

FOUNDRY REVIEW

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- SUMMARIES -



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CHARACTERISTICS OF PRODUCTION RESOURCES OF FOUNDRY PLANTS AND ASSESSMENT OF THEIR READINESS FOR IMPLEMENTATION OF INDUSTRY 4.0 PRINCIPLES

The technical development of production resources used in the foundry industry is focused on automation, robotization and is strongly related to digitization. However, technically and technologically advanced foundries require appropriate preparation for the implementation of Industry 4.0 standards. The equipment that is open to flexible programming enables the production of various castings, both in terms of size and complexity. Each of the production resources has the ability to collect process data and specific archiving to a certain degree, but it does not enable the analysis of process parameters. The development of IT systems can integrate resources, creating cyber-physical systems, capable of analyzing and exchanging data by introducing machine learning with the participation of artificial intelligence. Industry 4.0 standards transferred to foundry are gradually transforming companies producing castings into Foundry 4.0 ready plants. The article presents an overview of these trends, pointing to the pillars of Foundry 4.0, possible strategies for implementing this process, as well as a few examples of foundries participating in these long-term transformations along with their effects.

THE AGH FACULTY OF FOUNDRY ENGINEERING IN KRAKOW A STONE JUBILEE IN GOOD SHAPE

The new academic year of 2021/22 is an occasion to celebrate the 70th anniversary of the founding of the Faculty of Foundry Engineering in the structure of the AGH University of Science and Technology. The moment of establishing the Faculty was the crowning achievement of the education of casting specialists at the Academy. The 70 years of existence of the AGH University of Science and Technology Faculty of Foundry Engineering consists of over 4,000 graduates valued in the country and abroad who, thanks to their good preparation, have always been perceived as excellent specialists in the areas related to casting technologies. This is based on extensive research conducted within the Faculty. In recent years, there has been a dynamic development of the industry, which responds to the increasing demands of customers, especially in the field of quality assurance. The Foundry Department tries to respond to the market demand, educating engineers with competences that meet the requirements of modern foundry engineering. Cooperation with the best

universities and research units in the country and abroad, as well as many industrial plants, stimulate the scientific development of the unit, which operates in the field of widely understood materials engineering. The foundry industry is facing new challenges related to computerization and automation of the industry. This forces a change in the profile of graduates towards engineers with well-established knowledge, not only in foundry, but also very well-versed in the area of IT and simulation tools that support the production process. The answer to this are new fields of study that are conducted at the Faculty of Foundry Engineering.

ITM INDUSTRY EUROPE 2021

The ITM Industry Europe fair was held in Poznań from August 31st to September 3rd 2021.

After a year-long break, three hundred and forty exhibitors from Poland and abroad came to present their flagship offer.

The date and circumstances have changed. However, the energy of direct relations has not changed. The buzz of business talks and the sound of working machines returned to the MTP halls along with the four-day ITM Industry Europe fair. Crowds of visitors, satisfied exhibitors - this is how the success of the previous edition of the event can be summed up.

BŁAŻEJ SIODMOK

NEW FOSECO SLEEVES, FEDEX* FEF ENSURE NO FLUORIDE EMISSIONS TO BENTONITE ON HIGH PRESSURE MOLDING LINES

The new sleeve is an alternative to the previously used ones, applied to the model plate, as they do not contain fluorine, emit less volatile organic compounds (VOC), while improving the yield and quality of feed in bentonite molding lines. They fit the main priorities of the foundry: reduction of environmental impact and lower costs of waste disposal, while maintaining the best-in-class exothermic properties. They extend the FOSECO offer with the most modern solutions, ideally suited for high pressure automatic molding lines.

ZAKŁAD METALURGICZNY WSK RZESZÓW – PRODUCER OF CASTINGS FOR THE MOST DEMANDING SECTORS OF THE WORLD INDUSTRY

INTERVIEW WITH THE CHAIRMAN OF THE MANAGEMENT BOARD, WLADYSŁAW JASICZEK

Foundry engineering at Zakład Metalurgiczny WSK Rzeszów dates back to the 1950s, when an aluminum foundry was established. In the 1970s, precision foundries were built and lost-wax technology was brought from England. In those years, a cast iron foundry was also built and equipped. The 90s are a change of strategy. The aluminum foundry, so far operating mainly for aviation purposes, became strongly involved in the automotive and energy sectors, and it is still the case today. The iron foundry, on the other hand, entered the market of agricultural machinery, railways and other industries. The flow of time created new challenges. WSK's strategy is to create as much added value as possible - machining, tests, even partial assembly. The aluminum foundry operates in this direction, and for several years now, also the cast iron foundry. The added value is a better margin, lowers costs connected to poor quality and gives full control over logistics.

BADARINATH KALKUNT, LORENZO VALENTE, CRISTIAN VISCARDI, VLASTIMIL KOLDA

VIRTUAL DIMENSIONAL CHECKS TO PREDICT AND CONTROL THE FINAL SHAPE OF THE CAST PART

The automotive industry is brutally competitive and has increasingly requested high performance castings with high structural integrity and good mechanical properties. With light weighting being a trend, innovations around the die casting process making it a possible alternative to produce thinner and structural castings replacing the earlier sub-assemblies, in-tolerance dimensional control shall become an additional quality check to go further into the new sub-assemblies and assembly.

Casting components are subjected to continuous and varying thermo-mechanical loading during the entire manufacturing process; casting process and in cases where heat treatment need to be applied. These result in evolving stresses through the process. They accumulate especially while the casting is inside the die during filling & solidification, and are released and re-distributed during die opening, part ejection, and subsequent post operations like trimming and heat treatment. These result in continuous dimensional variation during the manufacturing process. It is thus important to study these variations through the process and be able to overcome in case of a mismatch in the final cast geometry as opposed to the desired dimensions prescribed by the part owner.

Process modelling has continuously evolved, and though residual stress modelling has always been talked about in the past, there has always been challenges to predict and compare the dimensional variations between simulation and reality. The die thermal evolution also influences the shape of the die cavity in a non-negligible way. Hence mapping of die temperatures as closely as possible starting from the pre-heating and thermal ramp-up to reach the operating conditions and master every aspect of the process in the simulation have always been studied deeper and deeper.

All these lead to the possibility to have a virtual dimensional control to predict first the final part geometry from simulation and compare it with the actual cast part or the target part dimensions. This is exactly like the part dimensional quality assurance is done on shop floor in the recent years, comparing 3D scan of the as-cast part with the target part dimensions.

Such kind of integrated tools during the development stage allows the die designers take necessary action early on and allows radically shortening of the metrological activities in the QA department. This is another effort to bridge the gap between design, manufacturing and QA.

MAREK SKOWRON

CAST IRON – AN UNUSUAL MATERIAL FOR THE CONSTRUCTION OF ROOFS AT THE TURN OF THE 18TH AND THE 19TH CENTURIES

In the old days, the construction of buildings was associated with the necessity of incurring significant costs. And this concerned not only the materials themselves, but also subsequent renovations. Especially one of the most important elements of any building – a roof that should be durable and relatively cheap, and at the same time protect against moisture, temperature fluctuations or fire. The materials used in the past, such as wooden shingles or ceramic tiles, did not meet all these requirements, therefore high hopes were placed in the new roofing, invented at the end of the 18th century - cast iron roofing tiles.

The article presents the history of their use in various European countries, including Poland. Examples are also given of the different types of cast iron roof tiles used, their dimensions and weight, and the method of installation.

KATARZYNA LISZKA

XXXIX AUTUMN TRIBOLOGICAL SCHOOL

ZGM ZĘBIEC SA – MINERALS OF THE HIGHEST QUALITY

As a leading producer of materials (bentonites, bentonite-kormix mixtures, resin-coated sands and expanded perlite), ZGM Zębiec SA has been providing the highest quality products for the foundry, construction and drilling industries for over 65 years on the both Polish and foreign markets. The company constantly cares about the development of its technological and research facilities, which results in introduction of new products.