WORLD FOUNDRY ORGANIZATION

The reference point for the global metal casting industry

WFO
WORKING GROUPS REPORT 2020

Activity during 2019 and plans for 2020

Documentation for the WFO stakeholders

July 2020

WORLD FOUNDRY ORGANIZATION

CONTENTS

1. Introduction

The WFO is a neutral body that represents the collective needs of the members on a global stage. Through the involvement of its member associations from 30 different countries, the WFO creates a network of technical knowledge and resources that is a vital tool to every foundry association, foundry and foundry worker throughout the world.

One of the main purposes of the organization is to promote the development of the casting industry and to coordinate different working frames that allow the exchange of technical knowledge, best in class experiences and advanced materials, process and technological developments.

One of the activities developed in the past has been related to the creation of International Commissions. An important number of Commissions (up to thirteen) have been active during many years. A solid historical background that has generated outstanding international and collaborative efforts, with a series of reports and published work available in the WFO bookshop and records.

Despite these previous positive experiences, at a certain point in time these International Commissions became obsolete, with a limited or even a non-existing level of activity and a clear lack of valuable outputs that made the World Foundry Organization reconsider the situation and coordinate a new strategy to re-orientate this working line.

At 2013 the World Foundry Organization took the decision to cancel the operation of all former International Commissions with an official communication to all their members and to set ongoing a clear new strategy, driven by the following main guidelines:

- The WFO shall continue promoting and supporting active working frames, either guided by a general interest (common challenges for the global casting industry) or by specific demands, focused on any matter of interest linked to the foundry industry.

- No fixed structures shall be established, but dynamic and active/collaborative initiatives designated as “WORKING GROUPS”, flexible in their working dynamics and open to regional, international or global participation.

- Official request shall be done to the WFO to define and to set ongoing a new WORKING GROUP providing the following basic information:
    - ✓ Name of the Working Group
    - ✓ Chairman and working members (updated on yearly basis)
    - ✓ Main objectives of the Working Group
    - ✓ Working Plan proposal (updated/reviewed on yearly basis)
    - ✓ Yearly reporting of the results (value added contents to be shared among all WFO Members)
- According to this proposal and working plan, the WFO shall give the official approval and make a yearly follow up and evaluation of the activity from all WORKING GROUPS.
- The WFO will provide the corresponding backup support to all WORKING GROUPS (space in the WFO web site, information and promotion of their activities, delivery of the results, …. etc).
- A yearly reporting from each official WORKING GROUP shall be done to the World Foundry Organization, providing as well the corresponding documents, proceedings or value added contents that shall be shared further on with all the WFO Member Associations.
- Follow up report will be presented in every WFO General Assembly meeting by the Secretariat.
- Finished, inactive or non-reporting initiatives shall be closed down after the yearly review (there is no sense in maintaining inactive proposals) and they shall be considered as flexible proposals, opened to be reactivated if needed.

Updated information about the WORKING GROUPS is available on the WFO website:

http://www.thewfo.com/working-groups/

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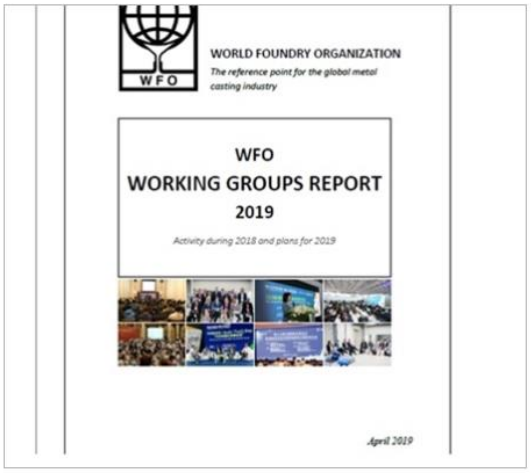
Working Groups

Historically a number of Working Groups have been active and a series of reports and published work by these working groups is available from the WFO bookshop on this website. See below for the contact information and objectives of each Working Group.

Members Login:

Username | Password

SEND



The following are active commissions:

- Cast Metal Matrix Composites Working Group
- Die Casting Working Group
- Ferrous Metals Working Group
- Moulding Materials Working Group
- Non-Ferrous Materials Working Group
- Training and Professional Development Working Group

Related Links

> Sponsors
> Executive Members 2019
> World Foundry Summit
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For more information, contact us

If you have a query please fill in the form below and we will come back to you as soon as possible.

First Name* | Surname*

Company / Organization* | Contact Number*

Email Address* | Best Way of Contact*

Message*

SEND

2. Initial note: Impact of Covid-19 in planning of the Working Groups

Following the global pandemic that arose in the beginning of 2020, different health restrictions have been adopted worldwide, including the ones in travelling, gathering of people or permitted activities. This is also changing rapidly, with an uncertain future prospective in how the situation and the restrictions will be evolving during the year in every country.

At the same time, in the beginning of the year, all the WFO Working Groups communicated their plans for 2020. According to the actual context and this rapidly changing situation, we have decided not to ask the groups to update all the received plans, as these new updates could be outdated very easily by the near future evolution of the pandemic.

Thus, you can review in this report the initial plans for 2020 of the different WFO working groups as they were programmed in the beginning of the year. Aware that the evolution of the global pandemic during 2020 will set the way for certain planned activities, all the WFO Working Groups will be adapting their plans according to the global situation along the year, in communication with the WFO Secretariat.

3. List of Working Groups and contacts

WFO Working Group	Contact
Cast Metal Matrix Composites Chaired by Prof. Natalia Sobczak	Prof. Natalia Sobczak Institute of Metallurgy and Materials Science Polish Academy of Sciences POLAND
Die Casting Chaired by Prof. Liming Peng	Mr. Liming Peng School of Mater. Sci. Eng., Shanghai JiaoTong University CHINA
Ferrous Materials Chaired by Prof. Y Li	Dr. Li Yanxiang Tsinghua University CHINA
Management of Foundry Associations Chaired in 2019 by Dr.-Ing. Ion-Alexandru Bacanu Chaired in 2020 by Ing. Vladimír Krutiš, Ph.D.	Dr.-Ing. Ion-Alexandru Bacanu ROMANIAN FOUNDRY TECHNICAL ASSOCIATION Bucharest, ROMANIA Ing. Vladimír Krutiš, Ph.D. Senior lecturer Faculty of Mechanical Engineering Brno University of Technology CZECH REPUBLIC
Moulding Materials Chaired by Mr. Lou Yanchun	Mr. Lou Yanchun SRIF - Shenyang Research Institute of Foundry Shenyang City CHINA
Non-Ferrous Alloys Chaired by Mr. Su Yanqing	Mr. Su Yanqing Harbin Institute of Technology Harbin City, CHINA
Training and Professional Development Chaired by Dr Pam Murrell FICME	Dr Pam Murrell Cast Metals Federation National Foundry Training Centre, ECMS UNITED KINGDOM

Should you need any contact with the WFO working groups, please contact with Mr. Andrew Turner andrew@thewfo.com

4. Working Groups Reports

4.1. Cast Metal Matrix Composites Working Group

July 2020

4.1.1. Brief description of the objectives of the Working Group

The **Cast Metal Matrix Composites Working Group** is aimed to articulate a vision and an action-plan for advancing the research, development, and applications of cast metal matrix composites under the banner of WFO.

The main topics covered all relevant aspects of the science, technology, economics and practice of metal matrix composites, including (but not limited to) the overall themes of processing, property characterization, modelling and simulation, measurement techniques, experimental investigation of high-temperature phenomena in liquid metals and alloys and their interaction with ceramic reinforcements, interface design, and recycling.

4.1.2. Leader and participants

1) Prof. Natalia Sobczak
Institute of Metallurgy and Materials Science
Polish Academy of Sciences
25 W. Reymonta Street
Krakow
PL 30-059, POLAND

2) Prof. Rajiv Asthana
Manufacturing Engineering
326 Fryklund Hall
University of Wisconsin-Stout
Menomonie

4.1.3. Main activities and outcomes of the Group during 2019

In 2019, main activities were focused on the organization tasks of the **2nd International Conference on Metals, Ceramics and Composites** (ICMCC-2) that took place in 25-27 September **2019, Warna**, **Bulgaria**, including:

1) establishment of Scientific Committee,
2) preparation of call for papers and abstracts for ICMCC-2 Proceedings,
3) development of procedures for reviewing abstracts for publication in Proceedings,
4) preparation of Conference Program,

5) promotion of cast metal matrix composites through the organization of oral presentations and posters dedicated to cast metal matrix composites.
6) Post-Conference activities were focused on collection of post-conference manuscripts and their reviewing for publication in JCR journal *Archives of Metallurgy and Materials* – The Journal of Institute of Metallurgy and Materials Science and Committee on Metallurgy of Polish Academy of Sciences.

Moreover in 2019, the reviewing procedure of post-congress manuscripts of EUROMAT2019 from Symposium "Interface Design and Modelling, Wetting and High-Temperature Capillarity" of Area C "Processing" was in progress for publication in Journal of Materials Engineering and Performance (Editor-in-chief: Rajiv Asthana).

4.1.4. Planning for 2020 and expected final outcome

1. Participation in the organization the following international conferences related to cast metal matrix composites:
   1) International Conference on High Temperature Capillarity, 2020, Miskolc, Hungary. For this event, we plan to organize a session dedicated to metal matrix composites.
   2) Junior EUROMAT Congress, 2020, Granada, Spain.
   3) Metallurgy 2020, Poland – it will be the jubilee conference at which the researchers from Polish Academy of Sciences and Department of Foundry Engineering of AGH University of Science and Technology will give a lecture dedicated to the state of the art of research on factors affecting graphite nucleation in cast iron; the results will be published as a book chapter.
   4) To start organization activities of EUROMAT Congress, 12-16 September, 2021, Graz, Austria, particularly the organization of a special symposium dedicated to high temperature liquid state materials science and technology and the post-congress publications will be published in Journal of Materials Engineering and Performance (Editor-in-Chief - Rajiv Asthana; Associate Editor – Natalia Sobczak).

2. Preparation and publication of the book dedicated to high-porosity metals produced by directional solidification (under the Patronage of WFO).

4.2. Die Casting Working Group

May 2020

4.2.1. Brief description of the objectives of the Working Group

The **Die Casting Working Group** is aimed to promote global technical exchanges on die casting industry; to organize technical conference on die casting periodically by which establish a platform for exchanging and cooperation, and enhance the global industrial influences of WFO.

4.2.2. Leader and participants

	Name	Organization	Country
Chairman	Peng Liming	Shanghai JiaoTong University	China
Secretary	Bao Linlin	Foundry Institution of Chinese Mechanical Engineering Society	China
Working member 1	Keung Wing Ching	Ka Shui International Holdings Ltd	China
Working member 2	Zhang Xiaoyan	Ningbo Die & Mould Industry Association	China
Working member 3	Fabbroni Marcello	Bühler AG	Swiss
Working member 4	Wang Zhijian	Ford Motor Company	China
Working member 5	Michael Barkhudaroy	FLOW-3D	U.S
Working member 6	Michael Er	AGS	Malaysia
Working member 7	Fang Jianru	D Dalian Yaming	China
Working member 8	Syunzo Aoyama	ahresty	Japan
Working member 9	I.W. Kim	Korea Diecast Industry Cooperative	Korea

4.2.3. Main activities and outcomes of the Group during 2019

Hosted the 14th China International Diecasting Congress, on July 15-16, 2019 in Shanghai, China, concurrently with the 5th International Symposium on Nonferrous Alloys and Special Casting Technologies.

The event was sponsored by the Chinese Mechanical Engineering Society, WFO Die Casting Commission and organized by FICMES.

In the two-day event, a total of 36 experts and scholars from universities, national key laboratories, and well-known enterprises at home and abroad brought wonderful presentations and shared their research and application results.

The topics of the presentations and name of speakers are as follows:

1. **Travelling magnetic casting technology.**
   Su Yanqing, Professor/Vice Dean, Harbin Institute of Technology;

2. **Development trends of high pressure die casting and key technologies of high vacuum die casting technique.**
   Xiong Shoumei, Professor, Tsinghua University;

3. **Smart management system of die casting cell.**
   Lu Hongyuan, General consultant, Buhler（China）Machinery manufacturing company;

4. **Research and Development and implementation of new generation high performance casting aluminum alloys for automotive applications;**
   Wang Jianfeng, R&D Manager, China Science Lab, General Motors Global.

5. **Application and development trend of die-casting aluminum alloy with high strength, toughness and high thermal conductivity.**
   Zhang Hai, Professor/Dean, Institute of High Performance Metal Structural Materials Soochow University;

6. **Review of study and development on casting technologies of Shanghai Spaceflight Precision Machinery Institute.**
   Chen Bin, Assistant Director, Shanghai Spaceflight Precision Machinery Institute;

7. **Wire+arc additive manufacture used for large - scale structural parts of aerospace.**
   Wang Defu, Professor, Nolan Corazza, Sales Support Manager – APAC, Italpresse Gauss; Innovative Systems for Diagnostic, Data Analysis and Energy Saving;

8. **The casting-cell in development, based on an APQP approach.**
   Andreas Kant, Sales Manager, Costamp Group-HPDC;

9. **Additive manufacture of die-casting tooling.**
   Harris Li, Industry Account Manager-Tooling, EOS Electro Optical Systems (Shanghai) Co., Ltd;

10. **Shrinkage cavity control and application of aluminum alloy cylinder head based on casting simulation technology.**
    Du Hang, Technical Manager, Jinan AnyCasting Software Co.,Ltd;

11. **Potentials and challenges for magnesium applications in crash-related passenger vehicle structures.**
    Liu Haifeng, Doctor, CITIC Dicastal Co., Ltd.;

12. **Selection and application of squeeze casting technology.**
    Luo Jixiang, Professor, Wuhan University of Technology; Guangzhou kinbang liquid forging Technology Co., Ltd;

13. **Research progress and development trend of cast titanium alloy for aerospace.**
    Nan Hai, Research Director; Aero Engine Corporation of China (AECC)-Beijing Institute of Aeronautical Materials (BIAM);

14. **Process and equipment of counter-pressure casting for amorphous alloys.**
    Sun Jianfei, Professor, Harbin Institute of Technology;

15. **Recent research on key technologies of lightweight and intelligent investment casting for high performance structural parts.**
    Dong Anping, Director, Shanghai Jiao Tong University;

16. **Environmentally-friendly inorganic binder coated sand technology and application in non-ferrous alloycasting.**
    Wu Changsong, Deputy General Manager, Chongqing Changjiang River Moulding Material (Group) Co., Ltd.;

17. **Microstructure and mechanical properties of high temperature titanium alloy for casting.**
    Zhou Zhongbo, senior engineer, Xi'an SuperCrystal Science&Technology Development CO.,LTD. ;

18. **Microstructure in high pressure die casting hypoeutectic Al-Si alloys.**
    Jiao Xiangwei, Tsinghua University; Characterization of inhomogeneous;

19. **Expected die casting technology in the period of automobile reform.**
    Amezawa Hiroki, Engineering and Quality Division Tosiba Machine Co., Ltd.;

20. **Defect reduction by utilizing die-casting machine Capability.**
    Sasaki Hideto, Chief researcher, MINO INDUSTRY CO., LTD.;

21. **Improving the wall thickness and weight of aluminium alloy casting by increasing the pattern design on die surface.**
    Qu Lihuan Engineer, PSB Engineering (Suzhou) Co., Ltd. (FLOW-3D);

22. **Structural components in new Al HP-DC alloys in comparison to a magnesium and a steel construction.**
    Rüdiger Franke, Dipl.-Ing., Aluminium Rheinfelden GmbH;

23. **Research status and future development trend of die casting aluminum alloy.**
    Fan Zhenzhong, Senior Engineer, AECC Beijing Institute of Aeronautical Materials (AECC BIAM);

24. **Discussion about few Issues of structural parts produced with vacuum.**
    Zou Zhihou, General Manager, Fondarex China;

25. **Current status and development trend of flow control technology for die casting die cooling water.**
    Kenichi Shimizu, Head of Technical Department, Toflo Corporation;

26. **Current status and development trend of effective detection of die-casting products using a measuring device.**
    Toshihiro Kaneo, Minister of Commodity and Technology Overseas; TOKYO BOEKI TECHNO-SYSTEM LTD.;

27. **OEE max - process excellence made by Frech.**
    Alexander Marks, Director of Die Casting Solutions, Oskar Frech GmbH + Co. KG;

28. **Die casting production shopfloor digitalization & IoT implementation.**
    Su Y. Lim, Project Manager, AGS (Suzhou) Co., LTD;

29. **Geesthacht. Comments on solidification of magnesium alloys.**
    Norbert Hort, Head Magnesium Processing Department, Helmholtz-Zentrum;

30. **Improving the wall thickness and weight of aluminium alloy casting by increasing the pattern design on die surface.**
    Li Daquan, Doctor, General Research Institute for Nonferrous Metals;

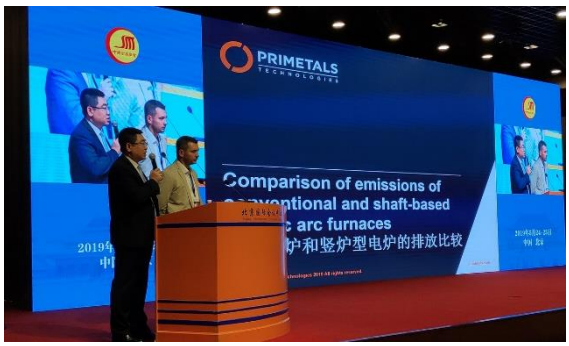
31. **Geesthacht. Grain refinement and its mechanisms of magnesium alloys.**
    Huang Yuanding, Senior Scientist, Helmholtz-Zentrum;

32. **Construction of digital casting innovation platform 2.0 and Its application in special casting of nonferrous alloys.**
    Zhou Jianxin, Professor, Huazhong University of Science and Technology;

33. **Innovative product design and robust process layout in die casting with autonomous engineering.**
    Liu Qiming, MAGMA Engineering (Suzhou) Co., Ltd.;

34. **Application research of casting simulation in die casting defect resolution and die failure analysis.**
    Zhou Wenke, Senior Researcher, Hitachi (China) Research & Development Corporation;

35. **Microstructure characterization of High Pressure die Cast AlMg6Si2MnZr and AlMg4Fe2 Alloys.**
    Liu Chaofeng, Tsinghua University;



Hosted the 14th China International Diecasting Congress, on July 15-16, 2019 in Shanghai, China, concurrently with the 5th International Symposium on Nonferrous Alloys and Special Casting Technologies

4.2.4. Planning for 2020 and expected final outcome

15th China International Diecasting Congress will be held in shanghai on July 2020.

The conference concentrates on casting technologies and equipment for nonferrous alloys, such as aluminum, magnesium, titanium, zinc, and copper alloys, and focuses on the development and technological innovation of the whole industry chain, as well as the domestic and foreign market situation of metal casting industry.

4.3. Ferrous Materials Working Group

March 2020

4.3.1. Brief description of the objectives of the Working Group

The **Ferrous Materials Working Group** is aimed to promote global technical exchanges on ferrous material s of foundry industry; to organize technical conference periodically by which establish a platform for international exchanging and cooperation, and therefore enhance the global industrial influences of WFO.

4.3.2. Leader and participants

	Name	Organization	Country
Chairman	Mr.Li Yanxiang	Tsinghua University, Department of Mechanical Engineering	P.R.China
Secretary	Ms. Liu Xiuling	Foundry Institution of Chinese Mechanical Engineering Society	P.R.China
Co-Secretary	Mr. Chen Xiang	Tsinghua University	P.R.China
Working member 1	Mr. Li Kerui	Zhengzhou Research Institute of Mechanical Engineering	P.R.China
Working member 2	Mr. Zai Qijie	Shanghai University	P.R.China
Working member 3	Mr. Li Wei	Jinan University	P.R.China
Working member 4	Mr. Liu Zhongli	Yantai University	P.R.China
Working member 5	Mr. Li Fengjun	YTO Group Corporation	P.R.China
Working member 6	Mr. Huang Zhifu	Xi'an Jiaotong University	P.R.China
Working member 9	Mr. Hu Jinbao	FAW Foundry Co., Ltd	P.R.China
Working member 10	Mr. Li Zhenhua	Kunming University of Science and Technology	P.R.China
Working member 11	Mr. Liu Jincheng	SinterCast Limited	P.R.China
Working member 12	Mr. Dong Hongbiao	University of Leicester	UK
Working member 13	Mr. Harry Tian	GIW Industries, Inc. Georgetown, Georgia 30713, USA Director, Metallurgy and Materials R&D. GI	USA
Working member 14	Mr. Steve Dawson	Sinter Cast, Sweden	Sweden

	Name	Organization	Country
Working member 15	Mr. Doru Stefanescu.	Ohio University, Department of Materials and Engineering	USA
Working member 16	Mr. Hideo Nakae	Waseda University	Japan
Working member 17	Mr. Sadato Hiratsuka	Organization: Iwate University Department: Materials Science and Engineering, Faculty of Engineering	Japan
Working member 18	Mr. Ramón Suarez	IK4 AZTERLAN	Spain
Working member 19	Mr.Pello Larrañaga	IK4 AZTERLAN	Spain

4.3.3. Main activities and outcomes of the Group during 2019

Call for papers and speakers invitation for the 2020 WFO International Forum on Cast Iron & Cast Steel Technologies to be held in Oct. 20, 2020 in Busan, Korea.

The event is sponsored by WFO Ferrous Metals Commission. The theme of the event is “Innovative Developments in the Field of Cast Ferrous Metals—Iron & Steel”.

4.3.4. Planning for 2020 and expected final outcome

The WFO Ferrous Metals Technical Commission will be reelected in 2020.

2020 WFO International Forum on Cast Iron & Cast Steel Technologies to be held in Oct. 20, 2020 in Busan, Korea.

4.4. Management of Foundry Associations Working Group

May 2020

4.4.1. Brief description of the objectives of the Working Group

The main objective of the **Management of Foundry Associations Working Group** is to share the expertise and best practice in management between national foundry associations. Though some National Associations have achieved a high level in management excellence, there are others that have certain difficulties in some related areas. Adopting best practices can make a significant contribution to raising standards and improving performance of WFO Associations. The purpose of this working group is to help Associations to raise their game by identifying and developing best practice and enabling the sharing of information and experience among members, by:

- Identifying their key aspects in excellence management.
- Allowing Associations to structure the discussions around these aspects.
- Developing possible deliverables for WFO Associations: white papers, documentation…

4.4.2. Leader and participants

September 20th, 2019; Portoroz, Slovenia

Ion-Alexandru Bacanu (Romania) - Chair
Mirjam Jan-Blažić (Slovenia)
Drago Brence (Slovenia)
Vladimír Krutiš (Czech Republic)
Lionel Alves (France)
Carsten Kuhlgatz (Germany)
Tadeusz Franaszek (Poland)
Katarzyna Liszka (Poland)
Sandy Majatladi (South Africa)
José Javier González (Spain)
Tuncag Sen (Turkey)
S.Koray Hatipoglu (Turkey)

4.4.3. Main activities and outcomes of the Group during 2019

During the kick off-meeting Mr. Vladimír Krutiš suggested the accomplishment of a common template - including the split of incomes, services, kind of membership (persons or / and companies) - to be completed in by every Member Association. The group needs to set up its structure and to go on with the organization.

4.4.4. Planning for 2020 and expected final outcome

For establishing the plans in this group for 2020, Mr. José Javier González contacted Mr. Vladimir Krutis (Czech Republic), as he was the candidate for the Chair of the group raised at the meeting in Slovenia.

Plan suggestion:

- Create a common template (questionnaire), including the split of incomes, services, kind of membership, major activities, urgent issues, best practices etc. to obtain targeted information about the activities of individual organizations.
- Fill in and analyze this template within our working group and prepare a final version which every Member Association could complete.
- Analyze the information received and identify the most important issues that the group will continue to work on.
- Outcome to the WFO management (and Member Association): structured feedback (report) about Member Associations, their current activities, issues and some suggestions about the best practices sharing.

Schedule of work:

- Q1 2020 – draft of the template (draft will be prepared by Vladimír Krutiš).
- Q2 2020 – share the template within a group and prepare a conference call (webinar) where the final version will be discussed. The final version will be sent to Member Associations.
- Q3 2020 – evaluation of the feedback.
- Q4 - A possible meeting could be made in South Korea during the next General Assembly to work on final report. Another possibility is to organize another conference call with the members in order to discuss the feedback and the report preparation and one association could explain some of their best practices as Poland did in 2019.

The Working Group celebrated a meeting on September 20th, 2019, in Portoroz, Slovenia

4.5. Moulding Materials Working Group

March 2020

4.5.1. Brief description of the objectives of the Working Group

The **Moulding Materials Working Group** is aimed to promote global technical exchanges on moulding materials of foundry industry; to organize technical conference on moulding materials periodically by which establish a platform for exchanging and cooperation and enhance the global industrial influences of WFO.

4.5.2. Leader and participants

	Name	Organization	Country
Chairman	LOU Yanchun	SRIF	P.R.China
Secretary	Wang Yunxia	FICMES	P.R.China
Working member 1	Trevor Ayre	VP Foundry Greater China FOSECO	UK
Working member 2	Kunihiro Hashimoto	Sintokogio, Ltd.	JAPAN
Working member 3	Yutaka Kurokawa	Tsuchiyoshi Acty Co.	JAPAN
Working member 4	ZHU Jianxun	Shenquan Group	P.R.China
Working member 5	Reinhard Stoetzel	ASK GmbH	Germany
Working member 6	FAN Zitian	HUST	P.R.China
Working member 7	SONG Huizong	FOSECO China	P.R.China
Working member 8	YIN Shaokui	SRIF	P.R.China
Working member 9	Jerry Thiel	University of Northern Iowa 艾奥瓦	USA
Working member 10	Gorka Zarrabeitia	IK4 AZTERLAN	SPAIN
Working member 11	Jon Sertucha	IK4 AZTERLAN	SPAIN

NOTE: SRIF- Shenyang Research Institute of Foundry, China
FICMES – Foundry Institution of Chinese Mechanical Engineering Society
HUST – Huazhong University of Science and Technology

4.5.3. Main activities and outcomes of the Group during 2019

With the theme Green Environmental Protection Moulding Materials and Advanced Casting Technology, WFO Moulding Materials Commission hosted the 2019 WFO International Forum on Moulding Materials and Casting Technologies in Wuhan on October 28, concurrently with the 2019 China Foundry Congress.

WFO Executive, Mr. Lou Yanchun and Dr. Carsten Kuhlgatz attended the opening ceremony and delivered a speech, 14 speakers representing enterprises, universities and institutes gave reports and presentations during this Forum. These reports cover wide topics of moulding materials and casting technologies and fully present the latest technical achievements in green sand and chemically bonded processes, new coatings, binders and additives, sand reclamation, 3D ink-jet core printing and printing materials and so on. About 200 delegates from moulding materials suppliers and foundries attended this event.

Presentations given:

1. **Research on industrialization of 3D ink-jet core printing**

   Zhu jianxun, Jinan Shengquan Group Share Holding Co., Ltd.

   Abstract: 3D inkjet casting core printing technology has been developed for nearly 20 years, and is currently the mainstream process of core printing. This technology plays an important role in the development of rapid manufacturing samples and new castings. However, due to the problems of efficiency and cost, it has not yet played a role in the production of batch castings. In this paper, the following aspects are discussed and tested ,so as to promote the industrial application of the technology, and to redefine the casting design and improve the foundry capability of producing arbitrary and complex (without parting and no slope), high performance and high value added castings.

2. **Cold-Box Systems With A Sustainable Footprint**

   Dr. Ion Bacanu, Hüttenes-Albertus Chemische Werke GmbH

   Abstract: Modern Cold-Box systems must meet the customer's requirements. Standard properties include a high strength level and high reactivity to ensure maximum productivity. Other important properties are thermal stability (deformation behavior) and gas and emission behavior (pollutants, smoke, odor, condensates). In recent years, the demands placed on foundry residues to be disposed of in landfills have also increased significantly. On the one hand, landfill space is becoming increasingly scarce, and on the other hand, the costs of landfilling

are increasing due to stricter legal requirements. As a result, the focus is increasingly on used sand parameters such as the phenol index, BTEX – aromatic hydrocarbons Benzen, Toluen, Ethylbenzen and Xylen, TOC - Total Organic Carbon and DOC - Dissolved Organic Carbon.

3. Innovative Sand Mould Casting Technology Featuring Lower Energy Consumption and Less Pollutions

Zhu shigen, Donghua University

Abstract: The casting method can be categorized as sand mold casting and special casting. There are a variety of specific processes. Among these, sand mold casting issued most commonly. However, current sand mold casting technology has four worldwide problems:1). Heavy pollution. 2). High energy consumption. 3). Poor casting quality.4). Poor reuse performance. The author has developed an innovative sand mould casting technology which featuring lower energy consumption while is environmentally friendly. This has laid a solid technical foundation for solving the above problems and will provide a strong support for the sustainable development of the Foundry industry. Technical features include: 1). No black pollution.2). Low energy consumption.3). Improvement of casting quality. 4). Outstanding reusing and recycling performance.

4. Coatings for Automotive Truck Production Demand and Features on productivity, elimination of casting defects, cleanliness and environment

Mr. Reinhard Stötzel, ASK Chemicals

Abstract: Capability and casting quality are the focus of enterprises casting truck components due to the great demand for good and high-quality castings. Having new concepts that can quickly match customer key performance indicators (KPIs) is crucial, e.g. by using sustainable solutions through optimisation optimization of the casting process, particularly by using core/mould coatings is crucial.

Lost foam casting is a casting technology, which, due to its the given process, provides to designers the maximum degree of freedom. However, these techniques require high-tech performance coatings to achieve a stable, reproducible casting in a fix and very narrow range of quality, and narrow quality range of castings. We have shown that these high- performance coatings enable foundries to produce more complex castings for Trucks trucks in a less complicated and more efficient way, which is means a competitive advantage for these foundries.

Last, but not least the environmental demands in foundries are more and more in focus and have to be managed by the foundries. Here In this regard, we have shown

a new concept on at the GIFA tradeshow how to reduce emissions, which have been that are released during the drying process of coated Cold Box cores.

5. Recycling Technology and Cases of Foundry Solid Waste

Liu chunlei, Guangxi Lanco Resources Recycling Co., Ltd.

Abstract: This paper systematically introduces the recycling technology of foundry solid waste containing waste sand, waste slag and dust. The recycling technology of waste sand include wet reclamation, thermal reclamation and combined reclamation. The slag and dust can be recycled by making ceramics and plates. The above examples of solid waste recycling technology in foundry was applied in China.

6. Study on improving inner cleanness of heavy truck head with SEMCO SIL 3544

Zhou daobing, Vesuvius Foundry Technology Co., Ltd.

Abstract: Described the main factors for inner cleanness of heavy truck cylinder head and relative company standard and test method of inner cleanliness, analysed the root cause for relative defects of cylinder head, compared performance of SEMCO SIL 3544 with conventional coating, produce heavy truck cylinder head with SEMCO SIL 3544 in customer product line and checked relative casting quality, SEMCO SIL 3544 is helpful for improve inner cleanness of cylinder head and better than traditional coating.

7. The Application of the New Low- Sulfur Curing Agent on the Ductile Iron Castings Castings

Shen yangbin, Suzhou Sinye Materials Technology Co., Ltd.

Abstract: In this research we develop a new low- sulfur curing agent for the furan resin. This curing agent have no phosphoric acid and no pungent odor, the main components are benzenesulfonic acid, organic acid, gelatin, water and methanol. The research show that molding sand could exhibit higher strength after 24 hours when we employ the XYGD curing agent for bonding the used sand compared with the normal curing agent, especially when the sand has been used many times. The sulfur content is equivalent or lower. It could solve the surface defects of spheroidization on ductile iron castings, and increase the utilization rate of used sand.

8. The Power of Green Sand for Aluminum

Per Larsen, DISA Industries A/S

Abstract: Green sand iron casting is proven and trusted to deliver outstanding quality – efficiently and at minimum cost. Now foundries and manufacturers worldwide are recognizing the power of green sand for aluminum components. The aluminum green sand casting process delivers the highest production speeds and breathtaking cost efficiency. The low pressure pouring process for DISAMATIC handles the most demanding applications, maintaining or improving current component quality and physical properties.

In the right applications, the ultra-flexible green-sand-based process has lower costs than other processes. Updating component designs becomes quick and easy, and there's no need for energy-hungry tooling temperature control either

9. Enviromental-friendly moulding materials and their application

Wu changsong, Chongqing Changjiang Modeling Materials Group Co., Ltd.

Abstract: This paper mainly introduces the realization of green technology of molding materials, including the choice and the treated method of sand, the application of green coating sand, the disposal and reuse method of waste sand etc. Combined with the works done by Chongqing Changjiang Molding Material Group Co., Inc. on these green technologies, the article focuses on their characteristics and key technologies.

10. The Development and Application of the Foundry Used Sand Reclaiming Technology in China

Fan zitian, Huazhong University of Science & Technology

Abstract: Based on the development and application of foundry sand reclaiming technology in China, this paper introduces the characteristics of several typical foundry used sand and its reclamation adaptability, evaluates the advantages and disadvantages of different reclamation methods for different kinds of foundry used sand, summarizes the new development on research and application of foundry used sand reclaiming technology applied at home and abroad in recent years, and discusses the suitable binder system for the related reclaimed sand.

11. Autonomous engineering in core production-systematic process design and optimization

Yale Yan, MAGMA Engineering (Suzhou) Co., Ltd.

Abstract: The process simulation is accepted today as a reliable analysis tool. It offers an expanded understanding of the process and the possibility of quantitatively assessing the relevant influencing variables. With the step from the individual

simulation to the autonmous engineering, correlations between process variables and quantifiable quality criteria can already be determined in the planning stage of a new core tool. At the same time, the process steps of core shooting and curing for systematic tool development can be optimized simultaneously. The virtual optimization either provides the best compromise for the entire process or the best solution for each process. This integrated approach offers great potential for robust core production, significantly reducing cycle times while minimizing resource consumption.

12. Application of foundry coating on 3D printing technology

Zhang yu, Greative Technology (Shanghai) Material Science Co., Ltd.

Abstract: 3D technology has formed the manufacturing technology that can best represent the characteristics of the information age, that is, it is supported by information technology and uses flexible product manufacturing methods to meet the unlimited and abundant individual needs.3D Printing's technical term is "Additive Manufacturing", and its technical connotation is to realize the manufacture of structural parts by digitizing and increasing materials. At present, the most widely used 3DP and SLS technology in the casting field, many manufacturers have produced a lot of high-quality precision casting parts, this paper focuses on coating application technology in the 3DP casting(cast iron, cast aluminum parts casting).

13. The Application of LE Technology in Foundries

Dr. Thomas Engelhardt, Clariant Produkte (Deutschland) GmbH

Abstract: friendly foundry additive was introduced. Essential component of these additives are special natural graphites with which at least a part of the conventional lustrous carbon formers like sea coal and resins can be substituted. In the last ten years, the practicability of this system, named LE (low emission) technology, was proved in many foundries worldwide. In some foundries, the emission of volatile aromatics from the molding sand could be reduced by up to 85 %.

LE technology came to China in 2015, which aimed at supporting foundries to reduce auxiliary materials' addition, improve casting quality, low waste sand and BTEX emission. It proved: compared to traditional green sand process, LE green sand technology could reduce auxiliary material consumption by more than 10%, improve casting surface finish, low BTEX emission by more than 50%, which will bring the bright future for foundries. Second generation LE technology has been adopted in European foundries several years before, compared to the first generation LE

technology, which has more advantageous and value added for foundries. The 2nd LE technology was imported into Chinese market this year, which has been proved to have such benefits as lowing consumption, reducing even eliminating penetration defect through application in well known foundries.

In addition to the reduction of the emission, graphite acts as a kind of lubricant within the molding sand, which could increase green sand flowability to make more homogeneous compaction of the mold, related casting defects can be minimized.

14. Effect of gel time of 3D printing binder system on quality of sand mold/ core.

Yu ruilong, Shenyang Research Institute of Foundry Co., Ltd.

Abstract: This paper mainly introduces the application of 3D printing technology in casting industry. Ink-jet printing is the most widely used additive manufacturing technology in the foundry industry at present. More and more foundry enterprises have recognized it because of its high efficiency, good precision, and the advantages of free manufacturing. The expensive materials is the obstacle for widely application in China. SRIF has developed binders, activators and sand for 3D printing in two years' trial and error. This paper discusses the gel time on the quality of printed core and mold.

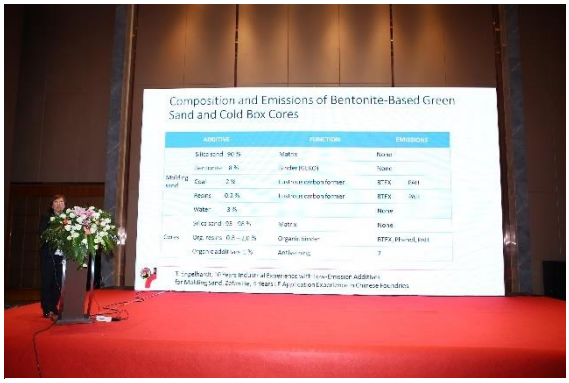
4.5.4. Planning for 2020 and expected final outcome

Planning:

(1) Secretariat of the committee will make an adjustment on the working members in 2020, Some members will be removed from the above list, and some new members will be added.
(2) Preparing for the 2021 WFO International Forum on Moulding Materials and Casting Technologies

Expected final outcome:

(1) Finish the adjustment on the working members.
(2) Confirm the site, date and theme of 2021 WFO International Forum on Moulding Materials and Casting Technologies.



With the theme Green Environmental Protection Moulding Materials and Advanced Casting Technology, WFO Moulding Materials Working Group hosted the 2019 WFO International Forum on Moulding Materials and Casting Technologies in Wuhan on October 28, concurrently with the 2019 China Foundry Congress

4.6. Non-Ferrous Alloys Working Group

March 2020

4.6.1. Brief description of the objectives of the Working Group

The **Non-Ferrous Alloys Working Group** is aimed to promote global technical exchanges on nonferrous materials of foundry industry; to organize technical conference on nonferrous materials periodically by which establish a platform for exchanging and cooperation, and enhance the global industrial influences of WFO.

4.6.2. Leader and participants

	Name	Organization	Country
Chairman	Su Yanqing	Harbin Institute of Technology	China
Secretary	Zhang Chunyan	Foundry Institution of Chinese Mechanical Engineering Society	China
Working member 1	Wu Shusen	Huazhong University of Science and Technology	China
Working member 2	Wang Deqing	Dalian Jiaotong University	China
Working member 3	Li Peijie	Tsinghua University	China
Working member 4	Nan Hai	AVIC Beijing Institute of Aeronautical Materials	China
Working member 5	Peng Liming	Shanghai Jiao Tong University	China
Working member 6	Qigui Wang	GM - Global Powertrain Engineering	USA
Working member 7	Mingdong Cai	Bodycote Testing Group Houston, USA	USA
Working member 8	Toshimitsu Okane	National Institute of Advanced Industrial Science and Technology (AIST)	Japan
Working member 9	Long Siyuan	Chongqing University	China
Working member 10	Ki Young Kim	Korea University of Technology and Education	Korea
Working member 11	Andrea Niklas	Engineering, R&D and Metallurgical Processes Department, IK4-Azterlan	Spain
Working member 12	Natalia Sobczak	Foundry Research Institute, Krakow Poland	Poland

4.6.3. Main activities and outcomes of the Group during 2019

The commission hosted the International Symposium on Nonferrous Alloys and Special Casting Technologies (ISNASCT-5) on July 15-16, 2019 in Shanghai, concurrently with the 14th China International Diecasting Congress.

The 5th International Symposium on Nonferrous Alloys and Special Casting Technologies and the 14th China International Diecasting Congress were concurrently held at Novotel Shanghai Clover on July 15 and 16, 2019. The event was co-sponsored by Chinese Mechanical Engineering Society (CMES), WFO Nonferrous Alloys Commission and WFO Diecasting Commision, co-organized by FICMES, China Foundry Productivity Promotion Center, the State Key Laboratory of Light Alloy Casting for High-end Equipment, and Shanghai Spaceflight Precision Machinery Institute.

More than 200 participants from well-known enterprises, universities, state key laboratories and industrial organizations, in the fields of die-casting and non-ferrous alloys casting, convened to share the achievements of new technologies, materials, processes and equipment. A total of 36 experts from different areas gave presentations on various topics of new materials, advanced casting technologies, computerization and automatic control were discussed at the 2-day exchange, covering the technical frontiers and hotspots in related fields, as well as analysis of development trends. Five speakers were appraised as the Best Speakers, they are Prof. Sun Jianfei of Harbin Institute of Technology, Prof. Huang Yuanding of Helmholtz-Zentrun Geesthacht, Mr. Sasaki Hideto of MINO Industry Co., Ltd., Prof. Dong Anping of Shanghai Jiao Tong University, and Jiao Xiangwei of Tsinghua University. This is the first time for this event to recommend best speakers, by which hope to encourage and attract more outstanding speakers.

4.6.4. Planning for 2020 and expected final outcome

Planning

(1) Secretariat of the commission will make an adjustment on the working members in 2020, Some members will be removed from the above list, and some new members will be added.
(2) Preparing for the ISNASCT-6 to be held in Shanghai in July 2020.

Expected final outcome

(1) Finish the adjustment on the working members.
(2) The secretariat of the Commission already started and will complete the preparations for the conference such as venue confirmation, call for papers, and speakers invitation in the first half of 2020.

The Working Group hosted the International Symposium on Nonferrous Alloys and Special Casting Technologies (ISNASCT-5) on July 15-16, 2019 in Shanghai, concurrently with the 14th China International Diecasting Congress

4.7. Training and Professional Development Working Group

April 2020

4.7.1. Brief description of the objectives of the Working Group

The **Training and Professional Development Working Group** is aimed to:

- Provide benchmarking of current provision in foundry specific education and training to assist the national foundry bodies support their members and foundries in raising knowledge and understanding of foundry processes and foundry technology.
- Develop database and provide sign-posting through WFO website for full and part-time foundry specific education and training programmes that are available with indicative qualification levels, target group and guided learning hours, provider and delivery language (ref FEANI).
- Facilitate collaboration and partnership for the development of training programmes by national foundry bodies that are relevant and current
- Support the national foundry bodies in promoting careers in the castings industry and increase visibility of the industry.

4.7.2. Leader and participants

Dr Pam Murrell FICME (UK) - Chair

José Javier González Estévez (Spain) - Secretariat

Franziska Kröger MSc (Germany)

Doug Kurkul (USA)

Dr.-Ing Ion-Alexandru Bacanu (Romania)

Conny Gustavsson (Sweden)

Kimberly Workman (Australia)

Sandy Majatladi & Isidore Kilongozi (South Africa)

Assoc. Prof. Zdenka Zovko Brodarac, PhD (Croatia)

Manini Phokwane Ramagaga (South Africa)

Tunçağ Cihangir Şen (Turkey)

S. Koray Hatipoğlu (Turkey)

Dr.Eng. Adel Nofal (Egypt)

Mitja Petric (Slovenia)

4.7.3. Main activities and outcomes of the Group during 2019

Webex working group meeting held in March 2019. One face to face meeting of the Working Group held during GIFA (kindly hosted by HA). Cloud storage facility was established and is in use, with relevant documents and reports uploaded for sharing with Members of the Working Group.

Dissemination of Information

The aims and objectives of the WFO Working Group have been shared with the European Foundry Association to enable a mutual haring of resources and best practice.

Presentation given during WFO Technical Forum during September 2019, in Slovenia on the aims and objectives of the Working group, as well as the initial results of the survey and future plans.

Foundry Training Provision

Survey of training provision - high level analysis completed and results reported to the Working Group Members.

The Group discussed how the information could be presented to Member Associations and others in the industry who were seeking information about technical training. It was agreed that the information would be presented via a simple searchable database on the WFO website.

A Project Brief was outlined for more detailed analysis of the survey responses: the group agreed that 'topic' was likely to be the most important search term that would be used. Then 'language' used for course delivery, 'course level' and 'duration'. The group further agreed that in order to simplify the task of analysis, e-learning courses would be considered first. The E-courses would be grouped by topic and those available in English would be included. In addition, all courses in English would be identified.

Each course was allocated a main topic key word, plus two further key words to enable a search to be carried out by an enquirer using the on-line database. Information about the course listings was provided to the WFO web complier and initial design discussion were held.

Careers Promotion

Promotional resources – to help promote casting as a career to new students and early career professionals: videos resources have been offered by, and shared with, working group members. Information about these resources have been provided to the WFO web complier and initial design discussions were held.

4.7.4. Planning for 2020 and expected final outcome

To continue the design and development of the two new areas on the WFO website – one on training provision and one on careers resources.

Finalising and checking of information to be presented on the website, including ease of use and search-ability.

Promotion and checking by Working Group Members.

Promotion to Member Associations.

Establishing protocols for updating.

Review and revision based on feedback.

Planning of any next steps.

Pictures from the Working Group meeting at GIFA2019

5. Final remarks

A yearly report is to be produced and shared in the WFO General Assembly Meeting, gathering the proceedings or any kind of additional value-added documentation from the different Working Groups.

The drafting of this report counts with the collaboration and the valuable feedback of the Chairmen of the active WFO Working Groups.

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