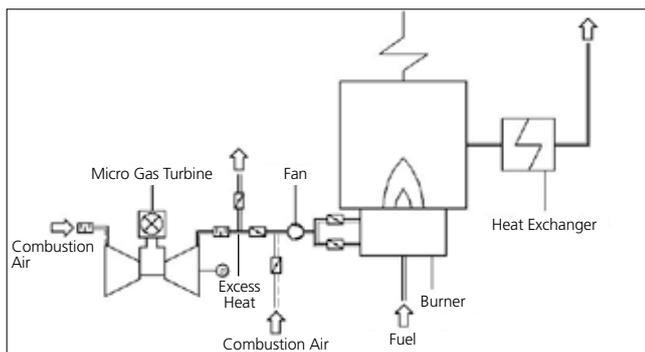


Power production through CHP combined heat and power

Direct use of gas turbine flue gas for combustion –
with high efficiency

The idea of using excess heat from generating electricity for process steam or hot water is not new. It could better be described as a logical step, because the hot flue gases of a cogeneration unit or a gas turbine contain great quantities of valuable energy. In a traditional combined heat and power plant (CHP) the hot flue gas is directed immediately through a heat exchanger or waste heat boiler. In this solution just presented by SAACKE it supplies a DDZG-GTM series burner instead. That way SAACKE not only opens the path to new high-temperature process for CHP plants, but also makes production more flexible and profitable overall. Because CHP plants can achieve high efficiency, they are not only very economical, but also environmentally friendly.

In the low and medium load range these plants have most commonly been implemented with cogeneration units, which are very maintenance-intensive, however. SAACKE is therefore now offering an alternative: an extremely low-maintenance combination of micro gas turbines with proven SAACKE burners known as „Micro CHPs“. A gas turbine generates from 50 to 1000 kW of electrical power, with its flue gas used to supply a SAACKE DDZG-GTM burner, which fires in the downstream heat generator. Depending on the design and configuration of the heat generator, a CHP like that produces heat, steam or hot water with conventional heat generators – and also produces valuable electrical energy.



Schematic example of a Micro CHP plant

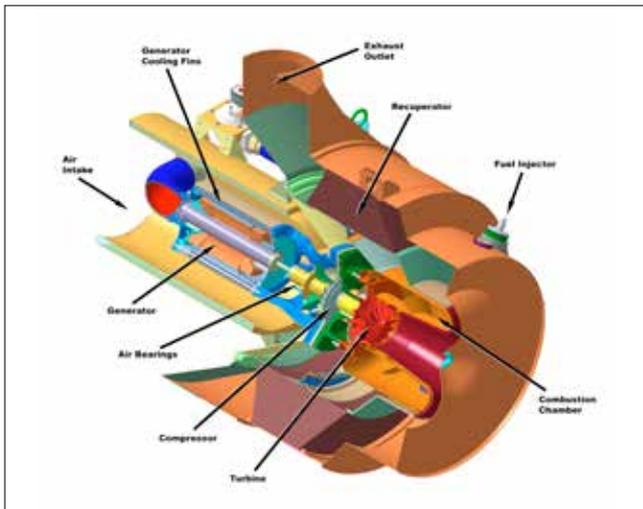
Advantages at a glance

- Standard capacity range: 50 –1000 kW electrical, up to 15 MW maximum burner output
- All standard fuels and numerous special fuels
- Applicable for steam boilers and hot water boilers as well as for combustion chambers and thermal oil heaters
- Long maintenance intervals of turbine and burner
- Short payback period
- Very low emission values, outstanding efficiency

The solution in detail

With the „Micro CHP“ principle, SAACKE introduces a highly profitable instrument for generating electricity for conventional heat generators.

The system is based on a Capstone micro gas turbine. These proven electricity generators were originally developed for use by the US army. They combine turbine, generator and line synchronization in one compact sound-proofed housing. They are typically operated with natural gas, but are also able to use biogas, fuel oil or biogenic oils.



Cutaway view of a Capstone micro gas turbine

Because all movable parts of the electricity generator run on a single (air-cushioned) shaft, the maintenance intervals of the micro gas turbine are extremely long, with a total service life of up to 80,000 hours for the turbine. Startup takes only a few seconds. Then, depending on the size, between 50 and 1000 kW of line-synchronous electrical power is available. The turbine features infinitely variable operation over a very wide control range with both heat and current guided mode.

The electrical power that is generated can be fed back into the electrical network or used strictly internally. Firing systems featuring high operating hours and continuous heat consumption are naturally suited to CHP solutions. However, the turbine and burner can optionally be operated independently of each other. Products from the proven SAACKE DDZG-GTM series are used as burners. They develop firing rates up to 15 MW (depending on the size of the turbine) and fire directly into the downstream heat generator.

Technical data¹

Turbine	C50	C200
Electrical power	50 kW	200 kW
Electric efficiency	28 % ± 2 %	33 % ± 2 %
Fuel demand	179 kW	606 kW
Flue gas temperature	289 °C	280 °C
Excess heat output	128 kW	394 kW

¹ without compressor under ISO conditions

In principle these robust burners work with practically all liquid and gaseous fuels and are even suitable for thermal utilization of problematic auxiliary substances.

The proven combination of turbine and burner always guarantees the lowest emission values, and also reliably exceeds even the strictest requirements over the entire control range.

Summary

Plants designed to generate only heat do not produce any electrical power, even if they are optimally configured. The combination of gas turbines and a SAACKE DDZG-GTM burner is fundamentally different: it produces electricity, significantly boosting efficiency and providing a profitable and especially energy-efficient solution. Your advantage: The amortization times of Micro CHP plants are often astonishingly short and also free production from price fluctuations in the electricity market. SAACKE offers you decades of experience in plant engineering. Our engineers will develop the optimum CHP solution for you regardless of your application or load range. The same applies to consultancy services when it comes to retrofitting existing plants.

Example Amortization²

Thermal energy	3,5 ... 15 MW
Electrical power	0,2 ... 1 MW
Investment	
Turbine, Combustion system, Installation	0,5 ... 1,5 Mio. €
ROI w/o subsidies	4 ... 2 Years



Gas turbine flue gas burner (DDZG-GTM series)

² Electricity price: 0,13 Euro/KWh, Natural gas price: 0,35 Euro/KWh
Running time: 8000 h/Year

For further information, please visit: www.saacke.com