New Product Introduction from a Flexible Circuit Manufacturer

by Dave Becker

Design and manufacturing companies spend a great deal of time and money attempting to bring new products to market. Developing a procedure that defines critical parameters and metrics is generally described as a "New Product Introduction Process (NPIP)". According to Wikipedia, "There are two parallel paths involved in the NPIP process: one involves the idea generation, product design, and detail engineering; the other involves market research and marketing analysis. Companies typically see new product development as the first stage in generating and commercializing new products within the overall strategic process of product life cycle management used to maintain or grow their market share."

Although NPIP is generally targeted at OEM's, many of the principles can be applied to companies providing a custom designed product. Manufacturers of flexible printed circuits fit this "custom designed product" description with unique tooling and bills of material. Engineering reviews are used to capture the "organizational wisdom" and apply past lessons learned to future product requirements. The challenge of product marketing (the second of the two NPIP parallel paths) generally remains the responsibility of the OEM, but the flexcircuit supplier shares an engineering, scheduling and quality responsibility with their customer. This partnership requires a close working relationship between supplier and customer and is best accomplished with an intimate understanding of the application and end customer expectations.

Start-up engineering is the core of a flexible circuit's product introduction cycle. This process includes design, mock up, prototyping, first article and production ramp up. Issues that drive costs are design layout, design manufacturability, learning curves, tooling, documentation, material selection, and communication.

The direct costs of a poor product start up include scrap, late deliveries, expediting costs, and added inspection and rework labor. Cost issues can propagate through the entire supply chain as each link deals with the consequence of poor quality and/or late deliveries. Once in production, engineering changes are made "on the run" to fix issues that are hampering volume production. The indirect costs can be even more substantial with missed market share for the OEM and damaged credibility for the flex circuitry producer.

Back in the 1980's Motorola introduced concepts such as Six Sigma, Design for Manufacturability, and other product introduction techniques to improve quality, delivery and costs. Some of the concepts that a Fortune 500 company applies to a high volume product are impractical for a small flex circuit manufacturing company. Custom engineering of these "build to print" products requires starting up 100's of part numbers a year and good management of the product start up process is a critical success factor.

All Flex has developed its own version of a NPIP system called "Jump Start™". It is a continuous improvement effort program to supply intensified customer support during initial part number design and delivery and is tailored to a company providing custom engineered products.

The following principles have been identified as continuous improvement metrics for the Jump Start process.

Rapid Response: Much of a product introduction process can be 'dead" time with various entities waiting for information. Reducing the response cycle for information flow greatly reduces the overall cycle time.
In All Flex's case the goal was a 24 hour response time for quotations, questions and customer service feed back. Today over 90% of quotations are turned within 24 hours.

Customer Involvement: Include the customer in the document and design review process. Obtain customer feedback to help identify areas for design improvement and insure there is no misunderstanding. The more the customer knows about the status and road blocks, the more they can help. Treat them like a partner in your process.

Involve the Supplier: Especially for custom or non-standard materials, the supplier is a valuable resource when involved early in the process. A good design will incorporate the collective knowledge of the supply chain experts to help ensure the end product will meet performance and cost goals.

Measure Results: Critical metrics may include cycle time, customer satisfaction, on time delivery, first pass yields and outgoing quality. These metrics should be formally tracked and managed. Companies need to set aggressive continuous improvement goals and insure ownership for these metrics has been assigned.

Think Parallel vs. Serial. Many types of production documentation, tooling part number assignment, supplier quotation requests, etc can be done in parallel with prototyping to save considerable time and resources. This will involve changing the mind set from a "prototype process is distinct from a production first run" to thinking in terms of "How can this be accomplished in a single prototype/production process?"

Formal Design Review: This process should include the planning and monitoring of the first run production. A cross functional team that includes operators can identify critical steps requiring approval before moving to the next step. First run product should be clearly identified on the production floor, (A color coded production travelers is a simple example). Engineering should be present at critical operations to assure that process and results are within specification.

Post Production Review: First time production runs should have a formal review. Gather operator feedback. What went wrong, what went well, what can be improved? Update documentation and procedures.

Management Involvement: Management might not be directly involved in the production run, but they should be reviewing critical metrics relating to product start up and drive improvement activities. Good performance deserves recognition and poor performance needs corrective action.

The above steps for a product introduction system create a learning organization with continuous improvement system based on Edward Deming's "**Plan >Do >Check >Act"** cycle of learning. **Plan:** Plan your product start up, establish controls, and create a schedule. **Do:** Monitor the plan –build the product with increased engineering involvement during initial runs. **Check:** Review results vs. metrics and identify areas for improvement. **ACT:** Implement corrective actions and plans for improvement. Then start the process over again.

The above process is really quite simple. It is based on getting the fundamentals right. It's blocking and tackling and a lot of common sense rather than a new management fad. It involves a commitment to getting the basics right and dovetailing it into a process for on-going improvement. I think it's fair to compare this to Darwin's Natural Selection process in which, "favorable traits become more common in successive generations of a population and unfavorable traits become less common. Individuals with favorable traits are more likely to survive and over time. This process may result in adaptations that create specialized organisms for particular niches and may eventually result in the emergence of new species."

Or as Deming would say, "Create constancy of purpose toward improvement of product and service, with the aim to become competitive and stay in business".

Dave Becker is the Director of Sales and marketing at All Flex. Dave has been in the flex circuit industry for the past 30 years with a variety of positions in Quality Engineering, Product Management, and Sales Management. All Flex designs and manufactures flexible circuitry and flexible heaters for a variety of markets. All Flex has had significant success with its own product introduction system called Jumpstart ™.