



# HSMM

## Hot Strip Mill Model

The **Hot Strip Mill Model (HSMM)** is the steel industry's leading off-line, PC-based model that allows you to simulate the complete steel rolling process for your hot mill. With the ability to model a variety of steel grades and products, you will achieve a deeper insight into your mill's operations to enable you to optimize production and conduct what-if analysis studies to reduce your costs and improve your quality. An extensive verification and validation program for the HSMM has proven that the HSMM provides reliable **thermal, flow stress, microstructure and final mechanical property results (YS, TS)** for a wide range of mill configurations and products.

### The HSMM saves you time and money!

By using the HSMM, increased productivity can occur and significant savings can be realized in process improvement and product development. For example, as shown in the table below from the HSMM, the HSMM helps you quickly develop and evaluate options for new or existing products to achieve a desired result.

Summary Results History					
Time Stamp	Comment	Ferrite GS Mid (µm) [Single]	Total UTS Mid (MPa) [Single]	Finish Temp Mid (°C) [Single]	Coiling Temp Mid (°C) [Single]
2/12/2004 2:49 PM	Base Case (HSLA Steel)	3.0	573.4	916.8	621.3
2/12/2004 2:50 PM	Base + Add Nb and Ti	3.0	619.7	916.8	621.3
2/12/2004 2:50 PM	Base + Reduce Finish Speed	3.1	582.7	881.3	543.8
2/12/2004 2:51 PM	Base + Add ROT Headers	3.0	580.3	916.7	547.4

By implementing a more structured product development program with the HSMM, you can reduce the number of product trials needed thus avoiding unnecessary costs. Saving just one 25-ton coil per month at \$350 per ton translates into an **annual savings of \$105,000 per year**. By using the HSMM to optimize rolling schedules, you can minimize downgrades **saving thousands of dollars per month**.



Photo Courtesy of United States Steel Corporation

### Customer Testimonials

Stelco uses the HSMM to assist in designing their development trials, including which cooling headers to use and the rolling speed. Using the HSMM rather than slabs has been *"very successful"* and saves time and money. **Keith Barnes, former Research Manager, Stelco**

The HSMM was used to set-up our trials for the development of dual-phase steels rolled on the hot mill. The HSMM proved to be *"hugely helpful"*. **Confidential Client**

For **More Information** please visit the INTEG website at [www.integpg.com](http://www.integpg.com) or by phone at 724-933-9350 x10.

### Live WEB DEMO

A live Web Demo is available upon request. Our experts will discuss how the HSMM can help you.

### 30-Day DEMO

A full functioning copy of the HSMM is available for use for 30 days for qualified users. Full support provided.

### PRICING

The HSMM is typically sold as individual copies. This includes a perpetual license, full documentation, two-day training class at INTEG with the first copy, and full support and upgrades for 1 year. Contact us for pricing on multiple copies and source code options.



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# HSMM Features

The HSMM can be utilized for simulations and studies for a variety of hot rolling operations, allowing you to model any or all of the following parameters:

## o Mechanics of Rolling

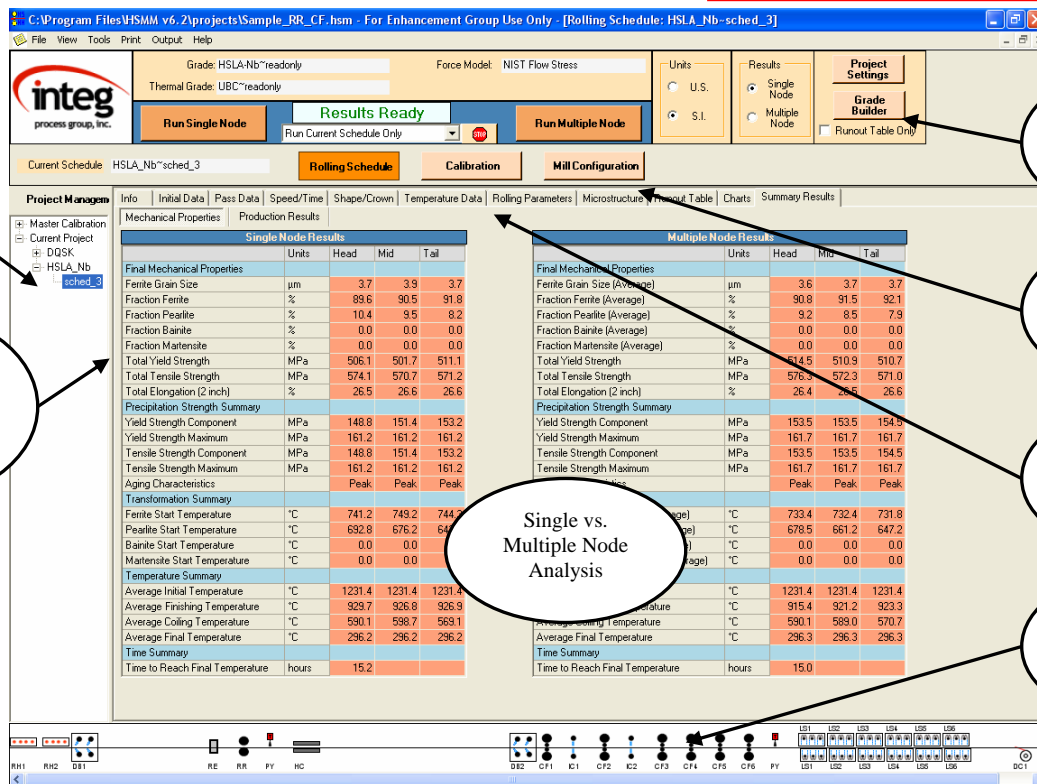
- **Temperatures** – radiation, water loss, work roll conduction, mechanical working – Low Coiling Temperatures
- **Rolling Loads** – rolling forces (flow stress), rolling torques, motor current, motor power
- **Roll Bite Parameters** – draft, percent reduction, bite angle, roll bite lubrication
- **Limits** – edger buckling, bite angle
- **Quality** – strip profile and flatness (shape)

## o Microstructure/Mechanical Properties

- **Microstructure Evolution** – Transformation, grain size, precipitation
- **Mechanical Properties** – Yield Strength, Tensile Strength, Elongation
- **Grade Selection/Enhancement** – Grade Builder
- **Flexibility** – User defined algorithms

## VALIDATED AND PROVEN

The HSMM was validated and proven using a variety of samples from multiple steel companies covering a range of mill configurations, rolling speeds, finishing temperatures, coiling temperatures and grades of steel. Excellent agreement was obtained between actual values and predicted values for temperatures, forces and final mechanical properties.



Easy Project Management

Experience the Power of Grade Builder

Configure Your Own Mill Easily

User Friendly Data Entry and Viewing

View Your Mill Configuration

Single vs. Multiple Node Analysis

Calculates Ferrite, Pearlite, Martensite and Bainite Transformation

For **More Information** please visit the INTEG website for additional articles or to contact us.

[www.integpg.com](http://www.integpg.com)

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## PC Minimum Requirements

Hardware:

- o Processor - 500MHz
- o 256 MB RAM
- o CD-ROM
- o 200 MB of available hard disk space

Operating System (any of the following):

- o Microsoft Windows 98, NT 4, 2000 or XP



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