

VAPMACHINE

Di-Tec



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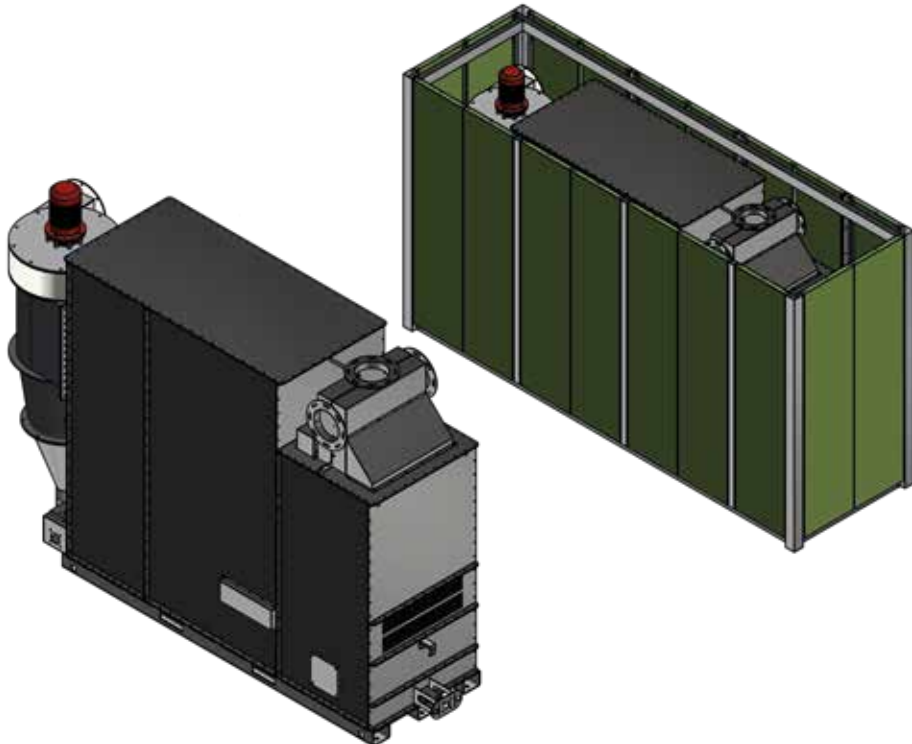
ELECTRICITY AND HEAT FROM
BIOMASS

THE COMBINED HEAT AND POWER SYSTEM
(CHP SYSTEM) WITH BIOMASS COMBUSTION
AND STEAM MOTOR

Electrical power: up to 100 kW
Thermal recovery: approx. 400 kW
per system, multiple versions possible

SYSTEM FUNCTIONALITY

Biomass is combusted efficiently at a high temperature in a specially-developed furnace. The heat that is generated is emitted to a closed circuit with distilled water using an exchanger. This process creates steam. The steam drives a piston motor with an integrated generator. After the motor, the residual steam is condensed, fed back into the furnace and the heat is emitted to a separate water circuit, which is used as hot water.



THE CORE COMPONENTS OF THE SYSTEM

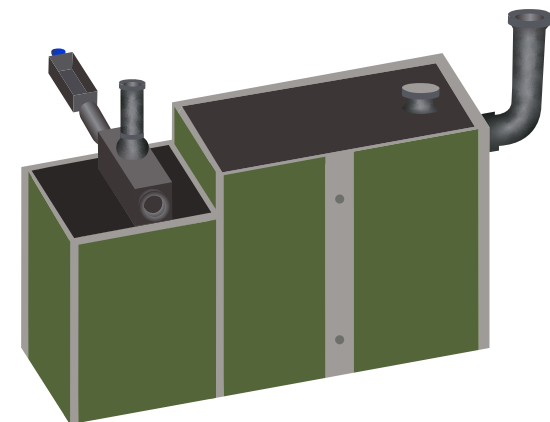
Steam exchanger, Flow steam production

The steam exchanger is one of the core components of the system. It has a sufficient exchanger area and a correspondingly large quantity of metal, which stores the heat. This facilitates continuous steam production (max. steam temperature 500 °C) in the flow whilst using a relatively low quantity of water. This avoids the costs of intensive monitoring by a boiler operator. The steam controlled system facilitates precise control of the steam pressure from 0 bar to a maximum of 50 bar.

Biomass furnace

The furnace combustion chamber is designed such that the combustion temperature can be held at between 1,200 °C and 1,400 °C. This is made

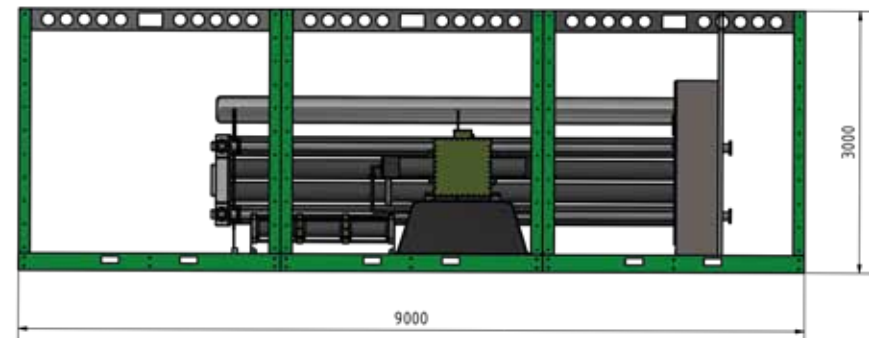
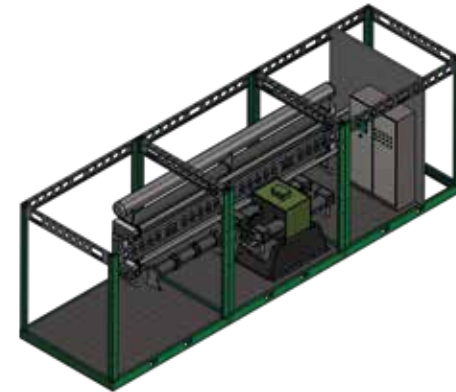
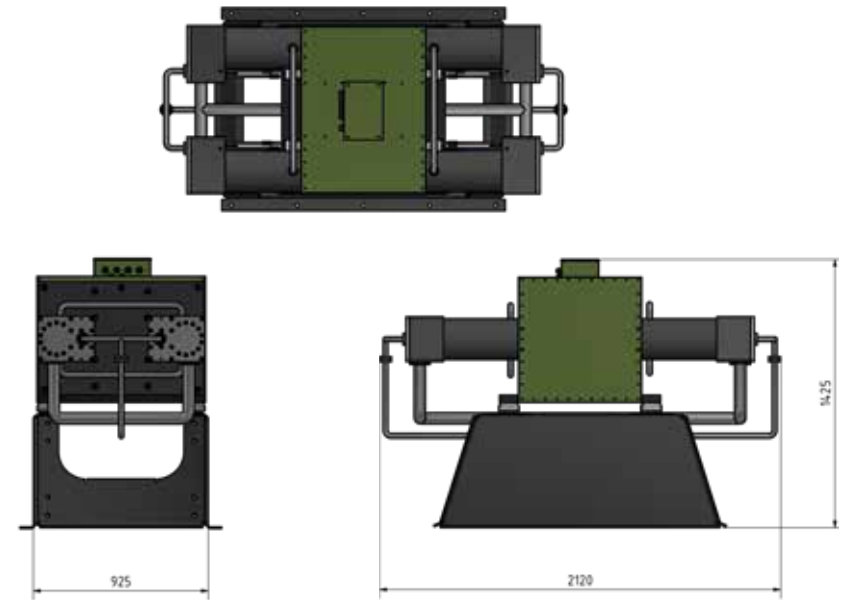
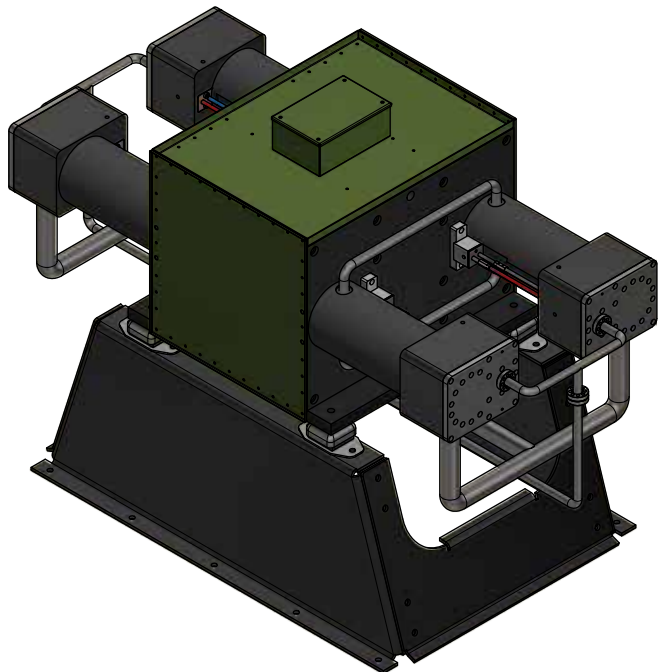
possible by the special hanging riddle grate and accelerated primary air and secondary air. The grate almost entirely prevents slagging too. In order to be able to respond to the calorific value content of various types of biomass, the hanging grate is adjustable and the combustion chamber can be made larger or smaller according to the requirements. In the event of more minor differences in the biomass (drier or damper material), the system responds automatically via the accelerated combustion air and subsequently also in the feeding. The high combustion temperatures keep the exhaust values very low. The ash formation ranges, depending on the combustion material, from between 0.5 and 5%, whereby this can be used as a high-quality fertiliser.



Electricity production with a motor, generator and inverter

The motor, like the furnace and steam exchanger, is a new development and is the product of decades of experience with similar applications. The linear arrangement of the cylinders means that all the components that are connected to the steam circuit function without oil lubrication. This prevents the formation of emulsions and, consequently, the need for expensive separation devices. The motor is a slow runner, which considerably reduces maintenance requirements and significantly increases its service life. Electricity is produced by a generator with a permanent magnet. This solution

allows deviations in the revolution speed of the motor. The system is intended to facilitate the use of biomass and combustion materials that are generally non-standard, which would otherwise need to be processed in an expensive manner. These materials can result, despite the stabilising exchanger, in fluctuations in the steam quantity. However, this issue is resolved by generator, which is not tied to a fixed number of revolutions per minute and can also utilise lower levels of energy from the steam. An inverter stabilises the frequency of the electricity that is generated.



THE KEY ADVANTAGES OF A CHP SYSTEM WITH COMBUSTION FURNACE AND STEAM MOTOR

Combustion process and feeding

The combustion process is simple, staff are only rarely required to be present and the supply of combustion material also takes place via a feed that has been specially constructed for this purpose. This feed is hard-wearing, quiet and requires little energy.

Combustion chamber and combustion material

The combustion chamber of the newly-developed furnace is designed for temperatures of between 1,200 °C and 1,400 °C, which is why the level of tolerance in terms of the combustion materials that are used is very high. Even material of a lower quality can be used. For this reason, there is a large amount of variety in terms of the materials that can be used and these range from biomass and fossil fuels to materials from the disposal sector.

Steam exchanger

The steam exchanger, which was also developed specially for this system, stabilises the steam production

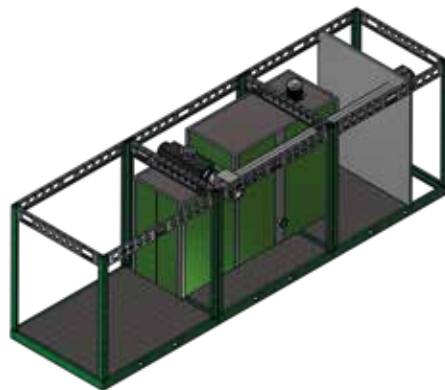
by storing heat in the metal mass. The steam production only takes place in the flow and without an additional storage device. This therefore removes the need for intensive monitoring by a boiler operator.

Steam motor

The steam motor, which has been entirely developed from scratch, is a slow runner, which increases the service life of all the components and reduces the maintenance requirements. The components in contact with the steam circuit do not require oil lubrication, which prevents emulsions.

Generator

The generator with a permanent magnet allows deviations in the revolution speed: should the steam supply be at a low level, electricity can still be produced.



READY-TO-CONNECT CONTAINERS

The system is pre-installed, the pipes are laid and the cables are connected in a specially-constructed container at the factory. This makes commissioning easier on-site. In addition, the system undergoes a test run at the factory before being delivered. For transport reasons, this solution is divided into a machine room container and a heating chamber container. The exterior dimensions of each of these containers are 12 m x 3 m x 3 m. Both containers can be positioned next to or above one another. All of them have a supporting base, an access area at the side and a separate supply shaft that contains the cables and pipes.

MODULAR CONTAINER

If space is limited, containers can also be mounted on a concrete platform on-site. This must be constructed in accordance with our specifications. The different system components can only be connected with one another via the pipes and cables on-site. The exterior dimensions are 12 m x 3.70 m x 3.70 m, which can be altered in length with 1 m modules.

