OLIVER WIGHT PAPER series

My Bow Wave Just Ate My Hockey Stick

A White Paper for Supply Planners and Executives



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Imagine the possibilities.
Realize the potential.

"David, you are not going to believe this, but my Bow Wave just ate my Hockey Stick!" Rob is a good-natured Canadian fellow but, while we were laughing, I knew this was not classic hockey humor. Something was about to break. (See Figure 1)

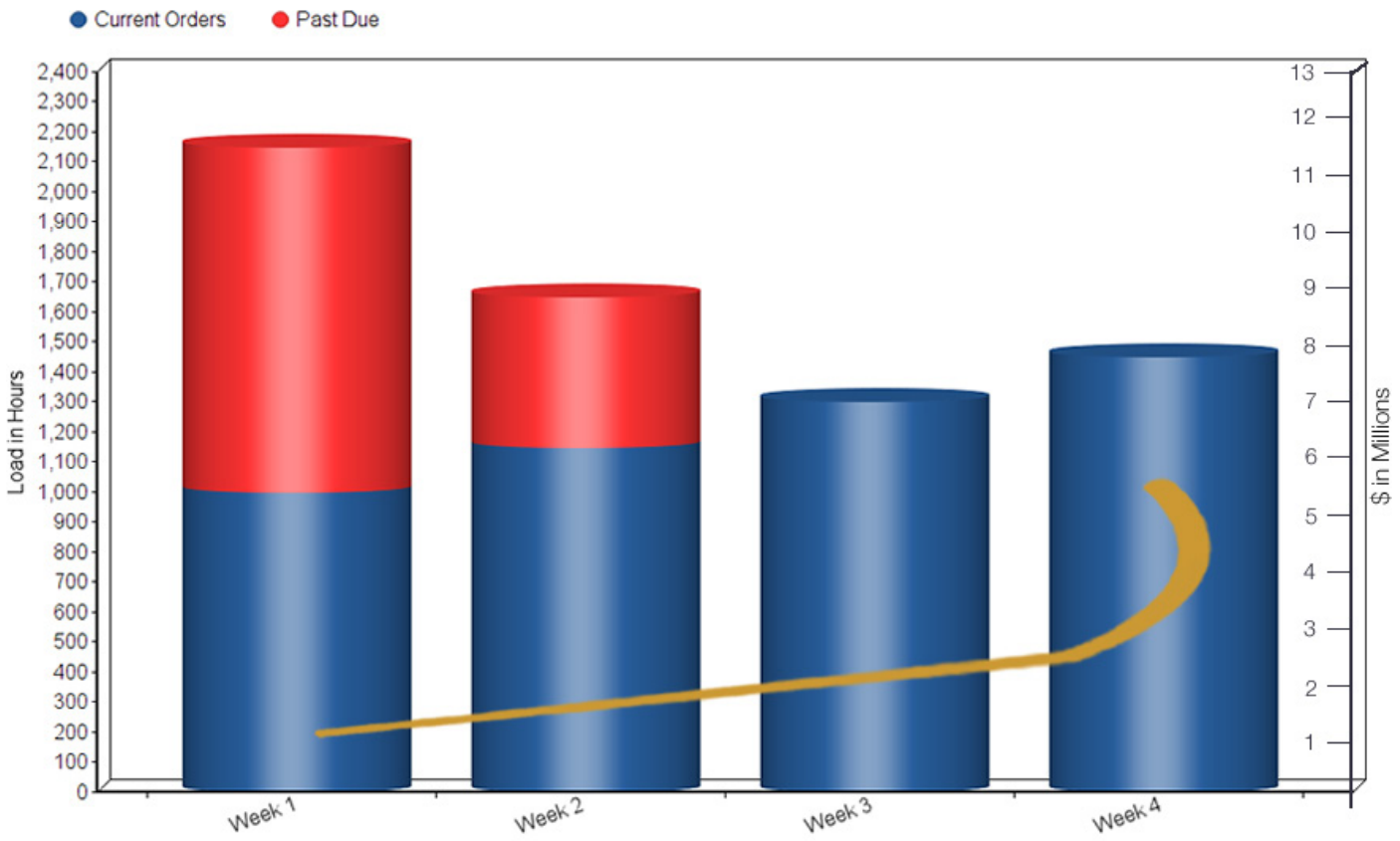


Figure 1 - Bow Wave and Hockey Stick

I'd been working with Rob, the new Plant Manager at an engineer-to-order capital equipment manufacturer, for a while. Rob had been making his way around a manufacturing floor for over 15 years. When we first met, he told me some of the challenges he was currently facing.

"I'm plagued by shortages all the time," he told me. "Raw materials and subassemblies keep biting me in the ….. And, of course, I have to reduce inventory based on corporate edict, which always seems random."

I nodded,

"To make matters worse," he said, 'look at shipments for this month."

Having just had a meeting with Mohamad, the North American Demand Manager, I knew that planned shipments for the current month were less than the average month. A lot less.

"I know you're down $5 million," I said.

He nodded, no longer laughing.

"But that's not all," he said. "Another edict; the executive team wants me to figure out what new customer order I can build -- to make up the lost revenue!"

I turned to him, surprised. "But you have no available capacity for the next two months," I reminded him. "Are you saying the executive team is planning your shop capacity based on revenue!?"

"Yeah," he replied. "No, well, yes. I guess I didn't think of it that way but, in fact, that is what they're doing."



Definition: bow wave	Definition: hockey stick
Bow wave: A mass of orders, both past due to promise date and current production, that sits in the current period on the planning horizon. Together, the combination of these orders is well beyond the company's capabilities to all be completed as promised and/or scheduled.	Hockey stick: The uptick in shipments that occurs at the end of each period as a result of pulling future shipments into the current period for the sake of generating additional revenue. The phenomenon tends to be greater at the fiscal end of quarter and annual cycles, in a last-ditch effort to hit budget.

Hockey stick phenomenon

Where does a hockey stick phenomenon come from in the first place? It's always the Executive Team that is responsible for knee-jerk reactions and often making unjustified decisions based on expected revenue numbers.

The issue is not the shortfall, per se. It's the surprise that causes the shortfall. In all cases, the hockey stick has been the result of an unrealistic revenue plan that all too often is developed based on poor, unrealistic assumptions.



Here's an example; Consider a company's executive team who expects to generate $120 million in revenue this year because that's what they generated last year. So, without better information, the Commercial team proposes the following assumption; "We should always track to $10 million in revenue per month." Heads nod; sign-offs are made.

Then, the first month that does not have a planned $10 million in revenue to be shipped is when cracks in the foundation begin to develop. The response is always the same; Sales says "We will make it up in the next month or two." At some time in the future, all hell breaks loose, the executive team panics and commences the pull-in effort.

The problem has started with a bad set of numbers that appeases, perhaps, a Board of Directors; it's what they wanted to hear. But these decisions based on "wonky" numbers rock the organization.

So, if the problem is in the numbers, where's the solution?

The solution is in the numbers too

Do the revenue exploration work up front. Explore demand plans, and look for trends and seasonality changes that will support understanding:

- When $10 million is a great month (that was planned to be $7 million) and
- When $10 million is genuinely a crisis

Not every month will be the same, nor should projections make it look that way.

Water, Water Everywhere

Another leading cause of revenue-based capacity planning is when departments aren't hitting revenue as a result of price erosion. It is the job of the executive -- more specifically, the commercial leader -- to sell the product at the planned sales price.

Giving product away, or deeply discounting it to make a sale, does not reduce the capacity load necessary to make the product. It still requires the same capacity and costs the same to build and ship.

Please see the Oliver Wight website for additional information on developing a demand plan.

https://www.oliverwight-americas.com/demand-management





The first step is to clean up the demand plan and ensure there are credible numbers.

The second step is to consider the time frame. For simplicity, let's talk about just two points on the horizon: 0 to 3 months and 4 to 24 months.

From a supply perspective, the 0- to 3-month time frame is the domain of Master Scheduling; we will take a look at this process a bit later.

The 4- to 24-month time frame deals with executive planning, and it must be supported by Integrated Business Planning (IBP). Here's why;

Integrated Business Planning (IBP) is the medicine the executive team needs to take to wean themselves from the hockey stick phenomenon. A properly executed IBP process will drive executive agreement on revenue plans across a 24-month horizon.

Back on the shop floor, I explained to Rob that he had to take two primary actions to support IBP from a supply perspective.

1. Develop a realistic, achievable supply plan that supports the commercial team needs (Demand Plan).

    - Realistic means that Rob will need to evaluate the resulting load on his supply chain to meet the demand plan (and resulting revenue) based on capability his manufacturing facility has demonstrated.

    - Achievable is equally important and means that, while the plan is realistic (as in, we do have the capacity), it may require extensive expediting of long lead-time materials or working massive amounts of overtime.

2. Deliver the goods. It's one thing to plan to do something, but month after month, Rob and his team will need to demonstrate that, not only was the capacity that he committed to available for production but also, that the units planned to be shipped were, indeed, shipped.

Rob now understood his task with the Executive Team. But there was more to do.

We needed to address the 0- to 3-month time frame to address both the bow wave and short-term hockey stick. I asked what his initial thoughts were leading to short-term challenges.

Rob did his homework and found that the shortages come from a few key areas:

- Constant churn of priorities from pulling up of shipments planned for next month
- Committing inventory and/or parts to jobs that end up not shipping
- Some loss due to quality issues
- Capacity constraints for base production and rework
- Planners drive to lots sizing rules

Further item accuracy in their ERP system, SAP

To understand the details of SAP challenges in the organization, we spoke to Viraj, Materials Planning Specialist. With a warm smile, Viraj walked us through a list of data challenges. Viraj's smile assured us he had been thinking of this for quite some time but without an outlet, as item master accuracy had received little attention from the previous materials manager.

But finally, the time was right for fixing fundamental data. Viraj explained the list of poor information driving SAP:

- Lead times no longer reflected reality of the complex machines they were building
- Bills of Material lacked accuracy
- Routings were made accurate only because they were manually fixed -- just prior to being released to the floor; and the list went on. (Those first three items on the list will be highly recognizable to many readers.)

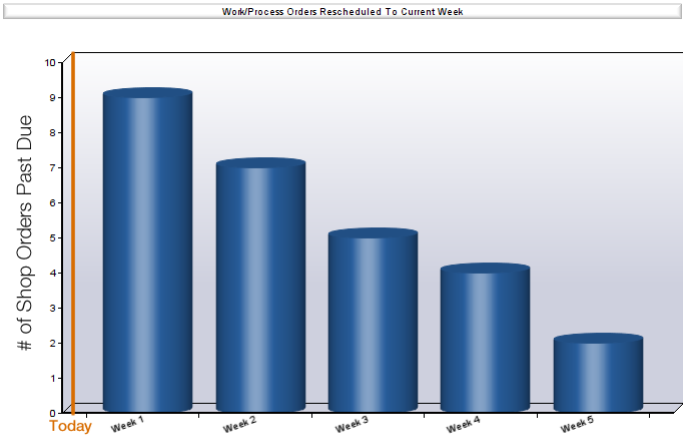


Figure 2 - Work Orders

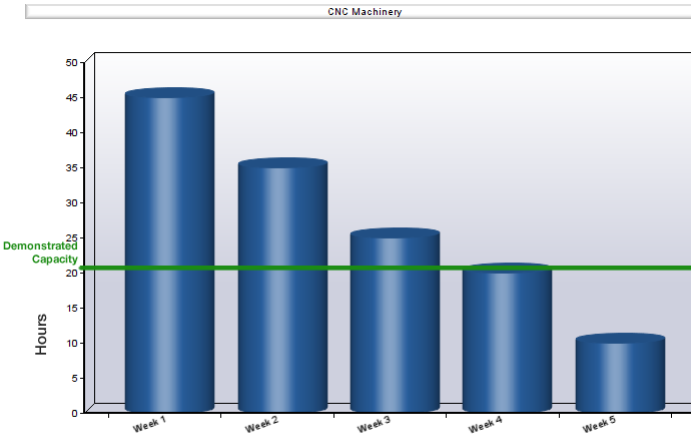


Figure 3 - CNC Machinery

One key impact to the multiple issues in master data was the lack of detailed capacity planning information.

The only yardstick the planning team had was the number of released orders. A nightly program updated any past due order with a completion date in the current week automatically, without regard to reality.

Simply graphing orders -- based on completion date -- revealed that the majority of work orders were due in the current week, and trailed off dramatically over the next few weeks. (See Figure 2)

And, when viewing those same work orders but based on load to the shop, the magnitude of the graph was greatly amplified to a point where there were not enough hours in the next few weeks to complete the workload. (See Figure 3)

Sure enough, everywhere we looked in the shop, we saw machines and people; all very busy. Nothing, no one was idle.

As we walked around the plant, Rob pointed out a line that had the very newest machines and most talented operators. The line had been built for the sole purpose of supplying emergency replacement parts to their install base. I asked if there was a quality issue, as the line was flush with parts being manufactured, and I could not believe that this company could be in business with that level of repair.

Rob chuckled. Since being at this company, he said he'd never seen the line idle nor actually running just spare parts.

The overloading of every other dedicated line in the factory had caused the day-to-day production to bleed into the line that had the absolute highest cost! This is the sort of inefficiency that is apparent only to managers on the floor– and, industry-wide, millions of dollars are lost this way each year.

Capacity Beyond Release

So, it was clear that understanding base capacity -- beyond released orders -- was going to take some work.

Rob and I decided to address the issue relative to commercial priority. In other words, we asked the Marketing Team where the highest priorities were for planned company growth. From that meeting, we emerged armed with a product family that was fairly well contained within the manufacturing facility.

We set our sights on establishing an Integrated Tactical Planning (ITP) process to fill the short-term needs. (See Figure 4)

The basic supply-side ITP requirements we'd focus on were:

1. Establishing a Time Horizon
2. Implementing Master Scheduling
3. Ensuring Rough-Cut Capacity Planning Capabilities
4. Developing formats for weekly discussions with Sales/Marketing at SKU level, covering the defined horizon

(For more depth on ITP, review the excellent white paper by Rod Hozack http://www.oliverwightasiapacific.com/en-GB/news-blog/white-papers/m/product/view/92)

I mentioned earlier that three months was the first horizon. For Rob's facility, the order promise window was to deliver in six weeks. We chose three months as a starting point, as it should give a view of a six weeks of commitments and an equal amount of time available for promising orders.

Note: Although the cumulative lead time of the product (time it would take to build a machine from scratch – assuming

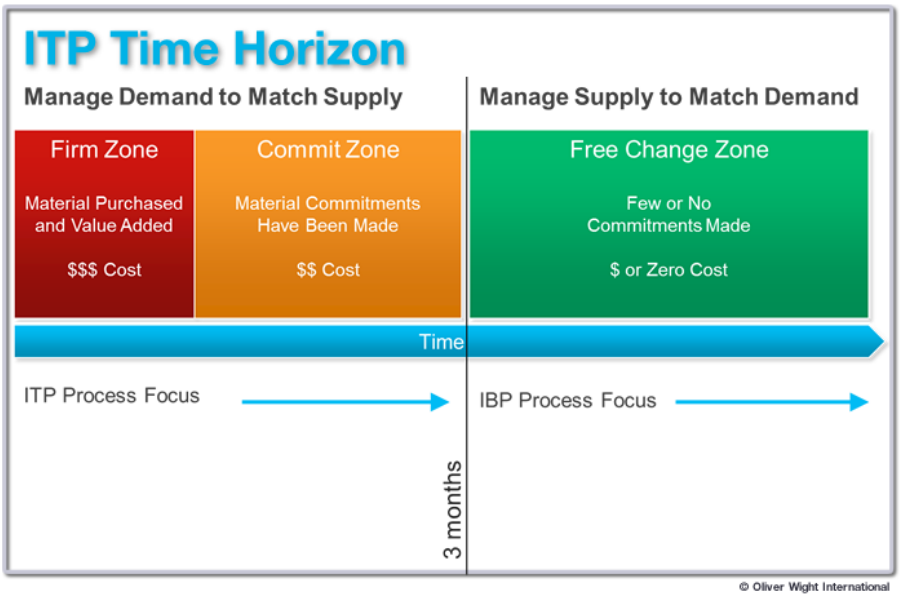


Figure 4 - ITP Time Horizon

no inventory) can be longer than three months, Rob's company does strategic inventory stocking of parts to shorten the actual lead time it takes to get a machine built and out the door once the customer order is received.

Typically, an average machine could be built in a month. Fortunately, raw material, for the truly engineered-to-order portion of their machines, was largely bar stock -- with two-day lead times – therefore, master scheduling over the three-month horizon worked well.

Note: three months is a remarkable number as it fits most companies, for the ITP horizon.

This first horizon has two distinct areas:

- A committed, inside of manufacturing lead-time zone where customer orders have been aligned to existing capacity,
- A partially committed zone where orders trail off to nothing

> In all cases, where implementing master scheduling, companies find capacity they never knew existed -- simply by providing stability to the manufacturing resources.

- A third area on the horizon is where no order has been placed. For now, we will address just the first two.

The Master Scheduling process covers both areas -- the first area is in alignment with commitments to customer orders. The second is in alignment with a combination of existing firm orders and the Demand Plan.

Master schedulers utilize Rough-Cut Capacity Planning (RCCP) to ensure that plans are valid and realistic in order to establish schedules over the entire ITP horizon.

With a Master Schedule in place, Sales and Customer Service can take orders using the Available To Promise (ATP) tools and approach. ATP is standard ERP functionality; it compares supply plans across the horizon to actual customer orders and, therefore, provides credible commitment to new customer order on-time delivery.

The ITP process kicks in when a customer order is different than anticipated. Let's consider a few instances:

- A customer requests an order in the sold-out zone
- The customer order is greater than the planned demand
- Customer orders have not materialized where a supply plan exists

In the first instance, we must consider that the committed schedule is not a statement of capability -- it is simply a plan in place. There may be an option to take an order in this zone, but the communication must first happen between Supply and Demand. If there is no more capacity or material to accommodate the request, an alternative date must be identified by the Supply team. However, the Commercial team may be insistent that this is a "high-priority customer."

ITP then focuses the discussion on what similar orders could be moved out to accommodate the "high-priority customer." But note: It will NOT be acceptable to simply pile on another order into an area that has committed capacity and is relatively stable and, most importantly, has been sold out!

The second instance – when a customer order is greater than the planned demand -- is quite common, as predicting customer demand is always a challenge.

Regardless, agreement on the term must be reached. Greater means we have to understand where on the planning horizon the order can be committed.

Sometimes, things can work out in favor of the customer.

In instance three -- orders have not materialized where a supply plan exists -- we have a dilemma of what to do with planned capacity and material where no customer order has emerged. So what should we do? We simply utilize the ITP process to evaluate options.

Maybe we could build something that most customers would want. You may have noticed that automotive companies often build cars with no specific customer orders. The cars that you see on a dealership lot have the options and features that someone from Marketing or Sales has determined are the most popular and, thus, direct manufacturing that, when no customer order appears, here is what they should build.

If we decide to not utilize the allotted capacity, it's lost, but the materials will carry over to future products. Or, as indicated, we get lucky sometimes and are able to apply spare capacity and/or materials to meet an unexpected customer request.

A Class Distinction

Prior to achieving Class A, these events occurred in my world too. But I was lucky: they did not occur together. When a bow wave forms in a supply chain, we typically spot it on a capacity chart.

In the best case, a bow wave has the first three months of load greater than demonstrated capacity -- and the rest of the horizon looks achievable.

> I can't tell you how many times a client has said to me, "I can't add capacity because in just three months, we are out of this situation." Unfortunately, a nice level month number four never materializes.



This is the best case, because showing load in the current period is far better than the worst case where no rescheduling is occurring.

When no rescheduling is occurring, the situation is the same -- but the load shows Past Due or in a Past-Due time period.

John Proud (author of the definitive book on Master Scheduling https://www.oliverwight-americas.com/book/master-scheduling) will tell you that having Past Due work/production/supply orders in the master schedule is illegal. I am pretty sure that the American Production and Inventory Control Society (APICS) has a secret team of supply chain police that enforce Past Due laws. This worst case implies that the company has given up on attempting to work through the bow wave – it says the company no longer cares to show a best attempt at recovery.

Taking the above concept a bit further, why not just reschedule?

In my first role as a capacity planner, I was told that the priority system for manufacturing was Due Date. Unfortunately, someone leaked this information to our Sales Team. Suddenly new customer orders were being entered into our ERP system due today.

Of course "due today" in a make-to-order environment was impossible, but the Sales team had been burned by late delivery, so why not try to get top priority on the shop floor?

However, what everyone, from Sales to the manufacturing floor, failed to understand is that once everything is overdue, there is no real sense of priority (or credibility).

I have repeatedly heard stories where Sales teams have tried, on more than one occasion, to enter sales orders as past due, in order to get priority.

Elements summarized

A Bow Wave alone demonstrates that the Supply Team has lost the ability to plan and control their supply chain with realistic expectations. A Hockey Stick phenomenon alone demonstrates an executive team is unable to manage the financial plan of the company within expectations. When both Bow Wave and Hockey Stick occur, the outcome can be disastrous for the company and for careers. Within Rob's company, we were able to develop a plan and solve the crisis before it hit red-line.

We oversaw the development of a good plan with realistic revenue projections across a full 24 months.

- If sales don't materialize according to plan, the Commercial team owns recovery.
- Capacity must be ensured across entire horizon.
- ITP ensures no surprises in the first three months.
- IBP ensures the plan is understood 4 to 24 months out.

If these events made you smile and/or nod because they sound familiar, consider bringing your planning team to an Oliver Wight Education Session. Education is the best option for reorganizing for success:

- Start with an IBP course for the executives and those who support them.
- Take the priceless Integrated Supply Chain Management course designed for both commercial and supply chain teams.
- Split into two separate groups:

    1. Demand folks must attend the Demand Management Course.
    2. Supply folks must attend the Master Scheduling Course.

3. Ensure that there is some cross-over in the courses, as this is a team approach. Supply planners must understand Demand Plan development to be supportive and, of course, the Commercial teams should be clear on Supply Plan development.

For a deeper dive, Oliver Wight educates and consults on all of these topics. If your Bow Wave eats your Hockey Stick, we want to help you recover and stay afloat!

About Oliver Wight

At Oliver Wight, we believe sustainable business improvement can only be delivered by your own people. So, unlike other consultancy firms, we transfer our knowledge to you; knowledge that comes from nearly 50 years of working with some of the world's best-known companies.

Your Oliver Wight partners will coach, guide, and inspire your people to drive change throughout your organization, allowing you to create a culture of continuous improvement and innovation that simply becomes, for you, 'the way we do things'. We call our approach to change management, the Proven Path; it's a proven, sustainable approach that will transform your business performance and deliver results straight to the bottom line.



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ABOUT THE AUTHOR

David Goddard, a principal with Oliver Wight, has comprehensive global operational supply chain experience in a variety of environments within industries such as oil and gas, pharmaceuticals, electronics, heavy machinery, forest products, and consumer products, coaching managers and executives to lead their companies to Class A certification. He brings to clients a wealth of domestic and international success impacting the entire supply chain – from Integrated Business Planning through execution.

His support of clients for FastTrack Sales and Operations Planning implementation as well as Integrated Business Planning is a core competency for David with clients ranging from chemicals to pharmaceuticals and consumer goods to capital equipment, helping them to achieve strategic and financial goals.

David is the lead instructor for Oliver Wight's Master Scheduling Course, Product Manager for our web-based assessment tool, eList and Product Manager for the Oliver Wight Americas' Supply process. David's skills benefit both clients and Oliver Wight in achieving success.

David has his CPIM from APICS and has served on the board of directors for two chapters. He holds a BS in Business Administration from Boston University with a concentration in operations management.

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