Moving grate firing system with integrated hot air turbine

HEAT AND ELECTRICITY SELF-GENERATED

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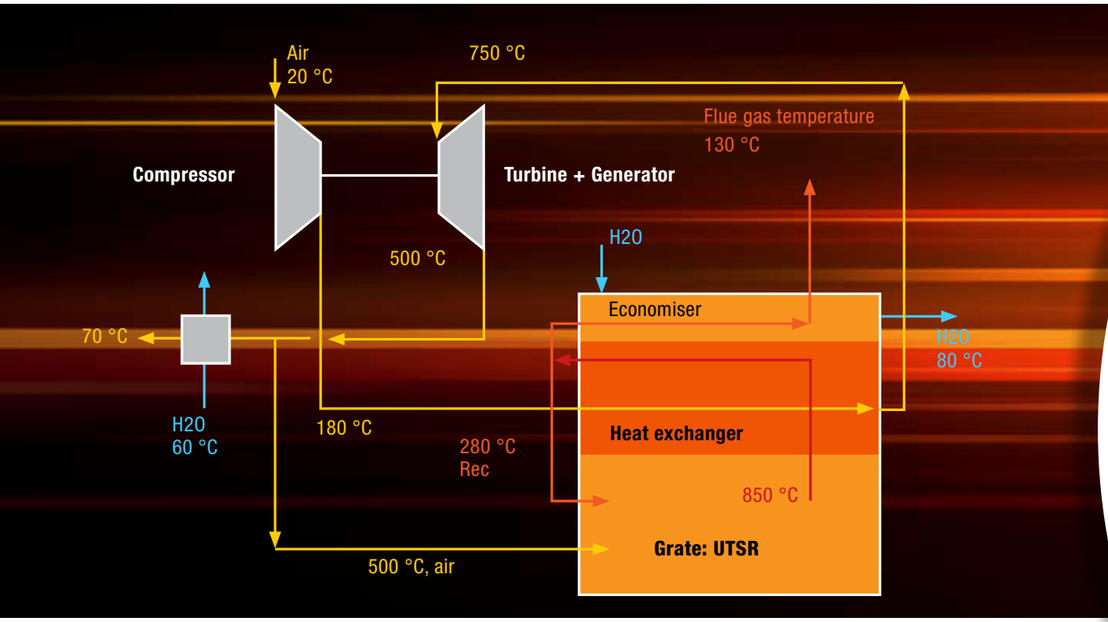
Self-generated heat and electricity



www.hotairturbine.ch

STATE-OF-THE-ART INNOVATION

With the **"HLT-100 compact"** hot air turbine, electricity can be generated with a wood firing system from a thermal offtake of 300 kW. Due to their complexity and maintenance requirements, other systems – such as ORC systems or steam turbines – only become worthwhile as large-scale systems with a thermal capacity above 2 MW. In many cases, heat offtake all year round cannot be ensured for such high capacities. The hot air turbine therefore fills the gap in the smaller operating range.

Area of application

- Heating systems with constant thermal offtake of at least 300 kW (e.g. a heating network with a heat requirement of 300kW during the summer months)
- Base load boiler in combination with a peak load boiler

FUNCTION OF THE HOT AIR TURBINE

The hot air turbine is an automated heating station with an electrical capacity of 80 to 100 kW. The waste heat generated during electricity production is used in this combined heat and power system to offer a thermal capacity of 350 kW in the form of hot water.

The main components of the system are:

- Moving grate firing system UTSR
- TÜV-tested hot gas heat exchanger with counter-current design
- Micro gas turbine unit consisting of turbine, compressor and generator

Electricity is generated through an externally fired Brayton process, whereby air from the atmosphere is compressed, heated to 750 °C in the hot gas heat exchanger by the hot flue gases from combustion and expanded in the turbine, which drives a generator. Some of the turbine exhaust air, which is still hot, is used as combustion air in the furnace and some is used to generate hot water.

The hot flue gases from the combustion process are partly recirculated after the hot gas heat exchanger. The remaining flue gases are cooled down in the economiser and cleaned via multi-cyclones and electrostatic precipitators before being discharged via the flue. The further utilisation of turbine exhaust air and flue gases ensures high overall efficiency of the facility.

1 Combustion chamber: Based on the proven moving grate furnace UTSR. The design was changed, so that the chamber is able to hold the large volumes of gas.

2 Turbine: The micro gas turbine rotates at 56,000 revolutions per minute and drives the compressor and generator.

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4 Economiser: In this economiser, the flue gas is cooled down further and used to generate warm water.

TECHNICAL DATA

Fuel	untreated wood chips moisture 50 %
Combustion chamber	Schmid moving grate UTSR 1200
Combustion capacity	600 kW
Turbine	designed for inlet temperature of 750°C, 56,000 rpm
Flue gas cleaning	multi-cyclone and electrostatic precipitator
Thermal capacity	350 kW
Electrical capacity	80 – 95 kW gross
Own consumption	15 kW
Electrical efficiency	15 %
Thermal efficiency	62 % (incl. exhaust air use)
Overall efficiency	77 %
Required space	8m x 3m x 7m

The maximum electrical capacity depends on the location, i.e. on the local altitude, air pressure, temperature and humidity.

Schmid energy solutions – full of energy

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The Swiss pioneer in wood firing systems

The Schmid Group is a Swiss family business that has specialised in wood energy solutions since 1936. The headquarters are in Eschlikon. In addition to other offices in Switzerland, Schmid energy solutions also has subsidiaries in Germany, Austria, France, Italy and Poland.

The Schmid team is supported by worldwide distribution and service partners that ensure optimum, seamless consultancy and service. Over decades, Schmid energy solutions has helped to develop wood energy on the front line and is now one of the leading companies in the industry.

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