

Driving force

Success factors in global high volume manufacturing

Tero Manner

The factors needed to bring about success in high volume production must be taken into account at the design stage. These include: a lean and efficient Supply Chain guaranteeing 100 percent component availability at all times; and where there are multiple manufacturing facilities across the globe, a management team that is capable of supporting a multi-cultural production environment.

A case in point is ABB's AC Component drives business. How can the demand for fast delivery be harmonized with the need to keep logistics and production costs low? With an annual unit volume in the hundreds of thousands – and growing by 50 percent every year – this is not as arduous as it might seem.



In today's market, small drives are now seen as components, much like coils or potentiometers. As customers are more concerned with what these drives can do rather than how they do it, together with the fact that they are cheaper than ever, small drives are finding their way into many and various applications.

ABB component drives¹⁾ are a category of basic and compact drives – what you see is what you get – aimed at simple low power applications like fans, exercise machines, access barriers and washing machines. The beauty of these “fist-sized” drives is that the number of options and variants are kept to an absolute minimum making installation and operation of the component drive very simple.

The current structure of ABB's Component drives business consists of five factories (Finland, USA, India, and two in China) each performing final assembly and extensive testing. ABB supplies the completed units to regional logistics centres appropriately located within the main markets. ¹

The need for speed

Because customers now demand rapid service, processes are being designed with fast delivery in mind. The key to such delivery is centralized inventory, in which all component drives are stocked and ready to ship.

Customization is no longer a problem in terms of speed, thanks to advancements in semiconductor technology and software capabilities coupled with developments in manufacturing

Footnote

¹⁾ Paakkonen, Mika “ACS50 – sizing up the consumer industry” ABB Review special report on Motors and drives, pp 14–16.

process technology. In fact, customer-specific changes are part of the service provided.

ABB's five logistics centers enable fast deliveries as well as flexibility. In many areas, units can ship in less than 24 hours. Transportation at medium and slow speed is also offered at a reduced price, thus leaving it to the customer to decide how important fast delivery is.

High volume production

Successful high volume production is highly dependent on several factors described in the following paragraphs.

The first factor focuses on quick assembly. For this to be possible, a product should be designed with as few components as possible (ideally less than 20). In addition, the assembly must be easy and error free, meaning the assembly process must be "tried and tested" at the design phase. Quality concerns must be tackled early on. The design should be modular to allow subcontracting and manufacturing optimization. Design for manufacturability and assembly, DFMA, is hence crucial.

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These points have been taken into consideration in ABB's drive business

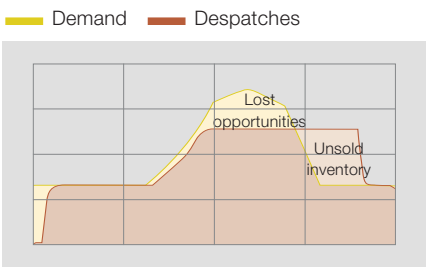
1 ABB AC Component drive factories and central stocks



and the result is that some models of component drive take less than half an hour to assemble.

Adequate logistics also play a part. This starts with an electronic ordering system integrated directly into the production system. Customer information is cascaded electronically to the supplier network. The flow of components must be constant, at the lowest possible cost with 100 percent availability to support a three-shift operation. Packaging material must be located at the assembly stations and designed for ease-of-use and to protect the product during transportation.

2 Component drive global stock turnover



High volume lines must be separated from low volume lines or products requiring special attention. This ensures a smooth flowing and "rhythmical" constant high volume output without interruptions. The product design must be complete before it is allowed onto a high volume line.

Well trained and motivated employees are a necessity if high volume production is to succeed. Therefore training programs must be conducted at all times. The correct labor capacity must be able to match market demand. By splitting the work-tasks into small entities, capacity can be brought quickly on line either from neighbouring ABB factories or the outside.

Cost sensitivity in high volume manufacturing requires close monitoring of a few key metrics such as:

- Units produced/employee hour worked. This measures productivity.
- Units passing final test when tested the first time measures first pass yield (FPY).
- Component availability must be 100 percent.

High inventory turnover

High inventory can compromise quality, and the distance between low-cost countries and major markets lends itself to inflated levels of inventory in transit and in the warehouse. The way to approach inventory is by tracking orders, and keeping careful watch over sales and the broader market. By tracking sales and inventory, the ebb and flow of demand can be monitored



Demand driven manufacturing

and responded to rationally. Systematic analysis that exploits the benefits of the ERP²⁾ system, combined with quick decision making concerning the optimal means of transportation, is the best remedy for high inventory levels, ² ³.

Bad quality costs millions in logistics

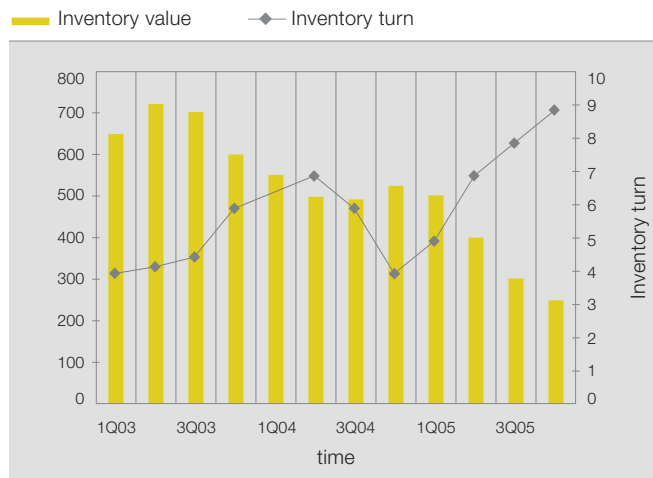
Maintaining low logistical costs in a global business requires superior quality. Air freight is 10 times more expensive than sea freight. With high volumes and long distances, sea transport is realistically the only competitive option, although some companies also use roads and railways. Compensating poor components or bad product quality by using air freight or other express modes of transportation may easily eliminate any profit. In addition inventory scrap and warranty costs must be financed. Good quality and good logistical planning are essential success factors in any high volume business.

The need for competitive pricing requires constant attention to quality along with a continuous hunt for low-cost suppliers.

Low cost country production – global supply management

The need for competitive pricing requires constant attention to quality along with a continuous hunt for low-cost suppliers. Quality and performance must be ensured at all times. The challenge is to calculate the actual process cost associated with low-cost country sourcing whether for factories or warehouses. These cost elements include the ramp-up cost, increased material cost for components and finished goods, quality issues, risk associated with long Supply Chain and the delivery cost. Experience combined

³ Determining the right levels and locations of inventory to meet customer commitments while minimizing costs



with careful analysis will result in a well founded decision as to whether outsourcing a component makes sense.

Supplier network management

The relationship between a factory and its supplier is essential to ensure a world-class process Supply Chain. Open communication, good delivery performance and high quality are very important. Other points to be considered include:

- Time and resource investments should be decided in co-operation with the supplier when ramping up a new component in production. Setting up the supply process together ensures attention to quality and prevents delivery problems.
- Quality processes and procedures must be clear. With long transportation distances there is no room for poor quality. This requires good manufacturing and in many cases extensive quality control and this is the responsibility of both parties. That is why all components are tested by the suppliers and then again at the ABB factory before the Component drives are sent to customers.
- An important way to approach improvement is through the Engineering Change Notice (ECN) process. This process includes all revision change issues and associated data relevant for proper communication and follow-up to ensure all the changes are implemented as intended.

Cultural differences must be understood

Global manufacturing encounters many interesting cultural business differences, and when properly managed these can be turned into strong advantages. Manufacturing with global sourcing does not conflict with local cultures as long as management is sensitive and adaptable to these issues.

Therefore, managers must learn to value the differences, creativity, and richness that diversity brings to the workplace. As the workforce changes, so must management strategies. Part and parcel of any diversity initiative is the ability of a company to recruit and retain a diverse workforce.

The principle of best practice is adopted in all ABB drives factories but in each case with a cultural twist. Communication between the international factories is arranged through regular information sharing sessions so that similarities are found and viewpoints agreed on. These efforts at understanding the other give everyone a chance to create a work culture that is neither totally one nor the other. It facilitates a gathering of ideas and efforts, creating beneficial synergies for everyone involved.

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Footnote

²⁾ See glossary of page 74.