WHITE PAPER

MANUFACTURING FREEDOM

Changing the Scheduling Paradigm to Achieve True Visibility of Shop Floor Priorities

Protected Flow MANUFACTURING™

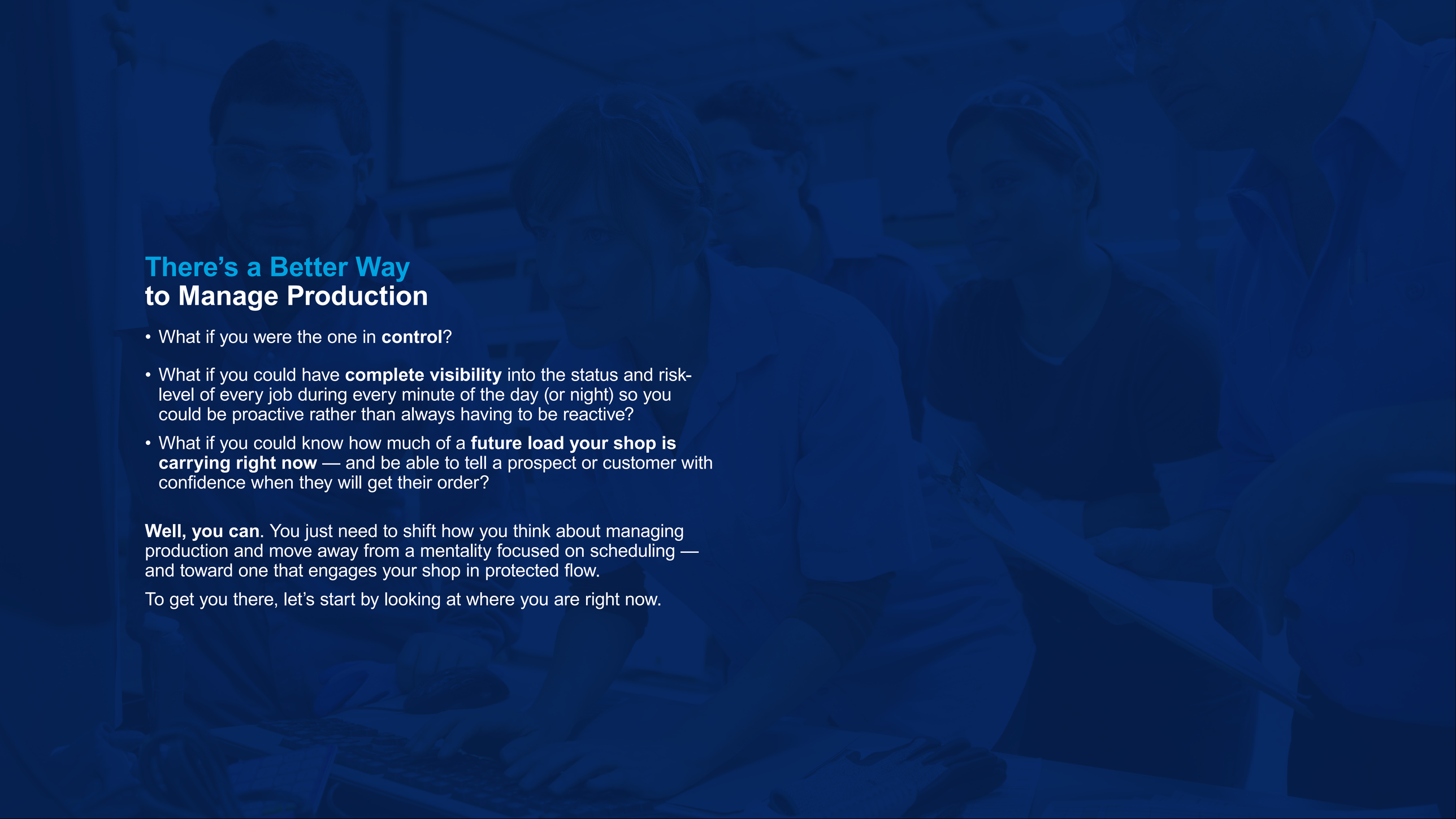
by LillyWorks

Feeling Trapped by Your Shop?

Do you feel like your manufacturing operations are **controlling you**, when it should be the other way around?

Do you purposefully **not take vacation** — even a day — because your shop floor would stop functioning properly without your constant direction, guidance, and firefighting?

Are you ready to change all of this?



There’s a Better Way to Manage Production

- What if you were the one in **control**?
- What if you could have **complete visibility** into the status and risk-level of every job during every minute of the day (or night) so you could be proactive rather than always having to be reactive?
- What if you could know how much of a **future load your shop is carrying right now** — and be able to tell a prospect or customer with confidence when they will get their order?

Well, you can. You just need to shift how you think about managing production and move away from a mentality focused on scheduling — and toward one that engages your shop in protected flow.

To get you there, let’s start by looking at where you are right now.

How Are You Managing Production Today?

If you're like most manufacturing companies you're using **manual whiteboards and/or spreadsheets**.

Those who have been able to get their ERP scheduling module or an APS system going may have some better visibility of their load vs. capacity — but there are still some fundamental flaws in the design of traditional ERP and APS-based scheduling programs.

Traditional ERP and APS-Based Scheduling Programs:

DON'T REALLY PRIORITIZE

The scheduling algorithms for these systems are designed to answer the question, "Will we have the capacity to build that/those?" Users assume that the capacity-loading algorithm places the orders in the correct order for executing in production but this is not actually the case.

HAVE INHERENT LAG

Any ERP or APS scheduling program is only as good as the last time you ran the program. But stuff happens. Customers change their minds about due dates, machines break down, tooling goes missing, etc. No matter how good your "plan" was, it becomes outdated very quickly.

RELY ON ESTIMATES

Any scheduling program uses your estimated setup and runtimes to allocate the future capacity and build the schedule. In order for the schedule to be believable at all, those estimated cycle times have to be extremely accurate.

Due Dates Are the Problem

Regardless of the method you're using to schedule your shop today — whiteboards, spreadsheets, or ERP-based or standalone APS scheduling tools — the default priority data point that everything gets organized around is the work order due date. This seems to make perfect sense on the surface. Due dates are extremely important; they represent your commitment to your customer.

However due dates are not a good priority mechanism. Why?

Why Due Dates Don’t Matter So Much

Most manufacturing companies in North America today are completely — or at least to some degree — “hi-mix, low-volume” (HMLV).

You will have jobs that are due, say, in eight weeks, that are much more at risk of being late than jobs due in even one or two weeks due to the fact that the eight-week job might take much longer or involve more operations, or need to go to outside processing, etc.

In today’s HMLV environment, you are potentially making the jobs with a later due date more at risk of being late by paying attention to the jobs with an earlier due date first.

This is why many manufacturing companies feel they are in “constant expedite” mode – always trying to catch up.

The Right Way to Prioritize Work

So, if it’s not by due date, what is the right way to prioritize work?

Controlling how much is sent into WIP (Work in Progress).

Many manufacturers have an “intuitive” idea that the sooner they get material out on the shop floor, the sooner it will come out as a finished product. On the surface, this makes sense. But, this is not the case. There is a law in queuing theory called Little’s Law that demonstrates how sending more and more work into WIP actually slows things down.

Flooding WIP also confuses the true priorities and greatly increases the chance that the “wrong” job will be selected to work on next in any department.

So how does one determine what the correct timing is to release any given job into the shop? The answer doesn’t lie in better scheduling; it requires a **paradigm shift**.

Preparing for the Paradigm Shift

If we're being honest with ourselves, are the methods we're using to manage production today restricting and impeding production, or promoting and enabling it?

This is the basic production management model that has been in use since the 1970s and 80s:

1. Plan
2. Create a Schedule
3. Execute the Schedule

BUT WE ALL KNOW THAT:

- There's no such thing as a perfect plan
- The schedule comes from flawed programs (e.g., ERP, APS)
- A schedule is almost never executed as intended

In other words, we're working in a way that fits the classic definition of insanity: "doing the same thing over and over and expecting different results."

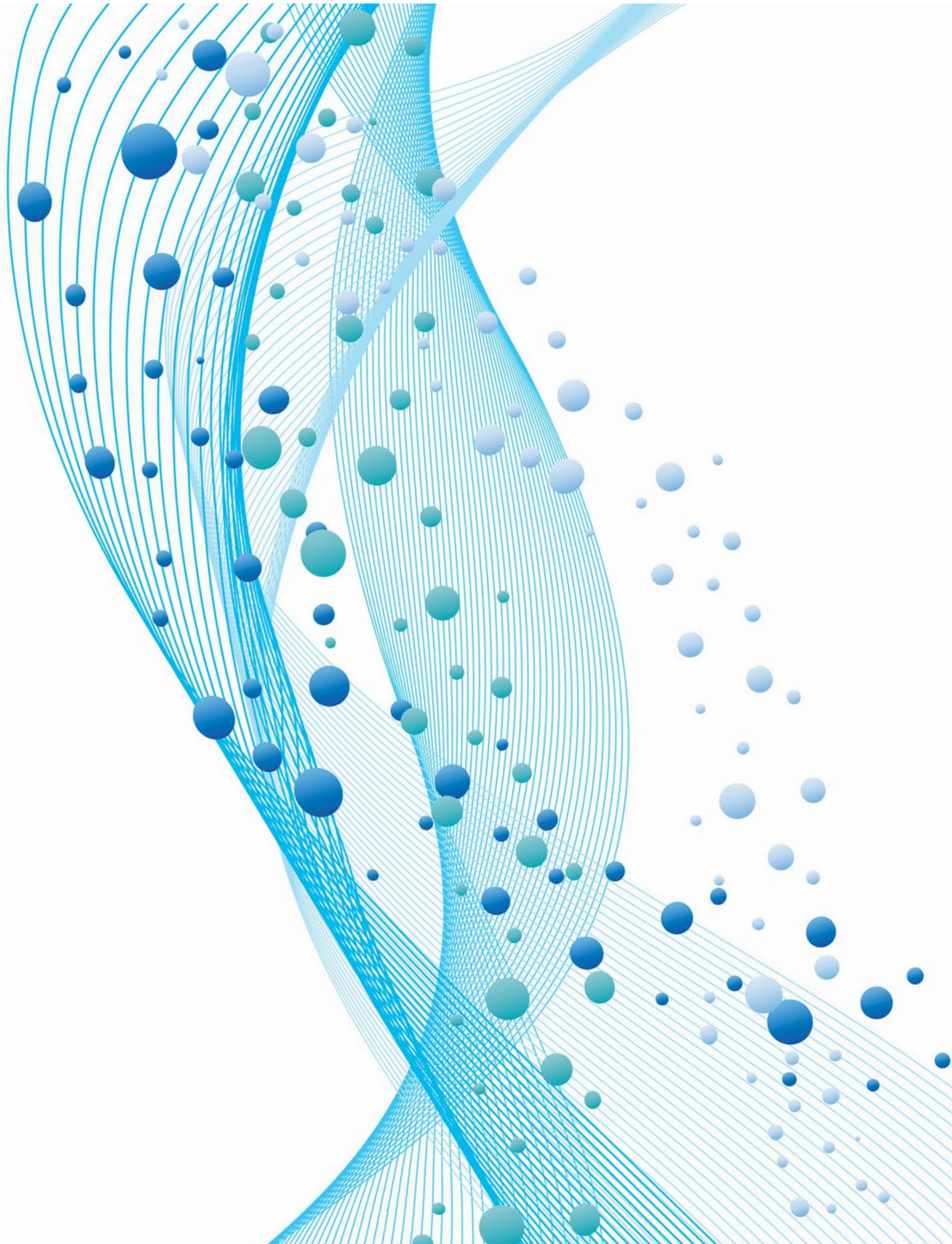
A New Paradigm Based on Flow

The paradigm shift away from scheduling is necessary because attempts to execute against a schedule will always, inevitably, be out of sync with reality.

Enter the concept of flow.

In Joe Orlicky's, *Materials Requirements Planning: The New Way of Life in Production and Inventory Management* (1975), he quoted George Plossl's "First Law of Manufacturing," which states:

> "All benefits [implied in a manufacturing company] will be directly proportional to the *speed of flow* of information and materials."



The Value of Flow

If you've been in manufacturing for any time at all, you understand that speeding up the flow of material through manufacturing processes is going to have many benefits:

- **Shorter** lead times
- **Better** on-time delivery
- **Shorter** quote-to-cash cycle
- **Stronger** overall financial and operational performance

To realize these benefits, we should focus on flow in the here and now and ask how we can deliver actionable intelligence to the areas of the company that need it to make the critical decisions that will promote and improve the speed of flow of materials.

How to Leverage Flow

Protected Flow Manufacturing (PFM) is a new type of production management software, based on a new, flow-based paradigm, that dramatically accelerates the flow of information directly to where the work happens.

PFM is real-time, actionable intelligence that can dramatically speed up the flow of materials.

How does it work? Let’s see.

SHOWING YOU FLOW WITH PFM

Here’s that chart for your shop, courtesy of PFM.

Like a radar image of a weather pattern, this chart shows all of the jobs in production right now and where the danger zones are.

Each dot plotted on this chart represents one or more jobs (the number in the dot represents the number of jobs). The placement of the dots on the chart represents the jobs’ “Threat Level,” or how at risk they are of being late.

The higher a job’s Threat Level, the more of a chance it has of being late — i.e., the more in danger it is.

Figure 1. Protected Flow Manufacturing shop overview chart.

Visualizing Job Threat Levels

To illustrate how Threat Levels works, here's an example of a PFM view showing the status of A8000, a job with three subassemblies.

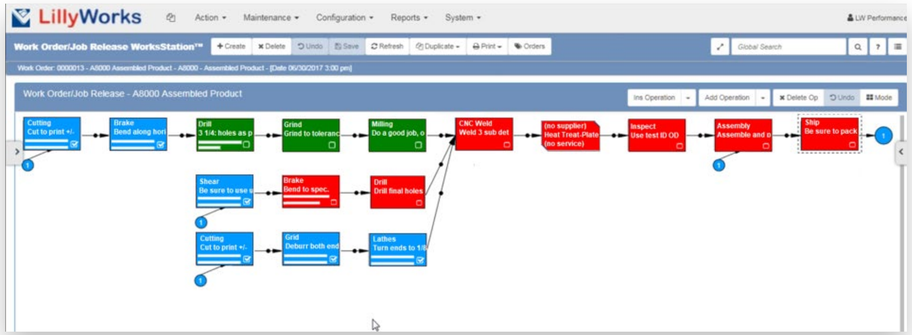
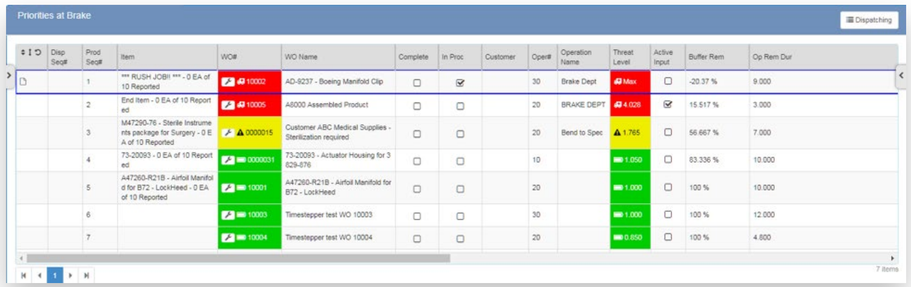


Figure 2. Status view of A8000, a job with three subassemblies.

- The bottom subassembly is finished (three operations in blue with the setup and runtime bars indicating complete).
- The top one is almost halfway done and does not have a high Threat Level (green).
- The middle subassembly is a little past halfway done, but it's in trouble with a high Threat Level (red).

What's Causing the High Threat Level?

Let's drill down to find out what is happening in the Brake department that might be slowing things down for A8000.



	Disp Seq#	Prod Seq#	Item	WO#	WO Name	Complete	In Proc	Customer	Oper#	Operation Name	Threat Level	Active input	Buffer Rem	Op Rem Dur
		1	*** RUSH JOB!! *** - 0 EA of 10 Reported	10002	AD-9237 - Boeing Manifold Clip	☐	☑		30	Brake Dept	Max	☐	-20.37 %	9.000
		2	End Item - 0 EA of 10 Reported	10005	A8000 Assembled Product	☐	☐		20	BRAKE DEPT	4.028	☑	15.517 %	3.000
		3	M47290-76 - Sterile Instruments package for Surgery - 0 EA of 10 Reported	0000015	Customer ABC Medical Supplies - Sterilization required	☐	☐		20	Bend to Spec	1.765	☐	56.667 %	7.000
		4	73-20093 - 0 EA of 10 Reported	0000031	73-20093 - Actuator Housing for 3629-876	☐	☐		10		1.050	☐	83.336 %	10.000
		5	A47260-R21B - Airfoil Manifold for B72 - LockHeed - 0 EA of 10 Reported	10001	A47260-R21B - Airfoil Manifold for B72 - LockHeed	☐	☐		20		1.000	☐	100 %	10.000
		6		10003	Timestepper test WO 10003	☐	☐		30		1.000	☐	100 %	12.000
		7		10004	Timestepper test WO 10004	☐	☐		20		0.650	☐	100 %	4.800

7 items

Figure 3. View of priorities for the Brake department.

It looks like a rush job for Boeing (AD-9237) is in process in the Brake department. This is why the A8000 job is in trouble. It is second on the list and waiting for AD-9237 to finish.

What Does a High Threat Level Mean?

We can also drill down further into the status of A8000 to see where it is in its unique lead-time life cycle, showing us why it has a high Threat Level, even though it is due after the Boeing job.

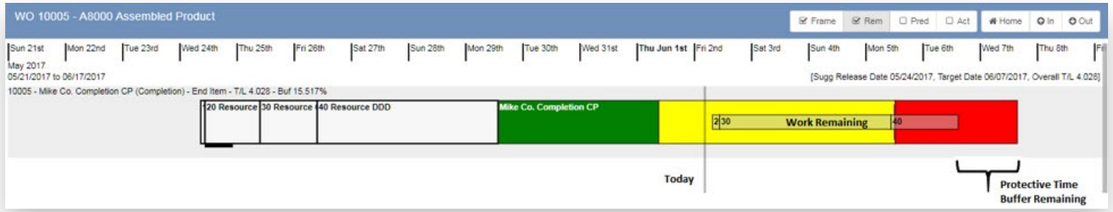


Figure 4. Lead-time view of the A8000 job.

What this view shows us is that even though A8000 is not late right now, the work remaining will not be completed until well into the red zone, giving it a Threat level of over 4, which means that it is very much in danger of being late.

CALCULATING THREAT LEVELS IN REAL TIME

Here's how the Threat Level indicator works. Every job starts at a Threat Level of 1, which is neutral.

If you're getting the work done faster than expected, then the job's Threat Level will drop below 1.

On the other hand, if work slows down or stalls, eating into the protective time buffer you have put in place and threatening your ability to deliver by the projected end date, the job's Threat Level starts to rise.

A Threat level of 4 essentially means that you have four times as much work to do as you have time left.

See PFM in Action

Protected Flow Manufacturing delivers actionable intelligence in real time to the people in your company who need to make informed decisions now. With Protected Flow Manufacturing, you'll have the visibility you need to be able to answer the following three fundamental shop floor production questions:

1. Where is the order, and how is it progressing?
2. Which job do I work on next?
   (In any department or shop-wide.)
3. How can I tell my customer — with confidence — when they'll be able to get their order?

For more information, or to request a demo, visit www.protectedflowmanufacturing.com or call 603-926-9696.

Protected Flow
MANUFACTURING™

by LillyWorks

Alert. Recommend. Do.

Protected Flow Manufacturing helps you drastically improve on-time delivery by prioritizing what needs to happen first, not what's due first.

Salesperson's Name

Salesperson's Phone

Salesperson's Email