

WHITE PAPER

Trends Shaping Engineering Specification Management of Tomorrow



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Abstract

Manufacturers are rolling out new and improved products at an ever increasing pace to maintain market share and augment their bottom line. This has exponentially increased the product data information that is being generated and has to be managed accurately and made available in real time to geographically dispersed stakeholders to meet product launch targets.

In response to this, many organizations have implemented an integrated suite of applications to manage the ever increasing data, new and existing versions of documents, processes and associated workflows across product delivery process. However, all this comes with its own set of challenges, which are being addressed by innovative solutions and best-in-class frameworks.

This paper sheds light on the trends shaping new product development process, initiatives that companies are taking to address these trends, the inherent challenges that come with these initiatives, and how outsourcing can help mitigate these challenges.

Engineering specification management process – overview

The ability of an organization to launch new products within benchmarked time and cost targets is critical for its survival in the marketplace. However, to ensure that these product development goals are met, it is imperative to effectively manage the information that is generated during the new product introduction

(NPI) process, and enable key stakeholders to effectively reuse it. Due to increasing complexity of new products and the supply chain ecosystem, the number of interfaces involved and the geographical dispersion of the stakeholders, most global organizations have implemented integrated technology solutions which could be a combination of ERP, product data management (PDM), sourcing and CAD solutions to manage the NPI product delivery process. While these solutions have enabled large

organizations to drive collaboration across the NPI processes, their implementation has increased the data management burden on the engineers, since they have to spend significant amount of time on transactional processes. Moreover, it is critical to ensure sufficient trained personnel who have an understanding of the underlying applications, the associated data transfer issues, and also the part development process.

Specification management process

A new product introduction (NPI) process entails time-bound execution of tasks and deliverables at each gate of the product delivery process. The specification management process involves managing data, information, documents, workflow tasks, and the associated engineering changes required for execution of these tasks and deliverables across gates of NPI lifecycle / product delivery process. Below is a representative sample of key tasks and likely deliverables.

Engineering change management

NPI gates	Study	Design	Develop	Verify	Implement
Key tasks	<ul style="list-style-type: none"> Develop objectives Set schedule Define design concepts 	<ul style="list-style-type: none"> Define EBOM Complete geometry Engineering assembly instructions Design FMEA Design review Define manufacturing process concepts Define cost estimates Define tooling estimates 	<ul style="list-style-type: none"> Complete MBOM and routings Detail manufacturing process and plant layout Process FMEA Source / Release PO Verify PPAP requirements Complete cost activities Conduct DPAR 	<ul style="list-style-type: none"> Release and order tooling Prepare factory to produce customer order Assembly trial fit Final customer requirement validation 	<ul style="list-style-type: none"> Release for PPAP Run PPAP parts Complete all PPAP requirements
Deliverables	<ul style="list-style-type: none"> Quality plan levels Target product specifications Part or assembly cost goals 	<ul style="list-style-type: none"> Product specs EBOM Geometry 	<ul style="list-style-type: none"> MBOM Product masters defined Manufacturing documents Process KCs defined Engineering release for build 	<ul style="list-style-type: none"> Tooling ordered Trial fit complete Implementation date determined QM documents complete, i.e. PPAPs 	<ul style="list-style-type: none"> PPAP approval Factory ready to produce to customer order



Trends shaping the specification management process

- Shorter product lifecycles generate product information / data at an ever increasing pace – inducing a need to manage and control this data accurately, and making it available in real time to all stakeholders within and outside the organization
- Geographically scattered teams from design / manufacturing / sourcing need to collaborate to evolve an optimized design following an iterative process
- The involvement of external stakeholders (suppliers, customers and other partners) in any new product development process is a competitive necessity due to the increasingly cross-enterprise nature of value chains today. The entire ecosystem works collaboratively to share / modify / review / approve inputs and deliverables for evolving an optimized design. (To manage this process, organizations need a solution that will facilitate protection of intellectual property, ensure prompt external stakeholder acknowledgement / conformance of shared inputs, enable quick reviews, approvals, and provide a centralized source of accurate product data for use in downstream processes.)
- Localization at plant level is necessary to increase fit of products to customer and market needs
- Managing engineering changes across the product lifecycle involves all the information created and used during product development process, i.e. engineering bill of materials (BOM), concepts, email, design drawings, manuals, test reports, text documents, etc. This information must be managed in such a way that information used and accessed for product development is current, accurate, available in real time, easily retrievable, and reviewed / approved by authorized stakeholders

Organizational strategies to address the trends

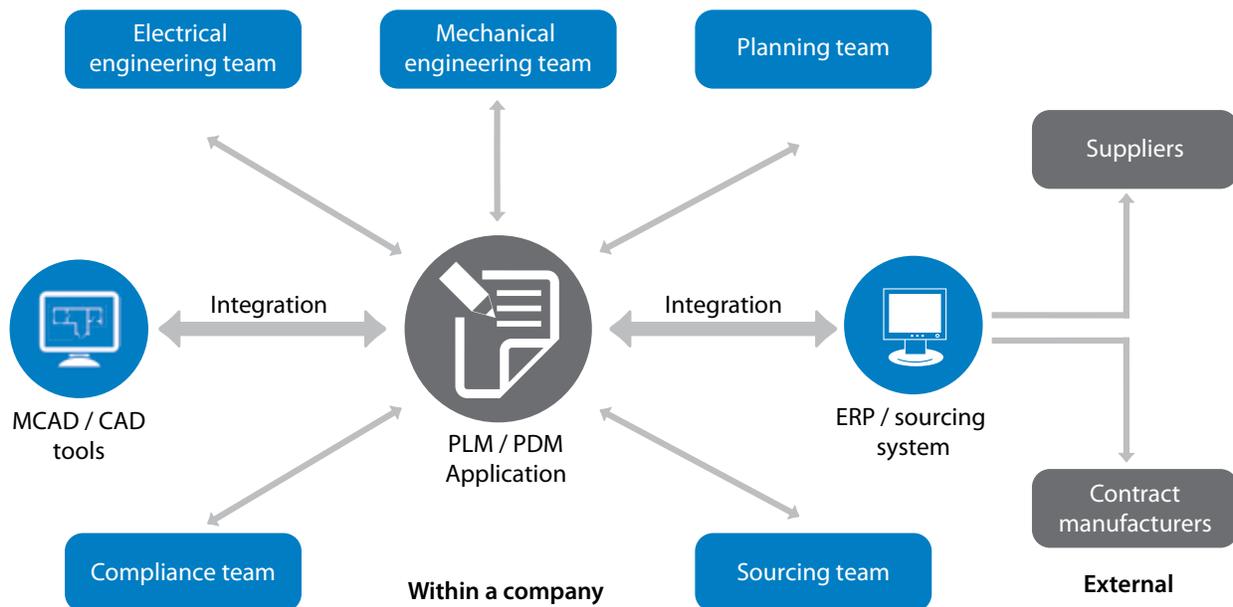
In response to the trends explained in the previous section, most global organizations have implemented an integrated setup of PDM and ERP applications to manage the information generated during the NPI process.

Considering the complexity of the process, the number of interfaces, the geographical dispersion due to multi-locational design and production facilities and the extent of information involved, specification

management in large global organizations is done using an integrated setup of PDM / product lifecycle management (PLM) and ERP /Sourcing / CAD applications. While PDM / PLM manages the creation of the idea of a product, ERP manages the creation of the physical products themselves.

PDM / PLM is used to manage and update all aspects of a product in its digital state, including its complete BOM /product

structure / drawings / masters, etc. On the other hand, ERP manages the operational aspects of the physical product, including planning / releasing POs and sub-contract orders, etc. An integrated setup of PDM / PLM and ERP leverages bi-directional data sharing and reliable closed-loop transaction management, allowing the release of important data from one system to another as dictated by the product development process.



Integrated PDM solution for NPI management

The need for a shared service model

Even though solutions have been implemented, the inherent nature of these solutions has increased the burden of data management on the engineering department. Whereas the increased technical product data and information is extremely beneficial to the product development ecosystem, the need to keep this updated and making it available real time to the stakeholders is critical. Some of the key challenges faced by engineering organizations are listed below.

Availability of bandwidth for engineers to focus on key design



Any NPI launch is driven by time-bound, milestone-based product delivery process having core product creation (design gate) and product realization (develop, verify and implement gates) processes requiring high domain knowledge and niche skills. Executing these high-end, multi-iterative processes also requires managing significant amount of data, associated engineering changes, and workflow tasks that are fairly transactional and IT systems-driven. These transactional and administrative tasks consume a lot of bandwidth of designers and engineers, resulting in delays and costly errors in the core product creation and realization work.

Outsourcing these data management and transactional workflow tasks would free up key resource bandwidth and eliminate costly errors and reduce delays. These can be efficiently handled with a shared service center having resources with good understanding of NPI value chain and product delivery process and also user / super user level knowledge of underlying PDM or PLM / ERP / other applications.

Focus on specialization to perform key transactional tasks



In today's world, internal and external teams dispersed across geographies work hand in hand – where deliverables and inputs are shared, reviewed, and approved by multiple stakeholders to progress and finalize an optimized design. There is a lack of a central coordination mechanism, which can look into the cause of delays and resolve issues to expedite sharing of inputs or reviewing / approving deliverables or other administrative tasks.

Also, the variation in these transactional design processes across the global design centers / plants results in higher turnaround time and low efficiency. There is a significant need to standardize processes, automate them, leverage learning from multiple geographies, and generate business savings.

There is an increasing amount of specialization in the specification management process due to the underlying technology applications involved.

A centralized shared service center addresses all these problems as there are focused resources to coordinate and expedite transactional / administrative design tasks. Also as the same resources cater / execute tasks for design centers / plants across the globe, there is an opportunity to standardize processes by running transformation projects and leveraging the best practices followed across design centers or plants.

Managing technology challenges to ensure return on investment on implemented applications



The specification management process is fairly IT system-driven. This would need super user level understanding of NPI product delivery process and associated workflows in integrated setup of PDM / ERP applications, besides the technical / process competence of the application integration architecture. Integrated setup of PDM / PLM and ERP leverages bi-directional data sharing and reliable closed-loop transaction management, allowing the release of important data from one system to another as dictated by the product development process. If loosely coupled, this can lead to integration and workflow issues / errors, which can result in delays and quality issues. Inability to manage this effectively can result in suboptimal usage of applications and affects the business case for application implementation. This function is best handled by a service provider having combined engineering, IT and BPO capabilities like strong PLM practice, experienced consultants and subject matter experts with in-depth user / super user level knowledge on PLM / PDM / ERP applications. The service provider would efficiently support the workflow task execution and also structure the integration and resolve or minimize integration issues / errors (both technical and process) to eliminate delays / impediments to a time-bound, gate-based NPI launch.

This calls for an innovative specification management solution that addresses these challenges and supports OEMs in effectively managing the data, information, and workflow tasks associated with NPI product delivery process across gates / milestones.

Recommended approach

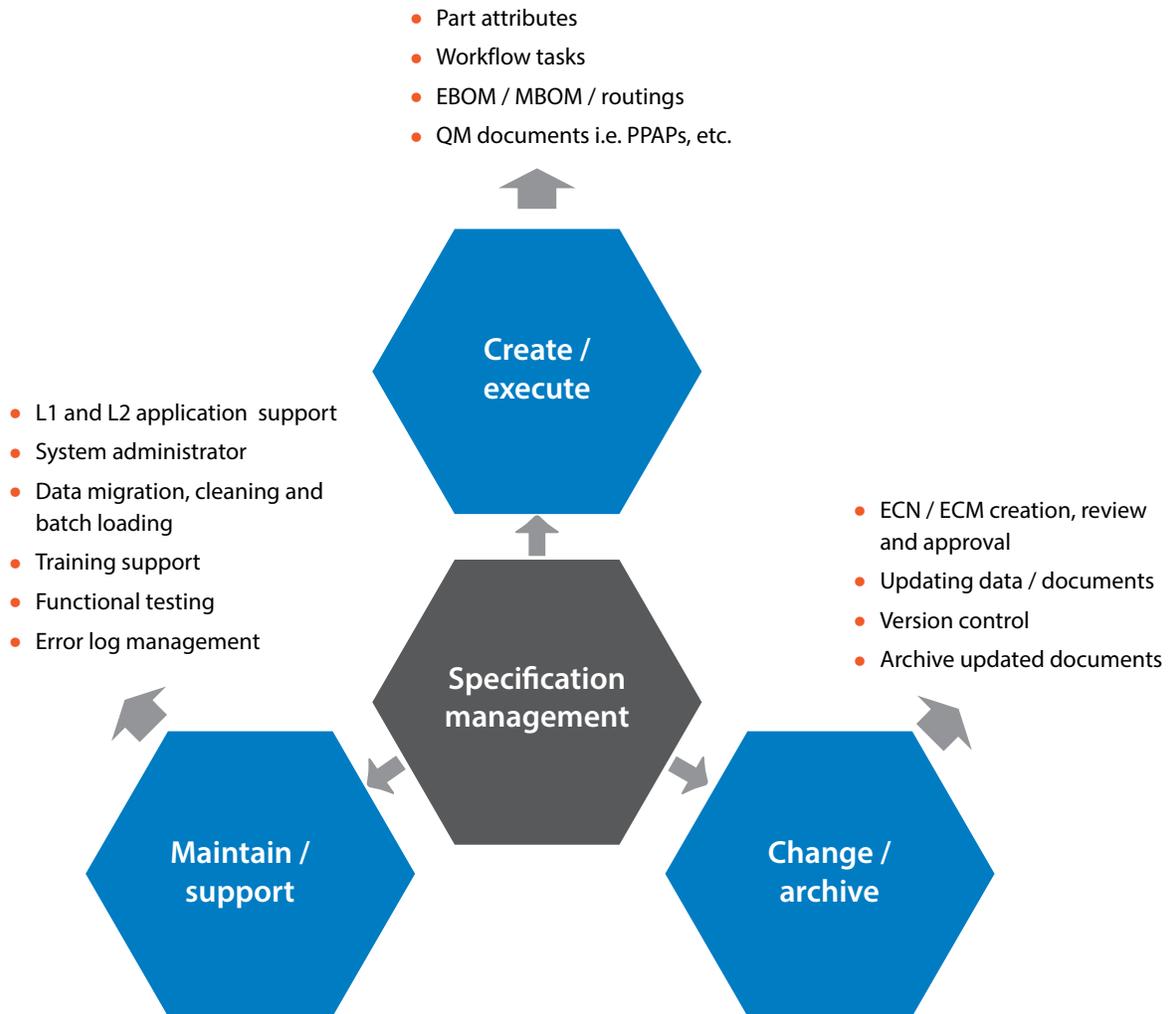
A centralized product data and specification management shared service center catering to global design centers and manufacturing plants

Many global organizations are either implementing an internal shared services

model or leveraging the expertise of external stakeholders in managing the specification management process. By leveraging various levers like a global delivery model, process frameworks, and application expertise, a specification

management SSC¹ can help realize savings in product development costs, reduce turnaround time, enhance information availability, and thereby ensure product development goals are met.

¹A specification management shared services center (SSC) is a global back office center to manage transactional aspects of the new product development introduction process and allow engineers to focus on core design tasks instead of administrative ones.



Key tenets: engineering specification management

Business benefits

- Accelerated time-to-market for NPIs within budgeted cost due to responsive management of engineering changes, prompt resolution of technical and process errors, and real-time collaboration with geographically dispersed design teams
- Effective utilization of designers and engineers in core design processes as their involvement in repetitive administrative tasks is eliminated / reduced
- Shared service center drives process standardization and efficiency enabling
- TAT / cycle time reduction, higher delivery accuracy and quality
- Productivity benefits with FTE reduction or capacity augmentation with the same number of resources on account of process automation /standardization



Case study

Managing product data and engineering changes through a PDM shared service specification management center for a global manufacturing company

Client context

The client manages new product launch and existing product improvements using integrated setup of product lifecycle management (PLM) and ERP. They were facing a challenge of high cycle time to create and release parts to production because of data errors,

integration problems, workflow issues, and bandwidth challenges of allocating key design personnel to manage design transactional processes. Low service levels were reported at the dealer end for existing parts due to delayed engineering change implementation.

Recommended solution

Infosys created a global specification management shared services center that could support multiple global design and manufacturing centers of the organization and deliver processes such as:

- Creating engineering and

manufacturing bill of materials (EBOM / MBOM), product specifications and master data

- Engineering change management for existing and new products
- Workflow tasks to execute activities at different gates of new product development lifecycle

Benefits to the client

The consolidation and centralization of distributed teams has driven efficiency, reduced turnaround time, and improved productivity through automation and reduced manual intervention.

Global manufacturing organizations need to explore outsourcing opportunities in core business process areas, as they search for newer avenues of growth. Specification management shared services is the way forward for large global organizations that manage vast amounts of product information and want to focus their engineering talent on key design tasks instead of managing PDM information. By leveraging service providers who combine technical expertise in PDM processes, with a strong background in PDM applications, it is possible to transform these processes and reduce turnaround time, product development costs, and ensure product development goals are met. Moreover, organizations can realize faster returns on investment on key PDM technology applications by effective utilization of these applications.

Author profiles



Mahesh Sawant

Head, Manufacturing Center of Excellence, Infosys BPO

Mahesh leads the manufacturing center of excellence for Infosys BPO. He is responsible for incubating new business process outsourcing solutions for manufacturing clients in the area of engineering process outsourcing, manufacturing operations support, planning, and performance management.

Mahesh has more than 16 years of experience in multiple areas including outsourcing, supply chain, manufacturing, business process re-engineering and enterprise solutions, with the last three years in Infosys BPO. Prior to joining Infosys, he has played leadership roles in manufacturing and supply chain in a large global manufacturing organization and was also responsible for driving several business transformation initiatives related to IT enabling the supply chain function, cellular manufacturing, business process re-engineering, supplier portals, etc.

Mahesh holds a graduate degree in mechanical engineering and a masters degree in management.

He is also a certified CPIM from APICS, the Association for Operations Management and a Six Sigma BlackBelt from ASQ, the American Society for Quality.



Vivek Katyal

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Vivek is a senior consultant with the manufacturing practice in Infosys BPO. He is responsible for developing industry solutions and managing functional delivery of these solutions, across engineering and manufacturing functions of the value chain.

Vivek has more than 12 years of experience in operations consulting with a global IT and consulting company, and manufacturing industry experience spanning manufacturing engineering, supply chain, and quality functions.

He holds a bachelor's degree in mechanical engineering, a master's degree in operations management, and a postgraduate certification in supply chain and logistics management.

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