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Press Release

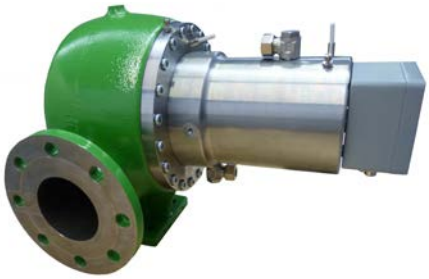
Unused energy potential just waiting for recovery

Use turbine technology to earn from surplus energy

A comprehensive range of accessories is available for the DEPRAG GET turbine generator

Climate protection and efficient energy usage are more important than ever. It is high time that we started using energy wisely. In the European Union there are attempts underway to not only reduce emissions of the climate killer CO2 by 20 percent before 2020 but by 30 percent instead and also to make it a binding commitment. Research and industry are called upon to come up with innovative projects which will help protect our environment.

The opportunities are numerous and wide-ranging. The unused potential is waiting for exploitation. In 2010 DEPRAG SCHULZ GMBH u. CO had already started an ambitious research project in the field of energy recovery. This project, sponsored by the German Federal Ministry for Economics and Technology as a result of a resolution by the German Bundestag (Germany's parliament), is based on the idea that "in many industrial processes, gas is released into the atmosphere. The aim was to utilize these gases as an energy source". The recovery of energy from process gases is not a new concept. Dr.-Ing. Rolf Pfeiffer explains, "the new aspect of our development however, is that our small compact decentralized energy recovery system can also convert small amounts of residual energy in the power range of 5 to 20 kW into electricity."



Turbine Generator

Prof. Dr. Ing. A. P. Weiß from the Ostbayerischen Technischen Hochschule Amberg-Weiden (East Bavarian University of Applied Sciences Amberg-Weiden) sees a great potential for this system in the future: "compressed air systems could be boosted by the use of this decentralized storage of surplus renewable energy. With the innovative GET turbine generator from DEPRAG, the so-called CAES (Compressed Air Energy Storage) temporary storage of wind or solar energy even in small kW ranges could present a new scope of application for compressed air technology".

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Now DEPRAG SCHULZ GMBH u. CO has completed the development of their initial prototype of the innovative DEPRAG GET turbine generator for the power range 3-50 kW into the sizes 5 kW, 20 kW and 50 kW. These design sizes are individually configured to each process.
For the fluid mechanic layout and design of the turbine generator it is necessary to define the specific processing parameters: type of medium, inlet pressure, outlet pressure, mass flow, and inlet and outlet temperature. The specialists at DEPRAG also require a description of the application and processing conditions in order to integrate the GET turbine into the existing production process.

The DEPRAG turbine generator can be used in both open and closed processes. It can be designed for use with diverse mediums such as compressed air, natural gas, CO2, steam, R245fa, SES36, Cyclopentane. Dr.-Ing. Rolf Pfeiffer: “Our energy recovery system is suitable for use in a multitude of applications to convert direct process gas into energy or by integrating the GET unit into an ORC process indirectly to utilize unused surplus heat”.

From the very start of their research, the team surrounding the Head of Development Gerd Zinn discovered that the new energy recovery system had to be a small, simple and robust system in the power ranges between 5 and 20 kW and they wanted to forgo the use of a gearing after deliberations concerning cost and maintenance. This proved however to be the greatest challenge to the developers. This is because the physical realities and the small diameter of the turbine rotors results in a relatively high speed of the turbine and therefore also of the generator. The mechanical properties of the suited materials set definite limits on the developers. No available standard generator was small enough or fulfilled the requirements for durability to be able to withstand the calculated speeds of approx 40,000 rpm. Consequently it

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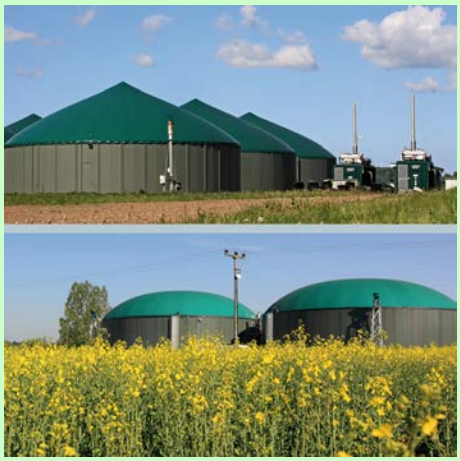
was necessary for them to develop a new electric generator themselves which would be suitable. The durability of the rotor was the focal point for the engineers.

Intensive research finally resulted in the compact complete system based on a permanently excited synchronous motor for the generation of power.

The DEPRAG turbine generator: a compact unit made up of a micro-expansion turbine with an electric generator which generates electricity from gas. Without its control cabinet the turbine generator is not much larger than a shoebox and can be installed decentralized at locations where gas pressure shifts from a high level to a lower level. Previously this released pressure energy has rarely been utilized to recover power and the ecologically valuable energy potential was therefore needlessly wasted. The innovative DEPRAG GET turbine generator changes the energy contained in the working fluid into electricity. Gas flows into the turbine and is “pressed” through jets and accelerated. When it reaches the blades of the rotors and is deflected, it releases its energy. The kinetic energy is changed into electrical energy in the generator. In this innovative design, the turbine and electric generator is one compact unit and shares the same shaft. Therefore when the turbine turns, the rotor of the generator also rotates.



Application examples - biogas plants and CO-generation plants

Energy recovery using the DEPRAG turbine generator is appropriate for use in many application areas. When smelting metals, for example aluminum and copper, the melting tanks are cooled by compressed air. The compressed air flows through cooling channels and absorbs heat. Normally, it is then released into the atmosphere. With the new micro-expansion turbine and integrated generator this is changed into electricity and fed back into the power network. A sample calculation for compressed air illustrates this: with an inlet pressure of 20 bar (abs.), an outlet pressure of 5 bar (abs.) and an inlet temperature of 180°C with a corresponding mass flow, the GET turbine generator can recover the electric power of approx. 20 kW.

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In biogas and thermal power stations, the GET turbine can be utilized by a method based on the ORC process (Organic Rankine Cycle) to convert residual energy into power. The electrical efficiency of plants can be successfully optimized by allowing small volumes of waste heat to be utilized economically in an ORC recovery process.

To further increase the efficiency of biogas plants methane can be fed into the natural gas network and energy can thereby be stored or transported. A large part of biogas is methane and carbon dioxide. A prerequisite for the feed-in is that the carbon dioxide is removed from the biogas. Usually this occurs in those processing plants where carbon dioxide is present at the end stage at relatively high pressure and temperature levels. A large amount of the stored energy can be recovered using the turbine generator.

Application example: natural gas pipelines

A comprehensive range of accessories has also been developed. The recovery units up to 15 kW combine the components rectifier, inverter and ballast circuit in a compact housing. An external load resistor is directly controlled by this unit. If the turbine is not creating power the feed-in converter turns off and does not use any electricity from the supply network. As soon as the turbine generator is generating power again the recovery unit automatically switches turns on.

The feed-in systems for 25-50 kW are specifically developed performance electronics for high-speed generators. Additional add-on functions and safety functions such as network monitoring and braking resistors can be taken into account, as well as specific measurement and cooling concepts.

To increase the time between maintenance intervals our Engineers have now developed a re-greasing unit, which automatically re-greases the turbine bearings. The compact greasing pump is designed for independent operation with a battery and therefore does not require an external electricity supply though it can be connected to a control panel with 24V.

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DEPRAG SCHULZ GMBH u. CO. is one of the market leaders in the manufacture of air motors. From the development and production of the most varied of air drives over the last decade, the turbine technology has become a new focus of the company. These innovative solutions can be used to realize brand new applications. This owner managed family business has around 600 employees and is represented in over 50 countries. DEPRAG has always considered innovation and continuous improvement of existing product lines to be the best solution to the challenges of our times.

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