

The Fallacy of Zero Inventories for Purchased Parts in Small Manufacturing and Job Shops

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ABSTRACT

In this article we examine the soundness of receiving most vendor shipments just prior to the time of use and then immediately delivering them from the receiving area to the point of use by some small US manufacturing industry. This approach in theory would save handling cost, storage cost, and inventory holding cost, the real world offers numerous pitfalls, especially for smaller manufacturers and job shops.

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1. INTRODUCTION

In an attempt to become more competitive in manufacturing, some US firms have adopted a philosophy of receiving most vendor shipments just prior to the time of use and then immediately delivering them from the receiving area to the point of use. While in theory this approach will save handling cost, storage cost, and inventory holding cost, the real world offers numerous pitfalls, especially for smaller manufacturers and job shops. Even disregarding the pitfalls, the “zero inventory” concept for smaller manufacturers is not as feasible as it may initially appear. Regarding “pitfalls” in most manufacturing firms the following are certain to happen [1]:

1. Actual orders will vary from the forecast.
2. Workloads will be unbalanced. Some work centers will be overloaded; others will be operating under capacity in any given period.
3. Vendors will be late in the delivery of key components.
4. Items will be scrapped in the shop.
5. Orders will be canceled.
6. Engineering (or a customer) will decide that an item must be redesigned either for customer protection or to meet minimum performance requirements.
7. A key piece of equipment will fail.
8. The company president will promise delivery to a favored customer within the frozen planning horizon.

2. ZERO INVENTORY METHODOLOGY

In the United States large firms tend to approach a zero inventory program in two ways. Through the lure of sole sourcing, a vendor is contracted to build a warehouse near the customer's plant with the vendor to do all the centralized storing and then send the individual parts to the consuming plant as requested or as needed.

In the second approach the lure of sole sourcing is again used but this time instead of warehouse the vendor is required to post a substantial performance bond. The vendor rather than risking default, will likely deliver early and have over-the-road trucks drop loaded trailers either on the customer's parking lot or at a convenient location nearby where they can be quickly dispatched to the customer's plants. In either case there are no zero inventories. It has just been shuffled around till the vendor carries it. Likewise the expense of carrying inventory does not go away. Since the vendor must carry the expense, presumably the hidden cost of storage will eventually be included in the sales price. Another factor is that the vendor is likely to be much smaller than the customer so the vendor's credit cost will be higher and along with the extra handling involved will cause the inventory carrying costs to be higher than if the customer carried the inventory in-house [2]-[3].

3. THE HE APPEAL OF ZERO INVENTORY

Major Japanese manufactures (generally large assemblers) utilize what is called a "pull" system of control. Each task requires the proceeding task to be completed before work on that task is started. This approach is simple and will definitely hold work in process down but unless workers are willing to look for work to do when caught up this approach will result in different people at different times having nothing to do or underutilized work centers. Contrast this approach with the American "push" system of control where work is scheduled to more fully utilize work centers and personnel but generally at the expense of extra work in process and excess inventory of finished product [4]-[5].

In the push system, each process operates as an isolated island, producing and pushing product forward according to schedules it receives from Production Control instead of the actual needs of the customer. Up till now American manufactures have observed the attractive inventory reduction aspects of zero inventory systems (which are considerable particularly during high interest rate periods) but have failed to note that work centers may be underutilized and workers may occasionally have nothing to do.

4. SUCCESS CLAIM

Some firms claim to have successful zero inventory programs in place. In cases where an ineffective or no inventory control system was previously used a zero inventory program may offer improved control, however; it is more likely that smaller firms will face hidden costs, underutilized work centers and production control personnel devoting too much time to tracking incoming materials at the expense of in-house activities, without a lot of visual controls and a full understanding of the production system in place. Even with visuals and an understanding it is almost impossible to have zero inventory programs. You would have some combination of zero inventory and supermarket systems built-in for unreliable supplies.

5. ABC ANALYSIS

Americans have some good ideas which firms should examine before going to an extensive zero inventory system. One of the best is ABC Analysis. ABC analysis is based on Pareto's Law: sometimes referred to as the mal-distribution of 80-20 curve first documented by Vilfredo Pareto (1848-1923) an Italian economist and sociologist. Pareto noted that many situations are documented by a relatively few vital elements. Thus, he surmised that controlling the relatively few will go a long way towards controlling the situation [6]-[7].

ABC is a ranking system with 'A' class items being managed most intensively then 'B' class items and then 'C' class items. Please note that a missing 'C' class item will likely cause you to miss or delay shipment just the same as an 'A' or 'B' class item, but the way you manage inventories will vary greatly among A, B, and C items.

To avoid confusion it is necessary to point out that ABC Analysis may not mean exactly the same thing to everyone in the plant. For instance, in the purchase department ABC Analysis is primarily concerned with the dollar value of annual purchases or different line items whereas in the warehousing, ABC Analysis is concerned only with quantity usage. For clarity in this report ABC Analysis will refer to the purchasing approach and warehouse (storage) activities will be referred to as high usage, medium usage, and low usage.

In the purchasing department, the initial priority is based on annual dollars spent for a particular inventory item. For example: if a firm carries 1000 different items (line items) in the inventory, it is not unusual for 5-10% or less than 100 items to account for over 80% of the money spent on purchases. Dollar value alone is not the sole criteria for 'A' classification. There may be additional factors that would cause an item to merit an 'A' classification. They include: 1) unit cost, 2) scarcity of material used in producing an item, 3) availability of resources to produce an item, 4) lead time, 5) storage requirements, 6) pilferage risk, and 7) shelf life. It is relatively easy to rank order annual dollars spent on each inventory item. Management then must judge which other items should be included in class A. The resulting distribution often resembles the chart shown below in Table 1.

If a grid is developed with storage volume on the horizontal and purchasing ABC classification on the vertical, it should be evident that most of the line items purchased represent relatively low annual cost. Little money will be saved by intensive management activity to control these items although stock outs of purchasing department class B and C items will cause as much grief as stock out of 'A' item.

Table 1. The resulting distribution

| Item | Annual Cost | Bold | Intense Zero Inventory Control |
|------|--|---------------|--------------------------------|
| A | High Annual Cost, approximately 5-10% of line items | | Yes |
| B | Medium Annual Cost, approximately next 10% of line items | abstract body | No Except special cases |
| C | Low Annual Cost, remaining 85-80% of line items | | No Except special cases |

The best candidate for the intensive (zero) inventory control would be the high annual cost items found in the purchasing class A. Even then they should be evaluated on a case by case basis. American managers still want the inside of the plant managed. Defects can be hidden in downstream inventory and realistic balances between inventory costs and scheduling risk must be achieved.

The most important point is that there is a relatively little money to be saved by intensively managing most purchased items. We can generally have ample safety stocks of most 'B' and 'C' items on hand which will provide an enhanced service level without significant cost implication. Indeed intense inventory control of most 'B' and 'C' items except for special cases will probably cost more than can be saved.

5. CONCLUSION

The potential savings of a zero inventory philosophy (particularly during periods of high interest rates) are a great attention getter for large American manufactures. However these savings are difficult for smaller manufacturers and job shops to achieve without sacrifice in other areas particularly in-house flexibility to handle normal problems (pitfalls) and workforce scheduling.

In smaller manufacturers and job shops, some of the savings that are apparent are not real. Inventory has not disappeared. In many cases it has been shuffled around and the hidden inventory carrying costs will end up in a higher purchase price.

Rather than the vendor carrying the inventory, in many cases, it is both less expensive and less risky, from a scheduling standpoint, for the customer to carry and more effectively manage the bulk of the line items purchased. Within the list of items purchased only a few have the potential for considerable savings through intensive inventory management and once isolated, they need to be reviewed by management on a case by case basis.

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