestrand with Kanthal air heating cassettes. The 7-ton slabs are heated to 600°C (1110°F) before rolling.

THE SANDVIK SOLUTION

From the start, the furnace has been equipped with Kanthal® air heating cassettes. An upgrading of the elements was carried out in 1990 and a change over to the latest design started in 1997. Today, there are eight heating cassettes in the furnace, four on each sidewall:

- Cassette 1 840 kW
- Cassette 2 840 kW
- Cassette 3 630 kW
- Cassette 4 420 kW

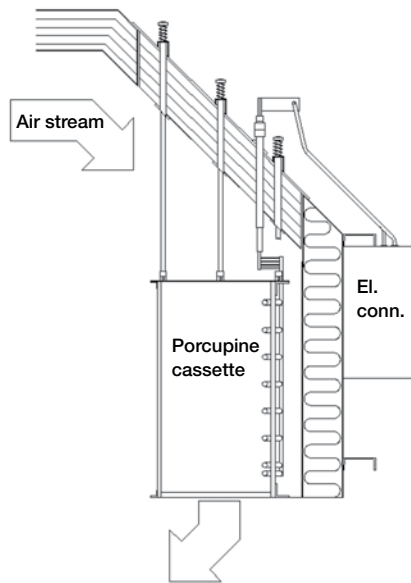
The total power is 5460 kW, which gives a production rate of about four slabs/hour.

Kanthal air heating cassettes are built in a modular system with heating elements of the “Porcupine” type with Kanthal AF 2.8 mm (0.11 in) wire. The key feature of the element design is that a very large proportion of its surface is in contact with the air. Heat transfer is therefore efficient and the turbulence of the air around the element prevents overloading. The elements are supported by ceramic tubes and mounted in stainless steel cassettes. The number of elements per cassette varies from 96 in the 840 kW type, to 48 in the 420 kW type.

The elements are connected in groups, each rated at 210 kW, thyristor controlled and connected on line voltage in four zones. In order to produce an optimal airflow, the furnace roof is built at a 45° angle above the cassettes and baffles guide the flow. The cassettes are mounted underneath and can be removed easily by lifting. The electrical connections are assembled in the space above the roof and consequently not subjected to direct heat.

THE RESULT

Kanthal® air heating cassettes are designed for maintenance-free operation over several years with no need for element replacements. In the extent of an element failure or broken ceramic tube, the whole cassette can be removed easily for repair, while a spare cassette is installed. At Hydro Aluminium Holmestrand, all expectations have been met fully and the large 5460 kW pusher furnace is running continuously and in accordance with production plans.



Kanthal air heating cassettes are mounted on to the walls and hang beneath the 45° roof. Baffles guide the airflow. The elements are mounted on to ceramic tubes, which are then inserted into a cassette with a sheet steel casing. Each wall has four cassettes; two rated at 840 kW, one at 630 and one at 420. The dimensions of each cassette is (L x W x H) 2000 x 820 x 1280 mm (79 x 32 x 50 in).



One furnace side with the electrical connections for two of the air heating cassettes, installed from the furnace roof.

Sandvik Group

The Sandvik Group is a global high technology enterprise with 47,000 employees in 130 countries. Sandvik's operations are concentrated on three core businesses: Sandvik Tooling, Sandvik Mining and Construction and Sandvik Materials Technology – areas in which the group holds leading global positions in selected niches.

Sandvik Materials Technology

Sandvik Materials Technology is a world-leading manufacturer of high value-added products in advanced stainless steels and special alloys, and of medical implants, steel belt-based systems and industrial heating solutions.

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CHALLENGE YOUR EXPECTATIONS

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