Organizers

6th HMnS
High Manganese Steel 2024

# 6th International Conference on Medium and High Manganese Steels

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Hong Kong Convention and Exhibition Centre



## E-PROGRAMME

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## Invited Lecture

# Holistic Alloy Design of MMnS for Presshardening - Increasing the Scope by the Environmental Perspective

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Medium manganese steels (MMnS) with relatively low manganese concentrations (4-5 wt.%) are the most promising candidates for industrialisation. These alloys are especially interesting for press hardening, as in comparison to the currently used manganese-boron steels, MMnS enable lower austenitization temperatures, which will lead to energy savings and reduced CO2-emission. However, due to the transformation kinetics, the process window for the reheating temperature is rather low, which might cause problems during industrialisation due to large variations in achieved phase fractions and final properties. Unfortunately, the high additions of alloying elements increase the environmental impact in comparison to the reference steels, which offsets the savings from the modified process.

This investigation presents a design approach to widen the process window by alloy design. For this matter, CALPHAD methods are combined with life cycle assessment (LCA) approach to directly analyse the environmental impact of potential compositions. It is demonstrated that a broadening of the process window for intercritical annealing can be achieved by adjusting the chemical composition. In addition, the material design is amended by analysing the translation of the environmental dimensions, already considered in the laboratory phase, to the industrial scale.

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