

Out of Stock is Out of Business

The Right Stock is In the Money

Greg White

Introduction

Some years ago, industry experts predicted that distributors as a whole would cease to exist; this was even before the dotcom bubble of the late 90's and early 00's had them pointing and saying "See, I told you." E-commerce, they said, spelled the certain end of distributors. Of course distribution survived, though it may be taking different directions or even leveraging e-commerce. In any case, what we know as distribution now thrives, as thousands of companies have entered the arena in the last 5 years. This growth is thanks in large part to the **success** of e-commerce, along with a proliferation of producers, including offshore product sourcing.

You may think of your business in another way, but I challenge you to view it as many of your customers do. The value you represent to your customers is to provide them goods that:

- They can't otherwise find
- They can't afford to source directly, or
- They aren't allowed by the manufacturer to source directly
- Otherwise, require too much lead-time

Many customers see the primary reason for the existence of your company...your "value added service," is to get goods at a price, in a timeframe and in a quantity that allow them to conserve cash; and for this they are willing to give you some extra money...those of us who love it, call it margin. What a beautiful word!

Considering the environment described above, it is obvious why your company is so reliant on inventory to assure a prominent position in the marketplace. Truly, it is this inventory that impacts so heavily your ability to provide your value added service and at the same time manage your business for profit. Does any of this sound familiar?

- You want to grow your business, so you need cash to invest in sales efforts, more inventory, delivery vehicles and the like.
- You have a lot of cash tied up in inventory, so you have to satisfy customers with as little inventory as possible.
- You want to make a profit, so you have to satisfy customers with as little inventory as possible, without spending too much money on selling, ordering, receiving, holding and shipping goods.

Inventory as Investment

The ability to accomplish these lofty, and yet necessary goals, requires a process that addresses inventory issues using proven techniques and a complete approach. That alone is difficult to say, much less to do, and yet you also need a process that makes it simple for your people to manage your inventory as an investment, rather than a nuisance.

In reality, it is a specific person...the much maligned, derided, and worse yet, ignored buyer that delivers on the promises your salespeople make to your customers. By predicting your needs effectively, and by having the necessary inventory in the right location on time, your buyer can not only help you make sales, but significantly impact the profit on those sales.

Even considering the complexities of the inventory management process, some “experts” make the process sound so easy, that you very nearly feel stupid if you can’t easily manage it. Let me tell you from over 25 years experience, that you are not alone. And as I am sure we can share with one another from experience, this process is *not* easy. It is also not impossible; so all is not lost. The process of assuring that you meet fill-rate goals truly is a number of simple steps. The difficult part is that they must be conducted in a precise step-by-step manner, using sound, complex and ever-advancing techniques; each step feeding another until “voila” you have the perfect inventory levels and the right orders just in time.

Fortunately, inventory management pioneers at IBM decades ago began studying inventory management as a science. One in particular, Anders Herlitz, defined the process that buyers must use to successfully manage inventory profitably. He identified seven key areas, “The 7 Steps of Buying” that must be mastered in order to purchase inventory profitably. Anders dedicated his career to understanding how to make technology work to support the business process of buying. More importantly, he strove to make sure that computer solutions made business sense for buyers and helped them to do their job effectively. Anders’ insights still influence the best of modern inventory management solutions.



In order to manage inventory effectively, you need to understand this process that buyers *must* go through in order to accomplish your inventory goals. Looking at what follows you may start to have that queasy feeling again, but fear not, you can do something...even if in small steps. In fact, you may feel as many other distributors do, that you have to do something different. If you can’t do all of the things I’ll describe; then become accomplished, effective and efficient at each one individually and you will be improving all along the way.

What Defines Your Company?

But even before you tackle the art and science of buying, you need to define your company. Not mission statements or marketing slogans but what you need to do to be perceived favorably by customers and yet still be successful fiscally. How aggressive your customer service goals are, and what are your cash constraints are primary questions to be answered. You may even have

the answers now, on paper or in your gut. This is not a process that requires consultants or analysts, though some cursory input from your accounting folks will likely be helpful.

Cash flow is perhaps the biggest driving factor in any business, and particularly when it comes to inventory, as inventory is the largest allocation of cash for nearly every distributor. It is difficult to have too much cash, but if you have specific goals for your company, you likely know how much cash they require. It may be easiest to simply focus on one goal and consider this your target for inventory; e.g., “We want to increase cash flow by XX%, because we want to gobble up that pesky competitor down the street.”

In defining your optimal customer service level, determination can be done by analyzing standards in your industry and setting your goals somewhere around those numbers. Or by understanding where you want to stand in relation to others in your industry. “We want to be different by maintaining a 99.5% first pass fill-rate.” Or set a goal for XX% “perfect orders” by filling every line in every order completely.

The result of this definition process is what will guide you in providing policies and processes to your inventory managers. Currently, your people have at least an informal understanding of your goals, and that guides them as they go through the buying process every time they order...at least sub-consciously. They very often react to the latest “noise” –

- Did Bob in sales complain about being short (on inventory) lately?
- Did I get yelled at for being overstocked?
- Did my vendor cross me up by shipping late?
- Did sales just spike on that staple item?
- Did Mr. Big just jump out of his new Mercedes and holler at me about needing cash? (Trust me; if they notice nothing else, they notice your new car.)

It is these kinds of occurrences that very likely shape the inventory policy in your company today. Not that I recommend it but, even if this sort of interaction is the only way you do it, once you have communicated your goals to your people, you can move on to managing your inventory to meet these goals every single day; now that you have recognized your inventory as a strategic tool.

Making it Happen Every Day: the Seven Steps of Buying

As I stated earlier, the process that Anders Herlitz discovered is conducted in some form or fashion by buyers every single time they place an order. The approach may be subconscious, it may be less scientific than what follows, it may or may not include every step that I outline here, or it may be done in another order; but rest assured that *every* buyer uses this technique in some way. The unfortunate circumstance is that many buyers try to do all seven steps at one time, and often in their head.

Believe it or not, there is good news in this. If you can find and communicate the link between any new process you put in place and the process your buyers are using today, you can virtually assure buy-in on their part. By showing your buyer how your new process is simply helping them to accomplish what they want in a more effective manner, you have helped make their job more satisfying...a necessary pre-requisite to employing any kind of change.

So now to Anders' Seven Steps:

- 1 Demand Forecasting
- 2 Lead-Time Forecasting
- 3 Order Cycle Analysis
- 4 Service Level Analysis
- 5 Replenishment Analysis
- 6 Special Order Analysis
- 7 Order Validity Analysis

First: Forecasting Demand

The first – and most important – thing that you must do for every single item, in every single location, individually, is to predict how much demand you will have. Buyers try to do this as part of their daily routine, but they are human and often emotionally react to:

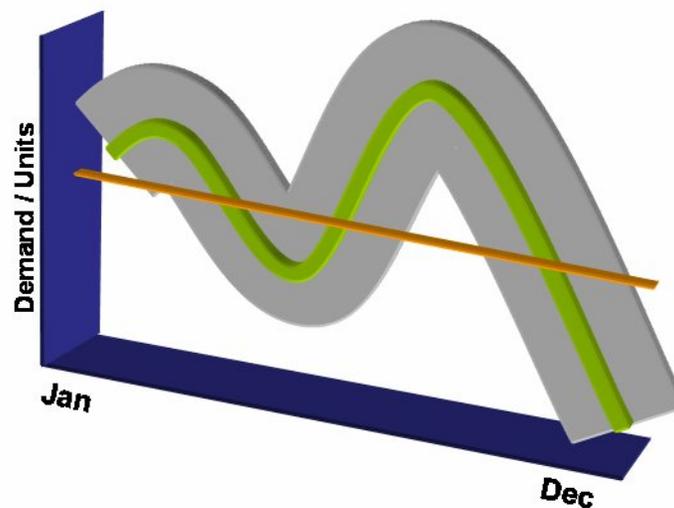
- Demand spikes – these cause buyers temporary, but memorable, pain due to “noise”. Even though these spikes are proven to be non-recurring in a large percentage of cases, and often due to errors.
- Month-to-date sales – sales may be hot in the first part of the month, so it is assumed that will persist, when in fact there is often a pattern of demand within a month on an item that causes demand to land nearer the forecast than any in-month estimate.

What does work? The most effective way to forecast demand is by knowing the historical demand, best is to know 2-3 years of demand. Many companies work from 3-6 months of demand and look at an average of what has happened in the past. The benefit of years of demand is that you can analyze that demand to know:

- How much of that history is relevant to current demand,
- How erratic demand will be
- The trend of demand over time
- Very importantly, whether there is seasonality of demand, and
- The lifecycle of items

Once you have identified what a relevant sample is, then you can analyze that demand to determine the average rate of demand, and any pattern that occurs year over year; which you can expect as seasonality.

For those of you wondering how to define seasonality, it is simply this. If your customer demand for an item averages, say 100 per week, and during a string of weeks during the year you can be certain that demand will be significantly above or below that average, then the demand is seasonal.



On my sample item above – I look at my history of demand and create an average forecast (orange line). I see a demand pattern (green line) and an average amount that demand varies from that pattern (gray area). Knowing this variation helps me to determine how much safety stock is required to account for spikes in demand.

Look at how much trouble I'm in if I just use an average (orange line) for demand. I don't account for a huge uplift in sales above the average about September, and I'm predicting a level of sales that I know won't occur in May and December.

Trending of demand will need to be included by determining how much demand has changed over time. Very importantly, you also need to know the variability of demand. Let's take the example of my bakery wholesale business:

- My company sold anti-freeze. Demand on anti-freeze was, remarkably, not seasonal. We were in Arizona. We sold around 12,000 cases per month, give or take five or six-hundred cases (a mere 5% variance).
- In another example, we sold starters for a '72 Chevy Impala. Impalas are unbelievably plentiful, due to the fact that there is no rust in the desert. Yet, the item was still a relatively infrequent sale. Demand averaged 3 units per month, but in some months we sold 5, and in other months not a single one. Demand for this item is highly erratic, as you can see, yet we had to meet demand every time. What kind of a parts supplier would we be if we didn't have a starter for a Chevy small-block?

What doesn't work? There are many buyer support systems out there designed by folks who have helped us a lot over time, and may even be using some of the 7 steps. Unfortunately, there are many pitfalls to the calculations these systems so often use to represent demand. There are many examples, but at the very least, beware of these methods:

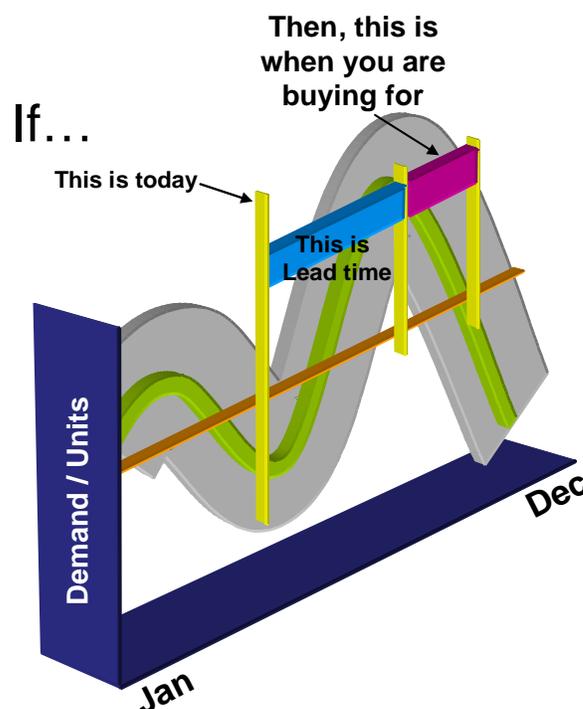
1. Any process that uses any number of months or weeks moving average – This process can be absolutely devastating if you have any amount of seasonality in your demand, because:

- The last 3(or so) months of demand don't help you predict that you are about to experience a sales uplift because it's back-to-school season.
 - On the other end, just about the time you are catching up to the impact of the sales uplift for a season, the season is over and you're stuck with goods it will take you all of the low season to sell.
2. Using this same time last year or same as last year with an expected sales increase as a forecast – Often this calculation is too general, due to using the overall sales increase for the company, category or vendor line.
- What if sales aren't up on this item?
 - What if sales were uncharacteristically high due to a large sale? Or,
 - What if Easter moved forward on the calendar by two weeks?

The more effectively you predict demand, the better you can manage your inventory to prevent issues in the future.

Often Overlooked: Lead Time Forecasting

We all know that it takes time to deliver goods after you order them, but we don't always take it into account. I know this sounds silly, but this is the one thing that nearly everyone forgets (including some technology solutions) when building an order. If you want to make sure you are able to meet demand, then you must account for the time your vendor needs to pull goods, load and ship them, and that you have to receive them and locate them so that they can be picked when your customer orders them.



You not only need to know how long it takes to get items from when you order them, but you also need to know how reliable your vendors are.

- Do the goods get to you on time?
- Is the order shipped completely?
- If not, how complete is the order?

This knowledge helps you in timing when to place orders and determine how much buffer (safety) stock you need. Often by the time a buyer realizes it is time to buy an item, it should have already been bought.

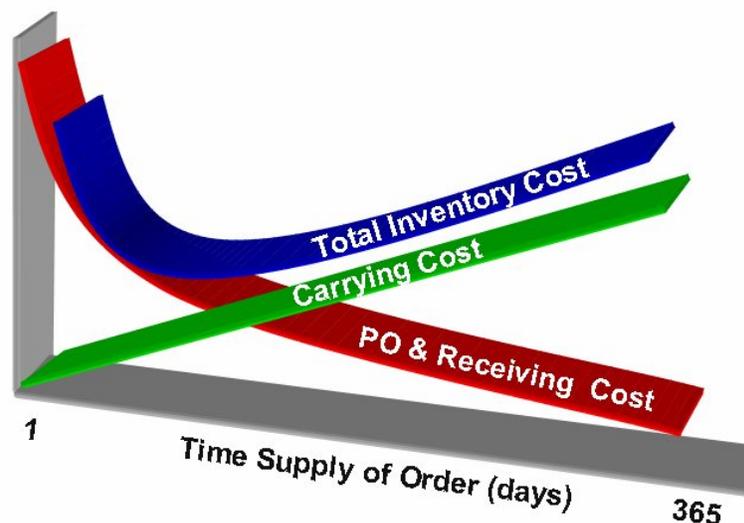
To be most effective it is really necessary to know the lead time for each *item*, because your vendor will ship more or less complete, or in different lead-times for different items. Your buyers do this every day as a matter of course. They are always guessing, “When will Acme get this here, and how complete will the order be?”

Knowing Order Frequency: Order Cycle Analysis

With the support of advanced systems, there is also the ability to determine how often you should buy from a vendor. To determine the best answer, the buyer should balance the cost of carrying inventory and the cost of placing an order. This will help determine the most economical order cycle for replenishing each vendor line.

For example, take a vendor line with a number of items and total annual sales of \$100,000. The cost of carrying inventory is 30 percent a year, and the cost of placing each order is \$20, with an additional \$1.50 for each line on the order.

- The PO and receiving cost will go down as you increase the size of orders and reduce the count of orders per year.
- The cycle stock and carrying cost goes up, since the average order goes up in size.
- The gross purchases, which represent the total amount we expect to spend with the vendor, remains constant since the vendor offers no discounts.



In this example, we could analyze many vendor order cycles, in an effort to find one that minimizes annual net cost. Let's say annual net cost (blue line), or the sum of all costs, reaches a minimum at six days between orders. In addition, we could find that the cost difference between six and 13 days between orders is so small that either could be chosen, and the decision may depend on which works most effectively within your environment.

You need to know how often to buy each item, too. Should you buy it every day? Weekly? Once a quarter? Once a year? I want to assure that you understand this one point; you should buy every item at most as often as you buy from the vendor. For instance, if you buy from your vendor every two weeks, make sure you aren't just buying one week's worth of flour. That sort of mistake, while all too common, is what fill-in orders are made of, and we all know how painful and expensive fill-ins and expediting can be.

You can also save yourself some pain by doing a simple economic order quantity calculation (EOQ) to help you determine the most economic quantity of items to purchase based on what it costs you to carry the goods vs. what it costs you to purchase the goods. The EOQ calculation works like this:

$$EOQ = \sqrt{\frac{2 \times \text{Annual Demand} \times \text{Cost of Each Order}}{\text{Holding Cost per Unit for One Year}}}$$

Typically, the cost of an order will be in the \$20 - 35 range, and includes:

- ✓ Time to review and place the order
- ✓ Accounts payable time, and
- ✓ Receiving cost.

Holding cost runs 15 - 40% of the purchase cost of the item per year, and includes:

- | | |
|---|-------|
| ✓ Cost of Money | 3-8% |
| ✓ Taxes and Insurance | 3-9% |
| ✓ Warehouse and Physical Carrying Cost | 7-16% |
| ✓ Obsolescence, Depreciation, Pilferage | 7-15% |

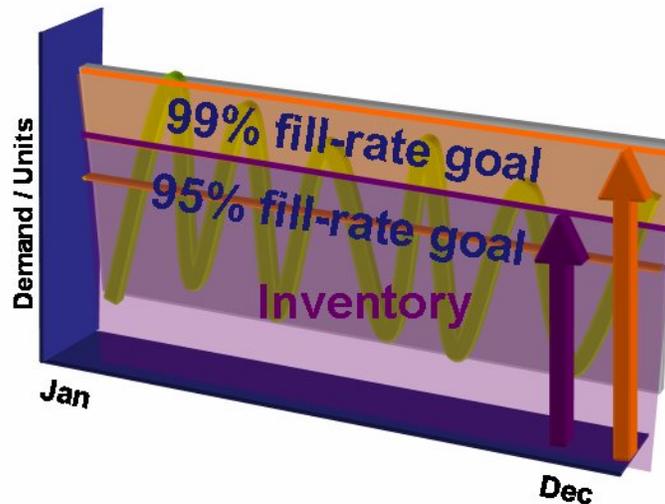
Depending on your business, an example would be nails, or bar napkins. You would never buy just a few of these types items because not only are they very cheap, often they are relatively small, so the impact to cash and space is not terribly significant. Be aware that the classic EOQ calculation (Wilson Formula) averages demand across the entire year, so it doesn't consider seasonality. For highly seasonal items you might serve yourself better by defaulting to the vendor frequency, or the order increment or casepack.

Service Level Analysis and Setting Safety Stock

Once you know all of your demand variables, lead-time and regular order amount, then you can determine how much safety stock you want to hold to buffer inventory. Safety stock is the “extra” inventory you carry in-case of a spike in demand or a late vendor delivery. To reach higher levels of fill-rate, or perfect order rates, you must carry increasing levels of inventory.

Today your company might set safety stock by carrying X number of weeks supply (based on that treacherous moving average) for all items, or maybe say 4 weeks for ‘A’ items, 3 weeks for ‘B’ items, and 2 weeks for ‘C’ items. This method is often touted by inventory experts and is an expeditious...if, in my experience, a costly and inaccurate...way to manage safety stock. The fact is, as we have said before, that the greater the demand and the more volatile the demand and lead-time are the more safety stock is necessary. Even among ‘A’ items demand and lead-time can vary widely. Using the common policy of setting the 20% of items that represent 80% of your demand as ‘A’ items (a faulty premise in and of itself, as in many industries it can be closer to 10% of items representing 90% of demand) you can have vast demand differences among your ‘A’ items.

For instance, recall our previous example of anti-freeze. Anti-freeze was an ‘A’ item *...and how!* At 12,000 units per month...with about 5% variability. 10w-40 motor oil was also an ‘A’ item; but only averaged 1,350 units per month with about 25% variability, for a range of about 1000 to 1700 units per month...a pretty big swing in demand. Using suggested logic we carried 4 weeks of safety stock on both items, which of course completely overstocked us on anti-freeze (by about 11,000 cases), yet the same policy nearly ran us dry on oil at times when demand spiked.



The lesson here is that safety stock, like demand and lead-time must be based on the individual attributes of the item. In order to avoid outs without breaking the bank you absolutely must break items into smaller groups than A, B, C. Many companies find 5 to 7 classifications helpful, and of course, individual attention is ideal.

Replenishment Analysis: Setting Target Stock Levels & Building an Order

Once you know the right safety stock level for every item, you can determine at what number of units you need to order to meet upcoming demand. You determine these inventory levels and your reorder timing by considering the lead time, and by using the safety stock and order frequency. Your goal for ordering is to *time* the order so that you can cover the demand that will occur between now and order arrival, and then to order the *amount* that will cover demand from the order's arrival, until the next time you will order from the vendor.

If today is the day you will buy from the vendor, then you need to identify for every item in the vendor line, whether you should buy any quantity on this order. We will call this the RQ point – the point at which you begin recommending quantities to be bought:

- RQ Point – looking ahead one lead-time, an amount of inventory in units to cover your desired safety stock level, plus the number of days between vendor orders.

If you will buy some quantity for this item on this order, then you need to determine what that quantity will be. We will call this the Order-to-Level:

- Order-to-Level – a quantity equal to the number of units that will be consumed between now and when an order arrives (one lead-time from now), plus number of units to reach the RQ Point.



So let's take the example of my anti-freeze. Fortunately, on this item my demand is not seasonal¹. My lead-time is 7 days, I want my safety stock to be 2 week's supply, and I buy from

¹ Seasonality causes one week's demand to be different than another, for instance looking out one week demand may be 400/day, but two weeks out demand jumps to 500/day. Your forecast will identify this for you, so consider changes in demand due to seasonality when looking ahead to determine optimal inventory and reordering levels.

this vendor every 15th of the month (approximately 30 days between vendor orders since we sell 7 days per week; it would be 26 days if 6/week; 22, if 5).

- At monthly demand of 12,000 cases, an average of 400 cases per day is a good estimate.
- The RQ point of 18,000 (12,000 to cover the month between orders, and 6,000 to cover two weeks for safety stock) tells me that if I am buying today, and I have 17,999 cases or less on hand, I need to order something
- I order up to a quantity equal to the number of cases that will be consumed between now and when my order arrives (the next 7 days), plus my RQ Point.
- So, if I have 17,999 or less on hand, I need to order the difference between my available on-hand (meaning, not committed to another customer, damaged, etc.) and 20,800 (18,000 to cover safety stock and days between vendor orders + 2,800 to cover lead-time)

If you have done a good job with the first 4 steps and processes, the replenishment step can be created in a relatively simple spreadsheet, and when provided with your on-hands and on-orders, really takes care of itself. Be aware that this is where the rubber meets the road in regard to how effectively you managed the previous 4 steps. If you haven't done a good job with the previous steps, go back and work on them. Otherwise, at best you will have only marginally better performance than you are experiencing today, and the work to get the replenishment step to work is significant.

Building an Order

To build an order you look at the stock status of every item every day to decide if you need to buy today to meet fill-rate level. Of course, you know it really doesn't make economic sense to buy just one item from a vendor, so you will want to buy the amount you need of every item at the time you place the PO. Don't forget that you must round your order quantities to account for any quantity minimums that your vendor may have, and for order increments; which are generally casepacks, layers, or pallets.

This "joined ordering" keeps inventory balanced so that all items have a chance to meet their lowest safe stocking level at the same time. At least if every item is approaching their safety stock level near the same time, every order will be able to meet constraints that your vendor or logistics folks require; like paid freight minimums. So you buy every item that is below its RQ point, because you would need to order it between now and the next vendor order anyway. This helps you avoid fill-in orders.

Special Order Analysis: Additional Order Considerations

It's just possible that you will have special order considerations, promotions, inventory investment opportunities and the like. Some examples:

- You need to buy additional goods to support that special price you offered to your customers.
- Your vendor offered you a special price, (or announced a price increase) and you need to know how much extra to buy to put off buying at the upcoming higher price as long as possible.
- You have a previous order commitment you made to a vendor that you need to fulfill

You need to consider these things after you have ordered for regular demand. This assures that you meet customer needs, then any additional considerations above that.

Order Validity Analysis: Meeting Order Constraints

Once an order has been built to assure you meet your customer's and your company's needs, the final step is to make sure that the order meets vendor requirements, or all of your hard work is for naught. The order is rejected because it doesn't meet the vendor minimum or shipping requirements, and customers languish while the buyer reconfigures the order and expedites delivery at great cost.

Buyers spend a significant amount of time making sure that an order *will* meet requirements. However, without proper tools, buyers can inadvertently cost the company money, rather than save it. For example, your vendor requires a minimum order of \$1,500.00.

- It's time to buy, and replenishment analysis confirms that we need to order \$1,300.00 to fulfill customer demand.
- This leaves us \$200.00 short of the minimum order, so we have to add quantities to some of the items to meet the minimum. Which items should we pick? Which items would you pick?
- Common sense says that the fastest movers ("A" items) will make up the \$200.00 quickly, and be the safest bet. So that's what you do. In my 25 years of experience, that's what I've found that *everyone* would instinctively do.

So, what happens to the following orders when we do what "common sense" tells us? I'll bet your buyers have the answer, even if they don't realize why.

- It's time to buy, and replenishment analysis confirms that we need to order \$1,100.00 to fulfill customer demand, mostly because we bought \$200.00 extra last time.
- We have to buy, though, because we're low on "B" items. So we reach out a little more and add \$400.00 worth of "A" items this time to reach the minimum.

You can see where this cycle leaves you. You've got so much stock in "A" items that you have to skip an order. Now we run out of stock on "B" and "C" items and here comes the noise!

With the right tools, you can handle this situation and make sure you meet service on every item. Whenever the order needs to be built up to meet a minimum, you add the same amount of *time supply* to every item. This will keep the line balanced so that future orders not only meet minimums, but also help make sure that all items meet service level. Since you are using time supply, not units, the impact to inventory isn't negative. Most everyone's concern is being over inventoried on slow-moving items, but consider that if you add 30 day's supply to an item that sells 1 per month, you've added one unit.

Once you have made sure that the order fits the overall order requirements; paid freight minimums, pallets, truckloads, etc. then you are ready to release your order to the vendor and you can be assured that the vendor will accept and ship against your PO.

It's just that simple...

Now, all you have to do is re-evaluate steps 1 and 2 for your items on a regular basis...every week or every month, and make the appropriate adjustments to predicted demand (forecast). For step 3 you consult your mathematical model (of course you do) to determine the new safety stock required for every item at every location. Now, after that simple set of steps, you know how much you need to protect as minimum inventory, and when you need to order more, to assure that you meet demand. Now all you have to do is look at on-hands and on-orders to do steps 5, 6 and 7 every day for all of your items and you can assure that you will meet customer expectations.

Of course a person can't possibly go through this process for every item every day; but technology can. Inventory management technology has been commercially available for over three decades. Now if this is true, why is it that less than 2,000 out of over 12,000 distribution businesses utilize such technology? Is it because it doesn't work? No, nearly all of the companies who use commercial technologies have had significant success stories.

Then why doesn't everyone use it? Two reasons:

1. Unfortunately, even though inventory is usually the largest asset of any wholesale or retail business; it's due to the fact that few people in a distribution organization...including owners and executives...have considered inventory management worth the attention. Today though, more and more companies are realizing that inventory as a strategic tool is worth the investment in processes, technology and education.
2. For many of the companies that do recognize the value, the prominent providers in the marketplace have been too expensive, and too difficult to use for small and mid-sized businesses.

Recently, solutions on the market are focused at businesses that to date have been unable to leverage their inventory as an asset. These tools are effective at addressing "The 7 Steps" and allowing companies to manage their inventory more effectively and automatically. Additionally, some of these providers recognize that some amount of art or buyer input will always be a part of buying. These providers not only help buyers use their creativity in their solutions, but also offer buyer education programs to help buyers make sound decisions with company goals in mind.

Give your buyers the right tools to make good replenishment decisions, and you will see that your inventory is an investment...an investment in the bottom line of your company.