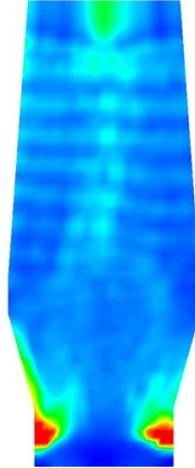


## TU Delft - M2i Develops Virtual Blast Furnace Model



**M2i—the Materials Innovation Institute** in cooperation with Group of Metals Production, Refining and Recycling from Delft University of Technology and Tata Steel R&D (IJmuiden).

TU Delft and M2i use EDEM® virtual prototypes in the R&D of iron and steel processes.

[www.m2i.nl](http://www.m2i.nl)

[www.mse.tudelft.nl](http://www.mse.tudelft.nl)

<http://www.tatasteeleurope.com>



### Challenge

It is nearly impossible to observe or conduct direct measurement in an operating blast furnace due to:

- hostile internal conditions
- large internal volume
- packed-solid load
- the complexity of the system: high temperature, counter-currents, and multi-phase flow

This makes it difficult to predict internal states of the iron-making blast furnace, creating an obstacle to optimizing blast furnace performance.

The Steel Industry needed an accurate, physics-based computer model capable of simulating particle movement and interactions within the blast furnace environment.

### Solution

Using EDEM with the EDEM CFD Coupling for Ansys Fluent allowed TU Delft - M2i to develop a **virtual blast furnace model**.

TU Delft - M2i was able to simulate:

- layering of charge materials
- realistic solid burden flow
- particle residence times
- interaction of ascending reduction gas with descending particles
- particle-gas heat transfer

EDEM-CFD co-simulation provided visualization and analysis of the downward migration of layers, cohesive zone shape, “deadman” development, and particle interaction with other particles and the blast furnace walls.

### Benefits

EDEM simulation & analysis have helped TU Delft - M2i increase their general knowledge of the iron-making process.

Though the scale and complexity of the process is hard to capture in physical experiments, **virtual testing allows for on-going model calibration**.

The virtual blast furnace model allows researchers to perform more realistic parameter studies **without interrupting productivity at an operating blast furnace**.

Using EDEM technology this industry-academic consortium is ensured of continued development and expert support.

**TU Delft - M2i researcher creates virtual blast furnace. Accurate physics-based model enables virtual parameter studies.**

*“EDEM has allowed us to start directly simulating the blast furnace. The EDEM CFD Coupling is critical to our project. EDEM software has been improving both speed and functionality since we began using it 4 years ago. EDEM delivers excellent results and shows great potential.”*

**Allert Adema, PhD Researcher, M2i-TU Delft (now blast furnace technologist at Tata Steel, IJmuiden, The Netherlands)**