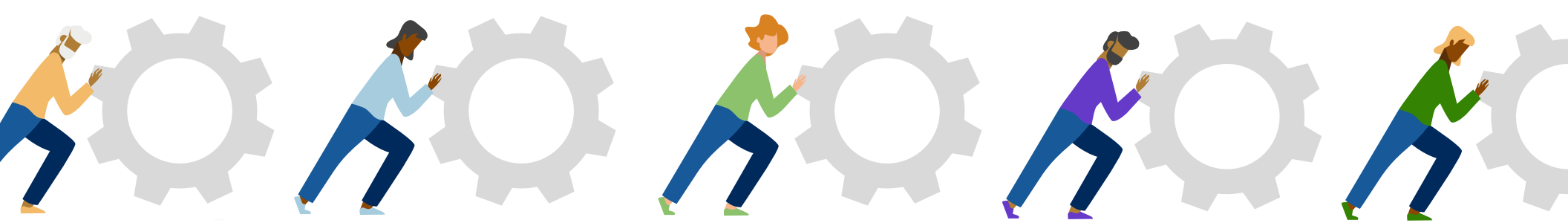
# SMART MANUFACTURING IN INDUSTRY 4.0

## How to Close Skills Gaps & Set Your Workforce Up for Success

# Table of Contents



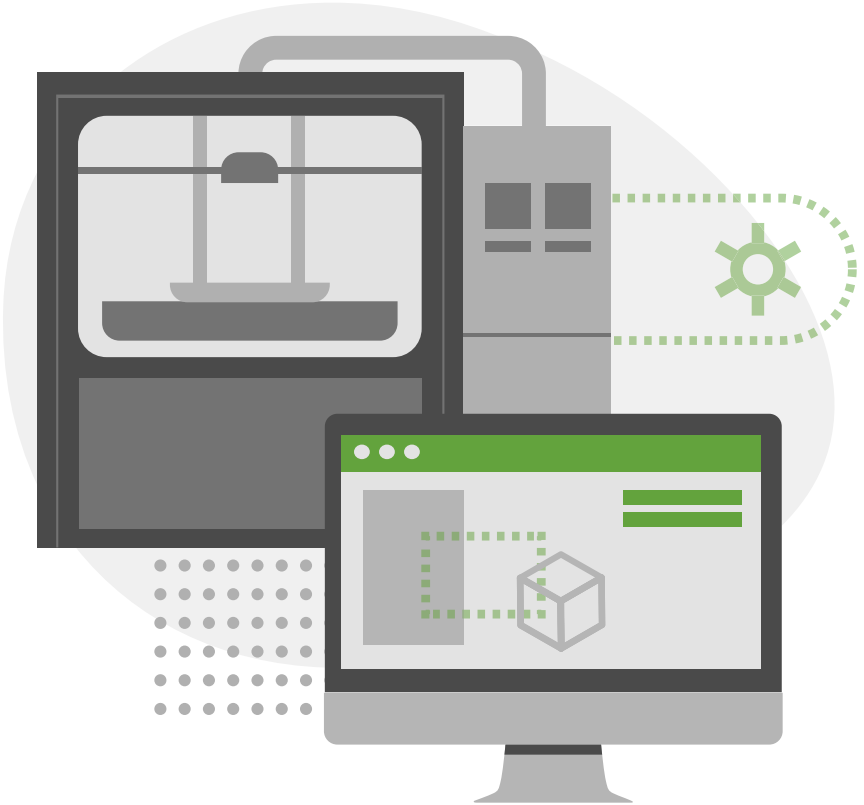


# Introduction

What do all industrial revolutions since the 1800s have in common? All were powered by new technology — from the steam engine to the assembly line to the internet. They not only challenged the modern workforce but revolutionized how products were made and work was done.

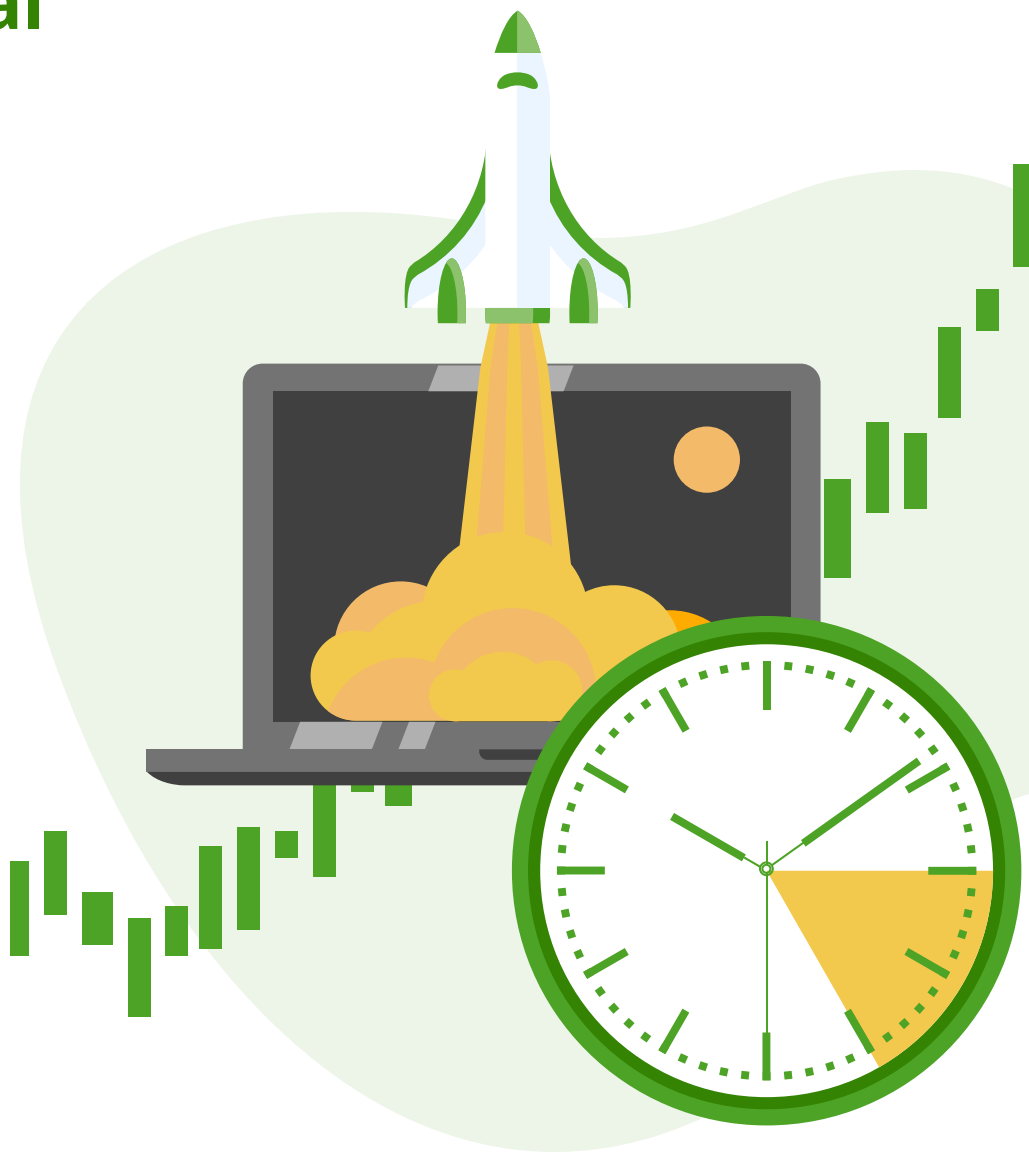
With the fourth industrial revolution underway, organizations are faced with the difficult decision of going all in or getting left behind. In fact, recent CEB research showed 87% of senior business leaders cite digitization as a priority for their company, and 66% fear failure to digitize will jeopardize their competitive position[1].

As the conversation turns from "should we?" to "how do we?" there are still a lot of lingering questions, especially as digitization causes skills gaps to widen. And with that, the search for well-rounded talent becomes increasingly difficult.



[1]IndustryWired. Why Digital Transformation is Imperative for Business Success. 2021.

# The Evolution of Mechanical Engineering Skill Sets



## Mechanical engineers then & now

Let's start by looking at how much mechanical engineering roles have changed. Mechanical engineering dates to the 5th millennium BC with the invention of the wheel and axle. It has since grown into a field specializing in the production and design of automobiles, aerospace technology, biotechnology, computers, electronics, microelectromechanical systems, energy conversion, robotics and automation, and equipment.

Today, mechanical engineers are largely responsible for the research, planning, design, development, testing, and continuous improvement and redesign of new and existing products, machines, and tools.

Read on for a glimpse at what that workflow looks like at each level now and how it's expected to change in the future.

## The current mechanical engineering workflow

The bulk of the mechanical engineer's work currently happens in the design stage.

**Level 1** focuses on product/process development and implementation with periodic touch points involving manufacturing engineers and machinists to understand processes, suitable manufacturing methods, and to produce prototypes while collecting feedback and identifying opportunities for improvement in all these areas.

**Level 2** handles strategy planning, research and development, design, process development, and production expansion with similar touch points mentioned in level 1.

**Level 3** identifies needs, new opportunities and continuous improvement while handling product definition and planning. This includes everything from specifications and concepts to prototyping, testing, redesigns, and after-sales service with similar collaborative opportunities mentioned in levels 1 and 2.

While future-state workflows are expected to follow similar steps as the current-state workflows we've laid out here, industry 4.0 technology knowledge and skills will far exceed current skill sets—and sooner than you think. The velocity at which these workflows are completed will be greatly accelerated through converged platforms, connected workflows, and cross-functional collaboration.

## Current skills and technologies used:

- **Computer aided design (CAD)**
- **Analytical software such as Matlab and Minitab**
- **Enterprise resource planning (ERP) software**
- **Programming tools**
- **Financial analysis software**

# Mechanical engineering roles of the future

As digitization continues to rapidly change the role of a mechanical engineer, in the next 5-10 years, we'll see more engineers lead strategic efforts to improve and adopt advanced manufacturing techniques and processes.

> **Engineers will need to know enough to determine how to apply technologies like AI/ML to improve automation results and adopt smart manufacturing practices like programming production lines, managing distributed manufacturing locations, and deploying real-time production monitoring systems.**

The goal, of course, is to design and implement systems that improve time-to-market and reduce cost, waste, and defects simultaneously. The future mechanical engineer will oversee finding the right resources in search of efficiencies — across the workforce and production machinery, including robotics, additive manufacturing, and digital twins, using data analytics and visualization.

## Did you know?

Understanding PDM workflows and operations can help engineering teams learn how to better collaborate on files and data.

Check out this course on SOLIDWORKS PDM.

# Setting Your Workforce Up for Success

## A new scope of work

In finding new ways to boost the product lifecycle, mechanical engineers will increasingly rely more on digital tools and technologies that:

- **allow them to make higher-quality products more efficiently,**
- **and react more quickly to shifting consumer demands.**

The skills mechanical engineers will be required to have will expand far beyond the traditional scope we know today. For example, you can expect responsibilities to include things like designing with electronics and enhanced product modularity/personalization. Think like Legos and how they contain elements that can easily be assembled and reused to develop different finished products. Knowing this, the search for well-rounded engineering talent will continue to become more difficult. Skills gaps are already widening.

Let's turn our attention to the skills you should be looking for in the fourth industrial revolution.

**Simulation & FEA** are great tools for staying competitive in the industry. Online courses can help your team learn these new skills:

SOLIDWORKS Simulation Professional

SOLIDWORKS Simulation Premium - Dynamics

SOLIDWORKS Simulation Premium - Nonlinear Analysis

# Skills to look for and build on

It's no secret the industry is often faced with large gaps between required skills and candidates' skill sets. And with the skills gap expected to widen as manufacturing firms accelerate their digital transformation, employers are increasingly looking for more advanced computing and data analysis skills. All this to say, the ideal mechanical engineer of the future could look a lot like:

## Hard skills

**knowledge and capabilities required to perform explicit job duties**

- Generative design
- AI/ML for product development
- Design for manufacturing (DfM), including knowledge of the subsequent manufacturing processes (for engineers involved in the design phase)
- Knowledge of coding
- 3D modeling/design with a focus on aesthetics
- Data analytics and visualization
- Prototyping
- Engineering simulation and digital twin simulation

## Soft skills

**interpersonal qualities like communication, collaboration, and problem solving**

- Creative problem-solving
- Collaboration as individuals/teams
- Communications (written/verbal)

## Interdisciplinary skills

**abilities for integrating knowledge across the different manufacturing functions**

- Experience with systems engineering
- Knowledge of electrical and software engineering
- A focus on sustainability

# Tools for the Modern Workforce

## Setting your workforce up for future success

> **They say a good handyperson is only as good as their tools, and the same goes for your employees' training.**

With the rapid expansion of mechanical engineer roles, getting your workforce up to speed and closing those gaps should be top of mind. But with all the learning curves that come with new software, processes, and skill sets, engineers increasingly need training where they can:

1. **Find answers quickly**
2. **Have access to resources on the go**

And just like the engineering industry, training and professional development have evolved with the digital age.

**Geometric Dimensions & Tolerancing (GD&T)** helps optimally control variations in manufacturing processes by using symbols to communicate design intent. Share these with your team so they can brush up on their skills:

Foundations in Dimensioning and Tolerancing

Fundamental Principles of GD&T

Applying GD&T Callout Types

Real-world Uses of GD&T

# It all starts with an effective training program

In recent years, online learning has largely taken the place of traditional instructor-led sessions — cutting costs and time spent in sessions while giving employees access to resources where and whenever they need to.

With that in mind, there are a few must-have tools for an effective training program:

**Video content**

helps attract attention and retain knowledge, allowing learners to immerse themselves in the course content without leaving their desk.

**Accessible support resources**

help your employees solve problems faster by revisiting course content and getting answers on the fly.

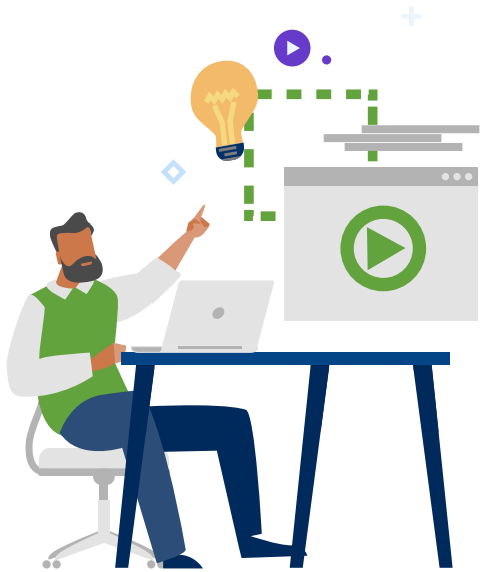
**A learning management system (LMS)**

allows your employees to learn at their own pace and convenience with limited dependence on an instructor. It also creates opportunities for customized learning programs.

The focus of online training is about speed and convenience.

> **Investing in an on-demand training solution is easily the best and most affordable way to get (and keep) your workforce up to speed in industry 4.0 and beyond.**

That little extra time spent training your team on new skills now sets your workforce up for less rework and better products down the road.



# About SolidProfessor

## For engineers, by engineers

SolidProfessor was founded on the idea of making engineering design knowledge more accessible and easier for everyone to learn — whether you're new to the field or an industry expert. We help engineering teams design the future with online training courses and on-demand resources.

### With SolidProfessor you get:

- 15,000+ video tutorials (3-7 mins. each) for SOLIDWORKS, PDM, Autodesk products, and more to train anytime, anywhere
- SolidProfessor SOLIDWORKS Add-in Tool to solve problems on the fly
- Customizable training programs for your team
- Admin dashboard and reporting tools to see how your team is progressing
- A Customer Success Manager dedicated to your account

### Ready to Get Started?

See why so many engineering teams choose SolidProfessor as their online training partner.

Log In to get stared.

www.solidprofessor.com
+1 (619) 269-8684
Facebook
X
LinkedIn