Core Master Modeler

foundation capabilities for feature-based variational solid modeling

SDRC offers a scalable range of core, solids-based modeling products that enable you to match price point and collaboration level to your requirements.

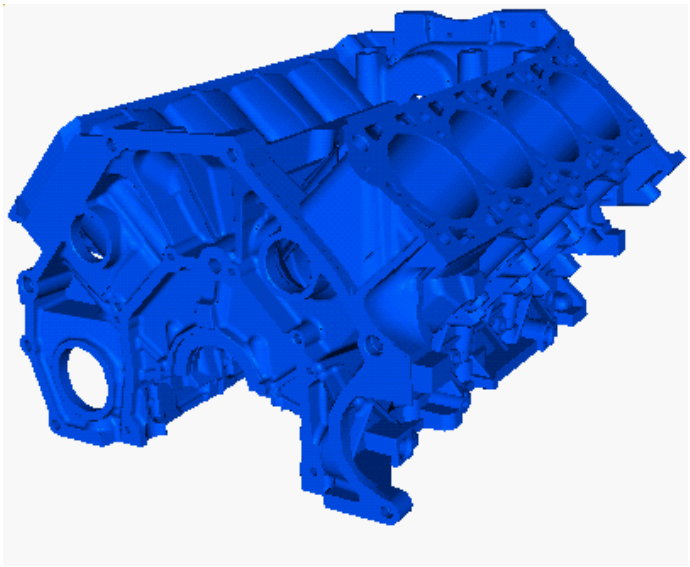
Three levels are available:

- I-DEAS®
- I-DEAS Product Design Package
- I-DEAS Artisan™ Package

The modeling, assembly, and drafting functionality included in each of these core offerings is the same. These core I-DEAS offerings are differentiated by the level of I-DEAS Team Data Manager™ functionality provided and the packaging of concurrent licensing available for each application task.

I-DEAS provides individually secured floating tools for I-DEAS Master Modeler™, I-DEAS Master Assembly™, and I-DEAS Master Drafting™. Each of these three tool applications are unbundled for maximum flexibility and the highest level of collaboration and are described in their individual write-ups. I-DEAS provides full I-DEAS Team Data Manager capabilities to enable collaboration throughout an engineering team.

For information on I-DEAS Artisan Package and I-DEAS Product Design Package, go to their individual write-ups.



I-DEAS Master Modeler provides a complete suite of feature-based variational solid modeling tools to increase the productivity of designing manufacturing components of any complexity.

I-DEAS Master Modeler

I-DEAS Master Modeler software is a high-performance 3D design system, and the multi-purpose geometric modeling foundation of I-DEAS. You work with a user interface tuned for ease of learning and optimal productivity to design complex mechanical parts in an intuitive feature-based solid modeling environment. The solids-based approach aids design productivity by simplifying construction of complex geometry, facilitating design changes, automatically removing hidden lines, directly calculating mass properties, and providing an accurate part definition for NC machining. In addition to being a design system, I-DEAS Master Modeler is also the common geometric modeling foundation of I-DEAS. You can use it to create application-specific geometry for use in other I-DEAS applications such as finite element modeling, drafting, and manufacturing.

An integrated data management system provides a foundation for concurrent engineering by maintaining associativity across the master model, drawings, finite element models, and NC data. With I-DEAS, your design team members can work together concurrently, creating assemblies, drawings, simulations, and NC jobs from the master model. This lets one image of a part in the master database underpin any number of linked application studies, such as assembly packaging models, layout and detailed drawings, stress calculations, design optimization, and NC part programs.

I-DEAS provides Concurrent Associativity. This means a designer can provide an early snapshot of a design to fellow team members, who can begin to perform analysis, create drawings, build assemblies, generate toolpaths, and bring the concept to reality.

What Is It?

•Core feature-based variational modeler underpinning I-DEAS that helps you develop a complete “master model” definition including:

- •model complex geometry
- •open part or solid geometry
- •variational constraints
- •parametric and variational design features
- •functional features
- •design history
- •engineering equations
- •dimensions

- datums
- coordinate systems
- GD&T
- notes and attributes
- materials
- properties (mass, volume, etc.)

- Associative Modeler
  - Design changes can be updated.

Architecture

- Nurbs-based
- Precise, Double Precision
- Wireframe, Surface, Solids hybrid modeler

User Interface

- Leading edge modeling interaction
  - high productivity
  - ease of use
  - ease of learning
- Streamlined command structure
  - Most commands involve click & drag, avoiding multiple menu levels.
- Dynamic Icon Palette
  - Frequently used icons “float” to the top.
- Interchangeable Operation Sequence
  - command then select
  - select then command
- Dynamic Navigator™
  - Anticipates user intent.
  - Pre-highlights geometry during selection.
  - Senses significant geometry and pre-highlights constraints:
    - end points
    - mid points
    - intersections
    - tangency
    - parallelism
    - perpendicularity
- Grouping
  - Define functional features.
  - Attach GD&T and notes.
  - Imbed URLs.
  - Use for selection.
- Compare Parts
  - Compare surfaces, edges, points between two versions or two different parts.

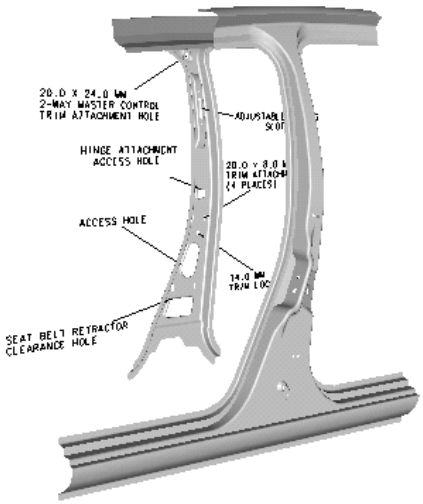
- Sketch In Place
  - Sketch directly on part surfaces and datums.
  - Dynamic navigation to edges & vertices.
  - Constrain and dimension wireframe.
  - Animation, color-coding to show free dofs.
  - “Focus” to edges and vertices off the sketch plane on the part.

Advanced Graphics (Requires H/W Support)

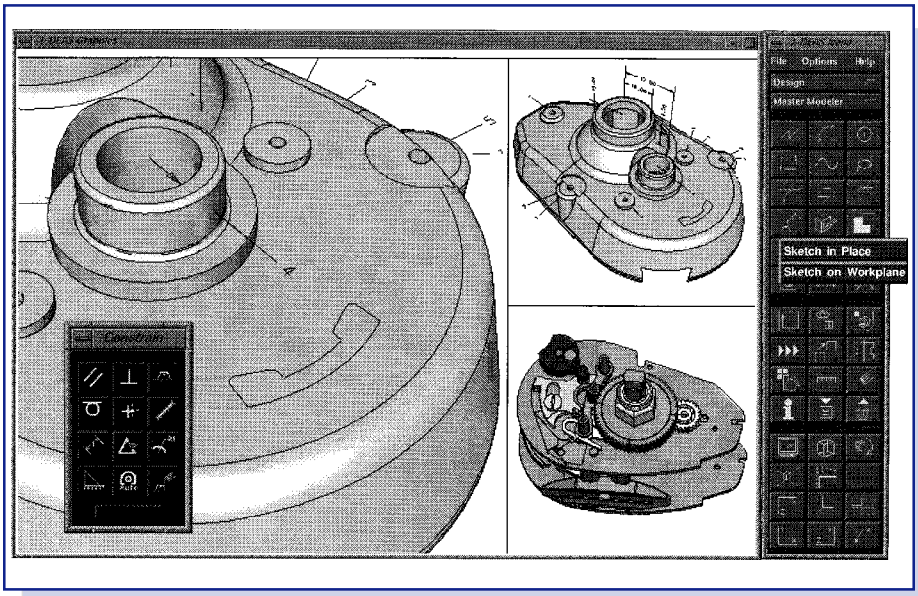
- 3D dynamic viewing
  - pan, zoom, rotate
- Shaded, hidden line viewing
- Multiple clipping planes with capping
- Texture mapping
- Stereo viewing
- Interference viewing

VGX™ Technology

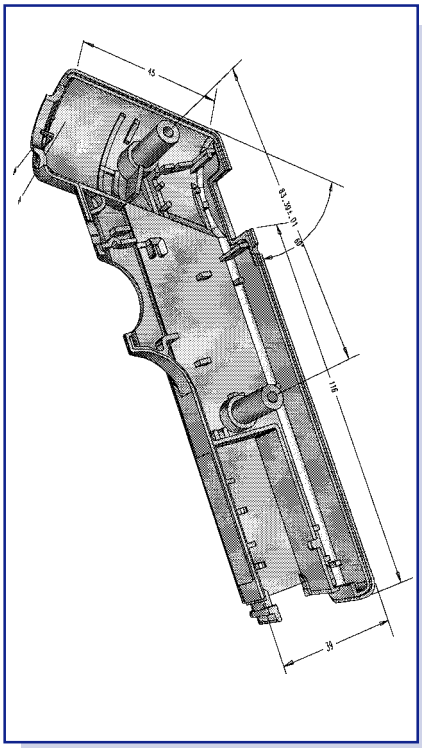
- Key foundation technology for I-DEAS.
- Unparalleled ease of use, learning and ease of modification.
- Combined design, manufacturing and simulation intent.
- I-DEAS Master Modeler application
  - variational sketcher
  - variational equations
  - variational features
- Enables best of Direct Manipulation and History-based systems.
  - drag & drop
  - flexible constraints and dimensioning
- Direct Manipulation
  - 2D Drag & Drop with Dynamic Navigation.
    - points, lines, arcs, splines, dimensions
  - 3D Drag & Drop with Dynamic Navigation.
    - planes, cylindrical surfaces, spheres, dimensions.
    - Dimension directly on 2D and 3D geometry.



Integrated GD&T checking provides consistent application of feature control frames and accurate representation of design intent.



Dynamic Navigator allows you to "sketch in place" directly on the solid, while automatically capturing constraints to existing geometry.



Intelligent features such as automatic shell operations capture design intent and dramatically improve productivity.

•Flexible constraints and dimensions
  •Constrain and dimension between variational entities.
    •when you want
    •how you want
    •change at will
•Bi-directional constraints and dimensions between variational features independent of modeling sequence.

Features

•Variational Sketch
•Extrude (from/to, until, depth options)
•Revolve (from/to, until, depth options)
•Fillet
•Chamfer
•Shell (parts or volumes)
•Silhouette
•Draft
•Reference geometry (datums)
•Patterns
•User-defined features
•Catalog features

Construct Operations

•Can occur between complex features
•Operations supported
  •Cut
  •Join
  •Intersect
  •Partition
  •Split Surface
  •Add
  •Stitch

Feature Management

•Graphical history tree browser
  •Feature Naming
  •Rollback
  •Modify
  •Delete
  •Feature Suppression
  •Replace Feature
  •Search Capabilities

Feature Catalogs

•Library of pre-assigned features (ribs, slots, other)
•Table-driven Features
•User-designed Features

I-DEAS 3D IGES Data Translator

The I-DEAS 3D IGES Data Translator software provides you with an accurate and flexible mechanism for generating and processing ASCII formatted IGES files. The data translator focuses on importing and exporting 3D graphic data between I-DEAS Master Modeler software and other CAD/CAM/CAE systems. This exchange of data provides your organization with a more open and dynamic system to meet the demanding requirements of a concurrent engineering environment.

Practical Usage

Data imported into the I-DEAS Master Modeler can serve a wide range of uses. Variational constraints can be applied directly to planar geometry and used for sweep operations in creating solid models, or for 2D tolerance and mechanism analysis.

You can also use 2D and 3D data for part definitions for machining operations, direct meshing of data for finite element analysis or plastics simulations, and the basis for solid parts and assemblies. Complete representations of a part defined as trimmed surfaces can even be stitched automatically into solid parts during the import of the IGES file. Solid parts in the form of the B-rep solid entity can be used directly in the design process as parts in an assembly, as the basis for a finite element mesh, or for machining purposes. Additional processing options are available so the system can be configured to meet the changing needs of the IGES files you encounter.

For export, the I-DEAS 3D IGES Data Translator supports a wide range of data flavors to facilitate the varying data structures of a wide range of software applications.

Data flavors available for export include:
- AutoCAD
- Computervision
- CATIA
- Ford PDGS
- VDA-IS
- Intergraph
- Analytic
- CADAM
- B-spline
- Unigraphics
- Camand
- JAMA

In addition, you can create and incorporate your own customized flavors.

Technical Specifications

- IGES Version 5.3 support for import and export.
- Form-based execution for ease-of-use in defining import and export parameters.
- Geometry support includes 3D wireframe, trimmed surface, and B-rep solid entities.
- Surface-to-solid sew-up capability with valid trimmed surface data during import.
- Curve/surface order reduction for higher polynomial order data - curves of order 7- to-25 and surfaces of order 7- to-25 can be reduced in order.
- Segment trimming curves for trimmed surfaces.
- Options for copious data processing.
- Export flavoring for most of the common CAD/CAM/CAE systems.
- Selective import of entities using import flavors.
- Full use of imported geometry for solid, FEM, and manufacturing applications.
- Detailed error checking and status reports.
- Export I-DEAS groups to IGES levels.
- Import control and blanked entities in the file (visible, hidden, ignored).

Supported Entities

Entities	Support
100 - Circular Arc	Import/Export
102 - Composite Curve	I/E
104 - Conic Arc	I/E
106 - Copious Data (forms 1, 2, 11, 12)	I/E
108 - Plane (forms 0, 1)	I/E
110 - Line	I/E
112 - Parametric Spline Curve	I/E
114 - Parametric Spline Surface	I/E
116 - Point	I/E
118 - Ruled Surface (form 1)	I/E
120 - Surface of Revolution	I/E
122 - Tabulated Cylinder	I/E
124 - Transformation Matrix	I/E
126 - Rational B-spline Curve	I/E
128 - Rational B-spline Surface	I/E
140 - Offset Surface	I
141 - Boundary Entity	I/E
142 - Curve on a Parametric Surface	I/E
143 - Bounded Surface	I/E
144 - Trimmed Surface	I/E
186 - Manifold Solid B-rep Object	I/E
314 - Color Definition	I/E
502 - Vertex	I/E
504 - Edge	I/E
508 - Loop	I/E
510 - Face	I/E
514 - Shell	I/E

I-DEAS VDA-FS Data Translator

The I-DEAS VDA-FS Data Translator software provides a mechanism for directly transferring geometric data between the I-DEAS Master Modeler and other applications. Using the translator you can import and export 3D wireframe and trimmed surface data to and from I-DEAS. Since development of the standard began in 1982, a high priority has been given to developing an interface standard for the transfer of free-form surface data to meet the requirements of the automobile industry. In support of this standard, the translator has proven useful as a means of data transfer among automobile manufacturers and their suppliers and toolmakers, as well as a valuable tool for communicating among a variety of software products within a company.

Practical Usage

The translator provides for full bi-directional data exchange. Data imported into the I-DEAS Master Modeler software can serve a wide range of uses. Variational constraints can be applied directly to planar geometry and used for sweep operations in creating solid models or for 2D tolerance and mechanism analysis. You can also use 2D and 3D data for part definitions for machining operations, direct meshing of data for finite element analysis or plastics simulations, and the basis for solid parts and assemblies. Complete representations of a part defined as trimmed surfaces can even be "sewn-up" automatically into solid parts during the import of the VDA-FS file. Additional processing options are available so that the system can be configured to meet the changing needs of the VDA-FS files you encounter.

Technical Specifications

•VDA-FS Version 2 supported.
•Form-based execution for ease-of-use in defining import and export parameters.
•Geometry support includes 3D wireframe and trimmed surface.
•Surface-to-solid sew-up capability with valid trimmed surface data during import.
•User-definable header element for export.
•User-definable processing options for individual entity types during import.
•Curve/surface order reduction for higher polynomial data - curves of order 7-to-20 and surfaces of order 7-to-20 can be reduced in order.
•Processing reports include statistics regarding errors encountered, information processing reports, and interactive status reports.

Supported VDA-FS Elements

Entity	Support
POINT	Import/Export
PSET	I
MDI	I
CIRCLE	I/E
CURVE	I/E
SURF	I/E
CONS	I/E
FACE	I/E

I-DEAS SET Data Translator

The I-DEAS SET Data Translator software provides a comprehensive mechanism for generating and processing SET (Standard d'Echange et de Transfert) data files. The SET data exchange standard was developed in France and is used for the exchange of geometric data between different engineering software products. The translator provides a broad range of support for many of the standard SET entities. This includes support for wireframe and trimmed surface entities, as well as the B-rep solid entity. It functions as a mechanism for importing and exporting data between the I-DEAS Master Modeler and a SET data file.

Practical Usage

Data imported into the I-DEAS Master Modeler can serve a wide range of uses. Variational constraints can be applied directly to planar geometry and used for sweep operations in creating solid models, or for 2D tolerance and mechanism analysis. You can also use 2D and 3D data for part definitions for machining operations, direct meshing of data for finite element analysis or plastics simulations, and as the basis for solid parts and assemblies. Complete representations of a part defined as trimmed surfaces can even be sewn-up automatically into solid parts during the import of the SET file. Solid parts in the form of the B-rep solid entity can be used directly in the design process as parts in an assembly, as the basis for a finite element mesh, or for machining purposes. Additional processing options are available so that the system can be configured to meet the changing needs of the SET files you encounter.

For export, the I-DEAS SET Data Translator supports a number of predefined data flavors to facilitate the varying data structures of a wide range of software applications. Data flavors available for export include:
•Analytic only
•Parametric polynomials
•Analytic and NURBS
•NURBS only

In addition, you can create and incorporate your own customized flavors.

Technical Specifications

•SET Z68-300-1 and Z68-300-1 + SOLIDE2 Version 89-06 supported.
•Version Z68-300-1 + SOLIDE 2 Blocks supported include 21, 41, 5, and 302.
•Geometry support includes 3D wireframe, trimmed surface, and B-rep solid entities.
•Surface-to-solid sew-up capability with valid trimmed surface data during import.
•User-definable flavoring capability for export.
•SET Block 9900 support allows you to enter a company name, department name, designer, and division.
•Curve/surface order reduction for higher polynomial data - curves of order 7-to-25 and surfaces of order 7-to-25 can be reduced in order.
•Processing reports include statistics regarding errors encountered, skipped blocks, information processing reports, and interactive status reports.

Supported Dictionary Values

Dictionary Entry	Parameter Description
1	Coordinate system
2	Mode (MODEL, DRAW)
3	Type of coordinates
4	Depth
5	Subordinate block switch
12	Dimensional tolerance
52	Visibility code
53	Line style
54	Line width
57	Color code

Supported SET Blocks

Geometric Primitives

Class	Type	Description	Support
0	1	Point	Import/Export
	2	Line	I/E
	3	Linear string	I
	4	Vector	I
	5	Point list	I/E
	10	Circular arc	I/E
	11	Elliptical arc	I/E
	12	Parabolic arc	I/E
	13	Hyperbolic arc	I/E
	20	Parametric curve	I/E
	21	NURBS curve	I/E
	36	Surface of revolution	I
	40	Parametric surface	I/E
	41	NURBS surface	I/E

Composite Geometric Entities

Class	Type	Description	Support
1	100	Constructed Solid	I/E
	101	Boundary Solid	I/E
	102	Composite Face	I/E
	120	Composite Curve	I/E

General Blocks

Class	Type	Description	Support
3	301	Coordinate system definition	I/E
	302	Specialized transformations	I

SET Management

Class	Type	Description	Support
99	9900	Start of SET	I/E
	9901	Start of assembly	I/E
	9902	Start of subassembly	I
	9997	End of subassembly	I
	9998	End of assembly	I/E
	9999	End of SET	I/E

User-Defined

Class	Type	Description	Support
9	9900	Identification of SET file	I/E
	9901	Date	I/E
	9902	Comments	I
	9905	Model space definition	I/E
	9911	Last sub-block in sub-block series	I/E
	9920	Initialization of dictionary params	I
	9930	Block header description	I

General Sub-Blocks

Class	Type	Description	Support
3	301	Reference system's transform matrix	I/E
	313	Definition of 3D transformation	I
	314	General matrix of 3D transformation	I
	315	Definition of 2D transformation	I
	316	General matrix of 2D transformation	I
	317	Translation	I

Geometric Definition: Construction

Class	Type	Description	Support
1	120	Definition of a composite curve	I/E
	123	Envelope or contour description	I/E
	130	Parametric definition of a surface of revolution	I

Geometric Definition: Result

Class	Type	Description	Support
0	1	Point coordinates	I/E
	2	Straight line segment	I/E
	3	Polygonal line	I
	4	Vector components	I
	5	Point list (blocks 21 and 41 on export)	I/E
	10	Parameters of a circular arc	I/E
	11	Parameters of an elliptical arc	I/E
	12	Parameters of a parabolic arc	I/E
	13	Parameters of a hyperbolic arc	I/E
	20	Start of param. polynomial curve	I/E
	21	Definition of a polynomial curve	I/E
	22	General parameters of curves	I/E
	23	List of nodes	I/E
	24	List of weights	I/E
	40	Start parametric polynomial surf	I/E
	41	Definition of polynomial patch	I/E
	42	General parameters of surfaces	I/E

I-DEAS Rapid Prototyping Data Translator

I-DEAS Rapid Prototyping Data Translator software provides the ability to link the I-DEAS Master Modeler software to commercially available rapid prototyping equipment. Rapid prototyping allows designers to create production prototypes within hours of creating the design. Typically, the process involves a liquid or powdered material (usually plastic), which is formed into a part using heat or laser light. Using I-DEAS Master Modeler solid models as the foundation, geometry is translated to an STL format file (a standard rapid prototyping file format), which can then be read into most of the industry-leading rapid prototyping machines. The rapid prototyping machines use this geometry information to build prototypes one layer at a time from the vat of raw material. The prototyping process is a quick and inexpensive way for you to evaluate the integrity of the design by analyzing actual 3D physical models which provide information that cannot be inferred by reviewing plots and graphics alone. The ability to rapidly generate prototypes early in the design process allows for further design evolution prior to the expensive and time-consuming process of soft or hard tooling. As a result, new products can be brought to market faster with higher quality, and at lower design and manufacturing cost.

Rapid Prototyping Methods

I-DEAS Rapid Prototyping Data Translator supports a wide variety of rapid prototyping methods, allowing you to use the process which integrates best with your design environment.

Rapid prototyping methods include:
- Stereolithography
- Selective Laser Sintering
- Fused Deposition Modeling
- Laminated Object Manufacturing

Rapid Prototyping Support

I-DEAS Rapid Prototyping Data Translator supports numerous rapid prototyping machines from the leading rapid prototyping hardware suppliers. For a complete list of supported systems, see the I-DEAS Solutions Network℠ on the SDRC website.

I-DEAS Rapid Prototype Modeling

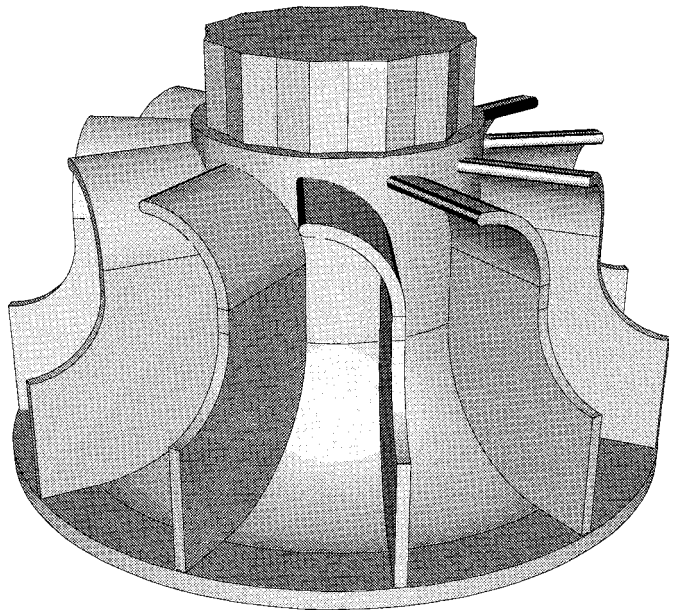
Solid models created in I-DEAS Master Modeler software can be directly translated to an STL format file, which can then be read by most rapid prototyping machines. Customization capabilities allow the designer to add new rapid prototyping devices to the design environment.

Prerequisite

None

For More Information

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



Using solid models created in I-DEAS Master Modeler, 3D prototypes can be generated within hours for quick evaluation in the early stages of the design process.