Siemens Teamcenter Service Lifecycle Management

The foundation of a modern SLM solution

CIMdata Commentary

Key takeaways:

- *Service Lifecycle Management (SLM) continues to grow in importance for many businesses, often enabling new business models, as well as increasing profitability and customer loyalty.*
- *Successful SLM environments leverage a digital thread that provides end-to-end connectivity; feedback among design, production, and service organizations; and maintains a comprehensive, actionable digital twin that contains the up-to-date configuration of the managed asset.*
- *Siemens' Teamcenter SLM solution enables companies to create an effective collaborative and closed-loop feedback environment among product design, manufacturing, and service. It also enables OEMs, EPCs, and production line builders to plan for service optimization as they design and produce their products, and Owners/Operators to optimize their service time and activities.*

Introduction

Today's products are becoming increasingly complex and are frequently part of expanding system of systems environments. Manufacturers of these complex products must often meet strict customer, regulatory, and serviceability requirements over extended periods of time—sometimes multiple decades. Ultimately, achieving business efficiency (and improving profitability) requires optimizing the in-service use of a company's operational assets.[1]

However, service is not always provided by the OEM who produced the asset—many third-party and home-grown solutions are often used as part of an overall SLM solution. This creates a very diverse, often widely distributed, service environment in which it can be difficult to gather and maintain updated asset-specific information as services are performed. It's also difficult to provide service technicians the up-to-date asset configuration information, service materials (i.e., parts, kits, etc.), and technical documentation they need to perform rapid, right-the-first-time service.

To improve service and create profitable "asset-as-a-service" business models, companies need to implement modern, effective SLM solutions that enable their customers to achieve better utilization of in-service assets throughout their entire operational life. Effective SLM reduces warranty and inventory costs, predicts potential risks, helps optimize asset utilization, helps document compliance to regulatory authorities, and increases customer loyalty. An effective, modern SLM solution should also help close potential "skills gaps" (e.g., lack of trained, experienced service technicians) by enabling service personnel to more easily and quickly find needed information and be guided through the appropriate service process.

An effective, modern SLM solution must incorporate an end-to-end digital thread that spans the diverse service environment and provides up-to-date accurate configuration information of all the mechanical, electrical/electronic, software, and associated document-related components of each asset as well as the status and history of their operational use. It must

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[1] Research for this commentary was partially supported by Siemens Digital Industries Software.

also enable an open ecosystem of OEM, customer, and third-party applications and solutions that can work together to deliver effective service of managed assets.

Defining a Modern SLM Solution

In today's fast moving, highly competitive world, successful companies need service to be proactive, not reactive. They need to be able to plan maintenance when it will least disrupt their business operation and avoid costly, unplanned outages and downtime. And when the assets are up-and-running, ensure that they are at their peak performance.

Managed assets may be located close to service depots and personnel, or they may be in widely dispersed locations requiring significant travel by service personnel. Regardless of location, companies want performed services to correct all problems on a single call. They expect service technicians to have the knowledge, information, and equipment needed to get their asset back into productive use quickly.

To meet these expectations, businesses delivering services need to provide complete, accurate service information to field service personnel so they can consistently deliver a first-time fix. Needed information includes the up-to-date configuration of the asset, service-related technical documentation and processes, the operational and service history of the asset, the parts, kits, and software to be updated or replaced, and the tools needed to perform the required service. As the service is executed, all changes made to the serviced asset must be captured and managed, for example, tracking the updated configuration, replaced components, etc. Effective service must enable complete support for physical assets and support all phases and configurations of the asset. It must also manage the evolution of that physical asset, e.g. swap parts, overhauls, upgrades. This includes the mechanical, electrical/electronic, software, and document-related components of each asset.

Foundational to a modern SLM solution is enabling a digital thread that connects all aspects of service information across the extended service value chain regardless of location, information type, and enterprise IT boundaries. Typically, service-related information and materials such as technical documentation, initial configurations, spares and kitting, service processes, etc., are created by the asset manufacturers and provided to the appropriate service organizations. Service management applications then assign and manage the service activities (and history) performed on the asset over time. For any asset, multiple organizations, personnel, and applications may be involved throughout its service life. A modern SLM solution ensures all of this information, and all of these processes are connected.

Traditionally, asset service information was recorded by service technicians as they performed their tasks. Unfortunately, with disconnected service applications and providers, that data was not always captured, consolidated, or managed, resulting in the data being "lost" or not available for planning and follow-on service. However, in today's smart and connected world, assets may generate, maintain, and deliver (via IoT connections) significant service information to multiple service-related systems throughout the product and service lifecycle. Modern SLM solutions manage this information efficiently, and ensure it is leveraged in the right service activities.

A successful SLM environment must be built on a flexible, adaptable, scalable architecture that enables an enterprise to easily adapt their SLM solution to meet their changing business needs. It must provide the ability to create an open ecosystem of seamless connectivity to multiple sources of service data and processes across the extended enterprise. For example, connectivity between in-house and third-party service applications and solutions, whether run on-premises, in the cloud, or at the edge. Additionally, a true end-to-end SLM solution may

need to include or be integrated with inventory, ERP, logistics, risk management, quality and reliability management, IIoT, service workload management, warranty and issue management, and other systems as required.

Enabling an open service ecosystem requires the implementation of a true digital thread and a comprehensive and actionable digital twin. The digital thread, enabled by PLM technologies, spans the extended value chain and enables the capture and management of product and service data from the right sources. A digital twin is a virtual representation of a physical asset or collection of physical assets that exploits data flow to and from the associated physical assets, continually evolving as it accompanies its real-world physical companion throughout its lifecycle.

Quickly resolving operational and service problems requires accurate knowledge of an asset's complete configuration and usage. To maintain the accuracy of the digital twin, the SLM solution must fully and accurately manage an asset's changing configurations and contextual information throughout its lifecycle (maintaining up-to-date, complete service and as-maintained BOMs). This includes providing the capabilities and tools to capture data from distributed assets and perform appropriate analyses on that data. This enables a company to use asset performance data to proactively manage service activities and optimize spare parts inventory (spares, number, location), among other things.

Siemens Teamcenter SLM: The Foundation of a Modern SLM Solution

Siemens has taken a pragmatic approach to developing and delivering the capabilities their customers need to create an effective, extended-ecosystem SLM solution. Teamcenter SLM is modular, so that customers can implement basic capabilities and grow the scope as business needs evolve, all while achieving value at each level of implementation. Siemens recognizes that no one solution provider can supply all the capabilities needed by every customer and therefore has (1) established relationships with leading SLM technology and solution providers (e.g., IBM Maximo and SAP Intelligent Asset Management); and (2) provides extensive open applications, e.g., Mendix and MindSphere, that can be used to quickly and easily integrate with third-party and in-house developed applications for creation of an open, adaptable service ecosystem.

Teamcenter SLM supports all aspects of the service lifecycle including the creation and management of more effective service plans, physical asset configurations, service operations, and asset performance. It is built on the Teamcenter PLM platform, providing essential capabilities (i.e., product data management, security, reporting, process management, etc.) required for the management of serviceable assets.

Teamcenter SLM delivers the right information, in context, to both up- and down-stream systems and processes, and provides a common, logical source of information for all SLM related tasks including creating and maintaining service plans, full multi-domain asset (as-maintained) configurations, asset status and service/usage history, and other related data. Teamcenter SLM enables workers at all levels to find and re-use product data and knowledge from engineering and manufacturing to improve service planning and execution.

Additionally, Teamcenter SLM supports the enterprise digital thread needed to manage and optimize use of assets. It provides service feedback loops connecting design, engineering, and manufacturing. With Teamcenter SLM, service related information including technical documentation, service processes, and AR visuals is linked to product design, resulting in accurate and successful serviceability and reliability. This creates the necessary environment for continuous learning and product or asset improvement.

A key function of Teamcenter SLM is that it enables the communication and coordination of operational activities for greater compliance, faster service, and lower costs. One of Teamcenter's strengths is its ability to fully manage small to very large and complex asset configurations, including product and platform variants, incorporating mechanical, electrical/electronic, software, and documentation components, and making that information available as needed to any service related user or activity. It provides the extensive complete configuration management capabilities required to deliver successful, right first-time service in an effective SLM solution.

Designed to work with multiple partner solutions, Mendix can be used with Teamcenter SLM to quickly integrate with in-house and other third-party service execution components as-needed. MindSphere can also be used with Teamcenter SLM to enable interaction with smart, connected assets, and provide comprehensive analytics on the asset data. Teamcenter SLM can be delivered via the cloud to provide global reach while decreasing IT costs. For ease of use and rapid adoption, it provides service information in context (role-based) to the user.

To learn more about how Teamcenter SLM and Siemens modern SLM strategy can enable companies to deliver more effective service to their customers and create a service-driven competitive advantage, please download and read the eBook titled "Making Service Lifecycle Management A Profitable, Competitive Advantage."

A SLM Case Study

OneSubsea Processing, a Schlumberger company, is a manufacturer of industry-leading technologies, systems, and alliances for increasing subsea production and recovery of oil and gas. They manufacture and service complex equipment with lifespans of 20+ years under tough conditions. Needless to say, even a short downtime could potentially cause the loss of millions of dollars due to a non-functioning oil or gas drilling field. Also, it could sometimes be impossible to service their asset in the field, being at the bottom of the ocean.

OneSubsea has to plan for service as they design and manufacture their assets. After the asset is in production they always need to have clear and accurate visibility of its configuration in order to prevent problems from happening, and to handle any problems in the most efficient way. Many times, this has to be done remotely or through redundancy of parts and/or systems. Further, all actions must comply with strict regulations, and OneSubsea needs to be able to provide compliance proof at any time during the asset's production life span.

OneSubsea realized that by starting their PLM journey with SLM they would be able to obtain immediate value to their business. A key requirement was to be able to plan for service throughout their design and manufacturing process. With such visibility they could fulfil this requirement and deliver value to both design and service engineering. In case of an un-planned problem, they can respond

> The primary benefits OneSubsea achieved from implementing Teamcenter SLM include:
> - Improved aftermarket efficiency and effectiveness
> - Saved engineering time
> - Obtained early involvement from manufacturing
> - Created one source of information
> - Reduced risk and cost
> - Ensured compliance
> - Worked smarter

immediately, knowing exactly how their subsea asset is configured and what serialized parts it contains. They are also able to achieve 100% proof for regulatory compliance. At a later phase they have implemented ERP and expanded their PLM usage with their physical asset configuration as their master data.

Summary

Today's complex physical assets must be operated efficiently and meet strict customer, regulatory, and serviceability requirements, often over many decades of useful life. To improve service, companies need to implement modern, effective SLM solutions to achieve better utilization of in-service assets throughout their entire operational life. Effective SLM reduces warranty costs, helps optimize asset utilization, and increases customer loyalty.

An effective, modern SLM solution must incorporate a comprehensive digital thread that spans the diverse, extended enterprise service environment and provides up-to-date accurate configuration information of all the mechanical, electrical/electronic, software, and document components of each asset. It must also enable an open ecosystem of OEM, customer, and third-party applications and solutions that can work together to deliver effective, quality service of managed assets.

The Siemens Teamcenter SLM solution is a modern, integrated suite of software and services augmented by key relationships with third-party service application providers. Teamcenter SLM provides a comprehensive enterprise backbone that manages a complete digital thread of service-related information and enables a comprehensive digital twin. Key is Teamcenter's leading ability to manage large, complex, multi-variant configurations of any serviceable asset, and manage the processes needed to optimize service and asset availability across an open service ecosystem that incorporates both Siemens, in-house, and third-party solutions.

CIMdata believes that Siemens' pragmatic approach to delivering an open SLM solution provides the breadth and depth that enterprises need to create comprehensive, actionable digital twins and manage the complete service lifecycle across a heterogenous set of extended enterprise solutions and needs, while protecting their service-related investments. Companies looking to optimize and expand their service capabilities should include Siemens's Teamcenter SLM in their evaluation of solutions for implementing a modern, flexible, adaptable, open SLM environment.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design, deliver, and support innovative products and services through the identification and implementation of appropriate digital initiatives. Since its founding over thirty-five years ago, CIMdata has delivered world-class knowledge, expertise, and best-practice methods on a broad set of product lifecycle management (PLM) solutions and the digital transformation they enable. CIMdata also offers research, subscription services, publications, and education through certificate programs and international conferences. To learn more about CIMdata's services, visit our website at http://www.CIMdata.com or contact CIMdata at: 3909 Research Park Drive, Ann Arbor, MI 48108, USA. Tel: +1 734.668.9922. Fax: +1 734.668.1957; or at Oogststraat 20, 6004 CV Weert, The Netherlands. Tel: +31 (0) 495.533.666.