Improving Product Realization Efficiency

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Achieving the right balance between product development and production is key.

Medical product manufacturers continue to face a critical challenge: finding ways to reduce cost and time to market, without compromising quality. While globalization increases the range of options in this area, it also increases the potential for errors. Cost is driven not only by materials and production efficiency, but also by the robustness, or lack thereof, of the communication and handoff processes among the various teams engaged in product development, new product introduction (NPI), and production.

Division of labor among teams and communication processes are often as important as engineering or production expertise. Univac Precision Engineering Pte Ltd. [1] is a Singapore-headquartered supplier specializing in product development, device fabrication, and mechanical assembly of precision plastics products. In order to optimize the product realization process, the company developed very robust processes for integrating product development, NPI, and production teams multinationally.

Lessons learned have included:

- Develop a detailed process flow and determine where each team should have input
- Structure teams in ways that maximize their expertise
- Include a local support element
- Maintain a strategic business focus

Develop a Detailed Process Flow
The company has divided product development, NPI, and production into a series of eight standard phases. Teams participating may vary widely by project. For example, some customers have their own design team, others prefer an independent design firm, and others prefer to use Univac's team as their main design resource. This phased approach creates a common framework that all parties can reference in determining overall division of labor, leadership responsibilities, and milestone achievement.

The phases are:

- Phase 1: User research and product definition
- Phase 2: Initial concept development
- Phase 3: Concept evaluation, refinement, and documentation

- Phase 4: Preliminary development
- Phase 5: Design finalization
- Phase 6: Tooling database layout
- Phase 7: Tooling process
- Phase 8: Manufacturing ramp-up and quality assurance

Typically, design finalization phase is the point at which design and manufacturing resources must be equally engaged in balancing product concept and best manufacturing practice decisions.

Structure Teams in Ways That Maximize Their Expertise
The product realization process can often be filled with conflict due to the personalities and responsibilities involved. Design engineers are creative and proud of their ability to develop innovative products. Exotic materials and unusual design are exciting to them. At the same time, production teams like to focus on efficiency which can translate to a strong focus on standardization and conformity. From a production team standpoint, exotic materials may translate to logistics difficulties or increased costs. Unusual design can translate to challenges in tooling development or quality issues in production.

However, successful companies have teams that discuss both sides of this equation. A design team that fails to innovate will eventually cost the manufacturer competitive advantage and market share. Similarly, a production team that doesn’t drive a focus on design for manufacturability, procurement, and sustainability will likely have trouble efficiently manufacturing those innovative products. A major quality issue or a missed market window because a design is not producible in high volumes will also hurt competitive advantage and erode market share.

This supplier has found that the best option for driving innovation and efficiency between the teams is to bridge the product development and production teams with an NPI team. The NPI team members are not biased against either party and can mediate between design and production when there is difference of opinion between the two teams. The NPI team also helps facilitate brainstorming sessions with all teams at the beginning of the process. Previously, either design or production tended to dominate the process.

In this supplier’s model, the design team typically includes a project manager and two product designers (with both product and tooling design experience). The NPI team is led by the engineering director and normally has one to two process engineers. NPI team members are dedicated to NPI and may support product launch and transfer in Singapore, Malaysia, and China. During Phase 8, the NPI team transfers its focus from product development to mass production. NPI finalizes machine and process selections, and supervises product validation. The end result is a smooth transition process handled by a group familiar with both the design goals and the constraints of efficient production.

The production team includes a program manager and account manager with dotted line relationships to relevant operations support personnel. The account manager focuses on sales and business issues associated with the program such as

revenue, profitability, pricing, cost reduction targets, and account growth. The program manager focuses on the timeline, customer satisfaction, adherence to schedule, and technical requirements.

It is very important that the downstream secondary process is very well defined and validated before transferred to production. Balancing what is feasible vs. what works in low volume is a critical part of the process. A project with a medical customer illustrates the value of this type of team effort. In that example, the design team was specifying too tight a tolerance for production to maintain in a multi-cavity mold. In medical disposables it is not unusual for the product to jump from a 1-2 cavity mold in prototyping to a 64-cavity mold in mass production. The NPI team's process engineers were able to identify the potential problem and work with the design team to modify their specifications appropriately.

Include a Local Support Element
While today's technology makes working at a distance relatively easy, there is also value in regionalization. In addition to its production facilities in Singapore, Malaysia, and China, Univac has offices in California and Germany. In this case, regionalization has created two benefits. First, it has enabled the company to field engineering teams in close proximity to their U.S. and European customers. Second, it has tapped regional design expertise.

Part of the initial funding for opening these offices came from International Enterprise (IE) Singapore and Singapore's Economic Development Board (EDB). While the offices are both self-sustaining today, the additional funding and other forms of agency assistance made it possible to expand design/tooling design team capabilities and enhance capabilities in multi-cavitation tooling design while the customer base that would utilize those services was still being developed.

Maintain a Strategic Business Focus
It is difficult for a contract manufacturer to be a jack of all trades. Good customer relationships take time and effort, and often require investment in additional capabilities over time. During the recent economic downturn, the company evaluated its business focus carefully. The strategy is simple: look for customers with projects that fit internal technology capabilities who share the company's long-term values. The company focuses on medical pharmaceutical devices; packaging solutions for the medical and consumer care industries; and ink delivery systems for printing imaging industries. These segments share the need for high volume capabilities, ultra-clean manufacturing environments and requirements for value-added services.

From a customer standpoint, it is equally important to have a strategic sourcing focus that looks at track record as well as supplier capabilities. Certification to industry-specific quality standards such as ISO 13485 is just one of the elements that should be considered in auditing a new supplier. Supplier behavior is another key element to evaluate. For example, tooling is the heart of an operation and tooling maintenance is a good indicator of the robustness of a company's commitment to quality. The better tools are maintained; the better the quality on the production floor. Another area to evaluate carefully is a supplier's technology

roadmap and track record in investing in additional capabilities. That area quickly shows the difference between companies committed to technological advancement vs. those opting to milk a cash cow. Financial stability, the degree to which operators are trained in production parameters and overall facility cleanliness are also areas for audit focus. However, the softer behavioral track record issues may be better indicators of the likely success of a long-term relationship, because they are stronger indicators of a management team's philosophy and commitment to the business.

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