

# Forging Ahead: Optimizing Steel Production in a Changing Landscape



How often have you, as the production planner, been frustrated by disturbances? You've considered demand and resources, yet a single unexpected event – like shortage of an alloy, cobble in the mill, or machine downtime - can derail your entire plan. You're not alone. Uncertainty in planning and scheduling production continues to be a significant challenge faced in the steel industry<sup>1</sup>.

To plan effectively, you need a flexible solution that works the way you do. One that helps you create a usable schedule with the least amount of time and effort. One that minimizes replanning and supports you in managing uncertainty and complexity. Schedule optimization can help you unlock your mill's potential – maximizing throughput and driving efficiency.

## WHY TRADITIONAL SCHEDULING JUST DOESN'T CUT IT ANYMORE: REAL WORLD COMPLEXITIES

- 1 It's a juggling act**  
When building a schedule, you're managing numerous changeover and sequencing rules – like width jumps, gauge jumps, finish, common alloys and a multitude of other considerations – all on one machine.
- 2 Uncertainties are the norm**  
From order cancellations to equipment breakdowns and quality issues, unexpected disruptions are part of the job. These uncertainties throw off traditional schedules, forcing operations to constantly adjust and adapt.
- 3 Spreadsheets fall short**  
They just can't handle the volume or complexity of data you're dealing with. Managing variables like material availability, order sizes, and scheduling constraints requires more than manual inputs and mental calculations.
- 4 Tribal knowledge is fragile**  
Key scheduling insights often reside in the heads of a few experienced people. If they're unavailable or leave the company, it's tough to adapt quickly or retrain, leading to costly delays and inefficiencies.

<sup>1</sup> Iglesias-Escudero, M., Villanueva-Balsera, J., Ortega-Fernandez, F., & Rodriguez-Montequín, V. (2019). Planning and scheduling with uncertainty in the steel sector: A review. *Applied Sciences*, 9(13), 2692. <https://doi.org/10.3390/app9132692>

## UNCERTAINTIES IMPACTING STEEL PRODUCTION SCHEDULING

 <p><b>Orders</b></p>	<ul style="list-style-type: none"><li>• <b>Rush orders:</b> Urgent requests can disrupt your carefully planned sequence, forcing quick adjustments to squeeze in high-priority work.</li><li>• <b>Priority shifts:</b> When customers' needs change, it can suddenly shift the urgency of certain orders, requiring a full reevaluation of your schedule to hit the new deadlines.</li><li>• <b>Cancellations:</b> When customers unexpectedly cancel orders, you need to fill the gaps in the production schedule and reallocate resources to keep things running smoothly.</li></ul>
 <p><b>Machines</b></p>	<ul style="list-style-type: none"><li>• <b>Breakdowns:</b> Equipment failures happen, and when they do, they bring everything to a standstill. The challenge is how to quickly reschedule to minimize downtime and keep things moving.</li><li>• <b>Unplanned repairs:</b> Even small, unexpected repairs can throw off production. You're already planning around maintenance windows, but flexibility is key when unplanned fixes pop up.</li><li>• <b>Performance variability:</b> Machines don't always run at the same speed or at peak performance, especially as they age or after maintenance. This inconsistency can skew your processing time estimates and throw your whole schedule off.</li></ul>
 <p><b>Product Specifications</b></p>	<ul style="list-style-type: none"><li>• <b>Failed specs:</b> When a product doesn't hit quality standards, reworking or scrapping becomes necessary. This adds delays, increases costs, and forces you to adjust schedules to fit in the extra work.</li><li>• <b>Last-minute changes:</b> Customers request changes to specs after production has started. This can mean altering processes, or even starting from scratch, which derails your timelines.</li></ul>
 <p><b>Processing Times</b></p>	<ul style="list-style-type: none"><li>• <b>Over/Underestimations:</b> Accurately predicting processing times is tough. Unforeseen issues like technical glitches, material shortages, or quality checks can drag out steps and disrupt the entire schedule.</li><li>• <b>Process variability:</b> Even when you've got a solid process, variations happen—operator skill, material differences, or equipment inconsistencies can all cause delays that ripple through your schedule.</li></ul>



## EQUIPMENT-SPECIFIC SCHEDULING CHALLENGES: REAL WORLD COMPLEXITIES<sup>2</sup>

- 1 Slab composition problem**

You know how tricky it can be to handle slabs that are out of spec. It's always a balancing act meeting demand and minimizing waste. You're constantly weighing order specs, slab dimensions, and cutting patterns to find the best solution. The right tools help you match slabs to demand to get the most out of every piece.
- 2 Charge batching problem**

Combining slabs into charges while juggling weight limits and steel grade compatibility is no easy task. You're aiming to maximize furnace load while keeping the number of production runs low. It's a complex puzzle, but when you get it right, you boost efficiency and keep costs down.
- 3 Cast batching problem**

Whether you're doing traditional blast furnace casting or EAF continuous casting, sequencing charges is all about optimizing production flow. You're balancing casting machine capacity, steel grades, and the need to either minimize the total number of casts or pack as many charges as possible into each one. Getting the sequencing right means smoother operations and fewer quality issues or delays.
- 4 Rolling problem**

Your job involves carefully sequencing and timing charges across multiple machines, considering everything from resource availability to processing times and due dates. The goal is always to minimize waiting times, avoid cast breaks, and hit that optimal efficiency mark.

### Your priorities:

Maximize output

Minimize delays

Meet customer deadlines

## SCHEDULE OPTIMIZATION: MAKING YOUR JOB EASIER

Effective schedule optimization can take some of the pressure off, giving you more control and less stress. From managing complex constraints to finding efficiencies that save time and resources, you can get ahead of issues before they become problems. The result? Hit targets more consistently, reduce waste and make sure everything runs as smoothly as possible.

### Boost output:

- Streamline production and maximize equipment utilization to achieve higher throughput and reduce operational costs.
- Optimize batch sizes and sequencing to get the right mix for improved furnace and casting machine throughput. By fine-tuning batch sizes, you ensure each production run delivers maximum output.

### Deliver on time:

- Produce orders on time by scheduling operations according to their due dates.
- Align scheduling decisions with the broader production plan to maintain a smooth and predictable production flow, minimizing the impact of disruptions and delays.

### Decrease waste, excess inventories, and work-in-progress (WIP):

- Effective material allocation cuts down on scrap and makes more efficient use of valuable resources.
- Align production with demand to reduce excess inventory, saving on holding costs and improving cash flow.
- Coordinate operations across multiple stages to keep materials flowing smoothly through the process, minimizing WIP and shortening lead times.

<sup>2</sup> Myungho Lee, Kyungduk Moon, Kangbok Lee, Juntaek Hong & Michael Pinedo (2024) A critical review of planning and scheduling in steel-making and continuous casting in the steel industry, Journal of the Operational Research Society, 75:8, 1421-1455, DOI: 10.1080/01605682.2023.2265416

## HOW THE LOGIC FACTORY'S SCHEDULING SOLUTION HELPS YOU TAKE CONTROL

- Quickly find the best schedule. Let the optimizer evaluate thousands of scenarios, leaving you to apply your knowledge and expertise to choose the one that works best.
- Immediately see the impact of alternative plans on your key metrics.
- Achieve stronger plan adherence with better alignment between corporate goals and factory floor operations.
- Ensure everyone – from production teams to logistics – is working with consistent, accurate information.
- Visibility of upstream and downstream work orders to match orders with material flow.
- Better serve your customers with automatic order promising. With the option to override the automation, you're always in control.

## KEY BENEFITS OF THE LOGIC FACTORY'S SCHEDULING SOLUTION

- 1 Boost output:**  
Leverage up-to-date data to make informed decisions to optimize processes, minimize bottlenecks and get more from your existing resources. Handle any order – rush, priority, or standard – with ease.
- 2 Confidently allocate materials:**  
With real-time inventory data, you know immediately whether you have the right materials available.
- 3 Reduce waste:**  
Smart batching helps you combine orders efficiently to minimize waste, cut costs and maintain production efficiency.
- 4 Gain actionable insights:**  
From production to delivery, track and analyze the metrics that matter most to you. Whether it's a single decision or the cumulative impact of multiple choices, you can always see how your actions affect the bigger picture.
- 5 Plan for any scenario:**  
Evaluate different production schedules and examine the impact of the different choices against your goals. You'll always be ready to adapt to change.

### Why The Logic Factory? | Real World Impact



Proven  
track record



Fast implementation  
methodology



Robust  
integration



24/7  
global support

Optimizing your production scheduling doesn't need to be a solo effort. Together, we can forge a path through uncertainty. We're just a call away.