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Press Release

Climate- and energy policies challenge to research and industry

Today, compressed air technology is more economical than ever before

Save electricity with innovation so you can continue to use proven technology

Compressed air technology provides essential service, and is now an indispensable part of industry, and technology. For example, the widely used PET bottles are inflated with compressed air, and compressed air also aids in sewage treatment plants that help treat the water. The cost-effectiveness and efficiency of compressed air as a working fluid, has been under criticism in the past, especially the effect in the foreground. Compressed-air-technology expert, Prof. Dr. Eng. AP White, from the University of Applied Sciences in Amberg-Weiden, states, climate- and energy policies require rethinking. "The focus is now directed to the efficiency," he said. Science and industry are breaking new grounds so that long and already proven technologies go hand in hand with innovation. The common goal is simple, continue to improve the energy efficiency of compressed air, and ensure the compressed air technology is ready for the future. Prof. Dr.-Eng. White is convinced, "If you use the compressed air, that is currently in operation, to its full potential, then this energy needs to be efficient!" A European Union study shows that 18 percent of the electrical energy used by the industry to generate compressed air is used as working fluids, and one-third of the usage is electricity. This study reflects how energy could be more efficient if used appropriately and by competent professionals.

At the University of HAW Amberg-Weiden, the subject of compressed air was added to the curriculum in 2000. A test and research center was then developed, to further test compressed air properties and pneumatic drives. Since that time, the university is working closely with the industry. A local resident, and mechanical engineer at DEPRAG was the congenial partner to develop innovative pneumatic tools. These tools were certified with the EX-protection, which allows compressed air drives to be used in hazardous environments, where even a single spark creates great danger. But the research was not limited to just power tools. The general construction and operation of an air motor were tested to avoid overheating. In the past, critics have questioned the efficiency of the compressed air technology. Depending on the type of air motor used, the expansion of compressed air does not work optimally, and as a result more air is consumed than

Turbine

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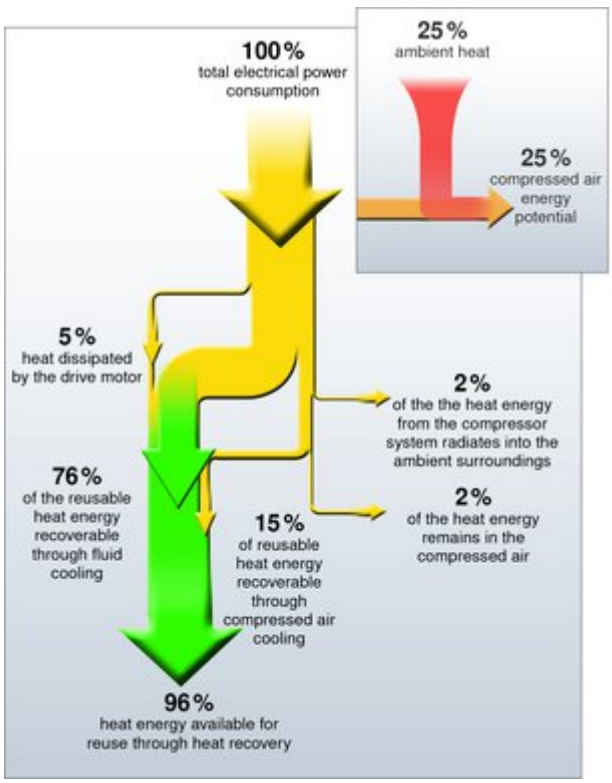
necessary. “The consumption of energy for the electric compressor is, therefore, higher than when the power is used directly for an electric tool,” they argue. DEPRAG Product Manager for Air Motors replies,, "air motors and electric motors cannot be compared one-to-one.” The application is intended to drive the solution, and needs to be clarified with reference to the following example:"

A motor is needed to obtain a rotational speed of 450 revolutions/minute in a packaging machine. The closure of a packing tape is over an extended period to a torque of 25 Nm at a lower speed. Electric motors cannot be loaded over a long period of time, this would lead to overheating. Therefore, an electric motor for this packaging machine, is designed for the load torque and requires a power of 1170 W (25 Nm divided by 9550 times 450 revolutions/minute). Quite different is the calculation for an air motor. Dagmar Dübbelde, "Both requirements of the packaging machine can be realized by the favorable torque curve of air motors with a smaller motor.” Here you would select an air motor with a rated torque of 15 Nm at a rated speed of 275 revolutions/minute. Since the output torque is less than the rated torque, the motor rotates at a low load near the idling speed of 450 revolutions/minute. The required power of the air motor is only 430 W. Dagmar Dübbelde adds, “If only one third of the performance of an electric motor is replaced by installing the right air motor into this package machine, then the energy balance of the air motor looks completely different.”



Sigma Air Manager schematics

Dagmar Dübbelde, therefore, advises all users, "The pneumatic motors must be carefully designed for their application, saving electric energy and operating costs." Simple, conventional measures increase profitability. Dagmar Dübbelde, "The manufacturer's recommended hose lengths must be strictly adhered to and bottlenecks, which act as a throttle and reduce the performance of the pneumatic motor must be avoided." Even manufacturers of air compressors stations contribute by reducing the energy consumption of compressed air generation by 30 percent. The market leader KAESER AG offers users a PC-based compressed air audit that accurately determines the actual air demand for new as well as existing systems.

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Dipl-Eng (FH) Erwin Ruppelt, "The more that transparency exists among the costs and potential savings in the use of compressed air supply, the closer you get to everyone reducing the energy consumption of air compression by one-third; this benefits corporate balance sheets and the environment." "During discussions, the savings potentials are discovered and the correct future implementation of the compressed air needs to be optimized to assure the highest reliability and energy efficiency".

The internal controls of modern compressors communicate with industrial PCs, enabling accurate data collection and analysis. This forms the basis for a complex management system, which significantly reduces the energy consumption, even on existing stations. Compressed air can do more. Dipl.-Eng. (FH) Erwin Ruppelt, is enthusiastic, "By using heat recovery one can save even more valuable energy. 100% of the drive energy supplied to a compressor is converted into heat. Now, up to 96 percent of this energy can be reused a 2nd time for example as a heat source or as processing heat! Through aimed utilization of the compressor's waste heat, it is possible to not only reduce the electric energy consumption of a company, but to perceptibly reduce the heat requirement of a business!" In a recent example, 552,000 kilowatt-hours saved. Efficiency increased through aimed heated recovery was achieved, by a mill and this type of savings also is possible with air compressors. In comparing the years 2007 to 2011, there was no utilization of the compressor wasting heat in 2007, whereas, in 2011, the positive results became clear.

For gas heating a total of 552,000 kWh was saved. These savings are equivalent to 36 percent of the total heating requirement. The annual average has been able to reuse 52 percent of the compressor power consumption for heating. The peak value of the measurement was 71 percent, which promises innovative developments in compressed air technology and also lowers your energy costs. For example, the pneumatic turbine-drive. Instead of the conventional vane motor it uses a turbine expansion work of the air. This utilizes the working fluids more efficiently, the air requirement of the engine decreases by a third. This scores the turbine drive with an unmatched power-to-weight ratio (kg / kW); it is only half the size of a vane motor. DEPRAG Product Manager Dübbelde, "By replacing a fist-sized vane motor with a turbine-motor of the same size, I can double the power in one swoop!" The turbine also does not require lubricants, and wear parts do not exist. This also speaks to the efficiency of a turbine. Prof. Dr. Eng AP White of the University of Applied Sciences Amberg-Weiden summarizes, "Air is now more efficient than ever if you start to consider using air recovery and there is nothing more economical". For the future, he still sees enormous potential, "Compressed air systems could increasingly find application where the decentralized storage of surplus renewable energy is an advantage. By combining the existing KAESER compressors with the

Test facilities Technical University Amberg-Weiden

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innovative DEPRAG GET turbine generator, the short time storage of wind or solar energy (as described by CAES = Compressed Air Energy Storage), could be a new application area for the compressed air technology even in the lower kilowatt range."

The Amberg-Weiden University is one of the newer, but highly-distinguished universities in Bavaria. For the past 19 years with around 3200 students, the 82 professors have devoted themselves to teaching modern topics such as: "renewable energy", "energy efficiency," and "rational use of energy".

It is a must to enter in discussions with individuals, who not only teach, in the subject of "Energy-efficient Compressed Air Technology," but also those individuals who are in the related fields of research. In addition to the availability of related lectures, students are able to work with compressed air technology in laboratories e.g. test compressors and tools. This university is also known for offering their services to industry partners. Students support industrial companies through energy optimization in their compressed air facilities, in projects, practical tasks and final assessment tasks. They are continuously accompanied and supervised by a professor. The above-average commitment of this young university is not a surprise since autumn 2013, together with the University of Regensburg, this young university has been named a technical university.

Kaeser, is one of the leading manufacturers and suppliers of products and services on the subject of compressed air. The range of know-how includes compressed air, compressed air purification and air distribution. The focus is always on reliability, energy efficiency and cost. Kaeser offers a complete line of air system products including rotary screw compressors with the highly efficient Sigma Profile and the Sigma Control system, Mobilair portable compressors, Omega rotary lobe blowers, vacuum packages, refrigerated and desiccant dryers, filters, condensate management systems and a variety of related products, as well as services such as consulting, planning, analysis and contracting. Kaeser is represented with over 400 employees in more than 100 countries worldwide either by its own subsidiaries or through exclusive partners.

The new Kaeser ADA 2 – Air Demand Analysis tool – enabling amongst other things web-based access and analysis of the data and providing the operator with the first details

For decades, DEPRAG SCHULZ GMBH u. CO. has focused on compressed air as a working fluid. DEPRAG compressed air motors and compressed air tools are established in the worldwide market. Innovation and the continuous improvement of existing product lines have made this Amberg-based medium-sized machine manufacturer (with about 600 employees, and present in 50 countries) one of the leading producers in its industry. Furthermore, the GREEN ENERGY sector is engaged in the development of an innovative gas expansion turbine (GET- Green Energy Turbine), which makes residual process gases economically beneficial even if they are small in volume.

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