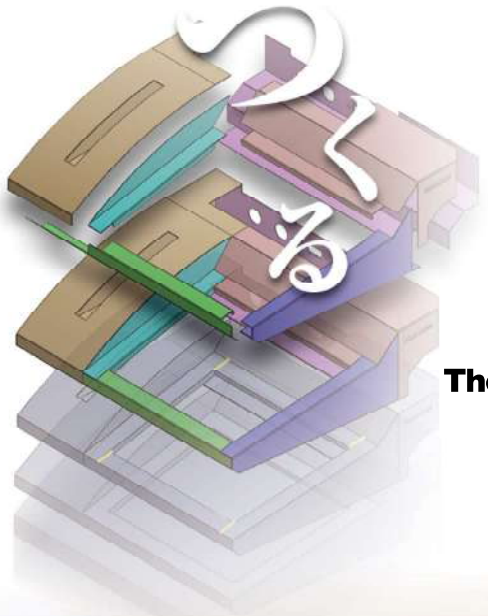
SOLUTION

AMADA DIGITAL INNOVATION V-factory

3D Solid Sheet Metal CAD System

SheetWorks for Unfold

Software



The Engineering AMADA

3D Solid Sheet Metal CAD System

SheetWorks for Unfold

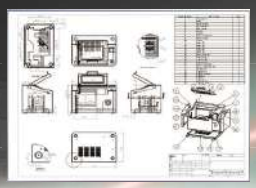
AMADA with SolidWorks

AMADA

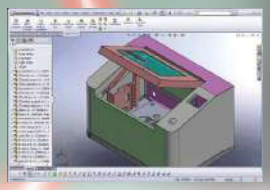
3D CAD Makes a World of Difference!!
～Introducing 3D into Manufacturing～

CAD serves as a bridge between designing and manufacturing.
Introducing 3D CAD makes a world of difference.

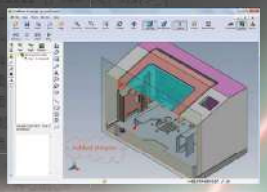
Many manufacturers use CAD software for unfolding. Most CAD software are 2D based and used for sheet metal parts only. Moreover, assembly models are not supported. Lots of products, however, include non-sheet metal products as well to build assemblies. Amada believes users can enjoy various benefits by expanding the range of what CAD software can achieve in the sheet metal industry.



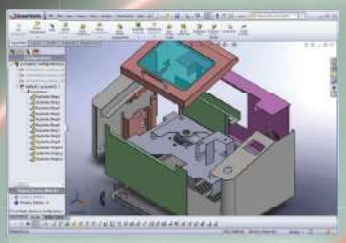
High-quality operating instructions to shop-floor (Eliminating Errors)



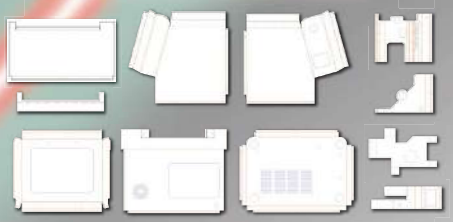
Unfolding complex products rapidly

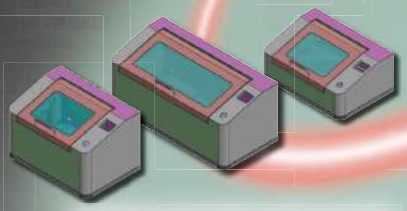


Proposal for designers (supplier)
(Reducing man-hour, VA/VE proposal)



Promoting Technical Skills





Speeding up modeling similar products

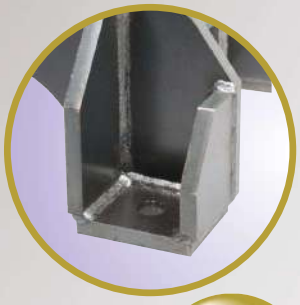
Accurate cost management
(Figuring out costs)

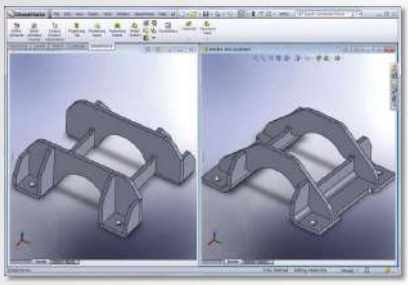
SheetWorks for Unfold is based on the kernel of SOLIDWORKS, 3D CAD software with over 5 million users worldwide, and provides various commands specialized for sheet metal industry.
“What 3D CAD used in manufacturing should be?” – well thought-out answer, that is SheetWorks.

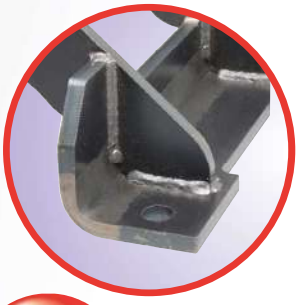
3D Solid Sheet Metal CAD System

SheetWorks for Unfold

A Case Study of Customer Work Sample







Before

Altering a model required many welding processes to a bending structure model. This achieves reducing the welding length to one-fifth, making it possible to improve its quality and cut costs.

After

Work Sample Case Studies

3D designed models

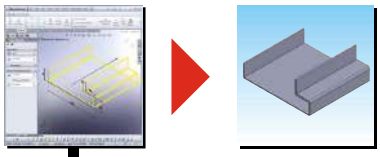
Finished work

1 3D Modeling

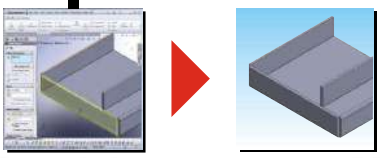
Sheet Metal Commands

SheetWorks offers plenty of powerful sheet metal specific commands and gives you a realistic representation of model by specifying details; thickness, inner radius, gap value, etc. It also allows you to change dimensions while designing and to edit models by going back to an earlier state.

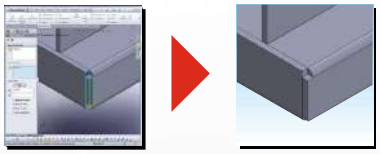
Base flange



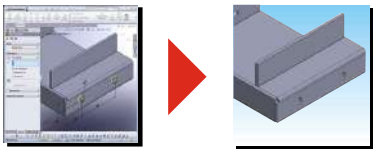
Edge flange



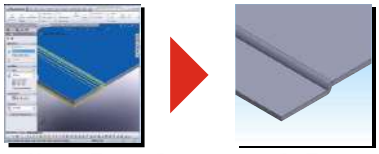
Setback



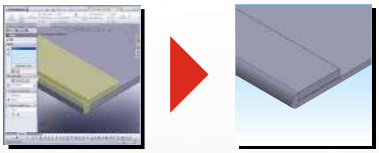
Holes



Z bend

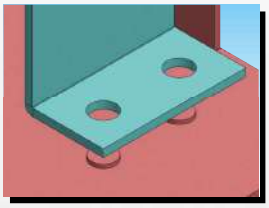


Hemming

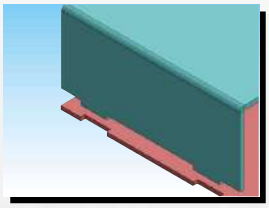


Positioning Commands

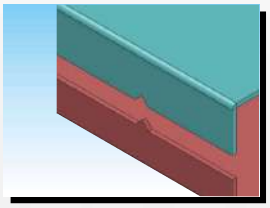
You can add positioning information between each part in an assembly model. “Tab” “Dimple” and “Notch” can be inserted with an easy operation, which prevents you from mixing parts up, thus helps you streamline assembling and welding processes.



Dimple



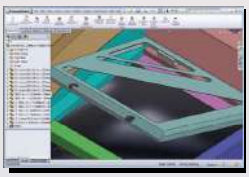
Tab

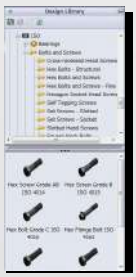


Notch

Inserting Non-Sheet Metal Parts

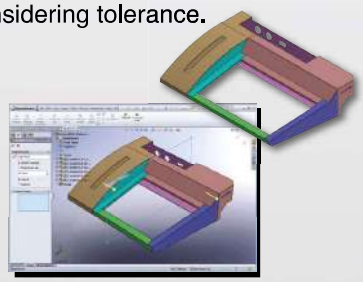
Library features of fastener parts such as ISO standard bolts and nuts are installed as standard. You can also insert third party 3D models downloaded from the web site freely.





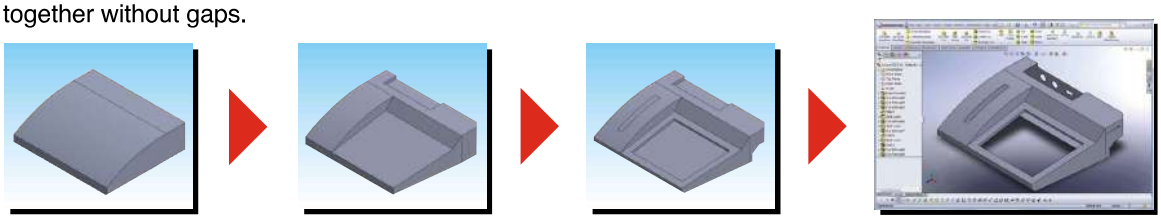
Tolerance Compensation

You can stretch 3D models based on a specified plane and move hole location, making it possible to modify models with considering tolerance.

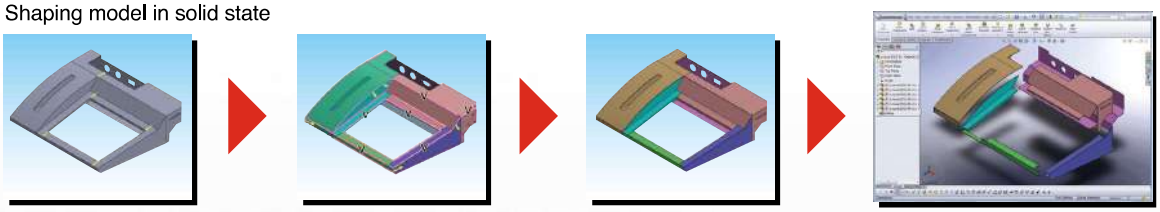


Shell Command

As far as modeling cover products is concerned, instead of using sheet metal commands, shell modeling enables you to design more quickly and effectively thanks to ease of determining parts coordination and modeling. By simply defining “Bend” and “Setback” on each edge of a shell model, SheetWorks can automatically generate accurate sheet metal assembly models in which every component part fits together without gaps.



Shaping model in solid state

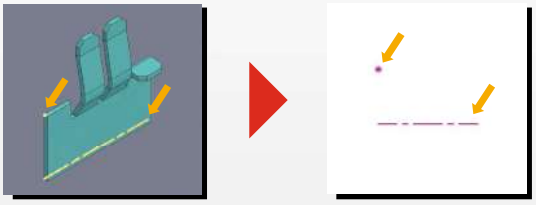


Inserting cut lines | Setting bend & setback | Automated assembly file creation

Convert Positioning Sketches

Sketch entities for positioning inserted on a model can be applied to a flat part.

- Construction lines → Laser marking
- Texts → Laser marking
- Points → Center punches or points



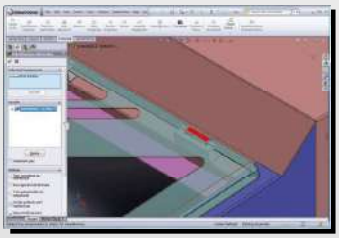
A point and a construction line inserted on assembly model

A flat part including entities convertible to center punch and laser marking

Interference Check

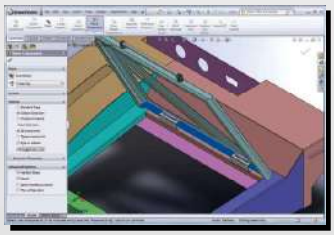
Static Interference

The interference detection tool allows you to check interferences within an assembly and highlights collided portions.



Dynamic Interference

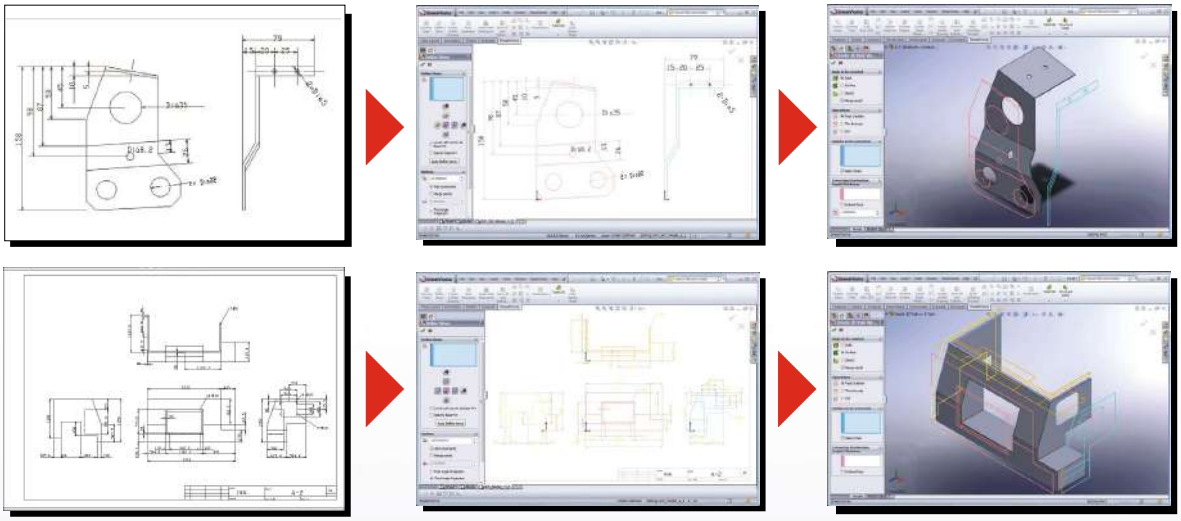
You can check collisions while dragging and moving a movable component in the graphics area.



2 Utilizing 2D Data

Generating 3D Models from Orthographic Views

You can create 3D models by utilizing orthographic views in DXF or DWG data. Automatic view defining function is capable of automatically capturing required entities to create 3D data from a drawing and making surface or solid 3D models.



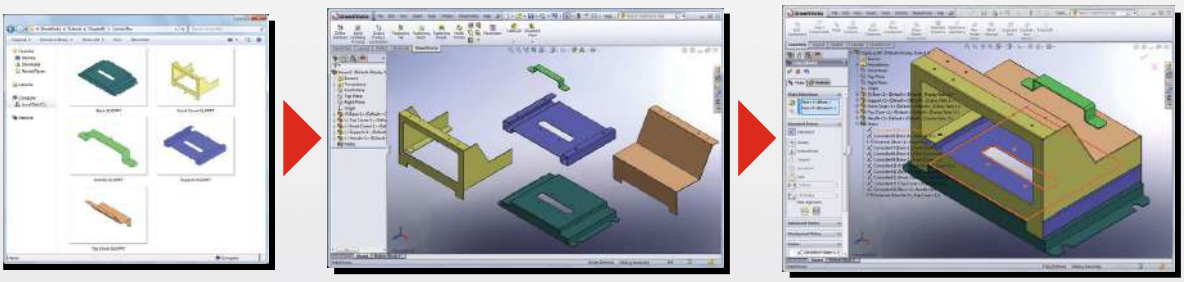
DXF/DWG Orthographic view

Extract required bodies to create 3D models

Create solid or surface 3D models

Assembly Mates

Respective parts can be mated within an assembly file in a simple operation. You can mate using entities within components such as faces, edges, points, and so on and also specify distance and clearance between entities. It is available to confirm parts coordination before producing actual products.

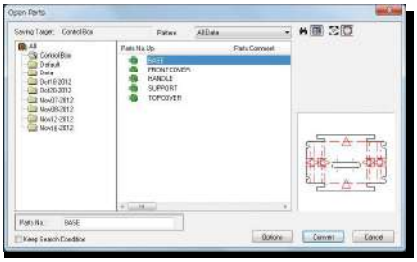


Loading stored 3D data in SheetWorks

Easy assembly creation

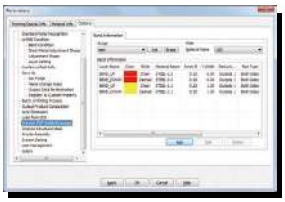
Load from SDD

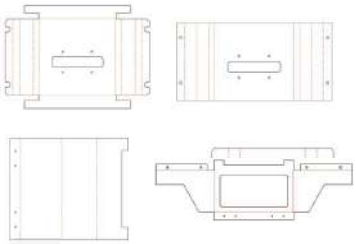
Unfold parts can be loaded from SDD (Database of PCL/AP100 server) and automatically converted to 3D models.

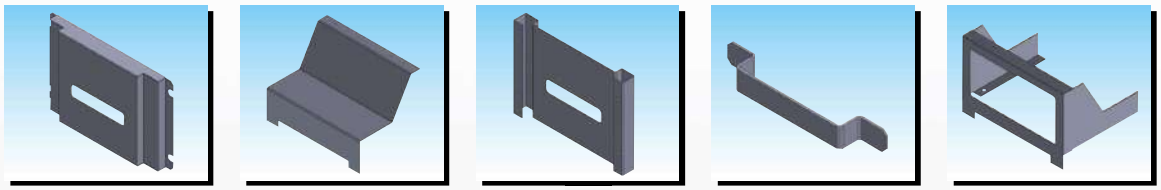


DXF Unfold Drawing

This function enables you to load unfold drawings in DXF data, create 3D models, and save data in SDD automatically. Specify the entities; layer name, style, color, etc in parameter setting to automatically convert them as bend lines.

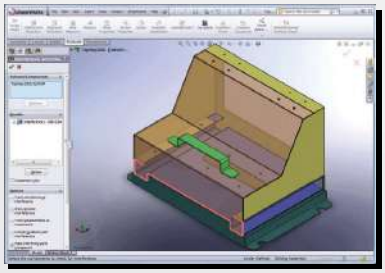




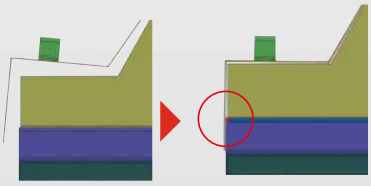


Interference Check

You can check if there are interferences between assembly components and collisions while moving movable parts (static/dynamic collision check).

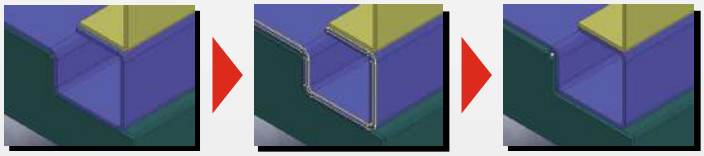


A collided portion is highlighted



Model Modification

Models can be modified while referring a collided part. You can freely make changes to a shape by cutting a face, moving hole position, etc.



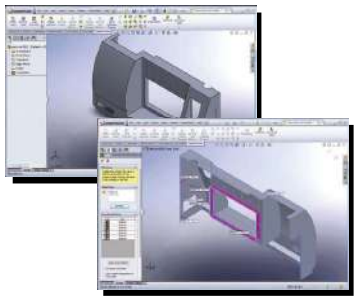
Cut an interfered position along with thickness face

Correct the position of misaligned holes by move command

3 Cover Products

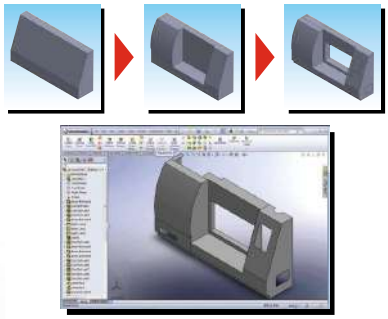
Importing 3D

Import a 3D designed model.



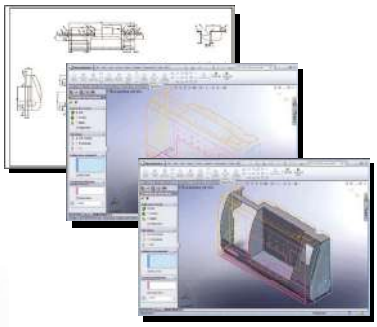
Modeling 3D

Model a 3D part while referring to a drawing.



Using 2D/DXF

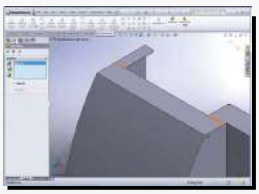
Create a 3D model using an orthographic view DXF data.



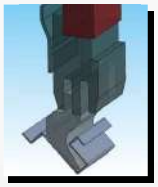
Production Design

Insert cut lines to divide parts and set bends and setbacks at each corner while examining process feasibility.

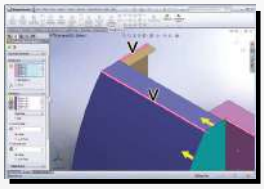
A sheet metal assembly model without gaps and interferences is automatically created.



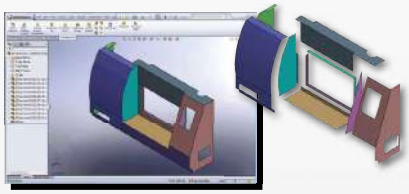
Specify where to divide parts



Bending feasibility check



Specify bends and setbacks



Automated assembly creation

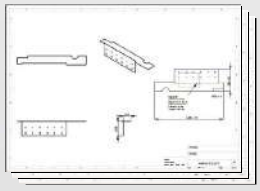
Set positioning info between parts

Output Unfold Data

Unfold data with sheet metal attributes are automatically output. Also, DXF unfold data can be automatically saved in a specified folder.

Output Orthographic View

Orthographic views can be automatically created from 3D models. It is also available to insert bend line information automatically.



Costing

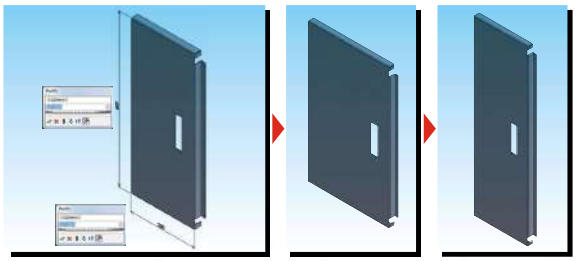
Index information used for estimation is automatically output.

4 Distribution Board / Control Board

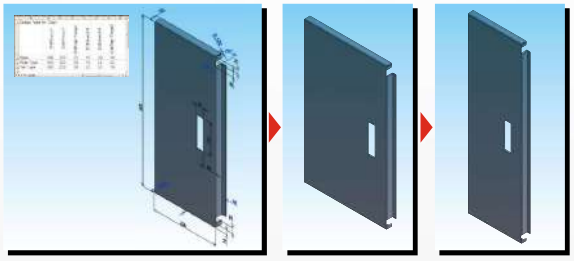
Parametric Build

Commands supporting various similar transformations are available. It's also possible to formulate an automated designing system.

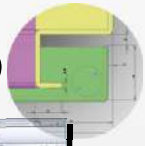
1. Manual Transformation by Driving Dimensions (per part basis)

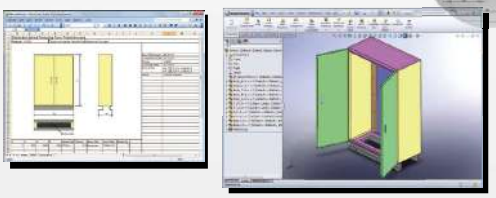


2. Automated Transformation Using Excel (per part basis)



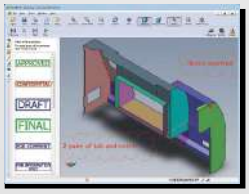
3. Assembly Parametric Transformation (Tables with manufacturing know-how)

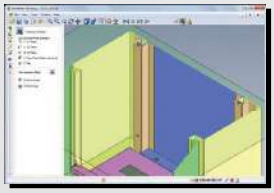




Electronic Drawings

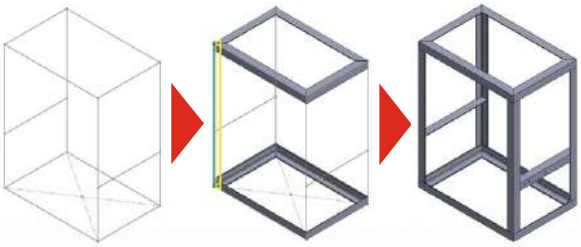
You can view electronic drawings on general computers and iPad. This useful tool enables you to communicate with your clients or shop-floor staffs effectively.





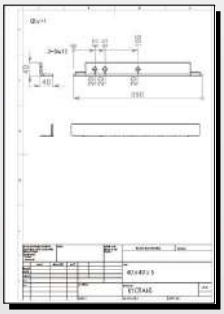
Structural Member

Chassis comprised of angle and/or channel iron can be created effortlessly and BOM(Bill of Material) and processing drawings are also created. Setback patterns to cut by an angle processing machine are also provided.



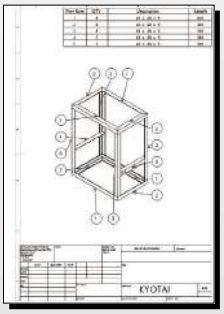
Steel Drawing Automatic Creation

Analyzing steel type and measuring length, hole shape, and hole position, drawing documents are automatically created.



Bill of Material

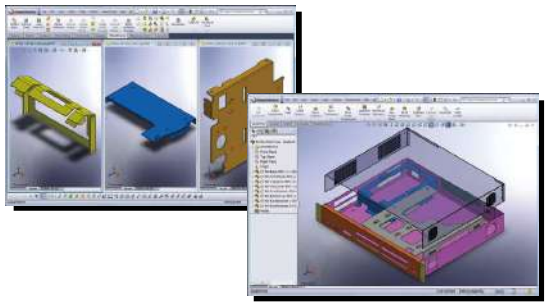
As identical steel shapes are automatically recognized, a bill of material can be easily created.



5 Precision Sheet Metal Works

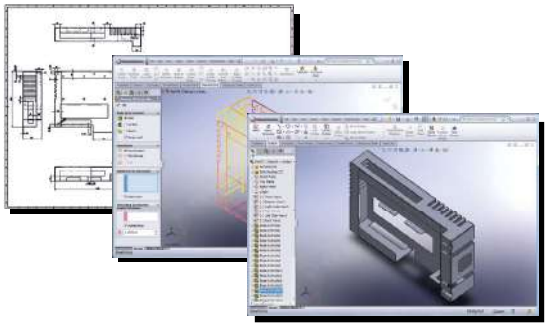
Importing 3D

Import 3D designed models. Various import formats are prepared in standard.



Using 2D/DXF

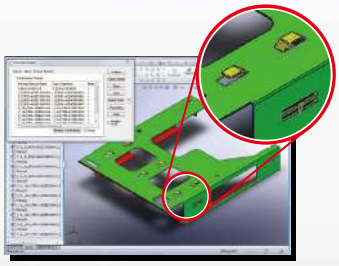
Create 3D models using orthographic view DXF/DWG data.

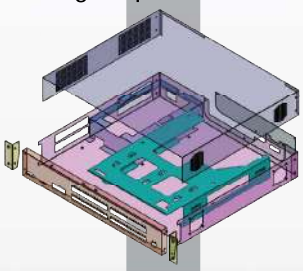


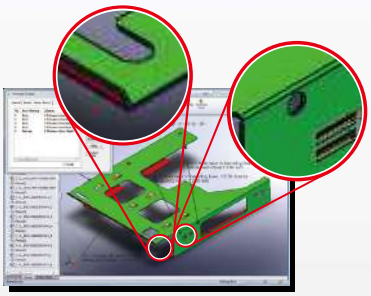
Batch process

Analyze Shapes

Models shapes to unfold are analyzed. This command automatically performs converting attributes such as forming/bend lines to CAM information, checking shapes that cause processing failures, and so on.



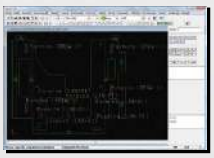




Formings/Special Tools Automated Recognition
Forming shapes such as; extrusions, tapping, half shears, bridge, and others, special tools, standard holes, and special shape holes are automatically separated. They are automatically converted into processing information.

Sheet Metal Model Check
Holes or formings near bends, minimum flange size and so on are checked to determine process feasibility, which prevents unfold data from being flawed.

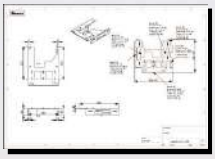
Unfold Data



Saving Data in SDD (PCL/AP100)
Unfold data with process attributes are automatically stored in SDD.

DXF/DWG Data
Formings are automatically converted to arbitrary symbol shapes and saved in a specified folder.

Orthographic View



DXF/DWG Output
Drawing documents with orthographic view of each part (dimensions are automatically inserted) can be automatically created and saved in a specified folder.

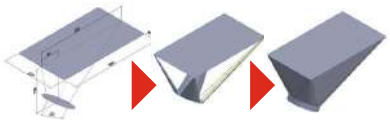
Estimation Data

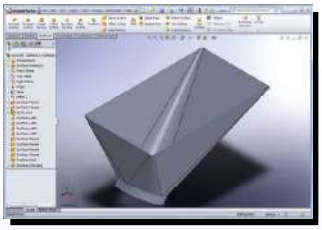
Access Format Output
Sheet metal attributes for each part can be output in MDB format. Costing is also available in EstimationWorks.

6 Ducts

Surface Modeling

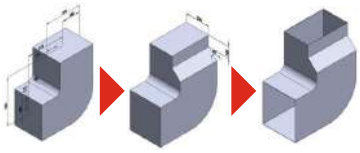
To model shapes, you can use surfaces with no thickness. Various commands such as sweep, loft, revolve, etc are provided, making it possible to design complex shapes freely.

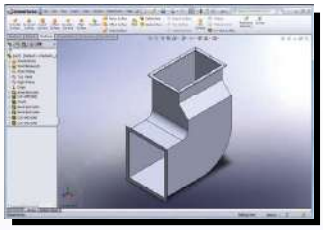




Shell Modeling

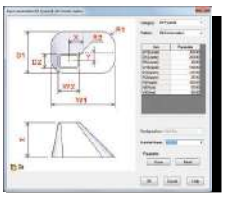
You can create models while cutting the outer shape of solid, which allows you to model required shapes without difficulty.

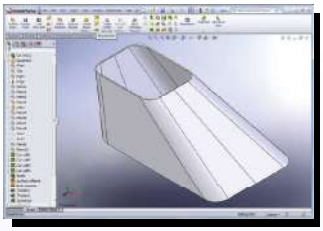




Pattern Input

3D models can be created automatically by simply selecting a pattern from the library and entering parameter values.

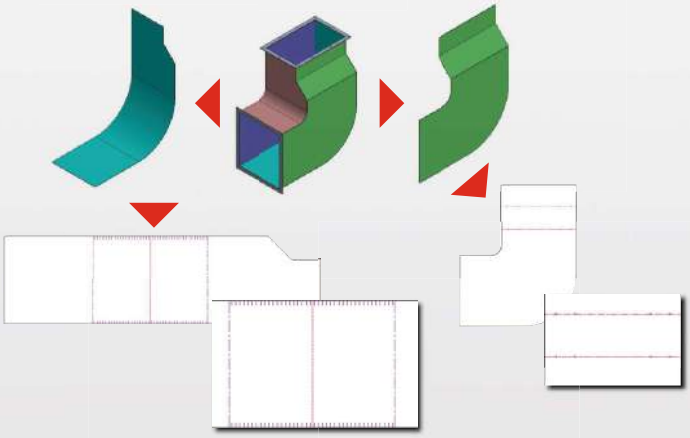




Unfold

Bending Assistant Information

Center punches and unfold sub-lines that can be used in bending process can be automatically inserted while unfolding.

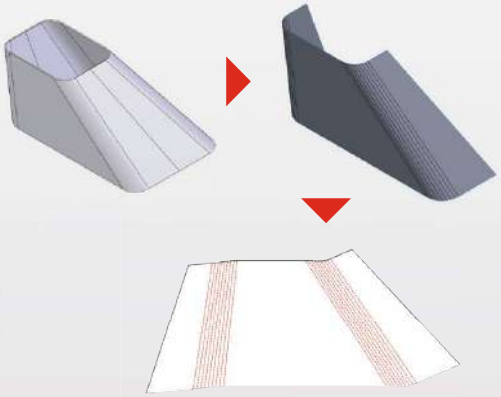


Unfold sub-lines are inserted in edges of R bend, which enables you to use processing attribute such as laser marking.

Points are inserted on bend lines. You can utilize them as center punch attributes in a turret punch press.

Create Polyhedron Command

It is available to create a polyhedron from a cone shape and inserting bend lines or unfold sub-lines while unfolding. You can specify any number to divide.



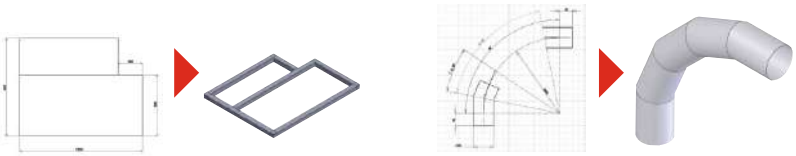
Unfold data is created by dividing faces with a specified number.

7 Chassis/Frame

Tube

Modeling

A wide variety of modeling methods are prepared; applying tube sections on the wire frame sketch, sweeping profile and path, etc.

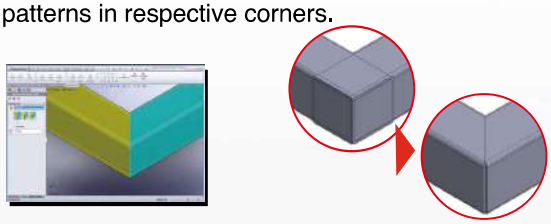


Pattern Input

3D models are automatically created by just selecting a pattern and entering required values.

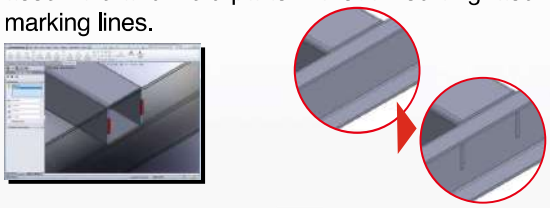
Setback Setup

We provide two setback patterns; slant and one side (2 types). You can freely apply setback patterns in respective corners.



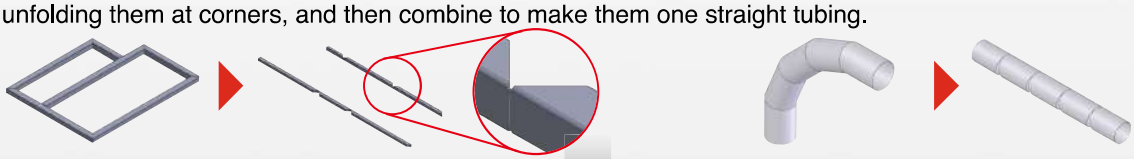
Positioning Setup

This command enables you to insert “Tab” and “Notch” with an easy operation, helping you assemble and weld parts without inserting laser marking lines.



Unfolding Models

On the premise that products are processed with laser machines, make changes to square/round tubing by unfolding them at corners, and then combine to make them one straight tubing.



Unfold data output

Dr.ABE_Tube (Tube/Steel Processing Laser CAM)

You can cut parts with a laser machine equipped with a pipe-index device by bringing unfold data from SheetWorks to “Dr.ABE_Tube”.

Data list

CAM data programming

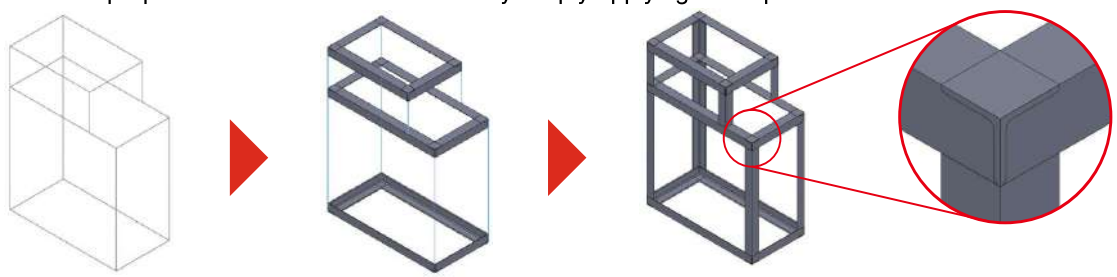
Processing simulation

※ Dr.ABE_Tube is not included in SheetWorks.

Structural Steel

Structural Steel Components Layout (Designing a Base Model)

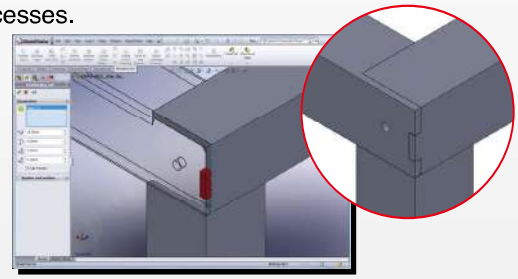
Create a wireframe shape using the sketch functions. Structural steel profiles complied with JIS/ISO standards are prepared. You can create a model by simply applying those profiles on a wireframe model.



Designing a wireframe　　Applying steel profiles　　Interfered state

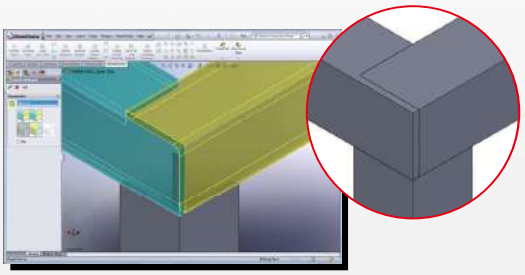
Positioning Setup

This command enables you to insert pairs of “Tab” and “Notch” with an easy operation, which prevents you from mixing up parts and helps you drastically streamline assembling and welding processes.

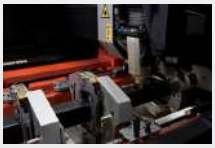


Setback Setup

The command that provides some setback patterns for steel is prepared. Patterns that can be processed by an angle cutting machine are also provided.



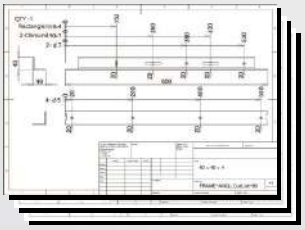
Unfold data output



FO-MⅡ RI3015

Steel Drawing Automatic Creation

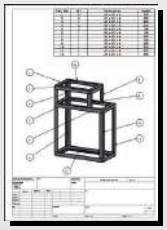
Analyzing steel type and measuring length, hole shape, and hole position, drawing documents are automatically created.



Drawings created automatically

Bill of Material

As identical steel shapes are automatically recognized, a bill of material can be easily created.



Easy creation of BOM

8 Other functions

For the sake of automation

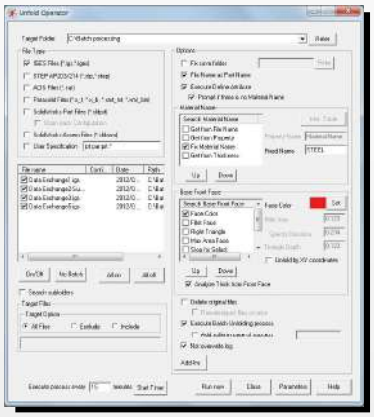
Import File Types

SheetWorks allows you to import models from intermediate files; IGES/STEP/Parasolid/ACIS, and others.In other 3D design CAD, to unfold models as sheet metal parts, sheet metal features must be used while modeling. SheetWorks is capable of performing automated unfolding as far as shapes are automatically recognized and determined as sheet metal even if sheet metal features are not used or models are saved in an intermediate file. You don't need to specify K-factor in CAD for design.

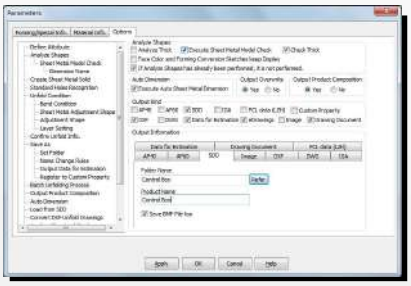
Importing condition is complied with SOLIDWORKS

Using Unfold Operator and Batch Unfolding Process

"Unfold Operator" can perform a series of operation; importing models, outputting unfold drawings /estimation data, and saving documents automatically."Batch Unfolding Process" is available to unfold models imported to SheetWorks at a time, while "Unfold Operator" can perform throughout processes.



Unfold Operator
(Timer setting/Sheet metal attributes acquiring setting)



Batch Unfolding Process Parameters
(Output Information/Save destination setting)

To Reduce Defects

"Sheet Metal Model Check" performed during the automatic process can automatically extract shapes that causes processing difficulties and output the error log, helping you reduce processing defects.

※ For more details, refer to P16 "Sheet metal model check"

Output

All the operations can be automatically performed by just selecting necessary items and specifying data save destination.

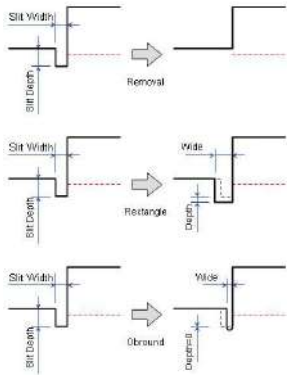
- Unfold data output (Saved in SDD)
- Unfold data output (DXF/DWG output)
- Orthographic view output
  (Automated dimension alignment)
- Estimation data output (EstimationWorks)
- Product composition output
- Model picture image output (JPEG/TIF)

Unfolding Functions and CAM Linkage

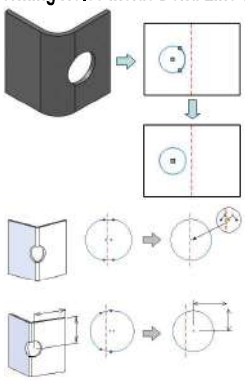
Unfolding Automated Shape Adjustment Functions

SheetWorks automatically optimizes unfold shapes. This helps you minimize shape adjustment in CAM side. Followings are some of shape adjustment function examples. You can control them by parameters.

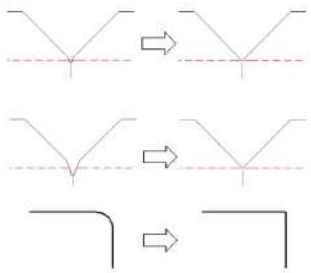
Bend Slit Shape Adjustment



Transforming Holes inside Bend Line to Arcs



Bend Edge Minute Lines Removal

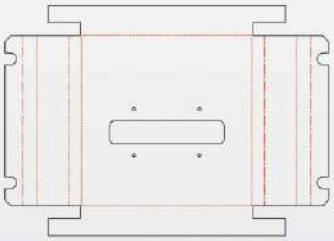


To Blanking CAM

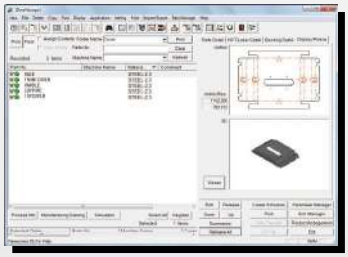
You can have SheetWorks learn formings/special shapes. Once formings/special shapes are registered, SheetWorks can automatically recognize them during sheet metal shape analysis, and then output punching process information.Also, SheetWorks allows you to replace formings/special shapes with symbols that can be automatically recognized in receiving CAM systems while outputting data in DXF, etc.

To Bending CAM

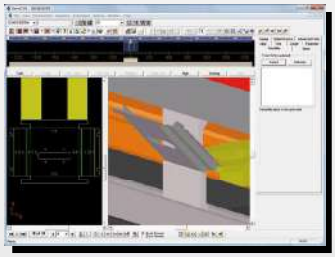
Bending data can be automatically created by bringing unfold data with bending attributes output from SheetWorks to Amada's bending CAM. This makes it possible to greatly increase the machine working rate since the software allows for the offline generation of setup such as bend sequence, tool selection, tool layout and so on, and processing simulation.



DXF/DWG Output
Forming information is automatically replaced with any symbol shapes, and saved a specified folder.



SDD (PCL/AP100) Output
Unfold parts with sheet metal attributes are automatically saved in SDD.



Utilizing Data in Dr.ABE_Bend

HG series

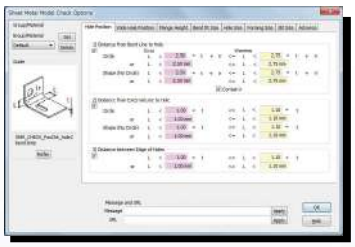
Sheet Metal Model Check

Reducing Defectives by Processing Feasibility Check

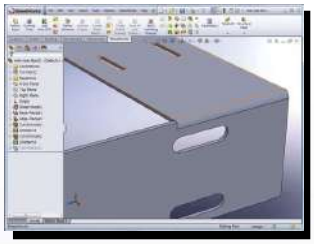
Correct sheet metal shaped models are not always free from processing errors. This function analyzes shape of models and gives you warnings with error logs if there are any issues, helping you reduce processing errors.

< Check item examples >

・Holes and formings near bends that may be deformed.
・Outer shape that causes hole/forming process difficulties and distance from an outer boundary lines to holes
・Minimum height flanges that are difficult to bend
・Holes that are smaller than thickness



Parameter setting window



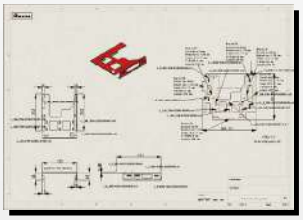
CAD

Actual product

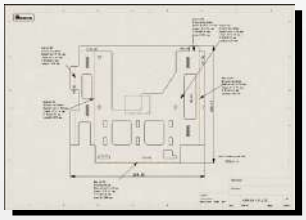
Drawing Creating Functions

Automated Drawing Creation

Drawings with orthographic are automatically created while running unfolding process. Flange dimensions, bending angles, forming information, bend line information, and chamfer information are automatically inserted by automatic dimensioning function.



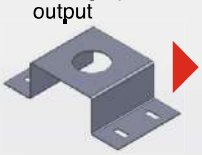
Orthographic view automated output

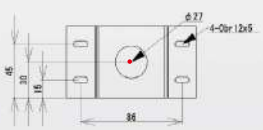


Unfold data automated output (Distance between bend lines)

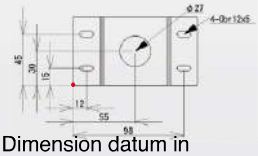
Insert Hole Dimension Command

Dimensions of hole size/position can be automatically inserted by specifying the dimension datum and faces (multiple selection available) for each orthographic view.





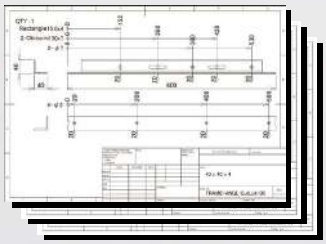
Dimension datum in center



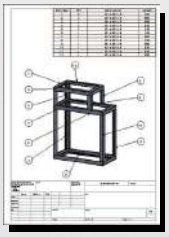
Dimension datum in bottom-left corner

Steel Drawing Automatic Creation

Analyzing steel type and measuring length, hole shape, and hole position, drawing documents are automatically created.



Drawings created automatically

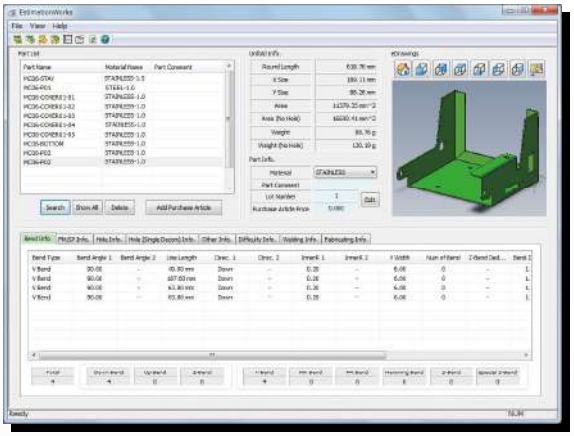


Easy creation of BOM

Cost Calculation (EstimationWorks)

Automation of Estimation System

Entity information that would be necessary for costing is output automatically in the MDB format (Microsoft-Access) while running shape analysis by the sheet metal analysis function and unfolding. Output contents are; perimeter of unfold data, maximum rectangular dimension, area, weight, bending information, forming/special shape information, hole information, 3D viewer, etc.
Also, EstimationWorks can estimate product costs of sheet metal products and parts by predicting takt times for blanking, bending, fabricating, welding, and assembly processing based on estimation data sent from SheetWorks and multiplying takt times by each processing charge. You can view EstimationWorks in a computer in which SheetWorks is not installed (network connection with SheetWorks is required).

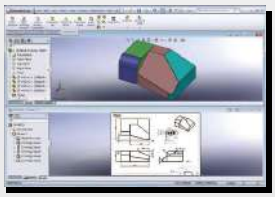


EstimationWorks

Communication Tool (eDrawings)

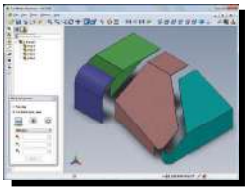
Information Exchange with Business Partners and In-house Information Sharing

eDrawings is an electronic drawing file SheetWorks can output. Prepared with the file compression technology and email viewing adaptive function, you can take a look at 2D drawings and 3D model data at one time. You can view data in general computers and iPad, helping you share information with your clients and shift to the paperless management in the shop-floor. In eDrawings files, operations and views such as rotate, zoom, measure, markup comments, cross section, explode/collapse, and so on are available.

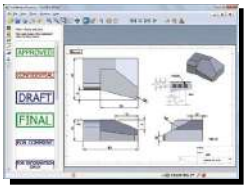


SheetWorks

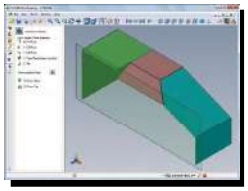
eDrawings Major Functions



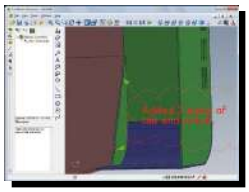
Exploded view



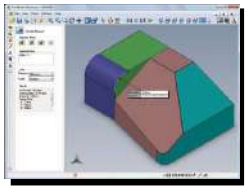
Drawing view



Cross section view



Adding comments

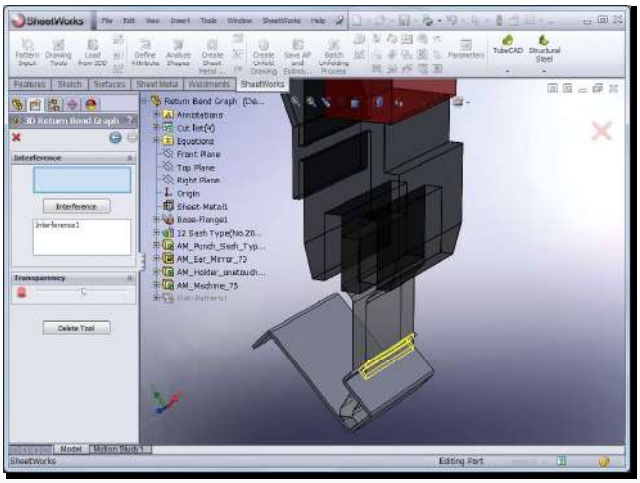


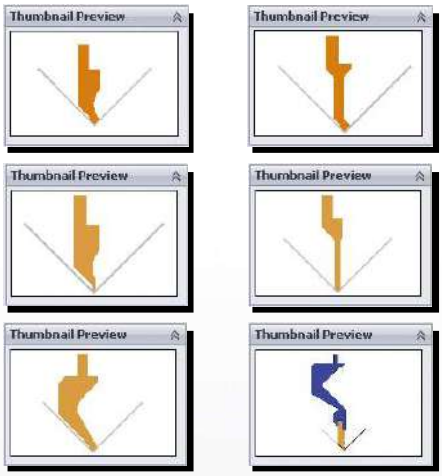
Measuring

Return Bend Check

Interference Check by Bending Tools

Library 3D models of standard bending punch tools are provided. You can check whether or not there are any interferences while processing by inserting a tool model on a bend of a sheet metal model. It helps you consider sheet metal attributes (bend/setback setup) and assembly model shapes.

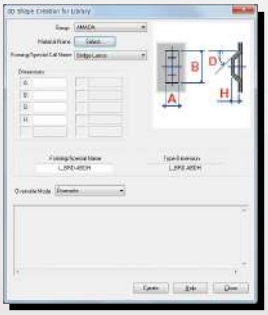




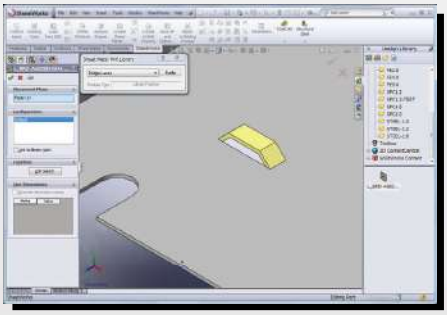
Sheet Metal Process Library

Easy Forming Shapes Creation

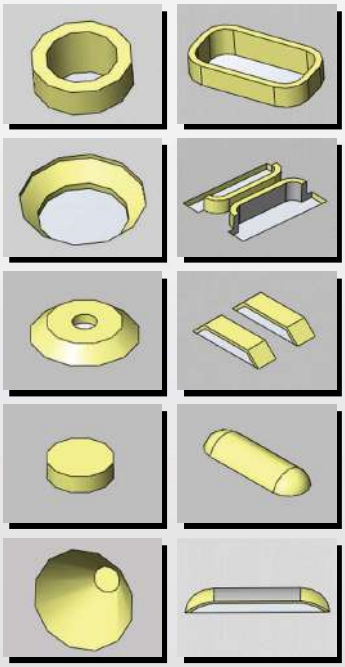
Many JIS standard formings such as extrusions, half shears, embosses, and others are prepared. You can apply them in a model by simply dragging and dropping. You can search library features by refining them in each material/thickness, preventing you from applying not processable shapes by mistake.



Input parameter



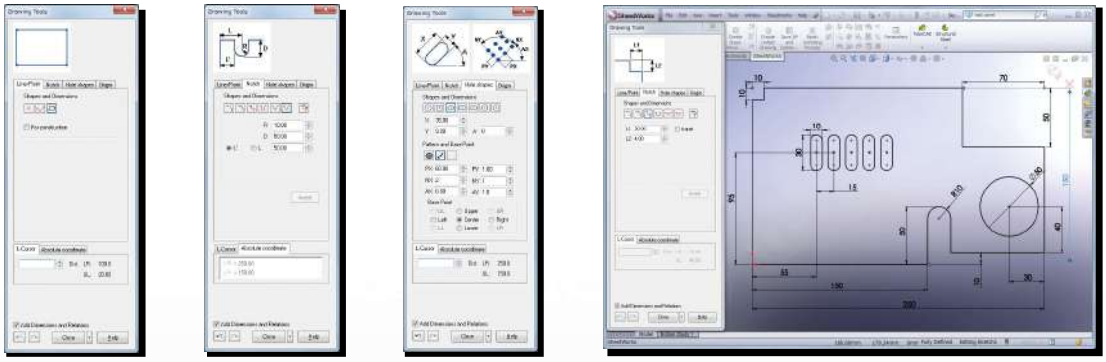
Forming allocation in SheetWorks



Drawing Tools

Available using 2D CAD-like Designing Methods

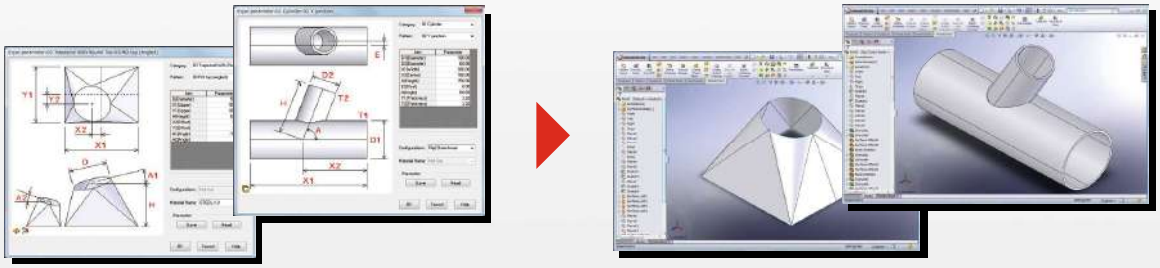
This command enables you to design sheet metal specific shapes such as notch, holes, etc. This command leading type interface allows for designing a fully defined sketch by the incremental type input.



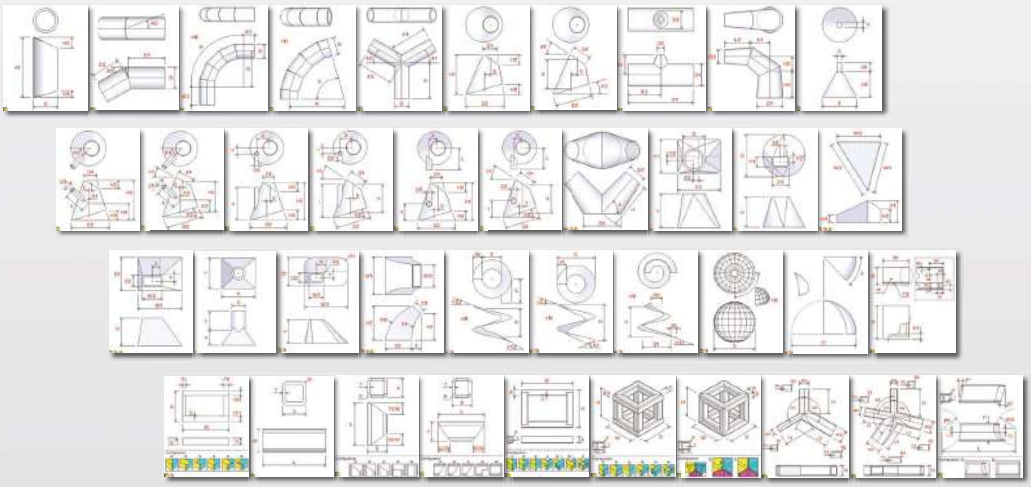
Pattern Input

Simple Modeling by Inputting Dimensions

Over 40 patterns of transition duct, tube, etc are prepared. 3D models are automatically created by simply selecting a shape and entering required values in parameter.

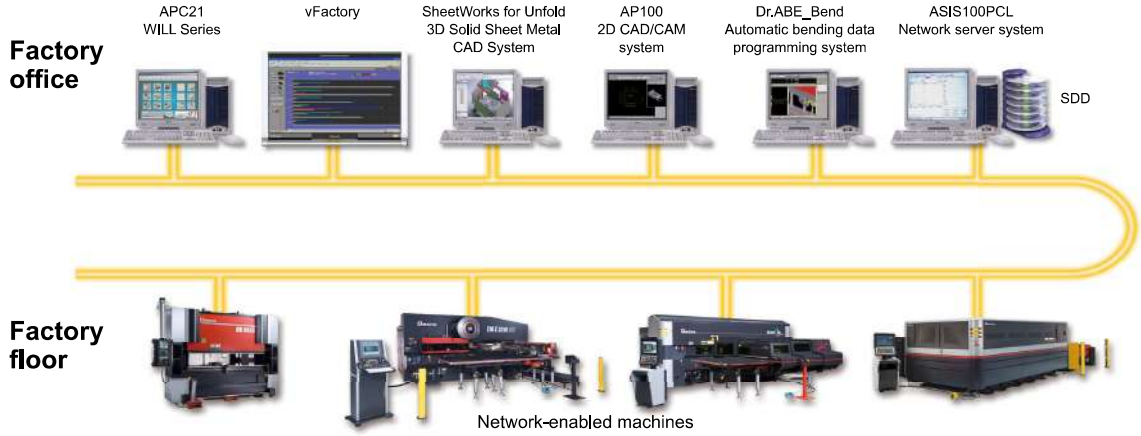


Pattern examples



Network

Amada proposes a digital sheet metal fabrication system with its virtual prototype simulation system (VPSS) as core. The processing data created in the factory office are managed together by the SDD and called through the network for use at the factory floor



■SheetWorks Operating Environment

Supported operating system	Microsoft Windows 10 Professional(64bit)
Memory requirements	8GB or greater
Graphics card	Refer to below URL to find a combination of certified graphics card adapter and driver. http://www.solidworks.com/sw/support/videocardtesting.html ※ Comply with SOLIDWORKS operating requirements.

※ For more details on operating environment, please contact your local sales service engineer.

■SheetWorks Products Comparison

Function		Description	Unfold	Tube	Design
SOLIDWORKS documents	Part	Creates part (inc. multibody) documents.	○	○	—
	Assembly	Creates assembly documents comprised of parts and assemblies.	○	—	—
	Drawing	Creates drawing documents from parts and assemblies.	○	○ ※1	—
Analyze Shapes		Checks whether a model is valid as a sheet metal model.	○	○	○
Sheet Metal Model Check		Detects problems in processing sheet metal models such as minimum flanges, holes near bends, etc.	○	—	○
Create Sheet Metal Solid		Creates accurate sheet metal models by setting sheet metal attributes; bends, setback, etc on a shell model.	○	—	○
Positioning Commands		Inserts positioning dimples, tabs, and notches at jointing positions between parts.	○	○ ※2	—
Create Unfold Drawing		Creates unfold drawings with sheet metal processing attributes (tools/bends)	○	—	—
Confirm Unfold Info.		Checks failures in unfolding shape such as open edge, minute lines, etc that may cause troubles in CAM processing.	○	—	—
Save AP and Estimation Data		Outputs unfold drawings as AP data. Outputs sheet metal processing attributes also to utilize for estimation.	○	—	—
Batch Unfolding Process		Performs a series of operations from define attribute to save AP and estimation data for multiple part models.	○	—	—
Parametric Build		Transforms models parametrically associated with Microsoft Excel.	○	—	○
Drawing Tools		Creates notches and holes specific to sheet metal in a simple way.	○	—	—
Create 3D from Views		Creates 3D models from orthographic view.	○	—	—
Create 3D from Cross-section		Creates 3D models from two intersecting cross-sections.	○	—	—
Load from SDD		Loads unfold data from SDD (PCL/AP server), and then turn them into 3D models.	○	—	—
Convert DXF Unfold Drawings		Loads DXF unfold drawings, and then turn them into 3D models.	○	—	—
Model Stretch		Stretches 3D models based on a specified reference plane.	○	—	—
Entity Analyzer		Analyzes and categorizes entities (faces and edges) on a model.	○	—	—
Sheet Metal Mnf. Library		Adds forming shapes to library, and then allocates them on sheet metal models.	○	—	○
3D Return Bend Graph		Executes interference check by inserting a bending tool into a model.	○	—	○
Pattern Input		Creates 3D models by simply selecting patterns such as transition, tubing, etc and entering parameters.	○	○ ※3	—
Tube CAD		3D CAD system for "Dr.ABE_Tube" CAM for laser machines with pipe-index device.	○	○	—

※1 Drawing documents can be created from Part documents (including multibody) only.
※2 Positioning tab and notches are available only.
※3 Round/square tubing are available in Pattern Input only.

For Your Safe Use
Be sure to read the manual carefully before use.

*Specifications, appearance, and equipment are subject to change without notice by reason of improvement.
*The specifications described in this catalog are for the Japanese domestic market.

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Inquiry

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