

Press Information

Magnetically coupled pumps: Great savings in electricity costs and greenhouse gas emissions thanks to ceramic containment shells

Kyocera manufactures the containment shells used in magnetic drive pumps from the ceramic material zirconium oxide FZM. Besides numerous technical advantages, ceramic containment shells enable energy-efficient operation and a consequent reduction in electricity costs and CO2 emissions.

Kyoto/London, 13. January 2022. Ceramic containment shells are a central element in magnetic drive pumps, such as those used in the chemical industry and in the extraction and processing of oil and gas. Large production facilities often operate tens of thousands of such pumps. Accordingly, the leverage for reducing energy consumption and, at the same time, harmful greenhouse gas emissions that results from the use of magnetic drive pumps with ceramic containment shells, instead of their metal counterparts, is considerable – especially when operating continuous duty pumps.

Unlike metallic containment shells, ceramic containment shells are not capable of being magnetized. Eddy currents that reduce performance are prevented and energy efficiency is significantly improved. It is therefore possible to reduce the drive power of a pump by up to 15 percent. In addition, losses due to eddy currents generate up to 20 kW of heat, which may constitute a safety risk depending on the process and the media conveyed. In the case of substances close to their boiling point or explosive materials, any additional heat input should be minimized. This can minimize risks due to any boiling distortions or deflagrations that may occur.

The potential savings in energy, greenhouse gas emissions and also costs are enormous: Electric drives in industry and commerce consume almost two-fifths of all electricity in Germany. In these two sectors, their share of electricity consumption is even around 80 percent. The Federal Environment Agency, for example, calculates that the use of energy-efficient pumps alone could save around 5 billion kWh of electricity¹. The latest climate balance published by the Federal Environment Agency states that this would correspond to around 401 kilotons of CO2 in 2019. Assuming an electricity price of 15 ct/kWh, the industries concerned could also reduce their energy costs by around 750 million euros.

¹ Source: <https://www.umweltbundesamt.de/themen/klima-energie/energiesparen/energiesparen-in-industrie-gewerbe#energieeinsparpotenziale>

Besides CO2 savings, also significant cost reductions

Companies have as such an efficient way of meeting the requirements of the new European climate law and the carbon pricing stipulated in the national climate protection program for Germany. Model calculations show that the annual savings for a pump range from around 2,600 to around 19,600 euros, depending on the speed and electricity price (assumptions: 8,000 operating hours per year, speed 1,500 or 3,000 rpm, electricity price between 12 and 18 ct/kWh). In this way, the higher purchase costs of a ceramic containment shell compared to its metal counterpart are usually amortised by the electricity savings after a maximum of half a year. The CO2 savings per pump applying the assumptions mentioned are between 13 and 68 metric tons per year.

In addition, BAFA (German Federal Office of Economics and Export Control) subsidizes investments in high-efficiency centrifugal pumps, glanded pumps and glandless circulators as well as for frequency converters for pumps with variable volume flow with 30 percent of the investment - for SMEs there is even a maximum of 40 percent with a maximum subsidy of 200,000 euros².

Many other technical advantages

In addition to these cost and environmental benefits, there are further, technical advantages of ceramic containment shells: Corrosion resistance, high mechanical strength, high fracture toughness, wear resistance and low thermal conductivity. The temperature range of FZM ceramics from -200°C to +450°C allows their use in cryogenic applications such as vaccine production, as well as in very hot applications such as pumping oils near boiling point. Kyocera, in cooperation with its customers from various industries, develops ceramic components that are specially tailored to meet specific requirements. Existing pumps also convert to Kyocera's ceramic containment cans without requiring any major effort.

² Subsidy prerequisites: https://www.bafa.de/DE/Energie/Energieeffizienz/Energieeffizienz_und_Prozesswaerme/Modul1_Querschnittstechnologien/modul1_querschnittstechnologien.html



For more information on Kyocera: www.kyocera.de

About Kyocera

Headquartered in Kyoto, Japan, KYOCERA Corporation is one of the world's leading manufacturers of fine ceramic components for the technology industry. The strategically important divisions in the KYOCERA Group, which is comprised of 307 subsidiaries (as of March 31, 2021), are information and communications technologies, products which increase quality of life, and environmentally friendly products. The technology group is also one of the most experienced producers of smart energy systems worldwide, with more than 45 years of know-how in the industry. The company is ranked #603 on Forbes magazine's 2021 "Global 2000" listing of the world's largest publicly traded companies.

With a global workforce of over 78,000 employees, Kyocera posted sales revenue of approximately €11,74 billion in fiscal year 2020/2021. The products marketed by the company in Europe include printers, digital copying systems, semiconductor-, fine ceramic-, automotive- and electronic components as well as printing devices and ceramic kitchen products. The KYOCERA Group has two independent companies in the United Kingdom: KYOCERA Fineceramics Ltd. and KYOCERA Document Solutions Ltd.

The company also takes an active interest in cultural affairs. The Kyoto Prize, a prominent international award, is presented each year by the Inamori Foundation — established by Kyocera founder Dr. Kazuo Inamori — to individuals worldwide who have contributed significantly to the scientific, cultural, and spiritual betterment of humankind (approximately €763,000* per prize category).

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