

Siemens PLM Software Analyst Event 2016

CIMdata Commentary

Key takeaways:

- *Siemens PLM Software is moving quickly to integrate their acquisitions of CD-adapco and Polarion to accelerate their initiatives for predictive analytics*
- *Siemens PLM Software introduced new design and analysis optimization capabilities that have been designed to help customers create and deliver more efficient, cost-effective products and solutions*
- *Generative design is a new MCAD capability that will help customers quickly leverage faceted data in their design process, simulation and analysis, and additive manufacturing*
- *Siemens AG, with significant support from their Siemens PLM Software organization, is delivering the integrated lifecycle vision (PLM—Automation) laid out in their original announcement of the UGS PLM Solutions acquisition*

CIMdata recently attended Siemens PLM Software's annual analyst conference held in Boston, Massachusetts September 6th through 9th. The event was linked with one of Siemens AG's Building and Energy Management events, sharing a joint keynote address on the 6th delivered by Dr. Horst J. Kayser, Siemens AG's Chief Strategy Officer. His talk, titled "Siemens in the age of Digitalization," introduced the theme of "Siemens—Ingenuity for Life." Dr. Kayser described Siemens AG's "Vision 2020" business initiative "Making real what matters" to: achieve sustainable growth, implement a new operating model, raise the bar in the digital transformation market, and inspire a genuine ownership culture.

Dr. Kayser stated that everything needs to be looked at in the context of the following five megatrends that are shaping our world of tomorrow:

- Demographic change—a growing and aging population
- Urbanization—cities as the main driver of GDP growth
- Climate change—global warming and weather extremes
- Globalization—trend to increase investment abroad
- Digital transformation—exponential growth of connected devices.

Siemens AG believes that the move toward digitalization will provide them a broader and greater opportunity even beyond their current strengths in automation and electrification. The company has made significant moves to support this strategy including spending over \$1.5 billion to add LMS and CD-adapco to the Siemens PLM Software's portfolio.

With digitalization comes the proliferation of new data platforms, some from traditional competitors, but most from new players. Dr. Kayser stated that the winner will be the company that can best turn insights from these platforms into customer productivity and efficiency. Dr. Kayser highlighted two announcements that Siemens AG believes positions them well to address this trend: Sinalytics, their big data analytics engine announced in October 2014, and MindSphere, Siemens AG's cloud solution for industry announced in November 2015. Later presentations on the agenda highlighted how these offerings fit into Siemens PLM Software's overall vision and PLM solution offerings.

In the PLM opening keynote on Wednesday the 7th, Dr. Jan Mrosik, CEO, Digital Factory Division stressed the essential requirements for companies throughout the manufacturing industry—speed to market, flexibility, efficiency, and constantly improving security, especially

as software and the Internet of Things (IoT) interconnectivity expand. According to Dr. Mrosik, ideation, realization, and utilization are all interconnected, thereby requiring companies to create the digital twin of their entire value chain—product, process, and equipment integrated into one digital model. Dr. Mrosik said that companies need to engineer customization by doing it in an automated manner and being able to simulate production lines and processes to create closed loop manufacturing. Companies need to be able to apply analytics to processes and production to be able to optimize them. CIMdata agrees that the explosion of smart, connected products will drive manufacturing companies to higher levels of systems engineering and development of systems of systems solutions that take advantage of new capabilities, interactions, and readily available operational information.

Mr. Chuck Grindstaff, Siemens PLM Software's CEO and President, described how "Digitalization Changes Everything, Everywhere," including how it is driving new business models for companies in every industry. It is driving the intersection of disciplines where finding the synergy and value is key to success. To illustrate the changes rippling through the global economy, Mr. Grindstaff quoted Pierre Naterme, Accenture CEO, who stated "Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000." He also referenced John Chambers, in a McKinsey & Company Report from March 2016, who stated "that over 50% of companies that attempt to move to a digital model will fail." Mr. Grindstaff stated that they will fail because:

- Digital is not central to their corporate strategy
- Companies invest in the latest siloed digital technologies and fail to work horizontally
- They perceive digital as a back office strategy aimed purely at operational efficiency
- They think "digitization" and not "digitalization"

According to Mr. Grindstaff, the speed of change has increased and technological forces are transforming industry by changing the way products come to life using approaches like generative design, intelligent models, systems of systems realized through machine learning, additive manufacturing, and advanced robotics. He stressed how they evolve via cloud technology, knowledge automation, and big data analytics. Companies need to accommodate change and collapse the ideation-realization-utilization lifecycle to enable continuous business transformation (of product, process, and services). Mr. Grindstaff stated that to do this, digital twins connected through a digital thread are needed at every step. CIMdata thinks that creating a digital twin to enable analysis and simulation of products and processes is key to designing and maintaining products more efficiently and effectively.

Mr. Grindstaff went on to describe how Siemens PLM Software developed and/or acquired new technologies and solutions to enable them to provide the capacities their customers need to meet the challenges of the digitalization age. These included delivering true integration of PLM and automation, closing the loop between engineering and manufacturing, providing predictive engineering analytics, transforming product development using generative design and new optimization capabilities, deploying smart manufacturing and digital machine shops, and improving performance with information and process visibility and insight for actionable decisions. CIMdata thinks Siemens PLM Software is taking an effective, holistic approach that will more effectively enable companies to work more efficiently and better leverage their engineering, manufacturing, and maintenance resources and processes.

Mr. Tony Hemmelgarn, Executive Vice President (EVP) Sales, Marketing, Service, then talked about "Making the Value of Digitalization Real." Value comes not from taking existing

processes and mimicking them, often referred to as “best practices.” According to Mr. Hemmelgarn, it is about next practices that help companies quickly respond to change and disruption. He stated that Siemens PLM Software is not just selling software, they are creating transformation for their customers, supporting transforming “the way ideas come to life.” CIMdata believes that transformation is key to long-term success in the market—transforming processes, products, solutions, and systems.

The customer keynote speaker, Mr. Uwe Tontsch, GIT-PL of BSH, presented BSH’s history and future vision for PLM. BSH was founded by a joint venture between Siemens AG and Robert Bosch GmbH in 1967 and was sold to the Bosch Group in early 2015. Mr. Tontsch described how they have created an engineering backbone that spans the product lifecycle from virtual product development through sales, service, and IoT content support. He stated that their past efforts, while effective, are not sufficient to move to the next level. To go successfully forward, BSH will have to focus on:

- Consumer centricity
- Brand differentiation
- Push digital transition and user experience
- Strengthen innovation, broaden portfolio
- Drive operational excellence
- Evolve leadership style

Mr. Tontsch stated that BSH would have to go through a digital transformation and create products and services leveraging a social paradigm, the cloud, mobility, and big data analytics to re-define how they engage their customers. He discussed how the IoT is impacting the home appliance world with smart, connected products providing new opportunities (e.g., sustain growth with software and services, drive innovation with knowledge from analytics, keep price premium, excite customers, and maintain brand value), as well as creating major challenges by requiring new platforms and processes with end-to-end capabilities, process re-engineering—not process optimization, security—more complex/more vulnerable, multiple eco-systems, and maturity. He also commented how product development complexity is shifting to systems of systems so people have to think and work differently. Companies need to establish a product architecture management strategy and R&D leaders need to take strategic ownership of PLM as their “platform.” For several years now, CIMdata has been describing and promoting the importance of defining and deploying business platforms as part of a company’s IT strategy.

Mr. Jim Rusk, Senior Vice President (SVP) and Chief Technology Officer, and his team provided a look at a number of new technology advances from Siemens PLM Software including the introduction of convergent modeling that allows classical b-rep exact geometry to be merged with faceted geometry in NX 11. Implemented within the Parasolid geometric kernel, convergent modeling promises to improve workflows when performing reverse engineering of digitally scanned models, interfacing with CAE, and preparing models for additive manufacturing. CIMdata sees this advancement providing users major gains in productivity and ease of use, especially as simulation and analysis drive more design and additive manufacturing becomes more prevalent.

Mr. Eric Sterling, SVP, Lifecycle Collaboration Software, provided an update on Teamcenter. He stated that Active Workspace adoption and use has been rapidly increasing and that its deployment is including more people into company processes and using product information in more ways. Throughout the analyst event, Active Workspace was shown being used in

many different applications (e.g., Teamcenter and NX). What CIMdata found especially effective was how it is being seamlessly and transparently embedded into many of the other Siemens PLM Software products so that users can work in their preferred application with full access to the data and processes managed by Teamcenter.

Mr. Sterling also described how Teamcenter is the collaboration platform upon which Product Lifecycle Management, Manufacturing Operations Management (MOM), and Integrated Production Automation are built. CIMdata believes that the combination of a common platform and functional integration among these three domains has allowed Siemens AG to realize the PLM—Automation vision they described when they first acquired UGS PLM Solutions. This collaboration backbone will better enable Siemens PLM Software to use task-based tools to solve business challenges and provide streamlined, process based capabilities for specific use cases. They can also better leverage and reuse their investment in user experience in which capabilities are developed once, and shared across tools, such as NX, MES, ALM, etc.

Mr. Sterling also described Siemens PLM Software five-year vision of:

- Systems driven product development in the context of physical configurations and BOMs
- High performance, integrated solutions supporting customer processes from early product definition through design, production and after sales support
- Mechatronic system design balancing mechanical, electrical, software and manufacturing requirements
- An integrated user experience

Finally, Mr. Sterling described Smart Discovery capabilities that provide new, much faster methods for finding and accessing the data and models of interest to a user when working with very large, complex products (e.g., ships, airplanes, cars, facilities, etc.). As an example, users can find content that is in the center fuselage, but is also in the Electrical Control System (ECS), is NOT temperature sensitive, and is within 100mm of an electrical generator. Mr. Sterling also stated that this Fall they will be releasing Deployment Center—a web-based system to remotely install, patch, and upgrade Teamcenter. This should significantly reduce the time and effort required to maintain and evolve Teamcenter.

Dr. Jan Leuridan, SVP Simulation and Test Solutions, described how Siemens PLM Software is continuing to add and integrate capabilities that help their customers transform their ideation processes. These include Smart Discovery, predictive engineering analytics, HEEDS from CD-adapco, and Imagine.Lab and Virtual.Lab from LMS. Mr. Joe Bohman, VP Product Engineering Software, discussed Siemens PLM Software's initiatives and investments in additive manufacturing. For example, they are developing specialized engineering software for mixed material complex assemblies as part of a complete additive manufacturing solution.

Mr. Jean-Claude Ercolanelli, SVP Product Management, discussed the CD-adapco acquisition and how it is being integrated within the Siemens PLM Software product suite. Part of the CD-adapco suite, HEEDS for design process automation and multidisciplinary exploration, provides predictive engineering analysis by automating the simulation process and help explore new design concepts that improve products and can significantly reduce development costs. Siemens PLM Software will be expanding the use of HEEDS and other optimization tools and CIMdata thinks this can be very beneficial for its customers as they strive to reduce the time and cost to deliver innovative products to the market.

Simcenter, the new Siemens PLM Software's environment for enabling ideation and innovation through predictive engineering analytics, brings together an extensive set of CAD-neutral and multi-physics modeling capabilities for structural, thermal, and flow simulation from the NX CAE suite, the recently acquired CD-adapco suite, as well as the LMS suite into a single, multi-discipline environment for simulation and analysis. Many of these tools will be made available via data-managed web-based applications, as well as in the native desktop versions. The integration of Simcenter applications with Teamcenter and other Siemens AG hardware/software platforms will enable a "closed loop" systems-driven product development approach that stretches into the domains of manufacturing and machinery in-service applications in the "digital twin" vision.

Mr. Zi Feuer, SVP Manufacturing Engineering Software, and Mr. René Wolf, SVP MOM Segment, presented how Siemens PLM Software is transforming realization and helping companies make the virtual, real. They commented that companies must digitize manufacturing to be able to predict and eliminate failure, digitalize the processes and analyze data, and accumulate knowledge based on a digital nervous system. Mr. Feuer described how Siemens PLM Software has connected PLM and MES to better enable companies to synchronize product design and production, as well as drive continuous planning improvement aligned with manufacturing operations.

They stated that "Intelligent Automation" is Siemens PLM Software's strategy integrating and automating production systems engineering, automating PLC generation, and using MOM for intelligent production. They also commented that doing this will require advancing technology, smart manufacturing, and a digital machine shop. Siemens PLM Software believes the factors that will drive this effort are advanced robotics, intelligent automation, and predicting how production will perform. CIMdata thinks that linking PLM and manufacturing engineering will enable companies to simulate to better optimize production and create closed loop quality processes. The two presenters closed by describing how companies will be able to gather and transform data into knowledge by using smart connect products and analytics, as well as monetize data by generating actionable insights and creating new business models. CIMdata thinks that Siemens PLM Software is delivering the integration of PLM and Automation they have been developing since Siemens AG acquired UGS PLM Solutions. We believe that this integration can help companies become much more efficient across the design and manufacturing phases of the product lifecycle.

Mr. Peter Weckesser, EVP and COO, discussed how companies must shift from being product focused to a customer-centric mindset. He introduced MindSphere—a comprehensive, cost-efficient, cloud-based data hosting platform that combines device management, easy connectivity, the necessary data storage and the associated infrastructure for virtualized data management. MindSphere is described as an open platform that can be used to develop, extend, and operate applications in the cloud. OEMs could monitor globally distributed machine tools, industrial robots, or industrial equipment as well as carry out simulations and optimize business processes. CIMdata thinks that MindSphere offers a platform for customers to manage the systems of systems and connected devices that are becoming more common in the age of IoT.

Mr. Kirk Gutmann, SVP, Industry Strategy, gave an update on the industry programs including their industry Catalysts and vertical market solutions that are focused on eight industries. CIMdata saw significant progress in the industry solutions and Catalysts from last year, Industry solutions and Catalysts have been released in all the industry segments, and in some cases several are now available. In addition, capabilities have been organized to address specific business processes rather than just technical functions. CIMdata believes

that these approaches can help customers get faster time to value. CIMdata looks forward to talking with customers to see how they take advantage of these capabilities.

On Friday morning Siemens PLM Software speakers Mr. Andreas Saar, VP Manufacturing Engineering Solutions, Mr. Aaron Frankel, Senior Director Marketing, and Mr. Christoph Kiener, Principal Key Expert from Siemens AG's Corporate Technology, described how additive manufacturing is being developed to support the digital factory of the future, including how it can affect the design process.

Siemens PLM Software is developing software technologies to support general additive manufacturing that in many cases create functionally optimized geometry that cannot be manufactured by conventional methods. On the manufacturing side, there are many different additive technologies to be supported including multi-material, powder based, inkjet binders, and direct laser sintering/melting, and hybrid processes. They stated that Siemens PLM Software is creating software that analyzes shapes and optimizes for a particular process. The key takeaways from this session were:

- Previously unsolvable design and manufacturing problems can be solved with new technologies—both software and production combined with innovative thinking
- Siemens PLM Software has a vision of how the technology fits together from end-to-end and is putting that vision in place to move industry forward

CIMdata believes these new hybrid approaches, driven by increasingly smart design tools that help select the right geometry, materials, and manufacturing process for the application, will help companies develop new, innovative products that were previously not feasible.

In summary, Siemens PLM Software continues to execute well, growing faster than the industry average. Throughout the event speakers described and showed examples of how recent acquisitions are being integrated to help customers improve their products and the value they provide. Solutions like Simcenter and their tools for predictive engineering and optimization should provide significant benefit for their customers in the years to come. CIMdata has long believed that Siemens PLM Software's vision and execution of how development can be integrated with production through digitalization is compelling from both innovation and efficiency perspectives. End-to-end support of additive manufacturing is a good example of the value Siemens AG as a whole brings to the table. Finally, CIMdata believes that Siemens PLM Software's automation capabilities are ready for production use by their customers. Other Siemens AG solutions such as MindSphere complement the PLM and Automation solutions and help Siemens Digital Factory Division enable their manufacturing customers to operate more efficiently and effectively from ideation, through realization and utilization.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through 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

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