

# Cool Solution Doubles Efficiency of Induction Heaters

## Super-cooled design halves energy consumption



A German company, Trithor GmbH of Rheinbach, one of the world leaders in the production of high temperature superconducting (HTS) systems, has applied its technology to the production of a new generation of non-ferrous induction heaters with shorter heating times and double the efficiency of conventional induction heaters. A key element of these unique machines is the rotation of the work-piece – and the company chosen as technology partner in this advanced venture? Control Techniques.

The Trithor's HTS Induction Heater, available in sizes between 0.25 MW and 2 MW, revolutionises aluminium,

copper and brass billet heating prior to extrusion, cutting energy demand and operating costs to almost half, since there are virtually no electric losses.

Conventional AC induction heating has an efficiency of around 45%, with the heat being dissipated in both the coil and the billet. The Trithor design differs in two crucial ways. The induction coils are manufactured out of the advanced HTS material, chilled with compact machine-mounted chillers to 30°Kelvin (-250°C) and carry high DC current, with virtually no losses. To create the induction heating effect, the billet is rotated in the powerful electromagnetic field – the speed profile being determined by the size of billet and type of material.

The rotation is controlled by two 132 kW Unidrive SP AC drives, one at each end, in closed loop control and with feedback from 1024 ppr absolute encoders. Rotation is opposed by torque, generated by the magnetic field, yet precise synchronism of both speed and torque is essential. This is monitored and controlled by the software in the intelligent option modules fitted to each drive.

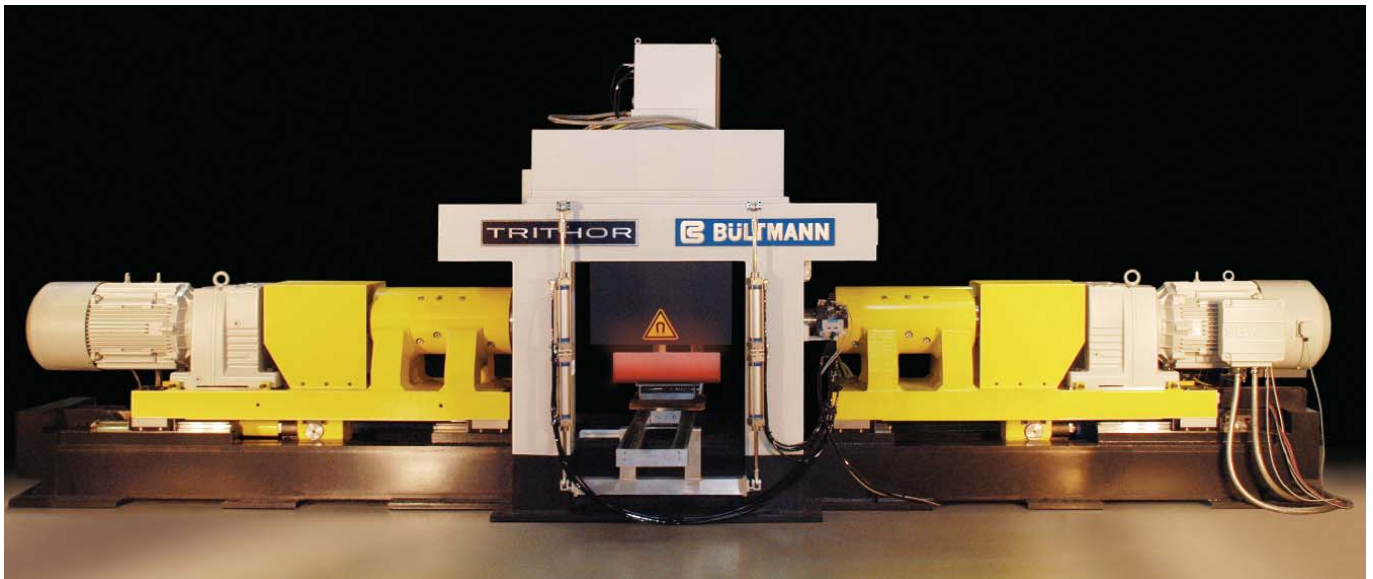
#### KEY BENEFITS

- ENERGY DEMAND REDUCED BY 50%
- OPERATING COSTS HALFED
- 93% OPERATING EFFICIENCY
- INCREASED QUALITY
- DECREASED MAINTENANCE REQUIREMENTS
- EXTENDED WORKING LIFE

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“Precise synchronism of the motor speeds is crucial, particularly as the billet is approaching its elastic state,” says Trithor’s Head of Sales, Dr Jürgen Kellers.

“The controlled rotation gives better control of the billet heating, enabling us to produce the best possible radial homogeneity of temperature by improved deep heating inside the component,” he says, “whilst, at the same time allowing precise, repeatable speed, time and temperature profiles to be set up, giving the customers levels of quality control not previously achievable.”

As well as improving operating efficiency from 45% up to 93% – saving, for example, some 180,000 per year on a 0.5 MW aluminium induction heater – the Trithor HTS Induction Heater requires less maintenance and has a longer working life, because of no conventional thermal loads. For the same reason, tool changing is faster and safer. Machines can be provided with dual heads heating chambers for greater productivity.

The Unidrive SP AC variable speed drive range spans 0.75kW right up to 1.9MW. Unidrive SP is the world’s most advanced ‘solutions platform’ AC drive, configurable into five operating modes – open and closed loop, vector, servo and regenerating modes – connectivity to most industry standard networks, configurable for all types of AC motors, including linear motors, and accepting 14 position feedback protocols. With a range of plug-in module options, its on-board PLC can be supplemented, as in this case, with programmable modules.

“Control Techniques has been involved right from the initial development stage in this and other projects. We like the flexibility and programmability of the Unidrive SP drives, which are ideal for all types of motors, including asynchronous linear motors used in direct drive applications such as our new Limodraw contactless tube drawing machines.”

Trithor GmbH, a subsidiary of Zenergy Power plc, develops technology that utilises high temperature superconductor materials, and the company now has in excess of 60 patents in the field. Products under development include superconducting power generation components for renewable energy (generators are much smaller) and surge protection devices for electricity grids. The industrial division is developing innovative, energy



saving solutions for the metals industry including induction heaters and high force density linear motor applications. HTS wires have a current density 100x that of copper and will play a significant role in reducing losses in many applications, with vast savings of energy consumptions and thus CO2 emissions.



For further information please visit  
[www.controltechniques.com](http://www.controltechniques.com)



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