Improve Business Performance by Optimizing Product Development

Using advanced design and collaboration technology, small & medium businesses are growing profits and reducing costs

Today's small and medium-size manufacturers – or 'SMBs' – are facing far more challenges than ever before, mainly due to ever-increasing complexities in product design, as well as more stringent time, cost, regulatory and quality requirements.

Added to that, SMBs now must collaborate more effectively with geographically distributed design and manufacturing partners, while also working within the constraints of a fragmented IT architecture. In the face of these new challenges, SMBs must still deal with many age-old business quandries: Which markets are most promising? Which products are most likely to succeed? What is the best way to prioritize business spending?

One of the biggest advantages of being a small or medium-size business is the fact that you can be much more nimble than your larger counterparts. You can respond to changes by improving processes and technologies more quickly than bigger companies. In a large company, improving traditional manufacturing processes and technologies can be prohibitively disruptive; on the flip side, an SMB can change more dramatically and more quickly because smaller organizations typically embrace change rather than fear it.

Yet, while SMBs are more flexible and nimble than larger organizations, they're typically less insulated from the consequences of 'mistakes' than are large businesses. In a large business, the failure of a product line can be mitigated by successes of other products; but for an SMB, a single product failure has the potential to devastate the entire company.

To better compete today, more and more SMBs are learning that change – when conducted in the right way – can have a significant positive impact on the business by enabling you to capitalize on new market and business opportunities – faster.

Many SMBs right now are using their agility and flexibility to their advantage by adopting technology to adapt to the changing market, so they can outmaneuver both larger competitors and less aggressive competitors of a similar size.

For many manufacturing SMBs, then, the key to success is to take advantage of the ability to quickly change and improve, while minimizing the risk of pursuing an improvement path that is less than optimal. For successful manufacturers, the key strategy driving value is improved product development activities – that is, activities performed every day, to make more money. This paper describes how to make improvements in product development that will link directly to your most important goals: boosting bottom line performance and capturing greater market share.

Product Development Challenges for SMBs

Product development companies – both large and small – are facing multiple challenges in every area of the business: by the ever-increasing complexities of products and product design; by the added time and effort of working with geographically distributed design and manufacturing partners; by the fragmentation of company IT systems, which can isolate product development from Purchasing, Finance, and other departments; and by the increasing need to include the regulatory and safety requirements of multiple regions and countries into product design.

Step One: Linking product development to business goals

For SMBs to make meaningful improvements to their business, they first need to understand how things are being done today, what are the steps, activities and roles of all product stakeholders both within and outside the organization, and how you can streamline these activities to gain a competitive advantage. Each problem facing SMBs presents an opportunity for improvement. The highest performing companies begin their road to excellence with an honest assessment about the current state of their business. All companies are looking to maximize revenue and minimize costs, but every company is different in their approach to optimization.

Based on 20-plus years of experience with SMBs, PTC has outlined six specific areas within product development where value can be identified for the company:

Value opportunities for growth

- **Grow market share** – Most often, growing market share comes from the ability to first, interpret customer requirements, and then to build those features into the product more quickly than competitors. One SMB succeeded by paying close attention to customer forums of its competitors, and responding with product enhancements that attracted new customers. By using the power of product development, SMBs can design enhancements to product that accurately interpret customer needs, and then move those designs to manufacturing quickly.
- **Improve your ability to meet customer demand** – In today's business arena, where change is the only constant, manufacturing SMBs must focus on being nimble, fast and responsive. Being able to deliver exactly what the customer wants, when they want it, is critical to success. Your product development process should be flexible enough to modify products quickly to meet new requirements and demands.
- **Develop new markets** – The right product can trigger an entire new market sector, which can pay off handsomely for the first companies that respond with new products. Fast, flexible product development processes enable SMBs to move quickly – for instance, by modifying existing product designs and getting them to market first – to leverage new-found demand.

Value opportunities for reducing cost and improving revenue

There are several specific ways to reduce development costs and improve revenue:

- **Realize a price premium** – Price premiums can be gained by delivering a product that brings unique value to customers, whether that value is in functionality, design, or even product quality. Product development is the core resource for turning strategy for differentiation into a compelling, tangible asset.
- **Lower product cost** – To lower the costs of individual products, product development must allow you to explore alternatives in everything from analyzing tolerance parameters to changing or reducing materials.
- **Lower lifecycle cost** – Manufacturing companies can save time and money during product development by implementing proven business initiatives to optimize critical processes. For example, labor costs can be significantly reduced through more effective reuse of existing designs.

Step 2: Take a closer look at product development

Once key value opportunities have been identified, SMBs can evaluate which business initiatives will best support their company's objectives. PTC consulted with numerous SMB customers to identify the top four business initiatives that are of particular importance. These initiatives are the key to growing market share, developing new markets, and lowering product costs.

Increase design reuse

The more information captured by the product development system, the greater the opportunities to reuse parts of existing designs as platforms for newer products.

Using the design of an existing part or assembly as a starting point for a new part or assembly can reduce both development time and the risk of making fundamental design errors. However, inordinate time spent searching and scanning for designs deprives a company of product design excellence. Searching for the part from memory or by part number is a hit-miss proposition. Even if the most-recently produced part is located, it may not be the best part to use. This process starts with capturing vital information when the new parts are created, and archiving it in a form that can quickly and easily be referenced for future search.

The key to building better products faster is to adopt design reuse best-practice strategies around planning ahead, by creating categories and indexes to build up a 3D product model library, and then putting search tools in place to automate information retrieval. Design reuse can go even further by first capturing the design engineer's math calculations, notes and other digital information that shows the context of the design, and then by adding to this data any other detail, such as test results that are relevant to the product. Altogether, this information can help the next designer of the new product make the best use of the earlier design. By creating templates of engineering best practices, even novice engineers will have a headstart on product design using knowledge captured from engineers with years of experience.

Improve customer collaboration

Customers have high expectations for manufacturing businesses to deliver products on time with consistent quality and pricing. In order to meet expectations, SMBs need to focus on collaboration across project teams. Collaboration today goes well beyond emails and Webex sessions. Collaborative practices might include a virtual design session, where design engineers from several OEM suppliers connect to customer representatives via desktop PCs. Basic collaborative tools include traditional whiteboards and workflows, but the session also needs to employ visualization software that lets the team view a 3D model of the finished product, so each supplier can see how and where the product fits within the customer's fully assembled product.

The session takes collaboration to a new level by letting each team member do a virtual walk-through – exploring the product internally as well as externally. By focusing on your company's collaborative framework in terms of speed, accuracy and completeness, you can develop a collaboration-building strategy that suits your specific business needs.

Increase use of virtual prototypes

Manufacturers need to continuously test new ideas in order to meet the requirements of ever-more demanding customers. However, physical testing can be costly and time-consuming. The goal for any company is to reduce the number of physical prototypes while maintaining the integrity of the product.

In order to stay competitive while also reducing cost, manufacturing businesses need to focus on increasing virtual prototypes. Virtual prototypes are becoming more realistic every day, thanks to a variety of factors, such as: advances in hardware and software architecture; new visualization tools, such as realistic rendering and lighting software that bring realism to the 3D model; and powerful analysis software that performs stress testing and other types of analysis more thoroughly than ever before.

Challenges in SMB Product Development

Today's small and medium-size product development companies face a number of complex challenges, including:

- **Growing complexities of new products**
  During new-product design, every component used in the product model requires time and thought on the part of the design engineer. Today's products are challenging because they typically contain more components, have greater ergonomic demands, and are more varied in nature.
- **Distributed design environments**
  Today's design engineers are likely to share data – everything from math calculations and third-party test data to the 3D model itself – with other members of a distributed design team working in distant locations with disparate software architectures.
- **Disconnected software environment**
  Some companies regard product development as a stand-alone process, so they don't tie the technology to their business software infrastructure – such as their ERP, SCM or CRM systems. These 'silos' of information make it difficult for design engineers to access company information, for instance approved parts from Purchasing.
- **New regulatory and safety requirements**
  With design teams and suppliers operating globally, and selling to customers who are geographically dispersed, the burdens of satisfying local regulatory and safety requirements mount up quickly. Each country has its own regulatory requirements, and these requirements must be communicated to the design engineer.

It's well known that a virtual prototype can save hours – sometimes days – over the time it takes to build a physical prototype. But digital prototypes provide advantages in other ways, too. They can let designers try out alternatives in surface materials, for instance, or product structures that would be impossible with physical prototypes. By allowing engineers to test virtually, they can free up time to innovate. Virtual testing also allows engineers to analyze hundreds – even thousands – of design alternatives that would be impossible to test in the physical world.

Reduce scrap and rework

Production scrap is expensive, and it can come from anywhere. It can result from supplier parts, ordered for a sub-assembly that don't fit into a finished assembly, or scrap can be a physical prototype that was used once and discarded. Wasted production scrap and the related need for rework can bite deeply into the time and budget for product development and manufacturing.

The key to reducing production scrap is to define all product information digitally. With advances in design and manufacturing integration, full digital product representation is easier than ever. Tools such as easy-to-use tolerance analysis software can help many companies reduce scrap, which, in turn, enables design engineers to spend more time innovating new products, rather than fixing old problems.

The ability to share information is also vital to reducing scrap and rework by engineers and manufacturing. Using today's 3D visualization tools, all decisions about product changes are visible to both engineer and manufacturing, thus preventing process mistakes. By sharing information, everyone in the development process has access to the latest information at all times.

Connecting to the business: Matching initiatives with opportunities

To take the final step – that is, to put product development to work by matching the company's initiatives to the most important value opportunities – requires that SMBs first prioritize their unique business value opportunities, and then determine the specific product development improvements to undertake. Clearly, there will be overlap in both areas, in value opportunities and in product development improvements. But when SMBs take the time to prioritize in each area, they will be focused and positioned to move forward.

For starters, consider: where are your opportunities? For SMBs, the best business opportunities depend on the company's industry, their product types, and their ability to differentiate themselves, among other factors. For instance, for a retailer, fulfilling demand might be the most pressing opportunity, since demand changes frequently – with the season, with the latest fashion, or with the styles appearing in a new movie. For an automotive supplier, growing market share and realizing a price premium may go hand-in-hand as the most pressing opportunity, that is, if the product can be differentiated well enough to sell in volume to several large customers. For a technology company, the opportunity might be to respond quicker to fast-opening markets, if the company can modify and deliver product to meet extremely tight delivery schedules.

In each of these cases, improvements made to the product development process can bring success. Improving customer collaboration is one way in which you can grow market share. By focusing on improving customer collaboration, you will be able to move quickly and build customer-friendly modifications into your products. If you are looking to reduce cost in product design, you will want to focus on reducing production scrap and increasing the use of digital prototypes.

By making fundamental and lasting operational improvements, SMBs can enhance their position in the marketplace, making them more agile, improving endurance, and enabling the company to win more business than the competition.