We set the benchmark for

Waste-to-Energy-Plants
MHPS based in Yokohama, Japan is a global player in the thermal energy power plant market, with the in-house capabilities to design, manufacture, construct, commission and maintain plants across the world.

The company has a total of 66 subsidiaries across 17 countries. It was established as a joint venture in February 2014, bringing together the thermal power plant divisions of Mitsubishi Heavy Industries Ltd and Hitachi Ltd. MHPS employs 20,000 staff (consolidated) worldwide and aspires to be number one in thermal power plant construction. Mitsubishi Hitachi Power Systems Europe is a 100% subsidiary of MHPS. We bring a wealth of engineering experience, plant construction and service knowledge to the EMEA region.
Environmentally friendly combustion requires special concepts and measures, whether it be for domestic waste, municipal waste, industrial waste, refuse-derived fuel (RDF) and biomass fuels of all kinds. According to waste-management concepts, the reutilisation of waste, through energy conversion in the thermal unit, is preferable to its environmentally harmful disposal in landfill.

MHPS has been working in thermal waste treatment for more than 50 years and offers integrated solutions worldwide that are always optimally matched to customer-specific requirements for solid waste materials up to 140 MWth and steam parameters up to 500°C – 100 bar.

Our range of services includes engineering, installation, commissioning, maintenance and servicing. As a one-stop shop, MHPS supplies complete systems right through from waste feeding device through to the emission of flue gases from the steam generator. And even after handing over the plants, we remain on hand to support our customers. Our service takes care of everything such as maintenance, repair, optimisation and modernisation.

**OUR SCOPE OF DELIVERY INCLUDES:**
- Waste feeding device
- Combustion grates
- Ash and slag removal facilities
- Combustion air supply
- Steam generator
- Cladding
- Fire-resistant refractories and heat protection insulation
- Ignition and auxiliary firing systems
- Heating surface cleaning system
- Steelwork, stairways and platforms
- Combustion control system
- Electrical and automation technology
Steam Generator Concepts

Together with the combustion grate, the steam generator forms the core of a waste incineration plant. A large part of the energy released by combustion of the waste fuel is recovered in the steam generator.

The steam generator system must take into consideration the particular operating requirements, e.g. relating to corrosion, fouling, slagging, material loading, partial load behaviour and plant dynamics.

**HORIZONTAL PASS STEAM GENERATOR**

- 3 conventional empty passes with 2 x 180° direction changes ensure thorough mixing of the flue gases prior to entry into the bundle heating surface
- Reduced fouling tendency for the empty passes, which additionally can also be reliably mastered by use of effective cleaning systems
- Evaporator tube bundles in the horizontal pass can be constructed very compactly and can be effectively cleaned by a rapping system (no steam consumption)
- The bundle heating surfaces can be arranged as required in respect of the pipes’ horizontal pitch, so that the bundles are always optimally designed in respect of the fluid flow
- The widely spaced design has improved and easier access, so is easier to inspect, maintain and repair
The hot flue gases are cooled as they flow through the steam generator. At the same time, water is first heated, then evaporated to form steam and lastly overheated. The steam is then used for electricity and/or heat generation.

The steam generators are designed as either vertical-pass or horizontal-pass steam generators.

The vertical design solely consists of steam generator passes in which the flue gases only flow in a vertical direction. By contrast, in horizontal steam generators, at least the bundle heating surfaces of the evaporator, and overheater heating surfaces are arranged in a horizontally arranged steam generator pass.

**VERTICAL PASS STEAM GENERATOR:**
- Reduced base area requirement, therefore this variant is used in particular for revamping measures, where there is only a limited installation surface available for the steam generator
- Simpler steam generator ash removal system, as fewer ash accumulation points
- Surveying and inspection of the bundle heating surfaces in the 3rd pass can take place without auxiliary scaffolding installation
Whether in power plants purely for power generation, or in industrial power plants for steam or power generation, the firing systems of MHPS are used in almost all fields of energy conversion and are always optimally adapted to the specified requirements.

Environmentally friendly combustion requires special concepts and measures for household and municipal waste, industrial waste, refuse-derived fuel (RDF), disposal of residues and biomass of all kinds.

Therefore, various conditions are required in order to achieve optimum combustion, which can be summarised as follows:

- The quality of the combustion products, represented on the one hand, by a high flue gas side burning quality in the form of minimisation of the CO/C content and the NOx content, and on the other hand waste material that is of a quality suitable for energy recovery, characterised in that it results in a low proportion of unburned material and that the leachability of the bottom ash is minimised,

- The economical operation of the plant, documented by high availability and a long period of operation between maintenance outages.

The basic requirement for such an outcome is the careful coordination of the individual process areas with each other and consideration of the fuel-specific factors in the structural design of the stoker firing system, including the steam generator-combustion chamber, resulting in optimum operation.
Our grate technologies, with many years of proven successful operation, provide the solution for thermal disposal at all calorific values.

The geometry of the combustion and afterburning chambers of the steam generator are of particular importance in combination with the combustion air supply. The quality of the combustion gases is important on the one hand for an emission potential that must be kept low, while on the other hand defining the conditions for economic plant operation. Uniform combustion means that optimum operating periods between maintenance are achieved.

The consistent implementation of various optimisation studies in respect of the combustion chamber geometry, the formation of the vortex zone for the afterburning (secondary combustion) chamber and the location and direction of the momentum of the secondary air injection are achieved via centre flow firing. This concept is characterised by the way the front wall ceiling directs the combustible gases from the start of the combustion reaction in the area of the hot flue gas flow from the main combustion zone. The area in the vortex zone that is supplied by secondary air intensifies the subsequent afterburning of these material flows.

The mechanical and thermal grate surface load, as well as the layout data of the respective heat input diagram, are the decisive variables for the layout of the grate surface area. Furthermore, the ignition and burn-out behaviour of the fuel, as well as the waste size and burn-out quality, determine the grate lengths and fuel layer height. Our know-how is protected by various German and international patents and registered designs.

### APPLICATION RANGE

- **Air-cooled**
  - LCV 6,000 – 14,000 kJ/kg
- **Partially water-cooled**
  - LCV 10,000 – 18,000 kJ/kg
- **Water-cooled**
  - LCV 12,000 – 30,000 kJ/kg

Grate type = f (calorific value)
Moving Grate/Roller Grate

Different grate systems are used depending on the calorific value. Waste fuels with medium to high calorific values require grate systems with grate bar cooling systems, such as our patented water-cooled moving grates. By contrast, for low or medium calorific value waste materials, patented air-cooled moving grates are used.

The MHPS moving grate is characterised by its robust construction. External hydraulic drives control, via a lever system, the advance and return stroke movements of the moving grate rows of each grate zone in accordance with the control requirements. The fixed and movable grate bar rows alternate in succession in a grate path and are each placed on separate grate frames. The uniform and long stroke movement in the feed, due to the grate bar design, leads to smooth incineration. In contrast to short-stroke operation, this movement is notable for its reduced wear. An additional advantage is the additional cooling resulting from the overlap of the grate bars due to the long stroke up to the grate bar head.

Dependent on the application, an MHPS roller grate system can also be used alongside the moving grate system. The robust roller grate system has a modular design comprising six grate rollers. It is intended to be used with low or medium calorific value waste materials. Only a part of the peripheral roller surface is in contact with the combustion chamber, while the bottom side away from the combustion chamber is air cooled. This alternation reduces the thermal loading of the grate surface.

<table>
<thead>
<tr>
<th>Moving grate</th>
<th>Roller grate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grate structure</td>
<td></td>
</tr>
<tr>
<td>Technical data (Typical values)</td>
<td></td>
</tr>
<tr>
<td>Grate inclination: 10°</td>
<td>Grate inclination: 20°</td>
</tr>
<tr>
<td>Number of grate zones: 3</td>
<td>Number of grate rollers: 6</td>
</tr>
<tr>
<td>Grate length: 9.2 – 10.8 m</td>
<td>Grate length: 14.8 m</td>
</tr>
<tr>
<td>Grate width: no limit, because of modular design</td>
<td>Grate width: static, max. 8.0 m</td>
</tr>
<tr>
<td>Grate bar material: CrNi steel</td>
<td>Through module</td>
</tr>
<tr>
<td></td>
<td>Grate bar material: cast iron</td>
</tr>
<tr>
<td>Transport behaviour</td>
<td></td>
</tr>
<tr>
<td>Clearly defined transport of the fuel through the step-type arrangement of the grate bars</td>
<td>Significant influencing of the transport behaviour by the friction between the carried fuel and/or grate slag cover and the grate rollers</td>
</tr>
<tr>
<td>No limitation in respect of the consistency of the usual lumpy fuel</td>
<td>Limitation for solid fuels (unprocessed municipal waste, industrial waste)</td>
</tr>
<tr>
<td>No limitation for solid fuels (municipal waste, industrial waste, processed waste)</td>
<td></td>
</tr>
</tbody>
</table>
The selection of the grate surface depends on the specific energy potential of the fuel. Accordingly, for low heat waste fuels the air-cooled grate surface is used, while for high heat waste fuels the water-cooled grate surface is used, which is then notable for its longer service life in comparison with a purely air-cooled surface and also because it supports higher thermal loading.

The design of the grate system is such that at any time, it is possible to switch between water-cooled and air-cooled grate bars without any structural change. In the transition range between low caloric and high caloric waste, the two cooling types can be combined. The grate bars of the thermally highly loaded grate zones are water-cooled, while the grate bars of the burn-out zone are purely air-cooled. The grate surface enables process-optimised reduction of the primary air fraction, accompanied by reduction in excess air and consequently a parameter relating to NOx formation.

**AIR-COOLED GRATE BARS**

Our patented air-cooled grate bars are designed for a long service life. This is achieved using a second wear front plate, located behind the frontside so that it is protected against temperature-induced corrosion. The outer frontside ensures the function of the grate bar and therefore also the extension of the lifetime, even subject to thermal wear. The grate bar can be constructed so that it is possible to use it as a “one side” or “two side-reverse” bar.

**AREA OF APPLICATION:**
- Unrestricted use for mid and low LCV = < 12,000 kJ/kg

**ECONOMIC AND OPERATIONAL BENEFITS:**
- Increased service life resulting from the use of our variable grate technology with wear front plate technology

**WATER-COOLED GRATE BARS**

Manufactured from cast iron, the grate bars include cast-in water pipes, the water-tightness of which is ensured even at high temperatures. Moreover, the cast-in steel pipe ensures a defined flow without local turbulences and dead spots of rectangular channels, which result in a risk of overheating.

**AREA OF APPLICATION:**
- Unrestricted use for the LCV range from 10,000 to 25,000 kJ/kg and with restrictions even up to 30,000 kJ/kg

**ECONOMIC AND OPERATIONAL BENEFITS:**
- 32,000 h operational guarantee
- Availability > 8,000 h operation/year
- Increased operational safety
- Reduced maintenance costs
- Longer inspection intervals
- Reduced spare parts inventory
The intelligence behind thermal waste utilisation

Waste is an extremely inhomogeneous fuel, the utilisation of which represents a complex process. Large fluctuations in respect of heat output and the release of noxious substances, water content and composition, granularity and/or bulk density over short time intervals must be reliably controlled.

The CCS is the control centre that controls and regulates the interaction of the influencing variables, hopper and grate speeds as well as the combustion air volume and distribution such that combustion chamber temperatures, fire location and residual oxygen content remain within the limits necessary for process control to achieve the following targets:

- Constant steam volume and temperature
- Complete out burn of the fuel slag
- Compliance with flue gas emission values
- Low heating-surface fouling – maximum interval between maintenance actions

We develop the correct solution for every plant type in respect of this demanding challenge. Selecting suitable sensors and actuators and matching them to the necessary control method is decisive for the overall control output. MHPS is the competent partner that combines the know-how of the plant design engineer with that of an automation expert. We offer our customers solutions for implementation in existing automation systems, as well as in independent, ready-for-use units.

**Combustion Control System (CCS)**

**SCHEMATIC VIEW OF A COMBUSTION CONTROL SYSTEM**

- Upper control level
- Central control level
- Process control level
We successfully apply our extensive knowledge when it comes to updating an operational incineration plant to the latest state of the art. Here, checking the combustion sequence, adapting the existing plant technology and optimising the control structures and algorithms lead to:

- Minimisation of variations in the steam volume
- Increased waste throughput
- Extended time between maintenance/reduced maintenance effort
- Reduction of operating resource consumption, manual interventions, and violation of emissions limit values

Ignition and Auxiliary Burner

The aim of start-up and auxiliary in waste incineration is the achievement and maintaining of the minimum flue gas temperature. MHPS has developed special burners that work with oil and/or gas for use as ignition and auxiliary burners in waste incineration plants with a thermal output of up to 40 MW.

These burners fulfil the legal requirements that apply in respect of safe and low-emission incineration. Shown here is an MHPS oil burner with a shut-off slide attached to the side wall at the transition from the vortex zone to the afterburning chamber. The burner internals and the airbox form, as a structural unit, the burner.
Ash and Slag Removal Systems

For many decades, ash and slag removal systems of different types have formed part of the scope of production and supply of MHPS. This relates both to the removal of slag from the stoker firing system and also the transport of ash from all other points where ash is deposited inside the waste incineration plant.

ASH REMOVAL COMPONENTS:
- One track chain conveyor
- Screw conveyors
- Clod crushers
- Rotary value wheel sluices
- Single and double flap valves
- Shut-off valves
- Nozzle conveyors
- Belt conveyors
- Trough chain conveyors

SLAG REMOVAL COMPONENTS:
- Ram slag removal systems
- Submerged apron ash conveyor
- Scraper conveyors
- Vibrating conveyors
Thanks to comprehensive experience in power plant technology, MHPS can fully meet requirements for the maintenance and optimisation of power plant systems, especially in the field of waste-to-energy.

Detailed knowledge of the plant, its method of operation and interactions between the multiple components is essential not only in respect of commissioning or recommissioning of a thermal waste incineration plant, but also for the optimal performance of essential maintenance and repairs.

To be able to correctly handle all the conditions of use of a plant, we develop appropriate optimisation and maintenance measures suitable for the plant in combination with the customer. With our local sites and skills drawn from the head office, as well as production shops for pressure parts and burner components, we offer our customers all the services they need from a single source. In doing so, we provide short reaction times and personal customer relationships.

Based on comprehensive know-how in all the disciplines of power plant construction, MHPS is able to offer efficient solutions to national and international operators of waste-to-energy plants. A wide range of services supports our customers along their whole value creation chain.

The experienced service teams of MHPS provide support for all necessary work and planning steps, starting with a feasibility study which extends from engineering through to production, supply, installation and commissioning. To ensure implementation complies with all relevant regulations, the individual steps are monitored by our quality management team.
Service for Waste-to-Energy Plants

Decades of experience in waste-to-energy plants means that MHPS can develop tailor-made solutions for specific plants and their requirements. Our wide range of previous successfully tackled challenges for WtE plants means we can offer our customers a wide range of options where maintenance and optimisation are concerned. Our experience covers plants from various constructors in different countries.

The increasingly challenging boundary conditions for the operation of a plant require location-specific optimisation and maintenance measures. MHPS supports and monitors the maintenance and service work to be performed, taking into consideration both individual and regulatory safety standards.

We ensure that the service offered is tailor-made to meet the requirements of the customer and their plant. This includes long-term maintenance, service life extending actions, and the complete renovation of thermal waste incineration plants. Here we rely on our own experienced and competent personnel, both for long-term planned overhauls and also for short-notice repair deployments.

Our comprehensive range of skills in all disciplines makes possible a detailed consideration of individual components and their assignment to the overall system. Consequently, we are able to identify possible optimisation potentials and then to assess them based on economic and strategic energy viewpoints.
Service – Close to the Customer

With our local sites and skills drawn from head office, MHPS offers its customers all the services they need from a single source. Based on the combination of engineering know-how, competent locally available service teams and extensive networking across multiple markets, we offer a complete service portfolio and support our customers along their entire value-creation chain.

By grouping together our comprehensive service portfolio, MHPS becomes a competent and leading partner for long-term service agreements (LTSA) for waste-to-energy plants.

Our EMEA-wide network means we can provide a reliable, flexible and prompt round-the-clock emergency service.

Mitsubishi Hitachi Power Systems

MHPS Europe provides scheduled and emergency support via our strategically placed offices, workshops and sister companies. We supply tools, field services, technical advisors, component repairs and original spare parts for planned and unplanned outages. Our ultimate goal is minimizing down time of power generation assets to maximize financial value for our customers and grids.

United Kingdom
- Headquarters
- Engineering support
- Service contracts
- New plant business
- Spare parts stock and management
- LTSA program
- Field service hub

Germany
- New plant business
- Boiler manufacturing
- Delivery of key equipment and components
- Service
- Pressure parts manufacturing

MHPS Africa
- Plant Engineering
- Service

Front offices with engineering and commercial support
- Netherlands
- Spain
- Italy
- Turkey
- Ireland
- Poland
- Egypt
- Romania

Sister companies
- ATLA (Italy)
- MHPS Saudi Arabia
- MHPS Middle East (UAE)
- Rotating equipment repair
- GT hot parts inspection and repair
- Field service
In accordance with the motto “From the steam generator to the chimney – all from one source”, we reduce air pollutants during both combustion and also flue gas scrubbing.

According to European and local regulations, operators of industrial and commercial plants subject to immission control are obliged to set up and operate their plants in such a way that:

- Harmful environmental effects and other dangers, significant detriments and considerable disturbance cannot be caused for the general public and the neighbourhood (protection principle)
- Precautions are taken to prevent environmental effects and other dangers, significant detriments and considerable disturbance (precautionary principle)
- In particular through state-of-the-art measures, waste is avoided, unavoidable waste is reused, and non-reusable waste is disposed of without harming the wellbeing of the general public
- Energy is used sparingly and efficiently

The regulations for large-scale firing and gas turbine plants and the regulations for the incineration of waste place high demands on the flue gas scrubbers. Our application area includes power plants, waste, special waste and sewage sludge incineration plants.

The technical dedusting principles are just as varied as the differing combustion processes. We have been successfully complying with the ever more stringent legal framework over many years with our mature and proven cleaning systems:

- Sedimentation in settlement chambers
- Impact and momentum forces (deflection separators, inertial separators, e.g. cyclones)
- Separation through fabric filters/bag filters
- Washing in scrubbers and spray separators (e.g. spray towers, quenches)
- Electrostatic forces (electrostatic filters, electrical separators)
- Absorption technology (dry, semi-dry and wet, e.g. desulphurisation)

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**FROM EMISSION TO IMMISSION**

**OUR RANGE OF SERVICES:**
- Inspection, failure analysis and consultancy
- Plant and resource optimisation
- Flue gas, dust and ash analysis
- Emissions and flow measurement and investigation
- Overhaul, upgrading, repair, maintenance
- Engineering, delivery, installation and commissioning
- Conversion of electrostatic precipitators (E-filters) to fabric filters
- Modernisation of filter control systems and electrical, instrumentation and control technology

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1. Cyclone
2. Electrostatic precipitator
3. Fabric filter
The MHPS Laboratory

Amongst the skills of the MHPS Laboratory in Duisburg are materials engineering, failure analysis and chemical analysis. These overlapping topics are covered by various investigation methods and numerous analytical procedures, allowing complex cases to be resolved accurately and reliably.

The skills of the MHPS Laboratory include the following services:

I. Materials engineering and failure analysis

- Materials testing
- Failure testing of metallic components
- Support in the qualification of new materials, design solutions or production processes
- Residual life evaluation of steam generator tubes (heating surfaces)
- Consultancy

II. Chemical analysis

- Chemical and physical properties of solid and liquid fuels including particle size distribution, grindability, ignition point, calorific value, ash melting behaviour, trace element determination and viscosity
- Analyses of power plant products such as ashes, slags, deposits, corrosion products, limestone, gypsum, sludges and leachates
- Investigation and analysis of process waters, aqueous solutions and ultra-pure water
- OES metal analysis (Fe, Ni, Co, Al, Cu or Ti materials)
- Autoclaves for corrosion tests in high-temperature water or other aqueous media
<table>
<thead>
<tr>
<th>Plant</th>
<th>Thermal power</th>
<th>Through-put</th>
<th>LCV</th>
<th>Grate area</th>
<th>Grate width</th>
<th>Grate length</th>
<th>Commissioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANO Bremen, lines 2+3</td>
<td>43 MW</td>
<td>15 t/h</td>
<td>8 – 15 MJ/kg (household waste)</td>
<td>48.6 m² (W: 1+2, A: 3)</td>
<td>4.5 m</td>
<td>10.8 m</td>
<td>2003</td>
</tr>
<tr>
<td>ANO Bremen, line 1</td>
<td>71.5 MW</td>
<td>24.6 t/h</td>
<td>8 – 15 MJ/kg (household waste)</td>
<td>75.6 m² (W: 1+2, A: 3)</td>
<td>7.0 m</td>
<td>10.8 m</td>
<td>2005</td>
</tr>
<tr>
<td>CHP power plant Bremen-Blumenthal</td>
<td>30 MW</td>
<td>10 t/h</td>
<td>10 – 20 MJ/kg (RDF)</td>
<td>39.4 m² (W: 1-3)</td>
<td>4.15 m</td>
<td>9.5 m</td>
<td>2005</td>
</tr>
<tr>
<td>ANO Bremen, line 4</td>
<td>70 MW</td>
<td>22 t/h</td>
<td>8 – 15 MJ/kg (household waste)</td>
<td>70.2 m² (W: 1-3)</td>
<td>6.5 m</td>
<td>10.8 m</td>
<td>2007</td>
</tr>
<tr>
<td>Moscow, lines 1+2</td>
<td>47 MW</td>
<td>22.5 t/h</td>
<td>4.8 – 12 MJ/kg (household waste)</td>
<td>94.8 m² (A: 1-3)</td>
<td>7.9 m</td>
<td>12.0 m</td>
<td>2008</td>
</tr>
<tr>
<td>Stavenhagen, line 1</td>
<td>52 MW</td>
<td>14.5 t/h</td>
<td>11 – 18 MJ/kg (RDF)</td>
<td>45.7 m² (W: 1-3)</td>
<td>4.97 m</td>
<td>9.2 m</td>
<td>2007</td>
</tr>
<tr>
<td>EVI Europark, lines 1+2</td>
<td>76 MW</td>
<td>22.8 t/h</td>
<td>8 – 15 MJ/kg (household waste)</td>
<td>83.2 m² (W: 1+2, A: 3)</td>
<td>8.32 m</td>
<td>10.0 m</td>
<td>2007</td>
</tr>
<tr>
<td>Prokon Weener, line 1</td>
<td>70 MW</td>
<td>21 t/h</td>
<td>11 – 18 MJ/kg (RDF)</td>
<td>74.2 m² (W: 1-3)</td>
<td>6.87 m</td>
<td>10.8 m</td>
<td>2007</td>
</tr>
<tr>
<td>MKK Bremen, line 1</td>
<td>121 MW</td>
<td>36 t/h</td>
<td>11 – 18 MJ/kg (RDF/household waste)</td>
<td>120.6 m³ (W: 1-3)</td>
<td>11.17 m</td>
<td>10.8 m</td>
<td>2009</td>
</tr>
<tr>
<td>Oostende, line 1</td>
<td>70 MW</td>
<td>21 t/h</td>
<td>11 – 18 MJ/kg (RDF)</td>
<td>74.2 m² (W: 1-3)</td>
<td>6.87 m</td>
<td>10.0 m</td>
<td>2009</td>
</tr>
<tr>
<td>Bitterfeld, line 1</td>
<td>56 MW</td>
<td>16.8 t/h</td>
<td>11 – 18 MJ/kg (RDF)</td>
<td>59.2 m² (W: 1-3)</td>
<td>5.92 m</td>
<td>10.8 m</td>
<td>2009</td>
</tr>
<tr>
<td>Prokon Stade, line 1</td>
<td>75 MW</td>
<td>21 t/h</td>
<td>11 – 18 MJ/kg (RDF)</td>
<td>74.2 m² (W: 1-3)</td>
<td>6.87 m</td>
<td>10.8 m</td>
<td>2009</td>
</tr>
<tr>
<td>EAB Bernburg, lines 1-3</td>
<td>67 MW</td>
<td>21 t/h</td>
<td>11 – 18 MJ/kg (RDF)</td>
<td>74.2 m² (W: 1+2; A: 3)</td>
<td>6.87 m</td>
<td>10.8 m</td>
<td>2010</td>
</tr>
<tr>
<td>Spremberg, line 1</td>
<td>110 MW</td>
<td>31 t/h</td>
<td>8 – 18 MJ/kg (RDF)</td>
<td>120.6 m³ (W: 1-3)</td>
<td>11.17 m</td>
<td>10.8 m</td>
<td>2012</td>
</tr>
<tr>
<td>Samsung, Suwon City, Korea, 1 line</td>
<td>17.25 MW</td>
<td>2.917 t/h</td>
<td>15.4 – 23.4 MJ/kg (RDF + Electronic waste)</td>
<td>20.9 m³ (W: 1-3)</td>
<td>2.375 m</td>
<td>8.8 m</td>
<td>2013</td>
</tr>
<tr>
<td>Samsung, Cheonan City, Korea, 1 line</td>
<td>29.06 MW</td>
<td>8.33 t/h</td>
<td>7.12 – 13.82 MJ/kg (RDF + Municipal solid waste)</td>
<td>41.0 m³ (W: 1-2; A: 3)</td>
<td>3.8 m</td>
<td>10.8 m</td>
<td>2014</td>
</tr>
<tr>
<td>Spittelau, lines 1+2</td>
<td>45 MW</td>
<td>16 t/h</td>
<td>7 – 15 MJ/kg (household waste)</td>
<td>62.0 m³ (A: 1-3)</td>
<td>5.74 m</td>
<td>10.8 m</td>
<td>2014/15</td>
</tr>
<tr>
<td>WTE Plant Szczecin, Poland, lines 1+2</td>
<td>29.17 MW</td>
<td>10 t/h</td>
<td>8 – 13 MJ/kg (RDF)</td>
<td>43.8 m³ (A: 1-3)</td>
<td>4.06 m</td>
<td>10.8 m</td>
<td>2017</td>
</tr>
</tbody>
</table>

W: water-cooled A: air-cooled
The priority for our customers is also the priority for MHPS: plant availability. Thanks to years of experience in continuous on-site care for our customers, MHPS is able to ensure efficient and reliable solutions even for short-notice malfunctions and defects.

<table>
<thead>
<tr>
<th>Customer/plant</th>
<th>Fuel</th>
<th>Throughput</th>
<th>On-site service since</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Utility Düsseldorf MVA Flingern, Germany, line 1–6</td>
<td>Household waste, industrial waste similar to household waste, bulky waste</td>
<td>Approx. 450,000 t/a</td>
<td>1989</td>
</tr>
<tr>
<td>ZMS Schwandorf MKW Schwandorf, Germany, line 1–4</td>
<td>Household waste, industrial waste similar to household waste, bulky waste</td>
<td>Approx. 450,000 t/a</td>
<td>1990</td>
</tr>
<tr>
<td>MHB Hamm MVA Hamm, Germany, line 1–4</td>
<td>Household waste, industrial waste similar to household waste, bulky waste</td>
<td>Approx. 295,000 t/a</td>
<td>2003</td>
</tr>
<tr>
<td>AMK Iselohn MHKW Iserlohn, Germany, line 1–3</td>
<td>Household waste, industrial waste similar to household waste, bulky waste</td>
<td>Approx. 295,000 t/a</td>
<td>1989</td>
</tr>
<tr>
<td>EVO Offenbach MHKW Offenbach, Germany, line 1–3</td>
<td>Household waste, industrial waste similar to household waste, bulky waste, hospital waste, sewage sludge</td>
<td>Approx. 250,000 t/a</td>
<td>1996</td>
</tr>
</tbody>
</table>

Spare parts – Not only for WtE products

Our spare parts & trading service is happy to offer:

- Dynamic processing of your request
- Tailored and alternative solutions to optimally fulfil your requirement
- Individual mass customised manufacturing of your parts in our own workshops and/or at certified partners both at home and abroad
- Professional A – Z service provision
- Top quality for OEM and third-party parts

WE SUPPLY:

- Steam generator pressure parts
- Firing systems
- Grinding plants
- Metering hoppers/coal feeding
- Stoker firing, grate surfaces
- Afterburn grate, scraper, wet slag removal
- Flue gas scrubbing
- Valves
- Instrumentation and control technology
- Catalytic converters (test and replacement)
Power for a Brighter Future