metals

MDPI

Editorial

Casting and Solidification Processing

Paolo Ferro

Department of Management and Engineering, University of Padova, Stradella S. Nicola, 2, I-36100 Vicenza, Italy; paolo.ferro@unipd.it

Casting is one of the most important shaping processes, largely used and consolidated throughout the world to produce near-net-shaping parts. The advantages, compared to other manufacturing processes, are evident: the relative low production cost and time, the high ranges of thicknesses and masses allowed, the possibility to shape alloys that are only castable (say, cast iron or certain light alloys), the high adaptability to the requirements of mass production, and, last but not least, the excellent bearing quality of the casted parts. However, all these advantages could be lost if the process parameters are not correctly calibrated to obtain near defect-free casting components. In most foundries, such parameters calibration is entrusted to experience rather than real knowledge of the rules governing the solidification phenomena. A comprehensive understanding of those rules is still unknown to the academic world and represents a formidable challenge in view of digitalization of the foundry industry.

This Special Issue collects 12 recent excellent research works [1–12] about casting and solidification processing to give the reader a good update of the actual knowledge about casting phenomena. New experimental, numerical, and analytical methodologies were proposed to investigate the intriguing relationship among alloy composition, casting geometry, and process parameters.

What will the foundry industry of the future look like? It is my opinion that smart data deriving from these rand future research works can help the modern foundry industry to take advantage of a real-time adjustment of process parameters through digitalization.

My hope is that the reader will find in this Special Issue new ideas for a modern foundry practice.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Prabhakar, A.; Papanikolaou, M.; Salonitis, K.; Jolly, M. Minimising Defect Formation in Sand Casting of Sheet Lead: A DoE Approach. *Metals* **2020**, *10*, 252. [CrossRef]
2. Lojen, G.; Stambolić, A.; Batič, B.Š.; Rudolf, R. Experimental Continuous Casting of Nitinol. *Metals* **2020**, *10*, 505. [CrossRef]
3. Yang, J.; Chen, D.; Qin, F.; Long, M.; Duan, H. Melting and Flowing Behavior of Mold Flux in a Continuous Casting Billet Mold for Ultra-High Speed. *Metals* **2020**, *10*, 1165. [CrossRef]
4. Liu, G.; Liu, Q.; Ji, C.; Chen, B.; Li, H.; Liu, K. Application of a Novel Chamfered Mold to Suppress Corner Transverse Cracking of Micro-Alloyed Steel Slabs. *Metals* **2020**, *10*, 1289. [CrossRef]
5. Guo, J.; Guan, Z.-P.; Yan, R.-F.; Ma, P.-K.; Wang, M.-H.; Zhao, P.; Wang, J.-G. Effect of Modification with Different Contents of Sb and Sr on the Thermal Conductivity of Hypoeutectic Al-Si Alloy. *Metals* **2020**, *10*, 1637. [CrossRef]
6. González-Yero, G.; Ramírez Leyva, R.; Mendoza, M.R.; Albertos, P.; Crespo-Lorente, A.; Alonso, J.M.R. Neuro-Fuzzy System for Compensating Slow Disturbances in Adaptive Mold Level Control. *Metals* **2021**, *11*, 56. [CrossRef]
7. Ren, X.; Tang, S.; Fu, H.; Xing, J. Effect of Titanium Modification on Microstructure and Impact Toughness of High-Boron Multi-Component Alloy. *Metals* **2021**, *11*, 193. [CrossRef]

check for updates

Citation: Ferro, P. Casting and Solidification Processing. *Metals* **2022**, *12*, 559. https://doi.org/10.3390/met12040559

Received: 1 March 2022
Accepted: 22 March 2022
Published: 25 March 2022

8. Tian, Q.; Deng, K.; Xu, Z.; Han, K.; Zheng, H. Microstructural Characterization and Mechanical Property of Al-Li Plate Produced by Centrifugal Casting Method. *Metals* **2021**, *11*, 966. [CrossRef]
9. Gandolfi, M.; Xavier, M.G.C.; Gomes, L.F.; Reyes, R.A.V.; Garcia, A.; Spinelli, J.E. Relationship between Microstructure Evolution and Tensile Properties of AlSi10Mg Alloys with Varying Mg Content and Solidification Cooling Rates. *Metals* **2021**, *11*, 1019. [CrossRef]
10. Cao, J.; Zeng, Z.; Zhang, F.; Guo, D.; Hou, Z. Effect of Cooling Rates on the Local—Overall Morphology Characteristics of Solidification Structure at Different Stages for High Carbon Steel. *Metals* **2021**, *11*, 1291. [CrossRef]
11. Pereira, R.P.D.A.; Almeida, G.M.D.; Salles, J.L.F.; Cuadros, M.A.; Valadão, C.T.; Freitas, R.O.D.; Bastos-Filho, T. A Model-Based Predictive Controller of the Level of Steel in the Mold with Disturbances Using a Repetitive Structure. *Metals* **2021**, *11*, 1458. [CrossRef]
12. Wolff, N.; Hohlweck, T.; Vroomen, U.; Bührig-Polaczek, A.; Hopmann, C. Development of an Experimental Setup to Investigate Influences on Component Distortion in Gravity Die Casting and a First Variation of Temperature Control Strategy. *Metals* **2021**, *11*, 2028. [CrossRef]