

Figure ES-4. Eighteen Top Priorities for MSV for Steel Optimization

Workplace Safety			
Virtual Safety Training for Improved Workplace Safety – Comprehensive training library and tools for operators based on common failure scenarios			
Energy Efficiency			
Optimization of Steel Mill Energy Efficiency – Tools to optimize energy efficiency in core processes, powerhouse boilers, and gas recovery	3D Integrated Blast Furnace MSV Capability – Rapid, 3D capability to improve fuel efficiency and enable fast optimization of furnace operations	Optimized Blast Furnace Fuel Injection – Raceway model to optimize fuel injection via comparative analysis of injectants and process conditions	Reduction in Energy Losses between Core Processes – Simulations to analyze energy/heat losses and prioritize optimization
Production Efficiency			
Improvement of Control Strategies for the Strip Steel Run-Out Table – Hardware-in-the-loop simulator to improve performance and resource efficiency of the run-out table cooling system	Simulation and Optimization of Alternative Ironmaking Processes – Models/tools to optimize alternative/ emerging ironmaking processes toward lowest resource requirements	Modeling of Steel Cleanliness Practices for Low-Temperature Cast Steel – Modeling/visualization to improve cleanliness and overall efficiency of steel caster	Simulation of Hot Rolling of Advanced High-Strength Steels – Integrated multi-scale modeling to eliminate use of empirical methods for thermomechanical rolling simulations
Reliability and Maintenance			
Early Preventive Maintenance Tools for Breakdown Avoidance – Predictive models, visualization, sensors, and training to avoid breakdowns and downtime			
Environmental Impacts			
Zero By-Product Fuel Flare – Virtualization and modeling of flamed by-product gases to allow for better design of solutions for flare gas reduction			
Raw Materials			
Optimized Raw Material Handling Designs and Practices – MSV for better material handling designs and materials management to reduce yield losses		Optimization of Raw Material Inputs into EAF – Technologies and models to optimize raw materials for EAF via better consistency and optimized composition	
Smart Steel Manufacturing			
Expert System for Integration of Scheduling, Production, and Material Flow – Integrated inventory, schedule, price and control management tool to improve operational efficiency	Integration of Sensors/Data with Process Control Systems for Production Planning – Automated sensor-driven smart system to optimize materials, manpower, downtime, and product quality	Optimized Material Flows through a Constrained Facility – Production planning execution model that enables operation of the constrained facility at a world class utilization rate	
Workforce Development			
Interactive Student-Steel Industry Program and Tools – Training, outreach, and curricula program to introduce students to the steel industry		Virtual Simulation and Visualization Training – Virtual training tools to enhance operator performance and productivity	