Trends in Numerical Simulation of Foundry Processes

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ESI Group as a pioneer in development of software for virtual prototype tests develops a unique global solution called "Virtual Try-Out-Space" (VTOS) – a virtual testing space. This medium enables continuous improvement of a product during engineering design, prototype manufacture and production. It will enable computer simulation of real behavior of many physical and mechanical phenomena. This complex solution replaces expensive physical prototypes with a computer model of physical reality. ESI Group uses the latest knowledge of material science with the aim of replacing slow tests and detecting deficiencies of real prototypes. In the field of technological processes the firm offers simulations of casting, forging, welding and heat treatment processes. Today's dynamic world requires quick responses to customer needs. New processes and technologies are designed, verified and implemented to the casting production in order to comply with demand of higher casting quality. Numerical simulation responds to these changes by new physical models creation. The major focus of the casting modeling industry has always been related to the solidification and fluid flow related defects like, macro-shrinkage, oxide, air entrapment prediction. The casting process however is only one step of the entire manufacturing process. The casting sequence involves upstream steps like gating and die design operations and downstream steps like trimming, heat treatment, forging and machining operations that will determine the main properties of the component. As the consequence these different steps will also influence the effective performance of the part once assembled in the final product and submitted to the real conditions of use. This presentation provides an overview of the latest developments, driven by requirements from the industry with a focus on prediction of part properties and product performance through an overall process chain.

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