



# The Design-to-Cost Objective for Engineering Teams



An Alternative Product Cost Management Method to Optimize Efficiency

# INTRODUCTION



## Engineering design teams have the greatest potential to reduce costs in the product development process.

Engineering teams are committing product costs in the design process, but traditionally don't pay tons of attention to them until they come back in the form of a manufacturing quote. When using the design-to-cost method, engineers consider product cost as design parameters from the beginning of development.

In this ebook, we will explore the design-to-cost method and how it's a significant opportunity for engineering teams to make an impact on the product development process — saving time and resources for themselves, the organization as a whole, and the end consumer.

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# THE DESIGN-TO-COST METHOD

## Product Cost Management Basics



### Is design-to-cost the same thing as target costing?

These methods are very similar, but have a few key differences.

- 1 Target costing can refer to an all-encompassing approach (including post-production costs), but design-to-cost focuses specifically on the design phases of product development.
- 2 Unlike target costing, the goal of design-to-cost is not to reach a specified cost number. Design-to-cost is instead about treating product costs as an important design element and not an afterthought.

<sup>1</sup>NPDSolutions. [Achieving Target Cost/ Design-to-Cost Objectives.](#)

Traditionally, products are designed following certain requirements (schedule, feature scope, etc.). When the first phases of design and development are complete and those requirements are met, the prototype is sent to materials suppliers and manufacturers for cost estimates.

**Design-to-cost** is an alternative product cost management method that incorporates cost as one of those initial requirements. When using design-to-cost, engineers treat product costs as important, foundational parameters in a product's design, just like they would with feature requirements.

### How Design-to-Cost Affects the Product Development

In traditional product costing, if manufacturer cost

estimates are too high to build into the price, the product will be sent back into development. Engineers will be tasked with changing aspects of the design (removing unnecessary parts, reducing the complexity of features, finding alternative materials, etc.) to make the product cheaper to produce. Once the product design attributes finally meet the desired cost estimates, it will be sent on to production.

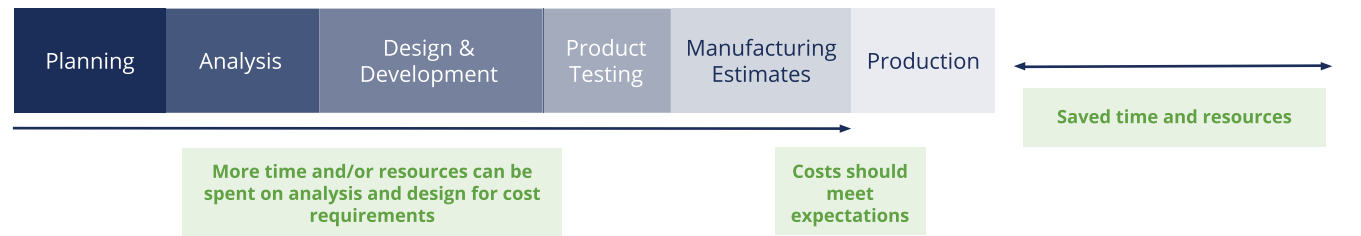
Design-to-cost seeks to avoid this kind of rework by taking product costs into account from the beginning of the product development process, hopefully, to meet cost requirements the first time<sup>1</sup>. What impact does this have? Initial phases of the process may take longer with added cost analysis and design work, but ultimately less time and resources overall.

### The Effect of Design-to-Cost on the Product Development Process

#### Traditional Product Cost Management



#### Design-to-Cost



# THE DESIGN-TO-COST OBJECTIVE FOR ENGINEERING TEAMS



## Does design-to-cost provide value to customers?

**YES!** The design-to-cost method saves time and resources for product development teams, but it doesn't stop there. These savings are passed on to organizational stakeholders as **reduced project budgets** and **faster time to market** and are ultimately reflected in **lower prices for end customers**.

The design-to-cost method might sound like something that concerns leadership teams or project management. In fact, the design-to-cost objective falls squarely into the category of engineering design. As mentioned previously, design-to-cost is all about considering costs early in product development, specifically in the design stages as the name indicates. However, the implications are greater than that:

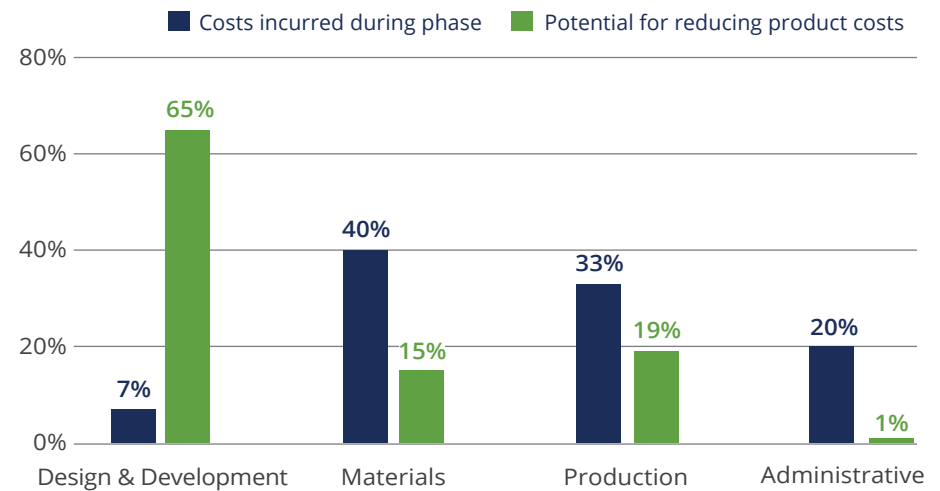
**About 85% of a product's costs are committed by the time it reaches the testing phase.<sup>2</sup>**

Meaning, the large majority of a product's costs are decided during planning, analysis, and especially, design. The remaining costs left to manipulate such as suppliers and manufacturers, overhead, and administrative only make up the remaining ~15% of total product costs. Optimizing those costs will only go so far. So if projected costs are too high, the product either has to risk a prohibitively high price or it must go back for further analysis and design work. This gives engineering design teams a major incentive to consider costs the first time through the process.

**The design and development phase only accounts for 7% of the total product cost but can be responsible for 65% of the potential decrease in costs.<sup>3</sup>**

While the majority of product costs are committed based on decisions made during design and development, the design work itself is a relatively inexpensive stage of product development (only 7% of total costs). Most of the committed cost decisions surface in production and administrative phases that follow. However, engineering teams can have the biggest impact on the design-to-cost process by holding 65% of the potential to lower costs through better analysis, foresight, and design techniques.

## Product Costs in Different Phases and Their Reduction Potential



Source: "Designing to Cost," Concurrent Engineering

<sup>2</sup> NPDSolutions. [Achieving Target Cost/ Design-to-Cost Objectives](#).

<sup>3</sup> Mahendra Hundal. "Designing to Cost," Concurrent Engineering, 1993.

# IMPLEMENTING DESIGN-TO-COST



## Does design-to-cost mean giving up on quality?

The goal of design-to-cost is not to find the cheapest ways to design a product. It simply puts the same level of importance on product costs as other design requirements. Quality can be maintained and costs lowered by using more efficient design techniques.

## What does design-to-cost look like in practice?

There isn't one set process for implementing design-to-cost. Engineering teams will need to figure out how best to use the design-to-cost method based on their resources, environment, and of course, the product they're designing. That said, there are common aspects of the design-to-cost process that all engineering design teams can consider.

Here's an overview of what implementing design-to-cost generally entails<sup>4</sup> for most design teams:

- Understanding upfront what customers can afford.
- Researching the market and determining a competitive pricing structure.
- Commitment to budgets and a design-to-cost mentality.
- Managing and considering costs as an important design parameter along with features, scheduling, etc.
- Understanding product cost indicators and considering these when establishing product specifications.
- Product cost modeling and projections early in development to help with design decisions.
- Exploring alternative and creative design techniques, often through training, to develop lower cost options.

- Using value analysis to understand which functions are essential and which could potentially have costs reduced.
- Adopting Design for Manufacturing techniques and ways to anticipate downstream costs and delays.
- Continuous improvement of design skills to increase product value and design-to-cost considerations over time.



<sup>4</sup>NPDSolutions. [Achieving Target Cost/ Design-to-Cost Objectives.](#)

# IMPLEMENTING DESIGN-TO-COST



## Looking at Cost Indicators

It's easy to say that design teams need to consider costs when developing products, but knowing where to look for cost indicators — and then, how to optimize for them — is a more advanced task.

As with implementing the design-to-cost process, **cost indicators**<sup>5</sup> will vary for each team and product. To give you an idea, here are a few key cost indicators to start looking for in your design phase:

## Common Product Design Cost Indicators

### Materials

Find the sweet spot between performance and cost. Plus, consider availability and manufacturing restraints.

### Tolerance Specification

Determine which tolerances are critical, essential, and desirable tolerances to minimize costs.

### Assembly Components

Use fewer, complex components instead of many small ones to reduce assembly issues and related costs.

### Design for Manufacturing

Using DFM techniques can ensure your product will be ready to manufacture and can help avoid rework.

### Packaging & Logistics

Consider how the finished product will be packaged and delivered to customers. Weight, size, and risk of damage can all add costs.

### Safety Features

Safety features are sometimes “over-designed” and add costs. Find ways to meet safety requirements while still being efficient.

<sup>5</sup>SOLIDWORKS Tech Blog. [Design for Cost — Staying Competitive in Today's World Market](#). Nov 2016.

# HELPFUL DESIGN-TO-COST TOOLS



Our [SOLIDWORKS Costing E-Guide](#) can help you get started calculating your design's manufacturing costs with real-time quotes!

It makes sense that the team controlling design decisions should also be in control of cost decisions, but this can be a shift for engineering teams that are used to relying on estimates from manufacturers. There are a couple of key tools that can help you get design-to-cost objectives underway.

## 1 Use cost data and cost modeling tools.

Determining product costs during the design phase shouldn't be a guessing game! Invest in cost modeling tools and work with materials and manufacturing partners to get accurate cost information before formally requesting a quote. Some CAD software, like SOLIDWORKS, have costing tools built-in.

## 2 Work with cost engineers.

Don't be afraid to rely on the experts, whether that's an in-house cost engineer or an external consulting firm. Their knowledge of downstream costs can supplement your design team's skills.<sup>6</sup> The value a design-to-cost strategy can bring to an organization over time makes investing in expert advice worthwhile.

## 3 Boost design skills with training.

Online courses in engineering will boost efficiency, productivity, and design intent on your team. On-demand video courses enable designers to learn while they work and implement more cost-effective design features on the fly. Plus, they can gain a deeper knowledge of what to

expect and how to communicate downstream, giving them greater foresight when designing for manufacturing. This is the easiest way to give your design team a leg-up on a design-to-cost objective.

## Key Engineering Courses for Design-to-Cost

- CAD software for all skill levels (SOLIDWORKS, AutoCAD, Autodesk Inventor, etc.)
- GD&T
- Design for Manufacturing
- Engineering Graphics and Spatial Visualization
- 3D Printing
- FEA

A little extra time spent training on key design skills, analyzing cost data, and even working with design-to-cost experts will result in more saved resources and less rework down the road.

<sup>6</sup>Rick Burke, aPriori. [Strategies for Successful Design-to-Cost Initiatives](#). Oct 2016.

# ABOUT SOLIDPROFESSOR



SolidProfessor is an online learning platform for engineering design, product development, and skilled production teams. Our Library includes 5,000+ on-demand video lessons in CAD, CAM, BIM, engineering methods, and more. Joining SolidProfessor as a team can be integral to implementing design-to-cost methods.

**In addition to full Library access,  
SolidProfessor Team memberships include:**

- Guided Learning Paths and 100+ Technical Certificates
- Dedicated onboarding support
- Customizable training programs and assignments
- An admin dashboard with reporting and progress tracking
- The opportunity to preserve your team's tribal wisdom with knowledge capture

## Contact us to get started

Find out how SolidProfessor's online learning platform can help your team improve design efficiency and reduce costs. Get in touch to learn more and schedule a free demo.

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