



# Ironmaking Course

## 13th to 16th May 2019

### COURSE OVERVIEW

The ironmaking course provides an in-depth overview of the blast furnace process and raw materials considerations. The presentations are a combination of theoretical, practical and operational aspects. A key part is the group work using a process options model to investigate the effects of process and material changes on cost. The course structure facilitates detailed discussion? (lower attendance than McMaster). (The material and format is based on a long successful series of ironmaking courses run by British Steel?)

#### COURSE ORGANISER:

Peter Warren – Former technical manager at Redcar Blast Furnace with over 25 years of ironmaking experience at Redcar, Scunthorpe and within British Steel research.

#### WHO SHOULD ATTEND

- > Manufacturing and Operations Supervisors and Managers
- > Technologists
- > Engineers
- > Researchers

#### CONTENT

- > Overview of the current world scene and future of blast furnace ironmaking
- > Raw materials preparation – coke oven, sinter and pellet plant operations
- > Selection and characterisation of coking coals, ore fines and PCI coals
- > Blast furnace process
- > Blast furnace process control
- > Burden distribution
- > Cast House Operations
- > Challenging operations and cost reduction opportunities
- > Blast furnace refractories
- > Slag markets and requirements
- > The Steelmakers' requirements
- > Blast furnace design

#### GROUP PROJECT

Small groups will use the process options model to evaluate the effects of raw material and process changes on the cost of liquid steel. This will consolidate the learning from the lectures and will demonstrate the concept of value in use for raw materials.

#### LEARNING OUTCOMES

The course will provide the delegates with an in depth knowledge of the blast furnace process, an overview of the upstream processes, and understanding of ironworks costs and constraints.

#### SPEAKERS

The course will be delivered by experienced personnel from both operational and technical backgrounds selected from MPI, Tata Steel, raw materials supply, slag use, plant building and refractories consultancy.

#### ORGANISATION/REGISTRATION

Materials Processing Institute  
Eston Road  
Middlesbrough, TS6 6US  
United Kingdom  
Tel: + 44 (0)1642 382000  
email: [training@mpiuk.com](mailto:training@mpiuk.com)  
Website: [www.mpiuk.com/training](http://www.mpiuk.com/training)

#### COURSE VENUE & FACILITIES

The course will be held at the Materials Processing Institute, Middlesbrough, United Kingdom.

#### COURSE PRICE

£870 + VAT / Subject to availability.  
This price includes lunches and refreshments.

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## COURSE PROGRAMME

### Monday 13th May 2019

- 10:00 Arrival, reception and refreshments
- 10:15 Introduction to course and facilities
- 10:30 **Keynote address - the world scene and the future of blast furnace ironmaking**
- 11:00 **The blast furnace process - chemistry, heat and mass balance, gas and liquid flows, cohesive zone, dead man. Part 1.**
- 12:15 Lunch
- 13:00 **The blast furnace process - Part 2.**
- 13:45 **Introduction to the Project and Project Work.**
- 14:45 Break
- 15:00 **Coking coal selection, coke oven operation and the role of coke in the blast furnace.**
- 16:30 Break
- 16:45 **Steelmaking requirements for the blast furnace – chemistry specification, impact of variable quality, through cost optimisation.**
- 17:15 End of Day One.

### Tuesday 14th May 2019

- 09:00 **Sintering and pelletising plant operation and requirements**
- 10:30 Break
- 10:45 **Ferrous raw material selection, characterisation, testing - standard and specific, quality requirements. World market trends.**
- 12:15 Lunch
- 13:00 **Project work**
- 14:30 **Selection of PCI coals - value in use, combustion testing, char reactivity, blending.**
- 15:30 Break
- 15:45 **Refractories requirements and performance - cast house runner, clay, hearth and stack lining.**
- 17:15 End of Day Two

### Wednesday 15th May 2019

- 09:00 **Burden distribution to control gas distribution - charging systems, control of fines, segregation, layer shape, layer thickness, use of probes.**
- 10:30 Break
- 10:45 **Cast house operations - runner and equipment requirements, impact of clay quality, casting regimes.**
- 12:15 Lunch
- 13:00 **Project work**
- 14:30 Break
- 14:45 **Slag markets and requirements - physical and chemical.**
- 15:30 Break
- 15:45 **Blast furnace design - cooling systems, hearth, profile, campaign life, interim repairs.**
- 17:15 End of Day Three

### Thursday 16th May 2019

- 09:00 **Blast furnace process control and tuyere injection - standard procedures for aerodynamic and thermal control, considerations for tuyere injectants.**
- 10:30 Break
- 10:45 **Challenging operations and low cost opportunities - procedure to recover from severe instability, cost reduction opportunities in a depressed market**
- 12:15 Lunch
- 13:00 **Project review**
- 13:45 **Course review and feedback**
- 14:00 Depart

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