ICCME25

V INTERNATIONAL CONFERENCE OF CASTING
AND MATERIALS ENGINEERING ICCME 25
KRAKOW, POLAND, OCTOBER 27-28, 2025

BOOK OF ABSTRACTS

AGH

FACULTY OF FOUNDRY
ENGINEERING
AGH UNIVERSITY

Lightweight innovations for a better climate

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V International Conference of Casting
and Materials Engineering ICCME 25
Krakow, Poland, October 27-28, 2025

BOOK OF ABSTRACTS

It is my great pleasure to welcome all participants to the 5th International Conference of Casting and Materials Engineering (ICCME 2025), organized by the Faculty of Foundry Engineering at the AGH University of Krakow.

The main theme of this year's conference, "Lightweight Innovations for a Better Climate," is both timely and highly relevant, reflecting current global trends in the development of lightweight components and the increasing use of environmentally sustainable materials.

I am pleased that this year's scientific program features four distinguished keynote speakers, representing a diverse spectrum of expertise in casting technologies, additive manufacturing, simulation, and process optimization.

Dr. Susana Mendez, Director of Casting Technologies at AZTERLAN Metallurgical Research Centre (Spain), will deliver a lecture entitled Application of Hybrid Models to the Foundry Manufacturing Process. Professor Maurizio Vedani from Politecnico di Milano (Italy) will discuss Solidification in Metal Additive Manufacturing: Similarities and Differences with Welding and Metal Casting. Mr. Young-Hoon Yim, Director of Overseas Business at AnyCasting Software Co., Ltd. (Korea), will present Metamodeling Approach to Predict Microstructure and Mechanical Properties in Aluminum Alloy Casting and Heat Treatment Processes. The plenary session will conclude with Dr. Wojciech Kowalczyk, who will share insights on the influence of casting parameters on the quality and efficiency of high-pressure die casting processes. His presetation title is High-pressure die casting in the face of global industry change. Opportunities and threats.

This year, we are honored to host participants and speakers from South Korea, Italy, Finland, France, Germany, England, Türkiye, Sweden, the Netherlands, and Poland. Among them are not only renowned scientists and industry experts but also PhD students and young researchers, for whom ICCME provides an excellent opportunity to present their work, exchange ideas, and establish international collaborations.

The International Conference of Casting and Materials Engineering has always been more than a scientific meeting – it is also a celebration of the Faculty of Foundry Engineering, its alumni, and its friends. It is a platform for sharing experience, inspiration, and innovation that strengthen the European foundry community.

Next year, the Faculty of Foundry Engineering at AGH University of Krakow, will celebrate its 75th anniversary. As the only academic center in Poland with comprehensive competence in foundry engineering – encompassing metallurgy, mould and process technology, modeling, and corrosion studies – the Faculty continues to expand international cooperation and serve as a center of knowledge for the casting industry.

I would like to express my sincere gratitude to the Organizing Committee for their dedication and effort in preparing this conference.

Special thanks are also extended to our co-organizer, the NetCastPL4.0 Project, funded by Horizon Europe (Networking for Advancing Excellence and Capacity in Lightweight Castings for Foundry 4.0 in Poland), and to our sponsors: CPP Poland, Foseco, Brembo, LENAAL, KPR Prodlew-Kraków, and Alu4Ceed, for their valuable support in organizing ICCME 2025.

Finally, I wish all participants an inspiring and fruitful conference, filled with constructive discussions, new ideas, and memorable experiences.

May ICCME 2025 strengthen our shared pursuit of excellence and innovation in the foundry and materials engineering community.

Prof. Marcin Górny

Dean, Faculty of Foundry Engineering, AGH University of Krakow

ICCME25

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IC MATE

27.10.2025 (Monday)

'STUDIO' CLUB, AGH University of Krakow CAMPUS (Budryka 4, Krakow)

08:30	09:30	**REGISTRATION**
09:30	10:00	**OFFICIAL OPENING**
		PLENARY SESSION | Main Hall
		Chairmen: G. Angella, R. Dańko
10:00	10:30	**S. Méndez** (Azterlan, Spain) Application of hybrid models to the foundry manufacturing process
10:30	11:00	**M. Vedani** (Politecnico di Milano, Italy) Solidification in metal additive manufacturing: similarities and differences with welding and metal casting
11:00	11:30	**Y.H. Yim** (AnyCasting Software Co., Ltd., South Korea) Metamodeling Approach to Predict Microstructure and Mechanical Properties in Aluminum Alloy Casting and Heat Treatment Processes
11:30	12:00	**W. Kowalczyk** (Frech, Poland) High-pressure die casting in the face of global industry change. Opportunities and threats
12:00	13:30	**LUNCH**
13:30	14:30	**DISCUSSION PANEL** (Chairmen: K. Jalava, M. Górny) Lightweight Innovations Panellists: S. Mendez, R. Dańko, J. J. Sobczak, G. Angella, M. Łuszczak

SCIENTIFIC SESSION A | Main Hall		
Chairmen: P. Jacquet, R. Cygan		
14:30	14:45	T. Tokarski (AGH University of Krakow, Poland) Spheroidal graphite in ductile iron: morphology, growth, and distribution
14:45	15:00	N. Sobczak (Polish Academy of Sciences, Poland) Effect of calcium alloying on the wettability and interfacial reactions between liquid Mg and a Ti substrate under different atmospheric conditions
15:00	15:15	U. Gürol (Foseco, Türkiye) Alloy and Process Optimisation of High-Manganese Steels: Linking Microstructure to Industrial Performance of Track Shoe Castings
15:15	15:30	N. Roudbarian (Aachen University, Germany) Integrated Design Optimization for Thin-Walled Cast Automotive Components
15:30	15:45	K. Jalava (Aalto University, Finland) Experimental Comparison of Al-Si and Al-Cu Alloy Fluidity in Thin-Walled Sand Castings Supported by Numerical Simulations
15:45	16:00	G. Angella (CNR-ICMATE, Italy) Specimen geometry and tensile testing system effects on the ausferrite stability
16:00	16:30	COFFEE BREAK

SCIENTIFIC SESSION B &D | Conference Room (1 Floor)		
Chairmen: M. Vedani, D. Myszka		
14:30	14:45	Ł. Rakoczy (AGH University of Krakow, Poland) As-cast microstructure, strength and steam oxidation resistance of René 125 nickel-based superalloy fabricated via lost-wax casting
14:45	15:00	B. Cygan (Teksid Iron, Poland) ADI cast iron production at Teksid Iron Poland – opportunities and challenges
15:00	15:15	A. Świątkowski (AGH University of Krakow, Poland) Influence of growth velocity v and temperature gradient G on the interlamellar spacing λ of FeC eutectic
15:15	15:30	A. Kmita (AGH University of Krakow, Poland) Modern Materials and Additive Manufacturing (3D Printing) Technologies for Foundry Molding Sands – Toward Reducing Environmental Impact
15:30	15:45	J. Piątkowski (Silesian University of Technology, Poland) What has the main influence on the shrinkage porosity of castings from secondary Al-Si alloys?
15:45	16:00	M. Kawalec (AGH University of Krakow, Poland) Hybrid Crusher Hammers: Improved Durability and Efficiency Through High-Carbide Alloyed Iron Inserts Cast into a Manganese Steel Matrix
16:00	16:30	COFFEE BREAK

Chairmen: A. B. Vieira Moreira, K. Major-Gabryś		
16:30	16:45	J. Marosz (AGH University of Krakow, Poland) SI-Mo Composite Reinforced with (TI,Mo)C In Ultra-Thin-Walled Castings
16:45	17:00	K. Morgiel (AGH University of Krakow, Poland) Mechanism of SIMo DCI HT oxidation based on complementary LM/SEM/TEM and XRD methods
17:00	17:15	A. Fijołek (AGH University of Krakow, Poland) Archaeometallurgy using modern research techniques and reverse engineering. Results obtained and prospects for the future
17:15	17:30	P. Stręk (LedaVI.com, Poland) Determination of the heat transfer coefficient in the isothermal quenching process of ADI cast iron cooled with water mist
17:30	17:45	K. Chrzan (AGH University of Krakow, Poland) The influence of induction melting parameters on the structure of ingots made of high-entropy alloys from the AlCoCuFeNI family
17:45	18:00	D. Halejcio (AGH University of Krakow, Poland) The influence of furfuryl resin type – classical and designed for sand 3D printing, on cast iron castings microstructure and surface roughness
18:00	18:15	M. Bork (AGH University of Krakow, Poland) An insight into high-nickel austenitic ductile cast iron

SCIENTIFIC SESSION C & E | Pub (-1 Floor)		
Chairmen: T. Tokarski, M. Kawalec		
14:30	14:45	D. Halejcio (AGH University of Krakow, Poland) The effect of microwave curing on selected properties of molding compounds with inorganic binders intended for 3D printing of sand molds and cores
14:45	15:00	N. Anwar (Aalto University, Finland) Evaluation of Sodium Metasilicate Pentahydrate Powder as Foundry Sand Binder
15:00	15:15	A. Sepiał (AGH University of Krakow, Poland) Influence of strand width and layer height on porosity in FDM 3D printed parts
15:15	15:30	O. Asghar (University of Padova, Italy) Raw Material Criticalities And Furnace Selection Choices In Aluminum Casting: A Pathway To Sustainable Foundries
15:30	15:45	K. Major-Gabryś (AGH University of Krakow, Poland) The use of green molding materials in the production of advanced lightweighting castings
15:45	16:00	A. Szczęsny (AGH University of Krakow, Poland) VR, AR, and MR in casting and materials engineering – opportunities and possibilities
16:00	16:30	COFFEE BREAK

Chairmen: S. Mendez, B. Cygan		
16:30	16:45	**B. Milewski** (AGH University of Krakow, Poland) Challenges facing the composite abrasives industry in the era of Energy consumption reduction
16:45	17:00	**A. Burbelko** (AGH University of Krakow, Poland) Modeling interaction of particles with crystallization front in in-situ nanocomposite using cellular automaton
17:00	17:15	**K. Lemonnier** (ENSAM, France) Differential Scanning Calorimetry of grey cast iron: Presence of iron nitrides after casting
17:15	17:30	**P. Paczkowski** (AGH University of Krakow, Poland) Optimizing Crystallization Control and Waste Heat Recovery in Foundries for Sustainable Electricity Generation
17:30	17:45	**G. Szczurek** (AGH University of Krakow, Poland) Evaluation of Carbide Eutectic in Castings of High-Chromium Cast Iron Grade EN-GJN-HV600 (XCr18)
17:45	18:00	**K. Bracka-Kęsek** (AGH University of Krakow, Poland) Coatings obtained in a zinc bath with Ti addition observed by TEM
18:00	18:15	**Ł. Gondek** (AGH University of Krakow, Poland) TiFe derivatives for cost-efficient hydrogen storage
19:00	24:00	**BANQUET**

28.10.2025 (Tuesday)

AGH Faculty of Foundry Engineering (Reymonta 23, Krakow)

09:30	10:00	**REGISTRATION**
10:00	10:15	**OFFICIAL OPENING**
10:15	11:00	**INVITED LECTURE** A. Kang (AnyCasting Software Co., Ltd., South Korea) Desing and Review of Battery Pack Housing Parts for Electric Vehicles with Thin Sectioned Die Casting
STUDENTS SESSION A		
Chairmen: N. Mordyl, P. L. Żak		
11:00	11:15	P. Paszek (AGH University of Krakow, Poland) Assessment of the influence of die casting machine chamber filling parameters on the stability of HPDC quality Supervisor: M. Brzeziński
11:15	11:30	J. Jaworowski (AGH University of Krakow, Poland) Project of Manufacturing a High-Pressure Die-Casting of an Oil Sump from AlSi9Cu3(Fe) Alloy Supervisor: Ł. Jamrozowicz
11:30	11:45	J. Juszczyk (AGH University of Krakow, Poland) Model of a robotic production line for the assembly of a selected gearbox assembly component Supervisor: M. Łucarz

11:45	12:00	**K. Adamiec** (AGH University of Krakow, Poland) **Design of a prototype lightweight brake caliper for motorbikes based on additive technology** Supervisor: J. Augustyn-Nadzieja
12:00	12:15	**M. Jaroszewski** (AGH University of Krakow, Poland) **The Influence of Electrochemical Cadmium Plating Technology on Hydrogen Embrittlement Phenomena in the Aerospace Industry** Supervisor: G. Michta
12:15	12:45	**COFFEE WITH NETCASTPL4.0 PROJECT**
STUDENT SESSION B		
Chairmen: P. Paszek J. Jakubski		
12:45	13:00	**J. Druciarek, K. Zaruczyński** (AGH University of Krakow, Poland) **Metallographic Studies of 3D-Printed Metal Alloys for Industrial Applications** Supervisor: G. Michta
13:00	13:15	**J. Lach** (AGH University of Krakow, Poland) **Advanced Optimization and Numerical Simulation of the High-Pressure Die Casting (HPDC) Process for the Automotive Industry** Supervisor: P. L. Żak
13:15	13:30	**M. Prażanowski** (AGH University of Krakow, Poland) **Implementation of rapid prototyping methods in process of manufacturing foundry wax models characterized by extremely thin walls** Supervisor: P. L. Żak
13:30	13:45	**A. Miśta, K. Machowska** (AGH University of Krakow, Poland) **Minimalizing the mass of a solar-powered racing boat, through the use of 3D printing, aluminum and composite materials** Supervisor: K. Sornek

13:45	14:00	**M. Majcher** (AGH University of Krakow, Poland) **Development of technology for the casting of the pump housing from ductile iron GJS-400-15** Supervisor: Ł. Jamrozowicz
14:00	14:15	**I. Herman** (AGH University of Krakow, Poland) **Designing the technology for making a casting using AnyCasting software** Supervisor: J. Lelito
14:15	14:30	**CLOSING OF THE CONFERENCE**
15:00	19:00	**STUDENTS SOCIAL MEETING** FILUTEK Club, AGH University Campus, Rostafińskiego 10

KEYNOTE SPEAKERS

Suzana Méndez
AZTERLAN, SPAIN
Application of hybrid models to the foundry manufacturing process

Maurizio Vedani
POLITECNICO DI MILANO, ITALY
Solidification in metal additive manufacturing: similarities and differences with welding and metal casting

Young-Hoon Yim
ANYCASTING SOFWARE, SEOUL KOREA
Metamodeling Approach to Predict Microstructure and Mechanical Properties in Aluminum Alloy Casting and Heat Treatment Processes

Wojciech Kowalczyk
FRECH POLSKA, POLAND
High-pressure die casting in the face of global industry change. Opportunities and threats

INVITED LECTURER

Andy Kang
ANYCASTING SOFTWARE CO., LTD., SOUTH KOREA
Desing and Review of Battery Pack Housing Parts for Electric Vehicles with Thin Sectioned Die Casting

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SCIENTIFIC SESSION E

INVITED LECTURE

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Abstract title:

The influence of furfuryl resin type – classical and designed for sand 3D printing, on cast iron castings microstructure and surface roughness

Authors:
K. Major-Gabryś [1*], D. Halejcio [1], A. Fijołek [1], J. Marosz [1], M. Górny [1]

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Key Words:
thin-walled castings, cast iron, molding sand, furfuryl resin, 3D printing

Abstract:
3D printing technologies are classified as innovative additive production methods. In the production of foundry molds and cores, the binder jetting technology is used. It is a modern technology that enables the production of molds and cores with shapes and layout impossible to obtain using traditional molding methods. The method involves binding layers of sand grains (with or without hardener) together using binders and/or other agents.

The production of thin-walled iron castings with complex shape, characterized by high quality while maintaining the required properties, involves many steps in the production process. One of them is the appropriate selection of the mold technology including molding materials.

Resin-based binders are one of the main materials used in foundry molding and core sands. Self-curing sands with furfuryl resin dominated the production of large-size castings and are also successfully used in the production of sand 3D printed molds and cores, especially for aluminum castings manufacturing.

This work is part of the research on new molding sands for molds and cores 3D printing. The work concerns the influence of furfuryl resin type (classical and designed for 3D printing) on cast iron castings properties. The pouring parameters were elaborated on the basis of MAGMA software. The microscopic observations of castings, produced in classical and 3D printed molds were conducted as well as roughness of the samples assessment.

It was proved that the type of resin does not affect the microstructure of the cast iron while - due to a greater amount of gas emitted from molds made using conventional technology, it affects the surface quality of castings,

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