New Product Introduction Challenges and Solutions
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Key Success Factors to Rapid New Product Introductions
In today’s competitive global market, innovative products are not enough. To compete effectively, companies need to accelerate new product development and reduce product cost—all while adhering to increasingly stringent environmental and regulatory requirements. The only way to accomplish all these objectives is to radically rethink the way new product introductions (NPI) are managed.

As a provider of on-demand Product Lifecycle Management (PLM) solutions, Arena has worked with over 300 companies across diverse industries to improve their NPI process. Through seven years of working with customers, Arena understands the obstacles companies face in developing new products. We hope this paper can help shed light on this important topic.

Introduction: The Unique Challenges in New Product Introductions
Inherently, the NPI process is highly complex. For almost all companies, NPI requires coordinated efforts of numerous teams within the organization, as well as an extended network of partners and suppliers. A new product can contain hundreds to thousands of new parts, each of which may entail unique design, specifications, development, and other specialized requirements. Working with a large number of geographically dispersed component suppliers to get the right parts at the right time requires seamless coordination.

The myriad of tools used during the NPI process further compound this complexity. Mechanical computer aided design (MCAD) applications, electronic design automation (EDA) software, spreadsheets, project management tools, and enterprise resource planning (ERP) systems all play a part in the NPI process at most companies. Manually managing all the ongoing changes among these disparate systems is virtually impossible.

Any miscommunication between teams or poor synchronization between systems may result in errors, inefficiencies, and delays, all of which can have a direct impact on a company’s bottom line. When product design and manufacturing are partially or entirely outsourced to partners and contract manufacturers, these challenges and resulting costs can grow exponentially.

What does NPI entail and how can the process be improved? The following section outlines the key phases in the NPI process and reveals the key requirements in each phase.
NPI Process Key Phases
A typical new product development and introduction consists of three core phases: 1) product definition, 2) product development, prototyping, and testing, and 3) product build and ramp to production. Through each of these three phases, effective project management is essential for ensuring optimized productivity and results. Traditionally during NPI, engineering’s role stops after development and manufacturing functions start. The sequential effort results in poor design for manufacturability, increased re-design effort, and delays in time to market. The best-in-class NPI process pulls manufacturing into the design phase early, and ramps up manufacturing effort as the design progresses to production (see Figure 1). Engineering continues to participate even in the production phase to ensure the design is correctly built. This collaborative approach improves NPI time to market and quality, but it also requires increasing level of communication and coordination amongst the project teams.

Product Definition
The first phase in a successful new product introduction is concept ideation. Through experience and planning, marketing and engineering teams generate new ideas. After performing business case analysis and technical feasibility studies, NPI teams create initial market and product requirements. These initial planning documents outline the objectives and goals for the NPI.

Contrary to conventional wisdom, the real challenge during product definition is not necessarily lack of ideas. The fundamental key is selecting the right ideas and managing them to commercial success. Best-in-class companies follow a disciplined portfolio management process to select the right product ideas and use consistent NPI processes to bring products to market, before the competition.

Product Development, Prototyping, and Testing
After a new product is defined, how well a company manages the project to develop and deliver the product determines how quickly the innovative idea reaches the market. New product development is complex. Participating groups include design engineering, component engineering, sourcing, quality engineering, compliance management, and others. These teams carry out hundreds of activities, such as design, coding, prototyping, sourcing, quoting, testing, manufacturing planning, and tooling. In a global environment, these groups are often geographically dispersed. Furthermore, design partners, suppliers, and outsourced manufacturing partners extend the teams beyond the boundaries of a single company.

In such a complex environment, it is essential for all participating teams to have common visibility into the most recent product information and changes. Companies must set up a centralized and shared project and data management infrastructure, so that cross functional and cross enterprise teams are able to access the latest design files, bill of materials (BOMs), engineering change orders (ECOs), work instructions, project plan, and task list, all under revision control. In a recent study, Aberdeen Group, a global research consultancy, reports that best-
in-class companies significantly out perform laggards in new product
development (see Figure 2). These companies tend to leverage product
lifecycle management tools to improve product development and project
collaboration. Specifically they are “over 50% more likely to leverage
centralized product data”.

Increasingly, companies outsource manufacturing to contract
manufacturers whose role is instrumental in delivering a quality product.
By having a centralized system for product information, contract
manufacturers and component suppliers can start to be involved earlier
in the design and change processes. Contract manufacturers are able to
provide valuable feedback on the manufacturability of a design to avoid
expensive late changes and suggest potential cost saving alternatives.
Companies also have the opportunity to leverage contract manufacturers’
expertise accumulated from working with hundreds of other companies.
Similarly, suppliers can identify hard to get or long lead time parts early, so
they can be planned for and available at production. Additionally suppliers
are able to provide key input to the design and influence cost and tradeoff
decisions.

Under increasing environmental and regulatory compliance pressure,
companies must seek cost-effective solutions to meet product compliance
requirements such as RoHS, FDA, and FCC, as well as process compliance
requirements such as FDA and ISO. Design for compliance is imperative
in today’s environment. Manually working with a large volume of
compliance data becomes increasingly difficult and costly, especially across a global supply chain. To efficiently
track, document and report on compliance, companies must implement a compliance management solution that
is directly integrated with the shared data management infrastructure. In an outsourced environment, companies
must assess compliance risks of all outsourced activities, implement necessary control, and create documentation
to establish an audit trail. Companies can then have the full confidence that the product has been kept in
compliance from initial design through end of life, revision by revision.

Product Build & Ramp to Production

With the product designed, prototyped and tested, manufacturing the product is the next key phase. Operations,
manufacturing engineering, test engineering, component engineering, and design engineering must work
together to ensure that a given design is manufactured to correct specifications. In fact, to ensure production is
efficient and cost-effective, these teams need to collaborate before the first product is built—the earlier they are
involved in the design phase, the better equipped they will be for a rapid production ramp.

In a recent study with 150 mid-market manufacturing companies, almost half of the respondents said that
including partners and suppliers in NPI project planning and execution was difficult. Communications about
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Product changes from a company to its contract manufacturer are frequent and complex. Design revisions, new manufacturing process instructions, and updated AVL/AML information all require contract manufacturers to react in a timely manner. ERP systems are not the right tools to manage and communicate changes with contract manufacturers. Many companies rely on error-prone and time-consuming manual communication methods. Any mistake can result in incorrect builds, excess and obsolete inventory, or insufficient parts which delay product shipment.

To facilitate efficient and accurate communication of a product BOM, companies must ensure that the product record is available to all involved in the production and change implementation, including internal groups, contract manufacturers, and suppliers. To manage the production phase more effectively, companies need to define and document a robust change management process and rules based on best practices. The process should involve multiple tiers of the supplier chain. For instance, changes to made-to-spec parts sourced from upstream suppliers, such as printed circuit boards in a printed circuit board assembly, must be reviewed by the upstream supplier and the downstream contract manufacturer.

Providing contract manufacturers and suppliers with selected visibility to centralized product record allows them direct access to the most recent changes. It removes the data communication bottlenecks that result from relying upon individuals and reduces the potential costly revision errors.

NPI Project Management

The NPI process requires a well-oiled machine with all its parts working smoothly and synchronously to manage hundreds of new parts, tasks and a great number of hand-offs. How do all these interdependent moving parts come together to bring a new product to market? Many companies currently use project-planning tools, such as Microsoft Project or Excel to compile high-level tasks, dependencies, and timelines.

These tools are not designed to be tied to product information—such as parts and subassemblies—and cannot be effectively shared across numerous internal and partner teams. In a recent survey of manufacturing companies, 66% of the companies attributed NPI delays to poor project coordination and communications across product teams. Fortunately, new tools available in the market can seamlessly associate project execution to product design effort. As a result, project collaboration between teams and across the supply chain is greatly improved.

A seasoned NPI project manager and a cross-functional product development process are both necessary to ensure the success of an NPI. But they are no longer sufficient in this competitive environment. A shared project and data management infrastructure is also vital. With it, teams are able to access the latest project plans and tasks that are related to parts, sub-assemblies, and assemblies.

In an outsourced environment, companies can share selected project task lists to involve contract manufacturers and suppliers as integral members of the teams, giving them visibility into status and potential risk. This way, teams are able to collaborate on value-added tasks instead of wasting precious time looking for the right document revision and correct mistakes due to miscommunications.
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Arena Solutions Helps Manufacturing Companies Manage Successful NPIs

Arena PLM, a leading Product Lifecycle Management (PLM) solution, has been used to introduce thousands of innovative new products across diverse industries. Arena PLM has been adopted by thousands of users across over 300 companies, including Foundry Networks, Tesla Motors, First Alert, Align Technology, Segway, and Intuit. Leveraging Arena’s award-winning PLM solutions enables companies to better manage their overall NPI process.

- The entire design and supply chain can access a “single version of truth” of product information and project details—including design files, items, BOMs, ECOs, compliance requirements and status, schedules, tasks, and other critical data.

- This “single version of truth” improves NPI project collaboration and reduces errors and delays in the NPI process. Companies benefit from reduced ECO cycle time and NPI ramp time as well as increased BOM accuracy and parts re-use.

- Companies can selectively share this “single version of truth” with design partners, suppliers and outsourced contract manufacturers. Benefits range from lower component cost to reduced scrap and rework.

- With a built-in validation model for FDA requirements and support for other compliance reporting, Arena PLM helps companies adhere to rigorous product and process compliance throughout the product lifecycle.

Arena PLM is delivered through an innovative on-demand service. Companies as well as their outsourcing partners and suppliers can access the solution and work collaboratively with a web browser and Internet connection. Arena PLM eliminates the need for companies to acquire new hardware, software, or additional IT staff. Moreover, companies can add unlimited number of users across their supply chains and selectively allow them to access product information and project details.

Arena Customer Successes

| SafeView | is an industrial product manufacturer. The company wanted to accelerate launch of checkpoint screening device while leveraging 100% outsourced design and manufacturing. |
| Results after using Arena PLM: |
| - Reduced time-to-market by more than 50% |
| - Supported 100% outsourced design and manufacturing model with real-time collaboration |
| - Achieved cost goals with first product release |

| Align Technology | a class II medical device company, desired to implement a robust electronic document management system to support growth and ensure regulatory compliance. |
| Results after using Arena PLM: |
| - Cut ongoing compliance cost by over $250,000 annually |
| - Reduced change implementation times from 22 days to 3-5 days |

1. Profitable Product Development for SME by Aberdeen Group, 2007