for the design, layout, and manufacture of sheet metal parts

Design and Manufacture of Sheet Metal Parts

Using the variational solid modeling capabilities of I-DEAS® Master Modeler™, I-DEAS Sheet Metal Design™ software automatically incorporates user-definable bend tables, stress reliefs, and shrinkage allowance into solid models to help you rapidly design and evaluate sheet metal parts. A catalog of sheet metal features including punches, tabs, and other features allows you to add final detail to the part to capture true design intent. The solid sheet metal model can be unfolded and used to create fully associative flat pattern production drawings, and numerical control (NC) toolpaths for manufacturing. The dimension-driven nature of I-DEAS Sheet Metal Design makes design changes fast and easy. The ability to fully integrate the design, documentation, and manufacturing into one design database greatly reduces the sheet metal design process.

Sheet Metal Part Modeling

With I-DEAS Sheet Metal Design, sheet metal parts can be quickly designed within the context of the surrounding assembly to allow you to evaluate the part for fit and function. You begin by sketching variational wireframe sections which represent the "panels" of the sheet metal model. Dimensional and geometric constraints are incorporated directly on the section. Alternatively, panels can be associatively extracted from faces of existing solid parts. The sheet metal part is generated by defining bends between the panel sections and specifying a material for the part. Dimensional relationships are automatically inherited by the solid model to permit rapid dimension-driven design changes. Sheet metal part modeling capabilities include:
•The ability to model the 3D part in the context of the surrounding assembly to capture the true design intent by considering the interpart relationships.
•The Dynamic Navigator™ guides you through geometry and constraint creation to accelerate the process of modeling sheet metal parts.

•The ability to create parts by defining common bend lines to join 2D sections. This allows you to create parts that incorporate complex shaped panels.
•The extrusion of open sections allows you to quickly create multi-paneled parts with bends and interpanel relationships automatically inherited.
•Solids-based interference checking in I-DEAS Master Assembly™ software allows you to evaluate the sheet metal part for fit within the assembly context.
•Catalogs of sheet metal families of parts can be created to give you access to common parts.
•The ability to add design details in the folded state which are associative to the unfolded state allows you to add design details at any time in the design process.

Sheet Metal Bending/Folding

With one command, you can quickly evaluate the flat pattern layout for the sheet metal part. Material growth for the flat pattern is automatically calculated. Material bend allowance can be varied per bend to simulate the effects of using different machines for each bend. The bend allowance (K factor) can be selected from a table-driven materials catalog. You can also add company-specific bend tables and equations. I-DEAS Sheet Metal Design software also offers tools for modeling of special situations such as welded joints, zero radius bends, and bends of any angle. The part can be partially unfolded and refolded in any order. Folding capabilities include:
•Automatic unfolding/folding with a single command allows for quick evaluation of the sheet metal part in any state.
•Material bend tables allow you to quickly select appropriate bend allowances for particular material and thickness.
•Independent bend radii allow you to specify the radius of each bend individually.
•0-degree bends simulate welds.
•180-degree bends simulate reinforcement bends.
•Stepping of bends allows you to define tangency between two bends to model parts which have offset panels (S-shaped-bends).
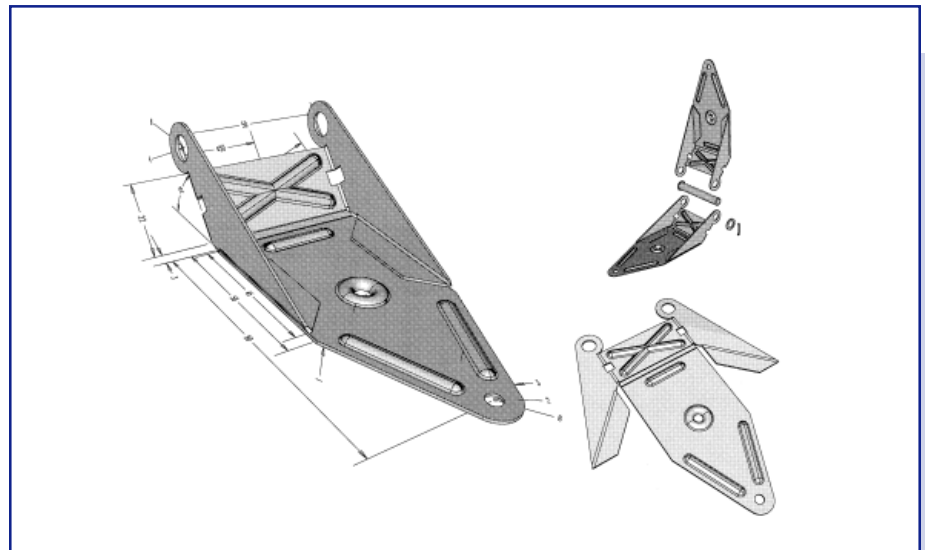
Complex bend modeling tools and a catalog of sheet metal form features allow you to incorporate specific details to capture design intent. Dimension-driven parts make design changes easy.

• Zero radius bends allow for modeling of bends that do not have an interior bend radius.

• Bends can be created without incorporating the K factor, allowing you to add sheet metal panels to the flattened model. This capability gives you the flexibility to define panels when you know the desired flattened length of the sheet metal panel.

• Independent bend allowance enables you to simulate the use of different machines for manufacturing each bend.

Automatic Stress Reliefs

Automatic stress reliefs help you with stress relief placement by indicating key locations where reliefs are appropriate. Stress reliefs are automatically calculated and placed on the model based on user-specified defaults. The reliefs can easily be modified or deleted from the sheet metal part. A set of standard relief shapes is provided including circular, rectangular, vee, shear, and slot.

Sheet Metal Features Catalog

A complete catalog of standard sheet metal features is included with I-DEAS Master Modeler software, allowing you to incorporate details on the sheet metal part which are necessary for accurately modeling its intended functionality. The catalog consists of various standard sections, punches, tabs, depressions, channels, and louvers commonly found in sheet metal manufacturing. The features are added to the sheet metal part using positioning relationships which help you capture the true design intent. You can create holes and punches across bends in the unfolded state which are associative to the folded state, and incorporate the appropriate material stretch allowance. The catalog can be tailored to include user-defined features. Standard features include straight and arc beads, dimples, tabs, slots, prick punch, depressions, rimmed holes, louvers, and notches.
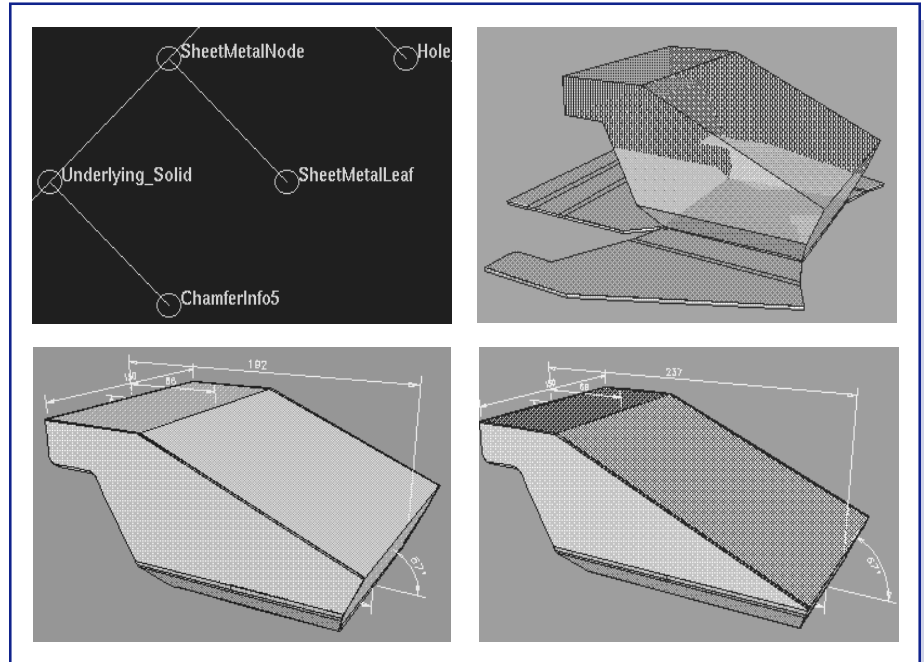
Sheet metal parts can be used to generate flat pattern drawings in I-DEAS Drafting software which are fully associative to the solid part.

Drafting

If you use I-DEAS Sheet Metal Design with I-DEAS Master Drafting™ software, sheet metal parts can be easily documented in their folded and unfolded states. Drawings are automatically created from the sheet metal solid, with complete representation of bend lines, material growth, and associated features. All geometry is completely associative to the solid part for rapid updating of design changes.

Drawing capabilities include:
• Drawing associativity to the sheet metal part makes design changes easy. Changes to the sheet metal part are automatically updated to the drawing.
• Bends and dimensions are automatically inherited on the drawing, minimizing the work required to make a fully detailed drawing.

Manufacturing

The sheet metal geometry can also be used with manufacturing software to create toolpaths for manufacturing. Use of existing sheet metal geometry eliminates the recreation of geometry for manufacturing applications, which in turn, greatly reduces the design cycle.

Capabilities include nesting, profile cutting, laser cutting, flame cutting, punch nibbling, and in-process monitoring of removed and remaining material.

Prerequisite

Core Master Modeler
-or-
I-DEAS Product Design Package
-or-
I-DEAS Artisan™ Package

For More Information

For more information, contact your local SDRC representative or call 1-800-848-7372.