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THE PIVOT ROLE OF MODELLING IN PROBLEM-SOLVING ISSUES IN CONTINUOUS CASTING OF STEEL: A PROJECT CLUSTERING EXPERIENCE IN THE EUROPEAN PROGRAMMES FRAME

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Problem-solving in industrial processes relies on the adequate development and use of tools able to get insight and improved knowledge and know how on the phenomena behind the occurrence e.g, of factors affecting production quality and productivity. In steel production, this gains particular importance due to the need of following the increasingly severe market request and the unavoidable sustainability needs for producers –economic and environmental. To this scope, process control tools, supported by adequate sensoring in a digitalised and AI-based framework, are of outmost importance and increasing use.
A backbone for the process control architecture, when aimed at setting up tools for process management as digital twin working off- and online, is a reliable description of the phenomena behind the process, based on a validated modelling. In this view, continuous casting of steel shows a multi-fold approach based on single issues, as steel flow, solidification, heat transfer, behavior of oxides dispersed in steel, or integrating them into a complex and Multiphysics architecture. A significant number of these activity were funded by European programmes grants, allowing as outcome an improved knowledge enabling a more efficient development of tools supported by sensoring on-field able to process management, quality control and support decision. An example is given in this contribution, where it is shown the pivot role of modelling in continuous casting, allowing to fundamental knowledge and problem-solving (headlines of METACAST project), the approach joint to process monitoring to a definition of a digital twin for quality control minimizing defects (SUNSHINE) and another (SHELL-CRACK) where the modelling approach is used jointly with lab activities and hardware products to better drive their use and to ensure problem solving as well as regards to as-cast surface quality enhancement. All of these are funded by the European Research Fund For Coal and Steel Programme (RFCS).

Primary author: DE SANTIS, Michele (Rina Consulting - Centro Sviluppo Materiali SpA)

Co-authors: Dr GRUBER, Christine (K1-MET); Dr MIER VASALLO, Diana (Sidenor I+D); Dr MARX, Kersten (BFI); Dr KOESTER, Marc (BFI); Dr EGIDO PEREZ, Nora (Sidenor I+D); Dr DI PIETRO, Orlando (RINA Consulting - CSM); Dr RAMIREZ LOPEZ, Pavel (SWERIM)

Presenter: DE SANTIS, Michele (Rina Consulting - Centro Sviluppo Materiali SpA)

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