SUCCEEDING ENERGY SYSTEMS



ClinX

An externally fired microturbine system for power generation from hidden fuels

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Abstract

1 Summary

With the development of ClinX, B+K has set as its mission the efficient use of even small energy potentials and the environmentally neutral recycling of residual materials. ClinX stands for "Clean Incineration", the clean combustion of any fuel - X to Energy.

With the process of the externally fired micro gas turbine, which is used in the ClinX plant systems, B+K offers a combined heat and power solution in the power range between 40 kW - 1 MW electrical. By separating the turbine from the direct flue gas stream on the process side and firing it with exclusively clean ambient air, a very wide range of fuels is possible.

ClinX plant systems consist of at least a micro gas turbine (externally fired) and a heat exchanger, the other system components are selected fuel-specifically and according to the legal restrictions regarding flue gas quality. In ClinX - X to Energy projects, the customer is recommended the optimized system solution based on his existing residual material.

As a turnkey product, B+K distributes ClinX-Wood with a focus on the target group of the wood processing industry.

2 Company Presentation

Professor Dr. Berg und Kießling GmbH (B+K) was founded in 2012 with the vision of Sebastian Kießling and Prof. Dr. Peter Berg to develop innovative and environmentally friendly energy systems "Made in Germany" and thus counteract the ubiquitous energy inefficiency.

Our mission: Every combustion chamber that exclusively provides thermal energy should be replaced by a B+K plant system and thus generate electricity AND heat - resource-efficient and environmentally friendly!

With "Succeeding Energy Systems", B+K meets this demand by supplying its customers with forward-looking energy conversion systems for the decentralized provision of electricity, heat and cooling and replacing systems which convert residual materials exclusively thermally.

From the very beginning, B+K has developed its own micro gas turbines and implemented them in various application areas (e.g. as range extenders). As an externally fired variant, this technology forms the basis for the ClinX plant system developed in-house.

The "ClinX" product idea has been developed of B+K since 2016 and developed jointly with the market - in direct contact with customers and their needs. In April 2017, the first pilot plant at the Cottbus site was officially inaugurated after a construction period of 4 months. The development of the externally fired gas turbine, which is the core of all ClinX plants, was awarded the Innovation Prize Berlin-Brandenburg in the category of energy technology in 2017.

The pilot plant has now been in operation at the Cottbus site since 2017 and has proven its robustness and functionality with over 10,000 operating hours.

Since 2019 we have been approaching our plant sales in a professional manner and, in addition to internal sales, are working on building up our distributor network.

3 ClinX plant systems

With the development of ClinX, B+K has made it its mission to use even low energy potentials efficiently and to enable environmentally neutral recycling of residual materials. ClinX stands for "clean incineration", the clean combustion of any fuel - X to Energy.

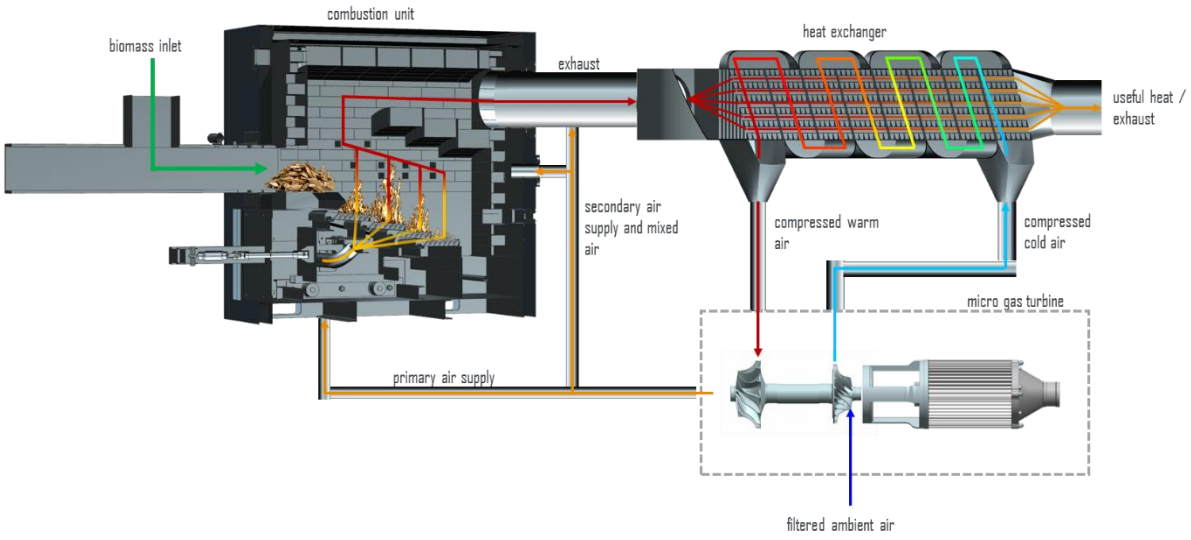
The B+K offers with the process of the externally fired micro gas turbine, which is used in the ClinX plant systems, a combined heat and power solution in the power range between 40 kW - 1 MW electric. By separating the turbine from the direct flue gas stream on the process side and firing it with exclusively clean ambient air, a very wide fuel spectrum is made possible.

ClinX plant systems consist of at least a micro gas turbine (externally fired) and a heat exchanger, the other system components are selected fuel-specifically and according to the legal restrictions regarding flue gas quality.

Residual materials are converted decentrally into electricity, heat and/or cold and are thus converted directly at the point of origin instead of being disposed of in a central disposal system, which is usually subject to a charge. The following applies to B+K: there is no waste for us, only energy sources.

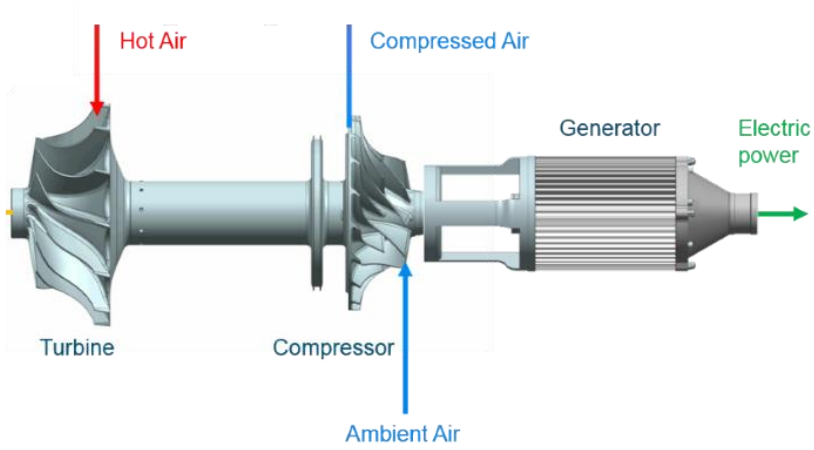
The decentralized provision of energy, exactly where it is needed, makes ecological and economic sense. In view of the limited availability of fossil fuels, the energetic utilization of residual materials that can no longer be recycled represents an environmentally friendly alternative. ClinX as a decentralized plant system uses the energetic potential of the residual materials effectively.

3.1 Process Description



Fuel and ambient air are thermally converted in the combustion unit (or alternative system) and fed into the exhaust system through a recuperator. The dust content is lowered in a final filter unit and the applicable statutory regulations are complied with.

In parallel, ambient air is drawn in by the turbomachine, compressed and then heated by the heat energy stored in the recuperator. The hot air enters the turbine at a pressure of approx. 4 bar and a temperature of approx. 850 °C, where it is expanded. This converts the thermal energy of the hot air into mechanical rotary motion, which is why the turbine can drive the intake compressor and a directly coupled high-performance generator. Electrical energy is generated in this generator from the mechanical rotary energy.



The turbine exhaust air takes part in the combustion at up to 550°C, increasing efficiency and reducing fuel consumption. A separate heat exchanger allows residual heat to be used to generate process air, hot water or other thermal energy.

The aerodynamic decoupling of the turbomachine from the combustion system enables very low-wear and clean operation. The external coupling of the heat energy via the heat exchanger is the basis for great fuel flexibility when using a turbo machine process.

The modular design of the plant allows flexible adaptation of the basic system to individual customer requirements.

3.2 ClinX-Wood with the application field of the wood processing industry

ClinX-Wood was developed for applications with the fuel spectrum in the field of natural, woody residual materials. ClinX-Wood are complete plant solutions which can be implemented directly in the application fields. With our complete systems, users can generate green energy decentrally with their own wood-like residues.



The ClinX plant system converts heterogeneous, wood-like residues decentrally into green electricity and green heat.

The residual materials can thus be converted into electricity and heat by a CHP process using ClinX. This offers a significantly more efficient energetic utilisation of the fuels than separate energy generation and thus both high economic (e.g. savings in fuel costs) and ecological advantages. With ClinX-Wood companies expand their business field and gain independence through their own energy generation.

In particular, even very thoroughly mixed, wood-like material streams with a high water content (up to 50%) can be converted efficiently and profitably into clean energy - thus opening up a very cost-effective residual material potential.

B+K has designed two standard system sizes - ClinX-50 Wood 50 kWel and ClinX-150 Wood with 150 kWel, which electrically cover a power spectrum from 40 kW to 1 MW due to the cascade option and can therefore be adapted to customer requirements.

ClinX-Wood was developed for and with the woodworking industry. Thermal sinks represent drying processes, heating requirements and production processes, while the electrical energy can be used by the user for its own supply or fed in with conveyors. At the same time, excess combustible materials (residual wood, sawdust, wood chips) are produced, which can be categorised as biomass or industrial residual wood in accordance with the Biomass Ordinance and thus the converted energy can be classified as renewable.

The target companies within the wood processing industry are the following: Veneer factories, kitchen manufacturers, furniture factories, pallet manufacturers, parquet manufacturers, sawmills, large table factories, timber house manufacturers.

3.3 Further fields of application of ClinX – X to Energy

The core system of the externally fired micro gas turbine with associated heat exchanger can be combined with various energy conversion and correspondingly necessary flue gas aftertreatment. The central process thus enables the efficient energetic conversion of various residual materials into electrical energy and creates the possibility to offer individual solutions according to the existing residual materials, which are scalable due to the constant central system.

