

# Interview with an Expert

Scheduling Challenges in  
Specialty Chemicals

## Featuring

John Ford, Senior Principal Consultant Engineer at  
Aspen Technology, Inc.

*In this interview, John Ford will describe the complex decisions that specialty chemicals producers face on a daily basis and some of the methods to improve efficiency within plants.*

## What are the top challenges that a scheduler faces in the specialty chemicals industry?

There are three areas that pose significant challenges to the scheduler. These are ensuring that high on-time order fulfillment rates are being met, determining optimal batch sizes, and making sure that resources are being used efficiently.

In the end, specialty chemicals producers make money from satisfying customer orders. However, spec chem producers are facing volatile demand from customers and an increased need for responsiveness as global supply chain become more complex. The ability to provide outstanding customer service by making sure that customers are getting the correct orders, on time and while remaining profitable, is a major competitive differentiator in today's market.

When dealing with batch size determination, it's important to understand that spec chem manufacturers have created company policies and rules to help facilitate the scheduling process. If we have an order to make products A and B, one of these rules might be to make 30 days' supply of product A. If we're making 30 days' supply of product A, not only could we possibly be making excess inventory that nobody needs, but if a new customer order comes in, there might not be enough capacity to fill this new demand.

Resource planning is usually the stage that is most locked down by these general company guidelines, leaving little room for change. The policy at this stage might dictate that product A is always made on reactor 1, and product B is always made on reactor 2. However, depending on the situation, it might be better to do the opposite.



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## What impact do scheduling solutions have on customer service?

Once, I asked a scheduler how much her schedule changes over a given month, and she said that it changes by at least 25-45% every single month. You have to keep in mind that the main challenge of schedulers comes from dealing with change, and change happens all the time. Every company has faced situations involving delayed or expedited customer pickups, last minute orders, and unplanned shutdowns. Using a best-of-breed scheduling tool is important when dealing with this uncertainty, but many companies still use manual scheduling tools such as spreadsheets.



### John Ford

Senior Principal Consultant Engineer

John Ford has MS degrees in both Chemical Engineering and Operations Research. He has been working with chemical companies for more than 30 years, and has implemented over 150 scheduling models during his career. He is an expert on production/distribution planning and scheduling within the petrochemical and specialty chemicals industries.

Let's take the example of the last-minute customer order. Customer service gets a last-minute order from an important customer, and calls the scheduler to see if it can be fulfilled. The scheduler needs to determine if there is enough inventory on hand to meet this order, and if there is, making sure that other customers aren't impacted. However, if there's isn't enough inventory, the scheduler needs to determine the impact this order will have on the schedule. Are the rest of the orders being met? Does this result in delayed production? With spreadsheets, it's difficult to have any visibility into the impact this will have on the schedule. A best-of-breed scheduling solution can help the scheduler answer questions such as what inventory is on hand, the impact on breaking into the schedule, and determining if this last-minute customer order is profitable.



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25-45% of the monthly schedule changes

## What is the typical scope of a scheduling project?

The important thing for a customer to understand is that Aspen Plant Scheduler creates models that will process decisions, and this helps the scheduler choose the most optimal decision for any given scenario. However, it's important to define what those decisions are, and what they should be. After that, companies need to determine where in the decision-making hierarchy these decisions should be made. In my experience, there are four levels of decision-making in a company.

1. **Headquarters:** Strategic decisions at this level have a profound impact on the business, but are made infrequently. These typically affect the whole company and are expensive. A good example would be the decision to add or remove assets.
2. **Operations:** Decisions on the operations level are less strategic than those made at headquarters, but they are made more frequently. Decisions revolve around determining the best way to operate a given set of assets.
3. **Scheduling:** At the plant level, scheduling decisions are more detailed and affect the day-to-day life of everyone in the plant. The Scheduling team is attempting to meet all customer demand while keeping an eye on inventory levels, shutdowns and other daily happenings.
4. **Control:** The plant floor is responsible for executing the schedule and ensuring that final products are being packaged and shipped on time.

Plant flexibility and agility come from making decisions at the lower levels of this hierarchy. Companies with inflexible software such as spreadsheets can find it "too difficult" and "too expensive" to change their scheduling processes, but in reality, great scheduling software has the ability to identify how "expensive" a schedule really is.

When using less powerful scheduling solutions such as spreadsheets, companies move decision-making higher up on the hierarchy and are stuck with them, even if they're unfavorable. This is the origin of these company rules and policies that many spec chem companies follow, and the real reason that plants have been doing things the same ways for years. This is why the first thing I do with customers is identify the decisions that need to be made and the constraints that impact these decisions. Once that is established, we can worry about obtaining the necessary data for the models.

## What are the top things you would recommend to a prospective customer before embarking on a scheduling project?

Customers need to understand the scheduling decisions that need to be made day-to-day. Most importantly, customers need to understand the constraints that exist in their plants such as storage limitations, throughput rates, and varying lead times. I've also talked about the guidelines that many companies use to help ease the scheduling process. In my experience, these guidelines could cost some specialty chemicals producers millions of dollars due to excess inventory, off-spec material that needs to be disposed of, and poor asset utilization. These rules might have been necessary when using spreadsheets, but best-of-breed scheduling solutions should be able to make the most optimal decisions at every level of the scheduling process.

## Is there synergy between scheduling and Manufacturing Execution Systems (MES)?

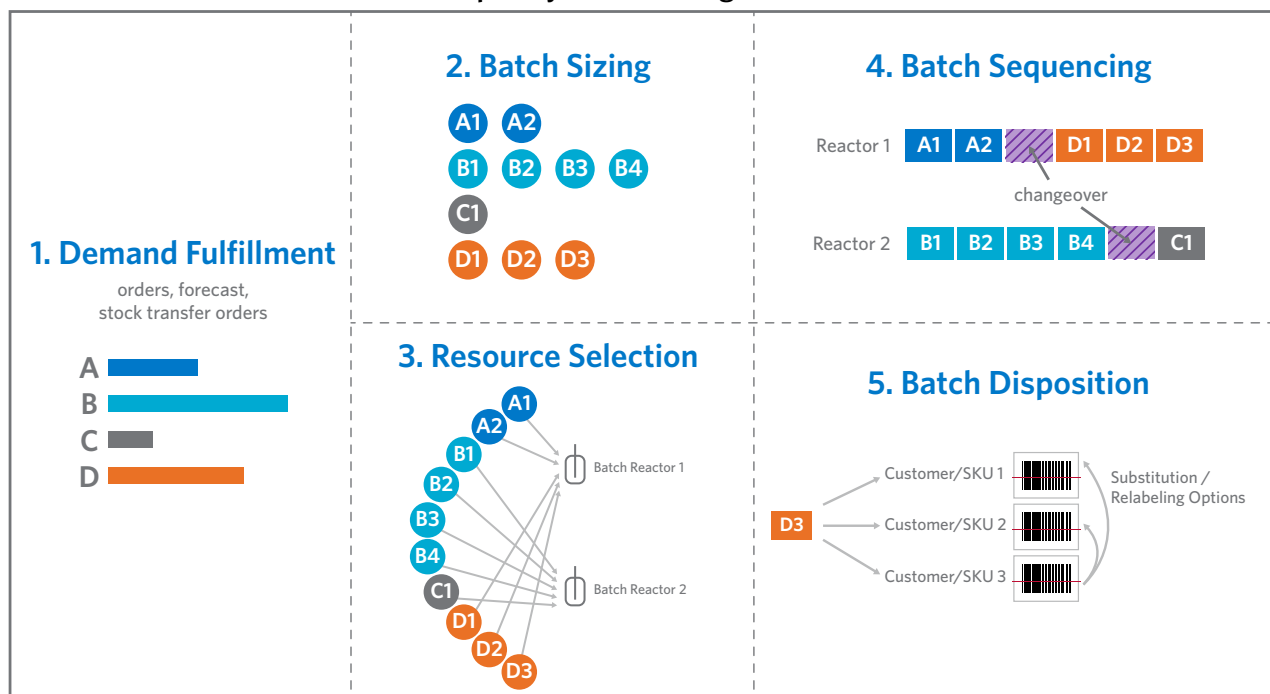
Yes, there is. This combination leads to faster decision-making with even higher asset utilization. Having the scheduling system tap into the MES system gives a new level of visibility into the plant. If your company has liquid bulk raw materials coming in, then they have to go into a storage tank, otherwise you're going to be paying demurrage for the raw materials to just sit there. The MES system identifies storage tank levels, and the scheduling software can make decisions on when these raw materials should be put into the tanks, and when they should be emptied. The MES system can provide a scheduler with opportunities such as this one, or alert him or her to something that is taking longer than it should. Now the scheduler is being proactive and identifying situations that need to be dealt with in real time, and coming up with optimal solutions using the scheduling software.



*With Aspen Plant Scheduler, you can let the scheduling model make key scheduling decisions such as batch size determination, resource selection, and batch sequencing and disposition, instead of only relying on your company's existing rules and policies. If the schedule changes daily, why would you use the same rules and recommendations for every scenario?*



### Complexity of Scheduling Decisions




Another important thing to understand is that your businesses will have new constraints. Maybe you open a new line of business, add another product, or your company is growing. You don't expect your company to remain static, so why should your business and associated scheduling models not change? The feedback loop created by the MES and scheduling software will make your models evolve and be more accurate, leading to better decisions, higher asset utilization, and higher on-time order fulfillment rates.

### **Why should prospective customers choose an AspenTech scheduling solution?**

That's easy. We build a scheduling model that reflects reality and incorporates all relevant constraints to simplify and optimize decision-making. It is easy to understand, uses real-time data, and makes realistic scheduling decisions. Most other tools use pre-defined models, which don't really represent any customers' reality. Really, the customer is tricking the other SCM solution into behaving in a way that is somewhat realistic, and therefore, the model cannot be robust.

Right now, the biggest insight in scheduling is the notion that agility and flexibility is good. With Aspen Plant Scheduler™, you can let the scheduling model make key scheduling decisions such as batch size determination, resource selection, and batch sequencing and disposition, instead of only relying on your company's existing rules and policies. If the schedule changes daily, why would you use the same rules and recommendations for every scenario? When choosing AspenTech, you'll increase your customer service levels and asset utilization, because our best-of-breed scheduling solution is making the most optimal and profitable decisions for your company.



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