# BRIDGING THE GAP BETWEEN ENGINEERING AND MANUFACTURING

# INTRODUCTION

Manufacturers are continually under pressure to get to market faster with lower development costs. At the same time, today's business environment requires product development to have the agility to react quickly to changes in consumer preferences and the resiliency to mitigate business disruptions. Meeting these requirements while under increasing product and process complexity is a significant challenge.

Inhibiting a manufacturer's ability to overcome the challenge is an infrastructure of disconnected design, engineering and manufacturing systems. Separate systems add unnecessary friction to the process and open up possibilities of errors, rework and delays.

To address these issues, manufacturers must rethink their product development processes to become more efficient through transformational strategies, rather than small incremental gains that produce diminishing returns.

A better approach is digitally connecting engineering and manufacturing with the **3D**EXPERIENCE platform to improve cross-team communication and collaboration. A shared, virtual product definition supports multi-disciplinary engineering and streamlines the engineering to manufacturing process. The virtual product definition, accessible to every stakeholder connected to the platform, replaces the Bill of Materials (BOM) as the single source of data and primary means of exchange. The virtual product definition reduces development time, improves agility and minimizes business disruptions by making data accessible from anywhere, at any time.

With the **3D**EXPERIENCE platform, manufacturers move faster through design, release and manufacturing. Faster time to market means lower development costs, shorter time to revenue and a market competitive advantage.

This eBook examines the challenges manufacturers face with their current BOM processes and explains how the **3D**EXPERIENCE platform supports a better approach with a virtual product definition.

# TODAY'S COMPLEXITY STRAINS TRADITIONAL PROCESSES

The BOM has served manufacturing industries well. It is the most common means for a manufacturer to describe the list of components that make up a product. It communicates to others what the company needs to produce it. Yet this approach originated in the age of mass produced, mechanical goods. In an age of complex products and rapidly changing customer preferences, manufacturers must move faster and be more agile than is possible using traditional BOM practices.

The BOM still plays a critical role in defining and communicating product information. However, the product development process often has a digital gap between domains. This gap prevents real-time collaboration and closed-loop feedback that is essential to drive innovation and ensure quality as designs change. As the pace of product development becomes faster and more complex, BOMs are no longer the most efficient way to exchange product and manufacturing information.

# MASTER SOURCE OF TRUTH

The BOM often serves as the master source of truth for Engineering, Manufacturing, Purchasing and the rest of the enterprise. However, each of these domains independently manages their own version of the BOM, disconnected from the others. This case is especially true for separate organizations such as an OEM and their supplier. The process of keeping each BOM aligned with the others through manual updates is time-consuming, costly and error prone.

An Engineering BOM (EBOM) contains the product structure and detailed data for each of the components, including geometry specifications. The EBOM may include additional engineering information for proper sourcing, manufacturing or purchasing. Engineering shares this information with Manufacturing, who in turn creates independent Manufacturing BOMs (MBOMs), perhaps one for each local manufacturing facility, to support manufacturing processes and planning. Most manufacturers maintain the MBOM in a separate system from the EBOM. This requires system integration and/or manual effort to keep the two in sync. The result is process inefficiency and a significant opportunity for errors.

An EBOM can serve as a master record of a specific product configuration at the end of the development process. However, it does not well serve engineers collaborating on designs during the development phase. Successful product development relies on the dynamic interplay of mechanics, electronics and software to deliver advanced capabilities. Eliminating functional silos is essential. Engineers must view, validate and optimize product designs as an integrated whole to understand the behavior and the customer experience.

# EVOLVING TO A VIRTUAL PRODUCT DEFINITION

Companies are beginning to recognize that using the BOM as the product master definition is no longer the best way to do things. BOMs cannot support the level of dynamic design required by complex, systems-oriented, mass-customized products. These products include mechanical, electrical and software components designed in separate systems. Ensuring the full CAD product structure for the design and a separate EBOM for engineering information remain synchronized is no easy task.

The **3D**EXPERIENCE platform provides a better way by offering a virtual product definition for multi-discipline collaboration. It offers an accurate, up-to-date representation of the product throughout the engineering to manufacturing process.

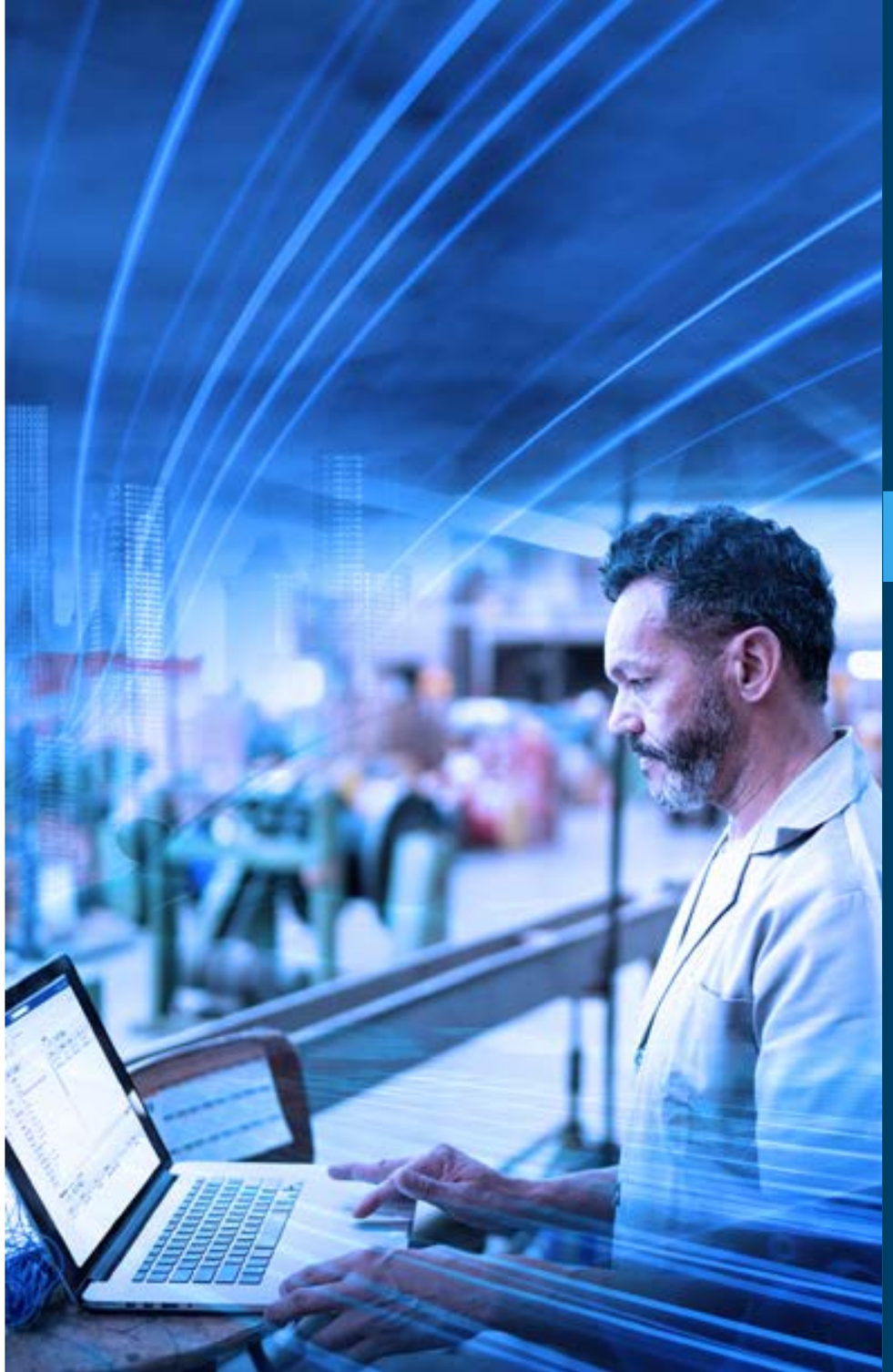
Industry-leading companies adopt the **3D**EXPERIENCE platform for a more comprehensive, virtual product modeling approach. Integrated, virtual models enable designing, validating and communicating the full product definition. Dynamic, living models go beyond documentation to support simulation for engineers to optimize product behavior. They also validate experiences to meet ever-increasing customer expectations early in the development process when designs are still flexible. This modeling approach goes further to provide the enterprise with the information needed to develop manufacturing instructions, create inspection details, support 3D augmented reality processes and more.

# THE BOM REMAINS

The BOM does not disappear in the transition to a virtual product definition. BOMs are an important part of downstream processes like costing and materials planning. Instead of the BOM serving as the master of the product definition, engineering releases the virtual model for use by others downstream. In essence, the BOM is another view of the virtual product definition. A functional view is available for all stakeholders to contribute to the product definition or manage engineering information. With this approach, a BOM supports unique processes and needs, yet stays up to date as designs change.

# DIGITALLY CONNECTED MANUFACTURING

It is essential to know with confidence that manufacturing can produce the engineered product feasibly, efficiently and safely. The creation of the MBOM extends the virtual product definition into manufacturing to address this need. The manufacturing engineer can view the status of the items assigned in the MBOM and reviews them as updates occur between engineering and manufacturing. By seeing whether there are new or removed classified items, the engineer gains a clear understanding of the impact of engineering changes on manufacturing. This might mean continuing to leverage the virtual product definition to make downstream changes to fabrication and robotics programming. Alternatively, it may result in creating an engineering change request if the impact of the change is difficult or costly to address by manufacturing. In either case, this digital connection between engineering and manufacturing provides a risk mitigation strategy that avoids disruption when bringing new products to market.



# IMPROVING ENGINEERING AND MANUFACTURING COLLABORATION

By moving from a BOM-centric process to a virtual product definition, product development becomes more efficient and less error prone. Time to market accelerates with faster exchange of information between Engineering and Manufacturing. A common product definition and an enterprise-wide change process eliminates the friction associated with multiple BOMs. Engineering and manufacturing identify and resolve issues in advance of the product release process. The result is faster time to market, lower development costs, shorter time to revenue and a clear competitive advantage.

# CUSTOMER SUCCESS STORY

As a leading automotive supplier in its various markets, Faurecia brings innovative solutions to major automotive manufacturers. Faurecia wanted to find a solution to unify its methods and processes while ensuring the synchronization of its produc¬tion operations, all over the world.

Faurecia uses the **3D**EXPERIENCE platform for product lifecycle management (PLM). DELMIA Digital Manufacturing is gradually being deployed globally across all of the company's business areas, with the introduction of the **3D**EXPERIENCE Twin to model and virtually simulate global production processes while also taking into account the customization constraints specific to each of them.

Consistency between the PLM project and the DELMIA Digital Manufacturing project is possible thanks to digital continuity, including the Bill of Materials (BOM). This document lists all of the items needed to manufacture a given product. Whether the information is represented as a tree or in a table, it allows all involved parties to quickly see which parts, components, subassemblies or raw materials are used.

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> "The integration of processes, from design engineering to manufacturing, is guaranteed by digital continuity.

> "Synchronization of the PLM side (E-BOM) and the DELMIA side (M-BOM) is imperative. We are very vigilant when it comes to the integration and consistency of bills of materials. The integration of processes, from design engineering to manufacturing, is guaranteed by digital continuity.

Laurent Vachey, Design & Validation Solution Manager, Faurecia

Inceptra supports engineering and manufacturing organizations with best-in-class solutions to digitally design, simulate, produce, and manage their products and processes, enabling enhanced innovation and productivity.

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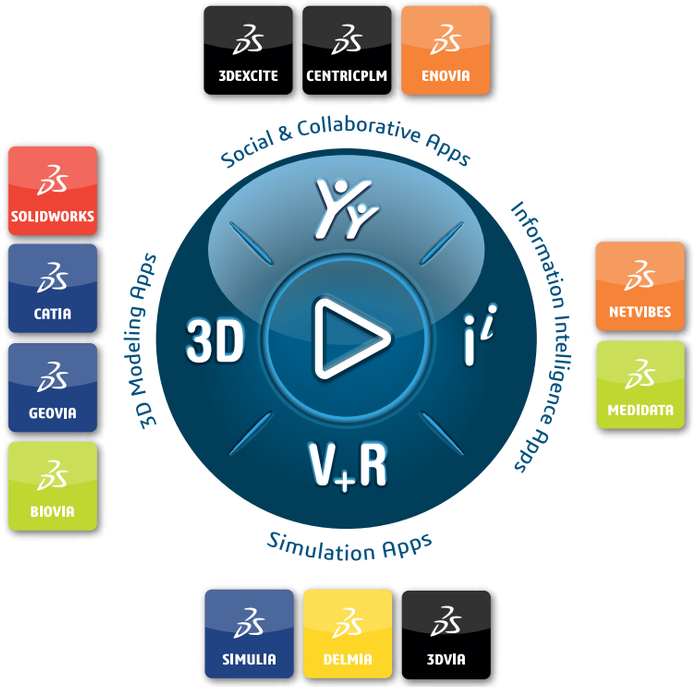
Dassault Systèmes, the **3DEXPERIENCE** Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our **3DEXPERIENCE** platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit **3ds.com**.

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