

## Press Release

Made possible through a special partnership project

### Power Generated By Industrial Waste Heat

*DEPRAG explains waste heat recovery using an ORC mini power generator*

Surplus heat from industrial processes is by and large an untapped resource. This unused potential is just waiting to be discovered! A joint cooperation project between the University of Bayreuth, the East Bavarian Technical College Amberg-Weiden and the company DEPRAG SCHULZ GMBH u. CO. has developed a new and innovative ORC mini power generator – supported by the Bavarian Research Foundation. The project partners have succeeded in efficiently converting existing waste heat into electrical energy.

The basic idea: "In many industrial activities process gas is lost into the atmosphere. The original plan was to find a way to utilize the potential of these gases", explains DEPRAG Chief Operating Officer Dr.-Ing. Rolf Pfeiffer. The recovery of energy from process gases is not a new idea. "What is new, however, is that with our development, using a small, compact, decentralized energy recovery system, even small amounts of residual energy in the power range of 3 to 120 kilowatts can be converted into power". If the surplus energy potential is in the form of heat instead of pressure, it can only be utilized via a special closed-circuit method – for example an ORC process (Organic Rankine Cycle). On this basis the three project partners developed an ORC test facility which has been installed and tested at the Centre for Energy Technologies at the University of Bayreuth.



*GET Turbine Generator*



In order to present their research findings, DEPRAG, together with the University of Bayreuth, organized a presentation for potential customers at the University of Bayreuth. At this event the participants had the unique opportunity of viewing the ORC system in action, getting to understand the processes and gaining further information about the integrated GET turbine generator.

## The DEPRAG GET turbine generator

A compact unit consisting of a micro-expansion turbine with an electric generator generating power from gas. Without its electric control cabinet, the turbine generator is not much larger than a shoebox and can be installed in a decentralized position wherever gas is transferred from a higher to a lower pressure level. The pressure energy released by this shift is only utilized in the rarest situations and therefore valuable energy potential is being wasted.

The innovative GET turbine generator converts the energy contained in working fluid into power. Gas flows into the turbine, is "compressed" by jets, accelerated and releases energy. The kinetic energy is converted into electric energy in the generator. In this innovative system, the turbine and electric generator constitute a compact unit – they share a common shaft. Consequently: When the turbine turns, the rotor of the generator also turns.

The DEPRAG GET turbine generator is available in sizes 5 kW, 25 kW, 50 kW and 120 kW and is individually configured to each process requirement. It is necessary to define the specific processing parameters for the fluid mechanic layout and design of each turbine generator: type of medium, inlet pressure, outlet pressure, mass flow, and inlet and outlet temperature. The specialists at DEPRAG also require a precise description of the application and processing conditions.



*GET Turbine Generator*

The GET 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, CO<sub>2</sub>, steam, cyclopentane, R245fa or SES36. In the ORC-test system in Bayreuth for example, cyclopentane is vaporized. 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 our GET unit into an ORC process indirectly to utilize unused surplus heat."

## A multitude of application areas

Energy recovery using the DEPRAG turbine generator is appropriate for use in many application areas. When smelting metals, for example, aluminum or copper, the melting tanks are cooled by compressed air. The compressed air flows through cooling channels and absorbs heat. Normally, it is then released unused into the atmosphere. With the new micro-expansion turbine and integrated generator this is changed into electricity and fed into the power network.

In biogas and combined heating and power units the GET turbine can also be utilized by a method based on the ORC process to convert residual energy into power. The electrical efficiency of systems can be successfully optimized by allowing small volumes of waste heat to be utilized economically in an ORC recovery process.

Essentially any combustion engine can be suitable for combination with a turbine. Even a very efficient combustion engine can use only around one-third of the potential energy available from its fuel for mechanical activities. The remaining 60 percent of the energy generated is lost as waste heat in exhaust gases and cooling water. One strategy for mobile drives, for example in commercial vehicles, is to use this thermal energy via a

vaporization process. Here the turbine generator demonstrates one of its key features. Through recovered electrical power, the onboard electrical system can be powered, the dynamo is relieved and the whole level of efficiency is improved.

DEPRAG SCHULZ GMBH u. CO. is one of the market leaders in the manufacture of air motors. Based on the development and production of a wide variety of pneumatic drives over the past decade, they have expanded their expertise into the new field of turbine technology. Their innovative solutions can now be applied to an entirely new range of applications. DEPRAG, based in Amberg, Germany has around 600 employees in over 50 countries. Innovation and the continuous advancement of their existing product lines have meant that DEPRAG is always ready with a solution to the latest challenges of the market.



*Dr. Eng. Markus Preissinger  
demonstrates the ORC*

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