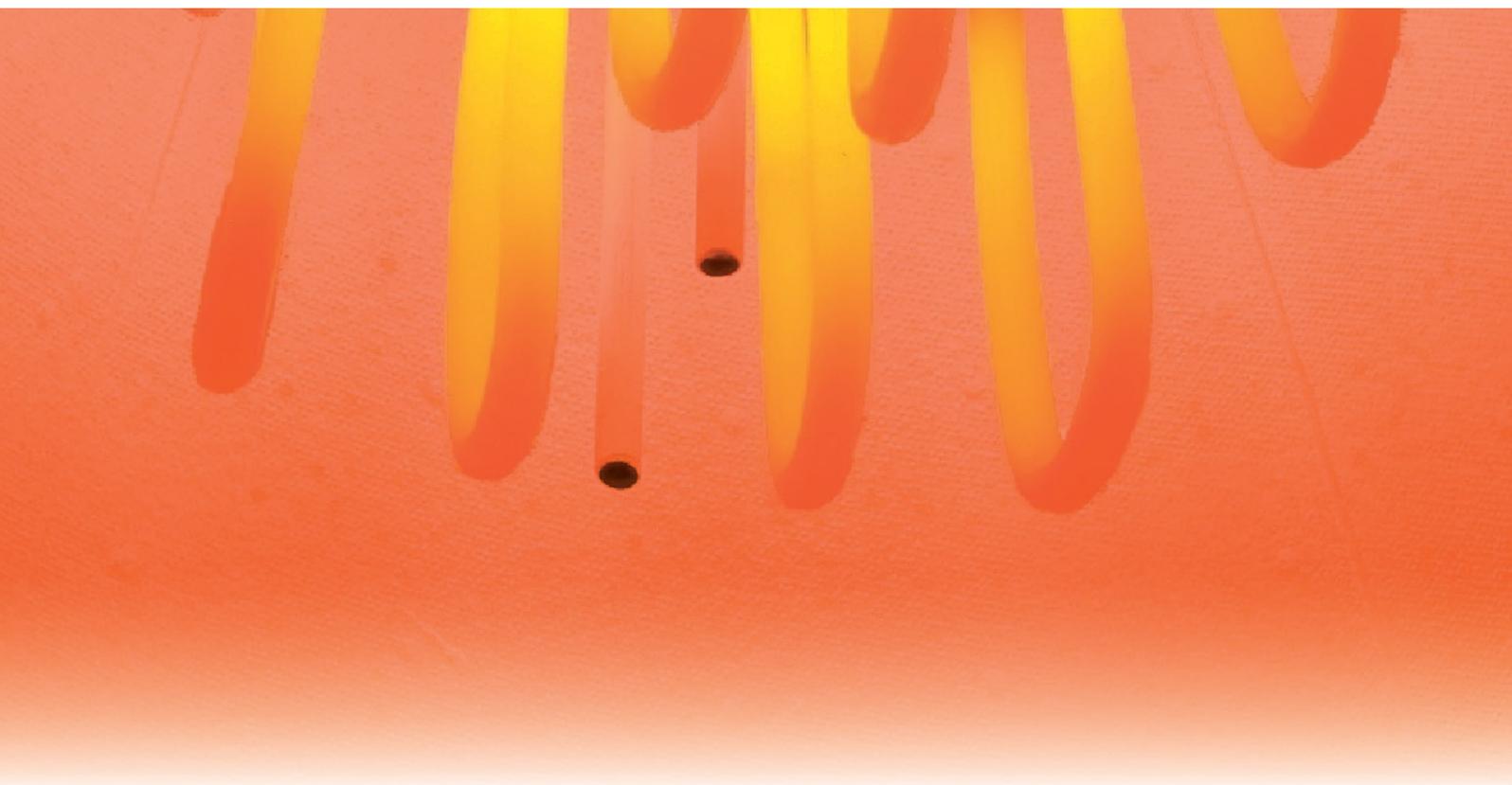


Electrical heating solutions for rodding shops



KANTHAL

Clean up your shop

Replacing gas burners with electrical heaters in your rodding shop can save you significant costs and generate substantial environmental and safety benefits.

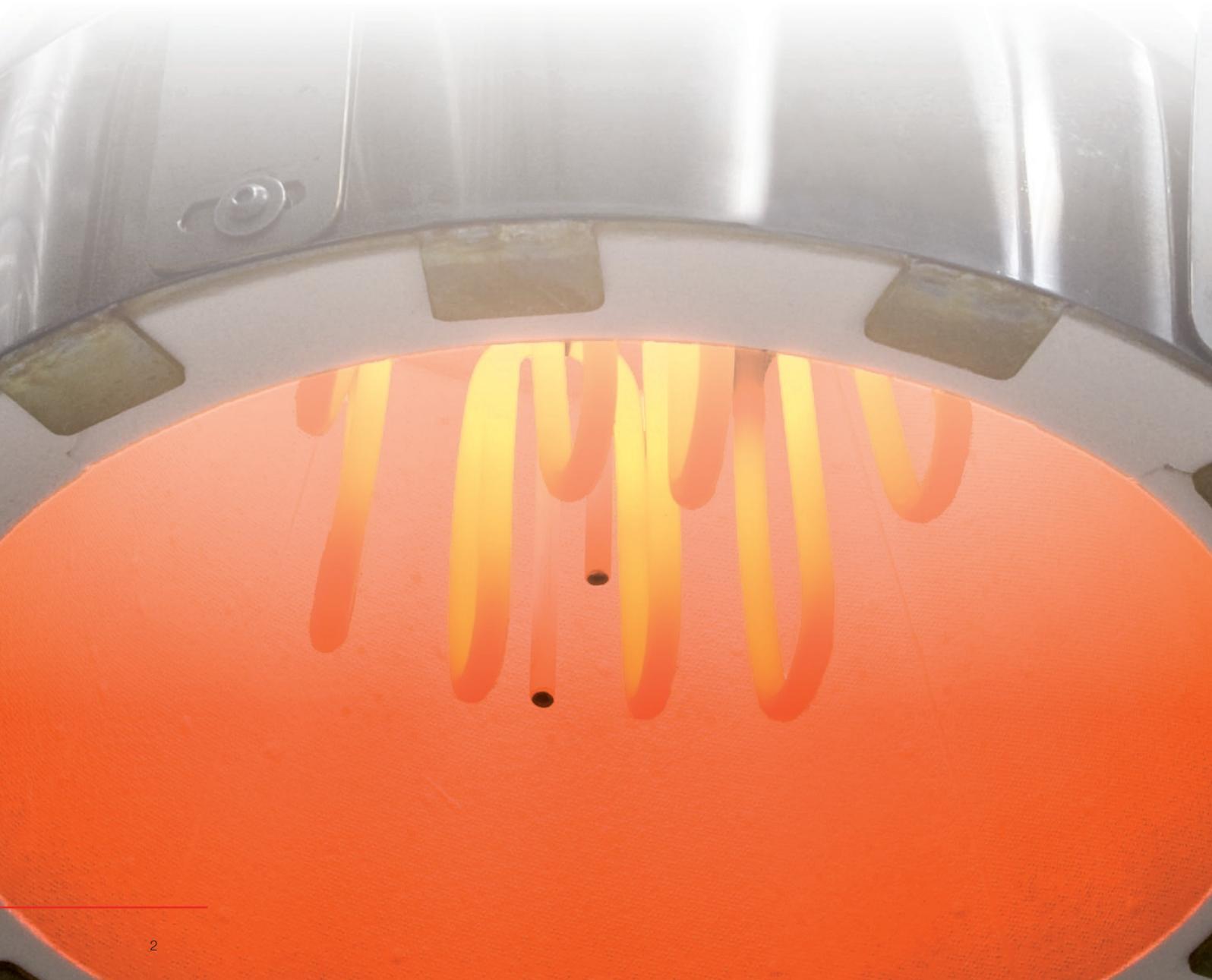
You not only achieve lower energy consumption, you also gain a much cleaner, safer and quieter environment, making it a more secure place for your operators.

Equally important, you reduce your greenhouse gas emissions to near zero—another step in your securing your reputation as an environmentally responsible corporate citizen.

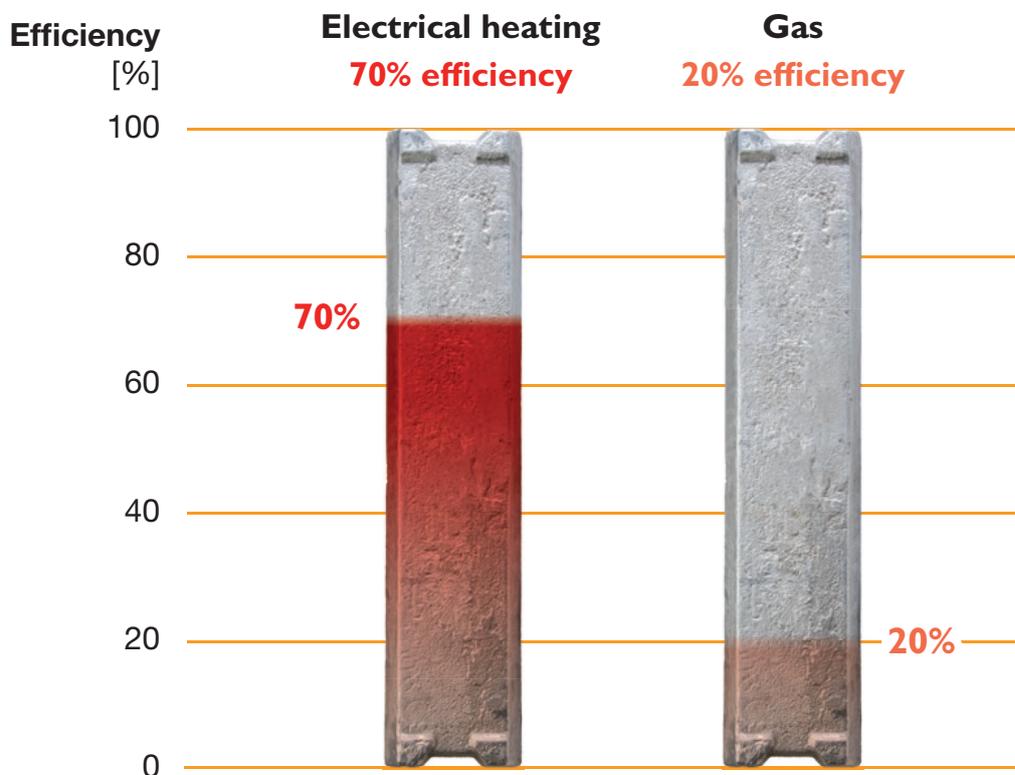
Paint it green

Although the rodding shop is only one of many steps in a primary aluminum processing plant, it is a critical one. With electrical heating from Kanthal, you have much more efficient pre-heating, re-heating and drying solutions for your anode blocks, stubs and ladles.

So why not turn your rodding shop into a green one? Following are some of the advantages of electric heating over gas in more detail.



Electrical heating compared to gas



Some key advantages over gas burners

- **Energy efficiency**

Open gas heaters are much less accurate than electricity. Energy efficiency is only 20% with gas, compared to 70% with electricity, which allows radiation to be accurately transferred to the target area within a specific amount of time.

- **CO₂ emissions reduction**

Less energy consumed results in less CO₂ emissions—a vital step in transforming your operations into a greener process.

- **Workers' health**

Gas, compared to electrical heating, generates a lot of noise and fumes and potentially unhealthy work environment.

- **Safety**

Greater accuracy ensures the object is exposed to radiation in a consistent way, ensuring the object is quickly and thoroughly heated, avoiding the risk of leaving behind residual moisture – a potentially explosive situation.

- **Reliable performance**

Unlike gas burners, electrical heating solutions offer a very even and controlled heating distribution that is consistent from batch to batch, ensuring reliably predictable results.

- **Low maintenance**

A burners require frequent adjustments and maintenance. Electric heaters are significantly more robust.

High efficiency heating in the rodding shop

Kanthal electrical heating solutions provide significant improvements over gas burners at critical stages in the rodding shop. In each process step, with the exception of the anode stub drying station. Kanthal heating solution includes a heating element located in a reflector arrange-

ment that allows the radiation to be more accurately directed towards the target area. This page presents some examples of specific benefits Kanthal provides for each of these stations:

Anode stub drying station

For safety reasons

Anode stubs must be heated up to at least 100°C (180°F) to remove any traces of water or vapor – a potentially dangerous issue that also deteriorates the quality of the welded joint.

Improved safety

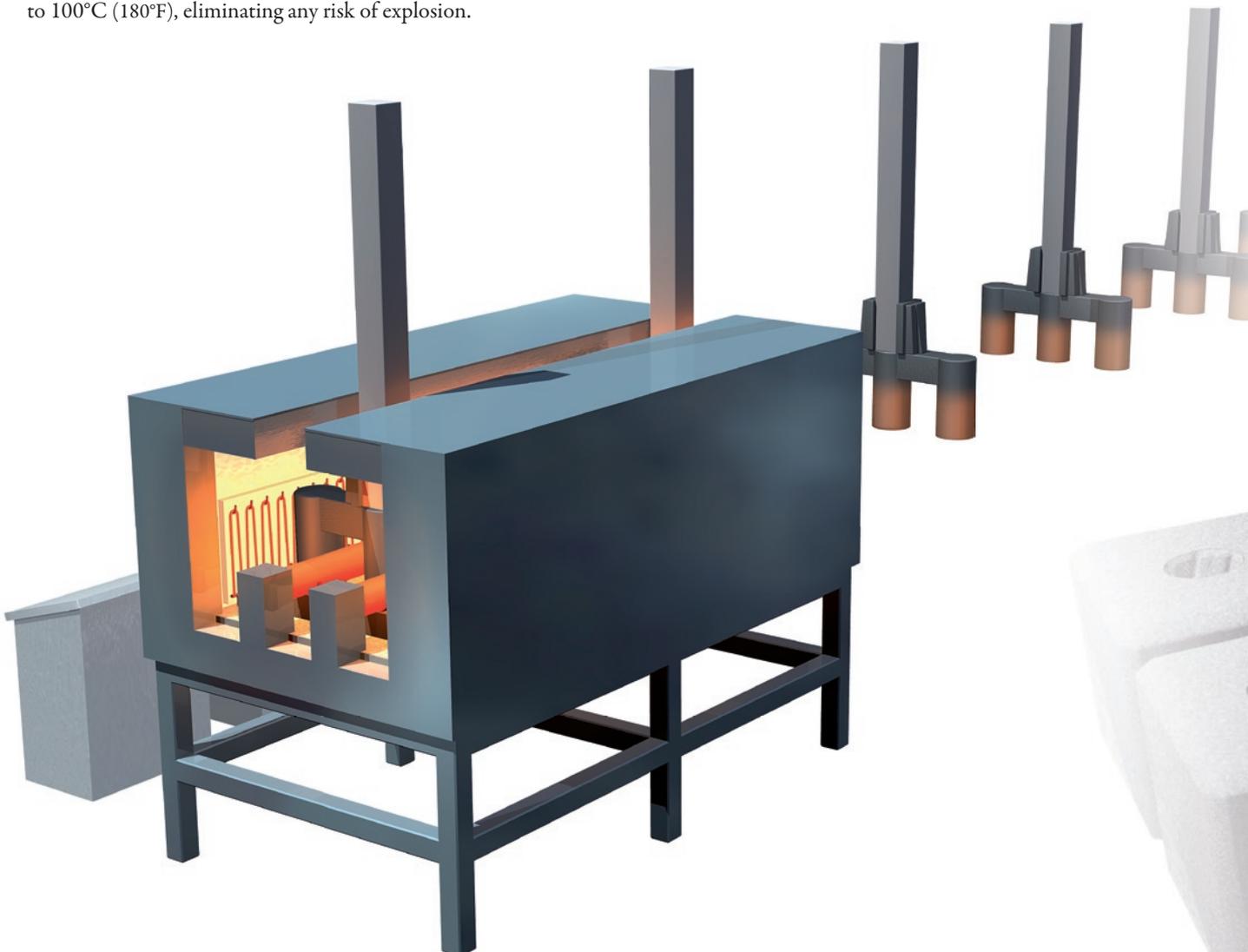
Kanthal high-density power radiating system ensures that any object prior to contact with liquid iron is brought up to 100°C (180°F), eliminating any risk of explosion.

Higher quality of welded joint

A perfectly dry stub contributes to a homogeneous welded joint free of porosity, ensuring minimized voltage drop over the thimble.

3–4 times more efficient

Open burners with atmospheric air mixture consume approximately three to four times more gross energy compared to electricity.



Anode pre-heating station

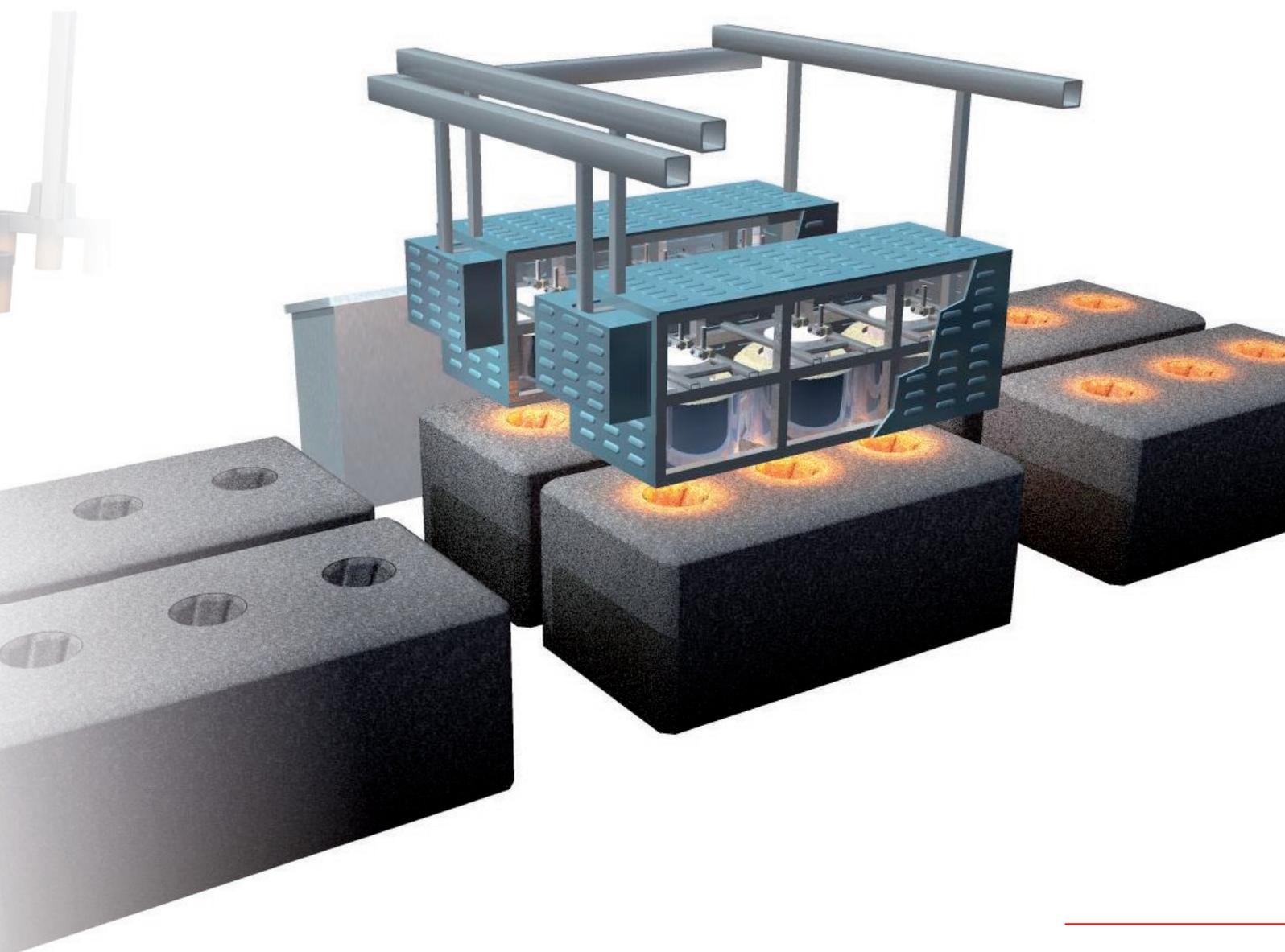
Prior to pouring molten iron into the anode slot, it is critical that the temperature in the slot is raised to about 100°C (180°F) as quickly (in less than 1 minute) and evenly as possible, improving the conditions for welding the stubs to the anode and securing the safety of the operation. The more even and thorough drying achieved by our electrical heating system contributes to minimizing the voltage drop over the timble.

Improved safety

Due to the porous nature of the material, anodes tend to accumulate some humidity during storing, which can result in an explosion, at worst, or a connection failure upon becoming energized. Kanthal highly focused reflector-based electric heating solution ensures more thorough drying.

Accurate heat transfer

Kanthal reflector technology is uniquely designed to provide focused radiation in to the stub holes only, and not on the anode block itself. That means that significant energy savings can be achieved. Electric heat transfer rate is 70% compared to only 20% for gas.



Ladle drying, ladle pre-heating and ladle holding station

With optimized curing during the dry out/baking process Kanthal solution ensure that the refractory lining lifetime is significantly extended. To both extend the life of a ladle and reduce the risk of thermal shock, ladles must be pre-heated to 1200°C (2190°F) before being filled with molten cast iron.

Kanthal solutions are more energy efficient, and provide dual functionality for both pre-heating and holding of liquid metal (valuable for when the anode rod mating operation is delayed for any reason).

Multi functionality efficiency

Replacing open-flame burner with more uniform Kanthal heating solutions, provides much greater efficiency and operating flexibility for ladle drying, pre-heating and holding.



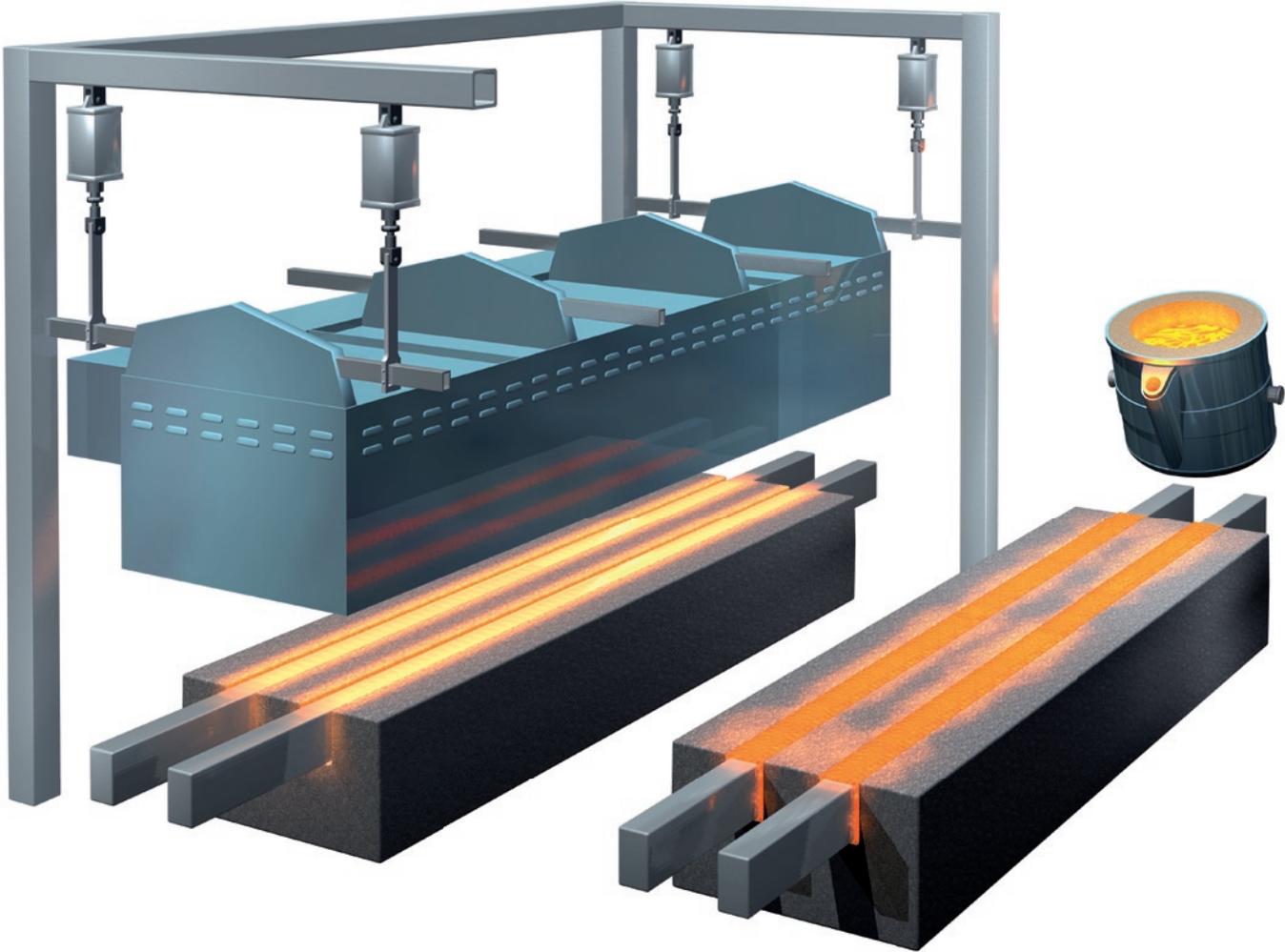
Cathode pre-heating station

By heating the pre-assembled steel bars and cathode block, Kanthal solution eliminates the need to move, lift and/or position hot steel bars, a potentially dangerous process. The Kanthal solution also ensures consistent bar positioning and cathode heating.

Simplified handling

Kanthal cathode pre-heating station deliver heat energy directly to the steel bars in the graphite block and provides indirect heating of the graphite slot. Huge energy savings

are achieved by eliminating the need for heating up the entire mass of the graphite block. Lifting and moving of hot and heavy bars by cranes and lifting devices is eliminated, greatly reducing the risk of accidents. This enables more efficient cathode handling and greater precision in positioning of the bars.



Case study:

Alcan Iceland Ltd. cuts costs by USD 100,000 annually

Since 2004, Alcan Iceland Ltd. has decreased the propane consumption overall by 39% by switching to electrical heating.

In the rodding room Kanthal replaced three open flame burners for anode pre-heating with three high power density heaters and thus achieving highly focused heat and high efficiency. Similarly, the ladle heater was replaced with electrical heaters utilizing the dual functionality of both pre-heating an empty ladle and holding of molten metal.

Kanthal's efficient design of the electrical stub heater ensures efficient heat transfer reaching the minimum surface temperatures on the stubs within the specified time frame.

In the rodding room the estimated savings are USD 100,000 annually.

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Customer data and calculations

Currency: Client:

Customer data
Current heating source
Price per Nm³
Electricity price

Propane/LPG	1	EUR
Electricity price	0.01	EUR

Products analyzed in this report
Anode Pre-Heater Station
Ladle Heating Station
Stub Heating Station

Anode Pre-Heater Station	Yes
Ladle Heating Station	Yes
Stub Heating Station	Yes

Disclaimer
1. Kanthal gives these numbers as an indication of the performance of the product.
2. Kanthal can never guarantee any performance based on these calculations.
3. The accuracy of this calculation is highly dependent on the input data.

Conversion (if necessary), use:
Note: these calculations are not

1 t3 =	1.03E+01
1 m3 =	9.66E+01
1 Btu =	0.293
1 kWh =	3.6E+09
1 Btu/t3 =	0.0293
1 kWh/m3 =	0.0293

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0	s
10	s
2	Nm ³ /h
30%	Energy saving
1.2	kWh
66%	Energy saving
10.5	kWh/Nm ³
0.12	EUR
0.01	EUR
46%	Energy saving
94%	Energy saving
0.11	EUR
30250	EUR/year
0.21	kg/kWh
0.25	kg
69396	kg
30250	EUR/year
69396	kg/year
94%	Energy saving
14%	Energy saving



Kanthal: an established solutions provider

Kanthal has 70-plus years experience in providing world-leading heating solutions to customers worldwide. Our advanced technical center is the largest R&D program in the heating solutions area today, one reason why Kanthal is the industry leader. Although we have only been providing solutions to the aluminum for a few years, our customers within the primary aluminum processing industry have already experienced the significant improvements in their processes (see case study).

Your one-stop shopping partner

Working closely with our customers, Kanthal provides complete, one-stop shopping solutions, from system design to delivery and installation supervision. Our installation services include all mounting hardware and fixtures needed for a complete installation and after-sales support for the lifetime of your product.





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As global leading manufacturer and industry innovator we continuously strive to improve our products to meet not only the evolving operational needs of our customer's furnaces, but also their environmental concerns in today's energy conscious world.

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