# Converting an S96 File into an IGES file for Cam Grinding

Converting an S96 file into an IGES file can be either for a cam profile that was measured by a method different than using the Cam Analyzer, or from a cam profile designed for a particular follower type.

You will need the Cam Grinder version of Cam Analyzer to do this.

First, open the file. You will see Cam Analyzer say it is an S96 file.
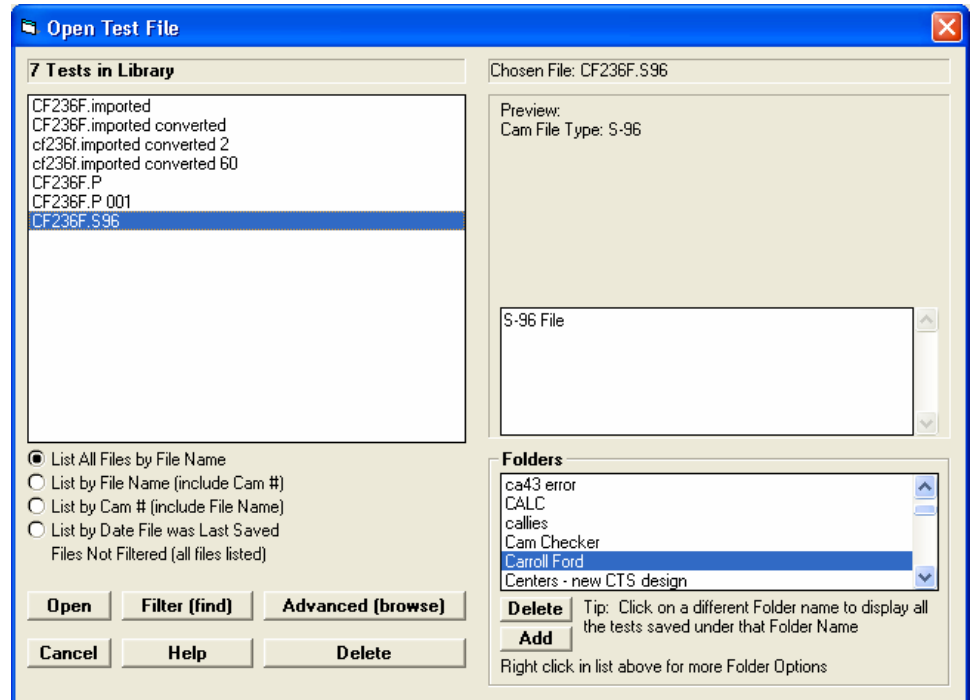
The Cam Analyzer will present a screen where you can enter some details about this lobe. Most of these do not matter if you are going to make an .igs file. That is because most of these items have to do with valve (not lobe) lift and what you want to name this lobe.

Then click on the Make File button.
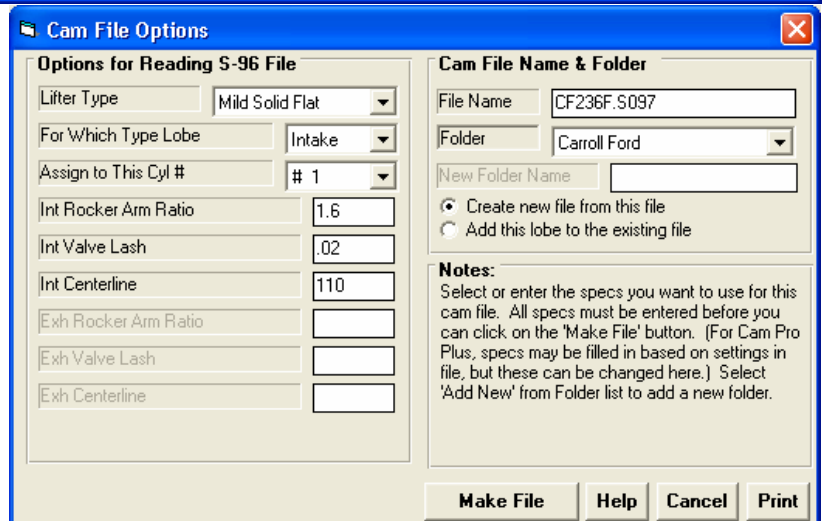
Lobe on Main Screen after it is imported.

Click on Test/Cam Setup to proceed to next page.
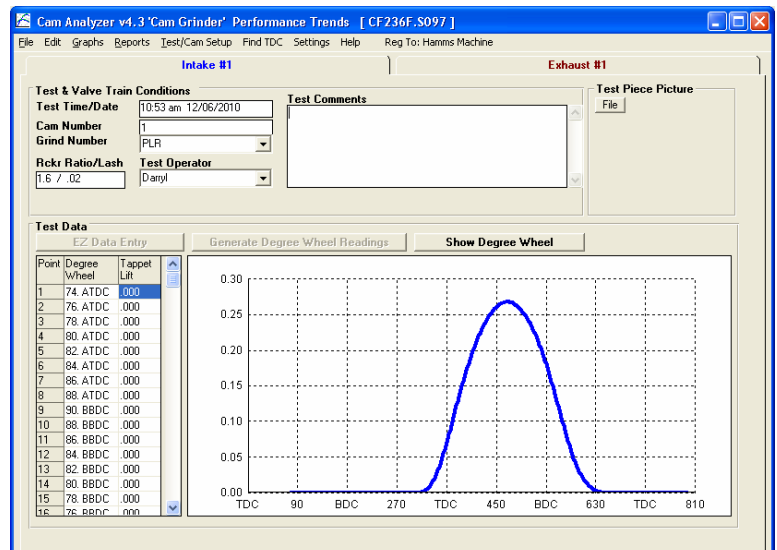
Here you want to change the "Type of Cam Data" from "From S96 File" to "Measured with Electronics". This is needed so you can do the Virtual Follower feature.

Test/Cam Setup

Back (ok)   Print   Valve Springs   Help   Refresh

Test Setup

Type of Cam Data   Deg Steps

From S96 File - Intake   2 deg

From Comp Cam's File - Exhaus
From Dr Doctor File - Intake   **For Cyl #**
From Dr Doctor File - Exhaust
From S96 File - Intake   #1
From S96 File - Exhaust
From Andrews File - Intake
From Andrews File - Exhaust
Measured with Electronics   ke   **Exhaust**

Rocker Arm Ratio   1.6

Actual Valve Lash, in   .02

Centerline, deg ATDC   110

Lift for Rating Events   .050 inch (1.25 mm ▼)

Degree Wheel

Type   TDC - 90 - BDC - 90 - TDC ▼

TDC
45   45
90   90
45   45
BDC

Max Lobe Lift, in   .268

Gross Valve Lift, in   .429

Designed Vlv Lash, in

Total Cam Advance

Lobe Seperation, deg

Help: Notes on Highlighted Item
Click on the down arrow button to select how the cam lift data was generated. If you select 'Generate from Cam Specs', you can also specify the tappet lift from which duration and opening/closing events are measured. American aftermarket standard is .050''. Metric and motorcycles use .040'' (1 mm). Seat timing is also called 'advertised' duration and is not as accurate a method. p 21   IMPORTANT: Select 'Measured with Electronics' if you are using the Cam Test Stand.

You will receive several message screen instructing you what is happening in this process. Choose Yes or OK for these messages.

Change Type of Cam Data Anyway?

The program will now convert your data to a format much like it was Measured with Electronic Sensors (800 crank degrees, 2 deg increments, etc). This will be a major change to the data, but will allow you to do additional types of analysis. After this change, you will NOT be able to return to the original data.

It is recommended you save this data, and then save again to a New Name before you continue. That way you CAN go back to your old data file if need be.

Are you sure you want to make this change to the Type of Cam Data now?

Yes   No

Convert to 'Measured by Hand' Now?

To convert from this data type will require 2 steps. First, the data must be converted to 'Measured by Hand'. Do you want to do that now?

Yes   No

Cam Analyzer

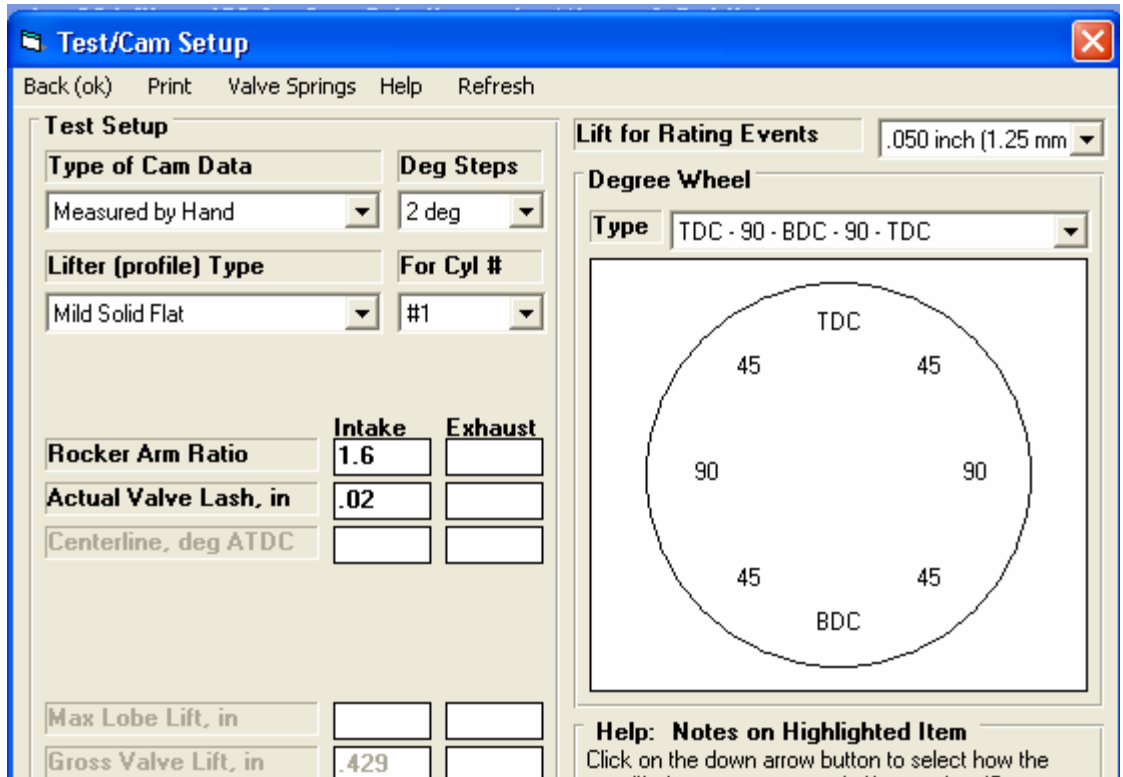This first conversion may take 5 to 15 seconds. Please wait.

OK

Cam Analyzer

The conversion to 'Measured by Hand' has been completed. Now you can select 'Measured with Electronics' to complete the conversion.
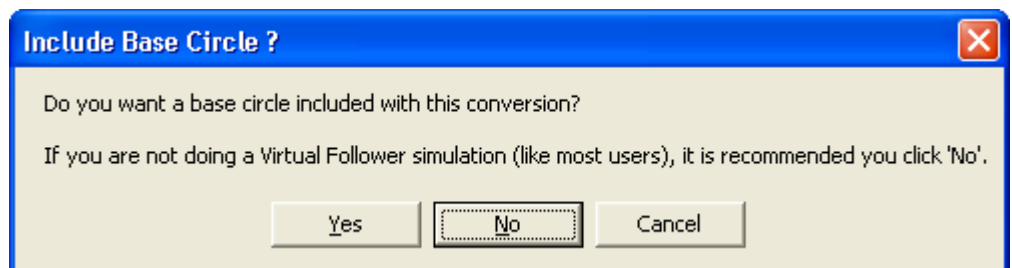
OK

Like the messages say, the program will first convert the S96 file to the Type "Measured by Hand".
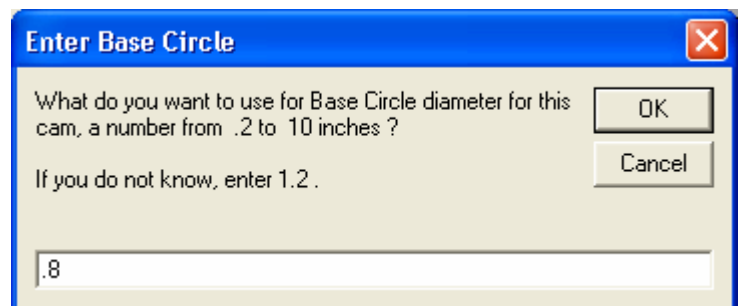
Test/Cam Setup

Back (ok)   Print   Valve Springs   Help   Refresh

Test Setup

Type of Cam Data   **Deg Steps**

Measured by Hand ▼   2 deg ▼

Lifter (profile) Type   **For Cyl #**

Mild Solid Flat ▼   #1 ▼

	Intake	Exhaust
Rocker Arm Ratio	1.6	
Actual Valve Lash, in	.02	
Centerline, deg ATDC		

Max Lobe Lift, in		
Gross Valve Lift, in	.429	

Lift for Rating Events   .050 inch (1.25 mm ▼

Degree Wheel

Type   TDC - 90 - BDC - 90 - TDC ▼

Help: Notes on Highlighted Item
Click on the down arrow button to select how the

Then it will convert it to "Measured with Electronics".

Change Type of Cam Data Anyway?

The program will now convert your data to a format much like it was Measured with Electronic Sensors (800 crank degrees, 2 deg increments, etc). This will be a major change to the data, but will allow you to do additional types of analysis. After this change, you will NOT be able to return to the original data.

It is recommended you save this data, and then save again to a New Name before you continue. That way you CAN go back to your old data file if need be.

Are you sure you want to make this change to the Type of Cam Data now?

Yes   No

You must enter the base circle for the cam from which it was measured, OK for the cam which this profile was designed for.

Include Base Circle ?

Do you want a base circle included with this conversion?

If you are not doing a Virtual Follower simulation (like most users), it is recommended you click 'No'.

Yes   No   Cancel

In this case, this cam was designed for a .800" base circle.

Enter Base Circle

What do you want to use for Base Circle diameter for this cam, a number from .2 to 10 inches ?

If you do not know, enter 1.2 .

OK

Cancel

.8

Now to do the conversion for Virtual Follower.

Click on the "See Virtual Follower Details" button to bring up the screen below.
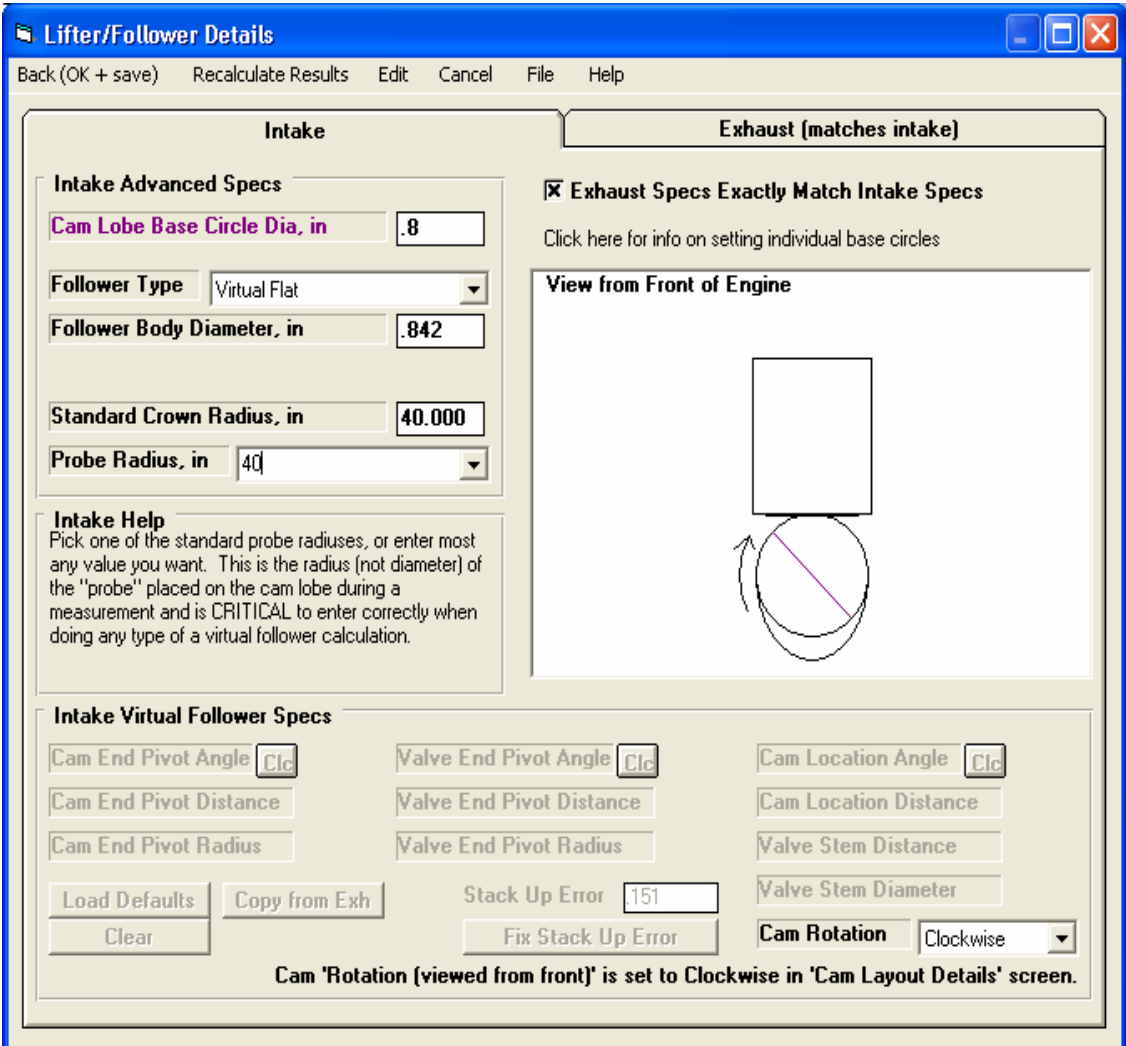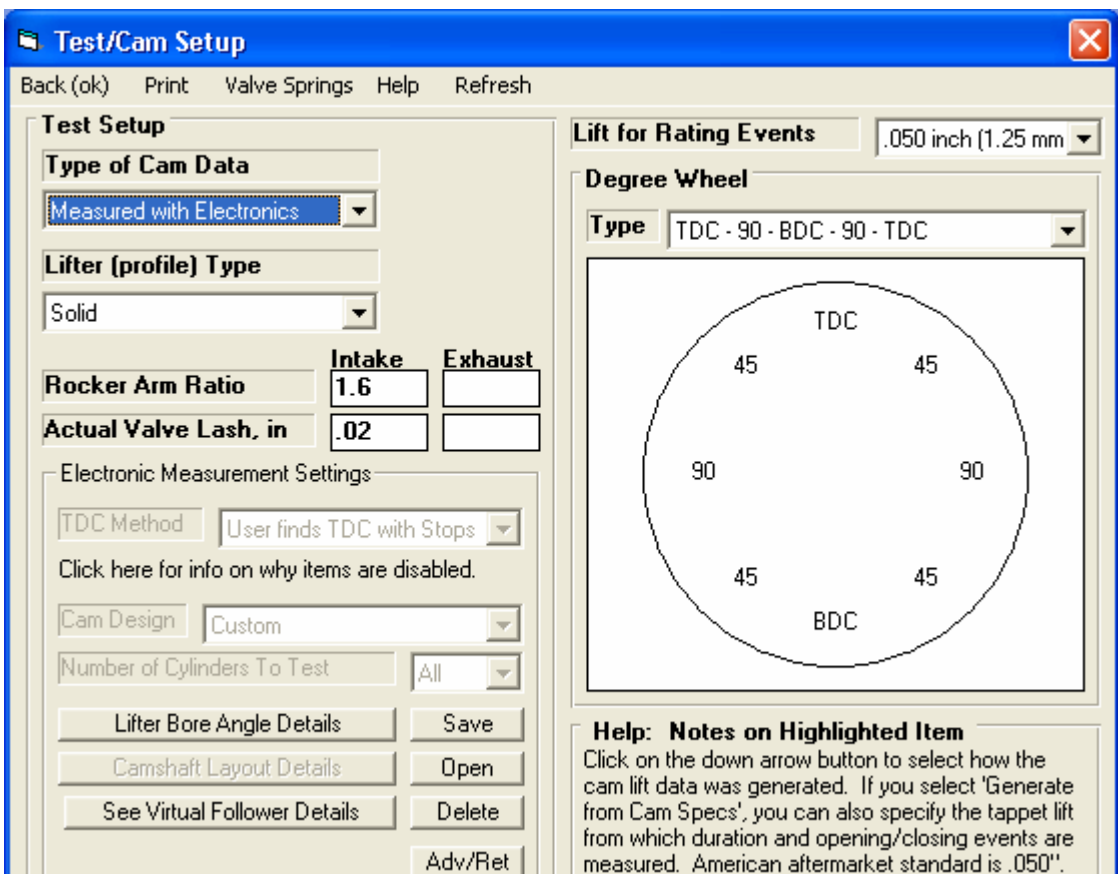
Set the "Follower Type" for what this cam is designed for, typically "Virtual Flat" or "Virtual Roller".

The parameters of "Follower Body Diameter" and "Standard Crown Radius" are not critical.

The critical setting for doing this conversion is setting the correct "Probe Radius".
This will be either to describe the probe on the cam lobe when it was measured, OR the diameter of the follower that this lobe was designed for. In this case it was designed for a Flat Tappet so we chose a very large Probe Radius of 40". (The difference between 40" Radius and a perfectly flat follower is negligible.)

When you click Back (OK + save) at the upper right the conversion is made.

Test/Cam Setup

Back (ok)   Print   Valve Springs   Help   Refresh

Test Setup

Type of Cam Data

Measured with Electronics ▼

Lifter (profile) Type

Solid ▼

	Intake	Exhaust
Rocker Arm Ratio	1.6	
Actual Valve Lash, in	.02	

Electronic Measurement Settings

TDC Method   User finds TDC with Stops ▼

Click here for info on why items are disabled.

Cam Design   Custom ▼

Number of Cylinders To Test   All ▼

Lifter Bore Angle Details   Save
Camshaft Layout Details   Open
See Virtual Follower Details   Delete
Adv/Ret

Lift for Rating Events   .050 inch (1.25 mm) ▼

Degree Wheel

Type   TDC - 90 - BDC - 90 - TDC ▼

TDC
45   45
90   90
45   45
BDC

Help: Notes on Highlighted Item
Click on the down arrow button to select how the cam lift data was generated. If you select 'Generate from Cam Specs', you can also specify the tappet lift from which duration and opening/closing events are measured. American aftermarket standard is .050".

Lifter/Follower Details

Back (OK + save)   Recalculate Results   Edit   Cancel   File   Help

| Intake | Exhaust (matches intake) |

Intake Advanced Specs

| Cam Lobe Base Circle Dia, in | .8 |

☒ Exhaust Specs Exactly Match Intake Specs

Click here for info on setting individual base circles

| Follower Type | Virtual Flat ▼ |
| Follower Body Diameter, in | .842 |

View from Front of Engine

| Standard Crown Radius, in | 40.000 |
| Probe Radius, in | 40 ▼ |

Intake Help
Pick one of the standard probe radiuses, or enter most any value you want. This is the radius (not diameter) of the "probe" placed on the cam lobe during a measurement and is CRITICAL to enter correctly when doing any type of a virtual follower calculation.

Intake Virtual Follower Specs

Cam End Pivot Angle Clc   Valve End Pivot Angle Clc   Cam Location Angle Clc
Cam End Pivot Distance   Valve End Pivot Distance   Cam Location Distance
Cam End Pivot Radius   Valve End Pivot Radius   Valve Stem Distance

Load Defaults   Copy from Exh   Stack Up Error 151   Valve Stem Diameter
Clear   Fix Stack Up Error   **Cam Rotation**   Clockwise ▼

Cam 'Rotation (viewed from front)' is set to Clockwise in 'Cam Layout Details' screen.

Back at the Main Screen the lobe does not look any different. However, "behind the scenes" the Cam Analyzer has calculated what this lobe would look like if a "knife edge" follower was used to measure the cam. This what the IGS file needs to describe the physical dimensions of the cam lobe.
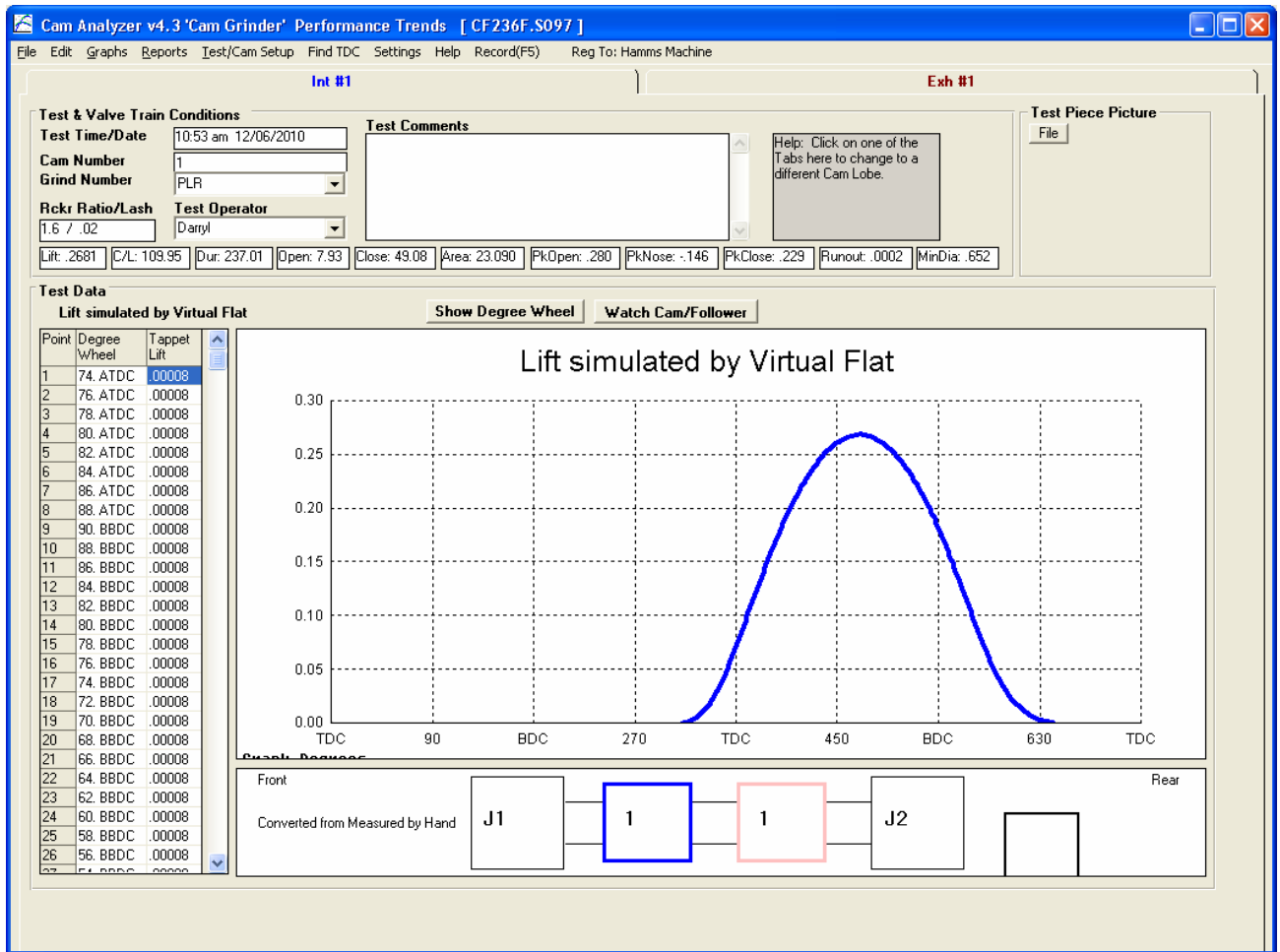
To see the difference between the cam lift profile (what the follower does) compared to the actual physical lobe, click on Graph at the upper left of the main screen.

Then select the "Type" of graph as "Pick from List" to open up the choices on the right side. Then pick "Cam Lift" and "Actual Cam Profile".

Then click the Make Graph button at the lower left. The graph on the next screen is produced.

The Actual Cam Profile is the green graph and you can see it is much more narrow than the Cam Lift profile. You have probably noticed this on flat tappet cams, that the lobe on the cam itself is very pointy.
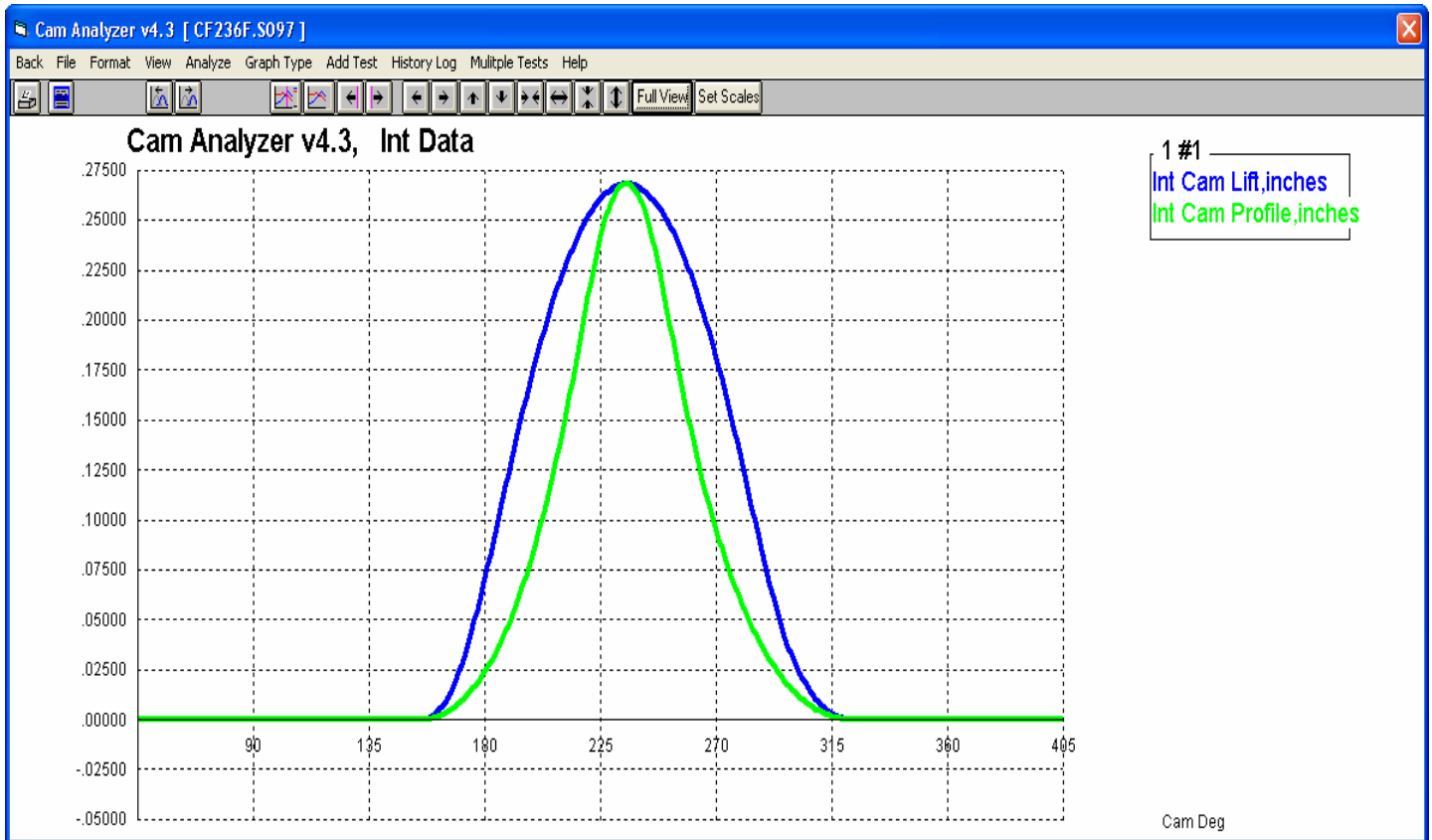
Return to the Main Screen, click on File, then Export Manufacturing Style Cam File. You will be presented with the form on the next page.
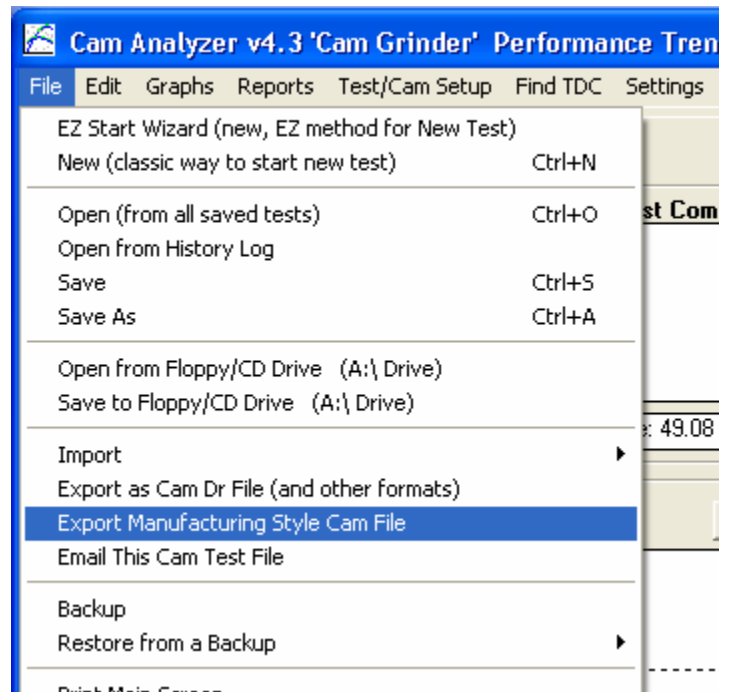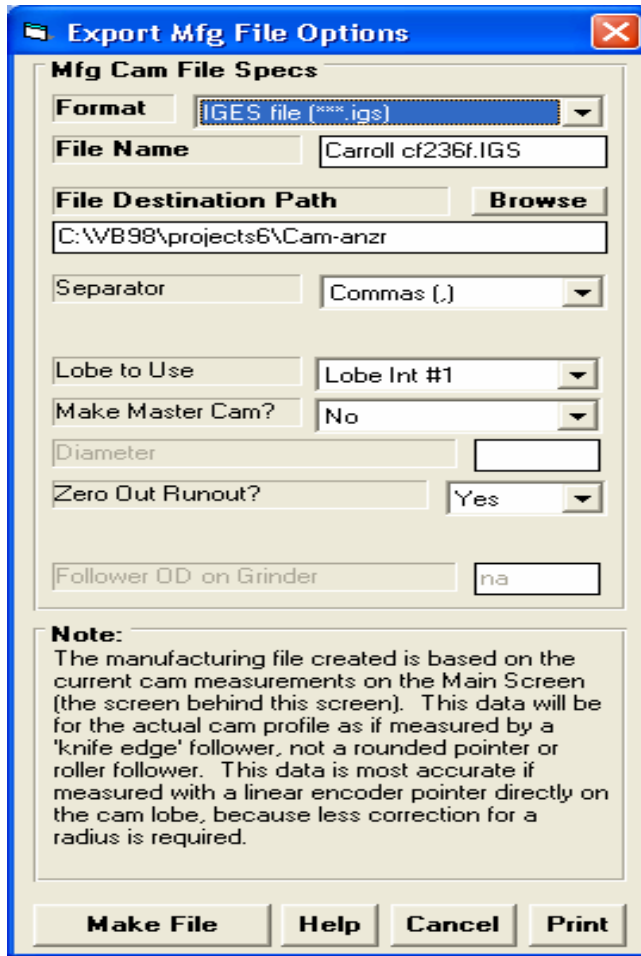
Here choose IGES as the Format, and a name and destination for the file.

Setting Zero Out Runout is a good choice to not produce any measured runout into this IGES file.

Click on the Make File button to produce the IGES file.

Then enter the thickness you want for this lobe.

Export Mfg File Options

Mfg Cam File Specs

Format	IGES file (***.igs)
File Name	Carroll cf236f.IGS
File Destination Path	Browse

C:\VB98\projects6\Cam-anzr

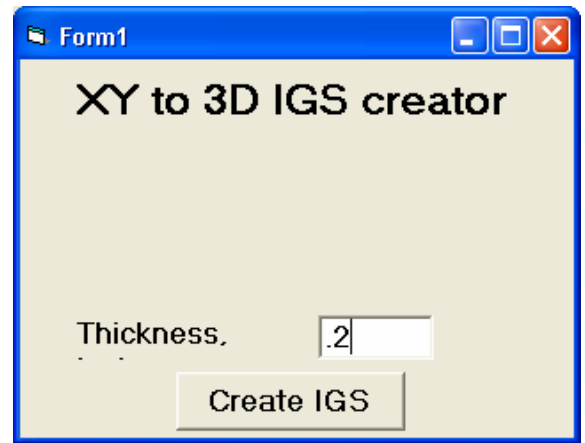|	
Separator	Commas (,)
Lobe to Use	Lobe Int #1
Make Master Cam?	No
Diameter	
Zero Out Runout?	Yes
Follower OD on Grinder	na

Note:
The manufacturing file created is based on the current cam measurements on the Main Screen (the screen behind this screen). This data will be for the actual cam profile as if measured by a 'knife edge' follower, not a rounded pointer or roller follower. This data is most accurate if measured with a linear encoder pointer directly on the cam lobe, because less correction for a radius is required.

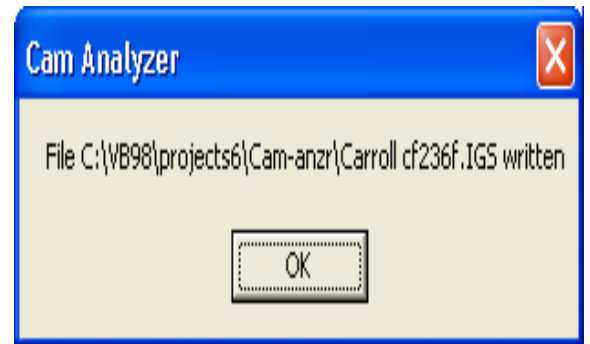**Make File**   **Help**   **Cancel**   **Print**

Form1

XY to 3D IGS creator

Thickness,   .2

Create IGS

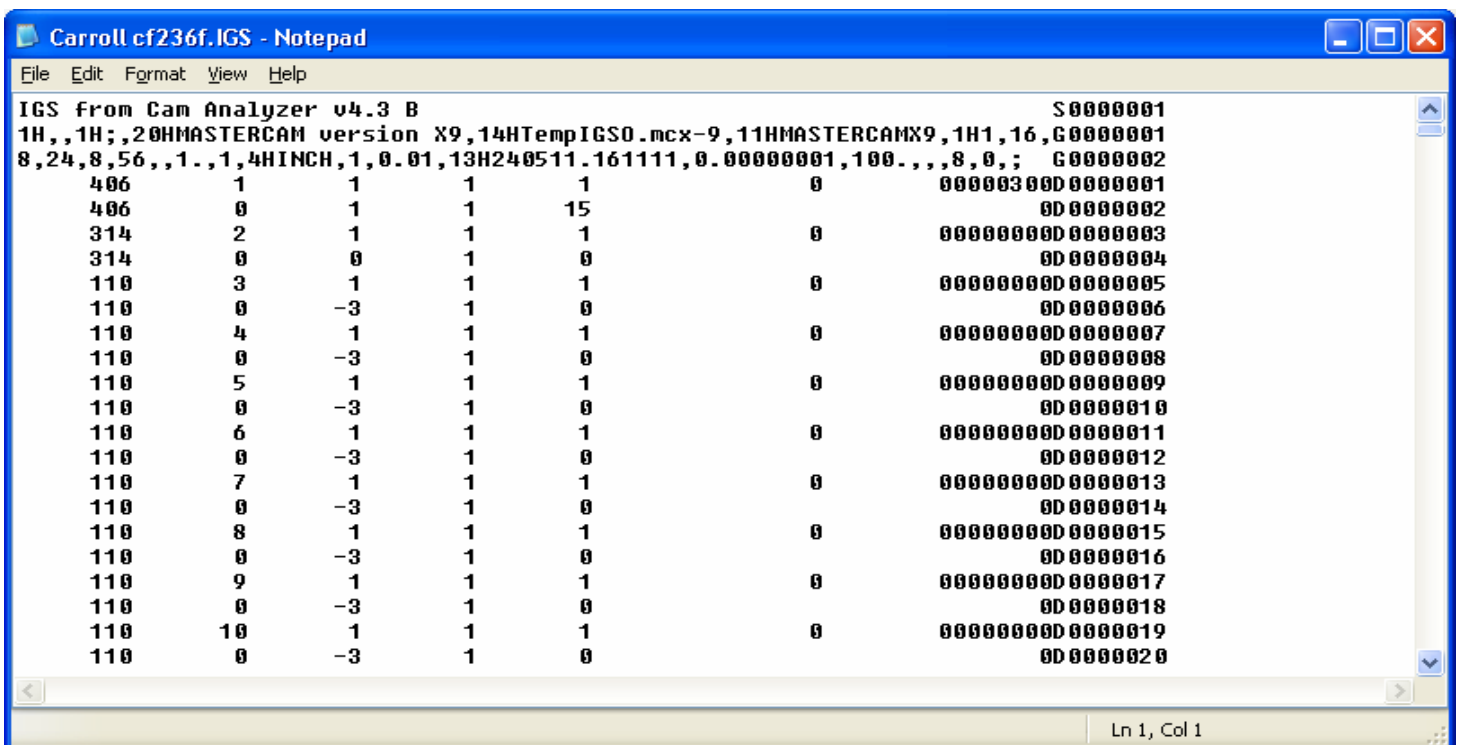**Cam Analyzer**

File C:\VB98\projects6\Cam-anzr\Carroll cf236f.IGS written

OK

Shown below is what the file looks like in Notepad.

Carroll cf236f.IGS - Notepad

File Edit Format View Help

```
IGS from Cam Analyzer v4.3 B                                    S0000001
1H,,1H;,20HMASTERCAM version X9,14HTempIGSO.mcx-9,11HMASTERCAMX9,1H1,16,G0000001
8,24,8,56,,1.,1,4HINCH,1,0.01,13H240511.161111,0.00000001,100.,,,8,0,;  G0000002
      406          1          1          1          1          0        00000300D0000001
      406          0          1          1         15                           0D0000002
      314          2          1          1          1          0        00000000D0000003
      314          0          0          1          0                           0D0000004
      110          3          1          1          1          0        00000000D0000005
      110          0         -3          1          0                           0D0000006
      110          4          1          1          1          0        00000000D0000007
      110          0         -3          1          0                           0D0000008
      110          5          1          1          1          0        00000000D0000009
      110          0         -3          1          0                           0D0000010
      110          6          1          1          1          0        00000000D0000011
      110          0         -3          1          0                           0D0000012
      110          7          1          1          1          0        00000000D0000013
      110          0         -3          1          0                           0D0000014
      110          8          1          1          1          0        00000000D0000015
      110          0         -3          1          0                           0D0000016
      110          9          1          1          1          0        00000000D0000017
      110          0         -3          1          0                           0D0000018
      110         10          1          1          1          0        00000000D0000019
      110          0         -3          1          0                           0D0000020
```

Ln 1, Col 1

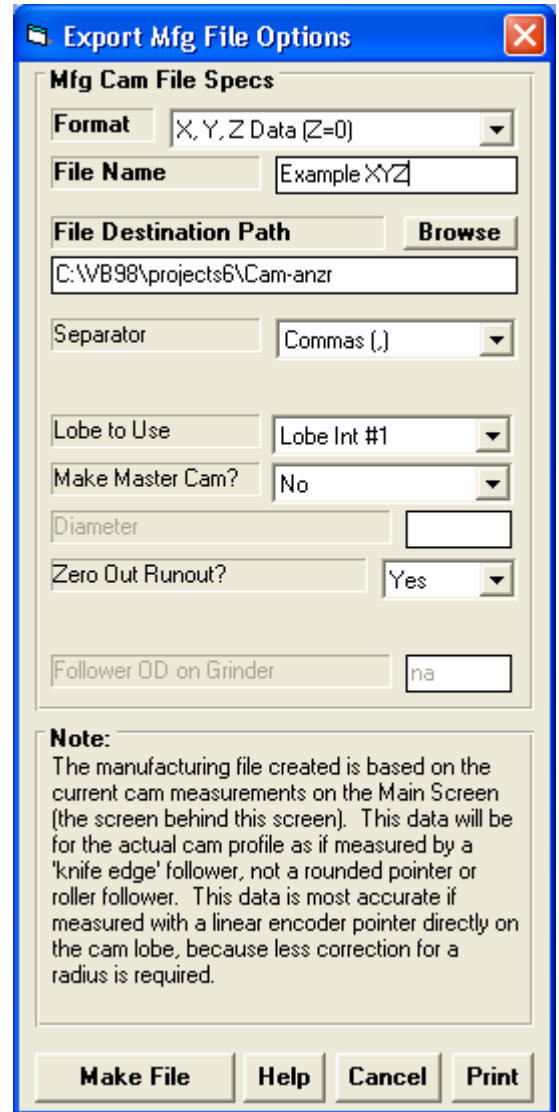Shown below is what the IGES file looks like in an IGES viewer program.
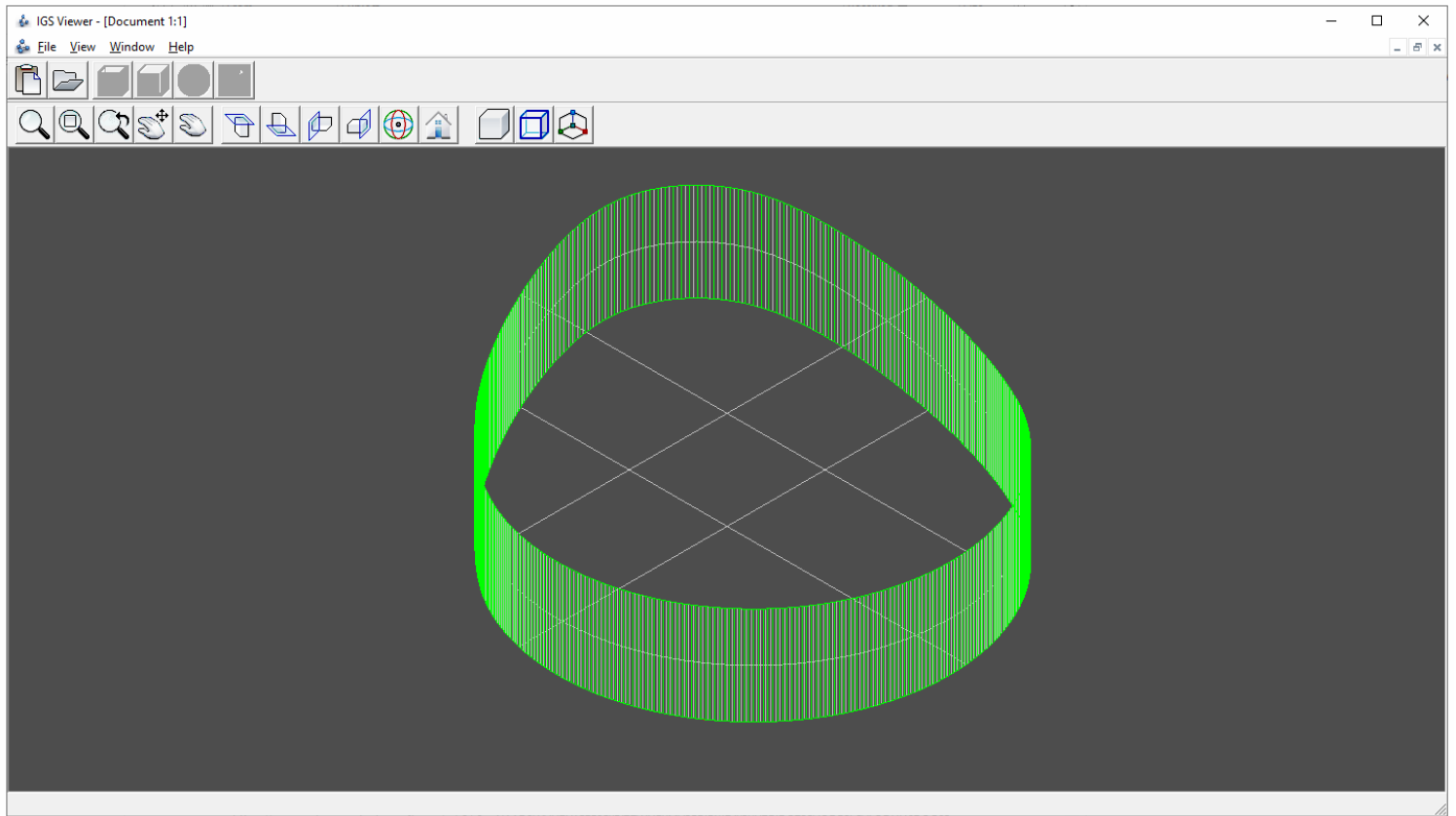
Some users want a file of arcs and not segments. In that case, the process on the next page will work for them.

Procedure for Doing Arcs

At the Main Screen, click on File, then Export Manufacturing Style Cam File. You will be presented with the form to the right.

Select the Format "X, Y, Z Data". This will be a 2D file. You will have to do some conversions in your CAD software to produce a solid from this comprised of arcs.
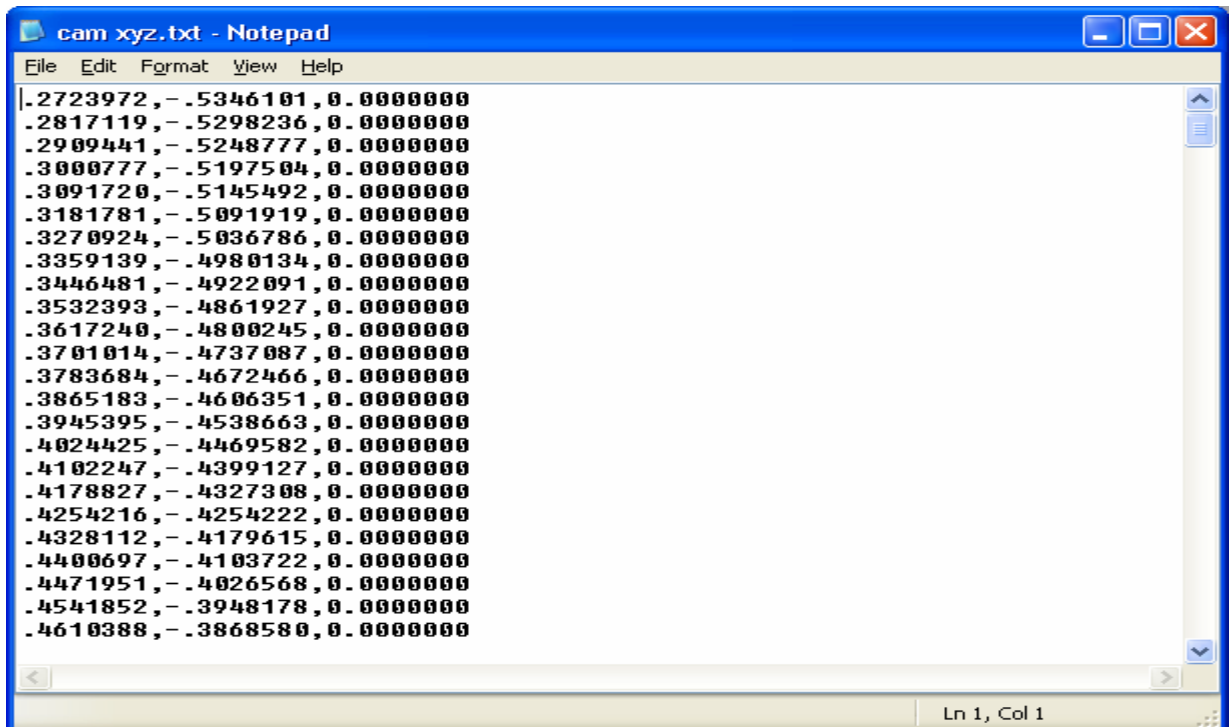
Export Mfg File Options

Mfg Cam File Specs

Format	X, Y, Z Data (Z=0)
File Name	Example XYZ

File Destination Path   Browse

C:\VB98\projects6\Cam-anzr

Separator	Commas (,)

Lobe to Use	Lobe Int #1
Make Master Cam?	No
Diameter	
Zero Out Runout?	Yes

Follower OD on Grinder	na

Note:
The manufacturing file created is based on the current cam measurements on the Main Screen (the screen behind this screen). This data will be for the actual cam profile as if measured by a 'knife edge' follower, not a rounded pointer or roller follower. This data is most accurate if measured with a linear encoder pointer directly on the cam lobe, because less correction for a radius is required.

Make File | Help | Cancel | Print

Click Make File at the lower left to produce the XYZ file. This file is shown in Notepad.

cam xyz.txt - Notepad

File Edit Format View Help

```
.2723972,-.5346101,0.0000000
.2817119,-.5298236,0.0000000
.2909441,-.5248777,0.0000000
.3000777,-.5197504,0.0000000
.3091720,-.5145492,0.0000000
.3181781,-.5091919,0.0000000
.3270924,-.5036786,0.0000000
.3359139,-.4980134,0.0000000
.3446481,-.4922091,0.0000000
.3532393,-.4861927,0.0000000
.3617240,-.4800245,0.0000000
.3701014,-.4737087,0.0000000
.3783684,-.4672466,0.0000000
.3865183,-.4606351,0.0000000
.3945395,-.4538663,0.0000000
.4024425,-.4469582,0.0000000
.4102247,-.4399127,0.0000000
.4178827,-.4327308,0.0000000
.4254216,-.4254222,0.0000000
.4328112,-.4179615,0.0000000
.4400697,-.4103722,0.0000000
.4471951,-.4026568,0.0000000
.4541852,-.3948178,0.0000000
.4610388,-.3868580,0.0000000
```

Ln 1, Col 1

You will have to do some conversions in your design software to make solids out of the XYZ file from Cam Analyzer.

To do arcs in SolidWorks go to:

1. File -> New... -> Part -> OK.

2. Set units accordingly units saved in *.txt file here: Settings - > Document Properties - > Units   (inches in the case of this file)

3. Insert -> Curve -> Curve Through XYZ Points... -> Browse...

Change file type from Curves (*.sldcrv) to Text Files (*.txt), select file and open it. Press OK.

4. Zoom to Selection or Zoom to Fit.

Now you can change Units setting back if needed.

Here are steps to create solid figure after points are imported:

5. Select Front Plane, then Sketch, then Curve1 and Convert Entities.

6. Insert -> Boss/Base -> Extrude... -> enter Depth and confirm with green check sign (OK).

Here are instructions for MasterCam.

1. SETTINGS -> Configuration... -> Start/Exit -> Current:, choose <English> or <Metric> units according to your file data, confirm with green check sign.

2. File -> Open, select file type ASCII Files (*.txt;*.csv;*.doc), select file with points clicking just once, don't open it now, go to appeared Options, select Entity Creation Splines, confirm with green check sign, then click Open.

3. SOLIDS -> Extrude... -> select contour, confirm with green check sign, change Distance, confirm with green check sign.