7 BUILDING BLOCKS FOR EFFECTIVE MCAD AND ECAD COLLABORATION

DASSAULT SYSTEMES

Traditionally, mechanical and electrical engineers traveled separate product development paths. The rise in popularity and expectation for smart and connected products is forcing a change in the MCAD/ECAD product development process.

Consumer and industrial sectors now demand smart and connected products, from industrial machines and robots to a vast range of electronics, medical devices, and more. Therefore, integrating electronics into mechanical designs is becoming increasingly pervasive, and requires engineers to collaborate more closely than ever before.

The widespread development of smaller, more efficient, and more capable sensors, actuators, and microprocessors allows engineers and designers to integrate them into mechanical systems. This integration is further enabled by advancements in micro-electromechanical systems (MEMS), embedded systems, and Internet of Things (IoT) technologies.

This trend favors products that perform mechanical functions while incorporating intelligent control and connectivity. The interdependence of mechanical systems and electronics underscores a critical shift because the domains are increasingly linked. In the bigger picture, the integration of MCAD and ECAD creates myriad opportunities for both mechanical and electrical engineers to collaborate and innovate.

OVERCOMING CHALLENGES

Integrated 3D CAD solutions are increasingly vital to optimizing the entire design-to-manufacturing process, enabling you to reduce inefficiencies and bring better products to market faster than your competition. Using connected CAD tools allows for concurrent operations, moving away from the traditional serial workflows. Integrated tools can help your engineers eliminate redundancies, unnecessary effort, and the potential for error.

Historically, every element of the product development process was conducted serially. Companies typically complete mechanical, electrical, and electronic designs sequentially and with different design tools. Waiting until all your design work was complete made sense before initiating design review, validation, and production.

Any business bringing products to today's market cannot afford this isolated approach to design, where minimal collaboration happens between your mechanical and electrical engineers. Furthermore, a nonintegrated approach increases the number of engineering changes and rework, which adds time and cost to your company's bottom line.

To truly streamline your operations and enhance collaboration between your mechanical and electrical teams, you may want to implement an integrated design approach. Here are the seven essential building blocks for effective MCAD and ECAD collaboration when you're ready to transform your product development workflow and achieve next-level results.

1. Adopt standards
2. Automate version control
3. Implement modern tools
4. Leverage past designs
5. Integrate and automate
6. Optimize documentation
7. Employ innovative solutions

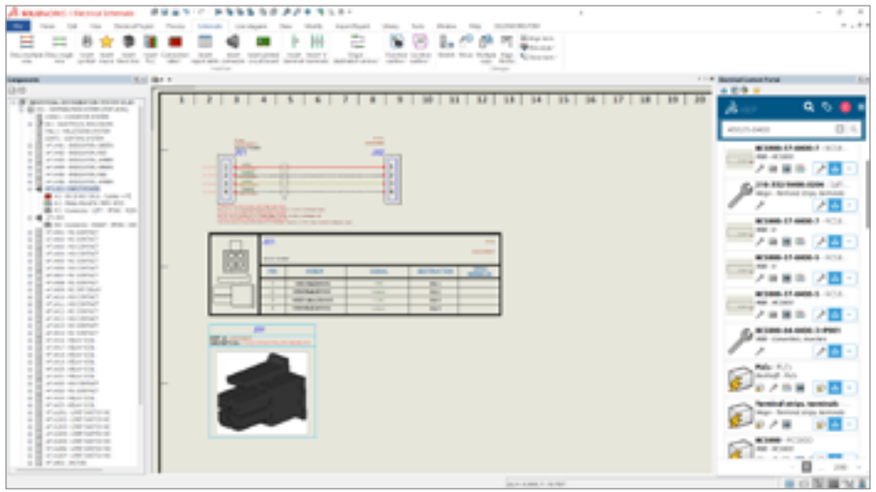
Keep reading to explore how these building blocks can transform your design process—saving time, cutting costs, reducing errors, enhancing communication, and sparking team-driven innovation.

ADOPT STANDARDS

What if every engineer in your organization spoke a different language? This scenario is not far from the reality of electrical design without standardization. When engineers maintain their own personal libraries of symbols and manufacturer parts, significant inefficiencies arise throughout design and production.

Unique components and symbols exclusively used by individual engineers hinder collaboration and make it difficult for product development teams to interpret and work with designs. This often leads to design errors and wasted time clarifying design elements, complicating the review process and slowing onboarding as new engineers struggle with unfamiliar symbols and components. If your industry has strict regulatory requirements, these variabilities can also result in compliance issues and delays in product approvals.

Furthermore, when engineers rely on a private directory of parts not shared with anyone else at the company, managing parts becomes inefficient, and engineers often duplicate efforts in part creation, causing inconsistencies and wasted time across an organization. Consequently, the efficient reuse of part designs is almost non-existent, leading to increased costs and extended development times.



Standards Streamline the Process

Integrated MCAD/ECAD systems that work in unison can help speed the standardization process to improve operational efficiency and enhance the overall quality and reliability of products.

You can adopt a unified set of symbols and parts across your engineering projects to streamline the entire process, from purchasing to manufacturing, assembly, and installation. This standardization establishes a shared visual language among your engineers, significantly reducing design documentation misinterpretations and ensuring project consistency.

In regulated industries, using standardized symbols safeguards compliance with industry standards and regulations, making your design reviews more efficient. By minimizing the time your engineers spend creating or interpreting custom symbols, they can focus on core design work, which speeds up project timelines and reduces the need for costly corrections.

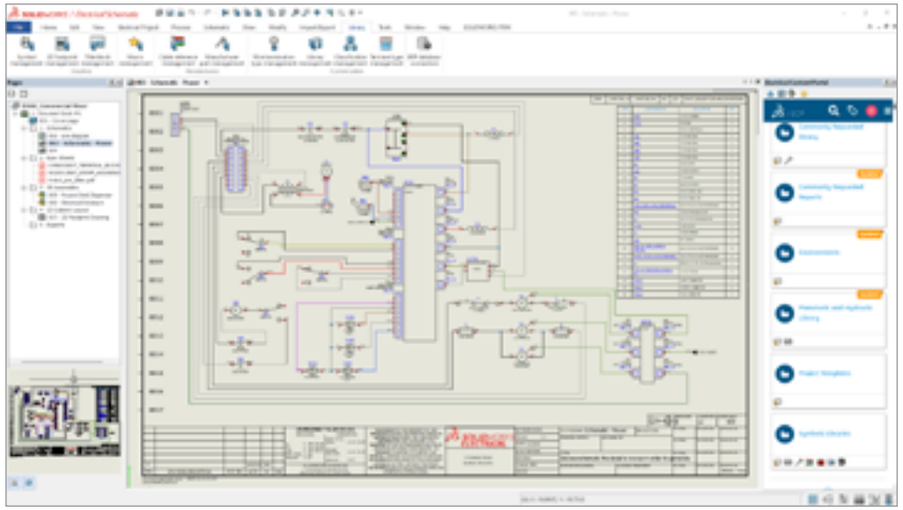
Standardizing symbols and manufacturer parts within an advanced, unified system offers several benefits that can significantly enhance efficiency. Your engineers will make fewer errors and you will see improved quality control and easier collaboration across teams and departments, and even with supplier companies.

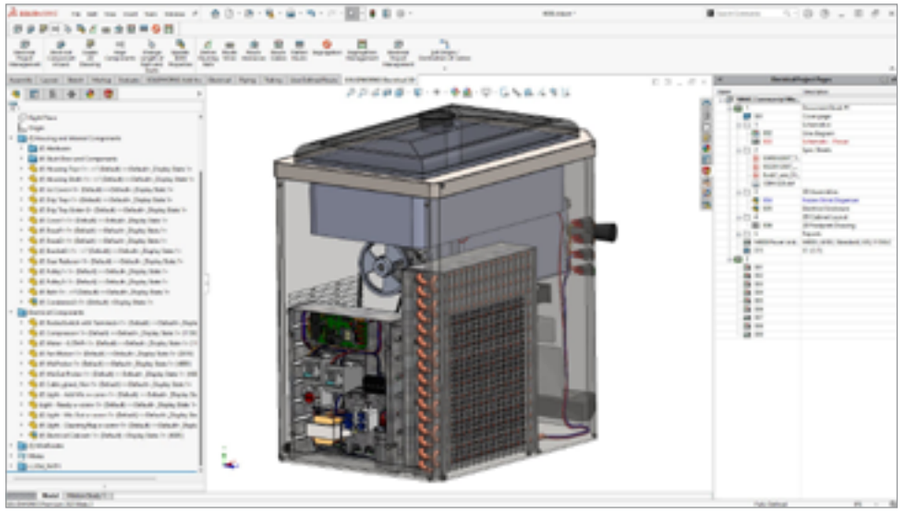
AUTOMATE VERSION CONTROL

Even when mechanical engineers work well together, keeping everyone on the same page is a constant challenge. Adding electrical engineers to the project mix, which is increasingly becoming a requirement, can make keeping track of who is doing what and when even more complex. You may lose your ability to deliver fast and efficiently, especially when your mechanical and electrical designers use different tools to design parts and components.

Manual tracking of design versions often leads to inconsistencies and errors as team members of every discipline inadvertently work on outdated versions of designs or documents. Confusion takes root, which hinders the design process and can increase the risk of costly errors downstream. The confusion extends to tracking modifications, as it becomes cumbersome to determine who altered what. In addition, the reasoning and timing of such changes, which are crucial for understanding the progression and rationale behind a design's evolution or design intent, can be obscured.

Without automated version control, engineering teams are often limited in their ability to revert to previous versions when newer iterations reveal problems. Furthermore, version control issues also affect critical areas, such as design reviews, approvals, and regulatory compliance, particularly in industries that mandate a clear demonstration of a history of design changes.





Harmonious Product Development

Implementing a data management system addresses these issues by providing a single source of truth for project data for mechanical and electrical engineers and all other stakeholders. Connecting all users to a unified product definition that enables real-time updates and access to the latest product and project information ensures everyone is aligned and working from the most recent version, reducing errors and wasted time while driving efficiency in the design process.

Advanced data management systems are often cloud-based and provide a platform of apps that streamline product lifecycle management from inception to obsolescence. All data is updated in real time as changes are made, which ensures that every team member, from engineers to executives, has access to the latest updates and can efficiently engage in the design review process. This promotes faster design maturity and enhanced decision-making.

With these cloud-based tools, you can also enable your multidisciplinary teams to simplify defining and executing project tasks while ensuring consistency by storing your data in a centralized repository. Built-in version-management tools automatically flag and update outdated components to maintain current and accurate data across the organization.

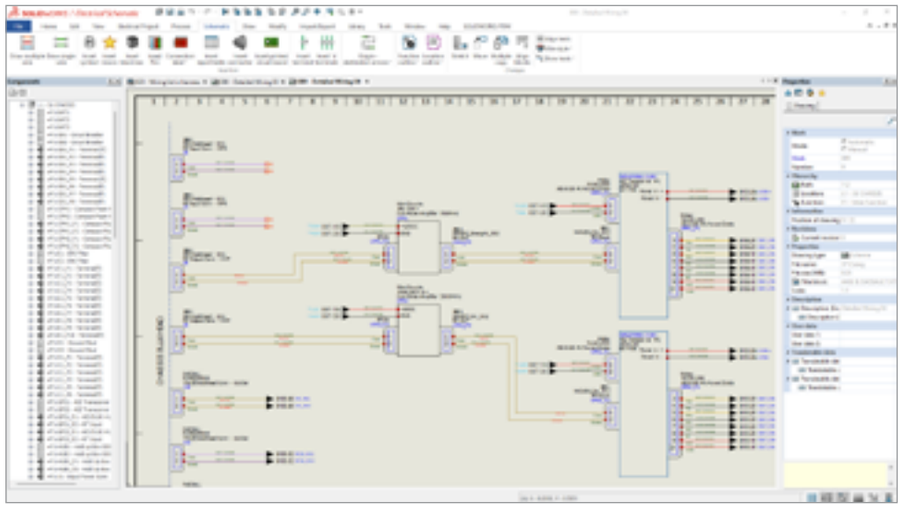
Make no mistake. Modern product development demands a precise and controlled process for all project stakeholders, including remote employees, vendors, and suppliers. An advanced data management system enables you to synchronize product development teams to help you beat your competition to market.

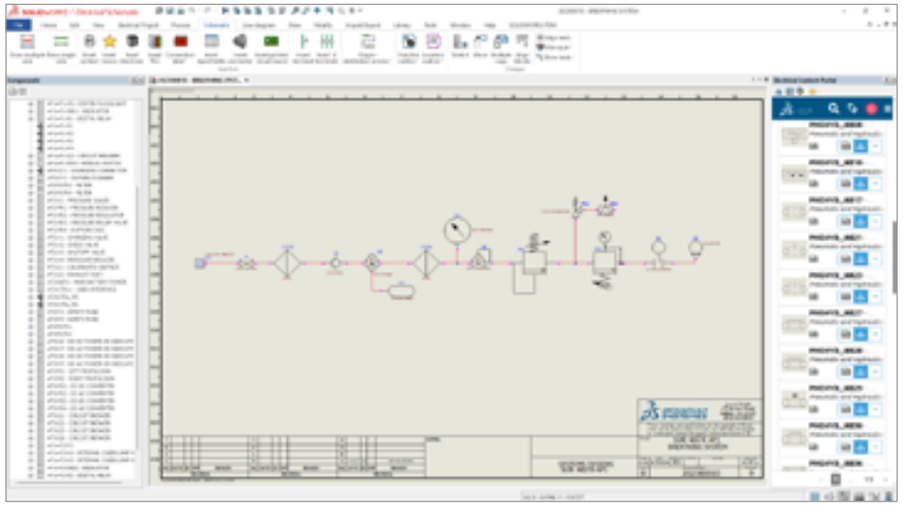
IMPLEMENT MODERN TOOLS

You can't deny that 2D CAD for electrical engineers remains a vital tool in mechanical design mainly due to its cost-effectiveness and simplicity. The ease of use and lower computational demands of 2D CAD mean it can operate smoothly on less advanced, more cost-effective computers.

For many industries, traditional 2D plans are still essential, as they provide sufficient detail for numerous applications, such as schematic designs and layout planning. Also, 2D CAD supports legacy data, allowing engineers to easily update and refer to a vast archive of drawings without needing to convert them for compatibility.

However, along with these advantages, significant disadvantages have evolved. Overreliance on simplistic legacy tools for electrical design poses substantial challenges as product complexities increase, particularly in products that integrate mechanical and electrical components. Rudimentary 2D drafting tools, which operate primarily with nonintelligent blocks, lines, and text, have become inadequate for handling sophisticated and complex modern product designs. Engineers have experienced increasing difficulty managing and coordinating myriad components using such tools. This limitation can lead to errors, inefficiencies, and oversights in the design process.



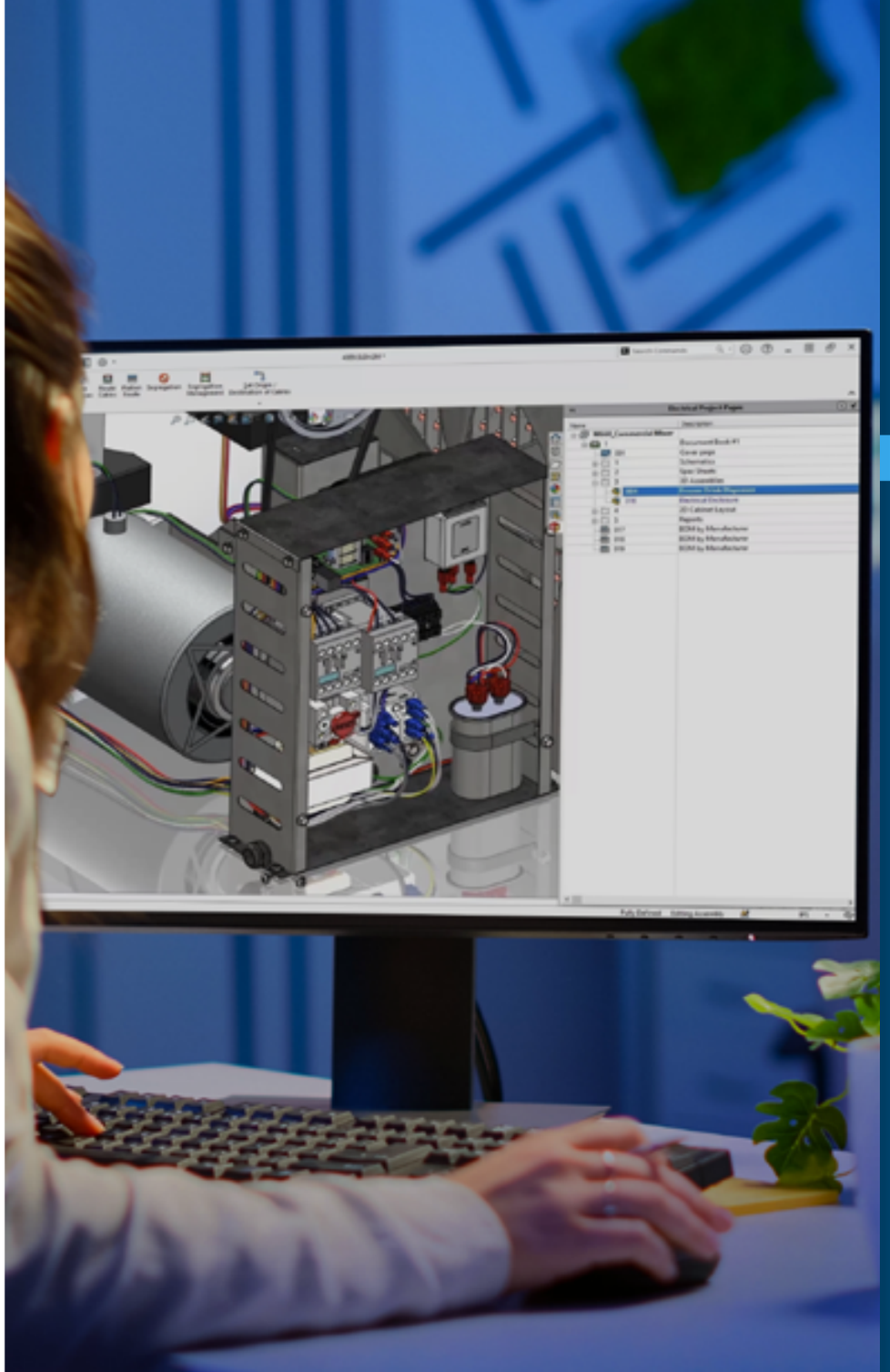


Handle Complexity With Modern Tools

Many organizations have recognized the need for advanced 3D CAD solutions that can better support the complex nature of projects in which mechanical and electrical parts and components are tightly woven together. Because 3D CAD offers enhanced visualization, it helps sell product design ideas to decision-makers outside of engineering, such as managers and executives who cannot visualize what 2D designs convey. Therefore, 3D models significantly reduce misinterpretations common with 2D drawings and speed up the decision-making process.

Beyond improved communication among stakeholders, the design and documentation process is integrated and streamlined with automated tools for tasks like generating bills of materials. Furthermore, 3D CAD models can be validated using thermal, structural, and electromagnetic simulation, allowing engineers to virtually test and refine mechanical and electrical parts and assemblies before physical prototyping.

The capabilities of an integrated 3D CAD system collectively lead to more accurate designs, improved communication, faster design cycles, and quicker performance optimization through virtual testing.



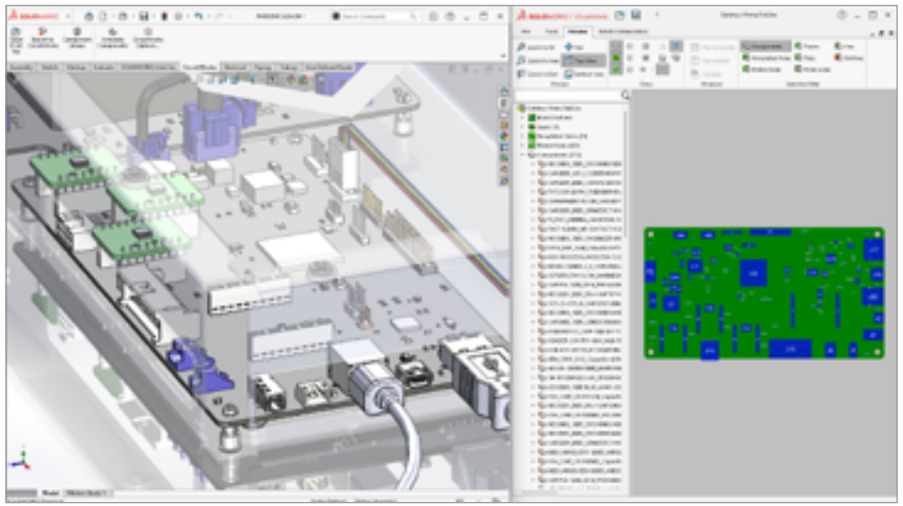
LEVERAGE PAST DESIGNS

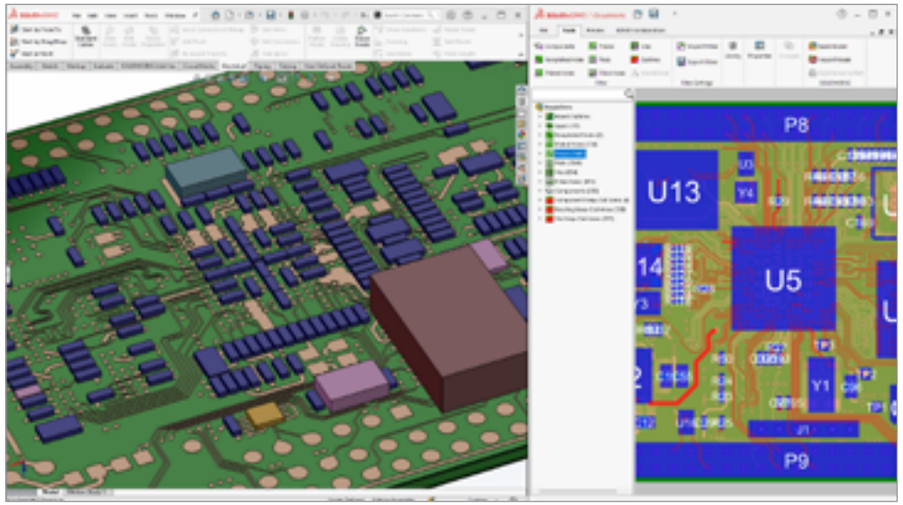
Reusing circuit designs can be an efficient way to streamline development in both mechanical and electrical engineering. However, reusing designs presents its own set of challenges.

Components from an existing design may not be compatible with new requirements or technologies, which can lead to significant redesign challenges in integrating newer or different components that meet the current performance needs. Similarly, finding replacements for obsolete components no longer in production can be particularly challenging. Furthermore, changes resulting from replacement components might ripple through a design, affecting mechanical layout and electrical performance. This can wreak havoc in a non-integrated design environment.

Additionally, standards and regulations may have changed since the original design was completed. Reusing old designs without thorough review and updates for current compliance can result in legal and safety issues. Or a design created for a specific application or scale might not perform effectively when modified for a different application or significantly different scale. This can significantly delay a schedule with the need for extensive testing and modification.

As products evolve over time and more technology gets packed into tighter spaces, mechanical and thermal considerations from the original design may need to be reconsidered, especially if the product was not intended for its current environment. Ignoring these kinds of issues can lead to reliability problems. Also, integrating reused designs with modern systems (such as digital interfaces or newer electronic components) often requires additional interface circuitry or software, complicating the overall design.



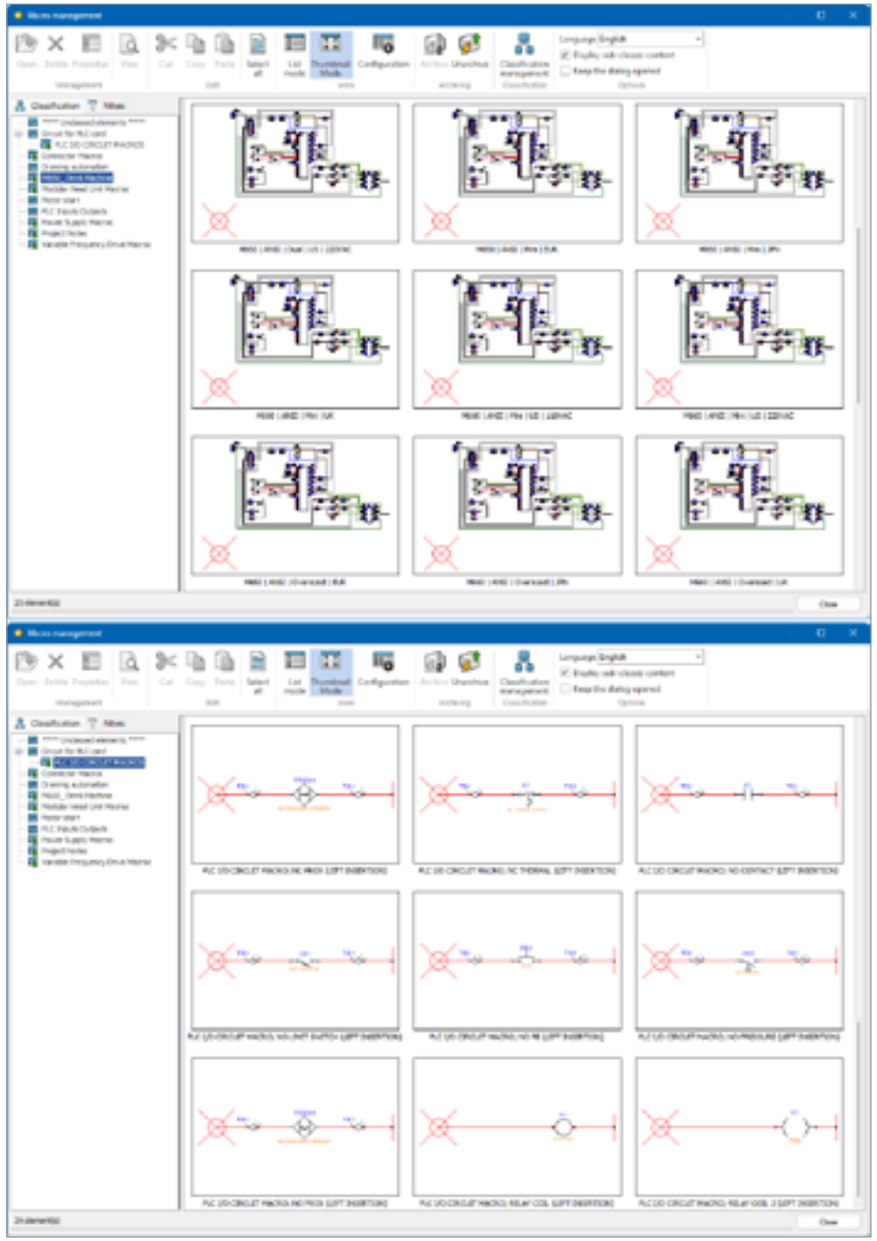


Intelligent Design Reuse

Circuit design reuse, particularly through the use of macros, offers significant advantages over the traditional method of copying and pasting graphic representations. By reusing circuit designs that incorporate built-in intelligence, engineers can ensure consistency and accuracy across multiple projects and significantly reduce the risk of errors.

Macros also enable encapsulation of complex circuit logic and parameters, which means such designs can be efficiently replicated with all their functional attributes intact. This not only saves time by eliminating the need to repeatedly recreate intricate circuits from scratch but also enhances the overall reliability and performance of the electrical systems designed.

Harnessing the power of circuit design reuse through macros elevates both productivity and quality in electrical design. When you pair it with a robust integrated system like SOLIDWORKS®, which facilitates a seamless and parametric connection between mechanical and electrical design projects, you not only streamline workflows but also enhance the precision and efficiency of the design process: the best of both worlds for your mechanical and electrical engineers.



INTEGRATE AND AUTOMATE

A lack of automation and collaboration in the electrical design and development process can significantly affect project outcomes, particularly in complex assemblies and installations. Without an integrated system that streamlines data sharing and communication, the intent behind the original design can be misunderstood or lost, which can lead to discrepancies and rework. Furthermore, designers are more likely to make mistakes that get overlooked, which can proliferate throughout the design process and result in more downstream errors.

You can alleviate these issues with integrated design software that automates mundane tasks and includes simulation tools that enable your designers to test and refine their designs under various scenarios before they go into production. Without these tools, testing may be less thorough, thereby increasing costs and the risk of product failures. While investing in automation software may seem expensive up front, the investment can reap substantial long-term savings through increased efficiency, reduced error rates, and minimized rework.

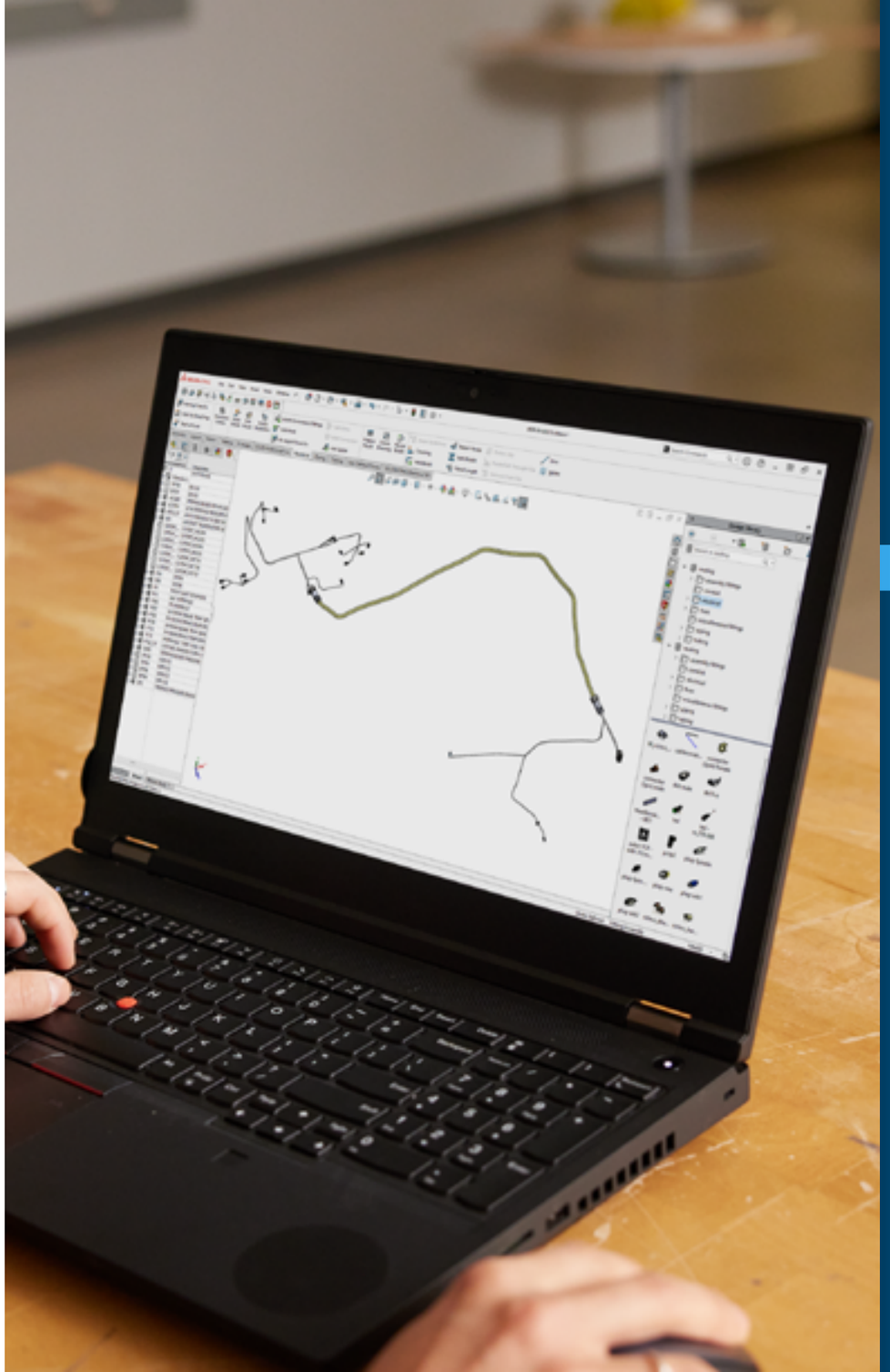
Efficiency That Gets Results

Integrating automation within mechanical and electrical development is pivotal, especially for complex assemblies and installations.

Automated tools, such as the 3D routing capabilities found in SOLIDWORKS, enable teams to visualize and comprehend the spatial arrangements of wires and conductors relative to other equipment. This capability not only creates a visual representation, it transforms abstract diagrams into interactive 3D models that can be manipulated and tested in virtual environments. Providing a clear, tangible view of the intended installation ensures that all your team members consistently understand the project requirements.

Leveraging automation within an integrated design environment significantly enhances the quality of project documentation by generating real-time updates to documentation as changes occur in the design. It also reduces the likelihood of errors stemming from outdated information. Such precise and up-to-date documentation facilitates maintaining design integrity throughout development. It provides engineers and technicians with explicit instructions and guidelines and helps ensure that each component is installed correctly and operates as intended.

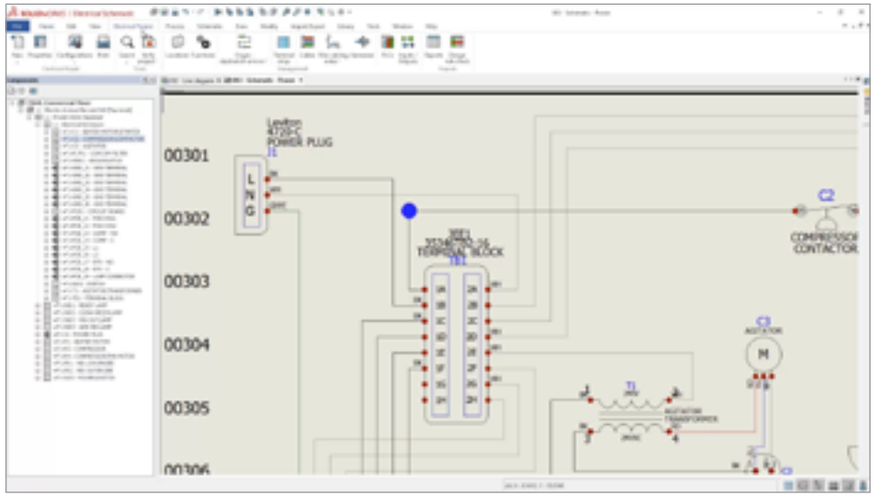
Using integrated design tools to automate tasks results in a more streamlined and efficient product development process. Your team can increase productivity by spending less time correcting mistakes or clarifying ambiguous design details while improving throughput and reducing the time to market.



OPTIMIZE DOCUMENTATION

Thorough documentation is crucial in electrical design, particularly to ensure that assembly and installation processes are consistent and accurate.

Poor documentation can create significant risks for your company. Missing or inaccurate information can lead to safety hazards and increase the likelihood of product failure and corresponding loss of revenue. Inadequate or unclear documentation can lead to inconsistent equipment assembly, which can result in operational failures and increased costs due to rework. In addition, substandard documentation may hinder your company's ability to compete effectively for new contracts. Comprehensive and accurate records provide a competitive edge in bid situations by showcasing your team's thoroughness and attention to detail.

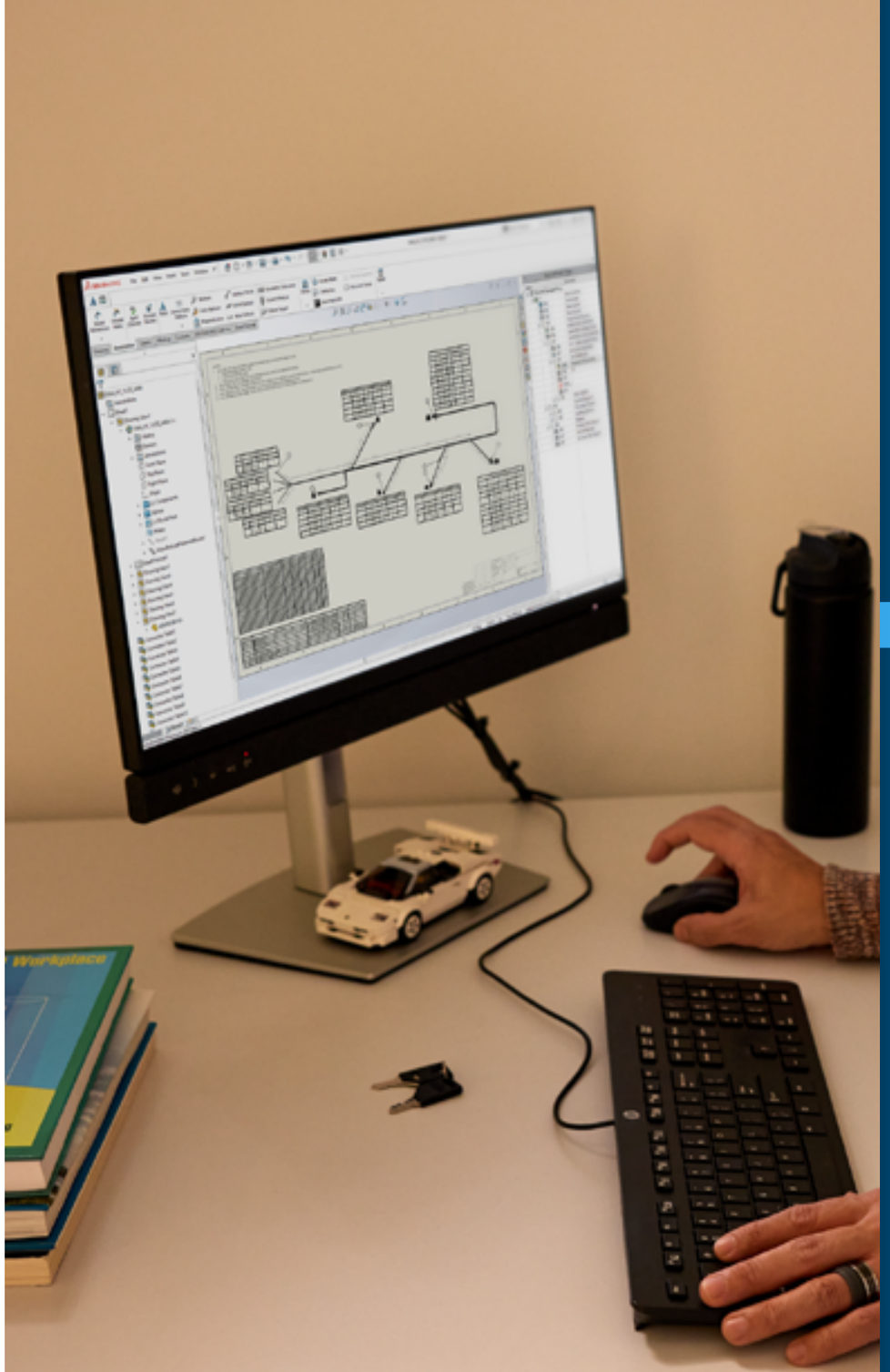


Good Documentation Mitigates Risk

Precise technical documentation practices provide your assembly and installation teams with clear, concise, and comprehensive visual guides to ensure they install every component according to specifications. By improving the quality of documentation, you can significantly reduce the ambiguity and errors that can plague the assembly process while helping ensure reliable outcomes.

Effective documentation of your mechanical and electrical engineering projects also enhances efficiency and safety while reducing costs and mitigating risks associated with miscommunication and human error. For instance, quality assurance in documentation ensures that all assembly and installation standards are met, along with safeguards against errors that could lead to costly recalls or even dangerous product failures.

Integrated mechanical and electrical CAD systems, especially those connected to the cloud, facilitate better technical documentation practices and compliance with industry standards, as all data is centrally located and can be easily accessed, edited, and reviewed. What's more, all changes update in real time and automatically propagate throughout the entire product definition. An integrated environment fosters a more holistic approach to product design and documentation and enhances the efficiency and quality of your engineering projects.

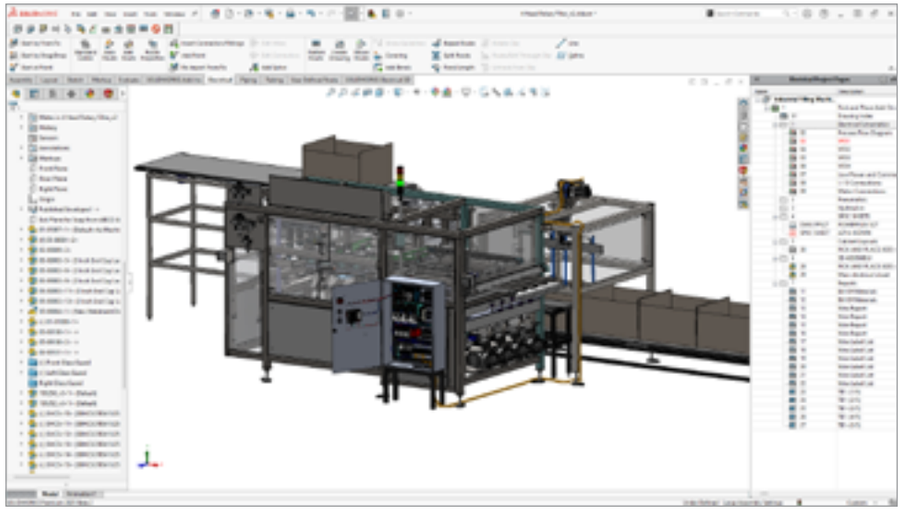


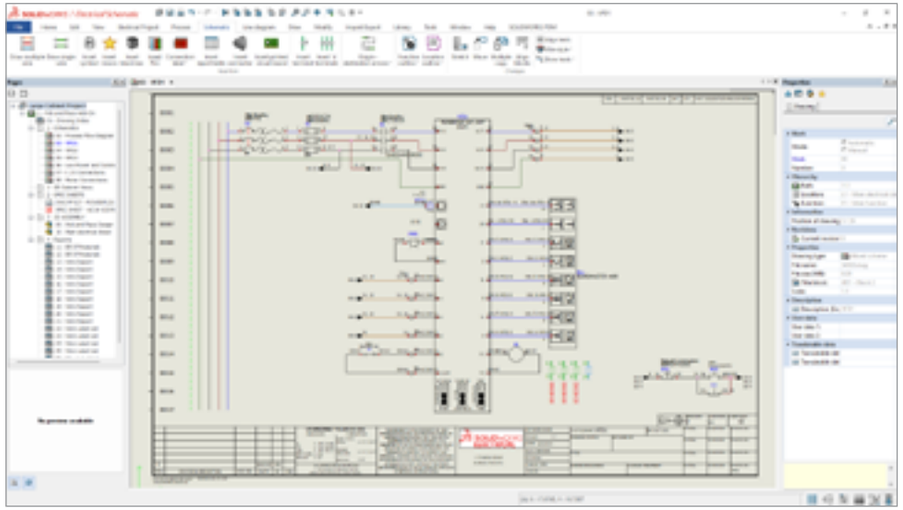
EMPLOY INNOVATIVE SOLUTIONS

Consumers today have high expectations. They want products that are multifunctional, user-friendly, and highly connected. Electronics play a central role in fulfilling these demands by enabling wireless connectivity and seamless integration with other devices and systems. From smart home devices, like lights, locks, and speakers, to personal gadgets, such as watches, scales, and fitness trackers, the influence of electronics is pervasive.

The industry has also wholeheartedly embraced this trend. The integration of sensors, microprocessors, and wireless modules into the manufacturing process has revolutionized production by enhancing automation, improving efficiency, and enabling real-time reporting, in addition to countless other improvements. Advances in electronics have also enabled the miniaturization of many components, making it possible for engineers to integrate more and more functionality into smaller form factors.

Despite these advancements, successful collaboration between electrical and mechanical engineers remains a challenge. Historically, there has been minimal interaction and integration among these professionals, both in terms of team collaboration and in the use of design tools. This separation has often resulted in inefficiencies, miscommunication, and missed project deliveries. The emergence of integrated systems that blend advanced mechanical and electrical design functionalities paves the way for teams to collaborate and innovate more effectively.



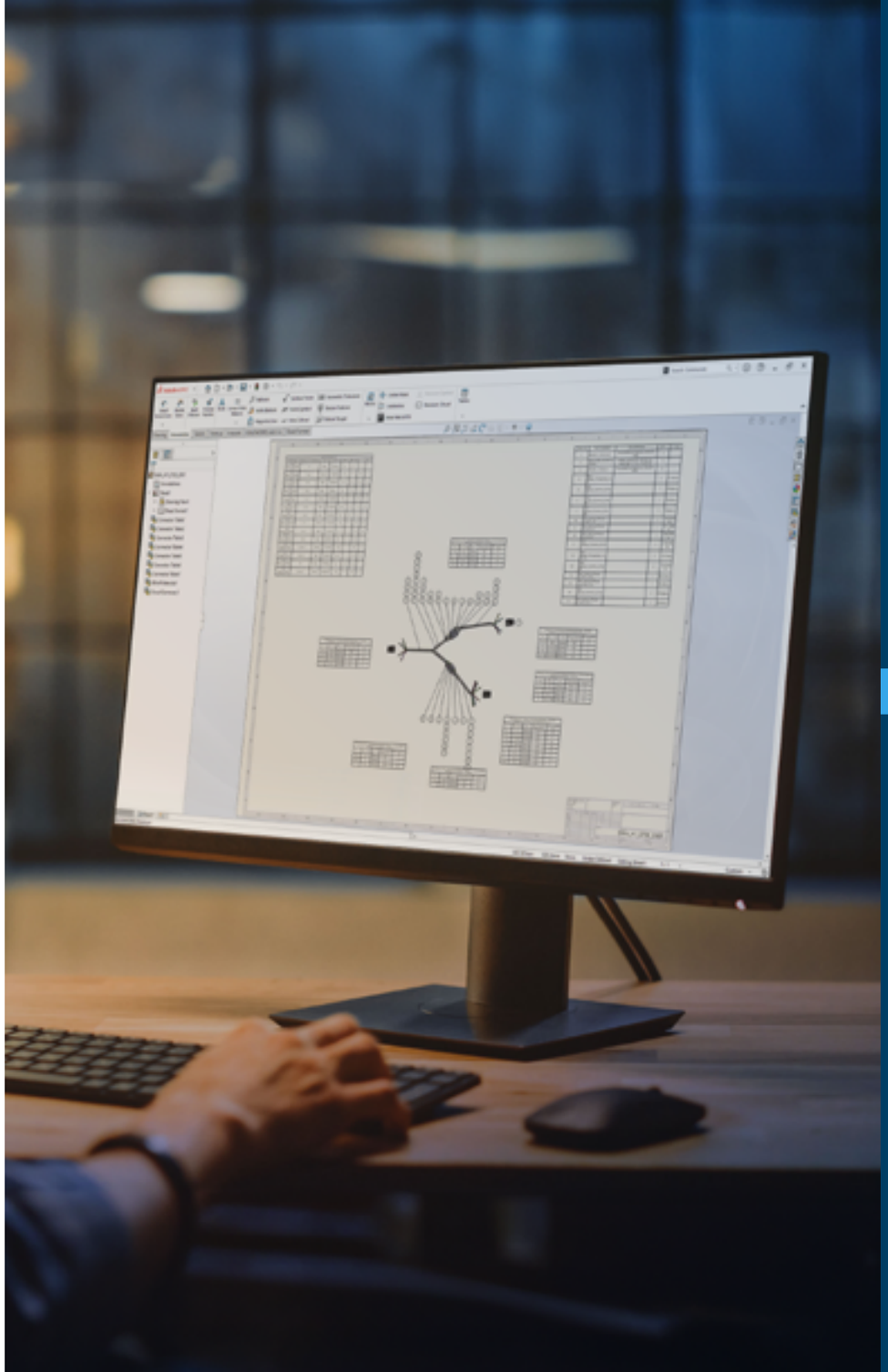


Integrated and Innovative Go Hand in Glove

By harnessing integrated systems with sophisticated mechanical and electrical design functionalities, your teams can achieve seamless communication and data sharing across disciplines. Furthermore, cloud-based systems enable remote collaboration, the ability to access and modify designs from any location, and real-time updates. This holistic approach not only streamlines your design process but also fosters innovation as your engineers, regardless of discipline, can more easily build on each other's work.

Due to the distinct engineering methods each team employs, more collaboration between your mechanical and electrical engineers could lead to frequent meetings. However, tighter system integration could drastically reduce the need for these necessary check-ins, as everyone would be automatically updated in a cloud-based system. For example, any change made by your electrical designers would be instantly visible to your mechanical designers, and vice versa. Similarly, closer collaboration between your electrical and mechanical designers can significantly cut down on unnecessary rework. Gone are the days of working in silos, when any modification by one team can inadvertently cause issues for the other, leading to a continuous iteration tug-of-war.

With better-integrated design software, innovation naturally increases. The system automatically prevents the use of outdated components, which helps avoid unintended disruptions across teams. This ensures that all designers, whether on the electrical or mechanical side, always have access to the latest, accurate data. This single source of truth for product designs allows both teams to focus more time on designing and less on correcting errors, and that translates into more innovation.



CONCLUSION

Your business can quickly respond to changing product specifications and market demands by incorporating integrated SOLIDWORKS mechanical and electrical tools into your product development processes. SOLIDWORKS enables your engineers to create innovative, high-quality products faster and more cheaply. In addition, integrated mechanical and electrical solutions provide manufacturers with the insights needed to build durable and reliable products that meet or exceed customer specifications.

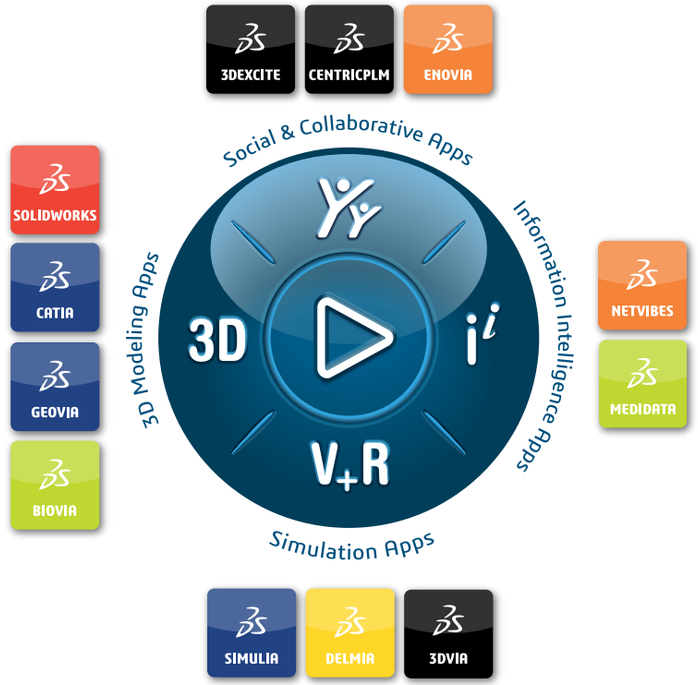
An integrated approach enhances collaboration and automation, enabling your company to bring better products to market faster and at lower costs, improving your competitive edge. When every development team member can easily access design data from concept through production, your company can save time, control costs, reduce errors, improve communication, and foster innovation.

SOLIDWORKS provides a cloud-based collaborative environment that connects every team member and allows secure access to the data and applications needed to expedite the innovation process from concept to delivery. Advanced tools and technologies include these:

- ***Design*** – Create and share designs quickly, enabling key stakeholders to give and receive feedback throughout the product development process.
- ***Simulation*** – Quickly validate designs to gain insights into product performance, reliability, and safety at any point in the development process to inform decision-making.
- ***Data Management*** – Automatically capture and manage all development-related data to monitor project tasks, manage revisions, and work through formal change actions and approvals.
- ***Manufacturing*** – Streamline communication between all departments, from the back office to the shop floor, at any phase to identify and reduce errors and ensure faster release to production.

In today's world, remote access to design data is no longer a nice-to-have—it is a must-have. SOLIDWORKS can securely connect all design, simulation, and manufacturing data to a central repository. Everyone on the team, even suppliers and customers, can contribute their expertise in a data-secure environment. The product definition automatically updates in real time, so all team members are always in sync.

Contact your local reseller for a demonstration of how the right mechanical and electrical tools will elevate your product development process and enable you to produce superior products and beat the competition to market.



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