



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

BOOK OF ABSTRACTS



FACULTY OF FOUNDRY
ENGINEERING
AGH UNIVERSITY



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 presentation 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

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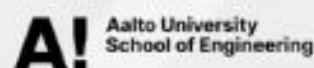


Co-organizer of Lightweight innovations panel



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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. Myszk

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. Sepiła (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. Szczepny (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. Juszczuk (AGH University of Krakow, Poland) Model of a robotic production line for the assembly of a selected gearbox assembly component Supervisor: M. Łucarz

CONFERENCE PROGRAMME

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 SOFTWARE, 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

LIST OF ABSTRACTS

PLENARY SESSION

Application of hybrid models to the foundry manufacturing process S. Méndez	26
Solidification in metal additive manufacturing: similarities and differences with welding and metal casting M. Vedani	27
Metamodeling Approach to Predict Microstructure and Mechanical Properties in Aluminum Alloy Casting and Heat Treatment Processes Y.H. Yim	28
High-pressure die casting in the face of global industry change. Opportunities and threats W. Kowalczyk	29

DISCUSSION PANEL

SCIENTIFIC SESSION A

Spheroidal graphite in ductile iron: morphology, growth, and distribution T. Tokarski	32
Effect of calcium alloying on the wettability and interfacial reactions between molten Mg- Ca alloy and Ti substrates under two different atmospheric conditions J. J. Sobczak, K. Janus, S. Terlicka, N. Sobczak, A. Jarzębska	33
Alloy and Process Optimisation of High-Manganese Steels: Linking Microstructure to Industrial Performance of Track Shoe Castings U. Gürol, S. Can Kurnaz	35
Integrated Design Optimization for Thin-Walled Cast Automotive Components N. Roudbarian ¹ , L. Kettenhofen, J. Singh, M. Ebadi, K.-U. Schröder	36
Experimental Comparison of Al-Si and Al-Cu Alloy Fluidity in Thin-Walled Sand Castings Supported by Numerical Simulations S. A. Shah, K. Jalava	37

LIST OF ABSTRACTS

Specimen geometry and tensile testing system effects on the ausferrite stability

Lun Fu, J. Olofsson, M. Schiralli, M. Vedani, M. Gorny, R. Donnini ⁵, G. Angella ⁵ 38

SCIENTIFIC SESSION B

As-cast microstructure, strength and steam oxidation resistance of René 125 nickel-based superalloy fabricated via lost-wax casting

Ł. Rakoczy, R. Cygan, M. Grudzień-Rakoczy, G. Cempura, T. Dudziak, T. Kargul, R. Chulist, E. Rząd, M. Górny 40

ADI cast iron production at Teksid Iron Poland – opportunities and challenges

B. Cygan, M. Górny, J. Marosz, G. Angella 42

Influence of growth velocity v and temperature gradient G on the interlamellar spacing λ of Fe-C unidirectionally crystallized eutectic

A. Świątkowski, T. Wiktor, D. Kopyciński 44

Modern Materials and Additive Manufacturing (3D Printing) Technologies for Foundry Molding Sands – Toward Reducing Environmental Impact

R. Dańko, A. Kmita, D. Gruszka, M. Skrzyński, D. Drożyński, J. Dańko, M. Holtzer, S. Tapola 45

What has the main influence on the shrinkage porosity of castings from secondary Al-Si alloys?

J. Piątkowski 46

Hybrid Crusher Hammers: Improved Durability and Efficiency Through High-Carbide Alloyed Iron Inserts Cast into a Manganese Steel Matrix

M. Kawalec, M. Górny, J. Świątły, J. Marosz 47

SCIENTIFIC SESSION D

Si-Mo Composite Reinforced with (Ti,Mo)C in Ultra-Thin-Walled Castings

J. Marosz, M. Górny, R. Cygan, Ł. Rakoczy, G. Angella, M. Kawalec, E. Olejnik 49

Mechanism of SiMo DCI HT oxidation based on complementary LM/SEM/TEM methods

K. Morgiel 50

LIST OF ABSTRACTS

Archaeometallurgy using modern research techniques and reverse engineering. Results obtained and prospects for the future A. Fijołek, A. Garbacz-Klempka, M. Wardas-Lasoń, K. Marlicka, J. Piekło, M. Piękoś, J. Kozana, D. Wałach	51
Determination of the heat transfer coefficient in the isothermal quenching process of ADI cast iron cooled with water mist P. Stręk, A. Burbelko	52
The influence of induction melting parameters on the structure of ingots made of highentropy alloys from the AlCoCuFeNi family K. Chrzan, B. Kalandyk, K. Jaśkowicz, S. Sobula, M. Grudzień-Rakoczy	53
The influence of furfuryl resin type – classical and designed for sand 3D printing, on cast iron castings microstructure and surface roughness K. Major-Gabryś, D. Halejcio, A. Fijołek, J. Marosz, M. Górny	54
An insight into high-nickel austenitic ductile cast iron M. Bork, M. Górny, Ł. Gondek, G. Angella, J. Morgiel, J. Marosz	56
SCIENTIFIC SESSION C	
The effect of microwave curing on selected properties of molding compounds with inorganic binders intended for 3D printing of sand molds and cores D. Halejcio, K. Major-Gabryś	58
Evaluation of Sodium Metasilicate Pentahydrate powder as foundry sand binder N. Anwar, K. Jalava	59
Influence of layer height and strand width on the porosity of 3D printed parts produced using FDM technology A. Sepiał	60
Raw Material Criticalities And Furnace Selection Choices In Aluminum Casting: A Pathway To Sustainable Foundries O. Asghar, L. Lattanzi, A. E.W. Jarfors, P. Ferro, A. Fabrizi, F. Bonollo	61

LIST OF ABSTRACTS

The use of green molding materials in the production of advanced lightweighting castings K. Major-Gabryś, D. Drożyński, M. Górny, J. Marosz, J. Lelito	62
VR, AR, and MR in casting and materials engineering – opportunities and possibilities A. Szczęsny	63
SCIENTIFIC SESSION E	
Challenges facing the composite abrasives industry in the era of energy consumption reduction B. Milewski, R. Antosz, J. Laska	65
Modeling interaction of particle with crystallization front in in-situ composite using cellular automaton A. Burbelko, P. Kurtyka, E. Olejnik	66
Differential Scanning Calorimetry of grey cast iron: Presence of iron nitrides after casting K. Lemonnier, A. Vaucheret, F. Rossi, P. Jacquet, F. Tritz, P. Honoré	67
Optimizing Crystallization Control and Waste Heat Recovery in Foundries for Sustainable Electricity Generation P. Paczkowski, D. Kopyciński	68
Evaluation of Carbide Eutectic in Castings of High-Chromium Cast Iron Grade EN-GJNHV600 (XCr18) G. Szczurek, J. Mędoń, D. Kopyciński	69
Coatings obtained in a zinc bath with Ti addition observed by TEM K. Bracka-Kęsek, M. Janusz-Skuza, A. Bigos, D. Kopyciński	70
TiFe derivatives for cost-efficient hydrogen storage K. Komędra, J. Michalik, K. Sworst, E. Borkowska, Ł. Gondek	72
INVITED LECTURE	
Assessment of the influence of die casting machine chamber filling parameters on the stability of HPDC quality P. Paszek, J. Wiśniowski, M. Brzeziński	74
Project of Manufacturing a High-Pressure Die-Casting of an Oil Sump from AlSi9Cu3(Fe) Alloy J. Jaworski, Ł. Jamrozowicz	75

LIST OF ABSTRACTS

Model of a robotic production line for the assembly of a selected gearbox assembly component J. Juszczyk, Mariusz Łucarz	76
Design of a prototype lightweight brake caliper for motorbikes based on additive technology K. Adamiec, J. Augustyn-Nadzieja	77
The Influence of Electrochemical Cadmium Plating Technology on Hydrogen Embrittlement Phenomena in the Aerospace Industry M. Jaroszewski, G. Michta	78
STUDENTS SESSION B	
Metallographic Studies of 3D-Printed Metal Alloys for Industrial Applications J. Druciarek, K. Zaruczyński, G. Michta	80
Advanced Optimization and Numerical Simulation of the High-Pressure Die Casting (HPDC) Process for the Automotive Industry J. Lach, P. L. Żak, K. Żak	81
Implementation of rapid prototyping methods in process of manufacturing foundry wax models characterized by extremely thin walls M. Prażanowski, P. L. Żak	82
Minimalizing the mass of a solar-powered racing boat, through the use of 3D printing, aluminum and composite materials A. A. Miśta, K. Machowska, K. Sornek	83
Development of technology for the casting of the pump housing from ductile iron GJS-400-15 M. Majcher, Ł. Jamrozowicz	84
Designing the technology for making a casting using AnyCasting software I. Herman J. Lelito	85

Abstract title:

The use of green molding materials in the production of advanced lightweighting castings

Authors:

K. Major-Gabryś ^{1*}, D. Drożyński ¹, M. Górny ¹, J. Marosz ¹, J. Lelito ¹

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Key Words:

thin-walled castings, environmental protection, molding sand, resin, inorganic binder

Abstract:

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 technology of molding and core sands, taking into account strict environmental requirements. The need to meet high environmental standards is currently the dominant factor in the development of molding sands technologies is. It's even being done at the expense of reducing the technological properties of the materials.

As part of the development of molding compounds for thin-walled castings, two compounds with organic binders and two compounds with inorganic binders were tested. Tests were carried out on the tensile and bending strength, permeability, and friability of the compounds. For selected molding sands, tests were carried out on their thermophysical properties (hot distortion parameter), gas emission, and thermal degradation. Molds were also made using 3D printing technology and no-bake system.

The tests carried out on the molding sands showed that all the proposed mixtures have the appropriate properties for the production of thin-walled castings. Sands with inorganic binders are characterized by lower gas emission, which is important both from the point of view of environmental protection and the quality of the castings obtained.

As part of the work, a mold for the production of thin-walled castings was designed. The molds were made from molding compounds selected for testing. Four castings with different wall thicknesses were made in each mold. The feeding system was designed on the basis of computer simulation.

Funding/Acknowledgments:

The research is co-financed within NetCastPL4.0 project. The project is funded by the European Union under the Horizon Europe programme, Grant Agreement No. 101159771.

