



Interview with an Expert:

Navigating Pharma Scheduling Challenges

During Periods of Volatility and Supply Chain Disruption



Cade VanRooyen

Pharma Product Management Specialist
Aspen Technology, Inc.

Cade VanRooyen has worked extensively with large global chemical and pharmaceutical manufacturers and recently served as a master production scheduler for Pfizer. Cade's expertise spans small molecule API fermentation and organic synthesis, drug product manufacturing and packaging, and medical device manufacturing and packaging. He has held roles in manufacturing engineering, packaging engineering, quality engineering, supply chain continuous improvement, master scheduling and network planning. Throughout his career, Cade has managed a wide variety of intricate pharmaceutical supply chains requiring complex decision-making. He has a BS degree in Chemical Engineering from Michigan State University.

In this interview, Cade VanRooyen will describe the complex decisions master schedulers face and how digital scheduling solutions can significantly improve the consistent on-time delivery of life-saving medicines.

How would you describe a day in the life of a master scheduler?

My role as a scheduler was to manage production pipelines that converted raw materials into bulk APIs used primarily in antibiotic and steroid medicines. It required making complex decisions daily in response to fluctuating and intertwining inputs across eight production areas and over 30 product families involving a couple to as many as 20+ intermediate steps. Due to the inherent complexity and inefficiencies, delivering bulk APIs to the customer – a drug product facility – could take 18 months or more from receiving the order. My customers included internal groups within our drug product division, external customers with contractual demands and our internal sales organization that sold specific medicines to other pharmaceutical companies across the globe.

What does scheduling involve?

Scheduling entails knowing all the inputs and requirements for generating a feasible schedule and working across teams to ensure that plans drive efficiency and match reality, especially as changes occur.

Demand forecasts enter the master scheduling window on a rolling basis, providing predictive information that helps inform how to extend and calibrate the production plan. The scheduler uses the plan to generate the manufacturing schedule and create coinciding process orders in the enterprise resource planning (ERP) system. Conducting reviews across starting material, equipment and labor availability complements this process and ensures feasibility. After completing these steps, the schedule is published for manufacturing to execute.

In addition, on both a routine cadence and as required by special circumstances, the scheduler meets with the manufacturing unit(s) to review and compare production status against the schedule. In collaboration with manufacturing, the scheduler will adjust the schedule as needed. For example, if manufacturing falls

two days behind, the scheduler might delay the planned production by two days. If moving the schedule out is not an option, the scheduler might drop other production to keep future plans on track. Any discrepancies require manual updates of the related data inputs across systems. The scheduler continually reworks the plan to be in the best position to meet incoming demands while preventing excess inventory and stock-outs.

What are the top challenges you face as a scheduler?

The biggest challenge is staying on top of all the individual shifts that occur while executing the master schedule. It requires balancing the new inputs affecting your production pipelines with your priorities and ability to make changes. Some areas have flexibility, and others have significant scheduling constraints. A critical aspect of the scheduler's role involves fitting in the needed adjustments across different parts of the schedule while making the new plan work efficiently and profitably. Triggers to rework the plan include manufacturing delays, equipment conflicts, staffing issues, unexpected orders and changes in run rates. Some weeks the schedule will move smoothly; other weeks disruptions occur that result in everything running off-course. Managing the master schedule can be compared to riding a roller coaster with calm periods and high-velocity swings.

Another challenge with generating the schedule is keeping all the information stored in different tools and systems accurate, updated and synchronized. Manufacturers with traditional scheduling methods constantly struggle with creating one source of the truth. High-volume, repetitive and duplicate data entry creates significant busywork and frustration. One small change to a schedule can easily result in a day's worth of adjustments. Instead of proactively working on perfecting the production plan, 25 to 45 percent of a scheduler's time involves reacting to changes in the supply chain. In addition, schedules, product pipelines and sales and operations planning are often tracked in offline spreadsheets. This reduces the immediate visibility of real-time production status and adds another level of complexity to making the best decisions at a rapid pace. Related to this, when a manual error occurs, chasing down the root cause is very time-consuming.

Both sets of challenges arise regularly. For example, if an ice storm causes a plant to shut down and orders become backed up, shipments may be delayed six months because everything needs to be re-calibrated. The scheduler must rework the plan, update tools and data systems, and determine the best plausible cycle times without making sacrifices that compromise order requirements across production lines.



How do you think the pandemic changed the expectations of the scheduler?

The supply and logistic variables have become increasingly unpredictable. Shipping costs, logistic workforce shortages, manufacturing delays and shortages, customs congestion and many other factors have complicated and impacted the end-to-end supply chain in new ways. For example, products used to treat COVID-19 complications experienced whiplashes of unforeseen demand as case counts fluctuated dramatically across global markets. These volatile conditions resulted in significant additional stress on many supply chains, making it much more difficult to meet customer demand.

With uncertainty and market swings driving disruptions across the supply chain, the job of a scheduler became far more challenging and critical to ensuring supply continuity for patients globally. The frequency of shifting inputs increased dramatically, requiring schedulers to manage new levels of complexity while remaining diligent in response to the dynamic environment. Hedging bets on safety stocks, production priorities and reliability of raw materials became part of the daily decision-making process. While no plan ever remains the same from inception to execution, the rate at which schedulers have had to navigate and adapt to changes intensified. It became more critical than ever to empower the scheduler to make better decisions and efficiently recalibrate plans.

One thing is certain: The global supply chain has made a significant step towards uncertainty with no indication of normalcy returning anytime soon. Navigating pharma scheduling challenges effectively through extended periods of volatility and disruption has become the new normal.

A scheduler spends 25 to 45 % of their time reacting to changes in the supply chain.

Navigating pharma scheduling challenges and unprecedented **market disruptions** has become the new normal.





How can digital technology solve scheduling challenges daily and during periods of disruption?

Digital scheduling solutions enable users to move from reactive scheduling to proactive scheduling by eliminating errors and busywork, delivering visibility into all pertinent performance indicators and enabling right-first-time scheduling. Updating production plans as changes occur and making optimal decisions become easier, empowering schedulers with an increased ability to manage complexity better, stay on target and meet key metrics.

Digital scheduling solutions improve daily decision-making, empowering a stronger, more resilient supply chain.

Most schedulers today lack easy access to all the current inputs regarding equipment run times, process conflicts, cycle times, material consumption, staffing requirements and other critical KPIs. With incomplete, out-of-date or corrupted data, the scheduler suffers handicaps in constructing a reasonable and executable schedule. As a result, when the scheduler puts together an initial schedule and reviews it with the production team for the

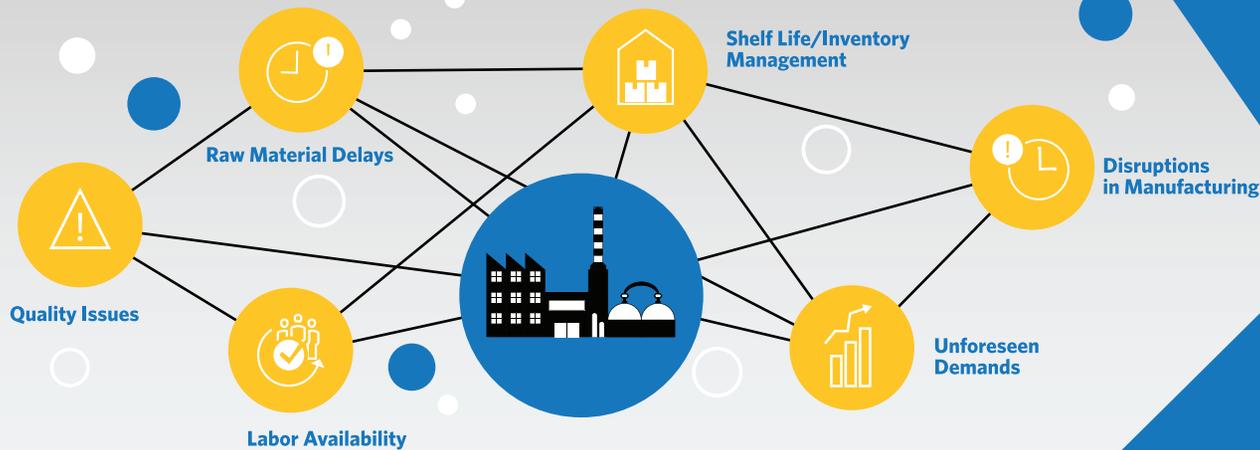
first time, they will come back with a laundry list of items to revise due to missing inputs or knowledge gaps.

With digital solutions in place, performance metrics can be tracked while scheduling, offering incredible value and visibility into understanding how different scenarios can maximize performance. For instance, de-bottlenecking production by modeling process improvements or potential additional assets through scenario planning and modeling empowers stronger decision-making. The scheduler gains the ability to confidently make capital spend and engineering decisions with known outcomes before spending a dime.

In addition, instead of the scheduler spending 25 to 45 percent of their time reacting to changes in the supply chain, they can shift their time towards being proactive and improving operations. For example, at Lonza, they used integrated planning and scheduling technology to increase facility production and throughput by 20 percent with better utilization of over 200 assets.¹

In the end, digital scheduling solutions enable the scheduler to perform better every day and during periods of disruption. Rather than reacting to every change, the scheduler can spend more time working through how to perfect the production plan and drive better outcomes.

Navigating through Scheduling Challenges and Market Disruptions



Digital solutions enable:

- Updated and synchronized information
- One source of scheduling truth
- Full visibility into emerging disruptions
- Rapid assessment of scheduling alternatives
- Shift from reactive to proactive decision-making

What types of business outcomes will improve as a result?

Digital scheduling solutions enable dramatic improvements across production planning, resource utilization, labor productivity, inventory management and even quality assurance. They guide the scheduler in minimizing operational waste and reducing production costs. Improving outcomes across all these areas opens up new levels of operational excellence, reduces the risks of production disruptions and strengthens the manufacturer's ability to deliver life-saving medicines on time and in full. Ultimately, the software transforms the scheduling process to enable it to play a pivotal role in driving optimal decision-making while empowering manufacturers in their efforts to build a stronger, more resilient supply chain.

Given the recent focus on Pharma during COVID, why do you think it's more important than ever to optimize scheduling?

During the pandemic, the general public gained new visibility into drug availability and its impact on patients. Access to medications can often be a life-or-death scenario. Availability of critical medicines to all patients is a top priority of the industry, yet discrepancies in patient outcomes due to lack of drug availability have never been more apparent.

Optimal scheduling plays a critical role in increasing throughput and maximizing drug availability to all markets given a finite manufacturing capacity. While scale-up or scale-out of manufacturing capacity can take

several years, digital solutions that enable optimal scheduling dramatically shorten the time frame to boost production capacity, therefore delaying the need to invest in expensive capital projects. Digital solutions drive an immediate positive impact for patients dependent on the availability of life-saving medicines by enabling a more agile, efficient and reliable supply chain.

Citations:

1. *Taming the Scheduling Beast, Pharma Manufacturing, February 2010.*



Technology That Loves Complexity

About Aspen Technology

Aspen Technology (AspenTech) is a leading software supplier for optimizing asset performance. Our products thrive in complex, industrial environments where it is critical to optimize the asset design, operation and maintenance lifecycle. AspenTech uniquely combines decades of process modeling expertise with machine learning. Our purpose-built software platform automates knowledge work and builds sustainable competitive advantage by delivering high returns over the entire asset lifecycle. As a result, companies in capital-intensive industries can maximize uptime and push the limits of performance, running their assets safer, greener, longer and faster.

[aspentech.com/pharma](https://www.aspentech.com/pharma)

