heat
GAS TECHNOLOGIES

THE EXPERTS IN ENERGY SUPPLY

FUEL GAS SUPPLY SYSTEMS

HEAT – LOOKING BACK IN THE RECENT PAST

HEAT gas technologies GmbH was founded in 1984 anc can look back on more than thirty years of experience. Planning, producing, delivery, installation and implementati-on of products and solutions in the area of natural gas respectively their core components were prioritised since the beginning of the business activities. HEAT possesses the procedural knowledge as well as the manufacturing technique to fulfil all specific demands of the gas industry.

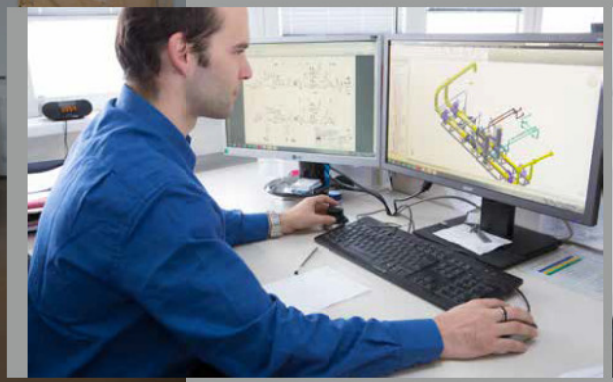
Benefit from our experience in the field of:

- All sorts of filters / separators for efficient cleaning of natural gas
- Tubular heat exchanger for heating and cooling of the gas
- Gas reducing and metering stations
- Gas dehydration units
- Gas pressure regulators and safety shut off valves

Furthermore, HEAT offers the erection and commissioning of turnkey plants. In any case, HEAT is a reliable partner to operators of natural gas infrastructure / distribution, transmission operators, gas storage operators, communal customers, power plants and industrial facilities.

»We are proud of the fact that for decades HEAT wärmetechnische Anlagen stands for continuity, experience and reliablity. To create customer specific solutions and to implement them outstandingly is and has been our explicit promise – and wil continue into the future.«

Managing board HEAT



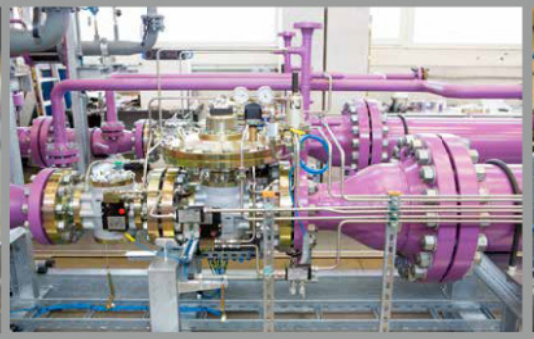
ENGINEERING

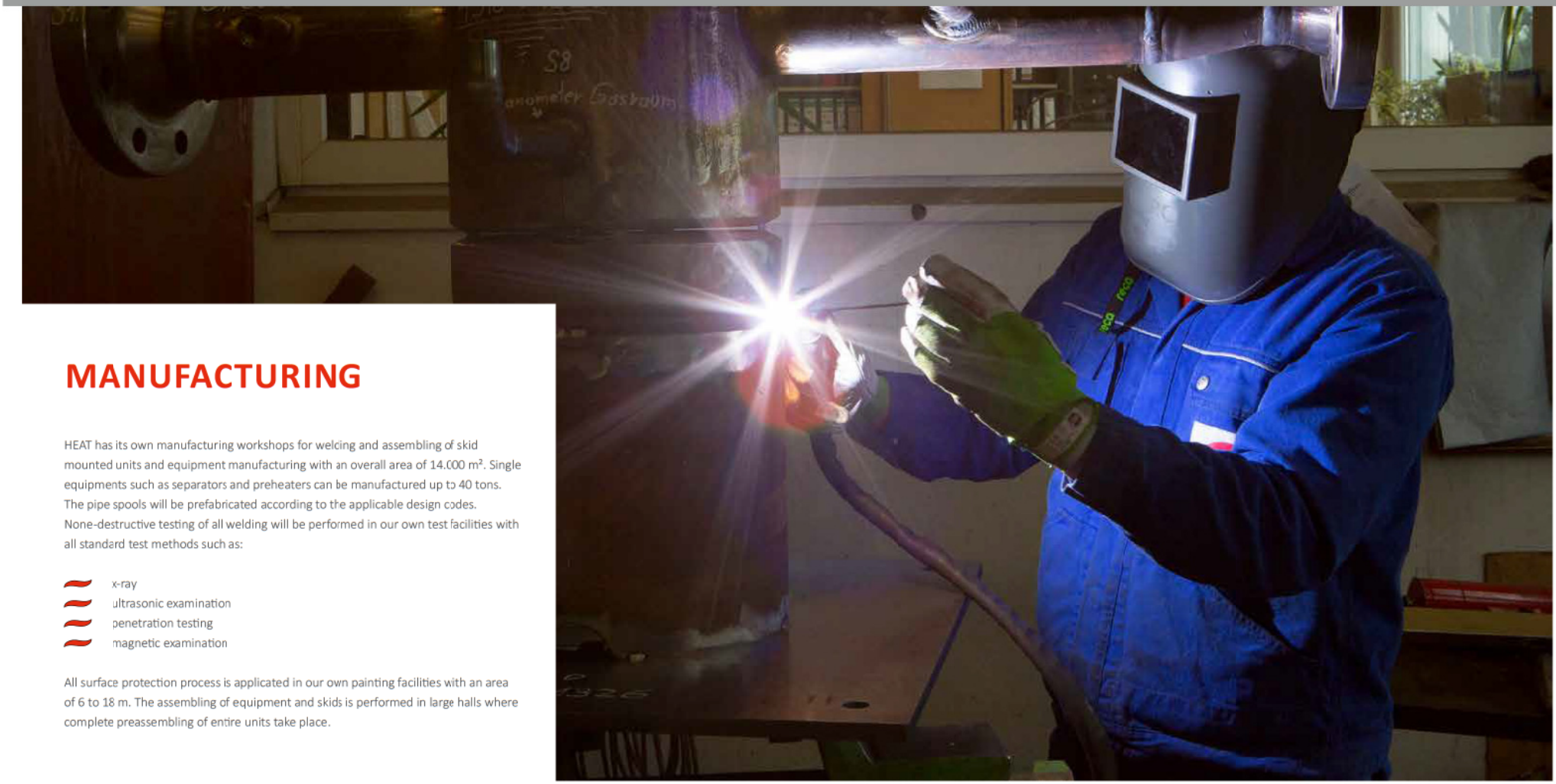
HEAT offers the complete fuel gas supply system engineering. We offer basic engineering including the process design for the equipment. We are specialized in the design of different separator and filter executions for various solutions to clean the gas from liquid and solid impurities. Our process design calculations include the dimensions of equipment, piping, valves and heat exchangers. The material for the equipment will be selected depending on the gas composition and the impurities.

The basic design includes the Process Flow Diagramm for the unit including mass and heat balance, the Piping and Instrumentation Diagram, Layout of the station, respectively the single skids, basic foundation drawings with loads and forces.

In the continuing detail engineering, following the chosen design code, we will offer the detailed manufacturing drawings of all equipment including part lists, data sheets for instrumentation and valves including hook up drawings, pipe classes, stress calculations, static calculations of hot piping. The process descriptions and control concept will complete the detail design.





MANUFACTURING

HEAT has its own manufacturing workshops for welding and assembling of skid mounted units and equipment manufacturing with an overall area of 14.000 m². Single equipments such as separators and preheaters can be manufactured up to 40 tons. The pipe spools will be prefabricated according to the applicable design codes. None-destructive testing of all welding will be performed in our own test facilities with all standard test methods such as:

- x-ray
- ultrasonic examination
- penetration testing
- magnetic examination

All surface protection process is applicated in our own painting facilities with an area of 6 to 18 m. The assembling of equipment and skids is performed in large halls where complete preassembling of entire units take place.

COMMON PART

INLETFILTER – METERING – ANALYSES – PRESSURE REDUCTION

The inlet section of a fuel gas station is usually designed for all consumers, e.g. gas turbines and boilers. So the common part is designed for one or multiple consumers and the dimensions can be rather large.

Inletfilter: To protect all equipment used in the fuel gas systems from damage and wearout, it is necessary to clean the gas efficiently when it enters the systems. It can be contaminated by solids like rust, sand or similar and by liquids like water or hydrocarbons. Depending on the contaminations a filter-separator has to be designed to clean the gas from all unrequested matter.

Metering: Usually the consumed fuel shall be metered for billing or for internal calculation of the efficiency of the heat/power generation. Variable technical devices can be used for metering, most common are turbine flow meters and ultra sonic flow meters. The meter counts the actual flow rate, the operating temperature and the pressure. With this data the nominal flow rate is calculated.

Analyses: To get also the energy content of the flow the calorific value of the fuel is needed. For this task a gas chromatograph is installed in the system. This unit analyses online samples of the fuel gas, shows the gas composition and calculates the calorific value of the gas. With the nominal flow rate and the calorific value the heat content is calculated and this is the basis for billing and for the determination of the efficiency of the heat/power generator. To substitute the gas chromatograph the calorific value can be programmed in the flow computer or the value will be supported from the fuel gas supplier on line.

Pressure Reduction: To supply the burners of the power generator usually the pressure has to be reduced. By the expansion of the gas the temperature decreases and to compensate this process the gas will be preheated before expansion. The preheating can be realised by electrical heaters or warm water heat exchangers, supplied by warm water generators or hot water or steam from the power plant. Direct fired heaters are used when no other energy source is available.

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UNIT PART
METERING – PERFORMANCE PREHEATER – FINAL FILTER

Metering: At the unit part the fuel gas is conditioned for each single consumer (e. g. gas turbine). Each of these power trains usually consists of a fuel gas metering a performance heater and a final filter to protect the gas turbine.

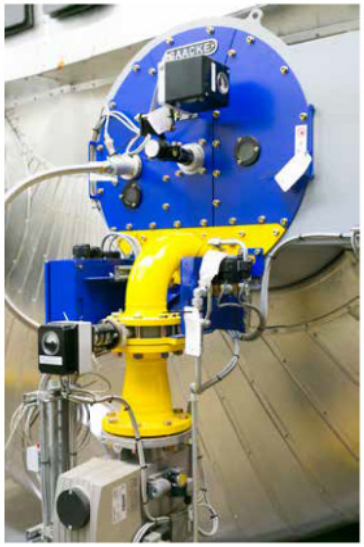
Performance Preheater: First the cold gas is metered similar to the description of metering in the common part with different technical solutions. After the metering, at gas turbine power plants, the gas will be heated to high temperatures (app. 215 °C, depending on turbine type and manufacturer) to increase the efficiency of the turbine. The heat source is hot water from the heat recovery steam boiler circuit.

Final filter: After the preheater a final filter is installed to protect the gas turbine from solid impurities coming from material wear out and to protect the GT from water droplets in case of a leakage in the fuelgas preheater.

REFERENCE PROJECT: FUEL GAS SUPPLY FOR DISTRICT HEATING

HEAT provided complete fuel gas supply system for district heating station with gas fired hot water boilers.

Location	Graz/Austria
District Heating Power:	170 MW
Gas Flow:	20.000 nm³/h (4,3 kg/s)
Inlet pressure:	30 – 64 bar
Fuel gas supply pressure boiler:	3 – 4 bar



REFERENCE PROJECT: FUEL GAS SUPPLY FOR INDUSTRIAL GAS TURBINE

DONG Energy ordered the execution of a turn-key fuel gas unit for Orsted power plant in Kopenhagen. The fuel gas unit supplies gas fired boiler and a gas turbine. The power plant generates electrical power for Copenhagen and provides district heating.

Location	Copenhagen/Denmark
Electrical Power:	185 MW
District Heating Power:	850 MW
Gas Flow:	60.000 nm³/h (13 kg/s)
Inlet pressure:	35 – 55 bar
Fuel gas supply pressure GT:	24 bar
Fuel gas supply pressure boiler:	3 – 4 bar

REFERENCE PROJECT: FUEL GAS SUPPLY FOR COMBINED CYCLE POWER PLANT

HEAT built a turn-key fuel gas unit including site installation for Vienna Energy supply. The fuel gas unit supplies two large Gas turbine SGT5-4000F.

Location:	Vienna/Austria
Electrical Power:	800 MW
District Heating Power:	380 MW
Gas Flow:	150.000 nm³/h (2 x 16,5 kg/s)
Inlet pressure:	39 – 70 bar
Fuel gas supply pressure GT:	33 – 35 bar @ 130°C

REFERENCE PROJECT: FUEL GAS SUPPLY FOR COMBINED CYCLE POWER PLANT

HEAT built a turn-key fuel gas unit including supervision of site installation in Korea. The fuel gas unit supplies one large Gas turbine SGT6-8000H.

Location:	Seoul/Korea
Electrical Power:	450 MW
District Heating Power:	238 MW
Gas Flow:	71.000 nm³/h (15,9 kg/s)
Inlet pressure:	24 – 46 bar
Fuel gas supply pressure GT:	33 – 35 bar @ 215°C

REFERENCE PROJECT: FUEL GAS SUPPLY FOR COMBINED CYCLE POWER PLANT

HEAT built a turn-key fuel gas unit including site installation in Mellach. The fuel gas unit supplies two large Gas turbines SGT5-4000F. The power plant generates electrical power for the grid and provides district heating for the city of Graz.

Location:	Mellach/Austria
Electrical Power:	838 MW
District Heating Power:	400 MW
Gas Flow:	170.000 nm³/h (2 x 16,5 kg/s + 2 kg/s auxillary steam)
Inlet pressure:	38 – 54 bar
Fuel gas supply pressure GT:	33 – 35 bar @ 215°C
Fuel gas supply press. Aux.boiler:	3 – 4 bar

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