

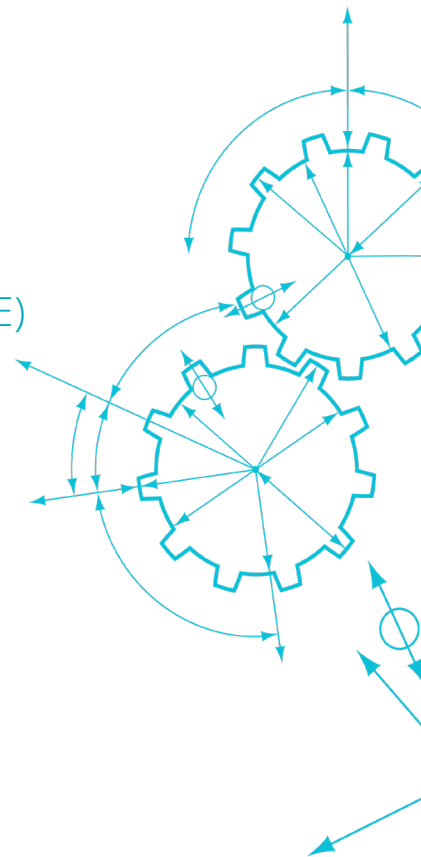


Transforming to thrive

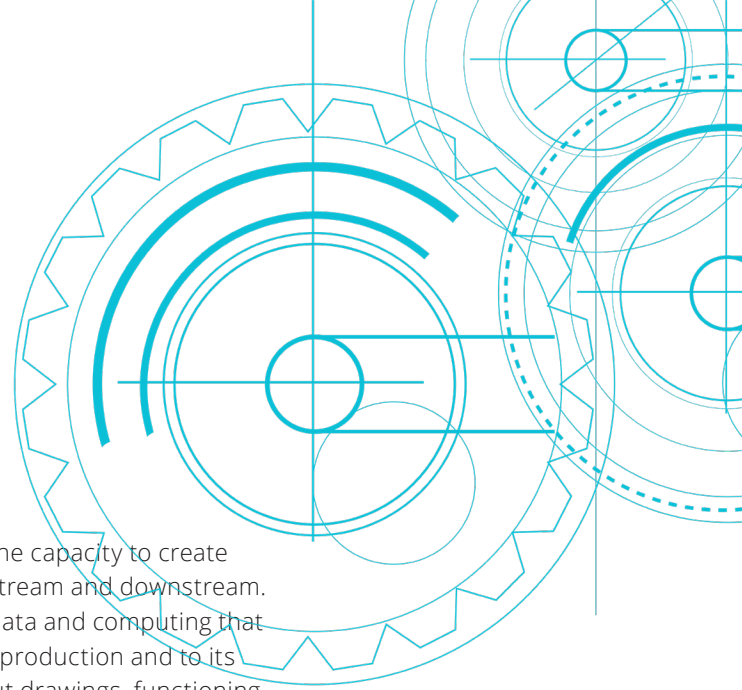
The path to becoming a Model-Based Enterprise (MBE)

Manufacturers are facing market pressure to dramatically reduce program development time and labor while also building and relying on processes that confirm product viability before production begins. Hot topics like Industry 4.0, digital supply networks, and smart factories point toward a fusion of process, technology, and talent that can deliver the game-changing outcomes needed to compete and win. Yet, there remains uncertainty about how these elements come together into a cohesive model-based approach across the product life cycle.

Too often, an effort to transform to a Model-Based Enterprise is frustrated by “random acts of digital” that fall far short of delivering value. What’s needed instead is a deeper understanding of what’s required to become a true MBE—and the tools and approaches that can accelerate transformation.



Elements of a Model-Based Enterprise



Modeling in engineering is not new, but what's emerging is the capacity to create models across the product life cycle that are connected upstream and downstream. The heart of a MBE is the digital thread—a single strand of data and computing that flows from a product's conception and engineering through production and to its aftermarket maintenance. It exists in an environment without drawings, functioning solely on models, and it includes all of the process and system capabilities that enable digital twins, of which there are three types:

Product digital twin

This is a virtual simulation of the product and each of its parts. While most manufacturers manage engineering models with CAD/CAE solutions, just 15 percent use product twins. Leaders in this space have seized a competitive advantage in product development and accelerated engineering. Yet, becoming a MBE requires more than product models.

Process digital twin

This model of the manufacturing equipment, processes, and the workforce for related operations. It reflects the physical shop floor, complete with work instructions, details, and resolutions for how the manufacturing itself is accomplished. It relies on data from the product digital twin and allows the enterprise to build toward the product plan and predict what will happen on the shop floor. About 5 percent of enterprises use a process twin.

Service digital twin

After production, there is a service digital twin, which mirrors aftermarket maintenance and repair. The service twin requires product and process twins to inform the aftermarket model that can be monitored, adjusted, and enhanced based on real-world data. Less than 5 percent of manufacturers use a service twin, which is perhaps expected given that using it successfully requires the other aspects of the digital thread.

When underlying data (e.g., models, specifications, and configurations) are standardized and integrated across the digital thread, an enterprise has the capacity to monitor and refine a product in a linear fashion while also injecting insights and improvements back into the thread. The result is that engineering and production feedback is continuous and efficient, achieving in weeks what once took years. Visibility into materials, costs, suppliers, and more enable the enterprise to pivot and keep production moving, even when dealing with unforeseen challenges. And real-time monitoring that synthesizes live data helps reveal performance insights and aftermarket issues that allow a company to improve its offerings and operations. **This is the vision for maturing into a MBE—and while less than 5 percent of companies have achieved the digital thread, more than 85 percent have a strategy to get there.**

Accelerating transformation

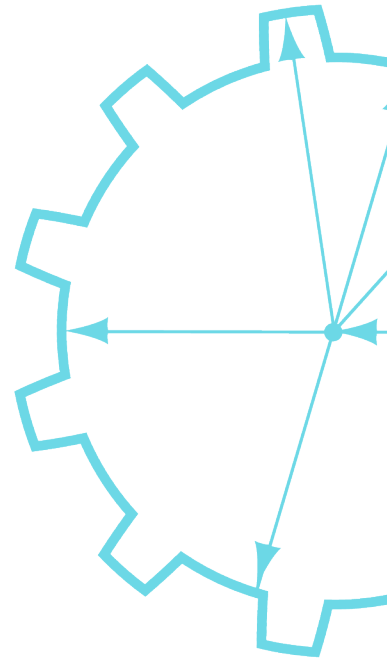
In working to mature into a MBE, new and emerging enterprises have an opportunity to build toward their vision without the constraints legacy systems can impose. For more established manufacturers, however, how legacy technology is viewed can challenge the path to transformation.

Executives may be tempted to weigh existing platforms or applications and look for how they can be used to enable the digital thread. This self-constraining mindset frustrates a broader, more holistic view of how to transform to thrive in the marketplace. There's a dual imperative to define future architecture without the constraints of existing systems while also establishing a roadmap that rapidly leads to MBE

maturity. Critically, transformation should not be a multi-year endeavor. Enterprises need to move quickly to compete.

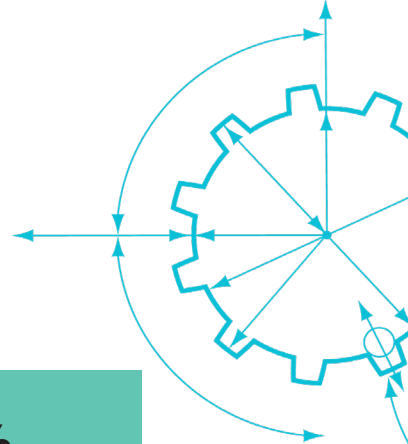
There are four core enablers of the digital thread: digital engineering, industrial simulation, manufacturing execution, and real-time monitoring. Addressing each with optimized tools allows a manufacturer to rapidly move from strategy to reality.

Recognizing the complexity and enterprise need, Deloitte developed preconfigured solutions using best-in-class software from Siemens Digital Industries that can help expedite and enhance transformation across each of these core areas.



Design with DPLM	Simulate with DSIm	Execute with DMES	Monitor with DIoT
Accelerates product life cycle management transformations with a multi-phased approach, including defining the vision, assessing the organization's existing capabilities, identifying opportunities, and defining the future state supported by a phased, multi-year PLM roadmap and business case.	Permits the ability to test and refine processes in a virtual environment, rapidly revealing the most efficient and effective industrial processes more quickly than is possible in a real-world environment.	Integrates pre-defined processes in production planning, execution, tracking and tracing, quality management, closing production units, data collection, and visualization, with integrations to PLM and ERP.	An integrated accelerator that helps deliver IoT capabilities faster, driving quicker returns for high-impact areas while cultivating digital adoption.

Importantly, transformation is not an all-or-nothing proposition. Rather, these preconfigured solutions are flexible and can be implemented based on where the greatest enterprise value can be created. Companies that work with Deloitte to transform to a MBE typically see:



 **15-20%**
BETTER
DEVELOPMENT
EFFICIENCY

 **30-50%**
FASTER TIME
TO MARKET

 **8-20%**
PRODUCT
COST
REDUCTION

 **10-30%**
DECREASE THE
COST OF
QUALITY

While most enterprises have initiatives in model-based systems engineering, definition, and manufacturing, few have tied them together at scale. Now is the time to seize the first-mover advantage.

Ready to get started? Get in touch today to discuss your transformation to a Model-Based Enterprise.

Brian Meeker

Principal, Product Strategy & Lifecycle Management

Deloitte Consulting LLP
bmeeker@deloitte.com

Vijay Santhanam

Managing Director, Product Strategy & Lifecycle Management

Deloitte Consulting LLP
visanathanam@deloitte.com

Deloitte.

As used in this document, "Deloitte" means Deloitte Consulting LLP, a subsidiary of Deloitte LLP. Please see www.deloitte.com/us/ about for a detailed description of the legal structure of Deloitte USA LLP, Deloitte LLP and their respective subsidiaries. Certain services may not be available to attest clients under the rules and regulations of public accounting. This publication contains general information only and Deloitte is not, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your business. Before making any decision or taking any action that may affect your business, you should consult a qualified professional advisor. Deloitte shall not be responsible for any loss sustained by any person who relies on this publication.