

## Enabling innovation for new product development

[www.siemens.com/plm](http://www.siemens.com/plm)

white paper



► Generating ideas is not the issue. Executing on them is.

## **Table of contents**

|   |           |
|---|-----------|
| <b>Executive summary</b>                                  | <b>I</b>  |
| <b>Strategic portfolio management</b>                     | <b>2</b>  |
| <b>Program execution management</b>                       | <b>6</b>  |
| <b>Product development</b>                                | <b>10</b> |
| <b>Manufacturing planning<br/>and validation</b>          | <b>13</b> |
| <b>Manufacturers who move<br/>forward: LG Electronics</b> | <b>15</b> |
| <b>Summary</b>  | <b>16</b> |

## **New product innovation is fundamental to growth**

*The future value of your company is dependent on the successful launch of new, innovative products and services.*

*According to a recent survey of CEOs by Accenture [Good Ideas are not Enough, 2005], two-thirds of executives believe that innovation is vital to the future of their company. However, the same survey found that only one in eight executives feels that their company excels at implementing innovative ideas.*

*Further research from AMR found more than two-thirds of companies admit that their new product development (NPD) processes are not under control. While 48 percent of companies surveyed have a formal NPD process in place, only 52 percent have metrics applied to the process. In other words, they have little idea how well they are actually performing. [Trends in New Product Development and Introduction Processes, AMR Research 2004]*

*Clearly there is room for improvement.*

*Leading manufacturers are reaping gains by pursuing business capabilities that improve team performance in new product development and that coordinate those efforts around customer needs. These companies are taking steps to compress the time it takes to deliver innovative products that meet market requirements. They are using product lifecycle management, or PLM, solutions to integrate people and processes through the implementation of a number of key, interdependent capabilities.*

*This paper discusses fundamental areas that need to be addressed if manufacturers want to create an environment that fosters sustainable, measurable innovation in new product development:*

- **Strategic portfolio management**  
*Capture the voice of the market and align it with the needs of the company. Prioritize the right investments and outline key requirements to direct research and development.*
- **Program execution management**  
*Control and manage projects to manage program and development team complexities, and put in place performance measurements and milestones to keep projects on track. Establish consistent and repeatable product development stage-gate and change-management processes across development organizations.*
- **Strategic product development**  
*Develop systems and technologies that embed market and customer requirements directly into product architectures. Align product concepts to strategic requirements that can be simulated and validated as a basis for detailed development.*
- **Manufacturing planning and validation**  
*Synchronize product manufacturing and sourcing processes with the rest of product development to ensure flawless product launches and smooth ramp-up. Validate manufacturing processes and line designs to ensure quality and compliance.*

Comprehensive portfolio management provides a means to ensure that the right projects are pursued to maximize a company's impact on its market. Strategic portfolio management enables companies to measure performance at every stage of the NPD process, so that corrective action can be taken when needed.

An effective solution for strategic portfolio management needs to consider several factors important to new product development.

### **Idea and innovation management**

The link between successful innovation and the ability to focus on customer needs is clear. Leading manufacturers demonstrate a strong ability to get closer to their market needs and to generate, understand and evaluate ideas.

At the same time, idea management can be challenging. First, it is important to encourage broad participation in the ideation process from both internal participants (such as marketing, development and sales) and external stakeholders (such as suppliers and key customers). Participation in these efforts can be encouraged through alerts, or more actively through emails for example. This requires that any infrastructure be able to support very distributed teams, and provide appropriate security mechanisms.

Secondly, ideas need to be evaluated and prioritized. Gathering prioritized input from all those interested in the success of any new product is a key component of the evaluation process. On-line surveys can assist in this process by gathering input on key capabilities from a wide variety of areas. The information and insights gained from these surveys are critical in defining direction for the group as a whole.

Effective management of new product or process ideas requires that all supporting data be stored with the original idea. An innovation management solution should make it easier to share, discuss, and route ideas for consideration by other team members and experts. The data from these consultations should be captured and made available along with all other data.

In addition, ideas themselves need to be subject to a higher level of structure. A system that provides a virtual environment for sharing ideas makes it possible to collate, search, group and filter and weight as appropriate into specific segments and categories. New ideas can be linked to old as part of the brainstorming process.

### **Business planning and decision management (a.k.a. portfolio management)**

Not all ideas are good ones, and even good ideas don't guarantee success. Approximately 86 percent of new product ideas never make it to market [PDMA 1995]; of those that do, 50 to 70 percent fail. [Driving Growth through Innovation, Robert Tucker] Apple's CEO Steve Jobs says that, among other practices, the seed of Apple's innovation is "saying no to 1000 things" so as to concentrate on the "really important" creations.

So, how do companies know which are the important creations? How do companies know how their current products are doing? How can product offerings be optimized? What do companies need to measure to make decisions? How do they make decisions?

Business decision management provides a framework to answer these questions. It helps companies establish clear strategies for innovation, enforcing a consistent focus and accountability across the organization.

An effective proposal, justification or business case for any effort combines input from sales, marketing and development. An effective business decision management solution needs to be based on an open and common business layer which can bring together information from the wide array of business applications that support those functions. By aggregating this information, companies can track actual program execution against budgeted and planned costs, resources and time. This provides the core metrics that help paint a picture of products' lifecycle curves.

From a product development perspective, the business layer needs to be closely connected to the product bill of materials. This makes it possible to clearly understand and account for commonality and variation with existing products in any new platform considerations. In turn product development costs can be more effectively outlined. It also is important to maintain a connection to R&D and technology management to ensure R&D efforts are focused on providing key technologies to be utilized in future new products.

A collaborative framework for business decision management allows participants to see and understand the various influences on the company, provide their input, and sign off on investigations, proposals, justifications and business cases. Armed with pertinent information from all key areas of the business, leaders are able to make more informed decisions about what offerings, platforms, products and technologies to develop.

Successful companies realize that this preparation is critical and give it a lot of attention. They take a pragmatic approach and typically have formal methodologies for business planning. Results and conclusions from these phases are communicated clearly and simply across the groups that are accountable for success. Success is based on performance metrics that come out of these efforts.

### A framework for effective NPD

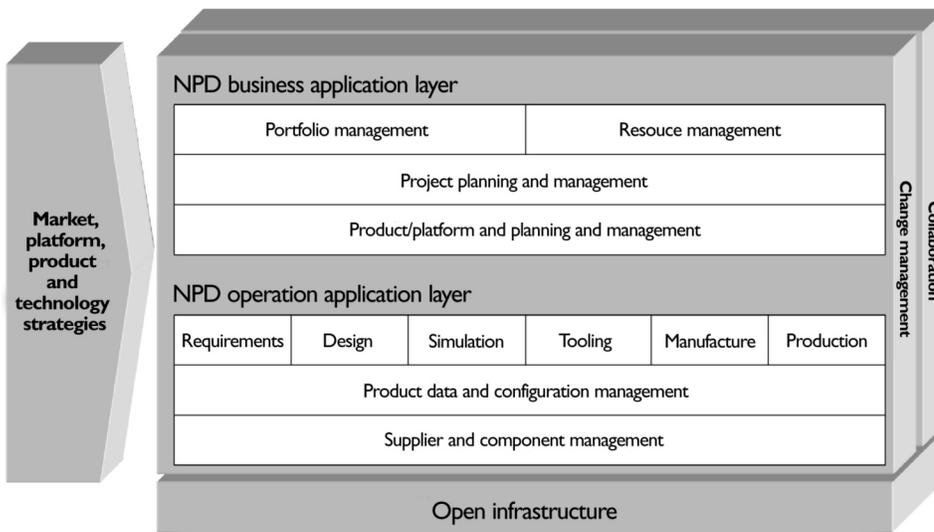


Chart adapted from *PDMA Toolbook for New Product Development*

## Requirements management

Requirements management helps ensure success by making certain that the product lifecycle is rigorously and relentlessly driven by the requirements, needs and preferences of a company's target markets and customer base.

In the initial phases of any effort, requirements management provides a key capability by accurately outlining the attractiveness and cost of any new idea. Once a project has been approved, requirements management provides the initial infrastructure required to enable development to effectively execute on bringing the idea to life.

Requirements management establishes an important link among business applications, operational execution and development applications. It directly connects product requirements to the digital environment that developers use to design and validate products. In this way, it goes beyond the basic maintenance of up-to-date product requirements and makes it possible for requirements to influence product design.

Requirements management allows companies to build on their innovative ideas by outlining and formalizing the various market, customer, product, regulatory and process requirements that will prove critical to the product's success. When these requirements are linked to the business layer, they can be more directly aligned with, and connected to, the initial idea and the resulting business case.

Everyone who participates in the product lifecycle needs to know what customers want if products are to succeed. By establishing these requirements within a collaborative framework, companies can feed them directly into the appropriate aspects of product development via systems engineering and digital product architectures.

## R&D and technology management

A recent survey of 940 executives by the Boston Consulting Group (BCG) found that 51 percent of them were dissatisfied with the financial returns on investment (ROI) that they are seeing from their innovations. This same research also shows that “there is no direct correlation between R&D spending and sales growth, earnings or shareholder returns.” At first glance this lack of correlation defies logic: In principle one would expect increased R&D spending to lead to more or better ideas and projects. This, in turn should result in better new products and corresponding revenue growth.

In fact, AMR Research findings suggest that the problem lies in the maturity of managerial processes overseeing investment in R&D. [Trends in New Product Development and Introduction Processes, 2004] Creating ideas and technology is one thing. Being able to leverage those in the market place is another. At the end of the day, as an article from analysts Booz Allen Hamilton suggests, it would appear that, “How you spend is far more important than how much you spend.”

Technology management helps to prioritize and focus R&D opportunities today that will have a positive impact on corporate revenue in the future. For many companies this is the embodiment of innovation.

Product lifecycle management tools, and more specifically R&D and technology management tools, allow companies to more effectively manage the R&D process while ensuring connection both to product development and to the wider aim of leveraging R&D knowledge in product development. Capabilities for project management, data management, collaboration and workflow management provide significant opportunities in this area alone.

In addition, by integrating R&D with product development, companies gain visibility into R&D efforts that enables them to more readily identify and align resident technology to current and future business needs. They are better able to identify gaps as well as situations where technology is no longer viable. Working together, R&D and product development can outline optimal approaches to obtaining new technology, whether through internal development or external acquisition, and identify new opportunities to expand technology usage beyond the current business.

All of the investment in planning is wasted if the organization cannot execute on it, consistently, as a single team.

AMR Research discovered that while 79 percent of companies surveyed have formal NPD processes, only 52 percent have metrics applied to the process. [Trends in New Product Development and Introduction Processes, 2004] In other words, they have little idea how well they are actually performing. What's more, most companies rank around one on the Six Sigma scale of quality. This is an indication that a process produces not just poor quality but also inconsistent quality.

Successful companies realize that linking higher level business planning to operational execution is critical to success and employ formal methodologies to maximize the impact of their leadership.

Program execution management provides an infrastructure of linked management and coordination capabilities to tie organizations together to meet a common goal. It provides total visibility into the most up-to-date and complete program information, including a program's rolled up performance metrics, process metrics, custom strategy-specific key performance indicators (KPI) and risk analysis metrics.

### **Program planning and control**

Executive managers traditionally have leveraged one set of systems to perform project management (planning and execution) and another set of systems to perform program management (status and reporting). To make better business decisions and improve their ROI, today's program leaders want to shift the focus from isolated solutions to a single integrated solution that can perform multiple mission-critical product lifecycle functions so that their companies can:

- Reduce the enterprise's built-in overhead
- Eliminate multiple information sources that prevent people from attaining their full productivity
- Synchronize the environment's unaligned product, process and project data
- Provide decision makers with immediate real-time access to the most up-to-date program data

A solution that provides these capabilities in a digital environment is an important tool for leadership. In this environment, executives can leverage collaborative workplaces to gain “big picture” views of an enterprise’s take-to-market programs. For example, they can view multiple workplace schedules, identify rising problems, and respond to potential resource bottlenecks. Combined with the findings from effective portfolio management, executives also can begin to leverage metrics with development groups in order to influence behavior and ensure accountability as programs progress.

An effective program execution management solution enables management teams to:

- Create, maintain and monitor project schedules that reflect fine-grain tasks, dependencies, milestones and start/finish dates
- Connect these schedules into automated processes that reflect repeatable rules, user roles and workflow definitions
- Leverage templates to rapidly facilitate process automation and improvement
- Directly relate these processes to the product/program data generated by these processes

Finally, an effective solution enables companies to save, re-use and modify processes over time, so that they can not only holistically leverage standard processes (such as stage-gate) to drive development, but also improve and optimize processes over time.

## **Project and resource management**

Team members from various groups working on the individual projects that make up a program need to collaborate using shared, virtual project management workplaces that can be linked directly to their operational activities.

A solution that provides a high degree of project management capability to outline schedules, detail activities and dictate milestones and deliverables makes it possible to coordinate the efforts of the group. However, collaboration requires more than a simple set of deadlines.

It’s also important to capture real-time discussions, provide document sharing, ensure interactive schedule updates and share project notebooks where team members can work together.

A digital collaborative environment allows globally dispersed users to simultaneously view and interact with the same instantaneously updated project information, including project schedules, threaded discussions, notebooks and collaborative documents. Distributed project management should not be limited to those internal to an organization. Market leaders in innovation support cross-functional product management teams that extend beyond their own organization to include representatives of their widely dispersed organizations, as well as experts drawn from their supply chain and business partners.

While project management typically has been an effort that is somewhat divorced from the actual work being done, program execution management links tasks in project management to automated processes that users activate and close using their standard workflows, signoffs and engineering change orders for development and manufacture. In this way, project and program management are always up to date with what’s actually happening on the ground.

## **Budgeting and financial management**

The ability to assign resources, financial or otherwise, against specific activities provides a key means to ensure that those resources are most effectively deployed.

At a base level, program execution management provides managers with access to collaborative workplaces to monitor project schedules, assign tasks, assess resource workloads and manage budget items.

At a higher level, it presents resource management and usage information visually, in terms that managers understand. For example, managers can validate resource demand through group-level histograms. Earned value management and reporting can be undertaken. Resource allocation status can be reported. Budgeted spend versus actual spend can be measured. Together these project and program-level status and progress reports can be updated in real time and summarized in dashboards. In addition, program execution management provides capabilities to proactively notify managers in real time when major scheduling changes occur and to generate management reports on both a periodic and ad-hoc basis.

## **Program risk management**

Program execution management helps reduce risk by ensuring that key stakeholders have a comprehensive view into a program's status at any point in time.

Program execution management is built on a common business layer that ensures that business decisions are tightly linked to program execution. Program execution management solutions provide executive dashboards that are directly associated with decision making metrics and analysis tools. This improved visibility helps management to more accurately predict what issues will arise during the execution of individual projects, and provides a tangible basis for guiding their business decisions. Critical paths, key dependencies and leverage points can be understood earlier in the process, in real time.

Risk is further mitigated by the adoption of best practices, such as "stage-gate" management – by allowing companies to tie project tasks into information workflows. This high-level process orchestration enables companies to extend the value of workflow to the overall new product development process while facilitating integrated project and resource management. As a result, companies are able to reduce the implementation burden on key personnel at the same time that they extend the transformational scope of the workflow initiative.

## Launch management

Product launch spans the time from initial planning to the review of product success in the market. Up to this point, the business case has been signed off and most of the business decisions have been made, but the business case has yet to be achieved.

This is a critical time. Typically a significant portion of total spending takes place during the launch phase. AMR Research estimates that the cost of goods sold (COGS) represents some 65 percent of total cost, and that most of this is spent during launch. [Trends in New Product Development and Introduction Processes, 2004]

An effective launch plan requires cross-functional input from often distributed team members representing launch management, marketing, engineering, sales, quality assurance, distribution and customer service. Given its importance, the launch plan should be reviewed by program management.

PLM provides the collaborative framework that allows these team members to work together effectively in a familiar environment that is tuned to their needs. Shared work folders, lightweight document management, base workflow signoff and review capabilities, scheduling and project management, metric and performance management, as well as capabilities for managing customer pilot studies represent some of the tools that enable teams to align their efforts and ensure success at the final hurdle.

In addition to these capabilities, an open level of business integration is key to outlining and disseminating an effective launch plan. Specifically, integration with business case management and the higher levels of program execution management ensures that sales and marketing plans and messaging are consistent with the demands of the business case, and aligned to the efforts of development and manufacture.

Integration with digital product development and requirements management also ensures that product features and differentiators are understood and highlighted appropriately. At the same time, it provides a way to ensure that product delivery mechanisms are designed into the product as appropriate.

Integration with digital manufacturing helps ensure that launch quality and quantities are aligned to the needs of the market. Integration with CRM ensures that lead sales are tracked to measure success.

With a clear set of goals and milestones outlined by program execution management, the development, engineering and design teams can align their efforts with the needs of the company as they start to develop and validate the systems, product architecture and concepts they need on their way to detailed development. Having established a clear set of requirements, the product development, engineering and design teams can contribute additional detail to the core ideas that gained so much attention earlier in the process.

In order to ensure that the end product aligns with the strategic intent of the company, strategic product development needs to focus on three key areas.

### **Systems engineering**

Companies leverage systems engineering to model and analyze the interactions among a product's requirements, subsystems, constraints and components and to optimize the tradeoffs that drive crucial decisions across the entire product lifecycle. For these reasons, systems engineering needs to be closely integrated with requirements management and product development as a whole, so that it can inform the product architecture.

Systems engineering supplements market requirements with quantifiable constraints that determine the success of take-to-market programs in terms of their cost and delivery schedules, as well as their ability to satisfy established performance, ergonomic, safety, usability, reliability, maintainability, recycling and disposal and other compliance-related metrics.

Systems engineering ultimately produces a structure that links requirements to system and subsystem structures and to product structure. This mapping of product and technology is a key to success as, when done correctly, it directly connects high-level product strategy with detailed development execution.

Given the increasingly diverse nature of the teams involved in product development, a common language for understanding a product's interrelated systems is critical. A familiar, open collaborative environment ensures that all contributors can participate in the design and validation process. The functional elements of the system as a whole need to be modeled in such a way that the output can ultimately feed all of the detailed mechanical, electrical and software-based design elements and applications. Ideally these core requirements would be incorporated in detailed design elements within the product definition. In this way, requirements can continually be checked and validated, and perhaps more importantly, balanced.

### **The V Cycle is a classic view of systems engineering**

The classic view of systems engineering, sometimes called the V cycle, establishes different layers of system definition, from a higher level system view down to elementary components of design, through the assembly of those components, and finally to the validation of the system.

Systems engineering supports the outline of use cases as well as scenarios to model customer and market expectations. This hierarchy of requirements then drives functional system architectures to model the actions the product will perform and the logical modeling that ultimately identifies the technologies needed to realize the desired functionality. Once they have been completed, systems modeling techniques can be used to logically group functions and components into systems and subsystems. This forms the first part of the V. The second part of the V involves the abstraction of the system model into a physical design.

Digital product development provides product control structures that are flexible enough to embed a wide array of knowledge into their definitions. Consequently they can be driven by input from a wide array of sources. This enables downstream product and process considerations to be built into the product definition at the point of design. As a result, companies gain the flexibility to drive product definition with key aspects of product performance or manufacturing.

Integration with downstream processes is a key component of digital product development. It provides the ability to validate downstream processes through a closed loop process at the point of design and closes the loop for continuous improvement. This is critical for initiatives such as design for Six Sigma or design for manufacture. It also ensures that the product can be sourced and manufactured, and that the product will perform to expectations.

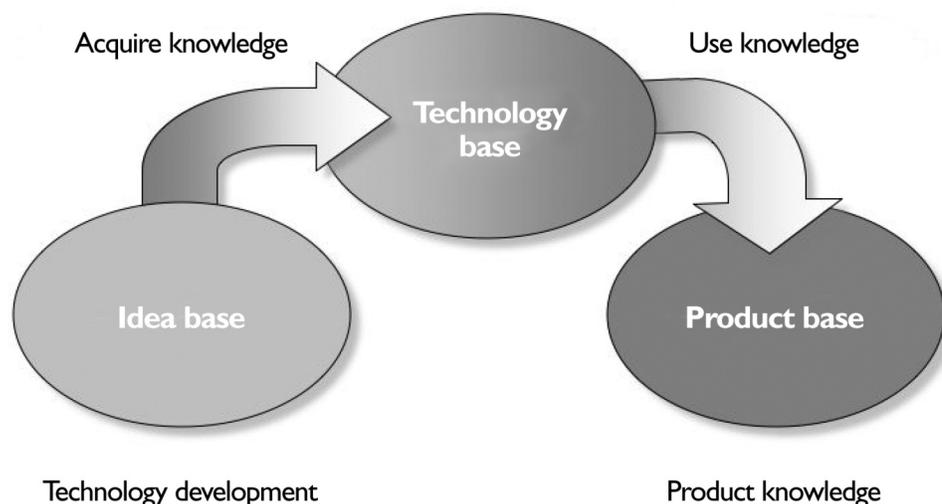


Chart adapted from *PDMA Toolbook for New Product Development*

### Concept design, shape and layout

Concept design, shape and layout are often important elements in a company's overall innovation strategy.

The Apple iPod is an innovation that illustrates how critical it can be that product design is in line with the needs of the company and its market. Successful innovation in product design is a pragmatic realization of the role of design in any particular effort to fit within a wider strategy for a new product.

No matter what design strategy a company decides to focus on to support its broader market needs (e.g. "cost advantage," "design eminence," or "desirable alternative") or the general design situation dictated by the needs of the company and its suppliers (e.g. "adaptive design," "evolutionary design," "discontinuous design") digital product development can support it.

PDMA provides a reasonable summary to consider "Design attempts to deliver value by embodying products across functional and emotional dimensions that match or anticipate consumer's goals."

For example in order to pursue a design strategy of “cost advantage” digital product development leverages existing designs to make use of common parts. At a higher level it also integrates with digital manufacturing, digital simulation, and sourcing and procurement to identify potential cost reductions. Alternatively to fulfill a strategy of “design eminence” may require a complete range of integrated industrial design and styling capabilities to ensure differentiating characteristics of products in appearance, form, function and style.

Irrespective of the design strategy employed, layout is critical. The detailed design structures representing the system and product architecture need to be outlined to allow multiple development teams to work upon them concurrently and collaboratively.

## **Digital simulation**

It is often said that experimentation is the key to bringing innovations to market faster. Simulation is definitely a key to experimentation. It can provide a means to undertake more ‘what-if’ studies and ensure a greater understanding of product and process behavior. In turn this encourages more innovation and reduces the risk of increased downstream costs.

Digital simulation supports exploratory system-level simulation that is carried out early in the development process – during the fuzzy front end, when the problem is still being defined and potential solutions are being considered. Here a relatively large number of simulations can be undertaken, any one of which might contain the right high-level mix of capabilities. Consequently automatic design exploration tools are critical in the quest to balance competing objectives. Needless to say, once a good balance of requirements has been achieved, the findings should be used to directly drive design.

Digital simulation provides key capabilities for development and manufacture at three critical junctures. It helps provide system-level direction to flesh out core ideas and identify what might be needed in an exploratory manner. Digital simulation tools can then be used to guide and assess more detailed development and manufacturing to ensure that efforts are on track. Finally it provides validation capabilities to help ensure that what was needed was in fact achieved.

Ultimately, digital simulation needs to sit alongside, and be integrated with, digital product development and digital manufacturing as a whole. If it is not, the level to which simulation can influence, guide and validate product development and manufacturing decisions is limited.

By eliminating the delays that occur between design and validation, digital simulation enables informed decisions to be made rapidly during the development phase, by ensuring analysis results are available in time to influence design and manufacturing. As detailed design progresses, continual examination of the key development drivers is critical. It is all too easy to lose sight of higher level development goals when faced with the multitude of engineering minutiae that occur in detailed development.

Digital manufacturing allows manufacturing process planners to work in concert with product designers for truly transformational product development improvements and supply chain advantage.

A key purpose of digital manufacturing is to break down the walls between product design, manufacturing engineering and production floor departments. In doing so, digital manufacturing maintains the crucial digital continuity of new product development thereby helping manufacturers bring more and better products to market faster at lower cost.

An effective digital manufacturing solution needs to address three areas that are fundamental to new product innovation.

### **Process design**

The virtual modeling capabilities of digital manufacturing enable companies to increase their flexibility in developing a comprehensive manufacturing process that includes part manufacturing, assembly planning, plant design, production management and other factory floor operations. Digital manufacturing helps define production lines and workstations that maximize efficiency and speed by leveraging existing lines and supply chains, to meet the needs of any new product. In addition, it enables companies to map this process to, and align it with, the wider product development process.

A digital manufacturing solution that is an integral part of the overall PLM environment provides a number of capabilities to effectively define and evaluate the manufacturing impact of design changes and enable manufacturing process-driven product design.

At a base level, digital manufacturing lets companies capture best practices in manufacturing processes and machining operations and apply them to new products. It establishes associativity between the product and its manufacturing operations, creating a fundamental link between design and manufacturing and facilitating the process of validating whether existing manufacturing operations can be applied or adjusted to a new product. Importantly, it allows product development and product manufacturing to work concurrently in a collaborative manner.

Digital manufacturing extends these links to bring together all the critical elements of product, process, plant and resources to form the eBOP – electronic Bill of Process. The eBOP ultimately provides the high-level structure that is used to define all manufacturing processes and operations in a single repository. Being able to efficiently re-use this library for product derivations and variants is a key way of maximizing market coverage.

By combining these capabilities in a single digital environment, companies gain the means for continuous improvement that is the key to supporting lean manufacturing and value stream mapping initiatives.

### **Process validation**

Ultimately, the success of a new product depends upon having a sufficient quantity of products available at the right quality levels. Digital manufacturing provides the capabilities required to simulate manufacturing and production processes prior to manufacture in order to ensure high quality and smooth flow.

Along side the ‘what-if’ studies undertaken by product development, manufacturing can analyze numerous scenarios to optimize processes and identify potential issues such as production

bottlenecks. In addition, digital manufacturing provides key capabilities to analyze, measure and optimize product quality levels. With each simulation iteration, companies are able to realize increased profits due to reduced manufacturing costs.

Digital manufacturing can be combined with ergonomic simulation to evaluate human considerations in the production process. In addition to determining the feasibility of a production process, companies can evaluate the potential impact of difficult processes on productivity.

In the case of product variants, existing manufacturing operations, processes and plant can be re-applied to product derivatives. To ensure that the older processes can work for new designs, a high degree of dynamic validation is required, and should be applied as automatically as possible.

Process validation is not just the responsibility of manufacturing and production. Both product development and manufacturing ultimately define the product. Digital simulation helps ensure process simulation results are available in time to influence both design and manufacturing process decisions. This reduces risk and helps to eliminate downstream costs caused by compressed schedules or last minute change orders.

### **Production planning and ramp-up**

Launch strategies, which typically are based on anticipatory methods for demand forecasts, usually dictate how much of what should be manufactured where and when. Failure to accurately plan and deliver results in missed opportunities, redundant stock and significant costs.

It is therefore critical that manufacture and production meet projected demand as accurately as possible while also transferring manufacturing process knowledge from the development team to the plants, suppliers, distributors and others who will manage the product and its post-launch production.

Digital manufacturing provides the capabilities needed to ensure that this process is smooth and that production is ready to go when and where needed.

In the planning phase, digital manufacturing also can help companies dynamically validate line balancing with discrete event simulation. Lines can be balanced based on product mix and line condition. Finally, process documentation can be generated relatively easily and effortlessly.

An open digital manufacturing environment enables companies to maintain a clear link between manufacturing planning capabilities and product management. This open environment ensures a smooth transition from planning to production by facilitating collaboration across the organization and particularly with global manufacturing sites. Original equipment manufacturers, their plants, manufacturing engineering firms and manufacturing contractors can work concurrently in a process-centric, collaborative environment that forms a continuous cycle of manufacturing development and improvement. A digital environment also provides access to a wide variety of customized manufacturing reports, cost estimates, training materials and process simulations that are stored locally, as well as at a corporate level.

## **LG Electronics**

LG Electronics Inc. (LGE) has mapped out a clear plan for reaching its goal of “Global Top 3 by 2010.” The company’s strategy for gaining market share is two-fold: fast innovation and fast growth. This is supported by its core competencies of product leadership, market leadership and people leadership.

To align with LGE’s corporate growth initiatives, the Telecommunication & Handset Company has been revising its product development process to drive innovation and growth. One effort for boosting innovation has been to increase research activities outside of Korea. To support growth, the company has been looking for ways to accelerate the development of new products.

To achieve LGE’s goals, management wanted to create a secure information infrastructure that would take advantage of the Web while providing immediate access to product information throughout the company, including overseas branches. A PLM system would provide the essential infrastructure LGE needed.

In addition to allowing people to work more efficiently, this type of infrastructure would:

1) permit the sharing of best practices and failure cases throughout the development team; 2) increase the re-usability of knowledge; and 3) permit real-time acquisition and analysis of test data. The new PLM system also had to leverage the information in the existing product data management (PDM) system.

With PLM facilitating the ECO process, the automatic notification and delivery of documents has reduced lead time from 1.6 days to one-half day, a 68 percent improvement.

A recent study by IDC shows that LGE mobile phones captured the largest share of the U.S. CDMA handset market in the first quarter of 2004, selling more than three million units to corner 26.8 percent of the market. In addition the company joined the list of the top six GSM manufacturers in the U.S.

AberdeenGroup's Product Innovation Agenda benchmark determined that companies that are best-in-class in new product development and introduction tend to share the following characteristics:

- Innovation strategy is centrally controlled or coordinated
- A senior manager is directly responsible for overseeing the full process of identifying innovation opportunities, engineering them and bringing products to market
- Product development and manufacture is enabled by the implementation of PLM-related technologies
- Measurement of innovation performance is frequent, and has visibility at the enterprise level

AberdeenGroup also found that best-in-class companies are four times more likely to have PLM-related technology than their poorer performing competitors. Companies that are better able to meet their new product development targets also are more likely to have centralized data and product knowledge than the industry norm. [New Product Development: Profiting from Innovation Processes, 2004]

These issues specifically relate to the integrated capabilities outlined in this paper:

- Strategic Portfolio Management
- Program Execution Management
- Strategic Product Development
- Manufacturing Planning and Validation

Historically the systems that have been deployed in these areas have been applications that, at best, support a single sub-process. While this has been an improvement over paper-based systems, it has resulted only in local optimization. It has highlighted the problems created by duplicate systems, incompatible data, unavailable information and lost data. In addition, the resulting drag on efficiency and productivity is compounded by work-arounds, making it difficult to re-establish the disciplines required for people to rely on a formal system.

*"The desired outcome of IT enabling the product development process is that it allows companies to institutionalize their hard won process improvements and build new capabilities leading to greater productivity, speed and innovation. An integrated system facilitates the electronic exchange of project and product information among product development sub-processes to further their efficiency as a whole."*

[PDMA]



For companies that want to maintain market leadership, it's not enough to implement point solutions. An integrated, digital environment is required. Product lifecycle management provides the only way for these applications to be tied together to ensure success.

Manufacturers can realize significant benefits from taking these steps. The findings of AberdeenGroup are corroborated by the U.S. National Institute of Standards & Technology, which outlines some below-the-line benefits:

- 30 to 70 percent less development time
- 65 to 90 percent fewer engineering changes
- 20 to 90 percent less time to market
- 200 to 600 percent higher quality
- 20 to 110 percent higher white collar productivity

For new product development initiatives, PLM provides an opportunity to link key business efforts, such as strategic portfolio management and program execution, to operational execution in product development and manufacture in a way that brings together development, marketing and sales.

At the end of the day PLM enables companies to build a Global Innovation Network that addresses their needs while setting the stage for increased innovation, increased revenues and accelerated business growth.

### **About Siemens PLM Software**

Siemens PLM Software, a division of Siemens Automation and Drives (A&D), is a leading global provider of product lifecycle management (PLM) software and services with 4.3 million licensed seats and 47,000 customers worldwide.

Headquartered in Plano, Texas, Siemens PLM Software's open enterprise solutions enable a world where organizations and their partners collaborate through Global Innovation Networks to deliver world-class products and services.

For more information on Siemens PLM Software products and services, visit [www.siemens.com/plm](http://www.siemens.com/plm).

# SIEMENS

## **Division headquarters**

### **United States**

Granite Park One  
5800 Granite Parkway  
Suite 600  
Plano, TX 75024  
972 987 3000  
Fax 972 987 3398

## **Regions**

### **Americas**

Granite Park One  
5800 Granite Parkway  
Suite 600  
Plano, TX 75024  
800 498 5351  
Fax 972 987 3398

### **Europe**

Norwich House Knoll Road  
Camberley, Surrey  
GU15 3SY  
United Kingdom  
+44 (0) 1276 702000  
Fax +44 (0) 1276 705150

### **Asia-Pacific**

Suites 6804-8, 68/F Central Plaza  
18 Harbour Road, Wan Chai  
Hong Kong  
852 2230 3333  
Fax 852 2230 3210