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# SPEED TO MARKET

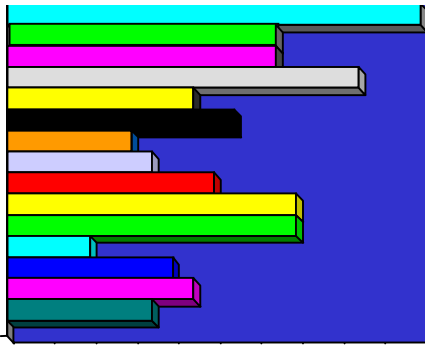
A Newsletter for  
Job Shops–Niche Manufacturers–Focused Distribution Systems

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## The Computer is Not the Solution A Perspective on Job Shop Scheduling



We often receive correspondence from readers asking if we can offer a solution, or words of wisdom, about scheduling and other job shop related problems. The following request from a job shop owner in Canada is typical.



We have 2 or 3 of your Speed to Market books, and have found them to be quite interesting and valuable in our operation. I wanted to get a bit of input from you. I will briefly describe our operation,

and see if there is any electronic system that may address our needs. I don't believe there is, but I would appreciate your opinion.

We are a job shop with about 10 customers, 2 of them totaling about 75% of our business. We have little or no visibility as to what will come in the door at any time. Ninety percent (90%) of the jobs are one-time parts (not repeats), and 80% of the orders are 1-8 pieces.

Priorities and ship dates change regularly and most parts are milling operations, often with outside subcontracting. Others are a combination of milling, turning, and 5 axis jobs. We often have in excess of 200 jobs on the go at the same time.

I have attended seminars conducted by various manufacturing software system suppliers, explained our operation, and have been told that their systems are set up with an optimal scenario of 10 parts on 5 year contracts and a hard schedule. We are almost as far away from that scenario as possible. I see having a person full time just updating the system to get a bit of an idea where we are at any point in time, and that information being good only for as long as there are no changes. In our case, we often get changes a couple of times in any given day. So, I am very skeptical that an electronic system will be useful for us.

Given this, do you know of any other possible way of giving an idea of estimating capacities and/or scheduling? That is, anything that might at least help to give us some

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Page 1

*better idea. We are brainstorming a couple of things, but just wonder if you have come across this, and might have any ideas regarding this or other things that might be valuable to us in our operation (reading, systems, etc.). Thanks in advance. John*

### **Our response was in the form of a memo...**

John...Nice to hear from you. Let's see if we can offer a bit of clarity on your situation.

First of all, it sounds like a classic job shop with much variety, short runs, lots of customer initiated changes, high variability with few repeat jobs, demand that exceeds capacity during peak periods, and customers that may be treating you as a captive supplier and jerking you around (2 customers totaling about 75% of your business).

What may differentiate you from a typical job shop, in addition to the dependence on two customers, is the large number of orders on the floor at the same time which makes it very difficult to track where jobs are, and their degree of completion. I assume you are looking for a system that will tell you where this work is in real time so you can reprioritize and reschedule as necessary, as well as manage work that has been outsourced.

Your comment about those systems you have investigated being "*set up with an optimal scenario of 10 parts on 5 year contracts and a hard schedule*" sounds like a contract manufacturing scenario. If you are doing contract manufacturing and classic job shop work in the same facility, you will need to differentiate these two value streams and manage them interdependently (recognizing that all work goes through the same work centers in the shop). If this is so, you need to make some process and organization changes first before you tackle the software issue. (See the section, *Organizing by Type of Demand*, in *Speed to Market*, Chapter 5.)

But for the sake of argument, let's put this on the side for a minute. I presume the objective is for you to know the status of each of the 200 jobs in process at any time so you can reschedule individual jobs based on changes in priorities and desired delivery dates.

**The question is, *Why do you have so much work on the floor at one time?*** You might want to reduce this number to something more manageable before looking for a software solution. If work is not flowing through the quotes to cash process smoothly, then work in process will tend to build up. This will bog down new work coming onto the floor, which then adds to WIP, and increases the difficulty of managing it. You may have a kind of worsening spiral, or snowball effect, where too much work on the floor makes it impossible to manage, so that new work being released to the floor only makes the situation worse.

If this is the case, then solving this problem should be the first order of business. It requires two things: one, a full court press to get existing work in process completed and shipped; and two, a system for preventing this build up from happening in the future. Otherwise, your problem-solving efforts will be like bailing the boat without fixing the leaks.

**The Ideal Software:** Imagine, if you will, a computer screen that shows all your work centers and their current capacities, plus every job in process in terms of its degree of completion, estimated ship date, and position in the queue behind each work center. Imagine further that this screen is in real time so that whenever a job has gone through a work center, it is read, and the latest information about its position and degree of completion is updated immediately. Also imagine that you can take an individual job and drag and drop it into a new position in a work center queue to reflect a change in the desired ship date (say in response to a change from a customer). And further imagine that this computer system also recalculates all the ship dates for the work in the queue that was pushed back when this hot job was moved to the head of the line.

Also imagine that jobs will change color from green to yellow to red when they get bumped by work you are moving up in priority so that you can immediately see which jobs are in danger of shipping late (yellow is on the verge and red would be late). Also, imagine that you can change the capacities of the various work centers in real time as well. Working overtime, adding a shift, sending work out, working weekend days, and so forth are methods for increasing capacity. For example, if you move a job up in a queue and a bunch of other jobs turn yellow or red, you can increase the capacity of that work center which should turn the jobs back to green again.

This software would give you the ability to run “what if” scenarios so you could say things to a customer like, “If we move job 05-1304 up so that it ships next Tuesday, we will not be able to make the promised ship dates on jobs 05-1305 and 05-1306. The new ship dates for those jobs will be July 12<sup>th</sup> instead of July 8<sup>th</sup> as originally planned. Is this OK?”

This may be OK with customer A if jobs 05-1305 and 05-1306 are for his company, but what if these two jobs are for customer B? Now moving a hot job up in the queue may not be an option if customer B needs the work on the promised ship date. This software may only warn you of potential problems, it will not solve them for you.

Another thing to keep in mind is that moving jobs around on a computer screen and actually moving jobs on the floor are two different things. One is free and one is not. You may, for example, have the tooling set, and the programming complete, for the next job in the queue. Moving a job up from the back may mean you have to undo and reset tooling, reprogram a machine or two, move materials around, and carry out a number of other activities in order to actually run this hot job through this work center in priority mode. This adds to the cost and erodes margins if you do not have a way to estimate these costs and charge the customer accordingly.

It would be nice if this ideal computer system would also recalculate the additional costs of each of the jobs that had to be moved in order to accommodate the hot job we are moving forward. Costs are added to a job when it is rescheduled, and these costs go undetected in most companies.

Is this ideal computer system more or less what you are looking for? If so, you can use this description to qualify software companies to see if their system has these capabilities.

**Capacity vs. Scheduling:** Keep in mind there is a difference between managing capacity, which is production planning (how much work of what type must be completed in what time frame), vs. scheduling which is a more detailed, job focus (which job, when, where, for how long, and in what sequence). For some ideas on how to expand and contract capacity to reflect changes in incoming volume, read the article, [\*Do You Know How to Play the Accordion: Managing Capacity in a Job Shop Environment\*](#).

Like you, I am not convinced that software, no matter how well it can model your shop, is really the answer to a situation such as yours where work is constantly in flux. It certainly can help, but is not the total solution. If you have a lot of changes you are trying to accommodate, you will always be running behind so to speak, and likely will not be able to schedule ahead. In other words, the changing nature of demand precludes you from constructing a schedule, and then sticking to it. We are not saying you cannot schedule in a job shop environment; rather, scheduling, no matter what system you choose, will not solve the problem you describe. Recognize the primary value of the software I described is to let you run “what if” scenarios. The changes you have to make on the floor to accommodate customers will be just as difficult and costly as they are now. The difference is that you will have a perspective that lets you see all the work at once (and farther out into the future), which may enable you to make less disruptive decisions. This is better than the piecemeal approach with its limited perspective and time horizon you are using now.

John...I hope this note and the article are helpful. Call me to discuss further.

**Comments:** There is no question that scheduling in a job shop is difficult. There is no inventory buffer between changing customer demands and the shop floor, as there is in a build-to-stock environment. Rather, changes in demand are transmitted directly to the floor where they result in jolts and ripple effects throughout departments and work centers. (If you have ever had the experience of riding in a car with no shocks and no springs, you will have a good idea of how changes in customers’ requirements are transmitted to the floor.)

You can also see from this scenario that the computer is not the solution because production will not stay fixed long enough to make the schedule a viable tool. In fact, the concept of a schedule as a fixed plan is another inappropriate concept borrowed from the world of mass production where runs are longer, finished goods inventories act as buffers, and production is repetitive. A schedule is not powerful enough to control the floor in a job shop where work is constantly in flux, and believing it can, is a mistake that will cause all sorts of problems.

**The Concept of Dynamic Scheduling:** So what can be done? There’s an old saying salespeople are fond of using, “plan your work, work your plan.” The belief is that scheduled appointments will be cancelled or changed because this happens frequently. It’s up to the salesperson to “work the plan.” That is, to make the necessary adjustments in order to be as productive as possible (essential when you are paid on a commission basis). The same idea of “plan your work, work your plan” is the essence of dynamic scheduling in a job shop environment.

Dynamic scheduling recognizes that a relationship exists between the schedule and the reality of changing conditions on the shop floor. Where static or one-way scheduling seeks to dictate what should happen on the floor and when, dynamic scheduling accepts the fact that changes are inevitable and must be accommodated. In dynamic scheduling, planning (developing the schedule) is no less rigorous, but changes are expected and integrated into an ongoing, dynamic cycle. For more, read *Chapter 8, Scheduling*, in [\*Speed to Market: Lean Manufacturing for Job Shops\*](#).

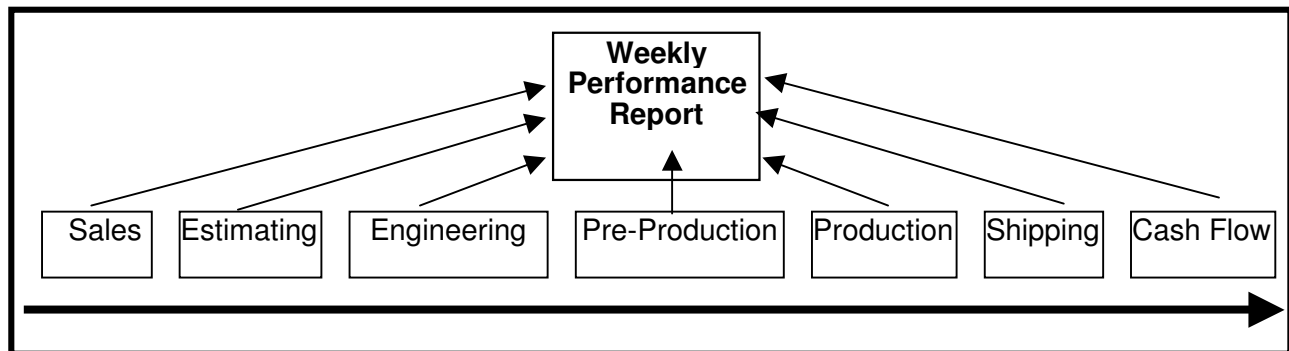
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## Upgrading Your Weekly Performance Report: Adding “Percent Goal Achieved”

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All of our clients, and many *Speed to Market* readers who implemented a *Weekly Performance Report*, are finding it to be an essential tool for running their businesses. We found that adding a new column, **Percent Goal Achieved**, provides an accurate and powerful way to highlight whether or not your organization is on target to achieve its annual goals.

For those of you who may not be familiar with it, our *Weekly Performance Report* provides high-level management information regarding the operational status and financial health of any business. It is published weekly with the most up to date information, and is structured to reflect the job shop business process from sales through shipping and accounts receivable (i.e., “quotes to cash”). The following graphic shows how the *Weekly Performance Report* wraps around the business process.



The *Weekly Performance Report* does not replace a company’s financial statements. Rather, it enables management to monitor business performance virtually in real time so that corrective actions can be taken immediately when a need is first detected. Information provided by financial statements can be 6 weeks old or more (from the first week in the month and 2 weeks in accounting during the next month to prepare and deliver the statements). When something in your business is going south, using 6-week-old information to detect it is a recipe for disaster.

## Basic Structure of a Weekly Performance Report

PERFORMANCE MEASURES	UM	Current	Average	YTD	Annual	2004	% Goal
Enter Week #	20	Week	Week	Cumulative	Run Rate	Goal	Achieved
Percent of Year Elapsed	38%						
<b>Sales</b>							
Orders Booked	\$	160,200	148,000	2,960,000	7,696,000	8,500,000	90.5%
Orders Shipped (Sales)	\$	132,000	143,000	2,860,000	7,436,000	8,500,000	87.5%

We are recommending adding another column, **Percent Goal Achieved**, which provides immediate information on whether you are ahead or behind your annual goal for any key metric at any point in the year. It is calculated by dividing the **Annual Run Rate** by the **Goal** for specific performance measures, and assumes linearity.

As you can see in the above example, this company is running at 90.5% of their bookings goal at Week # 20, and 87.5% of their sales goal. If they expect to achieve their annual sales goal of \$8,500,000, they will have to ship \$5,640,000 in the remaining 32 weeks of the year (\$176,250 per week on average). In other words, they will have to improve their performance by 7.8% per week for the balance of the year (from the original weekly goal of \$163,462 to \$176,250).

Another way to look at this is to recognize that 38.5% of the year has elapsed, and only 33.6% of the sales goal has been achieved. This illustrates how important it is to identify shortfalls in performance as soon as possible, and get back on track when the difference is small.

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## *Update on Closing the Loop*

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In the April 2005 Issue of the [Speed to Market Newsletter](#), we described a procedure for closing the loop. This refers to the often neglected yet critical practice of comparing estimated to actual costs on a job-by-job basis. The purpose of closing the loop is to determine why actual costs are higher (or lower) than estimated in order to determine reasons for variances, and then to use this information to drive continuous improvement.

When we installed this procedure in one of our client's locations and trained people to use it, we also established a base level of performance against which to measure improvement. Three measures were established. You can see the results in the following matrix.

**Margin Gains** shows the reduction of actual costs compared to estimated costs. This shows a cumulative improvement of \$15,665 over the base. In other words, without improvement, the losses would have been \$65,124; with improvement, they were \$49,459, the difference being \$15,665 or 24%

**Absolute Gains** shows the reduction of actual costs over the price charged the customer. Losses were reduced by \$7,137 or 28%. This is a start, not the total improvement possible. It does show, however, that implementing a disciplined approach to closing the loop, and then using variances to drive continuous improvement, will produce tangible results.

Results Summary	
<b>Margin Gains</b>	
Losses at Base	\$ 65,124
Actual Losses	\$ 49,459
Ahead/(Behind)	<b>\$ 15,665</b>
<b>Absolute Gains</b>	
Losses at Base	\$ 25,092
Actual Losses	\$ 17,955
Ahead/(Behind)	<b>\$ 7,137</b>

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## News and Notes

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**Learn...Adapt...Prosper** is the theme for Mazak Corporation's *Touch the Future 2006* Conference in November.. **Vincent Bozzone** will deliver the kick off presentation on each of the three days at their Center for Multi-Tasking and Manufacturing Excellence, in Florence, Kentucky. Mazak is the world's leading supplier of CNC machine tools. [Click here for more information on this free event.](#)

**Take Our Free Survey:** The first step on the road to profitable growth is an honest self-appraisal of your business situation. Download and print this survey, [Is This Your Shop?](#), administer it to your people, tabulate the results, calculate the costs of continuing to live with these problems, and then decide how you will move forward with a corrective action plan. And of course, we are always here to offer help that is just a phone call away...248-333-0482.