

Which CAD software is right for your sheet metal project

Designing for sheet metal fabrication requires specialized CAD tools to create a design that fabricators can successfully turn into your parts. If you aren't already using CAD software, you may want to talk to your fabricator to see if they have a recommendation based on your needs. However, in general, there are few things you should consider when choosing design software.



	Product performance analysis	Cloud version	Price	Compatibility / API to connect to other software	Available file formats
Alibre Expert	Performance analysis tools are not native to the software, but there are available add-ons: <ul style="list-style-type: none"> • Finite Element Analysis • CAM Analysis • Motion Simulation and Analysis 	None	\$2,000-\$2600 USD (one-time purchase, price is dependent on license type) +\$400-\$500 USD/year (updates and support)	Yes Alibre Script	Multiple including STEP SAT DWG DXF Supported File Formats
Fusion 360	Includes a simulation space with tools for: <ul style="list-style-type: none"> • Static Stress • Nonlinear Static Stress • Event Simulation • Modal Frequencies • Structural Buckling • Thermal Stress • Shape Optimization 	Available for storage and collaborative design. Users can work collaboratively between Inventor and Fusion 360 using the cloud functionality.	\$495/year (\$125/ year for a Team Participant license)	Yes Fusion 360 API	Multiple including STEP SAT DWG DXF Supported File Formats
Autodesk Inventor	Performance analysis tools include: <ul style="list-style-type: none"> • Cyclic Symmetry Analysis • Assembly Optimization/ Bolted Connections • Weldment Analysis • Wind Load Analysis • Fabrication Analysis • Sheet Metal Analysis • Motion Load Transfer Analysis • Modal Analysis • Finite Element Analysis 	Available for storage and collaborative design. Users can work collaboratively between Inventor and Fusion 360 using the cloud functionality.	\$1,985 /year	Yes iLogic and the Inventor API	Multiple including IPT IAM IDW DWG IPN IDE Supported File Formats
Catia	<ul style="list-style-type: none"> • Nonlinear Structural Analysis • Thermal Analysis • Simulia Rule Based Meshing • Generative Part Structural Analysis • Generative Assembly Structural Analysis • Generative Dynamic Response Analysis • Catia-Elfini Structural Analysis • FEM Surface • FEM Solid 	Cloud-based storage and collaboration	Pricing not listed. Quote from a company representative required.	Yes CAA-RADE	Multiple including IGES DXF DWG STEP STL Supported File Formats
Creo	Performance analysis tools include: <ul style="list-style-type: none"> • Finite Element Analysis • Static Analysis • Structural Analysis 	Cloud-based storage	Pricing not listed. Quote from a company representative required.	Yes Creo API	Multiple including STEP DWG DXF Supported File Formats
IronCAD	The Multiphysics Analysis Extension includes: <ul style="list-style-type: none"> • Finite Element Analysis • Stress Analysis • Thermal Analysis • Electrostatic Analysis • Static/Steady State • Dynamic/Transient Response • Modal/Vibrational Modes • Instability Buckling Frequency Domain 	None	Pricing not listed. Quote from a company representative required.	Yes IronCAD API	Multiple including STEP IGES Parasolid DXF Import Formats Export Formats
Solid Edge	Solid Edge Simulation includes: <ul style="list-style-type: none"> • Finite Element Analysis • Computational Fluid Dynamics 	Cloud-based storage and design sharing	Pricing not listed.	Yes Synchronous Technology API	Multiple including STEP SAT DWG DXF Import Formats Export Formats
SOLIDWORKS	SOLIDWORKS simulation is an add-on product that includes: <ul style="list-style-type: none"> • Linear Static Simulation • Cyclic Loading • Finite Element Analysis 	Cloud-based storage and collaboration	Pricing not listed. Quote from a company representative required.	Yes SOLIDWORKS API	Multiple including STEP SAT DWG DXF SOLIDWORKS File Types SOLIDWORKS Supported File Formats

PRODUCT DESIGN

Designing a product can be reduced to two essential elements: form and function. CAD is a tool both to visualize the final product and to test its performance and usability. Complete and comprehensive product design drafting software includes tools to guide the user through the entire design process, reduce wasted resources, and minimize the need for physical prototypes. When you're looking for CAD software that is suitable for sheet metal product design and manufacturing, you'll want a solution that let's you account for:

- The manufacturing process(es)
- Physical materials
- Structure and mechanics
- Form and usability
- Performance analysis and user safety

Product design is a broad process that starts with a concept to solve a problem and ends with a physical product that is ready to be manufactured. Other types of design may require sketching, performance analysis, rendering, or prototyping. Product design should be inclusive of these phases, and more, when developing a product to be ready for manufacturing. Comprehensive CAD software should have the capacity to take your product from start to finish without relying on exporting or importing files into other programs.

Most of the software products reviewed above provide a very similar set of features when it comes to product design.

DESIGNING FOR MANUFACTURABILITY CAPACITY

Some CAD tools include the ability to confirm the manufacturability of your design so you can correct problems early in the design stage. We cover Design for Manufacturability (DFM) in Chapter 13, and it involves validating the ability to manufacture a part efficiently during the design stage when you're still able to make changes. It's possible for the software to not only identify issues with tolerances but also factor in assembly, identify ways to minimize processing, and overall manufacture more efficiently. Taking a DFM approach can lower your cost of manufacturing and provide better, clearer directions for the fabricator.

Most of the software products reviewed above provide a very similar set of features when it comes to designing for manufacturability.

PRODUCT PERFORMANCE ANALYSIS

Performance analysis in CAD software gives the designer the ability to assess the safety and physical integrity of a product before it reaches the prototyping or manufacturing stages. Using software, the designer can simulate different stresses on their product. These commonly include how the product will respond under static, kinetic, or thermodynamic stresses. It helps to eliminate the need for expensive physical iterations of the product and can identify safety or feasibility concerns early in the design process.

CLOUD VERSION

Cloud storage has changed the way that people interact with data at every stage of the design process. Beyond storing your files safely and securely, reducing the need for redundancies in physical data storage, the cloud has made data sharing easier than ever before. Certain CAD software with cloud capabilities allow for real-time collaboration with your design colleagues. Using cloud-based design software can allow the designer to bring their work with them into the field to make changes and adjustments directly from the ground level. Some cloud-based CAD software also reduces the computational load on the users' CPU, offloading some of the computing functions to the cloud processors.

BALANCING FEATURES AND COST

Clearly you want a software that can do what you need it to do, but many of the CAD options available are loaded with features – many of which you may never use. While there may be a certain lure to all the bells and whistles of top of the line software, it comes with a price tag. Focus on a solution that gives you the ability to design for sheet metal and only consider other features if they add benefits to other areas of your business.

Also keep in mind that most engineering and design software has high resource demands and usually can't be run on a standard PC or laptop. You may also require a higher powered machine to run the software effectively.



COMPATIBILITY

If you're using other engineering or design software for things like simulations or VR, you want to be sure that there is interoperability between all the solutions so you can use them all to their fullest ability. You also want to consider that software will evolve and you'll want a solution that will remain compatible as you move forward.

Finding a CAD software that is compatible with the other systems you're running probably also means that there is a shorter learning curve for your team and may require less training. This isn't always the case, but an easy integration across software products usually makes it easier for staff.

DRAWING FILE FORMATS

Not all drawing file formats are readable and useable by all systems. In fact, features can be lost in transitioning from one system to another. So, it's important to know the format requirements of others involved in the design and fabrication process – and choose a CAD software that can accommodate. Creating design file standards with your fabricator is a good idea if you're doing more than a one-off fabrication.

Common formats include: PDF, DWG, DXF, STEP, IGES, Parasolid, STL, VRML, X3D, COLLADA

Also keep in mind that sheet metal begins as 2D and is formed into a 3D shape. A lot of engineering design today is done in 3D which typically doesn't provide the dimensions, tolerances, and other specifications needed for the sheet metal fabrication process. So, modeling your design in 3D works but it must be convertible to a flat pattern for fabrication.

There is a move towards model based design (MBD) which gives you the flexibility to include the sheet metal fabrication requirements such as dimensions, assembly, tolerances, etc in a 3D model. This eliminates the need to convert the files to a separate format for your fabricator. SolidWorks is one of the CAD tools that offers this capability.

FINDING DESIGNERS

With the amount of engineering software on the market, it is unlikely that you will be able to find a designer that is well-versed in all of it. However, most software ecosystems rely on the same fundamentals of 2D and 3D design. While there is always a learning curve to any new software, a designer that is versed in one CAD suite should be able to adapt to a different one. Every piece of CAD software has its own nuances and specialities, but the fundamentals are generally the same. A skilled CAD designer will be able to effectively learn a different program in a reasonable amount of time.

Software like Solidworks, Fusion 360, and Autodesk Inventor are common so designers will be generally easy to find. Some software is more niche like Alibre Expert or Catia which is more common with aerospace or automotive engineering.

Standard for the Exchange of Product Data (STEP)

STEP is a CAD file format commonly used to share 3D models between different CAD systems. It is an ISO standard that helps the industry overcome some of the issues with compatibility. It includes many different phases of the CAD process, and the industries it effects. Adhering to an international standard is crucial when collaborating with designers outside of your company or when working with your fabrication partner. By maintaining a cohesive design standard, errors in interpretation and implementation can be avoided entirely.