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Maximizing the potential of CAD technology in design & engineering

5 key considerations when implementing technologies to deliver on your design and engineering objectives

ASt Advanced Spatial technologies

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Introduction

The key challenge for design engineers is quality vs. time. In manufacturing, time is money. Profit cannot be realized until a product is in a customer's hands. Company leaders keep the pressure on employees to produce products at speed. In this context, design and engineering can be seen as a bottleneck.

Products can't be manufactured until they are designed and engineered; there is pressure to do this work quickly. However, there's no profit in products customers don't want or products that don't meet customer requirements.

This creates tension in design and engineering between making good decisions and making fast decisions. Everything that can be done to relieve design engineers of repetitive processes and free up their time for problem-solving is welcome.

Whether you are seeking to automate processes, reduce bureaucracy, or improve collaboration, digital tools will underpin your success.

However, simply buying design technology such as computer-aided design (CAD), product data management (PDM), or product lifecycle management (PLM) won't guarantee results. It's all about how you implement it.

In this guide, we'll present five key topics that will help inform your digital transformation strategy for design and engineering and ensure you get the results you require from your design technology.

About CAD managers

This guide is for CAD managers, PDM/PLM administrators, or IT specialists responsible for design and engineering software.

It's designed to address your unique challenges, ensuring that your technology will deliver on the promise of a more efficient and effective design and engineering function within your manufacturing company.

"CAD management isn't something you trained for; it's something you gravitated toward." – Paul Munford

Many companies don't have a formal position or title for people acting as CAD Managers; you are often on your own to determine your range of responsibilities. Too often, you are left to figure out the most effective use of design technology by trial and error.

Whether you are implementing new design technology or you've stepped up to improve the use of the technology you already have, we've provided these considerations and resources to help you realize the potential of your technology for design & engineering.

> " CAD management isn't something you trained for; it's something you gravitated toward."

Paul Munford -
CAD geek and Inventor enthusiast

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About CAD management

CAD management plays a key role in your company's use of design technology. If all company members have access to the CAD tools they need, know how to use them, and know how to process and pass on the data they create, you are doing well. If they are successful—you are successful.

> → **Autodesk Inventor: CAD manager fundamentals**
> From the Inventor help documentation, a guide to managing Autodesk Inventor for CAD Admins & Managers

The role is not clearly defined and varies from company to company. Some of the areas of responsibility for a CAD manager or PDM/PLM administrator may include:

- Keeping up to date with advances in design technology and contributing toward your company's technology strategy.

- Advising or directly administering the technology budget for your company's design and engineering technology strategy.

- Acting as the point of contact with software and hardware vendors for purchases, consultancy, licensing, training, and support contracts.

- Evaluating and advising on hardware, software, and network requirements to support CAD, PDM, or PLM users.

- Negotiating the number and type of required CAD, PDM, or PLM software licenses.

- Installing and licensing CAD, PDM, or PLM—or defining options for installation by an IT team, including migrating custom settings from previous product releases.

- Liaising with IT and other teams on how data from the design and engineering team will be managed and used across the company.

- Customizing CAD, PDM, or PLM tools based on company hardware, workflow, discipline-specific requirements, and CAD standards.

- Managing add-ins, plugins, or writing code to provide additional automation.

- Evaluating and integrating new features in the latest product releases or new technologies, such as the Autodesk Design and Make Platform.

- Backing up and migrating files and data to new releases.

- Providing training to users of CAD, PDM, or PLM.

- Technical support for engineering systems such as CAD, PDM, or PLM.

- Overseeing a design and/or engineering team directly.

- Acting as a project or product manager or team lead in design & engineering.

- Working directly on design and engineering projects/products.

5 key considerations:

What to consider when implementing technologies to deliver on your design and engineering objectives.

1. CAD standards, standard operating procedures, and training

A CAD standard is a set of guidelines that ensure consistency when creating, managing, and sharing technical drawings created using computer-aided design (CAD).

A CAD standard saves time by reducing the number of decisions needed to create a design model or set of drawings. A CAD standard outlines the required deliverables for the design engineering team's stakeholders and sets the expected quality. Implementing a CAD standard allows for the creation of templates, libraries, configurable parts and assemblies, and automations to reduce time spent on modeling and drawing creation, freeing up time for problem-solving. A CAD standard is the first step to benefiting from your design technology, and supports the definition of Standard operating procedures or 'SOPs.'

SOPs establish consistent workflows to ensure that no time is wasted reinventing everyday tasks. User training can be structured using the company SOPS, templates, and library files to encourage consistency of workflow and best practices and reduce the need to make decisions that don't contribute to problem-solving.

When standards and standard practices have been implemented, the foundations are in place to automate entire processes.

→ **Autodesk Inventor: Configure the Company Standard Styles using the Styles Editor**
From the Inventor help documentation, how to manage drawing styles using the Styles and Standards editor.

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CAD standards can include:

Graphical standards - e.g Drawing title blocks, line weights, line types, fonts etc.

Modelling standards - e.g Parameter and Feature naming etc.

Data standards can include:

Part & Drawing numbering.

Metadata for Bill of Materials (BOM) or parts list.

SOPS can include:

How to set up a new project

How to create a new part or assembly from a template

How to save a model or drawing

File naming for part, assembly, & drawing files

Design review.

Release workflow.

Change order workflow.

2. Libraries, templates, and configurations

What single feature caused traditional technical drawing to be superseded by CAD? Copy and paste. It's always easier to start a project by copying and editing an existing CAD model than by creating a new one.

However, copying and editing an old project that contains mistakes, errors, and omissions can lead to excessive time fixing broken models, rather than concentrating on solving design and engineering problems.

Your design team can reduce wasted hours on frustrating work by starting with clean, well-modeled, CAD standard-compliant templates, library components, or configurable designs that already contain the required metadata to automatically compile a BOM.

→ **Autodesk Inventor: Create Read-Only Templates for a Shared Server**
From the Inventor Help documentation, learn how to create Part and Assembly templates to eliminate repetitive tasks.

→ **Autodesk Inventor: Content center**
From the Inventor Help documentation, learn how to configure and customize the Inventor Content Center to support your design standards.

To get the best from your CAD tools:

· Use your CAD standard to build templates for models and drawings.

· Use your CAD standard to build library components containing required metadata.

· Use your CAD standards and library components to build configurable models that quick start new projects.

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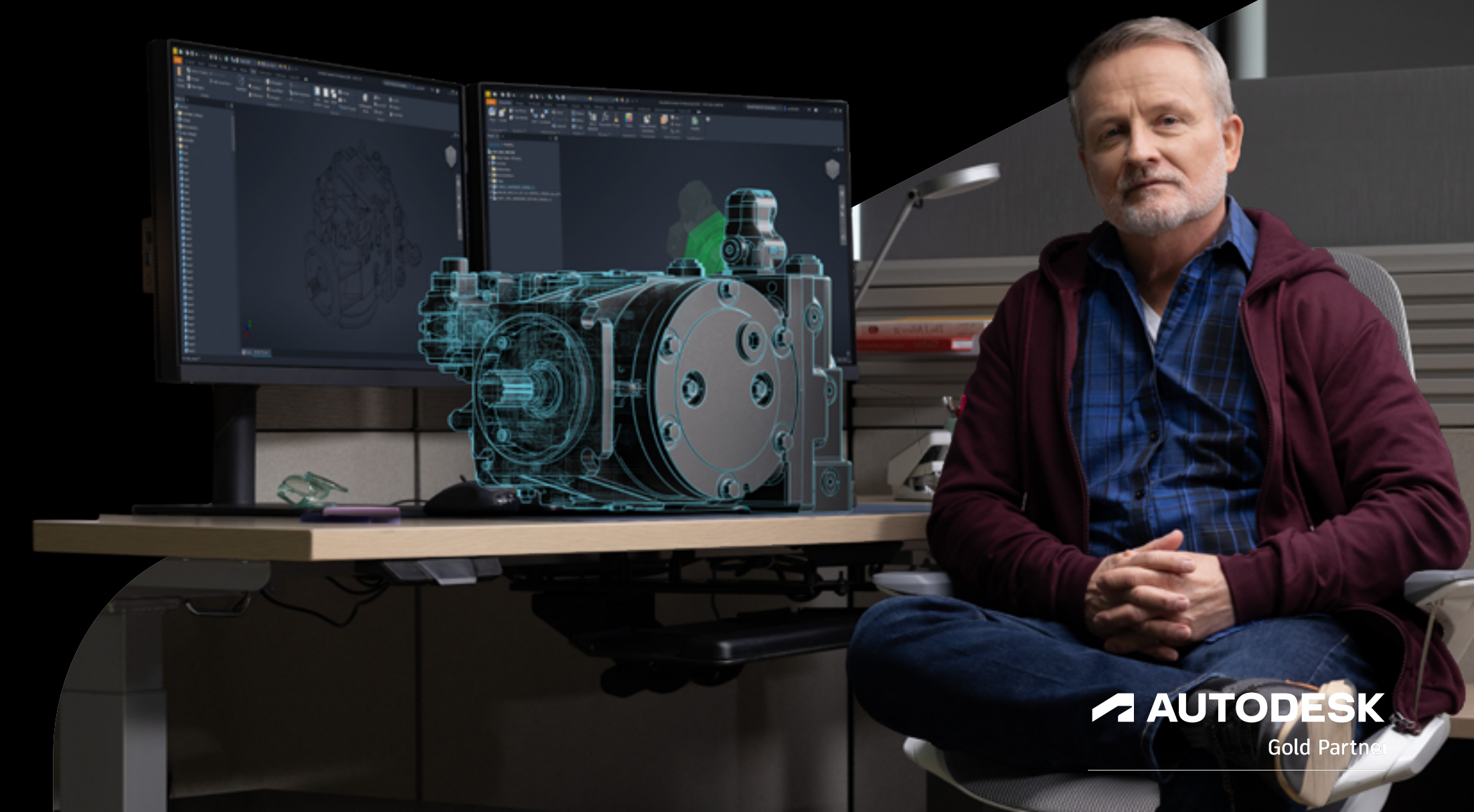
3. Data management

Are you working on the correct CAD file? How do you know? It's estimated that 20% of a design engineer's time is wasted working on out-of-date files or recreating lost data.

An advantage of CAD is the ability to collaborate on the same design in real time. However, concurrent design can be challenging when CAD files are managed manually.

Product data management (PDM) supports concurrent design and agile project management and reduces time wasted searching for the correct data.

PDM software can ensure the design engineering team uses the right templates and libraries for each project, manage workflows such as release to manufacturing or engineering change orders (ECOs), and prevent duplication of CAD files.

In addition to managing CAD files, PDM can provide secure, permission-controlled access to design and engineering data for colleagues outside the design and engineering team.

With permissions set by the PDM administrator, stakeholders such as procurement, manufacturing, logistics, and even external suppliers can access current design data without having to directly contact the CAD user who created it.

⊙ **Autodesk Vault: Administrator tasks**
From the Vault Help documentation, learn how to configure, manage, and automate your Vault installation.

To get the best from PDM:

· Decide how to group stakeholders and what permissions they need to view or edit CAD data.

· Map your standards for file and folder naming.

· Use your data standards to define metadata that you want to use to search your PDM for drawings, models, and engineering data.

· Map your workflows such as design review, release to manufacturing, or Engineering change orders.

4. Automation

Automation is an opportunity to reduce design time, increase capacity, and improve quality, freeing up time for the design engineering team to solve problems. However, a broken process cannot be automated.

The previous steps help prepare the way for automation.

- The CAD standard defines the required output.

- SOPs define what common processes are undertaken and how each process should be carried out.

- Templates and libraries reduce modeling time and maintain quality.

When these steps are in place, CAD managers can think beyond the software's standard features and begin to address the company's unique needs.

Every process frequently repeated by the design and engineering team can be evaluated for automation. Every choice a design engineer makes from concept to completed project can be considered. Can this choice be standardized and automated, or must it be made by a design engineer as part of the design process?

Start small with scripts that string together a series of commands or add rules to a design configuration. For inspiration on automation opportunities, find case studies and training material on AU online, or use the Autodesk Partner Finder to get support and expertise.
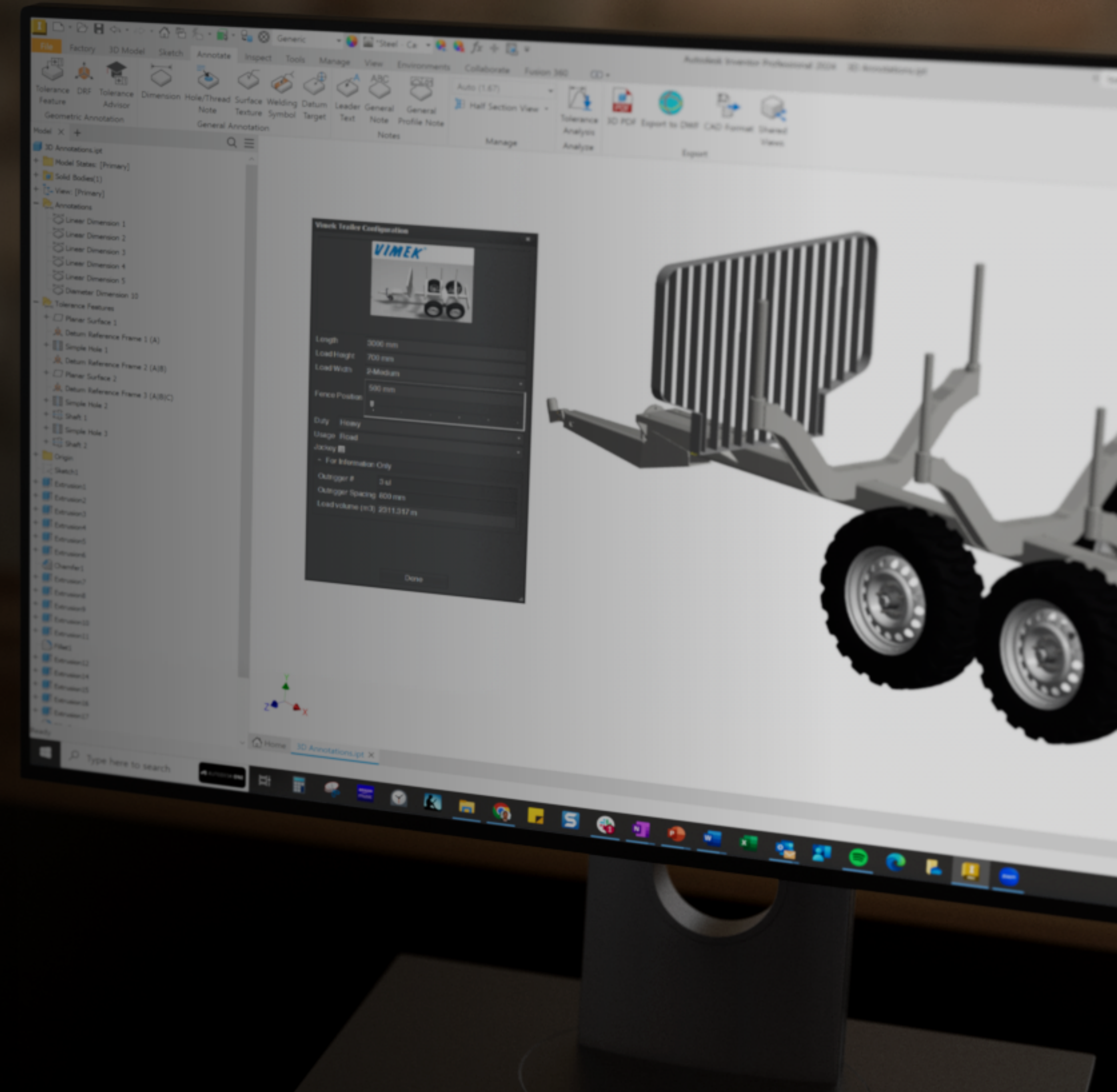
Automation APIs and services

Vault data standard is a customization layer that integrates custom business logic and rules into the file management workflow. Data standard can automate project setup, control template selection, regulate data entry, and improve compliance with SOPs.

Autodesk Inventor iLogic enables rules-driven design, running natively inside Inventor to standardize and automate design processes and configure CAD models.

Autodesk Inventor API, **Autodesk Vault API**, and **Fusion Manage API's** extend base functionality using standard programming languages such as Visual Basic, C++, C#, Python, Java, and REST. Use the APIs to write plugins, create standalone applications, or connect your business systems.

Autodesk platform services (APS) is a collection of cloud and desktop APIs that connect Design and Make data. The API's work across disciplines, industries, and file formats so that worlds as different as Inventor®, Revit®, and Vault can mesh with PowerPoint, SAP, and ChatGPT.

5. Connected data and digital transformation

It may be that CAD is seen as a commodity at your company. You already have it, you're already using it, and it's not seen as an area for new investment. It's considered part of the cost of doing business.

However, the design and engineering team remain the engine that drives product creation. The data that's created in design and engineering is used across the manufacturing process from sales and marketing to after-sales services. An opportunity exists to make better use of design and engineering data throughout the product lifecycle.

Many organizations experience rework, mistakes, and interruptions caused by siloed data. Employees lose confidence that they have the correct, up-to-date data. Time is lost in handover meetings and adhoc inquiries.

By connecting engineering data to Product Lifecycle Management (PLM), Manufacturing Execution System (MES), or Enterprise Resource Planning (ERP) systems, a single, secure, permission-controlled source of truth is provided, allowing manufacturing companies to begin the path to digital transformation of their end-to-end product design and manufacturing processes.
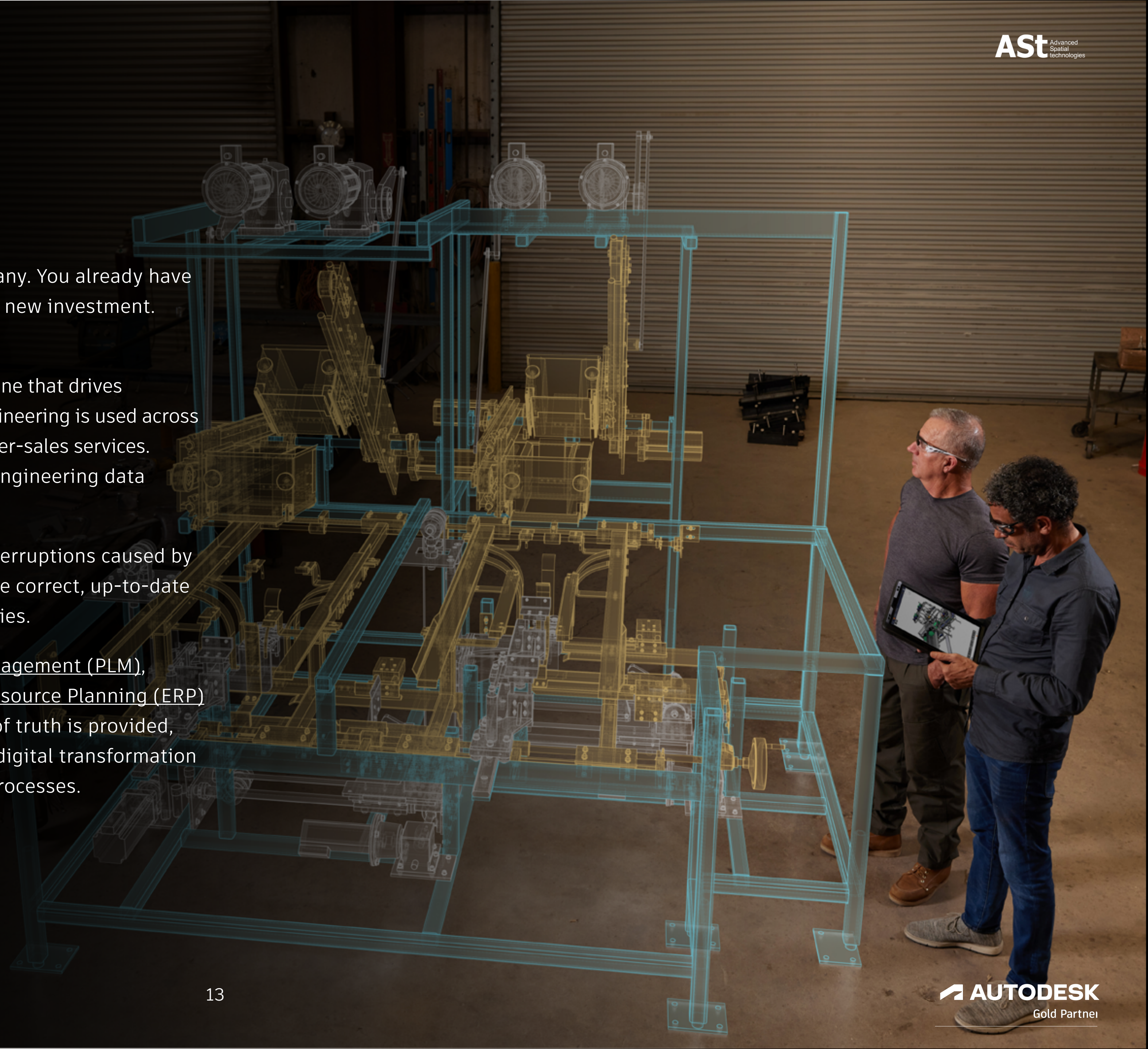
Resources for CAD managers

Total cost of ownership

The total cost of ownership for design and engineering technology includes hardware and networking, training and consultancy, and software licensing.

Here are some essential resources to help you cost, and plan your implementation.

You don't need to do all the work yourself.

Your Autodesk reseller can help you assess your current situation, compile a total cost of ownership report, and prepare a return on investment (ROI) assessment.

Your Autodesk reseller may also provide services such as consultancy, training, content creation, installation and licensing, customization and software development, and product support.

⊙→ **Partner Finder: Approved consultants who can help at any stage**

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Hardware and networking

To benefit from your design and engineering technology, you may need to upgrade your hardware and network. Use these resources to check your current specifications:

$\rightarrow$ **System requirements for Autodesk Inventor products**

$\rightarrow$ **System requirements for Autodesk Vault products**

$\rightarrow$ **System requirements for Product Design & Manufacturing Collection products (AutoCAD, Nastran, Navisworks Manage, 3ds Max, Recap Pro, Fusion)**

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Subscriptions

When you buy with Autodesk, you can choose a plan and subscription term that best meets your needs. Learn how to select a subscription plan that best fits your individual or company needs.

$\rightarrow$ **Autodesk subscription plans at a glance**

License management

Understanding your role as an Autodesk account administrator will help you get up and running quickly with your new Autodesk subscription. Learn how to manage your users and their products, and how to help them download, install, and activate their Autodesk software.

$\rightarrow$ **Autodesk account admin Quick Start Guide**

Installation

Learn how to download, install, and update Autodesk products or create deployments to automate installation in your enterprise.

$\rightarrow$ **Installation for administrators**

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Software configuration

Configuring the user interface can help users focus only on the tools they need to complete their work to your company standards and procedures.

The company configuration can be standardized across all installations to help you reduce waste, speed up on-boarding, and standardize training

$\rightarrow$ **Autodesk Inventor: Work Environment**

$\rightarrow$ **Autodesk Inventor: Customizing the user interface**

$\rightarrow$ **Autodesk Vault: Configure the Vault environment**

Add-ins, plugins, APIs, and services

When your engineering data is unlocked by the cloud, everything changes. Autodesk Platform Services (APS) is a collection of cloud and desktop APIs that connects Design and Make data. The tools work across disciplines, industries, and file formats so that worlds as different as Inventor®, Revit®, and Vault can mesh with PowerPoint, SAP, and ChatGPT.

$\rightarrow$ **Developer tools to transform design and engineering**

There may be a plugin that already does what you need. Explore the Autodesk App store:

$\rightarrow$ **Autodesk app store**

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Training

Whether you are a novice or an expert, we can all benefit from examining our workflows and looking for opportunities to improve.

Check out Autodesk Learning for free, on-demand tutorials:

→ **Search the Autodesk learning catalogue**

Read this article for more training resources to suit your requirements:

→ **Autodesk Inventor training resources, free and flexible**

Certification

Product design and manufacturing professionals and students can earn User, Associate, Professional, and Expert certifications to stand out to hiring managers and showcase their skills in CAD, CAM, design-to-manufacture workflows, and cutting-edge technologies like generative design.

→ **Autodesk Certification for design and manufacturing**

Support

What level of support do you need? Different subscription plans provide distinct support categories, including specialist assistance and live coaching. Find out more about Autodesk support levels for your plan.

→ **Levels of technical support**

→ **Contact support**

Summary

Maximizing your investment in design technology involves strategic implementation, effective management, standardization, automation, and integration with broader systems to support digital transformation.

The total cost of ownership includes hardware, software, training, and support. Use your Autodesk reseller to evaluate needs, assess licenses, and plan your implementation.

To truly unlock the full potential of your design technology, it's essential to move beyond software acquisition and focus on strategic implementation. Embrace these guidelines to streamline processes, foster innovation, and drive efficiency. With the right tools and practices, your company can not only keep pace with the demands of modern manufacturing but also set new standards in quality and productivity.

Take action now—leverage the resources and strategies outlined in this guide to propel your design and engineering teams toward unprecedented success. The future of manufacturing excellence is within your reach.