

Roasting
in
Good Time





Creating a Production Schedule

by Steve Smith

FOR THOSE OF US ON A MISSION to deliver superior coffees to discriminating clients, a well crafted production schedule is a thing of beauty. I'll grant that it's not as exciting as cupping a new crop Kenya or as romantic as a Central American sunset over rolling hills of flowering coffee trees. But the order that a well-planned schedule brings to the production process lends an elegant efficiency to the way you handle coffee and to the way you deliver its exquisite flavors to their final destination.

What is a Production Schedule?

In its simplest terms, a production schedule is a daily process of detailing which coffees to roast, calculating quantities and finally, creating a breakdown on how to package each order. The production schedule organizes each of those processes, defines responsibilities, highlights key steps and can even identify bottleneck areas. At its core, a production schedule keeps the entire staff on the same page—everyone knows what must be accomplished at every given moment.

A schedule can also help in other ways. Past schedules can serve as a guide to help streamline other aspects of the business that affect production, such as the ordering and receiving of green coffees.

In practice, a production roasting schedule is actually two schedules—one for roasting coffees and a second for packaging and shipping. Both are equally rigorous schedules and are extremely complex. It is important to break it down because each component has multiple steps. The roasting schedule, based on the quantity of coffee needed each day, must be flexible enough to accommodate daily adjustments, if needed. The packaging schedule is equally complex, based on the different order sizes and types. Hotel clients may need large bags of whole bean coffee for catering as well as one ounce packages for in-room coffee service. Coffee bar retailers may have different requirements. Internet customers may want one-pound bags in any variety of grind types. Each order type adds complexity and must be dealt with daily.

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Why a Production Schedule?

Imagine preparing a dinner for friends without a menu plan or a list of ingredients. Or, imagine preparing that same dinner for eight people and two more guests show up unannounced. Or even worse, you've finished preparing your main course and are ready to throw it in the oven, when you suddenly realize the power's out. All of these challenging situations can be avoided or at least greatly alleviated by having a plan each day.

A production schedule becomes even more critical if you choose to build a roast-to-order program. The vast improvement in cup quality in a roast-to-order program is so compelling that you may ultimately decide it is worth the effort. On the other hand, the daily production plan for roasters who choose this route has to be detailed and accurate because you must prepare orders and your plan on a daily basis in a very limited amount of time.

Lastly, a plan will help you to stay on track and keep you flexible enough to move quickly to resolve problems should you encounter disruptions of any kind—an impossible task if you are not prepared and organized, no matter what kind of roaster you are. Creating a production schedule may seem mundane and tedious, but it is as critical as the quality of green coffees selected and the type of machinery used to roast.

Creating a Production Schedule

Any production schedule will be custom because each roaster has their own way of roasting coffee—each roaster creates their brand based on the flavor profiles they believe will win the taste buds of coffee lovers. I recommend creating a system of roasting coffee that yields the quality you are looking for and gives you consistent results every time you roast. This may require many hours of roasting samples, countless tastings and of course, trial and error. This process is important because the sensory expression of coffee is the most authentic proof of quality. And, ultimately, having that system in place will help you organize your production plan.

As just mentioned, a coffee roaster's expression of flavor forms the very basis of the production schedule because it represents the systematic breakdown of blends and the roasting times for each coffee. It also specifies the line-up of coffees being roasted that day. In general, there are several components of a roasting schedule that apply to any type of coffee roaster, namely customer orders, roasting, packaging and shipping.

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Roast to Order (Or Not)

DECIDING WHETHER to roast to order is one of the biggest decisions you'll make as a roaster—and one that has a huge impact on your production schedule. If your intent is to inventory enough roasted coffee to fulfill future orders, then you're safe without roasting to order. However, if you want to roast only the amount of coffee required to meet current customer orders, then a roast-to-order system is the way to go. Whether you choose to roast to order or not, you will still need to create a production schedule. Ultimately, the choice you make affects how you prepare your schedule each day and each has its distinct advantages and disadvantages.

Roasting to inventory (RTI) levels presents tremendous benefits in efficiency. Many of us are batch roasters and our machines of choice are capable of roasting a range of load sizes that may vary from full capacity to as little as 25 percent capacity. Roasting to inventory, properly scheduled, allows full capacity for almost every charge, maximizing the use of time and material resources. Further, a standing inventory of roasted coffee, packaged and ready to ship, provides the ability to respond immediately to customer orders, even those unexpected “emergency” orders, with virtually no disruption to the production process. A roast-to-inventory system can also streamline the allocation of labor. Packagers, for example, can do long runs without changeovers and shippers can complete orders without waiting for specific batches to be completed further up the line.

The downside of a roast to inventory system is the potential for loss of freshness. The “special” in specialty coffee is extremely volatile—even the best packaging systems may not preserve the nuances of flavor that captivated us in the tasting room. In addition, roasting loads at machine capacity means charging full loads of not only our biggest sellers, but of lower volume coffees as well. These slower selling coffees are often the most expensive and exotic offerings, and are even more sensitive to the loss of flavor if inventoried.

In contrast, roasting to order (RTO) offers the ability to closely control freshness and to deliver into the customer's cup all the flavor potential that roasters enjoy at the side of the cooling tray. With it, it's easy to develop programs to frequently deliver smaller quantities of lively coffee to our customers. We know the destination of the coffee as we charge it into the roasting machine and can even tweak the roast to suit customer preference.

Roasting to order is no small commitment. It demands a level of inefficiency that includes undersize charges of green coffee in the machine, short, complex packaging runs and a feast or famine flow of coffee into the shipping department. Smaller orders are more expensive to produce, administer and ship, and these are costs that may be poorly understood in a competitive environment. RTO is a very demanding system in which a customer's call in the late afternoon after a half hour of cool down translates into a late dinner for you.

It's an interesting inversion. RTI has many benefits and one drawback, RTO has one benefit and many drawbacks. So you have to decide for your situation, taking into account the many elements that comprise your business, if it's RTI or RTO for you.

While the premise of preparation and planning to any seasoned roaster is fairly fundamental, the desire to create that same captivating experience with coffee requires much thought and a finely tuned plan for execution. Add to that the complexity of building a coffee business around the concept of roast-to-order freshness, and a daily production plan becomes critical.

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FULL PAGE

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Roaster's Daily Production Schedule Checklist

- Inventory roasted coffee
- Organize day's orders or par requirements for each coffee needed
- Subtract inventory from day's requirement
- Separate blends into single origin coffees
- Total roasted required of each single origin
- Multiply by shrink factor
- Divide totals required into loads
- Schedule loads in sequence
- Organize packaging as needed
- Meet shipping requirements

Roasting Requirements—Engaging the Customer

How to begin? In a roast-to-order schedule, it all begins with the customers. (Note: The roast to inventory folks are free to go to the racks at this point, take an inventory, subtract it from your par levels and wait for the rest of us at the roaster's desk.)

The rest of us have to head over to the order desk. Because the customer is the one who dictates what the production will be, it is important to track what they order, and to encourage them to order consistently in order to maintain an organized production schedule.

In this regard, it is important to educate your customers, so that they can cooperate with you in this process, namely by ordering correctly and consistently. By getting proper orders from your customers, you can set up pars that are slightly less than what you actually need, allowing you to start production earlier. You can also set timelines for your customers, letting them know that if they order by a certain time, it will get roasted and processed that day. And if they order later than that, their order will be roasted and processed the following day.

This cooperation on your customers' part is largely earned through your continuing contact with them. Whether you have a dedicated inside sales person or everyone at your plant takes orders, the interactions with the customer in the ordering process can make or break the system.

Having given up on some degree of efficiency, it is your ability to organize your customer's order cycles, your knowledge of their order histories and your ability to lend them the benefit of your expertise that will bring some structure to what is, by nature, an unruly system.

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And so, current orders in hand, we can join the roast to inventory folks at the calculator, each of us knowing which and how much coffee we need to roast.

The Number Crunch

At this point we have our specific requirements. We know which coffees to roast and how much of each we need. We can now translate this information into the appropriate loads to charge into the roaster by hand or with the aid of the computer. Simple accounting or database software can easily collate the coffee by type and give us totals of blends and single origins. A slightly more sophisticated program can break the individual single origin coffees out of our blends or we can do that by hand, arriving at a total for each individual coffee, some of which may be sold as single origin and some of which may be blended later in the production day.

I prefer using three simple forms that help us break down each step. The first is a Bagger List, which helps to organize what coffees have been ordered or are needed for the day. The second form is the Load Calculator, which helps you calculate the requirements of each coffee that need to be roasted and then calculates how much green coffee you will need. The third form is the Roast Sequence. It is the form where you decide which coffees you will roast and in what order.

One challenge of calculating how much coffee to roast is identifying and accounting for the shrink rate between green and roasted coffee. Green coffee loses weight in the roasting process, even as it increases in volume. The difference between green and brown weight in a charge of coffee, expressed as a percentage of the initial weight, is the shrink rate. The shrink rate varies somewhat among coffees of different origins depending on bean density and water content. It also varies among different roast intonations; darker roasts will increase the shrink of a given coffee and conversely lighter roasts will allow for a smaller shrink rate.

So, while there isn't a standard formula that can be used by every roaster, the general guideline is that the darker the roast, the larger the shrink rate. Each roaster must decide which flavor profile they desire and calculate their own shrink rate by weighing their coffee before and after roasting. You'll likely end up arriving at your shrink rate by trial and error based on your individual roasting preferences.

For the purposes of production scheduling, we'll use an average shrink rate, slightly inflated, that will insure that the roasted yield of our loads is sufficient to cover demand with only a pound or two left over. For our scheduling purposes we'll assume a 20 percent shrink rate. Working from the roasted side of the equation we can multiply the number of brown pounds required by 1.25 to arrive at the number of green pounds we need to charge to meet that brown requirement.

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For a 20 percent average shrink rate, here's how you would calculate on your Load Calculating Form:

$$\begin{aligned} &\text{Lbs. Roasted Coffee Needed} \\ &\times 1.25 \\ &= \text{Total Lbs. Of Green Coffee} \end{aligned}$$

Now we know how much green coffee to charge into the machine to meet our

needs. We can divide that quantity of each of our green coffees into loads. Every roasting machine has a sweet spot in its capacity range; some machines roast best at full capacity, some at a specific partial capacity. We'll try to divide the green coffee we'll be roasting into load sizes that will most often find us in the sweet spot. This could result in several loads of the same weight or one load of a less than ideal

weight followed by uniform loads in the sweet spot. Again, there is no standard for finding the ideal number of pounds to roast at a given time. It is dependant on trial and error and tasting your roasts, and has to do with the thermodynamics of your roasting machine as well as your desired flavor profile.

We've now completely identified our loads for this production cycle. Now we have to decide how to best arrange them in our schedule.

Sequencing

Our first responsibility is to sequence our loads so that they support our effort to get the best possible roast of each coffee. The first load of the day, or even the first few, may be best used for coffees that react well to a more direct or intense transfer of heat, as some of the components of our roasting machine have yet to achieve a stable level of thermal absorption. As batch roasters, particularly if we have drum machines that can cool and roast simultaneously, we'll need to be aware of the effects of a roast on the following load. We'll also need to consider any special preparation the machine might need related to preventing contamination of certified coffees.

A second consideration is the progress of the coffee through the packaging process. If we're using a very simple packaging system (say, one person bagging at a scale), you need only to know where they are in the progress of bagging a roast. If the rate of roasting exceeds their rate of bagging, you might choose to stagger loads sent directly to the bagging area with loads destined for post roast blends later in the day. In a more complex system, you may need to sequence your loads to keep a variety of coffees distributed among multiple packaging lines or available to several staging silos, for those who use them.

If you're operating within a roast-to-order environment, you must also accommodate the priorities of the shipping department. Shipments may be committed to different trucking lines and levels of service,

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from FedEx overnight to LTL freight carriers to overseas consolidators, and these may require widely different pickup times. Deferring key roasts to the end of our schedule may not allow shippers to accurately and efficiently prepare packages for shipment.

Riding the Flow

After completing the steps described above, you've created our roasting schedule for the day. Chances are, you've done this early in the day, most likely after evaluating yesterday's roasts and before other production workers have arrived. We've designed an elegant and balanced sequence that will support excellent roasts and an efficient flow of coffee to our clients. The machine is warmed up and awaiting the first charge of green coffee.

At this point we're left with only one outstanding question: What could come up during the course of the day's activities that will force us to chuck the whole schedule? It could be one of a hundred things: the filler is acting up on the whole bean line and will be down about an hour. A customer in the Midwest miscounted their inventory and needs 50 additional pounds right away, 10 of it overnight. Our delivery of the small size shipping boxes is late, but we have plenty of the large size.

As the scheduling roaster, you'll be operating in some degree as the de facto production manager. Your decision to roast a specific coffee at a specific time will ripple through the rest of production. But what happens throughout the rest of your operation will affect your schedule, and you need to be flexible enough to make intelligent adjustments as circumstances change around you. Adhering too closely or too persistently to what was admittedly a great schedule will leave you frustrated and potentially holding a roast in the destoner hopper for a half hour as you wait for things to clear up down the line.

In Conclusion

The effective scheduling of roasts within a production cycle will likely remain among the less glamorous of the links connecting origin to consumer. Be that as it may, the act of scheduling presents us with another opportunity to express

a detailed knowledge of the coffees we roast and of the process by which we deliver their unique qualities to the clients who depend on us. And, just like the orchestration of a dinner party, our goal to create an exceptional experience that our customers will never forget can ultimately be achieved with a good production plan.



STEVE SMITH has been Master Roaster for Fonté Coffee Roaster for 15 years, pursuing a passion for coffee with an artisan philosophy to roasting. An industry veteran with more than 27 years experience, Steve has worked with the founders of some of Seattle's most well-known coffee companies.

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