Production Agility:
Bend With the Wind or Get Blown Away

John Bell

Then:
"People can have the Model T in any color-so long as it's black." Henry Ford

Now:
June 2006, Business North Carolina
"Mass customization is all about combining the customized part of craftsmanship with the efficiency of mass production." Ping Fu, CEO of Geomagic, Inc.

July 17, 2006, Business Week
"VistaPrint is putting slickly finished products within the reach of small businesses…by combining online design tools for customers with sophisticated printing systems."

June 2006
"I received a special order braided rug from Capel Rugs, on my doorstep, within 7 days of placing the order." John Bell, President of Excel Consulting Group, LLC

The winds of change are blowing, and customers are looking for someone to give them what they want, when they want it, and at a price they are willing to pay. Many manufacturing companies struggle with the concept, opting instead to stick with a single design, and wringing out costs by high volume "efficiencies." Other companies attempt to produce customized products within that efficient, high volume line, but the net result is often so painful, they and the customer are often left asking "why bother?" (Remember the Burger King jabs at McDonalds during the "Have it Your Way®" campaign?) Still others will take the hand-crafted, fully customized route, but the result is frequently expensive, and only a few are willing or able to pay the premium. As suggested by the quotes above, the winds of change are blowing.

Some Companies Are Rewriting the Rules

Imagine being able to quickly recreate an out-of-production, legacy part to keep vintage machines running. Imagine being able to go directly from a dental cast to CAD model to manufactured appliance. Imagine being able to inspect a manufactured part and compare directly to the CAD model to verify quality. Imagine a pair of jeans that actually fit you and not just the model in the photo. Geomagic, a software company in Research Triangle Park, has done just that. They have combined 3D photography with digital processing software to convert an image of a 3D object into a CAD model that can then be utilized by a standard manufacturing process. Hence, "customized" and "mass production" appear in the same sentence.

In the professional printing arena, the traditional approach has been a dedicated print run to a customer. The drawback was the customer bore the brunt of the set-up and overhead costs. Either he was forced to buy more than he needed to get a reasonable unit price, or to pay an exorbitant price for the quantity required. VistaPrint recognized that many print jobs had similar characteristics, regardless of size. In fact, the company's

business model is based on the premise that 90% of professional printing jobs can be standardized. The key is software to combine like jobs (same colors, paper stock, etc.) into a single "production run" and then separate the jobs, jig-saw fashion. The set-up costs are shared, the customer need only buy what is required, and the price is 80-90% cheaper than custom print shops. Combined with a user friendly Web interface, the company has essentially created a market and a significant competitive advantage.

These are two examples of companies applying technology to address the need for cost competitive customized products and services. The fact that they are succeeding is testament to the existence of the market. It is a safe bet that they will be nipping at the heels of others in their respective arenas. Companies on the leading edge of technology adoption often change the rules for everyone else. So, what are the "rest of us" to do?

Rewrite Your Own Rules

Frequently companies find themselves trapped by "rules" that are of their own making, and not rules dictated by the market. How production processes are defined, how equipment is configured, and how work instructions are written can be more deadly to production agility than the absence of a hot new technology. The third example from Capel Incorporated is drawn from a personal experience. My wife and I were in the market for a braided area rug for the kitchen. The room layout dictated a round rug of a specific diameter. After thoroughly scrutinizing the entire inventory in the factory showroom, it was clear that a round, six foot diameter rug was not available. The salesperson volunteered that the factory could make a rug for us to our specifications. Mentally, I expected that it would be months before we saw the finished product. She insisted that they could make delivery in about a week. We selected the color scheme, gave her the specifications, and the result was on our doorstep in 7 days. Capel obviously has flexibility built into its process definitions. The answer could have been "we make oval rugs." Instead, a circle was within the definition of the production process. There were boundary conditions, however. We had to choose from the predefined color schemes, and if we had asked for a pentagon, I suspect we would have had less success. The key point is that there was sufficient agility to deliver a single "custom" product, in a very reasonable timeframe, at a similar cost per square foot in the midst of delivering large quantities of products to showrooms and catalog companies around the country.

A counter-example is a company I have worked with that manufactures cables as an internal part of the supply chain. The cables become an integral part of the final product, and are produced in a variety of lengths with a selection of terminating connectors on either end. The documentation is set up such that every combination of length and connector has its own drawing and its own work instruction. Because of varying OEM equipment configurations, customers frequently request a specific length. In order to accommodate the request, a separate drawing and adaptation of the work instruction must be created, introducing delay, overhead expense, and potential for error. The production process for a given connector was exactly the same, regardless of length. Had the documentation been set up to manufacture a cable with connector A and length L, with the value for A and L showing up at the appropriate time, only one document is required for an infinite variety of lengths. What was a "custom" cable is now a standard item within the process definition. If there are physical constraints, these can be predefined. For example, any length is available between one foot and thirty feet. A redefinition of

the internal rules greatly simplifies the maintenance of the documentation, reduces the cost of supporting a "custom" product, and improves the agility the customer sees.

Create Agility

It would be great if we all could adopt the latest new technology to maximize agility. However, business conditions do not always permit heavy investment, nor is heavy investment automatically required. Companies can frequently create sufficient agility to satisfy most, if not all, of their customers. There are a few key areas to examine to assess the degree of agility inherent to your production process.

- Product and process documentation: This is a common area for inflexibility to creep in. The more narrowly a product or process is defined, the less flexible it becomes. A symptom to watch for is numerous documents that are identical, except for a few details. Look for areas of commonality. If the process and the result are unchanged for a range of dimensions or combinations, create one document with a link to the required information (e.g. length) when that information is required. The result is not only more flexible, it is much easier to maintain when changes to the common part of the process are necessary.
- Process boundaries: In concert with documentation, an understanding of the practical limits of the production process is necessary. It is not unreasonable to have some boundaries pre-established. In the Capel example, the color schemes were restricted to a predefined set, and the geometry likely had practical limits. In the cable example, length had a practical limit. Understand the process, and know the practical limits. This will establish the boundary conditions. Agility requires that the boundary conditions be set as widely as possible.
- Market space and customer set: This is a fruitful area when developing a new product or process. If the market space is examined beyond the introductory product, agility can be designed into the production process. What is the range of dimensions, combinations, flavors, etc. that you will likely be required to serve? Build in the flexibility as much as possible with common fixtures, flexible documentation, programmable equipment, and so forth.

It is not necessary to be all things to all people. It is necessary to be what your desired customer set needs you to be. More frequently, customers are looking for exactly what they want, be it an end user trying to decorate his house, or an OEM trying to carve out a competitive space. Maximizing your ability to deliver to that need increases the probability of success. Ultimately, the successful companies will be those who can "bend with the wind." The rest will be "blown away" to the land of "also rans."