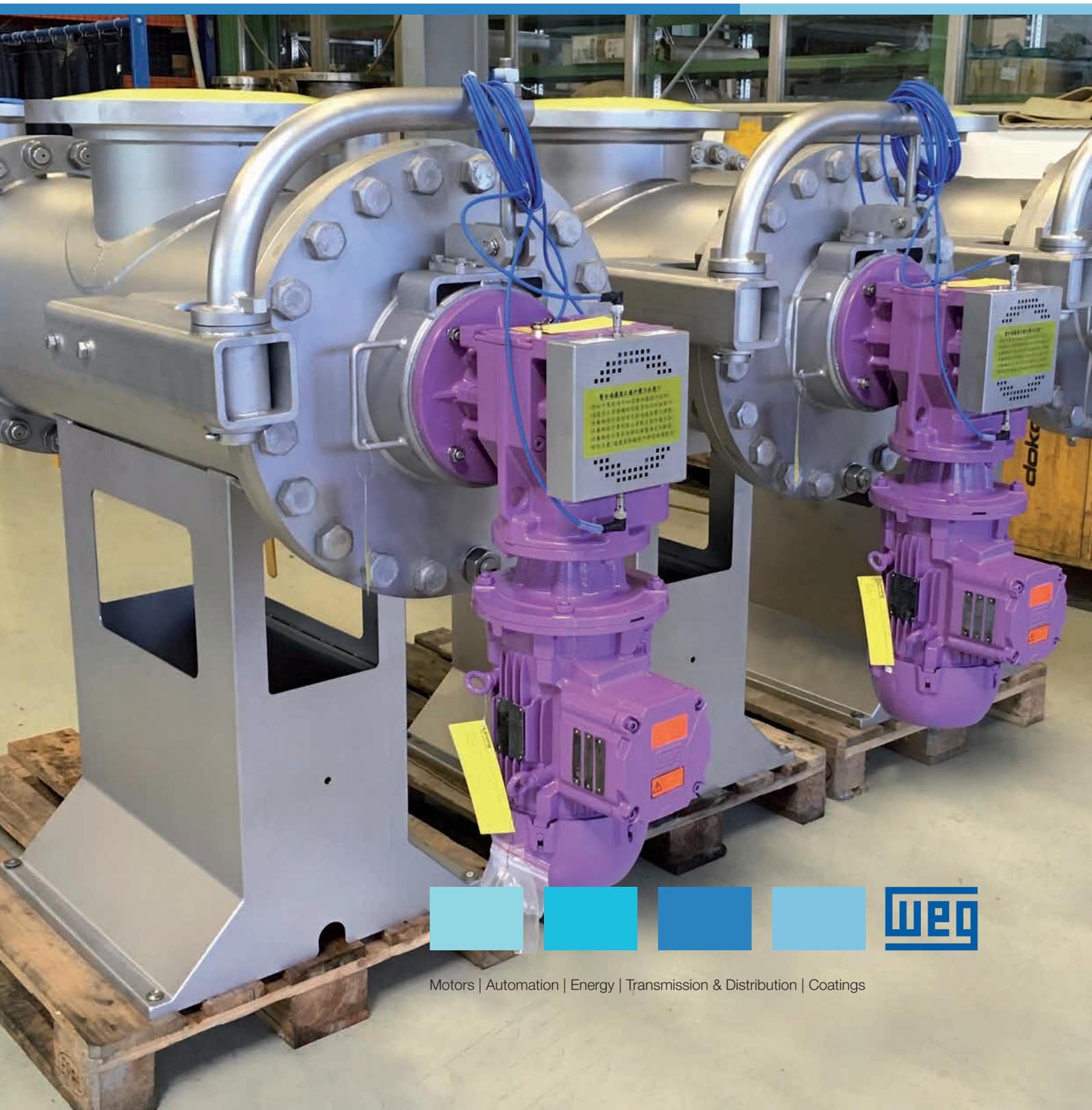


# Safety in hazardous areas

Geared motors and motors for ATEX application



# Safety in hazardous areas

***LenzingFiltration**, part of **Lenzing Aktiengesellschaft**, uses explosionproof WEG drive systems for its filtration technology used in the production of polymer MDI in China.*

*WEG subsidiary Watt Drive supplied **LenzingFiltration** with a total of 21 WG20 series gear motors and WEG flameproof encapsulated motors of the W22Xde (IIC T4 Gb) series for ATEX applications in Zone 1/21. These drive solutions for hazardous areas enabled **LenzingFiltration** to supply OptiFil-250-0720 and OptiFil-350-1080 backflush filters for the production of polymer MDI to China. There they will be used by a large Chinese chemical company with sites all over the world. A **LenzingFiltration** sales partner took care of the installation and commissioning on site.*

**LenzingFiltration** is a worldwide leader in offering filtration and separation technology. The Austrian company has a mechanical manufacturing facility, **LenzingTechnik**, which manufactures equipment for the filtration and separation technology of corporate customers as well as production-critical machine and plant components for all Lenzing Group sites. The filtration and separation technology section specializes in the development and manufacturing of high-quality filtration equipment for solid-liquid separation. Originally founded for the purification of high-viscosity spinning solutions for fibre production in the parent company, **LenzingFiltration** has been able to continuously develop and adapt its range of products over the past 40 years. The broad range of products ranges from disposable filter systems to patented automatic filtration systems. The company's focus is on automatic backflush filtration systems for the purification of low to

high viscosity media used in multiple industries. **LenzingFiltration's** filtration products can be used for liquids with different viscosities. The OptiFil® backwash filters are suitable, for example, for resins, lacquers, acids, alkalis, solvents, sugar solutions, molasses, starch, oils, cooling lubricants, cleaning baths, surfactants and all types of water – from waste water to cooling water.

## **Filtration and backwashing process**

The OptiFil-250-0720 and OptiFil-350-1080 backwash filters supplied to China are fully automatic and continuously operating systems used for the filtration of low-viscosity media. The OptiFil® systems have a patented backwash mechanism, high backwash efficiency and filter fineness's down to 1 µm. A filter fabric, which retains the particles on its surface or inside the fleece, is used as filter material.



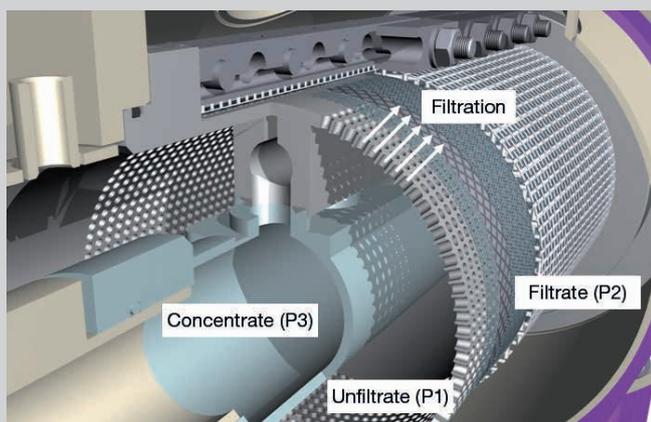
**Figure 1:** A LenzingFiltration sales partner took care of the installation and commissioning on site

The unfiltered medium is first transported via the inlet into the first chamber of the filter (chamber P1) with the help of a feed pump (see figure 2). Between this first and the second chamber (chamber P2), the filter material is attached to a “perforated drum”. The particles are separated while the unfiltered medium flows from the first to the second chamber. The filtered medium then leaves the filter through an outlet. A slight overpressure in the second chamber is required for the filtering process. The covering of the filter material causes a constantly increasing  $\Delta p$  differential pressure between the two chambers – this increase is analysed by the control system. When a predetermined degree of soiling is reached, which in turn affects the differential pressure, a backwash process starts cleaning the

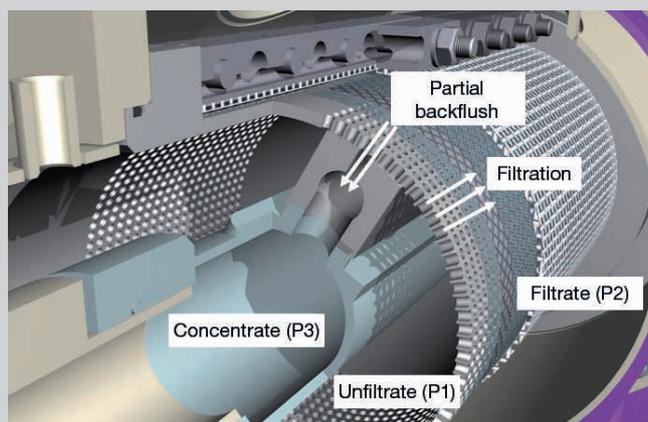
entire surface of the filter material (see figure 3). This is done by rotating the backwash device. The channel-shaped opening in the backwash bar, which seals against the inner surface of the perforated drum as carrier of the filter material, causes the backwashing of a minimal amount of backwash liquid (filtrate). This is necessary for flushing the filter material free of impurities. After cleaning the entire surface, the reject device remains in waiting position until the preselected differential pressure is reached again.

#### Highly demanding application in polymer MDI production

The Chinese chemical company uses the OptiFil-250-0720 and OptiFil-350-1080 backflush filters in polymer MDI production.



**Figure 2:** Lenzing filtration operating principle



**Figure 3:** Lenzing backflush operating principle

The polymethylene isocyanate produced in this process can be used extensively in the production of heat-insulating PU rigid foams. It is also used in isocyanurate foam, paints, adhesives, structural foam, cellular integral skin foam, bumper and interior parts of motor vehicles, highly resistant foam but also in synthetic wood. The production of polymer MDI places high demands on the technology used, which must be certified for potentially hazardous areas according to ATEX. Both the backwash filters and the complete installed WEG drive are closed and encapsulated. Everything thus complies with the ATEX requirements for zone 1/21 (IIC T4 Gb, IIIC 125°C Db). In addition to ATEX certification, the Chinese chemical company made a 660 V voltage supply a basic requirement.

### Drive solutions for highest requirements

As a subsidiary of WEG, one of the largest motor manufacturers in the world, the Austrian company Watt Drive offers a wide range of different versions and approvals – such as ATEX versions. The unsophisticated and quick offer of drive solutions, especially off-standard ones, was also convincing. For **LenzingFiltration** as a globally active company, this was a decisive factor in awarding the contract for the required gear motors.

The use in backwash filters also places very high demands on the resistance of the drive technology. For example, considerable axial forces must be absorbed by the gearbox due to the pressure in the filter. All filters are designed for a pressure of

14.1 bar and temperatures of 80 °C. For these reasons, **LenzingFiltration** decided to use WG20 gear motors in ATEX design with flameproof encapsulated W22X ATEX motors.

To be able to withstand the high temperatures, special Viton shaft seal rings are also used on the output. Due to the harsh environmental conditions, the WG20 gearbox and the integral motor are coated with a multi-layer epoxy resin finish of corrosiveness category C5. The motor protection class corresponds to IP56.

The 13 OptiFil-250-0720 backwash filters delivered to China each have a volume of 105 litres and a weight of 317 kg. A backwash volume of 25 litres can be converted within approximately three seconds. An explosionproof WG20 helical bevel gear motor (KO043-I90-W22 Ex 90S/L-04 TF) with a torque of 308 Nm and an output of 1.10 kW at a supply voltage of 660 V at 50 Hz is used here. The WG20 gearbox is connected to the flameproof encapsulated WEG motor of the W22X series with an IEC adapter size 90. The output speed is 33 rpm. As a unique feature, a special hollow shaft with hollow shaft cover cap is installed. Thermal monitoring is carried out with the aid of thermistors.

For the eight larger OptiFil-350-1080 backwash filters with a volume of 247 litres and a weight of 550 kg, a more powerful drive solution was chosen. Here, too, an explosionproof WG20 helical bevel gear motor (KO063-I100-W22 Ex 100L-04 TF) is used, but with a torque of 696 Nm and an output of 2.20 kW at an identical supply voltage of 660 V

at 50 Hz. An IEC adapter size 100 is used here, the output speed is 30 rpm. Thermistors also ensure reliable thermal monitoring of the drive train here.

### **Sophisticated solution reduces the personnel required in the Ex zone**

The complete design of the automatic backwash filters from **LenzingFiltration**, including the drive technology supplied by Watt Drive, also enables a significant reduction of the personnel required in Ex zones. Since the backwash process of Lenzing OptiFil® filters cleans the filter material automatically, it only needs to be changed very rarely. In the event of a filter material change, staff in protective suits must enter the hazardous area to

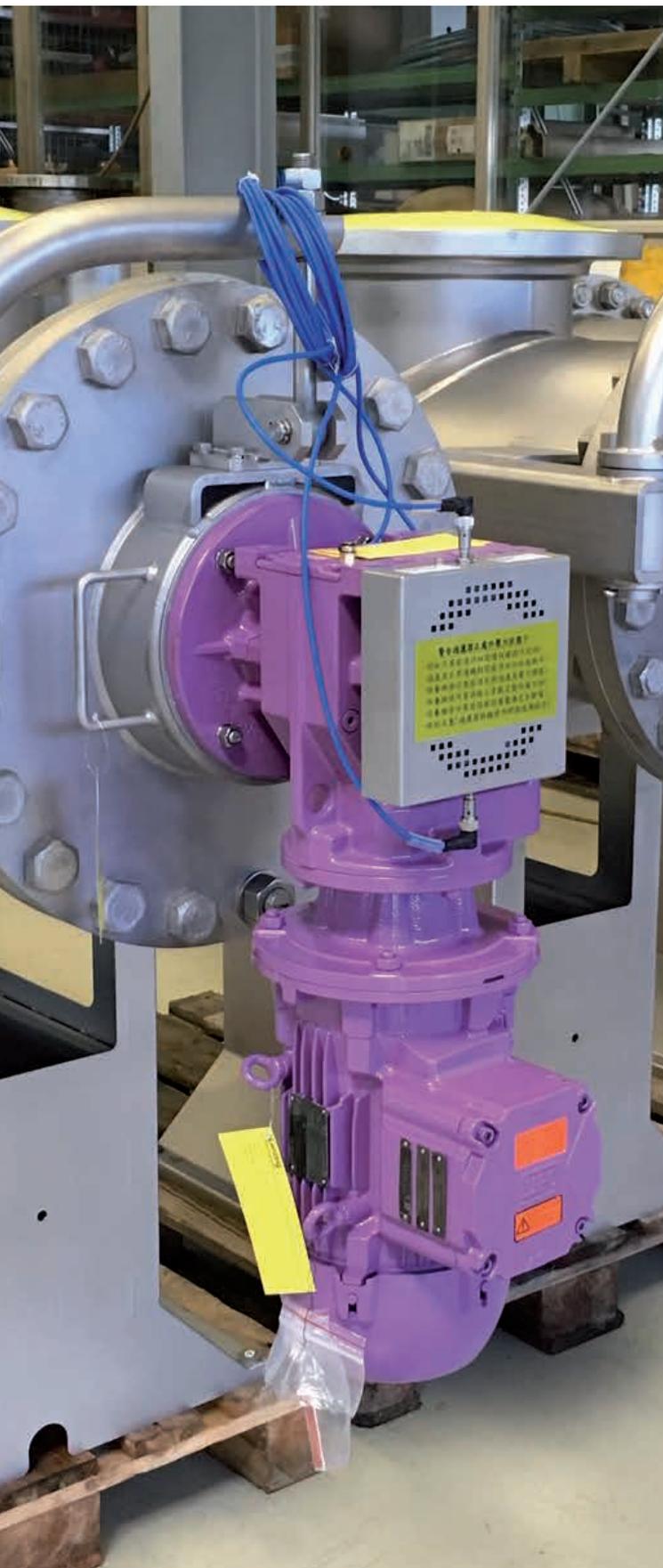
clean or replace the clogged filters. Depending on the application, a complete change of automatic backwash filters of the types OptiFil-250-0720 and OptiFil-350-1080 may only be necessary once a year or once a month – instead of once per shift, as is often the case with disposable filters. The **LenzingFiltration** backflush filters used in China also filter finer than would be possible with typical disposable filters – another advantage for the customer.

### **Everything from a single source**

Watt Drive supplied the entire drive technology for the OptiFil-250-0720 and OptiFil-350-1080 automatic backwash filters exported to China. The customer's requirements and the harsh



**Figure 4:** LenzingFiltration decided to use WG20 gear motors in ATEX design with flameproof encapsulated W22X ATEX motors



conditions in a potentially explosion hazard environment demanded a precisely designed drive solution. Likewise, the strong axial forces from the gearbox had to be reliably compensated.

Johannes Kneissl, Technical Manager Filtration & Separation, comments: “Watt Drive was able to design a very robust drive solution for us from a single source, which was able to meet all challenges and at the same time contributed to a significant reduction in overall costs. The line of different versions and approvals as well as their worldwide availability was also convincing. Not only were the performance and results right, but the cooperation and reliability also proved to be excellent. **Lenzing**Filtration is therefore very satisfied with Watt Drive as a supplier in all respects.”

Author: Martin Kneißl, Key Account Manager at Watt Drive Antriebstechnik GmbH

Pictures: Lenzing (5), WEG (1), Adobe Stock (1)



## WEG – international solutions for drive and energy projects

WEG is one of the world's leading manufacturers of electrical components and systems. The business is divided into five divisions: motors, power generation, power transmission and distribution, automation and varnishes. The broad range of products includes the latest generation of low/medium and high-voltage motors, transformers, generators, geared motors, low-voltage switchgear, frequency inverters, soft starters, ATEX-compliant flameproof motors, smoke extraction motors and full turnkey systems.

The company's solutions in the field of power generation, transmission and distribution guarantee more efficient plant operation in various industries, e.g. the oil and gas industry, water management, power distribution and the chemical and petrochemical industries. This means that they not only help to reduce energy consumption and CO<sub>2</sub> emissions, but also improve environmental sustainability. WEG also provides comprehensive solutions for renewable energy projects, e.g. complete wind turbines.

[www.weg.net](http://www.weg.net)



## Watt Drive – gear expertise with a long tradition

Watt Drive, specialised in the development and manufacture of gear technology based in Markt Piesting, Austria, is part of the Brazilian WEG Group, one of the world's leading manufacturers of electric motors. Watt Drive sells products and solutions in the fields of drive technology and automation all over the world. With its modular motor and gear system, the company offers a complete range of combinable drive systems for production machines and industrial manufacturing plants.

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The values shown are subject to change without prior notice.