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SPECIAL: Energy, Resources, Environment & Sustainability in the aluminium industry

Energy considerations – an industry route map

Aluminium cycle: machining, briquetting, melting

Otto Fuchs orders melting furnace from Hertwich

New sustainability reports from EGA and Constellium

New life cycle assessment of aluminium beverage cans

Innovative, water-heated log preheating saves energy and costs

Reports in the run-up to Euroguss 2020

Nemak installs modern KMA air extraction and filtration system in its new Slovakian foundry

In modern production plants, clean air in the working area is an absolute must. Product and workplace quality as well as certification requirements make measures for air pollution control absolutely necessary. The exhaust air generated by foundry machines is composed of oily smoke and aerosol substances. The continuous use of these machines results in a high smoke pollution, which has to be separated. Therefore, exhaust air technology in modern foundries offers high potentials for energy savings and CO₂ avoidance. When expanding its production site in Žiar nad Hronom, Slovakia, automotive supplier Nemak relied on a modern exhaust air filtration system of a specialist.

As a global developer and manufacturer of aluminium vehicle components, Nemak supplies components for over 650 vehicle types to more than fifty customers worldwide. The diversified portfolio ranges from complex

plant and to avoid any possible environmental impact from the start.

Energy-efficient operation required

In production plants air pollution control measures have not only to meet the requirements of occupational safety and environmental protection, but have also to ensure energy-efficient operation. In foundries, exhaust air technology is the second major energy consumer after melting and holding furnaces. High energy consumption results in high production costs and high CO₂ emissions. By using energy-efficient exhaust air filter systems, however, savings of up to 80% percent can be achieved, while at the same time improving the CO₂ balance of the production site and thus contributing to climate protection.

With conventional exhaust air purification, the exhaust air is extracted from below the hall roof and transported outside. To create a clean air environment for occupa-

Innovative exhaust air and filter technology represents cost-saving alternatives to conventional exhaust air technology. In order to keep air flows and thus energy costs low, Nemak in Žiar relies on punctual extraction at the machine in conjunction with just three to four central air changes per hour. Foundries worldwide use energy-saving Ultravent extraction systems from KMA Umwelttechnik in Germany. KMA is a complete solution provider for industrial exhaust air filtration and has previously equipped various Nemak foundries with Ultravent filter technology.

At the foundry in Žiar, each die casting machine was equipped with its own KMA system. This decentralized filter solution avoids long pipelines inside the hall, as the filter systems are located directly above the casting cells. New die casting machines can be retrofitted with decentralized exhaust air filter systems, offering customers more flexibility when expanding their production. This process is therefore widely used.

The Ultravent system consists of an extraction hood for smoke collection and an electrostatic precipitator for smoke separation. The smoky exhaust air is extracted through the machine-adapted hoods directly above the die casting machines. Extracting the exhaust air directly at the source allows to extract highly effectively all escaping smoke and to reduce the moving air quantities significantly at the same time. A further advantage: the individual filter systems are only operated at the same time as the casting machine – this flexible adaptation to the current capacity requirements further reduces the operating costs at this point.

The implemented exhaust air filter systems have a filter capacity of up to 20,000 m³/h each. The powerful Ultravent filter technology ensures high clean air quality at low energy consumption thanks to its patented electrostatic filter cells. The energy consumption of an electrostatic filter cell for the exhaust air volume of 5,000 m³/h corresponds approximately to that of a 100 Watt light bulb.

At Nemak, the highly purified air in the filter system is recirculated back into the hall. This eliminates the heat losses that would occur if the air were exchanged to the outside. At the same time, the foundry's CO₂ balance improves: for each die casting machine, the carbon footprint (the reduction in CO₂ emissions due to savings in heating energy) im-



In Nemak's Slovakian foundry, the die casting machines are equipped with a KMA smoke extraction hood and a filtration system

high-tech cast components for conventional and hybrid engines to structural components and solutions for e-mobility. Nemak's business unit in Europe comprises eleven production sites in nine countries. From its Slovakian location in the city of Žiar, the company supplies automotive components to customers both in the Eastern European country and beyond. In the course of an expansion, investments were made in modern exhaust air technology to increase the efficiency of energy consumption at the new die casting

tional health and safety requirements at the workplace, the air in the production hall has to be changed 10 to 15 times per hour. However, the higher the exhaust air volume, the higher the energy consumption for fans and filter systems. During cold winter months, the energy-intensive heating of the fresh air is an additional cost factor; the air transported outside must be replaced by the same amount of fresh air from outside. This results in high operating costs combined with increased CO₂ emissions.

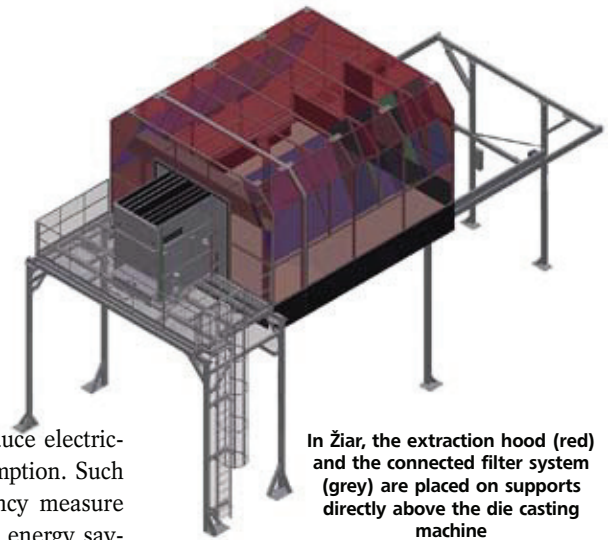
proves by 30 to 40 tonnes per year.

An automatic filter cleaning system integrated in the filter minimizes maintenance effort and service downtime.

Connecting casting machine and exhaust air filtration system

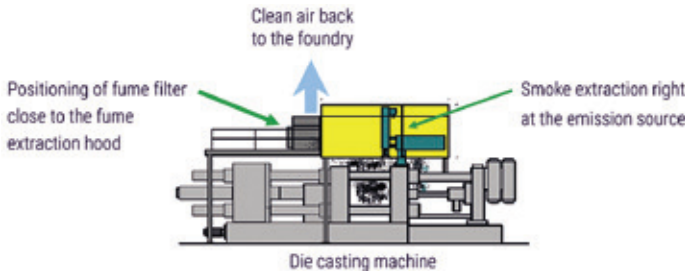
In a modern casting cell, various peripheral technologies are integrated into one coherent system. The basis for an intelligent connection between the exhaust air filtration system and

In Nemak's foundry in Slovakia, the filter technology can adapt to the current exhaust air requirements of the respective casting cell. By synchronizing the technical interfaces, the ventilation power of the filter system adapts to the spraying cycle of the die casting machine. During the spraying pause, a frequency converter can be used to throttle the fan output to 75 per-



In Žiar, the extraction hood (red) and the connected filter system (grey) are placed on supports directly above the die casting machine

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Modern exhaust air filter systems allow for high clean air quality at low energy consumption (here in circulating air mode)

the casting machine is the advanced communication between the respective control systems.

between the casting machine and the filter system forms the basis for many safety-relevant measures in the area of fire protection and

order to reduce electricity consumption. Such an efficiency measure allows for energy savings to be realized at each individual casting cell.

Furthermore, in the age of Industry 4.0, enhanced communication (ProfiNet) be-

occupational safety, such as auto start/stop, emergency control, etc.

Nemak places the highest demands on its production sites in terms of energy efficiency, occupational safety and environmental protection. The four Ultravent exhaust air filter systems at the die casting plant in Žiar have been in operation for over a year and deliver convincing results. ■

Ich Sorge dafür, dass unsere Gusslegierungen genau die richtigen Kundenspezifikationen haben und natürlich auch pünktlich ankommen.

Thomas Korte | Coldsidemitarbeiter



Als innovatives, mittelständisches Familienunternehmen entwickelt, produziert, recycelt, gießt und vertreibt TRIMET an acht Produktionsstandorten moderne Leichtmetallprodukte aus Aluminium. Rund 2.300 Mitarbeiter sowie 900 Mitarbeiter im Joint Venture BOHAI TRIMET Automotive sorgen gemeinsam mit unseren Kunden dafür, dass Autos sparsamer, Flugzeuge leichter, Windräder und Stromanlagen effizienter, Bauwerke moderner und Verpackungen ökologischer werden. Wann für Sie?

Besuchen Sie uns während der EUROGUSS 2020 in Nürnberg auf dem Stand der BOHAI TRIMET Automotive in Halle 7A, Stand 332.

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