

ELECTRIC PROCESS GAS HEATING

AN ENABLER OF FOSSIL-FREE DRI



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Project Manager – Electric Process Gas Heating

SAFETY FIRST

Kanthal's objective is zero harm to our people, the environment we work in, our customers and our suppliers.



Protective equipment



First aid kit



Alarm



Emergency exit



Emergency number



Health & well-being



Assembly point



Psychological safety

CONTENT

COMPANY BACKGROUND

WHY ELECTRIFICATION?

ELECTRIC PROCESS GAS HEATING

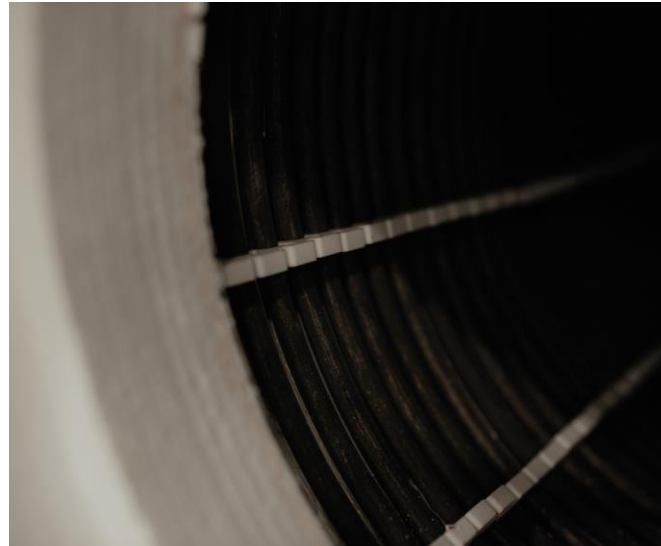
COMPANY BACKGROUND

KANTHAL – AN ALLEIMA COMPANY

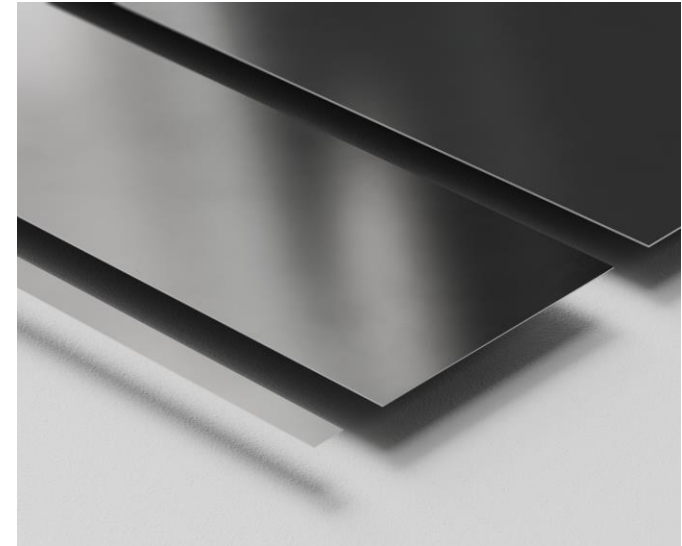
Three divisions in a decentralized set-up, revenues 2023



TUBE
14,475 MSEK



KANTHAL
4,609 MSEK

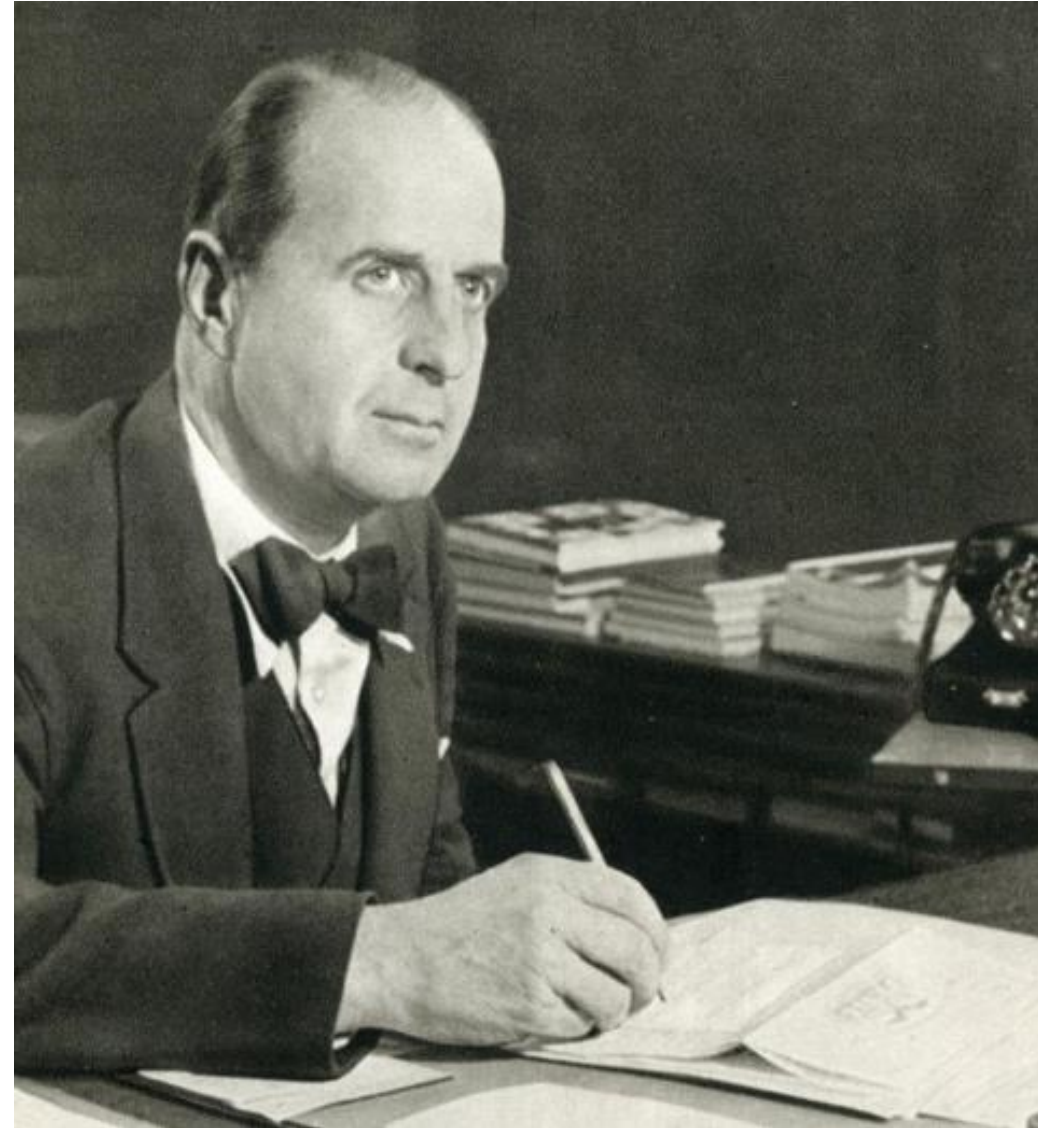


STRIP
1,585 MSEK

OVER 90 YEARS EXPERIENCE

- Pioneers in electric heating technology
- Hans von Kantzow invented the first FeCrAl alloy
- Founded Kanthal in 1931

KANTZOW+
HALLSTAHMMAR=
KANTHAL



KEY INDUSTRIES



Wherever you look, you'll find an application that was made possible by a Kanthal® product.

MATERIAL INNOVATIONS

**KANTHAL® A**

Patented in 1931

Outperformed existing NiCr alloys

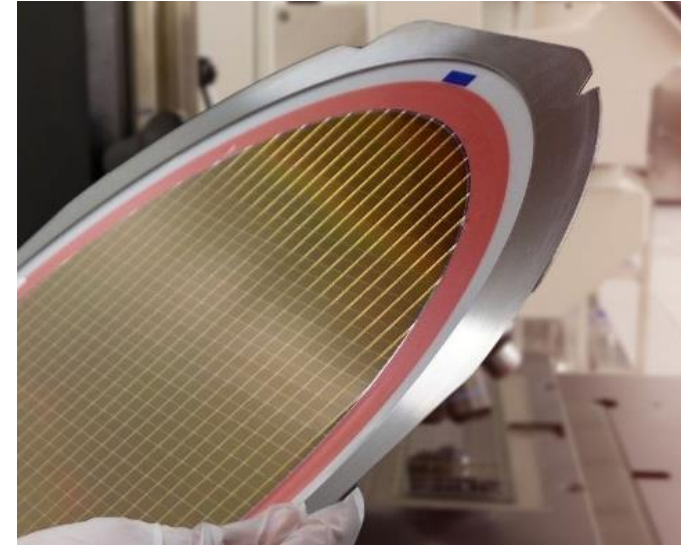
No. 1 choice for home appliances and electric radiators

**KANTHAL® SUPER**

Patented in 1956

The first commercial MoSi₂ material

Met need for high-quality resistance materials for high-temperature processes

**KANTHAL® APM**

Patented in 1986

Powder-based alloy

Great impact on production of silicon-based semiconductors

PRODUCTS AND SOLUTIONS



Resistance materials and heating solutions

- From **melt & powder** to **final product**
- **Metallic materials:** Wires, strips, tubes and plates
- **Heating elements:** Metallic & ceramic
- **Complete heating solutions**

WHY ELECTRIFICATION?

INDUSTRIES ARE FACING CLIMATE CHALLENGES

- Global policy and legislation
- Market and customer demands
- Higher cost of carbon credits
- Heating processes are energy-intensive while central to production
- Lack of clean electricity



ELECTRIFICATION BENEFITS

Five key benefits of electric heating compared with fossil-based solutions:

- Up to **95% efficiency**
- Excellent temperature control: **± 1°C**
- Reduction of **CO2 emissions**, zero if renewable energy is used
- Elimination of thermal **NOx** and **SOx emissions**
- **Safer** and **quieter** production environment



ELECTRIFICATION POTENTIAL IN STEEL MAKING

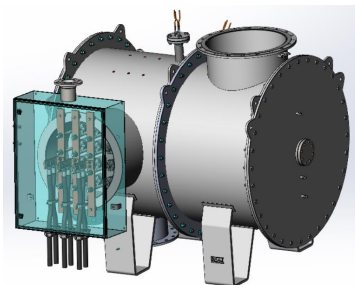
Ironmaking



Steelmaking



GAS HEATING



LADLE & TUNDISH HEATING



REHEATING



ANNEALING



ELECTRIC PROCESS GAS HEATING

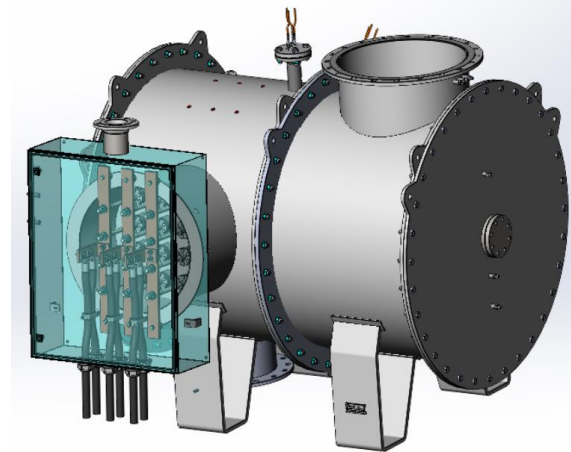
HIGH TEMPERATURE PROCESS GAS HEATING

- Introducing the **Prothal®** portfolio
- Revolutionizing process gas heating with **sustainable electric solutions**
- For diverse applications across industries such as **iron & steel, cement, petrochemical**, and **gas-to-electric conversions**
- Air and gas heating solutions under **development**



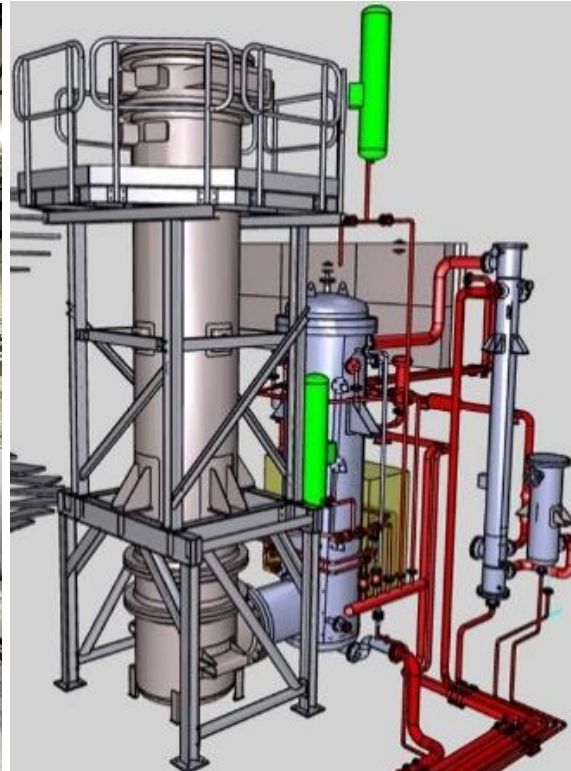
PROTHAL® PORTFOLIO

- Gas types: **Hydrogen, BFG, COG, Nitrogen, Air,** etc.
- **Direct** and **indirect** heating technologies
- High efficiency
- Outlet temperature up to **1,100°C**
- Customized options for **100 kW-100's MW** solutions
- Suitable for pressurized systems
- Low pressure drop
- High process controllability and uniform heat transfer



PROTHAL® TEST BENCH

The Prothal® test bench is a specialized facility designed to validate and support the development for electrical process gas heating.



- **Technical summary:**
 - **300 kW** pilot-scale test bench
 - **3 heater system** in the pressure vessel
 - **PED certified** with **ATEX certified** terminal enclosures
 - Pressurized **H₂** and **N₂** gas mixtures
 - Beyond **1000°C**
 - Closed loop system.
- **Validation and Support:** Supporting product development and commercialization of the Prothal® portfolio and electrical process gas heating.
- **Application target:** Primarily for Direct Reduced Iron (DRI) but also for other applications (up stream steel making, calcination, petrochemical, etc).
- **Market Expansion:** The test bench acts as a door-opener to new emerging market segments and facilitates application development.
- **Performance:** Multiple successful customer trials conducted in 2024.



**WE KNOW
ELECTRIC HEATING
TECHNOLOGY**

KANTHAL®

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PLEASE REACH OUT!