Heating Glass during Vacuum Moulding with Porous Burners

Increasing energy prices and heightened competitive pressure demand energy efficiency and enhanced product quality with, at the same time, continuously optimised operating costs. Particularly with energy-intensive high-temperature processes, it is becoming increasingly important to optimise processes. As a result, businesses are focussing on innovative combustion technologies more than ever before. The high-tech heating systems from the promeos company are based on one of the cutting edge technologies in the field of combustion technology: flameless combustion within porous media. The porous burner, which has been specially developed for industrial high-temperature processes, not only allows for optimising processes and costs but also offers additional environmentally friendly solutions.

Moulded Heat: The Porous Burner Technology

Despite the technical progress made in recent decades, the efficient heating of industrial production systems still presents a major challenge for plant constructors and operators. Faced with increasing energy prices and sinking emission limit values, but also because of the increased quality demanded of products and changed production conditions, such as for example "product on demand" systems, the use of flexible heating systems with optimised energy consumption is becoming an increasing focus of economic interest. New combustion technologies are therefore becoming more important than ever before. In particular, flameless combustion within porous media has established itself as one of the most innovative and profitable combustion methods with enormous potential for the economy and the environment.

In addition to the extremely precise controllability of the burner output and a power density unattainable by other burner technologies, and the absence of poorly controllable open flames makes it possible to achieve tailor-made burner geometries, leading to homogenous heating and, at the same time, enabling heating systems to be individually adjusted in accordance with the respective process.

promeos heating systems therefore combine high performance, homogeneity, controllability and sustainability (efficiency) to form an extraordinary overall package – the economic benefits and ecological responsibility go hand in hand.

The areo gas porous burner is a specially designed premix burner. In the porous burner, the combustion takes place in porous, high-temperature ceramics. This results in flameless, volumetric combustion in the form of glowing ceramic foam. This can be used both as a radiating surface as well as a homogenous heating source.

This enables flameless heat supply with a high power density (up to 3 MW/m^2), infinitely adjustable power control over the range P_{max}/P_{min} = 20/1 with homogenous temperature irradiation, burner modules in any desired geometric form and a previously unknown level of flexibility when integrating gas burners into existing process plants.

The intrinsic nature of porous burners enables them to meet the high demands of all industrial thermal processes that require a specific, uniform and precisely proportioned

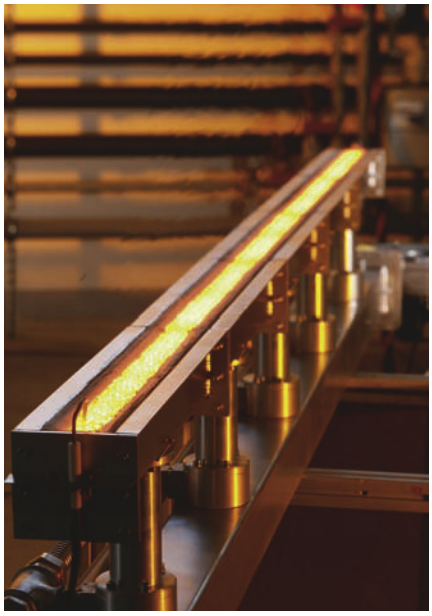

Fig. 1 Line porous burner

Fig. 2 Square porous burner

promeos GmbH
91058 Erlangen, Germany
jena@promeos.com
www.promeos.com

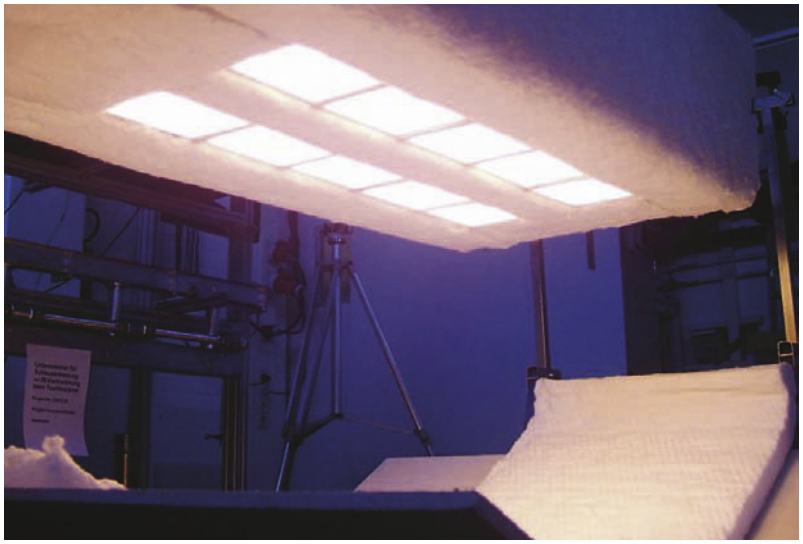

Fig. 3 Porous burner for glass heating consisting of different and seperately regulable sections

heat input with maximum output density. In the glass industry, porous burners are used for melting, processing, transporting and finishing, and are also setting new standards here.

Application Example: Heating Glass during Vacuum Moulding

LCD glass is heated in a vacuum extrusion machine in order to subsequently mould it. The porous burner is firmly fixed in the plant while the glass panes are moved on the mould, i.e. the extrusion tool. Here the distance between the glass surface and the burner can be varied in order to ensure an optimum moulding process. The burner surface has a segmented structure consisting of several separately controlled burners, each of which is composed of several burner seg-

ments. Here the individual burner line segments can be switched on or off. By combing radiation energy and convective heat transfer, the necessary amount of heat can be quickly and effectively coupled into the thin LCD glass. he infinitely adjustable and homogenous temperature distribution as well as the gentle application of heat through radiation and convective heat enables the process and the end product to be decisively improved. Furthermore, the modular structure with individual, freely combinable and geometrically configurable burner modules enables to precisely define the temperature profiles along the production line.

This offers the following advantages:

- Increased productivity with simultaneous energy savings thanks to a homogenous and precisely proportioned heat input
- Cost savings through the use of gas heating instead of electrical heating
- Improvement in quality thanks to specific temperature gradients and a gentle processing of the material
- Reduction of emission values of up to 45 %.

This provides:

- Productivity improvements of up to 50 %
- Operating cost savings of up to 75 %.

A further decisive feature of the porous burner is the combination of energy and cost savings together with environmentally-aware economic management: If electrical heating is replaced by a gas porous burner, the payback time shortens from 24 months to < 12 months, and if electricity produced from fossil fuel is substituted with direct gas firing, this leads to CO_2 savings of up to 70 %.

Based on the porous burner technology it has developed, *promeos GmbH* produces burner- and heating systems that are used in industrial thermal processes. The company has established itself in the market as a system supplier and plant constructor and is mainly active in the aluminium, steel, glass, plastic, rubber, ceramics and food industries.