Modeling and Simulation of Macrosegregation Induced by Thermomechanical Deformation in Steels

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December 2014

Contents

Introduction

Metallurgical processes have known a great evolution during the last 60 years. The advancement is attributed to research disciplines, like physical metallurgy, which investigated a great deal of solidification-related phenomena. Nowadays, metallurgists and physicists seek to understand deeper the connection between the different scales involved. From the nucleation theory to the mechanical behavior of metals, an chain of intricate phenomena occur in a such a way to create defects in the final product. This has been seen in casting processes like continuous casting and ingot casting. Suface and volume porosity, hot tearing and composition heterogeneities are known defects to the casting community. As far as the current project is concerned, the last defect, widely known as macrosegregation, is the subject of our interest.

Industrial Worries

- Talk about total steel production, variations over the last few decades
- Quality constraints for many applications thats require steel like construction, nuclear engines ?
- Difficulties to meet these constraints and what are the present solutions

CCEMLCC contribution

- some words about this ESA project
- in what ways does this project tries to alleviate the aforementionned problems ?
- academic and industrial partners and how does each of them contribute actually

Chapter 1

Bibliographic Study

In this chapter, a review on macrosegregation in solidification is presented.

Contents

1.1 the first section

[**?**] are going to appear in the paper

1.2 a second section

en fait ce mode est testé pour voir si les accents genre é è et î sont visibles

Bibliography

[] Tommy Carozzani, Charles-André Gandin, Hugues Digonnet, Michel Bellet, Kader Zaidat, and Yves Fautrelle. Direct simulation of a solidification benchmark experiment. *Metallurgical and Materials Transactions A*, 44(2):873–887, February 2013. ISSN 1073-5623, 1543-1940. doi: 10.1007/s11661-012-1465-1. URL http://link.springer.com/article/10.1007/s11661-012-1465-1.