Product as a Service: A Competitive Imperative in Industrial Equipment

CIMdata Commentary

Key takeaways:

- The global industrial equipment (IE) market is crucial for economic development and growth
- In many IE products, software and embedded electronics are providing differentiating features, and providing the most user value
- Many IE products are delivered as a service, imposing new requirements on product development and lifecycle management
- Product data used downstream to support manufacturing and services requires broad, deep, and varied content and delivery
- Some claim that these trends are driving a fourth industrial revolution

Introduction

Manufacturing is the engine that drives the global economy. Finance and other services may generate large amounts of cash, but it is manufacturing that helps economies grow and mature. Industrial equipment (IE), which encompasses a broad range of products, is essential to manufacturing—something that has been true since the Industrial Revolution. The ability to produce machines to make other machines is commonly used to measure the strength of a country's manufacturing sector. For example, Germany, Japan, and the United States have historically been leaders in the machine tool market (a key segment of the IE market), which correlates to their success in manufacturing. While these countries are still among the leaders, China has sped past them in recent years, which reflects the rapid growth of China's manufacturing capabilities.

Just as in other industries, IE companies are always looking for new ways to compete and to differentiate their offerings. Machines can be made to stock for catalog ordering. More often they are configured to order from pre-defined modules, or engineered to order where more complex adaptation is necessary to meet customers' requirements. In recent work on the IE market, CIMdata has introduced the notion of "innovation to order," to connote situations where more than engineering is required.

Changing Dynamics of the IE Marketplace

The nature of IE products is also changing. Electronics and embedded software have long been important in this market. But just as in other manufactured products, more and more value delivered by industrial equipment is coming from their embedded software. This has required changes in the product development process and expansion of the skills required in IE companies. Because of this reliance on software, CIMdata has also witnessed a growing interest in systems engineering within this market.

Getting smarter through embedded processors and software helps IE products generate large volumes of data about their usage, status, ambient conditions, location, and other factors. Making machines Internet-capable provides ready access to this data, even in remote locations. Because these ubiquitous machines are increasingly joining this "Internet of Things," it makes the world and solutions of "Big Data" more relevant to both IE suppliers and

their customers. Large volumes of data must be captured, processed, and analyzed to help assess machine status and effectiveness. Embedded self-test is giving way to remote diagnostics that rely on this data to determine when, and how, to maintain and enhance IE.

To borrow a phrase from mathematics, making good products is a necessary but insufficient condition for achieving market success. Industrial equipment often has an extremely long useful life, something factored into capital budget analysis in making the purchasing decision. IE product companies have to be ready, willing, and able to stand behind their delivered equipment for its useful life. In fact, some companies are seeing this lifetime support as their differentiation and primary money-making opportunity.

Product as a Service

Just as General Electric reimagined its jet engines as a service delivering "power by the hour," IE products are increasingly being seen as services. Customers want to buy uptime, not just a piece of equipment. Instead of a purchase order for a piece of equipment, buyers are executing a service-level agreement (SLA) that specifies that level of uptime. In this new world, first-time quality is important, but overall equipment effectiveness and efficiency (OEE) is a critical metric. Revenue from the product lifecycle comes not only from the initial sale, but from the provision of services and "authorized" spare parts. Historically companies have made big profits on spares, with some figures as high as 50-60% of revenue in service on spare parts, and 30% margins on the parts business. With more emphasis on parts and service, this needs to be optimized.

While IE companies have always worried about product development and quality, this new focus changes the way this work needs to be done.

Impacts on Product Development

Because many IE products are configure-to-order or engineer-to-order, product development systems need tools that support rapid configuration that can be used by sales and marketing, and by product design. Design tools to enable engineer-to-order or innovate-to-order must support cross-disciplinary design processes spanning mechanical, electrical, electronics, and software. These tools also create a greater need for analysis early in the product development process, so that failures are discovered virtually, and at a faster pace, speeding up development. All of this information needs to be managed as a virtual "single source of truth" to help drive downstream documentation for manufacturing and services. It also must be associative so the information can be readily adapted to support product variants.

As discussed above, machines are becoming smarter, and must engage as part of the Internet of Things. Designs must include more sensors, network connections, and other components to support this evolving requirement. Planning for the lifecycle must also include capturing and analyzing downstream data. Even simple machines will generate large data volumes, forcing companies to deal with more data from more channels. This makes the ability to handle Big Data more relevant, particularly to support predictive analytics.

Other Enterprise Impacts

Beyond just product development, companies need to close the loop across the lifecycle to maximize learning. Some important considerations for IE include:

- Depending on the IE segment, companies' support for Big Data needs to include harvesting information from the social web, and combining it in meaningful ways with other data sources.

- The focus on service makes connecting with customer relationship management (CRM) even more important. Companies must better leverage customer feedback from these solutions to enhance future product development. Including social tools to identify, vet, and harvest ideas, extending the conversation to prospects and other stakeholders.
- IE customers often rely on enterprise asset management (EAM) to ensure their equipment is operating at optimal efficiency. IE product companies need to determine how best to integrate with these solutions to gather and leverage field data.

If IE companies are delivering products as a service, the knowledge base supporting that service needs to be broad, deep, and varied in content and delivery. Beyond just manuals, there needs to be more "how-to" support, possibly including more use of video and simulations in the field. Textual information must be provided in multiple languages, and designed to support varied user skill levels. (If done right, videos and simulations have the added benefit of being independent of language.)

Because most of the work will happen in the field, this knowledge must be accessible from anywhere, to support the "deskless" workers who will rely upon it. This suggests that SaaS and Cloud-based applications are appropriate, and can add more value to support the needs of global services. Content must be associative, with evolving product and process definitions, to ensure that services can be delivered accurately and efficiently. Ideally, this information can be associated with other enterprise systems, like EAM, to support scheduled maintenance, preventative maintenance, and analytics-driven actions to support the vision of delivering products as services.

IE companies that want to deliver this vision will require a broad range of enabling solutions. These can include nearly the full range of CIMdata's PLM definition, such as mechanical computer-aided design (MCAD), computer-aided manufacturing (CAM), simulation and analysis (S&A), requirements management, collaborative Product Definition management (cPDm), application lifecycle management (ALM), electronic design automation (EDA), and digital manufacturing. Their chosen solution and service providers will need to understand the specific needs of the IE industry, and how best to bring these varied solutions together to meet the broad range of product and process requirements found in IE. Other industries have already taken many steps toward this vision and can provide insights on how best to make this complex journey. For more information, contact Dassault Systèmes at http://www.3ds.com/how-to-buy/contact-sales/.

Conclusion

Industrial equipment is a broad market, one that powers global manufacturing. This market faces significant challenges and is evolving to address them. One significant change is that more IE products are being delivered as a service. This makes availability at the right price and lifecycle cost the central metric, one that creates significant issues but also offers great opportunities. It makes connection with other enterprise processes and solutions even more important, and it makes information gathering from more sources across the extended enterprise and from the field essential for success. In the face of this competitive imperative those that will succeed will have to adopt the right combination of processes and enabling technologies.

Some claim that these trends, and how the industrial equipment market is responding to them, are part of a fourth industrial revolution. At this point, there certainly has been a

renaissance, an awakening of innovation, entrepreneurial spirit, and some market success. Will their broad adoption in traditional product development environments trigger that revolution, bringing down the dominant paradigms? The economic notions of creative destruction and discontinuous innovation suggest it is possible. These early successes are just the beginning.

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 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.