

The New Collaboration: A Guide to Transforming Product Design

How engineering leaders use cloud-based CAD and real-time productivity tools to improve teamwork



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Buzzword Bingo Card

B • I • N • G • O

WIN-WIN	STATE-OF-THE-ART	VIEW FROM 30,000 FEET	HOLISTIC	MONETIZE
CIRCLE BACK	THINK OUTSIDE THE BOX	★	PARADIGM SHIFT	VIEW FROM 3,000 FEET
DRILL DOWN	COLLABORATION	SYNERGY	DO YOU HAVE THE BANDWIDTH?	INCENTIVIZE

What is the New Collaboration? (And What it is Not)

Collaboration.

Has there ever been a word so frequently used, and so often misunderstood?

Collaboration is a universal ideal for companies and businesses based on the proven notion that individuals working together as a team can often deliver a better result than a single individual or individuals working alone.

But while widely applauded in theory, collaboration can be hard to accomplish in practice. Facing the challenge of actually achieving true collaboration within teams, some people have dismissed the idea as business jargon – relegating “collaboration” to a “buzzword bingo” card at company meetings. Unfortunately, more than a few bored employees sitting through long corporate presentations have uttered “bingo!” to themselves at the mention of the word “collaboration.”

In many cases, employees have become jaded as organizations have espoused the idea of collaboration without providing teams with the tools needed to make it a reality. The fact is, collaboration is too important an idea in product development to be thought of as a business cliché. At a time when companies are under increasing pressure to attract new customers and accelerate time-to-market, improved collaboration and teamwork are playing an increasingly vital role.

In order to make collaboration a reality for product design teams today, many organizations are now turning to cloud-based product development. These organizations are choosing to replace their file-based, legacy CAD systems to improve collaboration and accelerate time-to-market. While the specific reasons that firms are making the change will vary, some common themes often emerge. Let's take a look.

The Collaborative Shortcomings of On-Premise CAD

Historically, for engineering and manufacturing teams working together in the same physical location, installed on-premise CAD software has enabled only a very rudimentary level of collaboration. For these users, the extent of collaboration has really been little more than huddling over a CAD workstation to share ideas and painstakingly review edits. The fact is, even sitting together in the same room, users cannot simultaneously work on the same product design.

For firms with remote workers, distributed design teams or remote partners, the obstacles blocking collaboration are even greater. With file-based CAD, users simply cannot share real-time product designs. Instead, users must resort to annotating screenshots and writing exhaustive descriptions of desired modifications. The result is often slow, tedious, and prone to miscommunication.

In addition, version control issues often occur. Due to the nature of sending around copies of original designs, and transferring comments back to a master document, file-based CAD inevitably creates version control errors that sometimes lead to costly production mistakes.

For many firms, the new challenges of remote work due to the COVID-19 pandemic have only amplified the clear shortcomings of file-based CAD and created a renewed urgency for change.

Cloud-Based CAD Has Been a Collaboration Game-Changer for Engineers

Today, organizations that have switched to a cloud-based Software-as-a-Service (SaaS) CAD platform have seen the transformative impact of real-time, simultaneous collaboration. Designers and engineers can now work together in real time on the same product model, improving designs and accelerating time-to-market.

Cloud-based CAD users no longer need to wait for colleagues to respond to emails or upload static screenshots. Instead, they can now see each other's edits and feedback in live updated design documents in real time.

In addition, designers and engineers have been freed from the version control issues that have always accompanied the "copying and sharing" of designs using file-based CAD systems. With a single source of truth, users of cloud-based systems also don't need to purchase additional add-on PDM/PLM systems to manage files – freeing users of the cumbersome "checking in and checking out" of documents.

This eBook explores this "New Collaboration," providing an overview of how today's modern cloud-based CAD is transforming the way product development teams work together by:

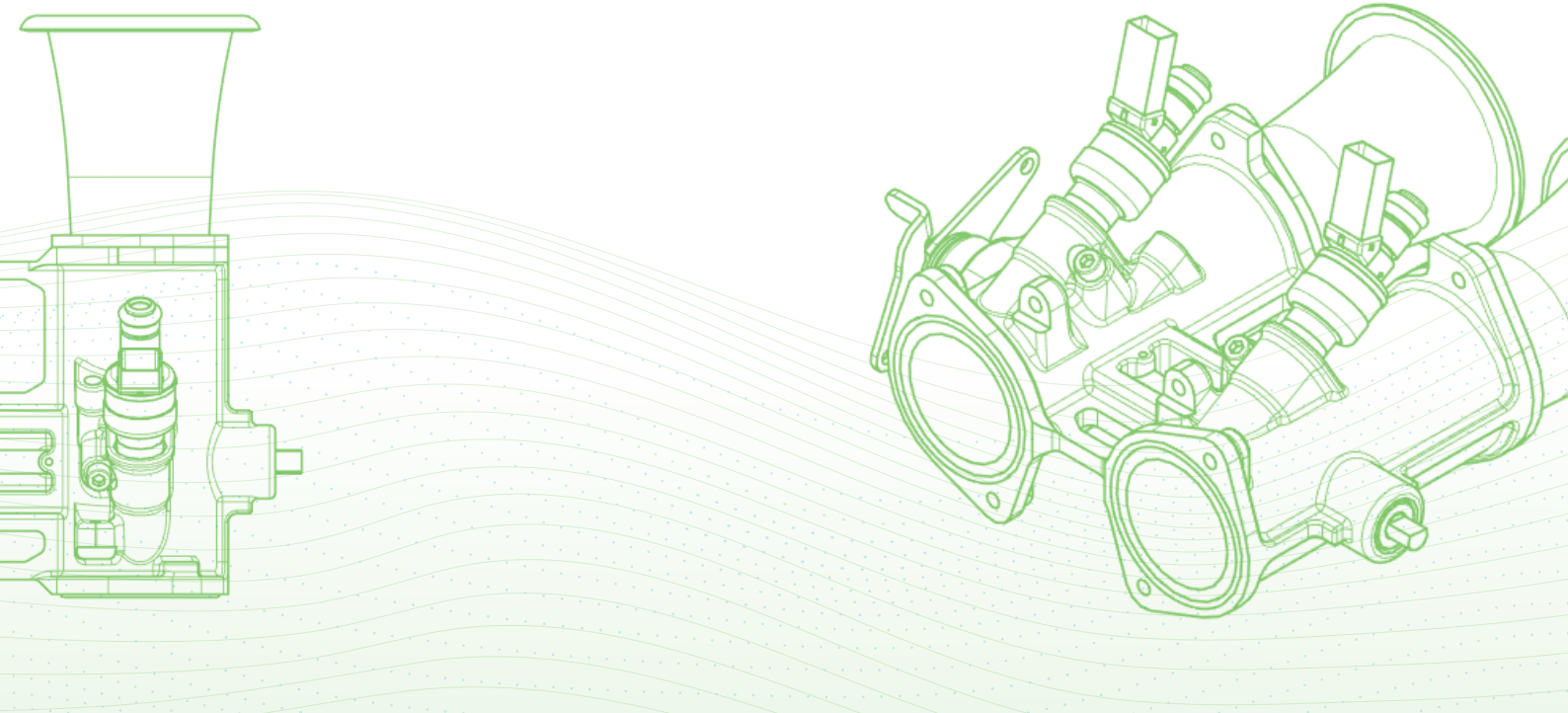
- Empowering real-time collaboration that lets **designers and engineers** on the core product design team work together more productively.
- Enabling designers and engineers to work more efficiently and collaboratively with an **extended team of internal stakeholders** to accelerate progress updates, feedback and critical product-release approvals.
- Redefining a new level of collaboration with **external suppliers and manufacturers** to ensure business resiliency in the post-COVID-19 world.

**INTRODUCTION:
WHAT IS THE NEW
COLLABORATION?
(AND WHAT IT IS NOT)**

In addition, you'll learn why cloud CAD collaboration tools have moved from a "nice to have" technology to an absolute imperative for distributed engineering and manufacturing teams during the new normal of remote work.

Lastly, you'll discover why choosing a SaaS product development platform is not just about the convenience to work from anywhere, but how the technology has enabled the creation of a brand new class of collaboration tools that help you do your job better and faster. We'll introduce you to PTC's Onshape SaaS platform, the only cloud-native CAD and data management system that enables true real-time engineering collaboration.

But before we dive into those unique cloud CAD collaboration tools in greater detail, let's take a step back and explore when and why we need to collaborate in the first place – the reasons why collaboration is not an empty buzzword for engineers.





Chapter 1

Why Improving Internal and External Team Collaboration Matters Now More Than Ever



Why Improving Internal and External Team Collaboration Matters Now More Than Ever

In the wake of the global COVID-19 pandemic and the accompanying widespread shift to remote work, the nature of teamwork and collaboration is being redefined. From sectors as diverse as manufacturing and software development, executives and project managers are being forced to reimagine and reinvent how their engineering teams collaborate, communicate and stay productive.

Product development leaders are seeking to redefine collaboration in three critical areas:

- ◆ **Core Design Team** – How to empower individual users (designers and engineers) to work more productively together. These core users require the tools to better share ideas and iterate on designs to improve product innovation.
- ◆ **Extended Internal Team** – How to connect and improve collaboration between the core design team and an array of internal company stakeholders. This extended internal team may include supply, operations and manufacturing team members who provide crucial input and approvals.
- ◆ **External Partners** – How to improve the way the company shares critical purchasing and manufacturing information with external supply and manufacturing partners.

WHY IMPROVING
INTERNAL AND
EXTERNAL TEAM
COLLABORATION
MATTERS NOW
MORE THAN EVER

The pandemic has given most companies the primary challenge of keeping their workforce productive from remote locations. Being forced to work remotely has robbed individual designers and engineers of their ability to simply walk across the office to share ideas with one another. No longer can they just pull up a chair and work on product designs together.

Consequently, more companies are seeking out CAD tools that ensure “anywhere, anytime” access. Many are concluding that their existing file-based CAD product development tools were designed for the pre-internet era and are simply inadequate for the job. Product leaders are realizing that to drive accelerated time-to-market and improved productivity, they need to change their technology.

Collaborative Teamwork Vs. Separate Business Silos

Taking a design concept from an idea to actual production has long required the input and expertise of a diverse array of individuals across an organization. From designers and engineers, to supply and manufacturing, to Quality Assurance, the vast majority of products would never see the light of day without the power of collaboration and teamwork.

However, genuine teamwork can be elusive. Entire libraries could be filled with the books written by sports coaches and business gurus that promise the secret ingredient for high-performing teams. These business books share a few universal themes in common. One important concept is the power of leveraging the skills of the collective group to achieve far more than any one individual can accomplish on their own.

As a popular saying goes, “If you want to go fast, go alone. If you want to go far, go together.”

WHY IMPROVING
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Today, many businesses have discovered that as they strive for improved collaboration they are encumbered by existing technology. In many cases, years of integration of disparate systems across departments in their organization has resulted in data and information “silos” that isolate teams and prevent effective collaboration.

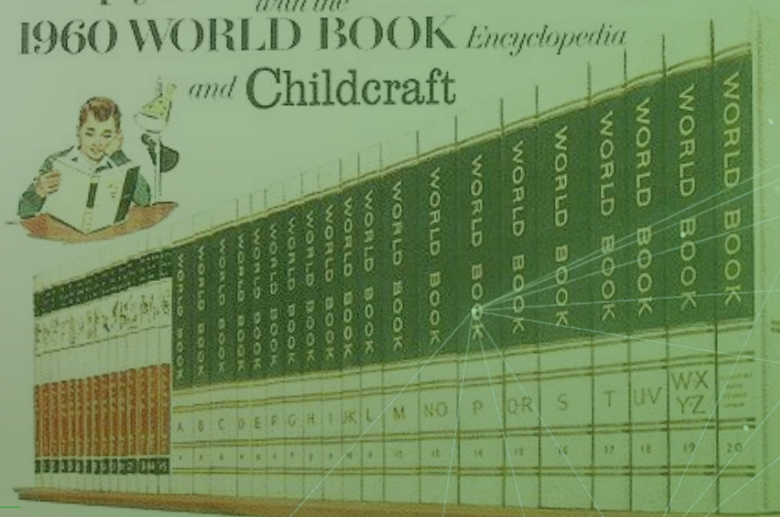
The widespread adoption of the Agile product development methodology in recent years highlights this need. In order to improve collaboration, many firms have implemented Agile practices such as the daily team “stand-up” meeting (now virtual) to enable team members to quickly and efficiently share information, identify barriers to progress, and accelerate the completion of goals.

In the time of COVID-19, cloud communication and productivity software have increasingly moved to the forefront of these efforts to break down information silos. These organizations are adopting cloud-based communication tools such as *Google Docs*, *Salesforce CRM*, *Slack*, *Microsoft Teams* and *Zoom*, to improve communication between individual team members and across departments. These tools are credited with accelerating the flow of information, and eliminating the need for more formal meetings to share time-sensitive updates.

Given the rapid adoption of these time-saving and productivity-increasing tools, it is surprising that one of the last business professions to benefit from Software-as-a-Service (SaaS) productivity tools has been hardware engineers. The sad fact is that the product development industry, long users of antiquated CAD and Product Data Management/Product Lifecycle Management (PDM/PLM) software, has been a relative latecomer to the cloud.



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MORE THAN EVER

Do You Remember Encyclopedias?

In many ways, the transition that product development is undergoing today – the shift from legacy, on-premise software to the cloud – is as profound as the shift from “analog” to “digital” that first occurred with the internet over 20 years ago.

One example of this is the encyclopedia. Prior to the internet and Google, the primary reference source for many folks was the encyclopedia. For the benefit of younger readers, encyclopedias are a collection of thick hardbound volumes organized A-to-Z with articles about every topic under the sun.

From the perspective of the firms selling encyclopedias, the best thing about their product was that it became obsolete almost as soon as it was purchased (not entirely dissimilar to modern software). Sure, while basic information such as the inventor of the automobile or the details of frog anatomy, remained timeless, new political, cultural and environmental events regularly occur every year. The result? Customers would need to re-purchase a new encyclopedia set every few years in order to stay current.

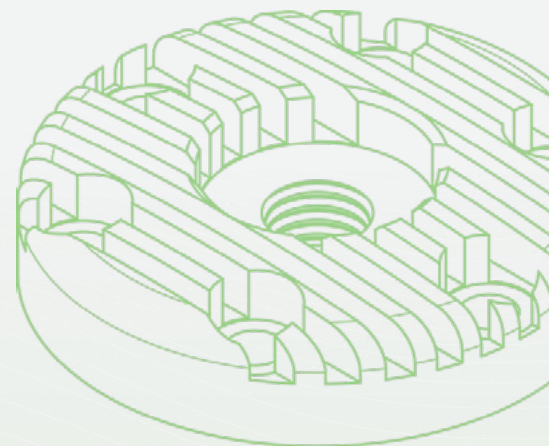
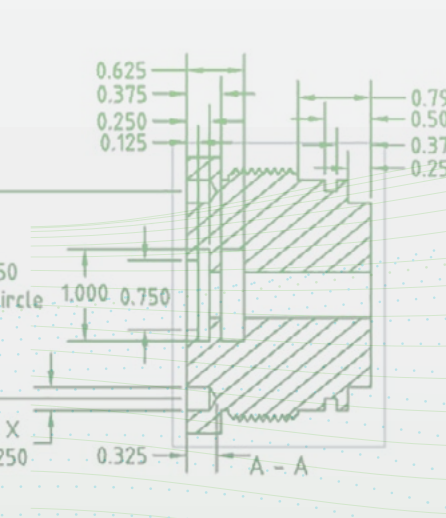
WHY IMPROVING
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Encyclopedias had other fundamental limitations. The often prohibitive cost of a set of encyclopedias meant that most children had to travel to a remote location – the local library – to access the information found inside.

In addition, even at the remote location, access could still become an issue. If you were a student traveling to the library intent on researching a report on elephants, you may have found that someone had already taken out the “E” volume... perhaps to research their report on electricity. In that situation, you would have to wait for that student to return the volume before you could get started on your work.

In many ways, the profound leap from file-based installed CAD to cloud-based CAD is similar to the evolution from the printed encyclopedia to its online successor. This shift from the analog world to the digital world has meant improved accessibility, convenience, and the ability to get more work done.

In the chapters ahead, we will explore how this shift from installed software to the cloud has evolved and the powerful ways that cloud tools are transforming product development for design and engineering teams.





Chapter 2

Digitalization, Remote Work and the New Collaboration



Digitalization, Remote Work and the New Collaboration

The COVID-19 crisis has caused a realization by firms that they need to adapt to become more digital and to prepare for a future that encompasses remote work. Many firms have decided that in order to survive and thrive, they need to make the move to the cloud and digital.

One recent [global survey](#) has clearly captured some of the challenges identified by organizations and the concerns and anxieties facing employees with this shift to remote work.

The survey by software firm ServiceNow found that collaboration challenges were the #1 concern of employees, and the #2 concern of executives. A more detailed breakdown is below.

Employees

83%

of employees are concerned about the overall impact of remote work.

#1

Among these employees, the impact of remote work on collaboration was #1 top concern

Executives

93%

of executives are concerned with the impact of remote work on their company.

92%

of executives indicated COVID-19 has forced their company to rethink how work gets done.

Concern over reduced collaboration is the second largest concern, with **51%** of executives reporting this issue. This trailed only concerns about delays in product or service delivery at **54%**.

DIGITALIZATION,
REMOTE WORK
AND THE NEW
COLLABORATION

The Importance of Digital

Organizations are also realizing the value of digital in addressing these challenges. A recent [survey](#) from *Tech Clarity*, a leading CAD and product development research firm, found that nearly two-thirds of respondents (**65%**) said that digital transformation was critical or important.

How Important is Digital Transformation to Your Company?

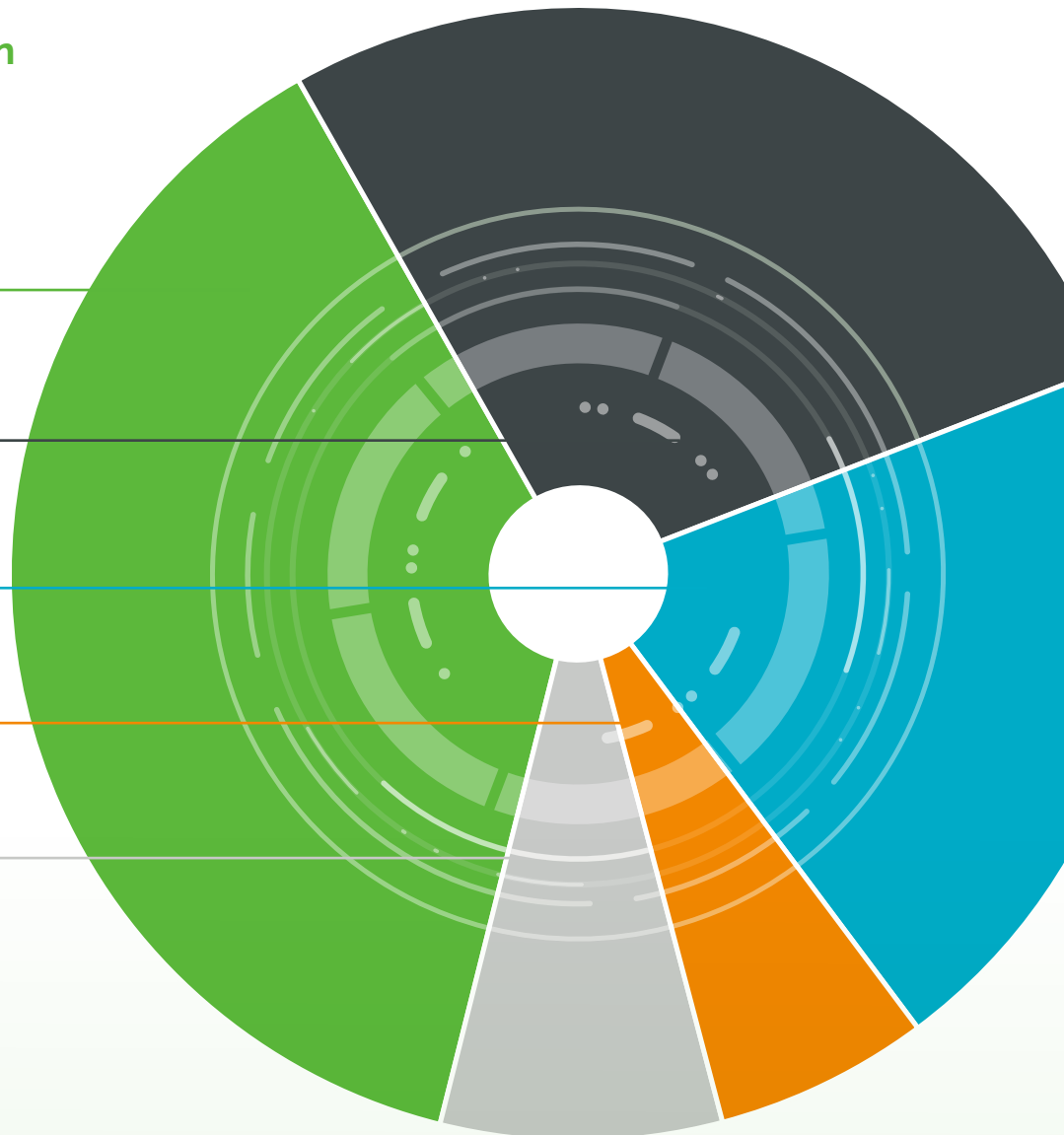
38% Critical

27% Important

21% May Contribute

6% Not Relevant

8% Don't Know



source: Tech Clarity

DIGITALIZATION,
REMOTE WORK
AND THE NEW
COLLABORATION

The importance of cloud to leading product firms was also echoed in a recent survey of nearly 1000 engineering and manufacturing professionals around the world. *The State of Product Development and Hardware Design*, an independent survey commissioned by Onshape, noted that:



8 of 10 companies

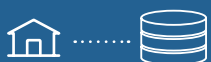
that use cloud tools today are *more* confident that they are ready to support their teams in any work environment.

According to the same industry survey, here is a comparison between the percentage of companies that rate their ability to support remote workers as *“Good”* or *“Excellent”*



Use online, cloud productivity tools

78%



Use locally installed productivity tools

48%

It's clear that the Remote Work Era is not going away.

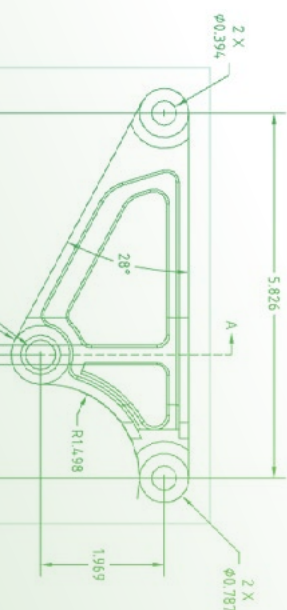
Last spring, Twitter announced that its workforce could **stay home indefinitely** – even after the pandemic is over. Twitter CEO Jack Dorsey **told analysts** that he viewed a remote workforce as a competitive advantage. “Our concentration in San Francisco is not serving us any longer and we will strive to be a far more distributed workforce which we will use to improve our execution,” he said.

As Dorsey notes, offering remote opportunities isn't just an employee perk – appealing to those who want to skip the commute – it's a recruiting advantage, too. Why limit your candidate search to a narrow geographical area when you can tap into the best talent in the world instead?

Across Silicon Valley, often a bellwether for innovation and “future of work” best practices, many firms are institutionalizing remote work as the norm. Recognizing the value of having a more flexible and versatile workforce, companies such as Tesla, Oracle and HP have even decided to relocate their headquarters away from California's Silicon Valley altogether.

In a **press release** announcing plans to move to Austin, Texas, Oracle noted that the move would not unduly impact workers as they would be given the opportunity to work from any location they wished. In a nod to its employees, Oracle **noted**, **“By implementing a more modern approach to work, we expect to further improve our employees' quality of life and quality of output.”**

But the rapid adoption of more remote-friendly work policies is not confined to Big Tech. French automaker **Groupe PSA** – parent company of the Peugeot, Citroën, and Opel car brands – recently declared a **“new era of agility”** in which its non-production workers will stay remote. Europe's second largest vehicle manufacturer touted the shift as an employee-friendly move that will improve work-life balance and reduce stress from commutes.



The French company's logic is supported by a recent "future of work" survey by [ServiceNow](#) in which:

94% of employees said they experienced benefits from working remotely

54% cited reduced commuting time as the main benefit

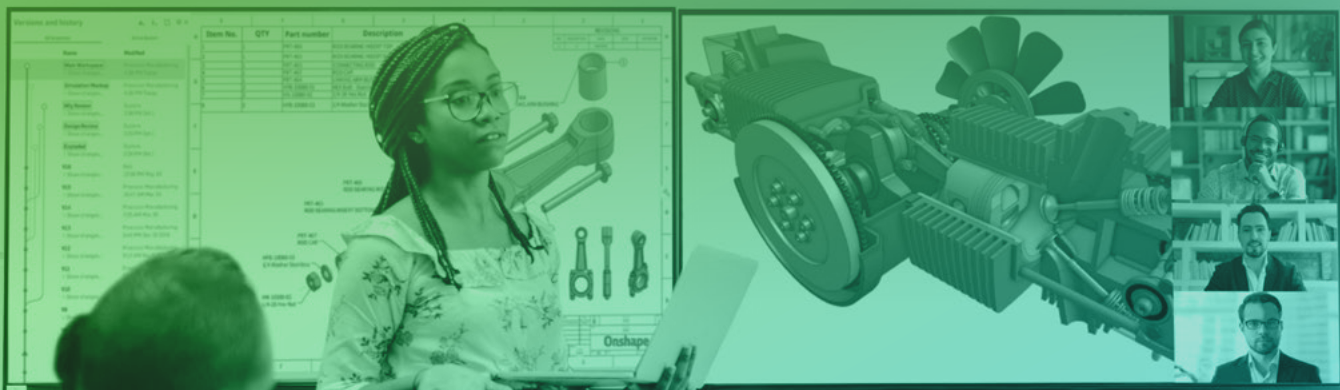
55% cited improved work-life balance as the principal benefit

For forward-thinking product manufacturers, the implications of a greater shift toward remote work are clear. In order to recruit and retain the best talent who can bring innovative products to market, firms must rethink their business models. Having agile product development processes is now more important than ever.

Investing in remote collaboration tools and other cloud-based productivity tools is no longer a "nice-to-have," but a "must-have" technology.

Chapter 3

Collaborating with Your Core Design Team (Engineers and Designers)



Who's Collaborating With Who?



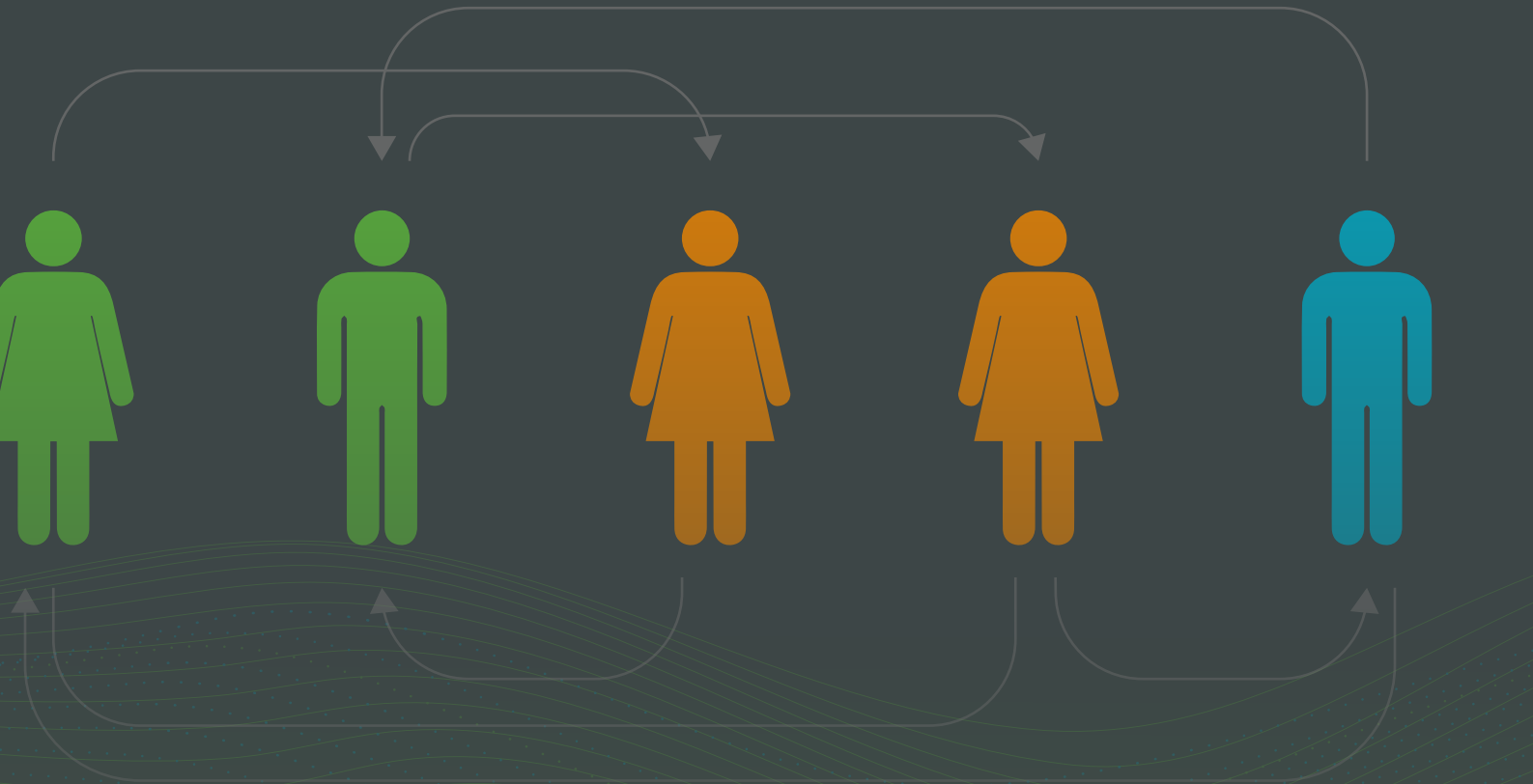
Engineers



Designers



In-House Manufacturing



Collaboration Challenges

Early collaboration between designers is clearly a critical element of any successful project.

Particularly on larger projects, it is not uncommon for managers to divide up facets of a design into smaller pieces, assigning roles and independent projects to each engineer. In this scenario, designers and engineers may be working independently on a piece of a project that has interdependencies.

In order to achieve fast and efficient product development, designers and engineers must collaborate with one another early in the life of the design. Users must ensure that each “piece” successfully comes together as a whole as intended. Collaboration ensures the team avoids unexpected surprises or delays at the moment of truth. Unfortunately, traditional, file-based CAD doesn’t always address these challenges.

Legacy on-premise CAD systems, designed for an earlier era, were not built for collaboration. These systems require users to work independently at their own dedicated workstations. In order to share ideas with a teammate, users must manually send a copy of a design file via email (or a file-sharing service like Dropbox) to a colleague. They must then wait for their colleague to return the copy with any suggested edits or comments. This process is often slow and prone to oversights.

Although many firms have recently adopted remote communication tools such as Zoom and Microsoft Teams to improve communication, these tools do not deliver the capabilities to engage in the “work” of product development – creating and iterating on a product design together.

For designers and engineers accustomed to working face-to-face with peers and perhaps walking across the office for input or collaboration, remote work presents a clear change in the way of doing business. For many teams, the existing file-based CAD systems that they have long used have become inaccessible or inconvenient to access and use.

How Cloud CAD Tools Improve Core Team Collaboration

Engineers need to not only communicate with each other, but they need to get work done. They require the ability to work in real time on the same product design to share ideas. Members of the core design team must be able to ask and answer questions, iterate on concepts and finalize product designs together. Only a cloud-based product development platform can enable this dynamic.

PTC's Onshape Software-as-a-Service (SaaS) platform allows multiple engineers to simultaneously work on the same CAD model remotely online from any computer, tablet or phone. Whenever one engineer makes a design change, everyone else on the team instantly sees it – whether they are working together in the same room or in different time zones across the globe.

A comprehensive Edit History also records who made what changes and when, allowing the team to return to any prior state of the design at any time. In addition, Onshape's Branching and Merging feature allows teams to explore multiple experimental design paths and later merge the best design ideas into one CAD model – without the risk of overwriting each other's work or having to recreate the original core design.

Onshape empowers design teams to take more creative risks and experiment with more iterations, often resulting in better designs.



To learn more about Onshape's full suite of cloud CAD collaboration tools, see Chapter 6.

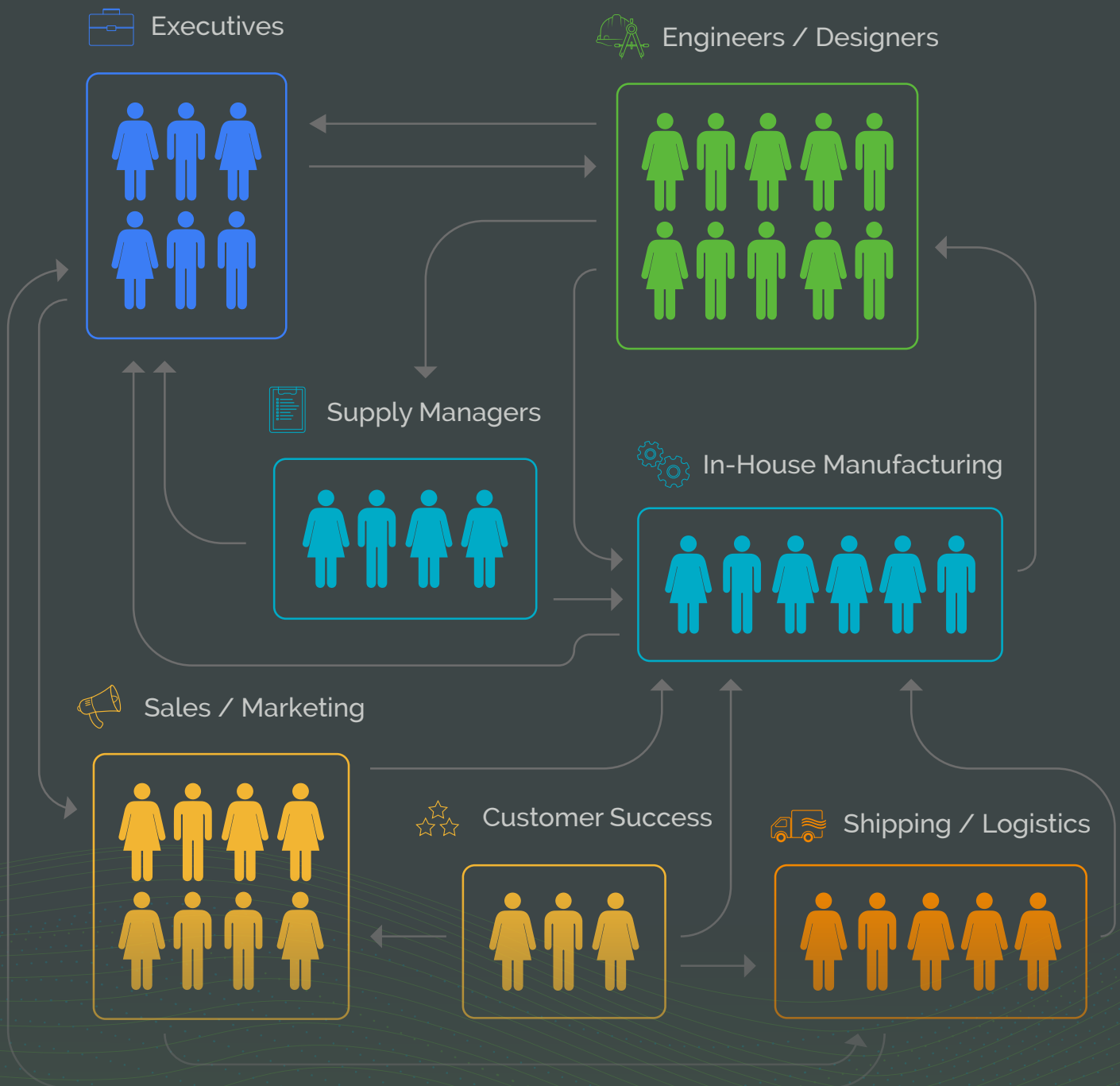
For additional Tech Tips, visit Onshape's [Collaboration Resources](#) page.

Chapter 4

Collaborating with Your Extended Internal Team (Company Stakeholders and Approvers)



Who's Collaborating With Who?



Collaboration Challenges

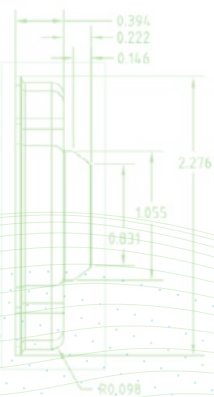
Today, manufacturers are increasingly seeking to improve collaboration between their core teams and an extended group of stakeholders within their organizations. These internal stakeholders include representatives across an array of functions – sourcing, operations, manufacturing, marketing and sales.

Due to their experience and specialized knowledge, these colleagues often bring key insights and in some cases required approvals, to the product development process. In many cases, these experts can often suggest improvements that make a difference in getting a product to market.

Unfortunately, traditional file-based CAD has not provided a good way for engineers to stay connected with these extended stakeholders. In fact, sharing a design file beyond the core team has often been a cumbersome and manual process.

In the majority of firms, extended stakeholders simply do not have access to a dedicated file-based CAD workstation due to the prohibitive cost. In order to share design files, engineers must find other ways to get feedback. This might include hand-walking a file over to a desk, taking input and later incorporating feedback. Alternatively, a designer might send an email with detailed notes and a screen grab image. In both cases, the manual sharing of designs and compilation of feedback in an ad-hoc manner can result in misunderstandings and delays.

Faced with the challenge of empowering these extended teams, manufacturing companies are now seeking improved digital and cloud-based product development solutions.



How Cloud CAD Tools Improve Extended Internal Team Collaboration

Rather than printing out drawings in 2D and physically walking them over to internal stakeholders to explain a design – or even sending an email with lengthy descriptions – cloud-based CAD enables designers to share live designs by just sending a web link. Rather than waiting for formal scheduled design reviews, stakeholders can check on the progress of projects 24/7 and tag comments to specific design elements – as easy as sharing feedback on social media.

PTC's cloud-native Onshape product development platform is making CAD data available to stakeholders who never previously had direct access to in-progress designs. Being able to share an Onshape Document with a link grants view-only permissions to anyone inside or outside the company – even if they do not have an Onshape account.

With view-only access to the product model, extended stakeholders can measure, evaluate the assembly structure, make comments, and also look at the Bill of Materials. Onshape is making CAD data accessible across departments, allowing for earlier and more frequent feedback throughout the product development cycle. Teams can now more easily break down information silos and accelerate their time-to-market.



To learn more about Onshape's full suite of cloud CAD collaboration tools, see Chapter 6.

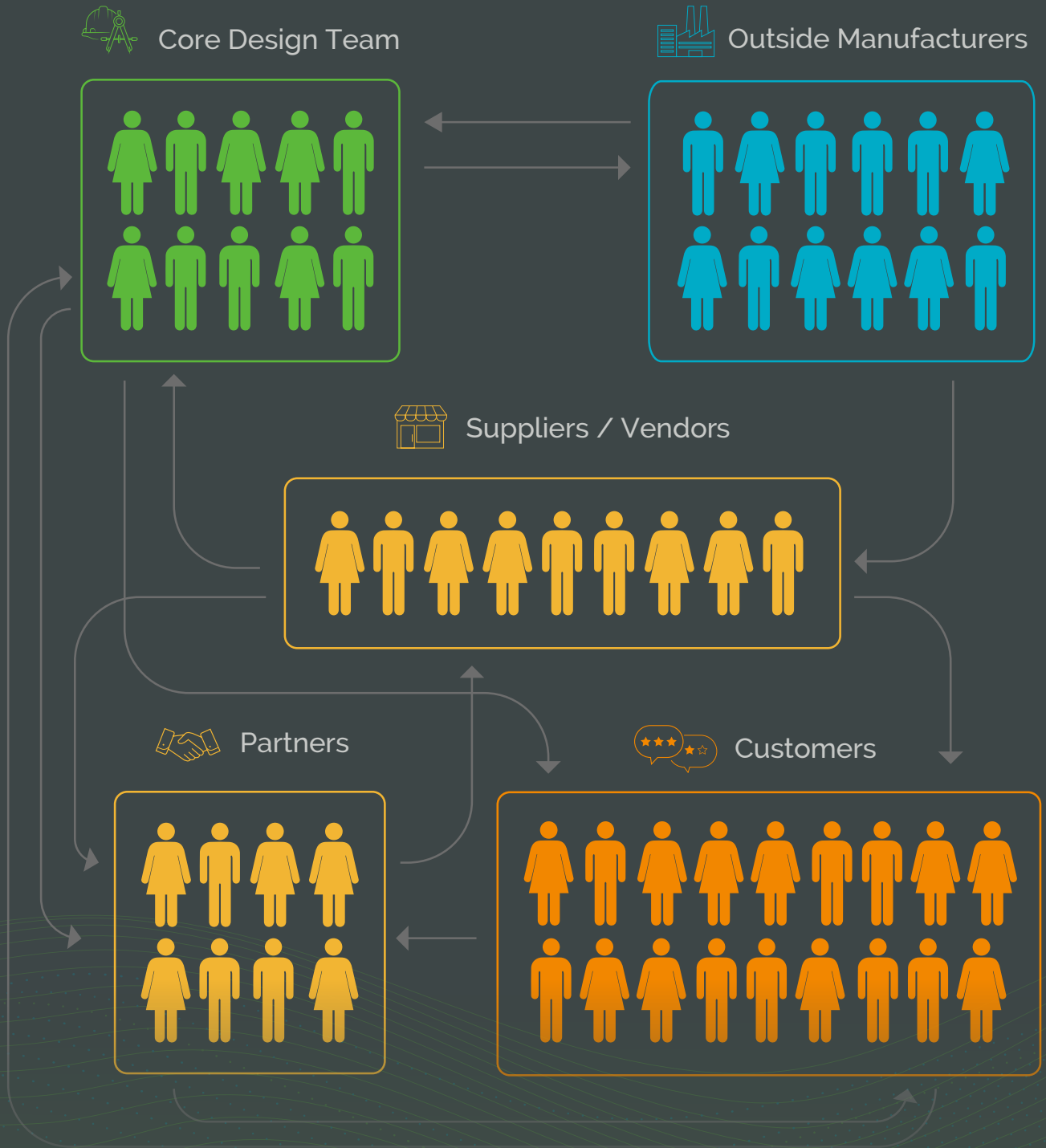
For additional Tech Tips, visit Onshape's [Collaboration Resources](#) page.

Chapter 5

Collaborating with Your External Partnerships (Partners, Customers, Suppliers and Manufacturers)



Who's Collaborating With Who?



Collaboration Challenges

For product firms seeking to improve efficiencies, product quality and accelerate time-to-market, close collaboration with external design partners, suppliers, and manufacturing partners is now more important than ever.

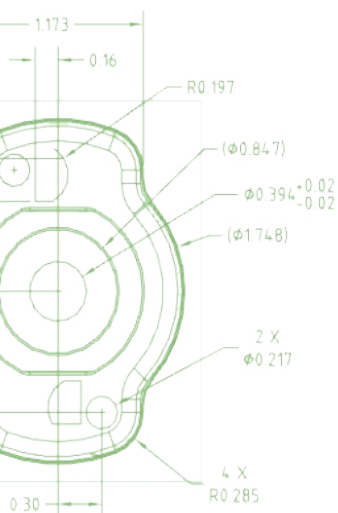
As many product leaders can attest, good communication and collaboration with supply and manufacturing partners is often a critical component of ensuring that their products are developed on time and to the highest quality standards.

Historically, collaboration with external partners has been far from easy and efficient. The struggle to ensure that manufacturers are 100% aligned with the vision of the product owner has kept many product managers awake late at night. Their biggest concern? Ensuring that the wrong file is not inadvertently released and the wrong product is manufactured – wasting precious time and money.

A major challenge for product owners is that legacy, file-based CAD is simply not designed to enable collaboration between designers and third parties. Because any design file that is shared is only a copy of the original, there is always room for error. Even when detailed instructions are appended, this communication may be missed or misinterpreted. In the worst-case scenario, a manufacturing vendor will end up with the wrong file and the wrong version of the product is produced.

As a result, the standard practice for working with external firms has been to send a copy of a design file followed up with supporting communication – via email, teleconferencing, or even an in-person visit. For most product managers, visiting a manufacturer in person is both time-intensive and expensive. With many third parties located in Asia, this process often means traveling halfway around the globe.

Despite the inconvenience and cost of business travel, there are sometimes no better options. This collaboration approach has been justified due to the limitations of the available technology. Product managers have had to make these trips to personally ensure that the correct CAD file is being used, the correct product tooling is then cut, and that the right product is ultimately manufactured.



How Cloud CAD Tools Improve Extended External Team Collaboration

Instead of sending a soon-to-be-outdated design file by email or Dropbox, product development teams using a cloud-based CAD platform can give their manufacturing partners immediate access to their models with a mouse click.

Onshape's Sharing feature allows teams to securely and instantly collaborate with a colleague, vendor, customer or partner by granting them editing, commenting or view-only access rights to a CAD model. Equally valuable is the ability to instantly withdraw outside access to designs when a project is over, reducing the risk of unintentionally leaking your intellectual property.

Sharing an Onshape model in a secure cloud workspace provides peace-of-mind that partners are always working on the latest design, eliminating version control issues and reducing the risk of costly manufacturing errors.

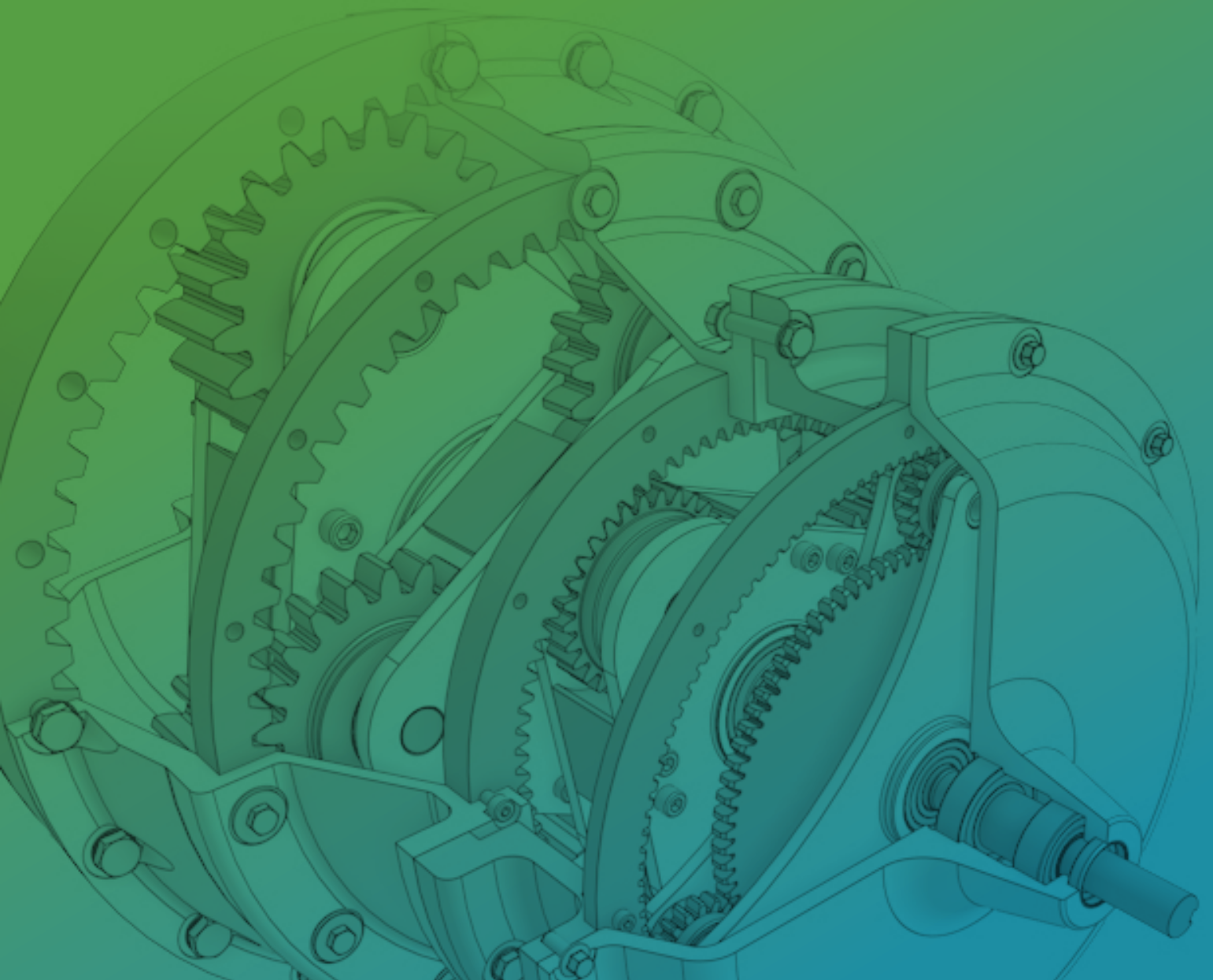


To learn more about Onshape's full suite of cloud CAD collaboration tools, see Chapter 6.

For additional Tech Tips, visit Onshape's [Collaboration Resources](#) page.

Chapter 6

The 10 Real-Time CAD Collaboration Tools That Will Transform Your Product Development Process





The 10 Real-Time CAD Collaboration Tools That Will Transform Your Product Development Process

While companies always rely on the talent of their designers, engineers and executives to create innovative products, the new normal of remote work has introduced additional barriers to effective collaboration and teamwork.

Only Onshape addresses the reality of a remote workforce with “anywhere, anytime” CAD access from any computer or mobile device (iOS or Android). But regardless of where they are physically working, it is essential for designers and engineers to be able to communicate seamlessly with one another to share new ideas, iterate and refine those ideas in real time.

Onshape’s unique cloud-database architecture has enabled the creation of a brand new class of CAD collaboration features that just weren’t possible in old file-based CAD systems.

Let’s take a look at the variety of tools that help distributed design teams communicate more efficiently and streamline their processes.

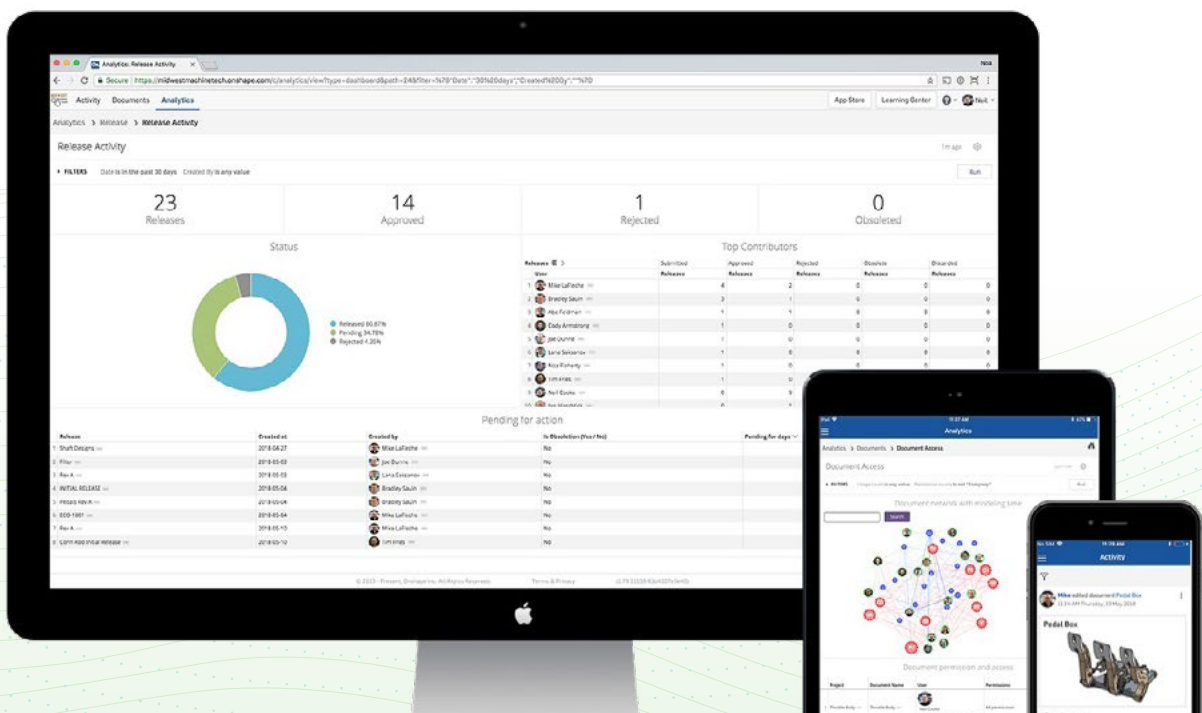
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Simultaneous Collaboration

Onshape enables true, real-time CAD collaboration, allowing multiple engineers to simultaneously work on the same 3D model from anywhere. Whenever one team member makes a design change, everyone else on the team can instantly see it.

Simultaneous access, viewing and editing allows designers and engineers to work in parallel and consider more alternative perspectives. Users can now ask and answer questions, share feedback and resolve issues in real time for improved designs.

Simultaneous collaboration eliminates the delays, waiting and misunderstandings that can arise while using file-based CAD. Users no longer need to send copies of files or exchange lengthy emails back and forth, instead working together instantly on one single source of truth.





Branching and Merging

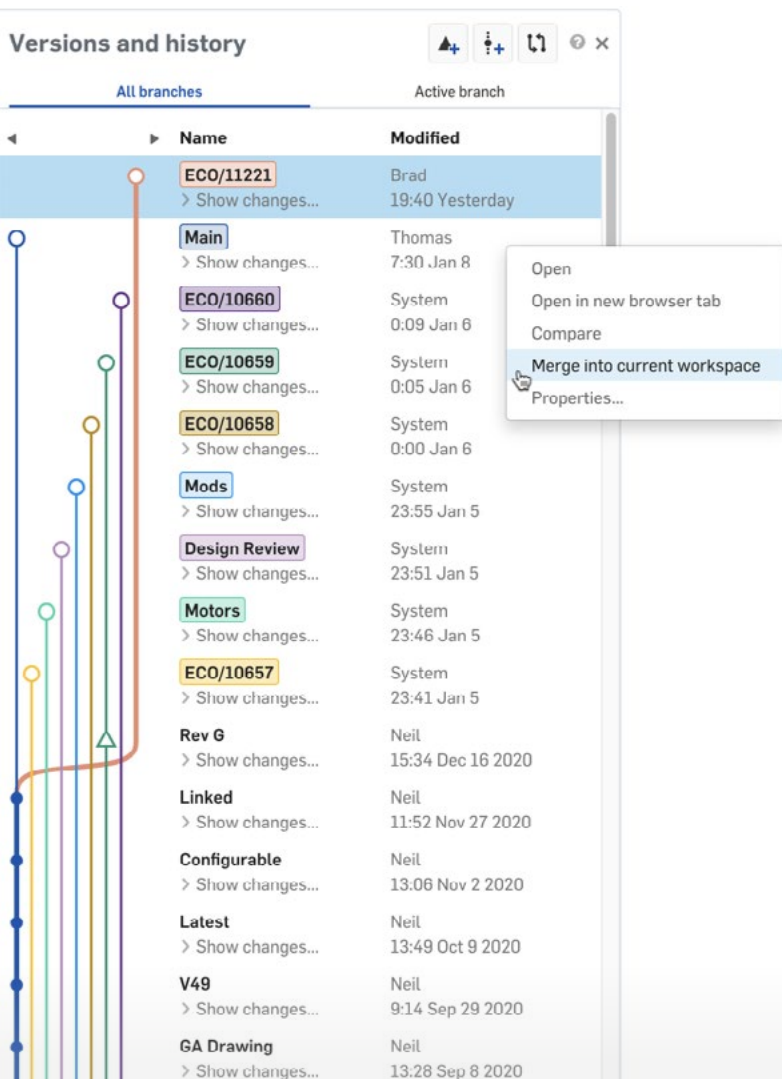
Onshape’s Branching and Merging feature allows teams to more efficiently explore alternative design ideas by independently pursuing experimental “branches” of a core design, with the ability to later merge the best elements from two or more ideas together.

The feature encourages creative risks by allowing users to return to the original main design at any time – or any previous stage of an experimental branch with the click of a mouse.

The convenient and intuitive feature lets teams build iterations on designs without worrying about overwriting their original work. With this capability, teams can easily work on different parts of a design, explore new design ideas or carry out engineering change orders at the same time, without affecting each other’s work.

By allowing users to see where their new ideas branch off the original design, users can instantly return to an earlier stage of a project if needed. Branches can be easily compared to check for conflicts and merged together to converge on the best design, allowing engineers the freedom to explore all possible solutions in parallel.

Unique to Onshape, this feature eliminates the manual, cumbersome and time-consuming work to “re-create” a new third design when engineers with two great design elements want to combine their ideas.



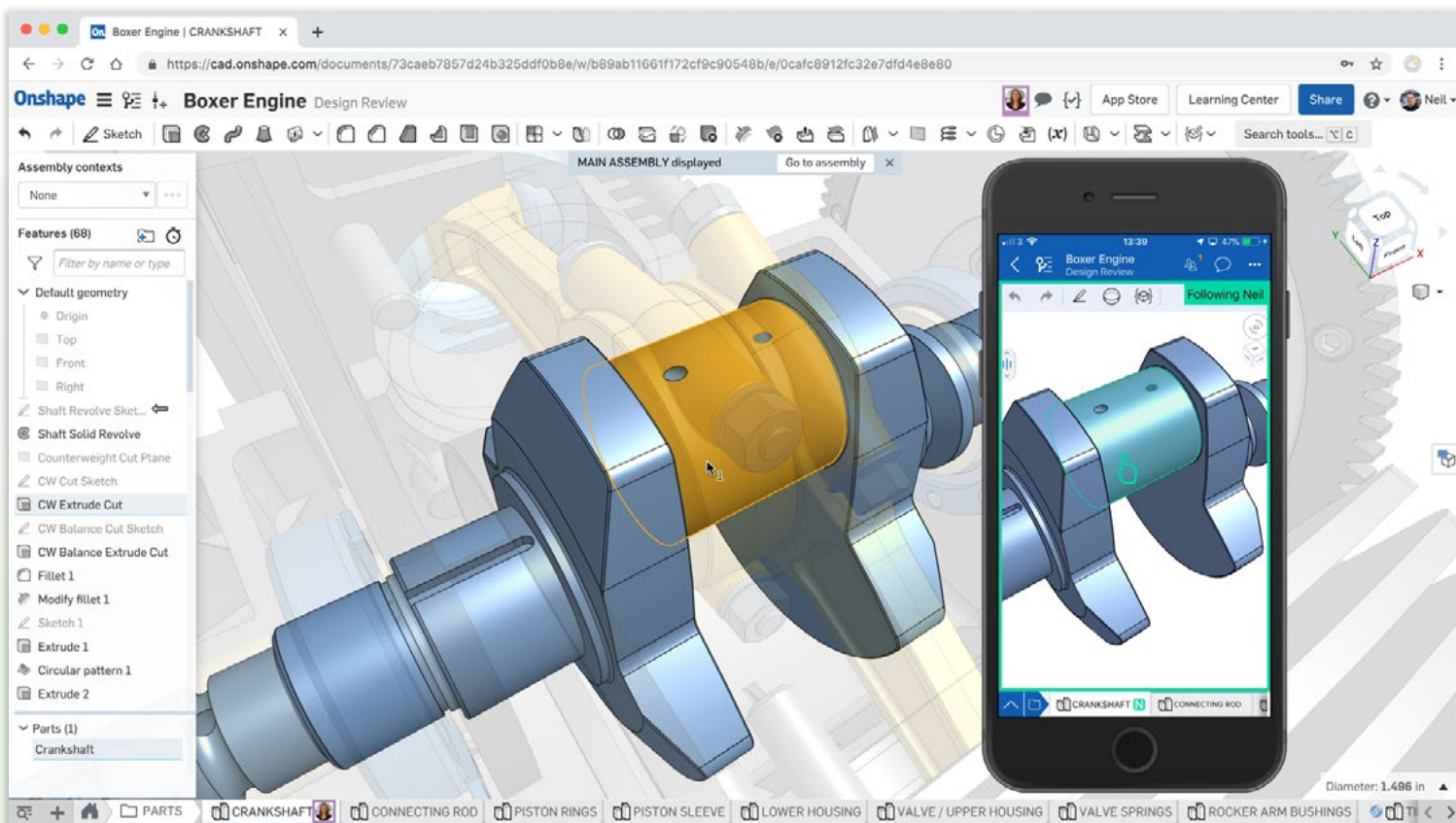


3

Follow Mode

When engineers wish to discuss elements of a design with team members, Onshape's Follow Mode feature enables multiple users at various locations to easily follow the leader in real time for live design reviews, demonstrations and training sessions. Follow Mode lets users share information and engage with their internal or external teams as if they were in the same room together.

Follow Mode lets participants see geometry selections, view rotations and model changes as they happen, making it easy for users to follow along and add suggestions using Onshape's built-in live commenting tools.



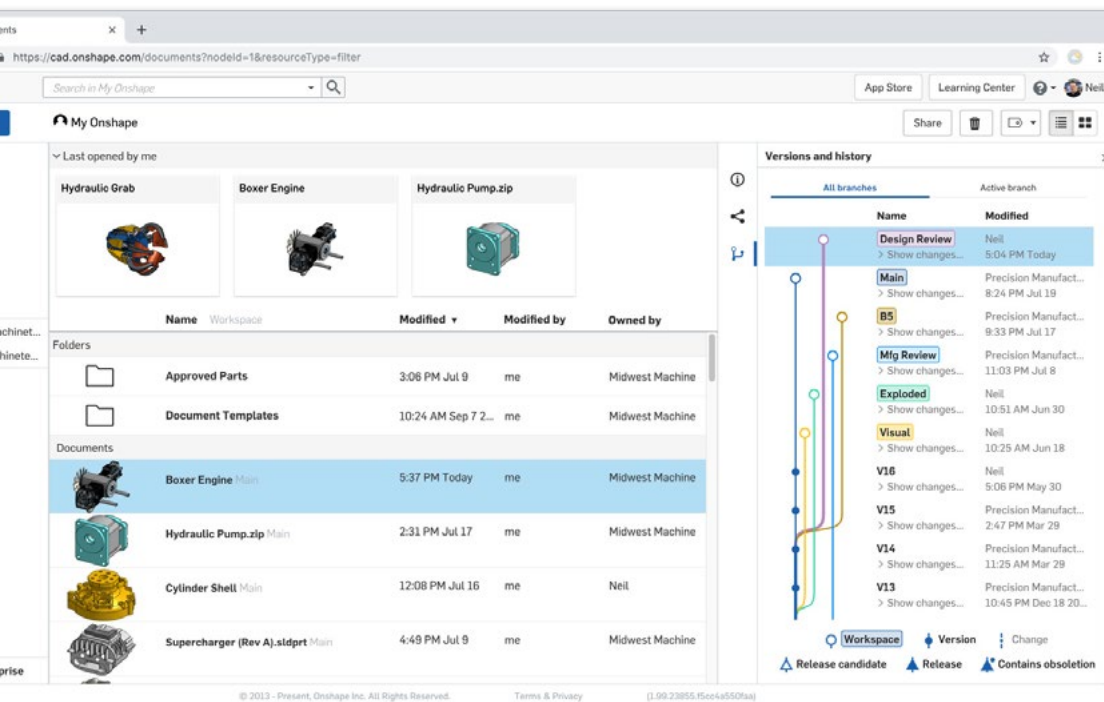
4

Edit History

As any designer can tell you, the creative process is seldom linear. The journey to a great design often requires experimentation, iteration and multiple starts and stops. With unlimited “undo” and “redo,” users can easily move forward or backward to any stage in the editing process.

Closely related to Branching and Merging, the Edit History feature provides a comprehensive list of all changes made to the design document.

The feature enhances team collaboration by letting team members work together and make edits and revisions without fear or concern of losing earlier work. With clear visibility into all edits, users can review, change and undo edits as needed. The Edit History’s audit trail is unalterable and is never erased, offering a reassuring always-available documentation of the life of a design project.



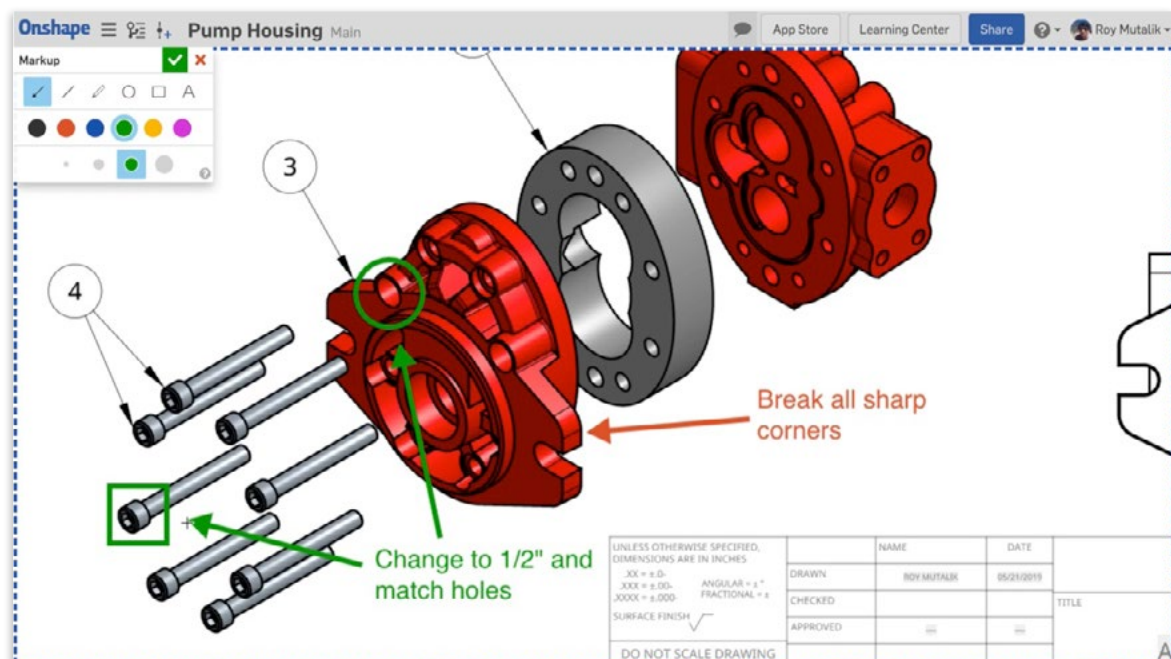
Users can now design more boldly, take more chances and try new ideas – all with the confidence that they can easily go back to an earlier version if needed.

5

Live Comments

Onshape's Live Comments feature allows users to share feedback in real time in a shared Document.

Teammates can share comments with specific individuals or the entire team. Users can view each other's comments, leave replies and receive email notifications when a new comment is made. Because users (with appropriate permissions) can make comments and mentions anywhere in the design document, colleagues no longer need to wait for serial clarifications via email or IM to address stakeholder input.



The intuitive and easy-view nature of the “flyout” in this Onshape application allows users to view comments at a glance and ensures that they are up-to-date on the latest feedback – eliminating the frustrating delays associated with traditional email feedback.

Live Comments adds an overall “chat like” feel to the feedback process, improving efficiency and eliminating ambiguity.

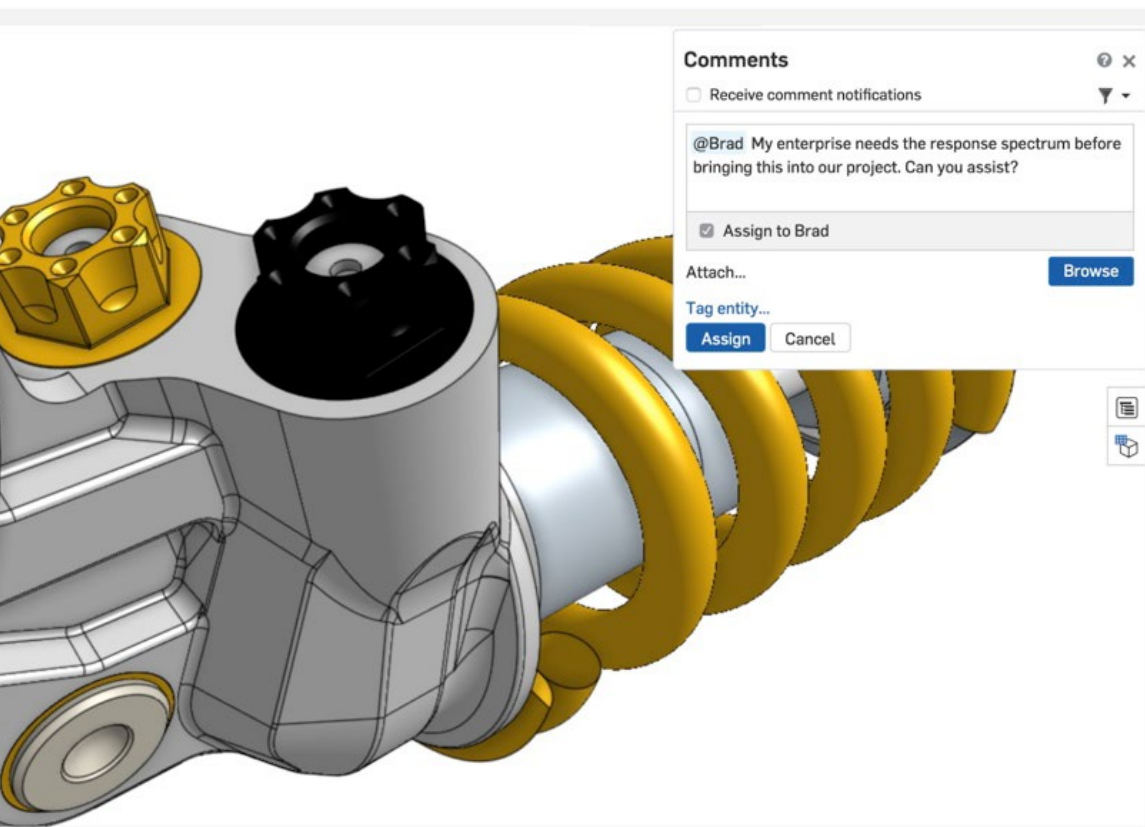
6

Real-Time Notifications

Real-time notifications ensure that designers and engineers receive timely “pushed” updates of comments in both the application and the user’s email.

For extended team stakeholders, the feature lets users know when a thread that they are part of has received a new comment. Because users now can see comments as they are made, real-time notifications improve team engagement and collaboration.

Real-time notifications reduce the administrative hassle and friction of manually logging into a design to simply “get up to speed” on feedback from other team members. The feature helps streamline team collaboration and improves communication, enabling a faster time-to-market.



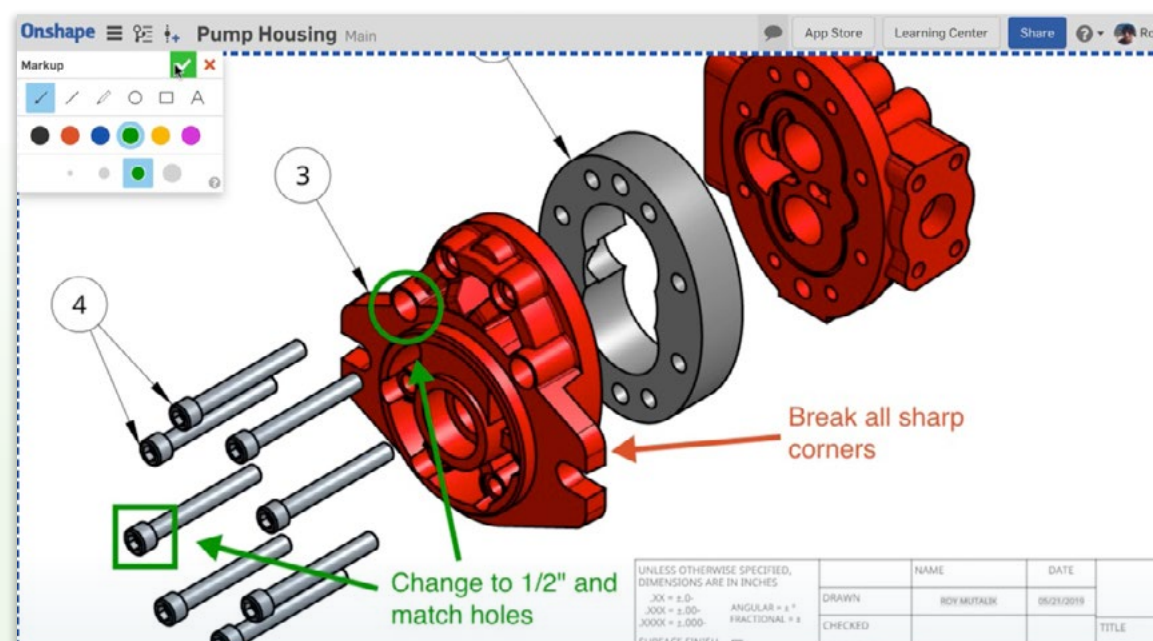
7

Markups

Onshape's Markup feature improves the ability of teammates to share instant feedback with each other. Markups allow users to quickly and conveniently capture an image of a product, assembly or part, mark it up with notation, and share it with a recipient.

The benefit to users is clear. The Markups feature eliminates the hassle of using multiple separate software applications to first take a screenshot, then mark it up, and then send it (usually by email). Rather than using multiple tools and systems, users can now make all markup notations in one place while never leaving Onshape's secure cloud workspace.

With Markups, users and recipients also now have a clearly documented workstream of changes. In addition, the feature keeps all files and key comments in one place – streamlining communication and providing a convenient, accessible record of activity that eliminates the need to constantly “find” an old email. As a result, there is clear documentation later in the process as to why previous decisions were made.

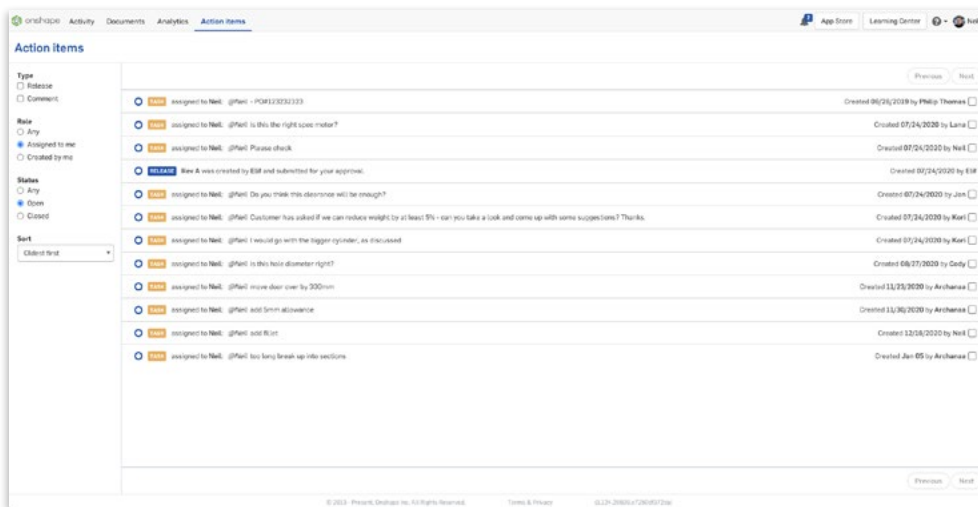




Assigning Tasks

No surprises here. Onshape's Assigning Tasks feature, as the name implies, allows users to quickly assign tasks to individuals or entire teams of individuals. A project lead can effectively use the commenting function to delegate a new assignment or a list of them.

From a user standpoint, the feature provides a clear task list that conveniently resides in the Comments section when they log into the application. This task list is easily referenceable, trackable and shows progress as it happens.



When users log in, they receive a comprehensive list of action items that lets them manage their own workload. Tasks are clearly outlined and nothing falls through the cracks. Everyone is aware of each other's responsibilities and accountability, and tasks simply don't get lost.

From a management standpoint, the feature allows project leaders to easily keep track of what has been assigned, completed, or is in process – and which team members can take on new responsibilities.

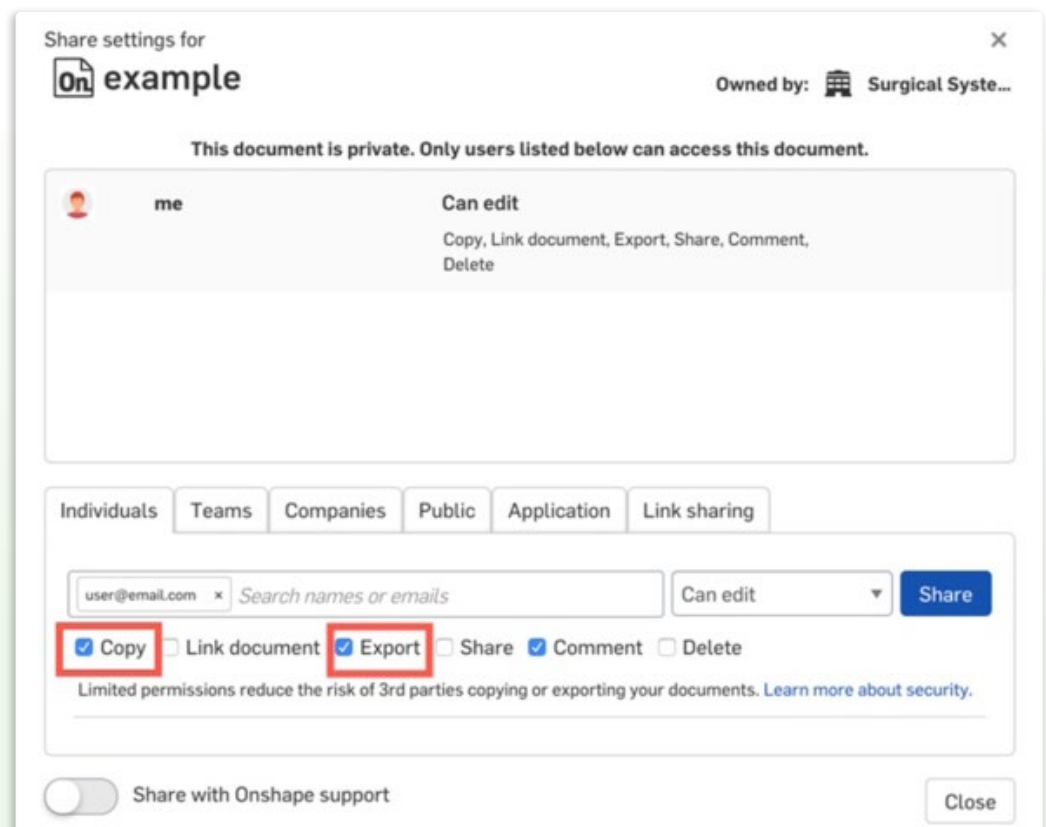
The built-in Assigning Tasks feature eliminates the need for cumbersome, secondary project management software. All your critical information is updated in real time in one central place.



Sharing and Access Permissions

Onshape allows users to control access to their CAD models with robust, secure sharing and permissions settings. Designers and engineers can share their Documents with an array of gated permissions that range from granting full editing privileges (for a trusted partner or vendor) to only offering viewing and/or commenting rights.

It is important to note that Onshape’s Sharing feature allows the original owner to remain in full control over their intellectual property. Users can quickly and easily revoke access permissions when a partnership ends or a project is over. This option to “pull back” a design link at any time is especially helpful when sharing CAD models to multiple vendors responding to RFPs.





Light Users

The Light User function in the [Onshape Enterprise](#) plan allows a core team member to designate a project stakeholder, either internal or external, with secure, limited permissions for providing feedback on a design. This provides flexibility for organizations to share up-to-the-minute product designs with extended team members or partners who typically would not otherwise have CAD access.

Light Users can be granted permission to securely access, view, measure or comment on a CAD model. Unlike full guest permission in Onshape's Sharing feature, the Light User permission prevents a user from editing a file. This can be particularly useful when sharing a design with an external partner – such as a supplier, manufacturer, or even a customer.

Light User functionality provides unparalleled access and collaboration between design teams and external partners. It also allows teams to manage permissions quickly and easily, ensuring secure access to only selected users.

Invite users
✕

Email addresses

client@client.com

User type

Light user
Access to shared data is limited to viewing, commenting and exporting data.

Full user
Can access all features including creating, editing, sharing and releasing data.

Status

Guest user
Guests only have access to data that is shared with them.

[Send invitation](#)

[Cancel](#)

How Onshape Users Collaborate with Onshape Technical Support

By design, these same real-time collaboration tools can be used by Onshape customers to better communicate with Onshape's Technical Support team. Instead of describing an issue through a lengthy email or long verbal description, you can more easily "show" where you need help in your CAD model by using Follow Mode, Markup tools or temporarily granting access to your model with the Sharing feature.

When your Support session is over, you can then instantly "unshare" your model.

For additional Tech Tips, visit Onshape's [Collaboration Resources](#) page.



Chapter 7

How Companies Benefit from the New CAD Collaboration





STIRLING ULTRACOLD

ATHENS, OHIO

COLLABORATION WITH EXTERNAL PARTNERS

Stirling Ultracold designs and manufactures ultra low-temperature (ULT) freezers for the storage and transportation of the COVID-19 vaccines.

The company's ULT freezers are sold to life science, pharmaceutical, biotechnology, academic and clinical research customers around the world. Stirling recently partnered with [UPS Healthcare](#) to supply portable freezers to store vaccines at temperatures ranging from minus 20 degrees to minus 80 degrees Celsius (minus 4 degrees to minus 112 degrees Fahrenheit).

Stirling Ultracold founder and CTO Dave Berchowitz, [a strong advocate for using cloud-based business tools](#), credits Onshape for helping his core design team collaborate more efficiently with a broad array of partners and suppliers spread between multiple locations.

“Onshape’s unique responsive structure allows mechanical designers, supply chain managers, process and quality people to work together on a single document in real time,” he says. “Inter-team communication no longer requires heavy email collaboration because the work site is available to all with an intuitive and familiar layout. The release mechanism for document control is robust, unambiguous and simple, resulting in a more productive Stirling team.”





DELTA DEVELOPMENT

TUCSON, ARIZONA

COLLABORATION WITH CORE DESIGN TEAM

Delta Development is an R&D company specializing in military applications for cooling and heating systems in extreme environments. The product development company was contracted by the U.S. Air Force to design and manufacture the **Autonomous Portable Refrigeration Unit (APRU)** for deployment by medics on the battlefield.

Current military procedures require wounded troops needing blood to be evacuated by helicopter to the nearest base or field hospital. The APRU enables medics to replenish blood to patients faster on the ground.

Onshape's **real-time collaboration** tools allow multiple engineers to work simultaneously on the same 3D CAD model in the cloud. Whenever one team member makes a design change, everyone else on the team instantly sees it. A comprehensive Edit History tracks who made what change and when, allowing teams to instantly revert back to any prior stage of the design.



"Whenever I describe Onshape to anybody, I always say, 'It's like the Google Docs of CAD,' and they're instantly like, 'Oh, that makes so much sense. Why haven't they (the CAD industry) done that already?'" says Robert Futch, CTO of Delta Development.

"Being able to collaborate in a browser just makes CAD extremely more useful for a distributed team like ourselves. I previously spent 30 years doing it the old way and I'm very glad we decided to change our approach," adds chief engineer Bill Barg, who has used a number of file-based, on-premise CAD systems in his career.

Although its core design team is based in Arizona, Delta Development has an electrical engineer based in Montana and frequently partners with an injection molding company in Detroit.

“The ability to do mechanical design reviews remotely has been critical for us,” says Futch. “When the COVID-19 pandemic forced us to work at home, we were able to continue as normal with our design process.”



BESPOKE ENGINEERING

LONSDALE, SOUTH AUSTRALIA

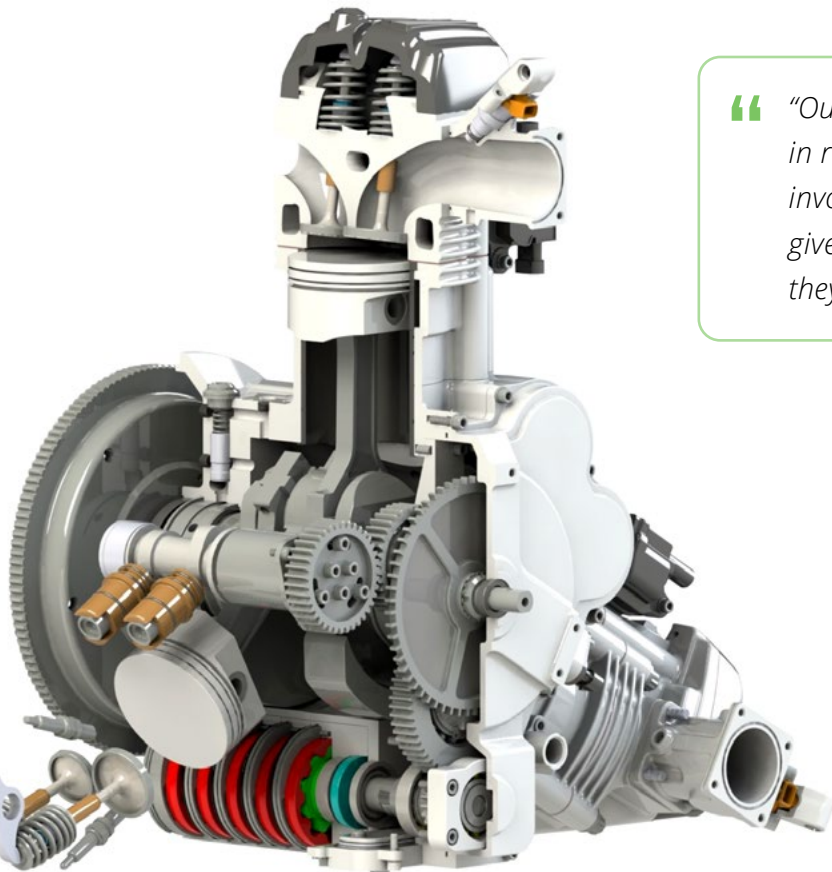
COLLABORATION WITH EXTERNAL PARTNERS

Bespoke Engineering is a product development firm offering a comprehensive suite of engineering services, from invention to production, all under one roof.

The Bespoke team includes industrial designers, mechanical, automotive and mechatronic engineers, machinists and technicians. The company has developed its **own brands** of motors and components for the automotive and aviation industries. Its high-performance **Radial Motion** engines are customized for motorsport enthusiasts and custom car builders around the world.

“Every custom engine we make is going into a different vehicle or aircraft,” notes Nick Mebberson, Bespoke’s founder and managing director. “So we need to closely interact with our customers and show them how everything fits. We can easily share the CAD model of a Comvee, for example, and say here’s the model of the engine and you can have a look at it in 3D.”

““Our customers can watch our progress on a project in real time in Onshape and it makes them feel really involved in the whole process,” Mebberson says. “You give them a link, and they can see design changes as they happen.””





DORIS DEV

NEW YORK/HONG KONG

COLLABORATION WITH EXTENDED INTERNAL TEAM AND EXTERNAL PARTNERS

Doris Dev is an on-demand, full-suite product development agency based in New York City with a dedicated sourcing and manufacturing team in Hong Kong. The firm can lead product development projects from idea to market, including industrial design, mechanical and electrical engineering, sourcing, manufacturing, compliance and fulfillment.

The company also creates its own brands of consumer products, including most recently the **Canopy humidifier**, billed as “Healthy Skin’s Best Kept Secret.”

Doris Dev relies on cloud-based Onshape for enabling its core engineering team to share early product designs with internal stakeholders across the company and incorporate their feedback into new iterations faster.



“In Onshape, we are able to quickly make design changes with input from multiple designers at the same time because we’re all able to share design documents,” says Lucas Lappe, Head of Product. “We’re all able to preview the designs with nine technical team members and the marketing and branding teams who can see the product and provide feedback without ever needing a CAD license or the ability to download a CAD file and open it up.”

Doris Dev also credits Onshape for improving communication between its core design team and their clients, allowing them to monitor the progress of a project 24/7.

“What we’re able to do with Onshape is give our clients a living link. They can watch us work and see all the changes we’re making,” says Lappe. “We do this freely because we want all of our clients to see how good, bad and messy the development process can be sometimes. We believe the more information they have, the better they’re going to understand us and the better clients they’re going to be.”

““In the Onshape Document, our clients can make comments when they see something they don’t like, and we can say, ‘Hey, okay. Do you want to make this change? Here’s what happens when we make this change, and here’s why we can or can’t make that change to the design.’ And they’re able to see all that in real time,” Lappe adds.



LOOP MEDICAL

LAUSANNE, SWITZERLAND

COLLABORATION WITH CORE DESIGN TEAM

Loop Medical is an R&D firm developing a new minimally invasive device to extract blood from capillaries just below the skin versus conventional methods that collect blood from the vein. Funded by the [Bill and Melinda Gates Foundation](#), the breakthrough technology is aimed at simplifying blood diagnostic testing at health care facilities around the world – typically in developing nations where medical resources and standards are subpar. The company’s research also focuses on reducing the spread of infectious diseases through used contaminated needles.



Loop Medical relies on cloud-based Onshape to speed up collaboration between its engineering teams in Switzerland, Germany and France.

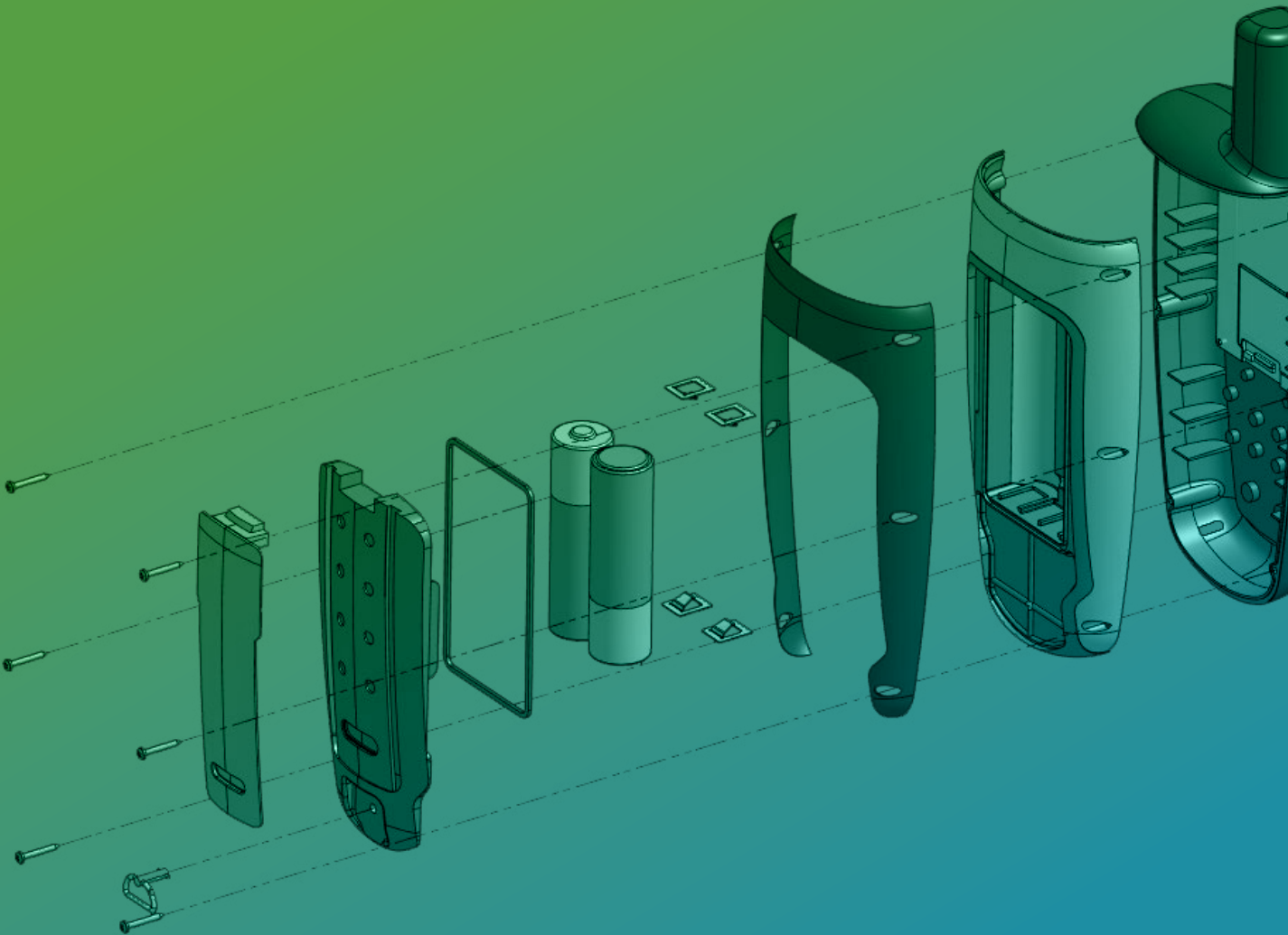
“Before Onshape, sharing design files used to be very frustrating because partners would always be working on a different version of the CAD system and we couldn’t open up each other’s work without having long email conversations or using Google Drive. Communication was very inefficient,” says Loop founder Arthur Queval.

“Onshape’s workflow is really smooth and it’s much easier to share our work and move on to the next task,” Queval adds. *“As the CEO, I can always see the status of a design and comment or address problems in real time.”*



Chapter 8

How Onshape's Cloud-Based Product Development Platform Enables Better Collaboration





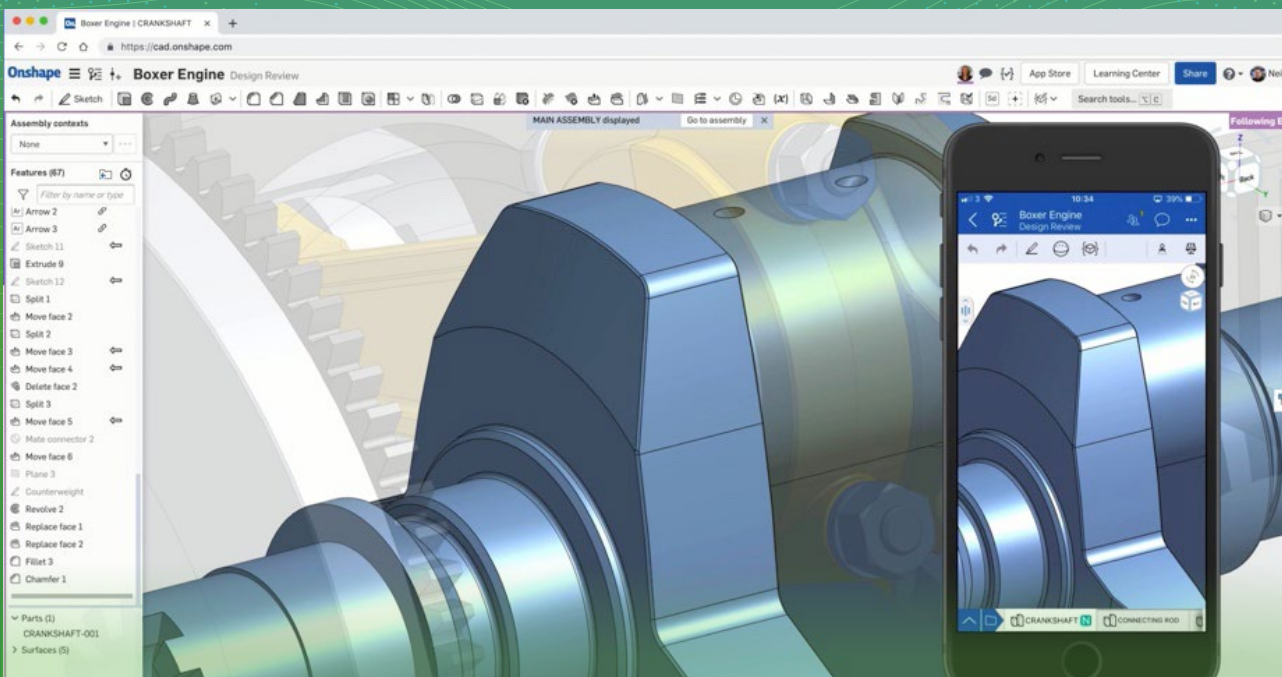
onshape®

The Challenge

At a time of the “New Normal” of remote work, companies are realizing they must embrace new technologies to improve collaboration across their organizations. Product development teams are recognizing the need to:

- Empower users and core teams with simultaneous collaboration.
- Ensure that extended internal team members and stakeholders can collaborate.
- Improve collaboration with third-party external suppliers and manufacturers located halfway around the globe.

The new reality of remote work is highlighting the need for improved cloud-based solutions to empower workers. No longer are legacy, file-based CAD systems sufficient to achieve the needed collaboration. Today's product leaders are turning to cloud-based platforms to enable the collaboration and teamwork necessary to accelerate time-to-market.



Real-Time Teamwork: Onshape offers simultaneous collaboration on multiple devices, including mobile.

Onshape is a next-generation Software-as-a-Service (SaaS) product development platform that helps businesses of all sizes modernize and accelerate their design and manufacturing processes.

The cloud-native platform is the only all-in-one system that combines a robust CAD system with real-time collaboration and data management, workflows, admin tools, and an API with more than 50 engineering applications. Onshape helps extended design teams work together faster from any location and helps executives make better decisions with real-time business analytics and unprecedented visibility into their company's operations.

Here's a quick look at why Onshape is uniquely architected to help boost product development collaboration:



Onshape Empowers Workers with Remote Access

Onshape empowers designers and engineers with the freedom to work remotely from any location. Users can stay productive and work on their CAD models from any device – computer, tablet or phone – using an internet browser or mobile app (iOS or Android).

Onshape users don't have to worry about rushing back to the office to make time-sensitive design changes or to respond to customers. Businesses can accelerate their time-to-market as individuals have the ability to communicate, collaborate and create in real time.

With the “anywhere” connectivity of the Onshape platform, managers no longer need to wait for formal scheduled design reviews. Instead, they can stay up-to-date on the progress of their teams 24/7 – reviewing, approving and even releasing products to manufacturing from the convenience of a mobile phone if needed.



Onshape Harnesses Teamwork as the Path to Innovation

Onshape uniquely provides team members with real-time, simultaneous access to shared 3D CAD models – users frequently compare the SaaS platform to the “Google Docs of CAD.”

Because there is always only one “single source of truth,” users no longer face the administrative hassles of copying files and grappling with version control issues. Onshape allows teams to work in parallel versus serially, eliminating needless downtime. Users can stay productive working on shared Documents instead of waiting on colleagues to check in and check out files.

Designers and engineers can now work free from the fear of lost work due to crashes or overwriting files. Onshape also encourages the creative risks that fuel innovation. Engineers can experiment with new ideas in alternative branches, later merging the best elements into the final product. A comprehensive “Edit History” tracks who made what change and when, allowing users to instantly revert back to any prior stage of the design if needed.



Onshape Turns Data into Insights to Improve Operational Efficiencies

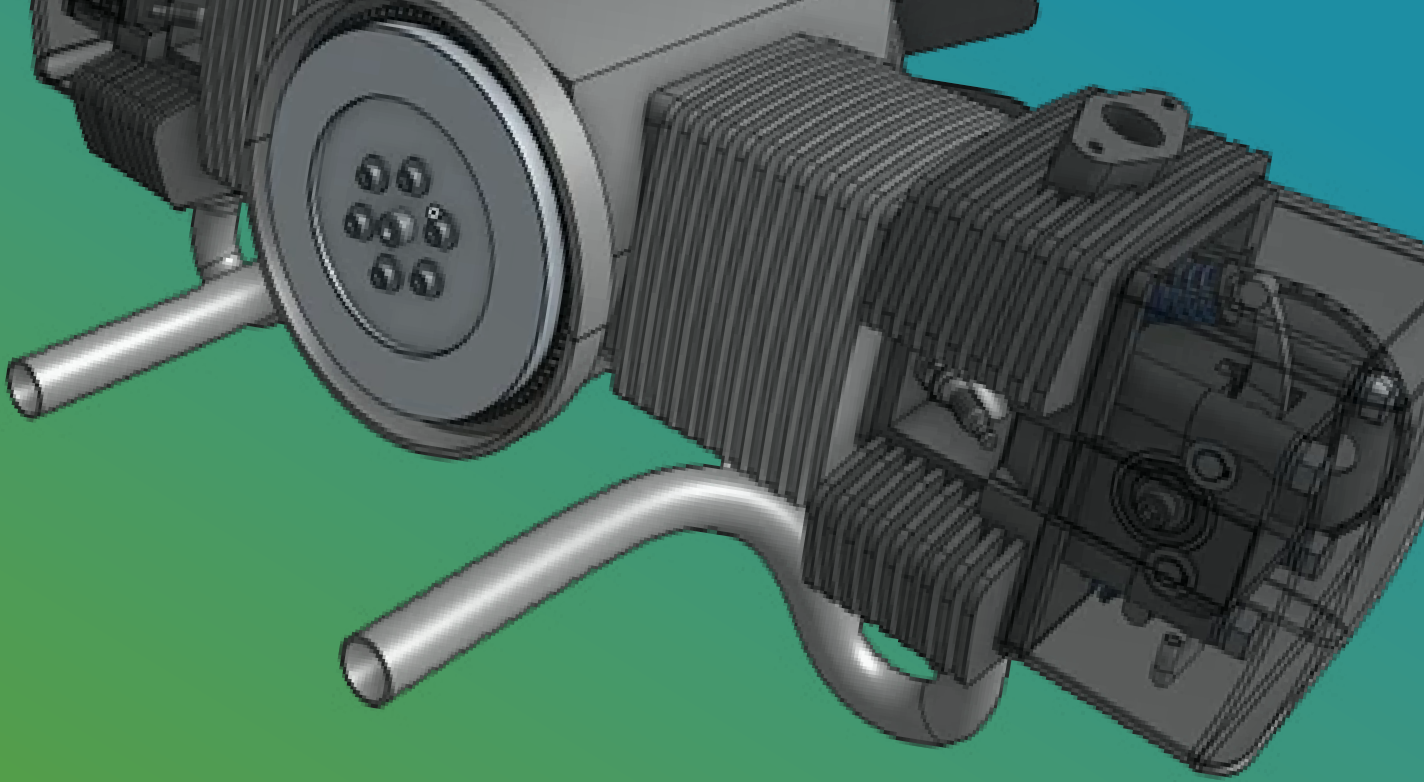
With integrated data management and analytics, the Onshape platform allows organizations unprecedented access to time-sensitive information during the product development process. It accelerates time-to-market by turning data into actionable insights, allowing managers to better identify and address process inefficiencies, bottlenecks and other barriers in the product lifecycle.

Onshape's real-time business analytics helps executives decide how to best deploy personnel across ongoing projects to where resources are needed the most, ensuring product development stays on track and that critical customer commitments are met. Furthermore, Onshape helps organizations create uniform, efficient and replicable "best practices" for their teams to follow on every project.



Onshape Helps Businesses of All Sizes Prepare for "What's Next"

As product development organizations address the continued challenges of the pandemic and seek to position themselves to succeed in the future, they are recognizing the critical role that cloud-based technology will play. Onshape's SaaS platform is enabling companies of all sizes to ensure seamless remote access, better collaboration, and improved product innovation. In addition, Onshape is helping product leaders ensure that their organizations stay flexible, agile and resilient, in order to address future challenges and "What's Next."



Onshape is the only Software-as-a-Service (SaaS) product development platform that combines powerful CAD tools with real-time data management, collaboration, and business analytics. Executives and managers can get up-to-the-minute progress reports on a project's status and built-in version control prevents costly delays and manufacturing errors.

Sign up for a free Onshape Professional Trial and experience the benefits of cloud-native product design today!

GET STARTED

Onshape.com

Onshape is a [PTC](#) Business.