

# IronCAD

## DATA TRANSLATION OVERVIEW

- [1. Introduction](#)
- [2. Choosing a 3D Format](#)
- [3. Model Types](#)
  - [a. Solid Models](#)
  - [b. Surface Models](#)
  - [c. Facet Models](#)
- [4. Suggested Translation Formats](#)
- [5. Scaling Issues](#)
- [6. Troubleshooting IGES files](#)
- [7. IGES Entity Support](#)
- [8. 2D DWG Export Entity Mapping](#)
- [9. 2D DWG Import Entity Mapping \(Profile Geometry Only\)](#)

### 1. Introduction

This technical brief is intended to give an overview of data translation within IronCAD. This information will allow a user, consultant, or support representative to choose the best 3D/2D-translation format for a variety of applications. This overview also points out known problems and compatibility issues related to IronCAD.

### 2. Choosing a 3D Format

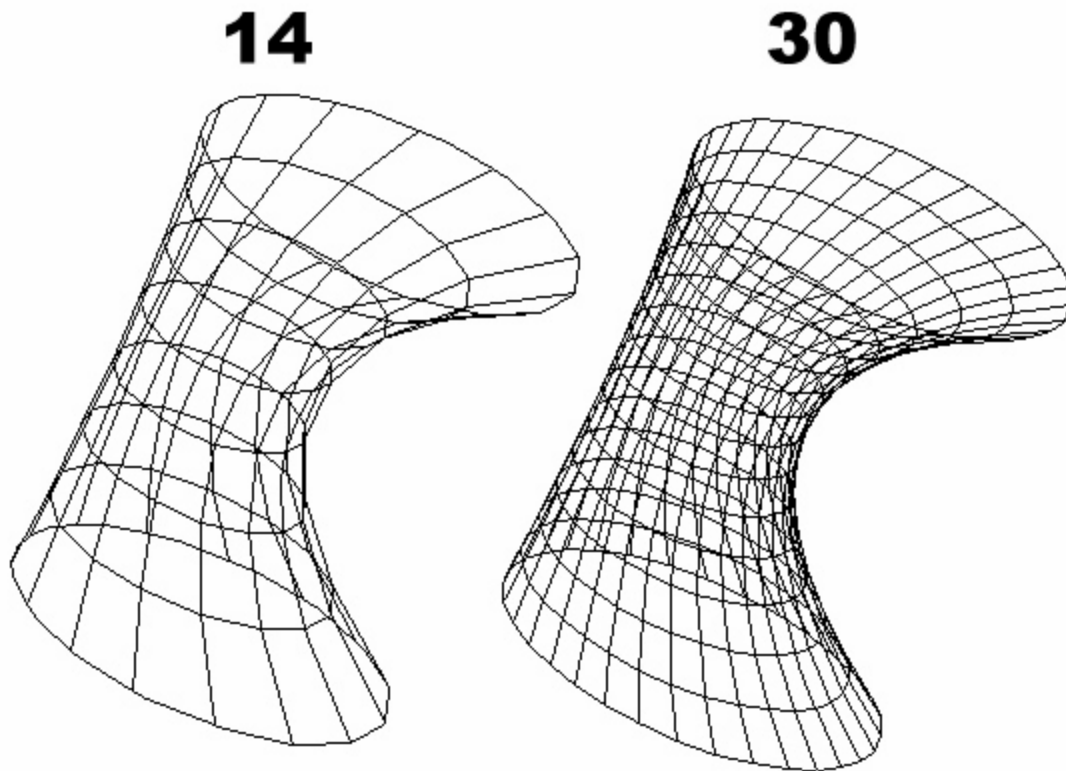
The model types, which are supported by IronCAD, can be organized into three main categories. These categories are solid models, surface models, and facet models. Choosing the best format is largely dependent on the task at hand.

The first question to ask is 'does the geometry of the model need to be modified?' If the model needs to be modified within IronCAD, you must import a solid model or convert an imported surface or facet model to a solid. If you are exporting from IronCAD, and the geometry of the model needs to be modified in another CAD software package, you will need to find out what format the other software requires. For most 'mechanical oriented' CAD systems this will be a solid or surface format. For graphically oriented packages (Alias, 3D Studio), you may be required to use a facet model format.

If you do not need do modify the geometry of the model, this allows much more flexibility for the choice of a model format. IronCAD supports the import and export of many industry standard formats in both the 'CAD' and 'graphics' fields. If you are importing a model for rendering or animation purposes only, you can use the solid or surface formats (these are usually the desired choice because the facet resolution is adjustable). However, in many cases these formats are not available, in which case you can use the variety of facet model formats, which IronCAD supports. These facet model formats are also useful for general viewing purposes. However, if accurate dimensions need to be measured on the model, a solid or surface model is required.

If you have a solid or surface model, IronCAD allows you to adjust the facet resolution, a feature which can be useful in many situations. For example, when exporting a STL file for rapid prototyping purposes, the facet resolution can be increased in order to make the smoothest prototype possible. Facet resolution should also be increased when rendering photorealistic

images within IronCAD. On the other hand, if the model is being exported as VRML for viewing on the Web, the facet resolution should be lowered in order to reduce the file size. The figure below shows an example of a model at two different facet resolutions.



### 3. Model Types

The following is a description of each model type and the specific formats, which IronCAD supports within each category.

#### a. Solid Models

Solid model formats are usually the most desirable format, especially when accuracy and 'ability to modify' are important factors. This type of model allows CAD solid modeling software to modify an imported model. Solid models also contain data that allow calculations such as mass, surface area, and dynamic properties of a model.

**ACIS (.sat)** - A solid model format developed by Spatial Technology, Inc. which is currently in wide use by commercial CAD/CAM software vendors. Visionary Design Systems is a licensed strategic partner of Spatial Technology. IronCAD can read and write ACIS versions 1.7, 2.0, 2.1, 3.0 & 4.0. Spatial does not guarantee 100% compatibility beyond 2 previous releases. (This means version 1.7 thru 2.0 compatibility is not guaranteed, but there have been no significant problems with translating these versions to date.)

**STEP (.stp)** - An international standard for the communication of product data, also known as ISO 10303. IronCAD supports Application Protocol 203 – Configuration controlled design (STEP AP203 level 6). Another popularly supported protocol for

the communication of solid model data is AP 214 – Core data for automotive design processes.

**IGES solid (.igs)** - A standard for solid model data. The solid format of IGES is not commonly implemented in commercial software.

## **b. Surface Models**

Surface models contain only information about the individual surfaces which make up a model. IronCAD and some other solid modeling systems have the ability to import a file of this type and 'stitch' the surfaces together to create a valid solid model. In some situations, where the accuracy of the surface data makes solids conversion impossible the user will still be able to load the surface but without modification capability. The user can however reference such surfaces during shape creation and while performing Direct Face Modeling commands. Imported surfaces can also be positioned, given color/textures/lighting, animations and exported as high resolution, color images and animations. IronCAD also has the ability to export a surface model to any of the facet model formats.

**IGES trimmed surface (.igs)** - A standard for surface model data. IGES is the most widely used data format for transferring CAD/CAM data. IronCAD can read and write IGES trimmed surface files. Incompatibility issues with this format are usually due to a particular software package's lack of support for certain IGES entity types. IronCAD also has the ability to export IGES 'wireframe' models.

## **c. Facet Models**

Facet or 'polygonal' models are approximate methods of defining 3D models. These formats are typically used for visualization / graphics applications, not for analysis or manufacturing (with the exception of STL).

**VRML (.wrl)** - Virtual Reality Modeling Language - designed as a compact 3D data format for use on the Internet. In addition to facet data, VRML supports primitive objects as well. Most Internet browsers have the ability to view this file type interactively on-line through the use of browser 'plug-ins'. IronCAD supports VRML 2.0 (export only) and VRML 1.0, including environment data such as colors, textures, lights, camera settings, and URL links.

**Stereolithography (.stl, .sla)** - used for manufacturing parts via Stereolithography or other rapid prototyping method.

**3D Studio (.3ds, .prj)** - file format for Autodesk (Kinetix)3D Studio, widely used in the 3D PC graphics community. IronCAD can import and export robust 3D Studio files including colors, textures, lights, and cameras.

**Wavefront (.obj)** - file format for SGI's Alias|Wavefront, a high-end graphics software package on the UNIX platform used mainly for 'Hollywood quality' renderings, animation and industrial design.

**AutoCAD (.dxf)** - a commonly used format for transferring 2D and 3D data on PC platforms. From the scene document IronCAD supports import/export of a limited subset of 3D DXF entities. 2D entities can be imported directly into scene profiles or exported as a drawing layout format when in drawing mode. See AutoCAD section below for details.

**TrueSpace (.scn, .cob)** - file format for Caligari TrueSpace, a low-cost modeling, rendering and animation software package used mainly in graphic design for the PC. IronCAD can import (no export) these file types and apply color, texture, lighting and animation.

**POV-Ray (.inc)** - file format for Persistence of Vision Ray Tracer, a high quality freeware rendering program available on all nearly all platforms. IronCAD can export (no import) robust POV-Ray files including colors, lights, and cameras.

**Raw Triangles (.raw)** - a generic format which contains very basic facet model information. Commonly used as a very simple way to read and write simple 3D triangle data for proprietary, academic, or 'hand-coded' programs.

## 4. Suggested Translation Formats

The following table provides guidelines for choosing formats to exchange 3D model data between IronCAD and other specific CAD software. Note that the recommended format is dependent on the type of application and whether the data is being imported or exported.

PRODUCT	APPLICATION AREA	IMPORT into IronCAD		EXPORT from IronCAD	
		recommended	secondary	recommended	secondary
SolidDesigner	rendering/viewing	vrml 1.0, stl	iges, acis	iges	step
	modeling	acis	step	iges	step
Autocad / Mech. Desktop	rendering/viewing	acis	stl, 3dstudio, iges	Mech Desk -acis 3.0 Acad 13 unsupported Acad 14 – acis 3.0	Dxf, 3dstudio, iges
	modeling	acis		acis 3.0	iges
SolidWorks	rendering/viewing	vrml 1.0	stl	vrml 1.0	stl,iges
	modeling	acis	iges	acis 3.0	iges
Solid Edge	rendering/viewing	acis	iges	acis 3.0	iges
	modeling	acis	iges	acis 3.0	iges
SDRC Ideas/Artisan	rendering/viewing	stl	iges	iges	
	modeling	step		iges	step
Pro / Engineer	rendering/viewing	wavefront/3Dpaint	vrml 1.0, stl, iges	iges	step
	modeling	step		iges	step
Cadkey	rendering/viewing	acis		acis 2.1	
	modeling	acis		acis 2.1	

### NOTES:

IGES always refers to 'trimmed surface' IGES files (version 4.0 or above).

If you are having trouble with IGES import / export, try using 'trimmed surface, nurbs only' IGES files.

STEP always refers to STEP AP203 files

When the ACIS version is not specified, any of the following 1.7, 2.0, 2.1, 3.0 or 4.0 is acceptable

IronCAD can import the following 3D DXF (.dxf) entities:

3DFACE - 3 or 4 point polygons

POLYLINE - Type 64 - polyface mesh, in a grid

POLYLINE - Type 128 without Type 64 - polygon mesh

If you are having problems importing a 3D DXF model make sure it contains these entities otherwise you may get an error message similar to "No facet data found" when trying to import the model. To import 2D DXF entities use the File menu Import option while the 2D profile grid is active.

## 5. Scaling Issues

When transferring 3D models between CAD systems, sometime the scale of the model may be translated incorrectly. These scaling problems can be critical in many situations (e.g. rapid prototyping via Stereolithography files). There are a variety of factors which can cause this to happen. For example, if a particular file format does not support units (such as ACIS 1.5, 1.6, & 1.7) then the CAD software will assume the file is in it's own 'system units'. When using 3D model formats that don't support units information, it is important to know what the 'system units' are for the importing and exporting CAD software involved. **The system unit for IronCAD is centimeters.**

The following chart lists some known scaling issues with specific CAD software, and gives a brief explanation of the cause. Because of these potential scaling problems, it is **imperative to verify the scale of the model after importing**, especially if the model will be used for manufacturing purposes.

From	Format	To	Imp. Unit/Scale			Notes
			mm	cm	in	
Solid Designer 6.0	ACIS 3.0	IronCAD 1.4	1 : 1	1 : 1	1 : 1	
Solid Designer 6.0	IGES	IronCAD 1.4	1 : 1	1 : 1	1 : 1	
Solid Designer 6.0	STEP	IronCAD 1.4	1 : 1	1 : 1	1 : 1	See Note 1
Solid Designer 6.0	STL	IronCAD 1.4	1 : 1	10 : 1	(10*2.54) : 1	
Solid Designer 6.0	VRML 1.0	IronCAD 1.4	1 : 1	1 : 1	1 : 1	
SolidWorks 98	IGES	IronCAD 1.4	1 : 1	1 : 1	1 : 1	
SolidWorks 98	STEP	IronCAD 1.4	1 : 1	1 : 1	1 : 1	
SolidWorks 98	ACIS	IronCAD 1.4	1 : 1	1 : 1	1 : 1	
SolidWorks 98	STL	IronCAD 1.4	1 : 1	1 : 1	1 : 1	
SolidWorks 98	VRML	IronCAD 1.4	1 : 1	1 : 1	1 : 1	
Solid Edge 4.0	ACIS 2.1	IronCAD 1.4	1 : 1	1 : 1	1 : 1	
Mech. Desktop 2.0	ACIS 3.0	IronCAD 1.4	1:10	1:1	2.54:1	
IronCAD 1.4	IGES	Solid Designer 6.0	1 : 1	1 : 1	1 : 1	
IronCAD 1.4	STEP	Solid Designer 6.0	1 : 10	1 : 1	2.54 : 1	
IronCAD 1.4	IGES	SolidWorks 98	1 : 1	1 : 1	1 : 1	
IronCAD 1.4	STEP	SolidWorks 98	1 : 10	1 : 1	2.54 : 1	
IronCAD 1.4	ACIS 3.0	SolidWorks 98	1 : 1	1 : 1	1 : 1	ACIS 4.0 will not import
IronCAD 1.4	ACIS 2.1	Solid Edge 4.0	1000 : 1	100 : 1	(100/2.54) : 1	ACIS 3.0 or higher will not import
IronCAD 1.4	ACIS 3.0	Mech. Desktop 2.0	1:1	1:1	1:1	

**Note 1:** When importing a STEP file from Solid Designer 6.0 a syntax error was detected that caused an import failure in IronCAD. This can be fixed by manually editing the STEP file as follows:  

```
FILE_SCHEMA( ( 'CONFIG_CONTROL_DESIGN' , 'SHAPE_
APPEARANCE_LAYERS_GROUPS' ) ) ;
```

## 6. Trouble Shooting an IGES File

Translating a file from one system to another can be a straightforward process when everything works as expected. However, what do you do when things don't go smoothly? The purpose of this section is to provide some insight into the file structure and some common problems that may occur.

### The basics in understanding the IGES file format

When a model is exported using IGES it can be in an ASCII or binary form. The most common encountered form is readable ASCII, a copy of which is included below. The IGES file is usually made up of five distinct sections and they should appear in order as follows:

- |    |                         |
|----|-------------------------|
| a. | Start Section           |
| b. | Global Section          |
| c. | Directory Entry Section |
| d. | Parameter Data Section  |
| e. | Terminate Section       |

**Start Section** - The start section of the file is designed to provide human-readable prologue to the file. There shall be at least one start record. All records in the section shall have the letter S in column 73 and a sequence number in column 74 through 80.

**Global Section** – The Global Section of the file contains the information describing the preprocessor and information needed by the postprocessor to handle the file. All records in the Global Section shall contain the letter G in Column 73 and a sequence number.

**Directory Entry Section** - The Directory Entry Section has one directory entry for each entity in the file. The directory entry for each entity is fixed in size and contains 20 fields of eight characters each, spread across two consecutive 80-character lines. All records in the Directory Entry Section shall contain the letter D in column 73 and a sequence number. The first field always contains an entity type number.

**Parameter Data Section** - This section of the file contains the parameter data associated with each entity. Parameter data is placed in free format, with the first field always containing the entity type number. All records in the Parameter Data Section shall contain the letter P in column 73 and a sequence number.

**Terminate Section** - There is only one line in the Terminate Section of the file. It is divided into ten fields of eight columns each. The Terminate Section shall be the last line of the file. Its purpose is to provide summary information about how many sequence number lines should appear in each of the previous sections.

## Example IGES File (Cube exported as wireframe)

```

File created by the ITI ACIS/IGES 2.0 translator.          S      1
, ,25HTriSpectives_Technical2_0,24HC:\WINDOWS\TEMP\tempsat4,24HITI ACIS/IG 1
GES_TRANSLATOR,3H2_0,32,38,6,308,15,,1.0D0,1,2HIN,1,0.0D0,13H970902.1000G 2
27,.001D0,0.0D0,12HShaun_Murphy,12H3D/EYE, Inc.,9,0,13H970902.100027;   G   3
110      1      0      0      0      0      0      0      000000000D    1
110      0      0      2      0      0      0      0      0D          2
110      3      0      0      0      0      0      0      000000000D    3
110      0      0      2      0      0      0      0      0D          4
110      5      0      0      0      0      0      0      000000000D    5
110      0      0      2      0      0      0      0      0D          6
110      7      0      0      0      0      0      0      000000000D    7
110      0      0      2      0      0      0      0      0D          8
110      9      0      0      0      0      0      0      000000000D    9
110      0      0      2      0      0      0      0      0D         10
110     11      0      0      0      0      0      0      000000000D   11
110      0      0      2      0      0      0      0      0D         12
110     13      0      0      0      0      0      0      000000000D   13
110      0      0      2      0      0      0      0      0D         14
110     15      0      0      0      0      0      0      000000000D   15
110      0      0      2      0      0      0      0      0D         16
110     17      0      0      0      0      0      0      000000000D   17
110      0      0      2      0      0      0      0      0D         18
110     19      0      0      0      0      0      0      000000000D   19
110      0      0      2      0      0      0      0      0D         20

110     21      0      0      0      0      0      0      000000000D   21
110      0      0      2      0      0      0      0      0D         22
110     23      0      0      0      0      0      0      000000000D   23
110      0      0      2      0      0      0      0      0D         24
110,-20.522971231927D0,-17.1032488757888D0,17.443851445227D0,      1P    1
-20.522971231927D0,28.8285096543949D0,17.443851445227D0;          1P    2
110,-20.522971231927D0,28.8285096543949D0,-15.3645475049043D0,      3P    3
-20.522971231927D0,28.8285096543949D0,17.443851445227D0;          3P    4
110,-20.522971231927D0,28.8285096543949D0,-15.3645475049043D0,      5P    5
-20.522971231927D0,-17.1032488757888D0,-15.3645475049043D0;      5P    6
110,-20.522971231927D0,-17.1032488757888D0,-15.3645475049043D0,      7P    7
-20.522971231927D0,-17.1032488757888D0,17.443851445227D0;          7P    8
110,-20.522971231927D0,28.8285096543949D0,17.443851445227D0,      9P    9
38.5321468783092D0,28.8285096543949D0,17.443851445227D0;          9P   10
110,38.5321468783092D0,28.8285096543949D0,-15.3645475049043D0,      11P   11
38.5321468783092D0,28.8285096543949D0,17.443851445227D0;          11P   12
110,38.5321468783092D0,28.8285096543949D0,-15.3645475049043D0,      13P   13
-20.522971231927D0,28.8285096543949D0,-15.3645475049043D0;      13P   14
110,38.5321468783092D0,28.8285096543949D0,17.443851445227D0,      15P   15
38.5321468783092D0,-17.1032488757888D0,17.443851445227D0;          15P   16
110,38.5321468783092D0,-17.1032488757888D0,-15.3645475049043D0,      17P   17
38.5321468783092D0,-17.1032488757888D0,17.443851445227D0;          17P   18
110,38.5321468783092D0,-17.1032488757888D0,-15.3645475049043D0,      19P   19
38.5321468783092D0,28.8285096543949D0,-15.3645475049043D0;          19P   20
110,38.5321468783092D0,-17.1032488757888D0,17.443851445227D0,      21P   21
-20.522971231927D0,-17.1032488757888D0,17.443851445227D0;          21P   22
-20.522971231927D0,-17.1032488757888D0,17.443851445227D0;          21P   22
110,-20.522971231927D0,-17.1032488757888D0,-15.3645475049043D0,      23P   23
38.5321468783092D0,-17.1032488757888D0,-15.3645475049043D0;      23P   24
S      1G      3D      24P      24      T      1

```

## The most commonly encountered problems

### 1. Corrupt file

#### a. Bad formatting

Many times a file will not translate because the postprocessor runs into some formatting problem with the file. The most common case is a violation of the 80-character per line length. Where some of the fields are not correctly aligned. The best way to test for this is to load the file into a text processor such as Word or WordPad. All the columns should align up correctly. If you see some columns out of alignment, you most likely have a corrupt file.

#### b. Missing lines in the file

Another common problem is that some of the lines of the file may be missing. The best way to check for this is to make sure that the numbers for each section called out in the Tail Section match the actually number of lines in that section. You do not have to count each line but you should check that the totals match. In the example above, the Tail Section lists the data (D) and parameter (P) sections as each having 24 lines. If you

check the file, you will see that the sequence numbers for both the data and parameter sections do indeed have 24 lines apiece.

Possible causes - Some possible causes of this problem are improperly exported files or some problem during file transfer. The best way to get locate an improperly created file is to load the source file back into the originating system prior to transport. If the round robin is successful, you have a good indication that the file is being corrupted during transport.

## 2. Unsupported Entities

Knowing what you have been given is very important. Many times IronCAD will fail to load because it has encountered unsupported entity types. This problem mostly occurs due to improperly selected export options on the source system. The best way to locate this problem is to look at the Data Section of the IGES file with Word or WordPad. The first entity listed is the entity type number. By scanning these numbers and matching them to the supported entity type list you will quickly see any entity mismatch problems. In the example above IronCAD would have a problem with this IGES file since it only contains entity types 110 (a line). These lines are not accompanied by any other surface types so we can assume that what we have here is a wireframe only IGES file.

Possible causes - Wrongly selected export options.

**Advice** - Make sure you ask the person to try loading the file back into the source system prior to accepting it for a translation test (round robin approach). This will catch most of the formatting issues and save a lot of time for all concerned.

Please remember that sometimes a file can be formatted correctly, and contain all the right entities and still fail to load into IronCAD. Such is the nature of a standard created by committee, open to the personal interpretation of each developer.

Each of these files will have to be looked at individually. The information above is aimed at reducing the amount of time spent tracking down some of the more common problems.

## 7. IGES Entity Support

The following entity types are supported in the IronCAD IGES translator:

Type	Form	Description
100	0	Circular Arc
104	0	Conic Arc
106	0	Copious Data
110	0	Line
116	0	Point
118	0	Ruled Surface
120	0	Surface of Revolution
122	0	Tabulated Cylinder
124	0	Transformation Matrix
126	0	Rational B-Spline Curve (General)
126	1	Rational B-Spline Curve (Line)
126	2	Rational B-Spline Curve (Circle)
128	0	Rational B-Spline Surface (General)
130	0	Offset Curve
140	0	Offset Surface
141	0	Bounded Entity
142	0	Curve on Parametric Surface Entity
143	0	Bounded Surface
144	0	Trimmed (Parametric) Surface Entity
186	0	Manifold Solid B-Rep Objective
190	0	Plane Surface
192	0	Right Circular Cylindrical Surface
194	0	Right Circular Conical Surface
196	0	Spherical Surface
198	0	Torroidal Surface
502	0	Vertex Entity
502	1	Vertex List
504	0	Edge
504	1	Edge List
508	0	Loop
510	0	Face
514	0	Shell

Why some programs IGES translators may not be compatible with IronCAD:

Some IGES translators do not support entity types 141 and 143. Instead, they look for the similar entities 142 and 144. IronCAD by default does not export 142/144 entities; instead, it uses 141/143 entities. If you are exporting to a system that requires 142/144 entities check the "Use entity type 144" box in the IGES Export Options dialog.

In addition, if you are having trouble bringing an IGES file into IronCAD, it may be because the IGES file is a 2D drawing. Currently IronCAD does not import 2D IGES drawings. Again, check your applications documentation to see if you are exporting a 3D model or a 2D representation of that model. The 2D representation will not import into IronCAD.

In addition to the 3D translators, IronCAD supports the importing and exporting of 2D DXF and DWG entity types. Import can only be performed during the edit cross section portion of IntelliShape creation (including 2D shapes), while export is performed on the active 2D-drawing document. The following tables detail the supported entity types for DWG import and export.

## 2D DWG/DXF Export Entity Mapping

<i>IronCAD Entity</i>	<i>DWG/DXF Entity</i>	<i>I/C ver 1.4</i>
<b>Views</b>		
Standard	Block/Insert	x
Section	Block/Insert	x
Detail	Block/Insert	
Auxiliary	Block/Insert	x
General	Block/Insert	
<b>Page Geometry (3D)</b>		
2 Point Line	Line	x
Vertical Line	Line	x
Horizontal Line	Line	x
Polyline	Polyline	x
Rectangle	Polyline	x
Circle	Circle	x
Arc	Arc	x
Bezier	Spline	
<b>Projected Geometry (2D)</b>		
Point	Point	
Line	Line	x
Circular Arc	Arc	x
Circle	Circle	x
Ellipse	Ellipse / Circle	x
Elliptical Arc	Ellipse / Arc	x
Discrete	Polyline	x
<b>Page Text</b>	Text	x
<b>Dimension</b>		
Linear	Rotated/Aligned	x
Angular	Angular	x
Radial	Radius	x
Diameter	Diameter	x
<b>Leader</b>	Leader	x
<b>GD &amp; T Text</b>		
Feature Control Frame	Block with Leader + Tolerance	x
Datum Feature	Block with Polyline, text, Leader	x
Datum Target		
<b>Reference Curves</b>		
Linear	Line	x
Circle	Circle	x
<b>Center Lines</b>		
Linear	Block + Lines	x

Arc	Block + Arc + lines	x
<b>Section Lines</b>	Block+Line+2 Leaders + Text	x
<b>Staggered Section Lines</b>		x
<b>Auxiliary Lines</b>	Block+Line+2 Leaders + Text	x
<b>Detail Lines</b>	Circle	
<b>Curve Properties</b>		
Line Width	Width	
Line Pattern	Linetype:segdata	
Standard		x
Custom Dash		x
Line Ends	No ACAD Equivalent	
No arrowhead		x
Color		
Standard	Linetype:Color	x
Custom		
End Caps	No ACAD Equivalent	
Flat		
Square		
Round		
Joins	No ACAD Equivalent	
Miter		
Bevel		
Round		
Layer		x
<b>Text Properties</b>		
Text Box	Geometry	x
Font	Shape file	
Font Size	Text height	x
Font Style	Shape file	
Normal		
Bold		
Italic		
Vertical Justification	Mtext::verticalignment	x
Horizontal Justification	Mtext::justification	x
<b>Dimension Properties</b>		
Dimension Lines		
Length of outside dim lines	No ACAD Equivalent	
Knee length	No ACAD Equivalent	
Line Width	No ACAD Equivalent	
Arrow Location	DimStyle::dimfit	
Inside Extension		
Outside extension		
Visibility		
Show/Hide first dim line	DimStyle::dimse1	x
Show/Hide second dim line	DimStyle::dimse2	x
Extension Lines		
Distance beyond dimension line	Dimstyle:dimexe	x
Offset from geometry	Dimstyle:dimexo	x
Angle of obliqueness	ADDimension:dimoblique	
Arrow Location	DimStyle::dimfit	
Inside Extension		

Outside extension		
Visibility		
Show/Hide first ext line	DimStyle::dimse1	x
Show/Hide second ext line	DimStyle::dime2	x
Line Ends		
Symbol	DimStyle::dimblk1, dimblk2	
Open		
Closed Unfilled		
Closed Semifilled		
Closed Filled		
Length	No ACAD Equivalent	
Width	No ACAD Equivalent	
Measurement		
Show measurement	No ACAD Equivalent	
Precision	Dimstyle::dimrnd	
Tolerancing		
Dimension		
Default		x
Basic	No ACAD Equivalent	x
Reference	No ACAD Equivalent	x
MAX	No ACAD Equivalent	x
MIN	No ACAD Equivalent	x
Show tolerance	Dimstyle:dimgap	x
Above value	Dimstyle:dimgap	x
Below value	Dimstyle:dimgap	x
Style	Dimstyle:dimlim	
Plus/minus	dimlim = 0, dimtol = 1	x
Limit	dimlim = 1, dimtol = 0	
Layer Name	ADDimension:Layer	x
Font Name	No ACAD Equivalent	
Font Style	No ACAD Equivalent	
Font Size	No ACAD Equivalent	
Color	Dimstyle:dimclrd, dimclre, dimclrt	x
Text Orientation		
Above, parallel	Dimstyle:dimtd = 1, dimtih = 0	
On, horizontal	Dimstyle:dimtd = 0, dimtih = 1	
Text distance from leader	Dimstyle:dimgap	
Prefix/Postfix	Dimstyle:dimpst	x
Suffix	Dimstyle:dimpst	
<b>Layer Properties</b>	ADLayer	
Color	ADLayer:color	x
Visibility	ADLayer:flag	
Override element color with layer color	Entity:entcolor = AD_BYLAYER	
<b>Hatch Style</b>	R13: Block with graphics	
	R14: Hatch	
Number of overlays		x
Distance between lines		x
Hatch angle		x
Offset along hatch line		x
Perpendicular offset		x
Repeat cycle		x

<b>Units</b>	R14: Measurement	
	R13: Apply to geometry	x
<b>View scale (to apply or not to apply)</b>	User option	x
<b>Color Codes</b>		
Red	Not implemented	
Blue	Partially implemented or needs fixes	x
Black	Completely implemented	x

## 2D DWG/DXF Import Entity Mapping (Profile Geometry Only)

<i>DWG/DXF Entity</i>	<i>IronCAD Entity</i>	<i>I/C ver. 1.4</i>
<b>Geometry</b>		
Point	Not processed	
Line	Line	x
3D Line	Line	x
Circle	Circle	x
Arc	Arc	x
Ellipse	Ellipse	x
Elliptical Arc	Arc	x
Spline	Bspline	x
<b>Polyline</b>		
Fittype		
Line/Arc	Complex Path	x
Quad. Bspline	Bspline	x
Cubic Bspline	Bspline	x
Bezier	Bezier	
Polyflag		
Closed	Processed for curves	x
Curvefit	Fitted Bezier	x
Splinefit	Fitted Bspline	x
Closed N	Ignored	
Continue Line type	Ignored	
Lightweight Polyline (R14)	Path Curve	x
Trace	Ignored	
3D Face	Ignored	
Construction Line	Ignored	
Block	Processed for Inserts	x
Insert	Process component curves	x
Solid	Ignored	
Multiline	Ignored	
Ray	Ignored	
<b>Table Entries</b>		
Block Headers	Processed for inserts	x
Class	Ignored	
Dimension Styles	Ignored	
Layers	Ignored	
Linetype	Ignored	
Registered Application	Ignored	
Shapefile	Ignored	
UCS	Apply transformation	

<b>Objects Section</b>	<b>Ignored</b>	
Object Header		
Object Body		
Dictionary		
Dictionary Variables		
Group		
ID Buffer		
Image Definition		
ImageDef Reactor		
Layer Index		
Multiline Style		
Object Pointer		
Proxy Object		
Raster Variables Object		
SortEntsTable		
Spatial Filter Object		
Spatial Index		
Xrecord Object		