Prediction of Rolled Steel Properties

INTRODUCTION

The prediction of rolled steel properties can be done in various levels, with different accuracy and different cost. (1) Simple solution: Use TTT-diagrams in connection with rolling/cooling temperature practice. (2) Medium level solution: TTT-diagram plus temperature process together with a modification from strains and strain rates in the deformation history. For example, Zener-Holloman parameter Z is a typical modification of temperature from strain rate. (3) Medium-high level solution: To determine final grain size based on the deformation history and cooling history as well as chemical composition, and to determine the mechanical properties based on the final grain size and chemical composition, etc. The mechanical properties can also be determined through a combination of the microstructure simulation for ACC and a system learning for the grain size at the entry of ACC, etc. (4) High level solution: fully temperature and microstructure simulations throughout the production history from reheating, rolling, ACC, and maybe also air cooling. This is to track the phase structure and grain size from slab to the final product, so that the final properties can be much more accurately determined.

In the following sections, two proposals are given based on the medium-high level solution and the high level solution mentioned above.

PROPOSAL 1: CALCULATION WITH GRAIN SIZE AND COMPOSITION

Properties at Room Temperature

Calculation of Yield Strength

Calculation of Tensile Strength

PROPOSAL 2: WITH MICROSTRUCTURE SIMULATION

Structure-Property Relationship

Transformation Model during ACC

Deformation Model during Rolling

Precipitation Model

INTEGRATION TO THE CURRENT LABORATORY AND LEVEL 2 SYSTEMS

(For the full content of the proposals, please make a request to bli@metalpass.com. We need a description of your project or potential project for half a page including your name of business, address, phone, fax, email, URL of your website, scope of your project, problem to be solved, and expected length of the project, etc. Thank you in advance for your submission. We promise that the information you submitted is only for the purpose of the described project. We reserve the right to deny any request for any reason. Metal Pass LLC.)