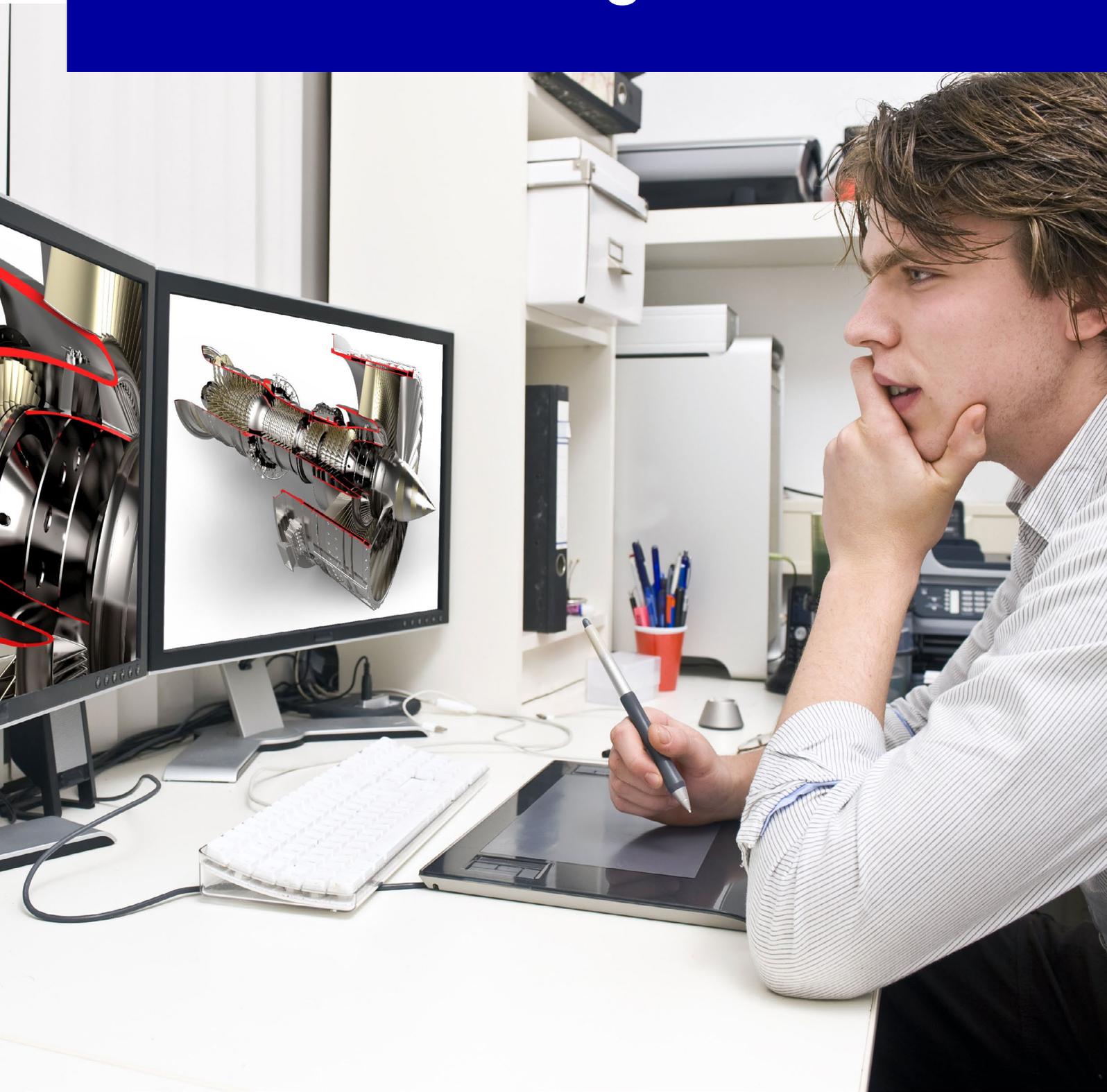


How to unlock siloed data and create a digital thread for manufacturing



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Executive summary

Manufacturers are constantly struggling to drive down the cost of quality (CoQ) associated with the design and manufacture of their products. This cost is due to issues such as redesigning parts that already exist, scrap and rework brought on by inaccurate documentation, overlooking make or buy opportunities, expedited shipping expenses and warranties.

This complexity is not surprising. The product lifecycle is a maze of activities supported by disconnected manual processes and applications producing a steady flow of product-related content. These applications can include product-data management (PDM), product lifecycle management (PLM), enterprise resource planning (ERP) and a slew of others. Product data is also buried in various computer-aided-design (CAD) modeling solutions, which have proprietary formats, documents, spreadsheets, portable document formats, images and emails. All this disarray is amplified through a mix of on-premises and cloud-based applications coupled with the recent hybrid working model.

Organizations have pursued a range of initiatives to unify access, including trying point-to-point integrations, establishing data lakes and, more recently, building out data-processing hubs. The results have been mixed, in part because initiatives to provide analytics and insights are not designed for consumers of content from across the enterprise.

According to the American Society for Quality (ASQ), poor quality management can cost an organization as much as 15-20% of their total sales revenue.¹

Fortunately, technologies and best practices exist to offer manufacturers unified product-data access, actionable insights and enterprise collaboration regardless of the siloed data repositories, proprietary file formats and hybrid hosting conditions

This paper discusses content produced during a product's lifecycle and the challenges manufacturers face in enabling access to product data. It also examines how to solve these challenges through enterprise content management (ECM) coupled with application integration technologies and supporting collaborative processes.

¹ American Society for Quality, Cost of Quality (COQ)

Introduction

The number of applications used in manufacturing processes has greatly expanded, providing increasingly sophisticated support throughout the product lifecycle. Unfortunately, these applications and the content they produce are often stored in disconnected, siloed systems. This disarray is amplified through a mix of on-premises and cloud-based applications, coupled with the recent hybrid work model.

Organizations are trying to unify access, using point-to-point integrations, establishing data lakes and building out data-processing hubs. These initiatives provide analytics and insights, but do not necessarily improve efficiency and collaboration for employees searching for and using content.

Fortunately, technologies and best practices exist for manufacturers that offer unified product-data access, actionable insights and enterprise collaboration. Staff can get what they need despite siloed data repositories, proprietary file formats and hybrid hosting conditions.

The product lifecycle

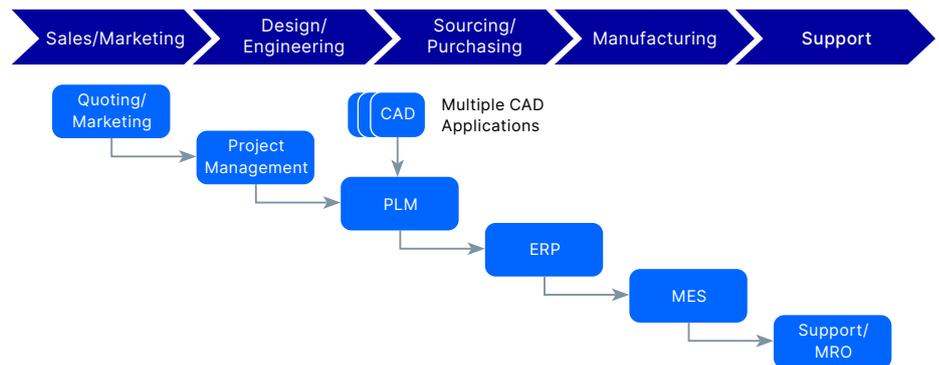


Figure 1. Typical product lifecycle of activities

The figure above shows the typical activities associated with a product's lifecycle and the applications used for each stage. Sales and marketing teams use many applications, including customer relationship management (CRM) software, sophisticated market analysis and forecasting tools, and configure, price and quote (CPQ) applications.

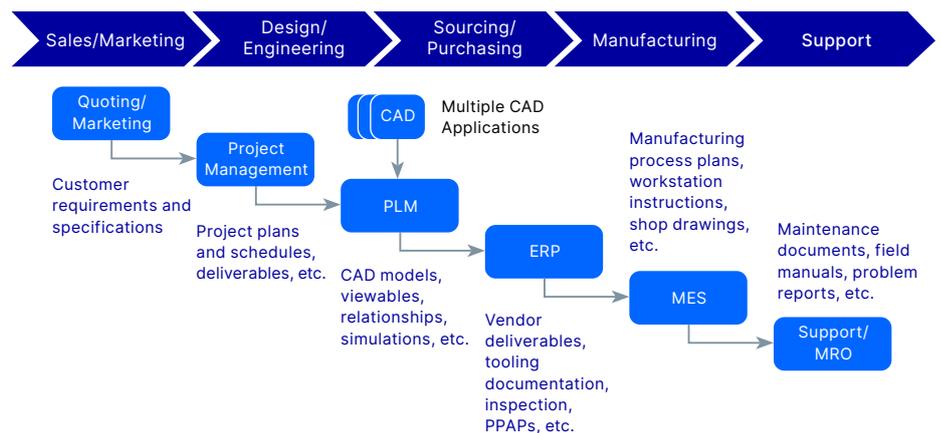
Project management applications establish project oversight to ensure all aspects of the product development process are coordinated, from design and procurement, to manufacturing and delivery. The use of computer-aided-design (CAD) tools is also common, as most anything manufactured today will have mechanical and electrical CAD model(s) associated with it. Given the exploding growth of embedded software functionality, it can also include various code-based development and management platforms, such as Microsoft® DevOps and Atlassian's GitHub™.



Product lifecycle management (PLM) or product data management (PDM) are cornerstones of the product design and engineering stage of the product lifecycle. PDM has evolved to be an important platform to support CAD activities and typically operates as a subset of PLM. PLM is a much broader platform that extends beyond simply managing part data, bills of materials (BOM), documents, drawings and change management operations. It now includes requirements management, simulation management, quality (proactive and reactive), manufacturing process planning and, in some cases, maintenance, repair and operations (MRO).

Enterprise resource planning (ERP) covers human resources, operating expenses, procurement, inventory and production planning. As manufacturers operate across geographic regions, the importance of ERP cannot be understated. This is typically a significant IT budget line item. An extension of ERP is the manufacturing execution system (MES), which focuses on the manufacturing processes, machinery, tooling, workstations and routings, operational steps and monitoring of processes.

Once products are shipped, manufacturers provide support operations, such as replacement parts or technical support. For many companies, MRO and computerized maintenance management system (CMMS) solutions are a major part of operations.



Content produced throughout the product lifecycle

Figure 2. Content produced at each stage in the product lifecycle

These applications can produce vast amounts of content at each stage of the product lifecycle, as outlined in Figure 2. This can include customer information, contractual terms and conditions and detailed pricing of components. Project management creates content including project schedules and deliverable requirements, bills of materials (BOM), specifications, CAD model developments and engineering change management, simulation results and shop drawings.

Procurement, inventory inspection and manufacturing activities produce content including vendor specifications and deliverable requirements, inspection documentation, tooling and associated instructions, manufacturing processes, and for suppliers, the production part approval process (PPAP) documentation.

The manufacturing process produces content such as simulation and inspection results, test output, acceptance criteria checklist and certifications. Once a product is delivered and in use, a wide range of associated artifacts are required, including maintenance documentation, field operations manuals, problem reporting and work orders.

Silos, silos and more silos

Throughout the product lifecycle, information is spread across a collection of silos divided across on-premises and cloud-based solutions. Manufacturers must ensure that information is accurate and current while maintaining process continuity and understanding relationships between business items.

These challenges directly impact topline profitability and are typically characterized as the “cost of quality” (CoQ). CoQ really means “profit leakage.” It is manifest by incorrect product orders, return on shipments, delayed deliveries, scrap and rework and expedited delivery expenses.

Studies have shown that the CoQ for manufacturers, especially as unique order requirements increase (for example in built to order or engineered to order companies) represents approximately three to 10 percent of a manufacturer’s overall revenue. If a company generates \$100 million, the estimated CoQ is at least \$3 million.²

The indirect impact is on the human capital spent on what might be referred to as “intervention management.” To circumvent disconnected content, individuals spend time developing their own tracking systems and sophisticated spreadsheets, chasing down the status of activities across different departments and mitigating fallout from decisions made based on incomplete or inaccurate data. Siloed data’s impacts extend to a company’s reputation, personnel stress, burnout and job dissatisfaction.

The opportunity

Today’s enterprise content management (ECM) platforms are ideally positioned to serve as a single, unifying repository for all release product data. They provide the digital thread that brokers siloed information between any stage and any business unit and automates the sharing and collaboration of documents.

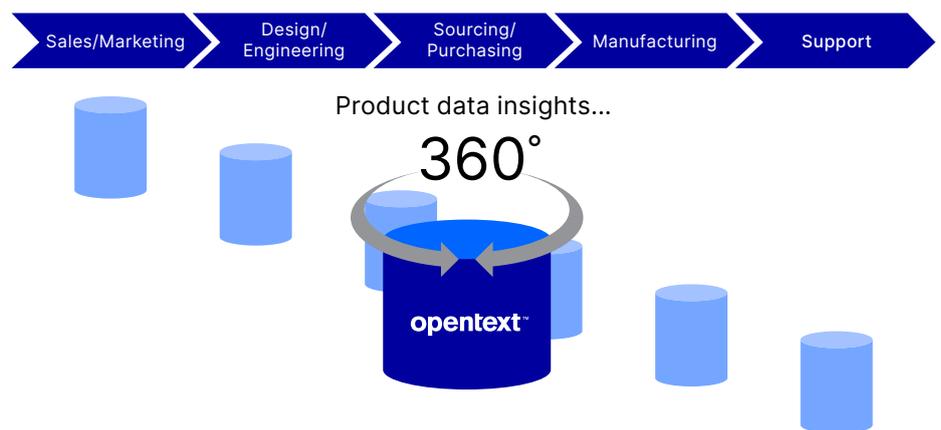


Figure 3. 360-degree secure view of product data

² McKinsey & Company, The social economy: Unlocking value and productivity through social technologies. (2012)

📄 Solution: Digital Thread
for PLM

📄 Product: OpenText™
Extended ECM

ECM is a key part of any organization's information management strategy, connecting information from across the enterprise with the people and systems that need it. ECM drives personal productivity with simple, intuitive tools and user experiences and process productivity through full connectivity with lead applications such as SAP® and Microsoft.

ECM platforms can readily manage various artifacts and their relationships, provide secure and appropriate access, support governance and retention management overlays and enable access through any browser. This single repository provides a 360-degree view of product data that is automatically collected from the different applications used in the product lifecycle.

An alternative to leveraging ECM can be found with earlier initiatives referred to as master data warehousing or in more recent years, an approach referred to as data lakes. The theme is to establish a single pool of data derived from multiple sources of data. However, this construct has typically been in support of reporting and data analysis requirements as opposed to the easy consumer access and back-end file management functionality associated with ECM platforms.

Conclusion

A significant opportunity exists for manufacturers to enable unified access to product data, documents and drawings. By leveraging proven ECM capabilities, coupled with a Digital Backbone, data governance best practices and the orchestration of change processes and synchronization across multiple applications, enterprise users and consumers can readily find, access and collaborate with product data and related content.

This can be achieved without disrupting employees' work or displacing existing applications. The technology is here today and leverages out-of-the-box capabilities, minimizing extensive and lengthy implementation efforts and costs.

Liberating released product data and content in a controlled and sustainable manner for users and consumers across the enterprise will be a mandatory requirement for manufacturers to remain competitive and profitable in an ever-changing global economy.

About OpenText

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