

## Level 2 Automation – between Hot DRI and EAF steelmaking production



**BSE applies its comprehensive process know-how by introducing an automated coordination / charging system between Hot DRI and EAF production facilities**

Lion Steel, Malaysia, was looking for a solution to firstly coordinate the Hot DRI (HDRI) distribution from its newly built DRI plant to the three Electric Arc Furnaces and secondly to control the direct HDRI charging into the three EAFs (Megasteel 1 & 2 and Amsteel 2). As the hardware supplier of the HDRI system was not able to deliver the process intelligence, BSE was asked to link this new system up with the furnace process at the 3 EAFs.

### THE APPROACH – WHY HDRI CHARGING?

HDRI charging into the EAF is an additional source of energy and raw material. HDRI shall be charged directly after production to the EAF in order to utilize the energy. The trick lies in monitoring the process status of the responding EAFs as of when to send the filled vessels with HDRI in order to arrive at the right time for charging. The filling, transport and charging of HDRI has to be done in a non-oxidizing atmosphere due to the fact, that HDRI starts burning when getting in contact with air (Oxygen).

The challenge of the project was to establish the data interfaces to all involved systems; starting with the DRI plant via EAF PLCs, the EAF Level 2 systems and the overall Management Information System (MIS).

### HDRI COORDINATION SYSTEM

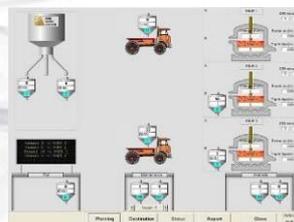
With the Hot DRI coordination system the coordinator got a tool to see the status of the three EAFs and the HDRI production at a glance. The production coordination office is the logistical centre of the steel plant with its 3 EAFs and the rolling mills. The decision, where to send the next vessel is made by the system under consideration of the production planning, the status of the EAF and the vessels already in circulation.

The vessel distribution is made with heavy load trucks. The truck drivers get their instructions via a large scale display that is located in the HDRI filling bay. The displayed instructions are sent directly from the HDRI coordination system.

The system collects and sends the actual EAF process data, the HDRI production and vessel filling system via newly established data links.

BSE engineered the new network connections and interfaces of the different networks at the Lion Steel facilities.

The system itself is based on a server system with Oracle database. The application software was developed with DotNet 2003. Both systems are already in use at Lion Steel, that means the IT department is capable to service and maintain the system by themselves.



### HDRI CHARGING SYSTEM

The HDRI is charged directly out of the vessels (capacity 40t) via a covered conveyor belt into the EAF. The charging system has two vessel stands in order to have an uninterrupted charging of HDRI. Each stand is equipped with a weighing system and slide gates.

BSE delivered the control and visualization system for the fully automatic charging of HDRI. At Megasteel Siemens S7 PLCs were used, while at Amsteel 2 a Mitsubishi Melsec PLC was used. This setup was necessary as the two steelplants have different standards for PLC equipment. The HMI was done with Wonderware Intouch. The new screens for the HDRI charging were integrated into already existing HMI systems. The feeding rate of HDRI is controlled by a power profile and is automatically adapted to the actual power input. Oxygen content of the covered system is monitored and controlled with Nitrogen purging.

### RESULTS / SUCCESS

The system was commissioned middle of 2008. As soon as the DRI plant started to produce HDRI the filled vessels could be automatically discharged into the EAFs

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