

TCS's New Paradigm for PLM: Digital Thread for the Connected Product

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Summary

Tata Consultancy Services (TCS) recently rolled out a comprehensive strategy for transforming business called *Digital Thread for Connected Product*. The company believes this represents a new paradigm for product lifecycle management (PLM). TCS views the digital thread as the foundation for digital

Neural Manufacturing is TCS' thinking about the future of manufacturing. It enables value chains that are responsive, adaptive, and personalized with intelligence built on the edge of the networks.

business transformation and connects the digital value chain across the design/build/service PLM lifecycle.

Additionally, TCS has defined a new set of PLM imperatives in the context of *Business 4.0 in the New Normal* (post COVID) and aligns with the Industry 4.0 initiative. Business 4.0 is a TCS thought leadership framework augmented with a new business lifecycle predicated on

purpose-driven, adaptable, and resilient business transformation. Extending this thinking to the manufacturing customer, TCS articulates the future to be neural. It defines "Neural Manufacturing" as an intensely networked set of partners aligned to a common purpose, where the value chains are responsive, adaptive, and personalized with intelligence built on the edge of the networks.

TCS has defined four imperatives for PLM and the new normal:

- Virtualization in everything possible
- A comprehensive collaborative platform and process to enable remote operations
- Automation at full extent and machine first response model

- Adoption of agile mindset for rapid product development for mass customization

With its Digital Thread for Connected Product paradigm, TCS strives to take the fundamental concept of the digital thread and digital twin to its full functional implementation strategy.

TCS Well Positioned in PLM Solutions

TCS has had a strong industry presence in PLM solutions for over 25 years. The company has strategic partnerships with the leading PLM solutions providers like Dassault Systèmes, Siemens Digital Industries Software, PTC, SAP, and Oracle. TCS's integrated engineering information and digital services range across many industries. These include automotive, aerospace & defense, machinery & process, high-tech & telecom, life sciences, energy & utilities, and retail & consumer packaged goods. TCS offers a full portfolio of solutions across the product/process lifecycle, including product development, plant engineering, and IoT and Industry 4.0.

Digital Thread Is the Foundation for Business Transformation

TCS offers a set of solutions based on the digital value chain and the digital thread connect all fundamental product/process lifecycle elements. This digital thread would start with product concepts, design, and manufacturing and extend through delivery and service to product end-of-life. In this age of IoT and Manufacturing 4.0, companies are well advised to employ digital twins to design smart and connected products, use advanced materials and manufacturing process, operate a digital supply chain, and provide services for products in the field. Further, an end-to-end connected PLM innovation platform should ideally operate through a closed-loop feedback system that allows the digital thread to function properly. This is the digital business transformation value proposition that TCS is offering with its solution framework on digital thread-based connected innovation platform. Guided by its thinking on Neural Manufacturing, TCS' digital thread solution framework is designed to enable customers to make intelligent decisions about connected products and operations.

TCS has identified key characteristics that are essential to conceptualizing and implementing a functional and comprehensive digital thread:

- *Model-driven behavior:* The various models for engineering design, manufacturing processes, operational processes, etc. must reflect the constraints each place on the other and the changes in behavior throughout the digital thread and the product/process lifecycle.
- *Value Chain Connectivity:* The digital thread must be designed and implemented to enable an uninhibited flow of data and information across engineering, production systems, analytics, operations, and service planning.
- *Actionable Insights:* A comprehensive digital thread must be able to recognize and deal with issues that arise across the product/process lifecycle and use analytics and analysis to adapt, act, and make changes as necessary.
- *Closed-Loop Feedback:* All elements across the product/process lifecycle must be connected and able to communicate relevant information between upstream and downstream operations.

Key Elements Drive the Digital Thread Roadmap

Several key functional elements enable the TCS digital thread platform to work. These include agile, automated, and intelligent cloud-based systems.

TCS' digital thread-connected architecture can be used to implement actionable use cases in which product concepts and requirements can move through functional, logical, and physical modeling stages to product validation.

Another critical element for the most important functional element for the digital thread is pervasive connectivity. TCS has created a connected user experience across a comprehensive digital thread that provides foundational continuity through engineering design, manufacturing, and services. These, in turn, provide a collaborative product lifecycle ecosystem predicated on a model-based enterprise. This digital thread-connected architecture can then be used to implement actionable use cases in which product concepts and requirements can move through functional, logical, and physical modeling stages to product validation. At the same time, the product development process can move through connected bills of materials (BOMs) for engineering, manufacturing, as-built, service, and maintenance.

Conclusion

Clearly, TCS has built a comprehensive PLM architecture around the fundamental concepts of the digital thread to help further connect the product development ecosystem. Manufacturers across multiple industries can now use this architecture to develop and implement a digital thread for the connected product.

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