ABB Ability™ Smart Melt Shop
Enabling connected, autonomous & optimized operations

- 4–5% higher casting speed
- 5% less arcing per heat
- Payback within 6 months
Industry-first smart factory solution for steel melt shops

ABB Ability™ Smart Melt Shop is a unique solution that enables steelmakers to take meaningful steps towards the fully connected and autonomous melt shop. By connecting and tracking all moving ladles, cranes and transfer cars in real time, and providing advanced algorithms to synchronize operations, this system allows steelmakers to optimize ladle and crane movements and improve melt shop productivity, energy-efficiency and safety.

Customer need/background
Steel melt shops involve multiple material movements and high energy demand. Batch operations can vary depending on the operator. Personnel often have no system for real-time visibility of ladle movements, so operations rely heavily on manual coordination between crane operators and ladle processing facilities. Higher superheat is maintained to avoid delays, resulting in production loss at the caster and overall thermal losses.

ABB solution
ABB Ability™ Smart Melt Shop is the first solution of its kind in the metals industry, designed to connect all melt shop equipment for safer, more autonomous and efficient operations including increased superheat compliance enabling 4–5% higher casting speed, increased cost and energy-efficiency by reducing arcing in ladle furnace by 5 °C per heat, resulting in payback within just 6 months.

Based on advanced digital algorithms, the new solution is unique in that it offers not only powerful real-time ladle tracking but also automated crane scheduling and a predictive thermal modeling engine. The tracking engine follows ladle movement via cranes and transfer cars in real time. Radar and laser positioning technologies provide accurate visualization while reducing hardware footprint and maintenance needs compared to RFID-based solutions. The automated crane scheduling includes job forecasting, route planning and automatic acknowledgement of jobs.

Values unlocked and realized at JSW Steel Ltd.
ABB Ability™ Smart Melt Shop has improved productivity and energy-efficiency at JSW Steel Ltd.’s steel melt shop at their Dolvi Works in Maharashtra state, India. These efficiency gains are expected to increase the company’s annual EBITDA profit by $2MUSD through 4% higher caster speeds, time savings of one working day per month and additional output equating to 24,000 tonnes of steel per year. Read the full story here.

“We relied on the metallurgical expertise of ABB’s Metals team as they proved to us that this digital solution could be integrated into our complex plant with its diversified operational procedures.”

JSW Steel Ltd.
Real-time visualization
The tracking engine follows ladle status via cranes and transfer cars in real time via intuitive dashboards. Image processing is used for ladle identification, laser-based technologies are used to identify transfer cars and radars are used for crane positioning. The result is accurate visualization with greatly reduced hardware footprint and maintenance needs compared to RFID-based solutions.

Optimal crane scheduling
The scheduling engine acts as a consolidated schedule display and crane operator cockpit. It allows for more effective crane management by using historical and real-time production data to automatically plan routes, including precise pick-up and drop-off times, and both forecast and acknowledge crane jobs. Ladle scheduling data can be used as the basis of service planning, thereby eliminating unnecessary maintenance.

Heat loss prediction
The heat loss prediction module uses the scheduling engine to forecast ladle movement in the near future, and the tracking engine to access ladle thermal history in the recent past, in order to accurately predict thermal loss during ladle transfer to the caster. It also optimizes and recommends lift temperature to the ladle furnace operator to avoid excess overheating. The resulting increase in superheat compliance enables casters to run at optimum speed and improves both productivity and energy-efficiency.

Main features
- Real-time visibility of ladles, cranes and transfer cars position via intuitive dashboards
- Accurate tracking using image-processing, radar and laser identification technologies
- Low hardware footprint & maintenance by using wireless, non-RFID-based tracking technologies
- Automatic crane management including job forecasting, route planning and job acknowledgement
- Heat loss & lift temperature prediction using forecast data from tracking & scheduling engines
- Reports & KPIs enable performance analysis from individual work order to overall effectiveness
- Powerful, reliable data storage at customer site using ABB Historian
- Compatible with ABB & 3rd party systems by using all standard communications protocols
- Extendible to features of crane system asset management
- Fully scalable solution available for ladles, torpedoes, slag pots, scrap buckets etc.
- Cyber-secured data thanks to ABB’s multi-layered defense-in-depth approach
### Benefits

ABB Ability™ Smart Melt Shop provides the following benefits as well as payback within just 6 months:

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<th>Productivity</th>
<th>Energy efficiency</th>
<th>Safety</th>
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<tbody>
<tr>
<td>4–5 percent increased</td>
<td>5 °C less arcing per heat in ladle furnace using thermal models to accurately predict target temperature</td>
<td>Increased safety with less footfall in hot zones which would otherwise be needed to manage ladle and crane movement</td>
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<td>casting speed due to better superheat compliance</td>
<td>Reduced tapping delays, i.e., in EAF or converter due to more efficient scheduling of cranes for ladle movement</td>
<td><strong>Safety</strong></td>
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<td></td>
<td>Less material rejection due to incorrect temperature at destination</td>
<td><strong>Safety</strong></td>
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<td></td>
<td>Better ladle management and maintenance planning thanks to access to historical data on all movements</td>
<td>Increased safety with less footfall in hot zones which would otherwise be needed to manage ladle and crane movement</td>
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<td></td>
<td>Improved decision-making thanks to real-time availability of actual heat loss information</td>
<td>Increased safety with less footfall in hot zones which would otherwise be needed to manage ladle and crane movement</td>
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<td></td>
<td>Increased manpower productivity since no manual intervention or acknowledgement is required</td>
<td>Increased safety with less footfall in hot zones which would otherwise be needed to manage ladle and crane movement</td>
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For contact details please visit our website: www.abb.com/metals