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Editorial

Alloy Steels

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Since their invention in 1865, alloy steels have found broad application in multiple industries; the automotive, aerospace, heavy equipment, and pipeline industries to name a few. Alloy steels include a tremendous variation in alloying content. They range from the 1–2 wt. % Cr or Ni in some low alloy steels to the 15–18 wt. % Cr content of many stainless steels. The topic of alloy steels contains both the common 4140 and 316 alloys to more exotic alloys such as the Hadfield steels. These steels can form a wide variety of microstructures such as pearlite, bainite, or martensite, which result in an equally broad range of properties. It is this range that has made them useful to so many industries. In some cases, these are the only steel alloys that can provide the required combination of properties. Their use in the automotive industry has been key to the development of safer vehicles and improved fuel efficiency. Our modern world would not be possible without the advanced alloy steels employed to safely transport oil through pipelines. Therefore, continued development is necessary to expand markets, improve products, and enhance the human condition. It is this importance that has lead us at *Metals* to create the special issue on alloy steels that you are reading. What follows are 23 papers from a wide range of authors and nationalities which represents the current state of the art in alloy steel research.

This issue, like alloy steels themselves, covers diverse set of articles. There are articles on manufacturing, microstructure, heat treatment, corrosion, and service conditions. This expansive range reflects the multifaceted nature of alloy steels. Even the individual areas are extensively represented. In manufacturing, there are articles on the effects of welding [1–4], electroslag remelting [5,6], and rolling [7–9]. As is typical in any discussion of steels, many papers focus on microstructure–property relations [10–14]. These form the basis for improving the alloys and their processing. Another large section of work focuses on topics of more interest to those who are the final customers of the steel industry. Many alloy steels are heat treated and understanding the effects of heat treatment and heat treating parameter selection ensure the correct microstructure and properties are attained. Readers will find these topics addressed by several authors in our pages [10,15–18]. Those readers interested in improving the corrosion resistance of alloy steels will find several pieces on this topic [2,19,20]. An aspect often ignored by many journals is performance under actual service conditions in the final product, there are two articles on wear resistance and pipeline life that remind us of the importance of understanding the final product [21–23]. Data from the final products created from these steels always provide a powerful insight which the best labs can never replicate, and their inclusion in this special issue is a significant contribution to this special issue.

Of particular interest to the readers of *Metals* should be the excellent review article by Mohammed et al. that presents a wide review of welded austenitic and duplex stainless steels [3]. Their work covers the effects of heat input on the microstructure, corrosion resistance, and mechanical properties of this diverse class of steels. Mohammaed et al. also review the current state of stress corrosion cracking work. They distill the results of over 140 papers in the field of stainless steels and deliver an accurate view of our current understanding of these alloys. Readers will find this an invaluable asset in building their understanding of these technical issues. The bibliography alone is worth reading this article.

As can be seen from the topics in this special issue of *Metals*, the broad world of alloy steels remains a current area of research and innovation. My goal as editor at the outset of this issue was to include papers covering the large variety of research and industrial work being done to address the challenges facing alloy steels. While it is impossible to cover everything in a single issue, this issue provides the reader with an excellent understanding of the modern problems needing solutions to create the alloy steels of the future. Hopefully, the readers will find it as enlightening as everyone here at *Metals* believes.

Being my first time as an editor, I would like to thank the staff at MDPI and *Metals* for their help. In particular, I appreciate the fine editorial assistants and the managing editor for assisting me in this. They guided me through the process and helped me understand my options with reviews. I hope I correctly balanced the request of our reviewers and the needs of our authors in creating as fair a peer review process as possible. I want to thank all our reviewers for the tireless efforts in examining and commenting on our papers. This effort is always key to a successful journal. All of the authors also deserve recognition for their contributions and tireless work to promote alloy steels. Finally, I would like to thank you the reader since without you there would be no need to write papers or publish regular issues, let alone special issues.

Conflicts of Interest: The author declares no conflict of interest other than his own passion for alloy steels and their development.

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