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## Lessons For a Successful Implementation

Get your production scheduling  
project done right...  
The first time!

Companies with growing complexity in their manufacturing systems will eventually realize that they need better production schedules. This realization can be the result of shrinking margins from stiff competition, or increasing amounts of waste in products and resources: machines staying idle for longer periods, more of their products being thrown away or sold at deep discounts to keep inventories manageable, more personnel being furloughed or dismissed, etc. Regardless of your specific reason, as Plant Manager or Production Manager, you eventually realize that your experienced scheduler cannot continue to rely on very complex and unwieldy spreadsheet models to obtain efficient schedules for your facility.

You convince your boss, the COO, and then you convince the CFO, that a new production scheduling solution is needed. Naturally, you begin researching the market for a solution that can “fix” these problems for you. So, you ask around, use Google, or benchmark what your competition is doing. You soon read about or hear the buzzwords: “automated”, “fully integrated”, “advanced”, “algorithmic”, etc. and become convinced that a solution that uses all these terms to describe itself is exactly what you need: *a fully integrated, automated, advanced planning solution that uses algorithmic approaches to find the best production schedules, fast!* You think to yourself: “I must find this solution and implement it now! It can solve all my problems!”

Can such a solution really solve your production scheduling problems? Sure! Does such a solution exist? Not yet. Can you get there? Yes, but it will be a journey...

Let me explain. During my 5+ years of developing and implementing production scheduling solutions across various industries, I have not come across such a solution “out-of-the-box”. Sure, if your production facility is simple enough, there may be tools out there that come with your ERP or that you can buy “off-the-shelf” that can help; however, if your operation involves multiple products that share the same infrastructure and labor resources; if you make some products for larger retailers and some to fulfill small, custom orders; if the market demand for your products is variable or seasonal; if there are significant costs or delays in changing over from one product to another on your production lines, then I guarantee that no off-the-shelf tool or ERP planning module will solve all your problems. In fact, most of my clients have previously attempted to implement an ERP planning module or some “advanced planning solution” (also known as an APS) and failed.

See, there is no “one-size-fits-all” solution for complex production scheduling. The complexity of each situation may warrant a unique approach. In some cases, a rule-based algorithm may be enough, while others may require a solution approach that combines advanced machine learning and artificial intelligence techniques with

mathematical optimization and discrete event simulation. The devil is always in the details. For that reason, I have put together this list of 6 top lessons learned that any organization should keep in mind before, during, and after embarking on one of these projects.

## 1. Do NOT fire your production scheduler!

If your goal is to improve your production schedules, **your single, most important resource is your production scheduler**. The impetus for your project should NEVER be to replace your scheduler with an automated tool. The goal should be to make it easier for your scheduler to obtain more efficient schedules in a fraction of the time it currently takes her. That way, she will not experience burn-out, will be free to work on more value-added activities, and will be able to react quickly and come up with new, optimal schedule in the event of disruptions.

Most importantly, your scheduler has years of experience at the plant, and has – over time – learned what the plant’s ideal workflow should be and how a good schedule can support that workflow. The scheduler will also be aware of “unwritten rules” that a good production schedule should follow. This know-how is irreplaceable, and it will be invaluable when you make design decisions and set the business objectives and the constraints that will guide the successful implementation of a new scheduling solution. And, once the new solution is in place, that person will ensure it is always kept up to date with any changes to the plant or the production process itself.

## 2. Think big, but start small

When you first embark on a production scheduling implementation, it is best to work on the design of the “ideal” solution. **Start with a comprehensive assessment of your situation** and identify your business objectives and all constraints that apply to your operation. Think big picture and don’t limit yourself. Make sure you do a thorough job of gathering requirements from a broad set of stakeholders whose roles may be affected, in any way, by the new solution. For example, if the new solution will be expected to automatically generate purchase orders for materials required during production, then make sure you include the purchasing department in the project. In other words, think big.

However, don’t try to boil the ocean during implementation. **Plan your implementation in multiple phases** and start with a Pilot phase. **A Pilot phase is critical to success**. Identify an implementation scope for the Pilot phase that

will provide the operation with 80% of the expected benefits but includes only 20% of the planned functionality of the ideal solution.

The Pilot, carefully designed to implement a prototype that includes the technical aspects of the solution, can get you most of the expected benefits: better production schedules, reduced costs, reduced wasted resources, and improved business indicators (the "*must-haves*" of the solution).

However, the Pilot will likely not include additional capabilities, such as automated data input and output, or fully integrated ERP or MES systems; therefore, real-time tracking of jobs, or rapid re-optimization of the schedule (the "*nice-to-haves*" of the solution) may not be possible, yet.

Starting with a Pilot phase will provide other added benefits, as well. It allows your users to become familiar with the prototype and to identify additional features and enhancements to include in the design, to be implemented during subsequent phases of the project.

### **3. Test, test, and test again**

This step cannot be emphasized enough. You need to make sure you conduct thorough testing of the solution. This includes setting up a couple of test sets, where you use historical data to compare the performance of the new tool against what you did in the past. It also includes a user acceptance testing period, where the user(s) of the tool test it "as if" they were using it in a real production environment, alongside their current scheduling system, to make sure any unforeseen circumstances can be handled by the new solution. And it should include "stress tests", where the solution is tested under unusual and difficult circumstances, whether real or made-up; for instance, a machine going down for a long period, or one or two key plant operators being absent during a shift or two.

The purpose of thorough testing is multipronged. First, and obvious, is to make sure the solution works as expected under normal circumstances: that it optimizes the correct business metrics and does not violate any of the system constraints imposed on it, while producing a quality schedule. For this reason, testing should be done continuously, even while the initial prototype is being built, and all the way until after implementation. Testing also facilitates less obvious goals, like training the users, getting feedback from users, and making sure it handles unexpected or difficult situations correctly, or that the users know how to use the solution correctly under those circumstances.

#### **4. Train the scheduler and production manager**

Somewhat related to testing is to train the users of the solution along the implementation journey. Testing is an excellent way to accomplish this. Even if the organization has decided to develop the solution “in-house”, but especially if it is being sourced from a third-party vendor, training should never be skipped or de-emphasized. No matter what the situation, the entire project should be treated with the same attention and priority as given any other project that is critical to the success of the organization.

Training is an excellent way to obtain good feedback from experienced schedulers and users, so it should also be done after reaching each project milestone. Even if there is no delivery of software involved, the project manager should take the opportunity to present the status and any assumptions and requirements to users, to get a chance to hear from them. Even if this has already been done multiple times in the past, doing so at each step can generate ideas and observations that stakeholders may not have thought of before. It will be the responsibility of the project manager (or the consultant or vendor) to maintain a prioritized list of these and decide if, and when, they should be incorporated into the scope of work.

#### **5. Integrate only after you evaluate**

There is a saying in the field of process improvement: “if you are currently doing a manual task incorrectly, automating that task will only ensure you do it incorrectly much faster.”

Rushing to automate the data input and output or to fully integrate the solution with your current ERP or MES systems can be counterproductive. It can distract key project team members from their focus to ensure the solution works first, and it can exacerbate issues with the solution itself. Automation and integration should be started only once the team has thoroughly tested and evaluated the solution and is certain that its core functionality is correct, and it is delivering the value expected. Remember, the prototype should already be delivering about 80% of the expected benefits of the ideal solution.

Once the solution has been tested and thoroughly evaluated, then the remaining 20% of the benefits can be realized by implementing additional functionality, which should include a more sophisticated graphical user interface to make it easier for users to vary assumptions, change parameters, etc., automating data input and output capabilities, and integrating the solution with existing systems such that

schedules can be easily visualized, “tweaked”, when necessary, and translated into clear instructions for plant operators.

## **6. Track your progress and follow through**

One of the reasons many projects fail is that people consider them “done” too soon. After implementation, many stakeholders and managers will turn their focus elsewhere. However, the implementation of a new production scheduling solution does not really end at implementation. Things may change in your operation and, depending on the complexity, some changes may affect the solution and require adjustments that were unforeseen during development.

Make sure you put in place a system that will monitor and measure the performance of the solution into the future. And make sure this performance is communicated on a regular basis to the plant management as well as the plant operators to ensure credibility in the solution is maintained. The solution may require changes in the way things are done, which may cause resistance from plant personnel who “had been doing it differently for many years.” Never underestimate the need to manage these changes, by explaining the benefits of the new tool and objectively showing these benefits using the right metrics. While it may be uncomfortable for someone to change the way they have been doing things, it is easier to convince them to change if 1) they can “see” the benefits for the organization, and 2) they have input into the solution design and implementation. Even better would be to relate those organizational benefits to their own personal situation – through alignment of incentives.

The reasons projects fail are numerous, but the above lessons will help you avoid some of the most common pitfalls. However, there are certain principles that will increase the likelihood of success of any project. These include making sure you have buy-in from the top and you have chosen quality team members spanning multiple impacted areas within your organization. This will ensure that the project will be correctly funded and that it will be given the attention and visibility it deserves, while increasing the likelihood that it will deliver on its value proposition.



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