Whitepaper

Best Practices for NPI and NPD Success

Must-Have Tips to Ensure the On-Time Delivery of New Products
Best Practices for NPI and NPD Success

**What separates New Product Introduction and New Product Development?**

Adherence to best practices can make your new product development (NPD) and new product introduction (NPI) processes smoother, efficient and more cost effective.

Many companies make the mistake of treating manufacturing, new product development and new product introduction as if they are nearly identical. They’re not. Not at all. These processes are interrelated, complementary, and prerequisites for one another. They may use many of the same tools and buzzwords, but they’re like brake components from different manufacturers. The brakes from a Boeing 777 do not fit in a Mini Cooper even though they perform the same function.

NPD is a creative endeavor in search of future business success, and, as such, is a fuzzy process that confounds strict organization. NPD thrives on variability. Well, most of the time. NPD needs plenty of management to keep the project focused on the end goal or your product idea will never happen on time. However, too much rigidity when managing your project and your new product idea can eat up resources, time and money. That makes it a balancing act.

NPI, on the other hand, is all about execution on a sticky wicket of interrelated tasks that must be carefully planned, implemented, executed and fused into elements that can become manufacturing processes. Generally speaking, manufacturing is a linear series of predictable and repetitive processes from procurement to fabrication, assembly and shipment. It requires well-ordered hand-off instructions from your NPI team to ensure efficient operations and meet time to market targets. Manage it right, and manufacturing will get your new product done right. Manage NPI exceedingly well, and you can advance your product portfolio to the next level.

Both NPD and NPI need nurturing as well as managing. This paper examines how product lifecycle management (PLM) coupled with flexible project management provides a best practice approach that will guide your NPD and NPI processes along to their desired outcomes on time, comporting to specifications and within budget—without stifling innovation.

**What Are the Keys to New Product Development?**

New product development is a data collection, communications, control and management issue. Whereas manufacturing is a linear process, NPD is cyclical. However, the NPD cycle rolls along a straight, gated path of stages from concept through release to NPI. Each stage within the NPD cycle has its own cycles that start, stop, backtrack and restart before passing through to the next stage. Often, different stages of development happen concurrently.

NPD has five stages: concept, ideation, design, test and release. The criticality of the concept stage cannot be understated, and it’s vitally important not to conflate concept and ideation.
Both concept and ideation revolve around ideas, but concept loosely defines a product idea while ideation culls through many ideas to make the product idea a reality. The two are hopelessly intertwined at the onset of a project. But once a concept is set – “we’re going to build a thing that does this” – ideation takes over throughout the product development process until the final design is locked down.

The concept phase has two basic functions. First, it defines a problem then it defines the new product that solves the problem. This establishes the direction and confines the scope of the development process to a concrete task at hand. Second, the concept phase defines the technical and business goals the new product will achieve. All of that is easier said than done.

It’s at the earliest stages where you’ll likely spend a healthy portion of your entire NPD time. Theorists call these first steps the Fuzzy Front End. By that they mean, you’re brainstorming and investigating a product concept idea from all sides without establishing requirements or locking down product specifications.

Eventually, this brainstorming process leads you to a point where you decide to integrate your ideas into an action plan. Here, it is important to spec out the product to its logical end and create a preliminary bill of materials (BOM). Yes, specifications will change throughout the development cycle as a natural consequence of operations such as design and prototyping. That’s okay. You want to determine if a product is technically feasible, lies within your area of expertise and resources, and whether it seems to be a viable product to manufacture and sell profitably. Decisions made in the earliest moments of concept development can have profound effects on downstream costs as well as final end-user pricing, so focus on the minimal requirements that achieve your technical and business goals for the first version of the product. Extended capabilities can be added to a successful product in later revisions.

As part of your business goals, you’ll need input from your legal, procurement and even marketing teams. Legal must determine such matters as whether or not this new product is patentable or in violation of an existing patent, what liabilities may be lurking, and so on. Procurement needs to start sussing out such risks as the availability of off-the-shelf and alternative components, and who on your list of trusted contract manufacturers (CMs) can handle your needs as well as determine the reliability of the CMs’ supply chain partners. Marketing needs to determine if anyone will actually desire or buy your new product and, if so, at what price so they may start developing plans to roll it out to the market.

Importantly, it does not matter where or how a concept arose. Once your concept passes beyond idle talk in the cafeteria to a formal meeting that begins serious consideration of the idea, set up its product record in your PLM system. This is vitally important in any industry, but an absolute necessity for certified, regulated and audited companies that have to be able to prove they can identify, manage, disseminate and track documents.

As you set up the product record, use a consistent set of naming conventions for all the files associated with the project, including manufacturer’s datasheets for commodity parts as well as internally generated 3D CAD and 2D drawings. Take the time to develop file names that can be readily associated with components or assemblies within the product.
It may help you and your team members to build a cheat sheet of naming conventions in a spreadsheet stored, managed and revision-controlled in your PLM document system. With file names that everyone can recognize, all stakeholders will speak a common language and understand part numbers and revision data at a glance of the file name.

If something nixes your product concept, you did no harm creating this early foundational work. But you'll be glad to have the foundational product record well underway if you get the nod. Data accumulates rapidly, and it is far more efficient to have your PLM in place first, than to collect scattered data, models, parts lists and so forth and then attempt to backfill a product record only after development efforts have commenced. Additionally, setting up the product record infrastructure at the onset, ensures that the project’s archiving, control, collaboration and communications backbone is in place and that everyone involved in the project has a single, unified source for all of the latest data—evoking the proverbial “single version of the truth”.

Concurrently, begin formal project management. Assemble your teams, identify deliverables, assign responsibilities, estimate resources, identify the gates to pass through and milestones to achieve to produce the deliverables, and determine development time and costs. Create pragmatic work schedules and devise a realistic budget. If your schedules are too tight, you’ll burn out your teams and tick off upper management when you consistently miss gates and milestones. If your budget is too high or too low, you risk project cancellation—if not your career.

**Embedded Project Management**

When devising your project management schema, seek out a project management solution that enables you to link schedules at all levels to your product record. This is important. Linking schedules and their associated task assignments to the product record provides product managers essentially real-time visibility into all events in the development cycle and facilitates communications and collaboration around items, changes, files, and tasks at team as well as global levels.

When assembling your teams, ensure that you’ve included all the unique, multidisciplinary roles to be filled: design, test, procurement, contract manufacturing, assembly, quality, marketing, sales, service and so on. Vet your team assignments closely. The temptation is to appoint your best and brightest, but that could adversely affect on-going operations and other projects. Sometimes the smart-alecky new kid who is “too stupid” to know that you cannot develop a product like what you have in mind is a better fit for bold ideas to magically happen than the cranky old pro who “knows” it cannot be done.

Take care when estimating required resources. Accept that you’ll never have enough. Development is inherently slower because of its learning curve. It starts, and it stops. It evaluates and redesigns. It takes a time out. Assume that development will not operate at full resource capacity some of the time and schedule accordingly.
How PLM Supports Product Ideation, Design, Test and the Release Phases

With the official go-ahead, ideation continues while the design and test phases begin. They feed into and off of each other. Design and test are straightforward concepts in the abstract. Something is designed and simulated or prototyped, and, based on the simulation and prototyping test results, the design is modified. Later, physical prototypes are built and set through their paces to validate that the design meets specifications. Ideation simply means that your teams are figuring out how to take the new product concept and make something that meets the technical goals within the project time frame and constraints of business goals. But that’s all that’s simple about it.

While ideation is frequently spoken of as a separate step, it’s not. It’s like rust. Ideation never sleeps. It’s an ongoing activity throughout your new product design and test cycles. Ideation is concurrent with other engineering activities. It means feedback loops where engineers design, evaluate, reject, redesign, and, ultimately, optimize many design ideas. Failure is encouraged. But fail fast. Ideation means that revisions are forever being temporarily locked so that prototypes can be made and tested or simulated.

It also means many of your normal procedures and processes are ignored. For example, prototype circuit boards are often larger than the planned final product to accommodate circuitry for the test engineers. And engineers have been known to bypass procurement and solicit free evaluation components from manufacturers that may or may not be on your approved manufacturer list (AML). Gasp.

Consequently, from the earliest stages of NPD, project managers and team leaders must exert deft leadership or these sort of activities can bog down a project’s progress, make back-end costs spiral out of hand and cause timelines to slip. But therein lies the dilemma.

World War II army general George Patton said it best: “Never tell people how to do things. Tell them what to do and they will surprise you with their ingenuity.” You want to get out of people’s way so they can be creative. But you do not want engineers wringing their hands in some Hamlet-like soliloquy of innovative indecision or tinkering with potential improvements for an updated version of a product that does not yet exist. And you cannot allow bypassing of normal procedures for development purposes, such as temporarily skipping form-fit function (FFF) rules, to be an excuse for abrogating proper BOM and change management, documentation preservation and other standard operating procedures (SOP).

This underlines the importance of PLM, document management, as well as realistic scheduling and budgeting from a project’s onset. The product requirements plan, calendar and budget give you cudgels to keep teams focused on the specifications, the clock and expenses. PLM and document management add rigor, enforce and maintain proper enterprise-wide procedures during your new product development processes. They lay the groundwork for a smooth transition to new product release.
Without PLM, you’d be struggling to make sense of all the rapidly changing models, drawings, test results, assemblies and BOMs. And without PLM, your development teams would be bumping into each other. PLM assures that communications and collaboration among all the engineering teams is clear, up to the minute and automatic. This reduces the likelihood that one team will march off in a direction that leads to a dead end for another.

**All Hail the Product Record**

But PLM alone will not solve the project manager’s dilemma nor keep teams from operating in their own worlds. A project management solution that connects with PLM provides visibility into the product record and, importantly, links schedules and assignments to the product record. Every time.

With project schedules linked to the product record at all schedule levels, managers can see what’s going on across the development process and development teams can see where they fit into the big picture—in real time. Further, schedule notes and detailed status reports linked with the product record keep teams aligned and facilitate global collaboration, reducing the chances that one team charges off down a barren path.

Project managers and company executives benefit from tools that track development progress through the design, test and redesign phases by schedules, assigned tasks and milestones. Project managers, for example, can assign tasks to teams and individual team members that have built-in notifications and reminders that keep everyone, project managers and team members alike, focused on the job at hand and abreast of changes, gates and milestones achieved and other critical developments in real time.

In practice, this means project managers can readily identify teams and individuals falling behind or surging ahead. With this real-time knowledge, you can tweak schedules and re-allocate resources to accommodate exculpatory situations or exploit better than estimated circumstances. Further, with the ability to reference links to items, changes, files, requests, and related data, project managers can easily confirm tasks are completed and approved by simply seeing updates to the product record in context.

Project management linked to the product record provides project managers additional benefits such as comprehensive reporting capabilities of all project data across teams. This enables you to generate detailed project metrics as well as cross-project analyses on demand. It encourages you to stay buttoned-down.

With all of your development activities tracked in your product record and linked with a product management solution, project managers can leverage that visibility into all project data as well as a suite of management tools which reside in an advantageous locus. This, in turn, empowers project managers to drive the NPD cycle and meet its technical and business goals in ways not possible before. Moreover, when your new product passes final validation and is ready for release, its consistent numbering schemes and well-managed BOMs, AMLs, documentation and supplementary data is up-to-date, you are well positioned for a smooth transition to manufacturing and new product introduction.
Best Practices to Streamline NPI Processes

If manufacturing is a linear process and NPD is a cyclical process, NPI is an integration process that unites NPD with manufacturing. But NPI is also a process that fine-tunes the new product you’ve developed and, with each new product introduced, you get the opportunity to fine-tune your manufacturing processes by applying the lessons you’ve learned from across your portfolio.

A lot of things can take you by surprise when introducing a new product. You may find that your internal resources are not always available in the time frame or with the required expertise to meet NPI demands. Your internal resources may also have limited bandwidth, forcing you to hire and manage outside partners. And if you are a global organization, the complexities of your global customers and supply chain pose additional extra challenges.

Smart companies know that well disciplined NPI processes are critical to success. Yet, even these companies can suffer from NPI failure when important project management documents, policies, and guidelines are haphazardly managed as clumsy manual processes. And when these processes go bad — and they inevitably will — it attributes to a corrosive culture of blame.

Michael Keer, CEO of Product Realization Group (PRG), a consortium of Silicon Valley experts that helps bring product companies to market, believes most companies’ NPI processes fail due to a few common mistakes. He recites these in his whitepaper, “PRG’s NPI 7 Best Practices”. (1)

Learn more on how every department contributes to new product introduction (NPI):

Conclusion

For NPI processes to be successful, PLM is an absolute must for managing design and manufacturing documents, such as your BOM, change management and compliance management. Specifically, companies need a multi-tenant cloud based PLM solution with embedded modern project management and quality solutions that connect directly to the product record to increase change visibility and drive efficient NPI and NPD. Combine a modern cloud-based PLM system with an embedded modern project management solution and NPI project leaders have the perfect one-two combination to deliver successful NPD and NPI initiatives. And that’s why more NPI project leaders choose Arena.

References:

About Arena

Arena, the inventor of cloud PLM, provides an all-in-one product development platform that unites PLM, ALM, supply chain collaboration, and QMS for the design and manufacture of complex electronics. With Arena, electrical, mechanical, software and firmware engineers can collaborate with manufacturing and quality teams to manage their bill of materials, facilitate engineering change orders, and speed prototyping. As a result, Arena customers can better meet standards while they ensure regulatory compliance, improve training management, reduce costs, increase quality, and collapse time to market. Arena has been ranked a Top 10 PLM provider and won the coveted Design News Golden Mousetrap Award in 2016. For more information, please visit http://www.arenasolutions.com.

Author

Tony Lockwood has 36 years of technical editing and writing experience. He spent nearly 13 years at BYTE magazine, where he rose to become the managing editor of McGraw-Hill's BIX, the first online news, information, and moderated commenting system from a major publisher. He was the founding editor and later publisher of Desktop Engineering magazine, a leading CAD/CAM/CAE publication. Since 2007 Tony has provided content and media relation services to technology companies serving the manufacturing, design and mechanical engineering communities. He continues to write two columns for Desktop Engineering.