DASSAULT SYSTEMES

SOLIDWORKS

CHAPTER ONE

INTEGRATED DESIGN-TO-MANUFACTURING SOLUTIONS

LOWER COSTS AND IMPROVE QUALITY

CHAPTER ONE

THE ADVANTAGES OF DESIGN AND MANUFACTURING INTEGRATION

BRINGING DESIGN AND MANUFACTURING TOGETHER

One of the single best decisions you can make to accelerate your product development process while lowering cost and improving quality.

Success in today's global market requires more than creative and innovative products. Products must also offer the features customers want to buy. At the same time, to be profitable, you must be able to design and manufacture products economically. Yet, time is of the essence and all this must be accomplished ahead of the competition. To survive in today's global economy and create a competitive advantage, ensuring quality while controlling costs is a must. Simply put, you must define WHAT you will build and cost-effectively manage it all the way through HOW you build it.

Achieving these goals requires the coordinated efforts of all those involved in product development, from concept to delivery. Processes must be streamlined to eliminate the hiccups that often occur when designs are passed from one phase to the next. One of these potential disconnects occurs between design and manufacturing. This is a result of the disparate tools used and the lack of a common, unified platform through which design participants can collaborate, problem-solve, and communicate.

This eBook will unveil how adopting an integrated design and manufacturing solution enables concurrent engineering, which helps companies make the seamless transition from design to manufacturing. With a unified platform, there will be less miscommunication between teams due to tools that require translation to communicate, resulting in a loss of information, all of which translates to boosted productivity, reduced costs, and higher-quality products. Research finds that concurrent engineering leads to a 20 to 90 percent reduction in time-to-market, up to 75 percent less scrap and rework, up to 40 percent lower manufacturing costs, and 200 to 600 percent higher overall quality.[1]

Simply put, you must define WHAT you will build and cost-effectively manage it all the way through HOW you will build it.

CONSIDER WHAT'S REQUIRED TO MAKE PRODUCTS COMPETITIVE

Ensure a balance of performance, innovation, quality, cost, and time.

In today's very competitive global economy, it is increasingly difficult to stand out from the competition. Figure 1 shows the top ways companies differentiate their products. What's especially interesting is that it is no longer enough to just focus on one aspect. To stay ahead of the competition, products must have excellent performance, be innovative, and offer high quality. Balancing this is hard, especially because these goals often conflict with other business criteria. Too much focus on product differentiation might put schedules at risk and drive up costs. Not enough, and competitors may steal market share.

With this in mind, it is important to take advantage of opportunities that will streamline processes. This will give you more time to focus on differentiation and get to market sooner. Or, you can concentrate on quality issues that hurt product reputation or drive up costs. Integrating engineering and manufacturing is one of the best ways to achieve all of this. It can help you lower costs, improve quality, and get to market sooner. As a result, you can win over customers, bring in more revenue, and boost profitability.

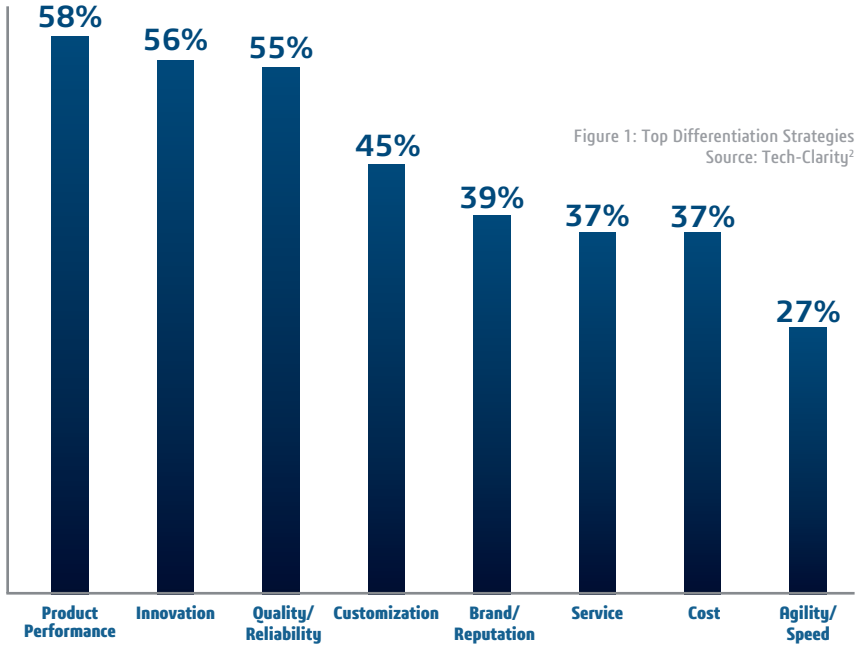


Figure 1: Top Differentiation Strategies
Source: Tech-Clarity[2]

USE DESIGN AND MANUFACTURING TIME EFFECTIVELY

The sooner you find problems, the better.

Numerous studies have shown that design decisions have a significant impact on production costs and product quality.[3] By the end of the design phase, you've determined 70 to 80 percent of the final production costs and 80 percent of the work impacting product quality[4] (Figure 2). On top of that, the further along you are in the development cycle, the more expensive it becomes to make changes (Figure 3). As the design evolves, more of it is locked in and there are dependencies across components. This means even small changes can impact multiple components and before long, they become extremely complicated. Once you order steel and have tooling in place, the cost implications for small changes skyrocket. At this point, you quickly get to the point where any change means costly scrap and rework.

With this in mind, if manufacturing doesn't have insight into the design until after design release, options to improve manufacturability are very limited. Changes become far more difficult and costly. However, with those design decisions impacting 80 percent of production costs, you could be missing lots of opportunities to save cost and improve quality. In addition, any problem found on the production floor becomes extremely costly to correct. To avoid this, engineering and manufacturing teams need to collaborate. In fact, when they do not, it often comes at a significant cost to the company.

Figure 2: Up to 80% of Product Costs Locked in at Design | Source: Dowlatshani[5]

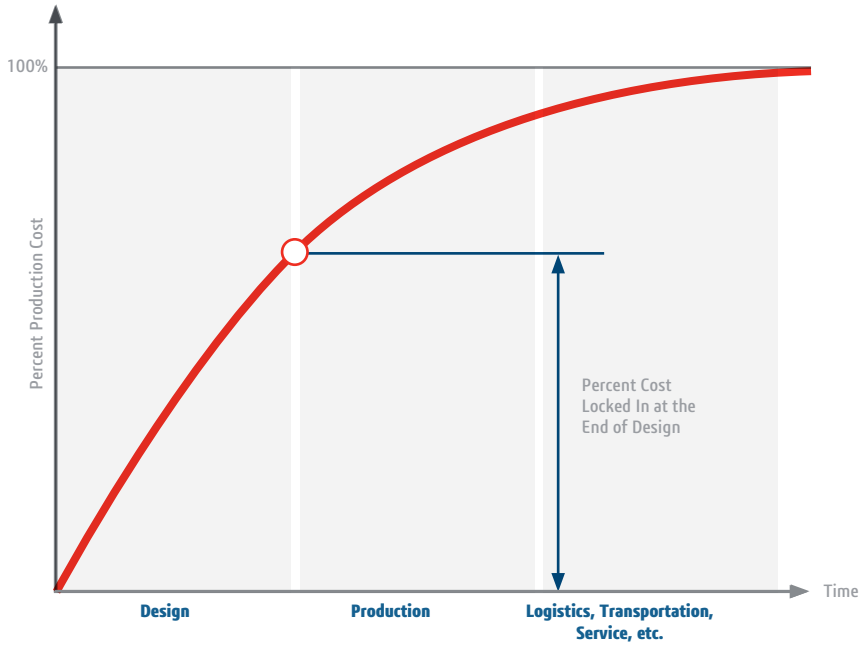
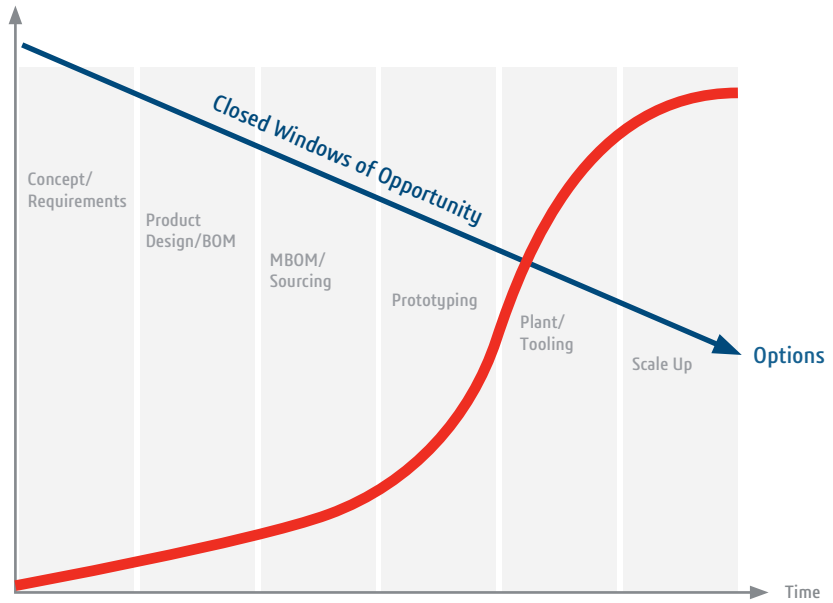


Figure 3: Closing Window of Opportunity for Changes | Source: Tech-Clarity[6]



COST OF POOR COLLABORATION BETWEEN ENGINEERING AND MANUFACTURING

Why create a competitive disadvantage?

While collaboration is important, it is also abstract, so it's difficult to measure its cost. However, when engineering and manufacturing operate in silos, problems arise and there are bottlenecks. Figure 4 shows the business cost of poor collaboration.

The very nature of releasing design data to manufacturing requires collaboration. Engineering and manufacturing must be able to share and exchange design information. Usually that data needs to be imported and repaired, which is not only tedious and time-consuming, but the translation process can introduce errors.

Any design problems found during production can cause further delays. Perhaps there isn't enough clearance to drill a hole or maybe tolerance stack up has caused a misalignment with the mounting holes. Whatever the problem, it takes time to come up with a solution. This puts schedules at risk and can delay time-to-market. On top of that, bad parts need to be scrapped or reworked, adding even more cost.

Involving the engineering department in the solution adds to development cost and takes them off other work, hurting productivity and potentially delaying new projects too. To minimize delays and cost, the fix will often be whatever is quick and easy. Unfortunately, that may hurt quality, which can hurt market success and may mean lost revenue opportunities. Extended delays may give competitors time to beat you to market and steal market share, further hurting your revenue potential.

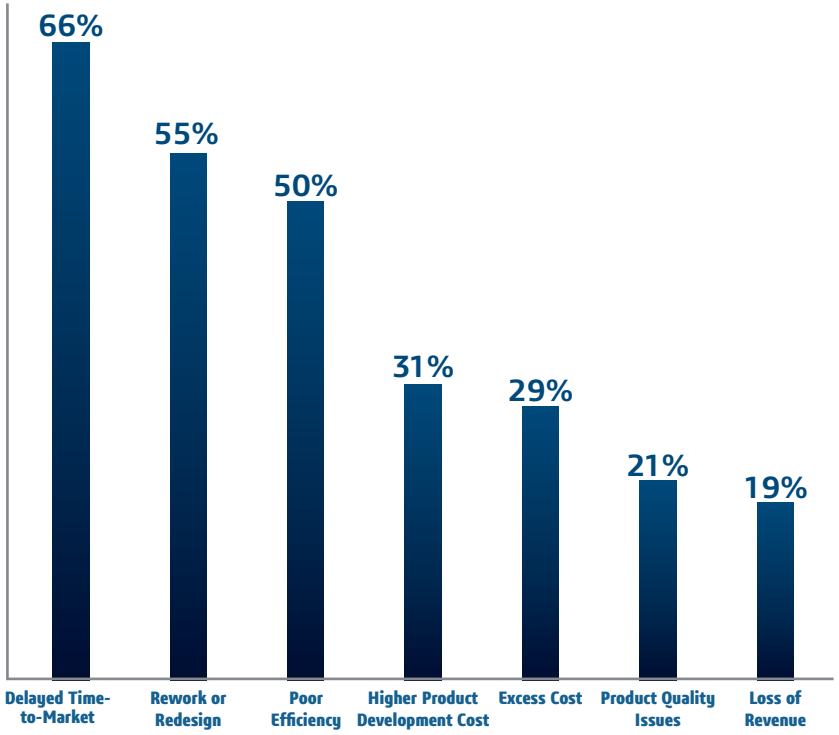


Figure 4: Top Impacts of Poor Collaboration | Source: Tech-Clarity[7]

By supporting better collaboration between engineering and manufacturing, you can greatly reduce the risk. You can avoid much of this cost just by finding these problems earlier. To make this possible, you must overcome some obstacles.

WHY IS COLLABORATION SO HARD?

Integrate engineering and manufacturing to enable better collaboration.

While collaboration between engineering and manufacturing is important, the lack of integration of software tools across the organization creates a fundamental barrier. Unfortunately, it's so common, it is the top challenge of today's engineering environments (Figure 5).[5]

Manufacturing planning typically involves translating and converting design data to production information, such as NC toolpaths. Plastic parts are especially problematic because they involve multiple translations to design the mold core and cavity, bring in the mold base, and then create NC toolpaths. Each translation involves importing and repairing data that eats up valuable time. Then, every time the designer introduces a change, the cycle of importing and exporting information begins again.

Segregated engineering and manufacturing systems create a host of problems. Not only do those data translations add extra steps, they can also introduce errors. In addition, you now have to determine which system holds the "master" representation. Plus, maintaining and training people on multiple systems is expensive.

The result is many missed opportunities for improved efficiency because colleagues can't work concurrently. They have to wait until one process is complete to begin the next. With any change, downstream work, such as tooling and fixture creation, inspection documentation, shop floor assembly instructions, in-process drawings, and NC toolpath data, has to be completely recreated or updated manually. Either option is time-consuming and often error-prone.

The good news is you can avoid these challenges by integrating design and manufacturing systems.

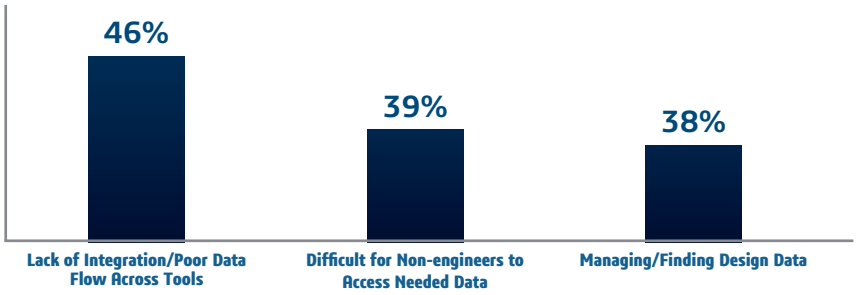


Figure 5: Top Impacts of Today's Design Environments | Source: Tech-Clarity

"The improvements to our product development process that SOLIDWORKS® has enabled us to achieve, has helped us to support growth of more than 500 percent."

— Jorge Smart Cruz Arenal,
Director General, DCF Mexicana, S.A. de C.V.

When you integrate design and manufacturing systems, changes from design propagate automatically to manufacturing, so you can incorporate last-minute design changes and minimize the need to push out delivery dates.

Figure 5: Process Comparison

INTEGRATE DESIGN AND MANUFACTURING SYSTEMS

Provide a collaborative platform that enables faster and easier sharing of manufacturing data.

By integrating design and manufacturing systems, the teams can share design information seamlessly and avoid the excess costs, delays, and quality issues that arise with poor collaboration. Benefits of an integrated platform:

- Accelerate time-to-market by 20 to 90 percent, catch problems sooner, reduce scrap by up to 75 percent, and lower manufacturing costs by up to 40 percent, by enabling concurrent design and manufacturing.
- Save time by avoiding the need to import/export/repair model data.
- Avoid errors introduced during data translation.
- Lower software maintenance costs due to fewer systems and reduced training.

You accomplish this by integrating a manufacturing software application (e.g., mold design software, quoting software, inspection software, and 2D and 3D CAM software), with product design (CAD) software.

An integrated design-to-manufacturing system allows all departments to use the same software system, eliminating the need for data translation. Plus, you can easily make late design changes without significant impact on product delivery. Because changes propagate from design to manufacturing, you can incorporate last-minute design changes and minimize the need to push out delivery dates. So if you must make last-minute changes—for design, competitive reasons, new features, or to accommodate manufacturing or industrial designers and stylists—you are covered!

An integrated system enables designs to move seamlessly back and forth between design and manufacturing, facilitating a collaborative workflow (Figure 5).

By working collaboratively, you can catch problems impacting manufacturability much sooner, avoiding excess cost and wasted time. This way, companies can focus more of their energy on the qualities that will make products more competitive.

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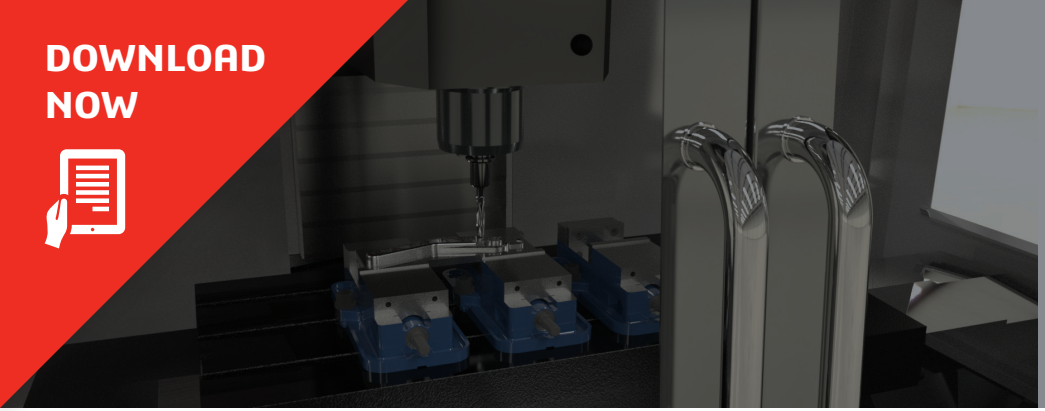

Don't miss the next eBook in our *Integrated Design-to-Manufacturing Solutions with SOLIDWORKS* series.

CHAPTER 2

YOUR COMPLETE 3D DESIGN SOLUTION

Now that you've seen the tremendous advantages of integrating your design and manufacturing processes and teams, be sure to download the next eBook in the "Integrated Design-to-Manufacturing Solutions" series. It will describe how you can design exceptional products with SOLIDWORKS solutions, while also bridging the gap between your design and manufacturing teams.

Learn more about how SOLIDWORKS solutions can take you from design to manufacturing by visiting http://launch.solidworks.com.

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Americas
Dassault Systèmes
175 Wyman Street
Waltham, Massachusetts
02451-1223
USA

Europe/Middle East/Africa
Dassault Systèmes
10, rue Marcel Dassault
CS 40501
78946 Vélizy-Villacoublay Cedex
France

Asia-Pacific
Dassault Systèmes K.K.
ThinkPark Tower
2-1-1 Osaki, Shinagawa-ku,
Tokyo 141-6020
Japan