

Appendix 10: New Features in v4.3 B

Cam Analyzer has had many updates since this user manual was written for the original v2.0 for Windows. These include 3.2A (Appendix 3), 3.2B (Appendix 4), v3.8 (Appendix 5), v4.0 (Appendix 6) and now v4.3. Here is a listing of some of the new features for Version 4.3:

Cam Analyzer v4.3 actually has 5 different versions, which include:

- Cam Analyzer Basic (for analyzing cam data from either manual data entry or computer cam files)
- Cam Analyzer Plus (for more detailed analyzing of cam data from either manual data entry or computer cam files)
- Cam Analyzer Basic for use with the electronic Cam Test Stand (CTS) sensors
- Cam Analyzer Plus for use with the electronic Cam Test Stand sensors
- Cam Analyzer Plus for use with the electronic Cam Test Stand sensors, with advanced “Cam Grinder” features

Note that some of these new features apply only to the “Plus” version and/or “Cam Grinder” version of the software. Also note that the “Cam Grinder” version contains all Plus version features.

New Features for All Versions:

You can now flip the drawing of the camshaft on the main screen to now match how you have the cam on the Cam Test Stand. This makes it easier to keep track of what lobe you are measuring. Fig 10.1.

S96 files are now always generated where the highest lift (assumed to be the centerline) is placed at line 198 (center of the file). Some programs from other companies expected this to always be the case.

The program has some new Example Cam Layouts, including Ford Godzilla 7.3L, Ford OHC Modular V8, Ford 292/312 Y block, and more.

The program now remembers the size and position of the Main Screen and Graph Screen and restores them when the program is opened or the Graph Screen is reopened.

The Main Screen graph now fills the available screen if it is maximized.

The program has increased the number of significant figures in various screens, up to 8 in some cases. For profiles that have been measured, this was not really necessary. For profiles that have been generated by a cam design program, this does help show a designed file in good detail.

Now reports of duration at various lifts show blank duration, opening and closing events if the duration is 0 at those particular lifts. Previously the reports showed fictitious numbers as the opening and closing events, and 0 duration. These rows with all blanks are not included in the report, saving space on the screen and printouts. Fig 10.2.

Now the spacing of columns in reports are more correctly sized to show all columns, especially if the screen size is small and the number of columns is quite large.

The program will now “talk” to our Engine Log Book Pro v1.1D, so you can pull cam specs from a Cam Analyzer file into the Engine Log Book Pro. Fig 10.3 and 10.4.

Lash and Duration in Test/Cam Setup now are always shown to .000 inch or .1 mm decimal places.

You can now stop displaying the program’s opening Warning screen by checking the “Don’t show this again” box in the lower left corner.

New Features for the Plus Version Only:

A new report type has been added: TDC Lifts, Set Cam Timing to help time the cam you measured in the engine. This report will tell you what intake and exhaust tappet lift to look for at TDC to know how advanced or retarded the cam timing will be. Fig 10.5.

A new report type has been added: Lobe Analysis - Short similar to the Lobe Analysis report, but with fewer outputs. This report also includes a new output called "Drift Error", and indication of measurement accuracy. Fig 10.6.

You can now specify up to 6 lobes for each cylinder. Fig 10.7.

You can now specify more details when creating a cam profile from .050" inputs, .040" inputs, etc. NOTE: Profiles generated this way are still not precise enough to use for grinding custom cams. Fig 10.8, 10.9 and 10.10.

When doing one of the OHC Rocker Arm layouts with the Virtual Follower feature, the program now draws the layout as it appears from the front of the engine for Clockwise and Counter Clockwise rotations. There is also a new choice of drawing the layout with the valve to the left or right of the cam, so 4 choices total. This will make it much easier to visualize the valve train layout. Fig 10.11 and 10.12.

The report of Seating Velocity is now titled Seating Velocity/Est. Lash to indicate it can do both functions.

There is a new method of estimating the valve lash point. Many modern cam designs do not have a zero velocity point for estimating the valve lash point. See Fig A59 on page 177. Finding zero velocity was the method of earlier versions of Cam Analyzer to find the lash point. Instead, the program now looks for a particular velocity point of tappet lift vs cam degrees. You can set this in Preferences, with 2 defaults provided if you do not have particular velocity you want to call the lash point. Lash points for both the new method and old method are given. If the old zero velocity method gives a reasonable lash point, it is likely based on the program finding a zero velocity point in the profile. This is probably the better lash point to go with. For more information on the Zero Velocity lash point, there is a FAQ on our website called "How can I tell if a cam is hydraulic or solid, and if solid, what lash it is designed for?" Fig 10.13.

There is now an option to remove several outputs on Cam Card to simplify it. This was requested by one particular cam grinder.

The program now has a Calc utility to calculate the radius of curvature for inputs in Virtual Follower screen.

There is now a Preference setting of "Report Asymmetry in" so you can choose the original of "Crank Degrees" or the new option of "Cam Degrees".

The program has reduced the lower limit for "Valve End Pivot Radius" to 3 mm and 0.2 inches. This may help simulate certain OHC valve train geometries.

There is a new Preference called "Allow a Degree Offset When Finding TDC with Stops". Set this to Yes and the program allows you to enter an offset for TDC when finding TDC with mechanical stops.

Output files are now giving results to 8 decimal places for writing smoother output files.

Now the Lobe Analysis and Lobe Analysis - Short reports for lobes which were not measured show blanks instead of fictitious numbers like 0 or 180.

Now the Lobe Analysis labels the 3 Indexes at the bottom of the report as "Hyd. Intensity", "Minor Intensity", and "Major Intensity". These terms were developed by Harvey Crane to describe how quickly a cam profile got the tappet moving. In previous versions of Cam Analyzer these were just labeled an "Index", but now these "Intensity" labels are included also. The smaller these numbers, the more quickly the tappet gets going. The Indexes or Intensities are calculated from the subtracting the duration at .050" from the duration at .004, .010 and .020 inches.

New Features for the "Cam Grinder" Version Only:

Now there are 2 new File options in the Graph screen for exporting graph data as displayed, one to export as a text file for Notepad, and one to export as a .csv file for MS Excel. This is similar to the ASCII File option in the Reports screen, but makes the necessary degree increments so it more directly imports into Excel. Fig 10.14.

You can now identify an individual base circle measurement for all lobes. If you have selected this option, the program now asks for base circle measurement before each lobe measurement. The program checks if the Individual Base Circle value is reasonable for calculating out a Virtual Follower. This feature was requested by someone measuring diesel cams. He wanted to measure the fuel injector cam profile, and told the program he had 2 intake profiles like a 4 valve motor would have. But because the fuel injector lobe was so different, he needed to specify a different base circle measurement for these lobes. Fig 10.15 and 10.16.

Now you can edit a cam profile (stretch and/or shrink the lift or duration) from data "Measured w Electronics" directly. This eliminates several steps that were required in previous version, where you had to convert to "Measured by Hand" data, do the edit you wanted, and then convert back to "Measured with Electronics". Fig 10.17 and 10.18.

If you click on a section of a report while holding down the Ctrl key, the program presents options for making a small report of the data in that section with a small graph. This lets you quickly see if the data has any trends, or spot data points which are quite different than the rest. Fig 10.19.

You can now generate a 3D.igs file with a particular thickness for the lobe. This will produce a file of 360 1 degree segments. If you need a Solidworks or Mastercam file consisting of arcs, there is an FAQ on our website for doing that. But, you will need to do some additional conversions once the file is in Solidworks or Mastercam. There is an FAQ on our website titled “How do I convert a cam file (CPP, S96, Cam Dr, etc) to a manufacturing type file (.p, .igs, .iges, X/Y, etc) for a CNC cam grinder.” that goes into this in more detail. The first 4 pages go into converting a non-Cam Analyzer file into a Cam Analyzer file. Starting on page 5 it discusses how to do the conversion to a manufacturing type file from a Cam Analyzer file. Fig 10.20 and 10.21.

Figure 10.1 Flipping the Camshaft Layout Drawing

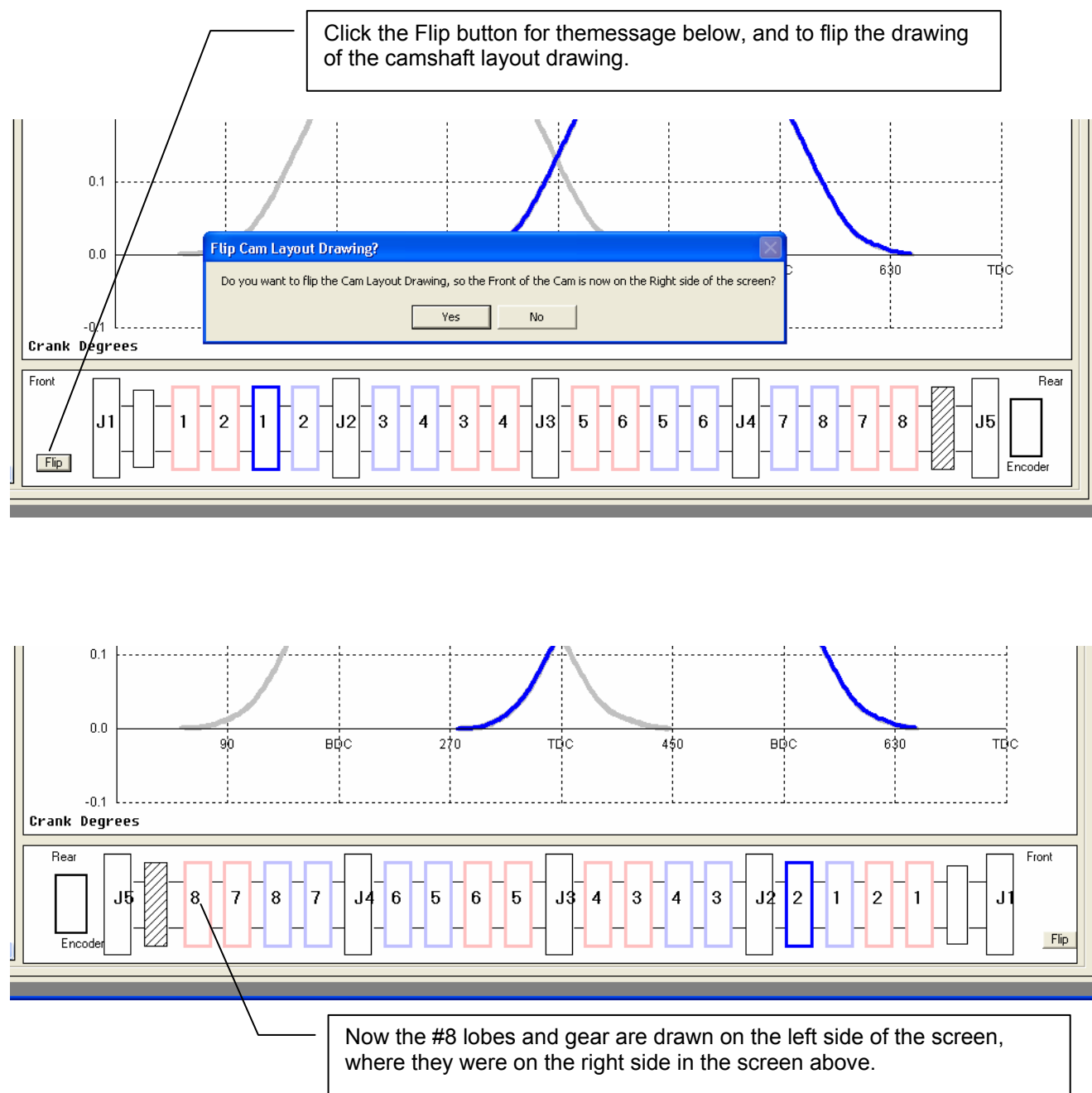


Figure 10.2 Duration Reports only show data for lifts with Duration Readings

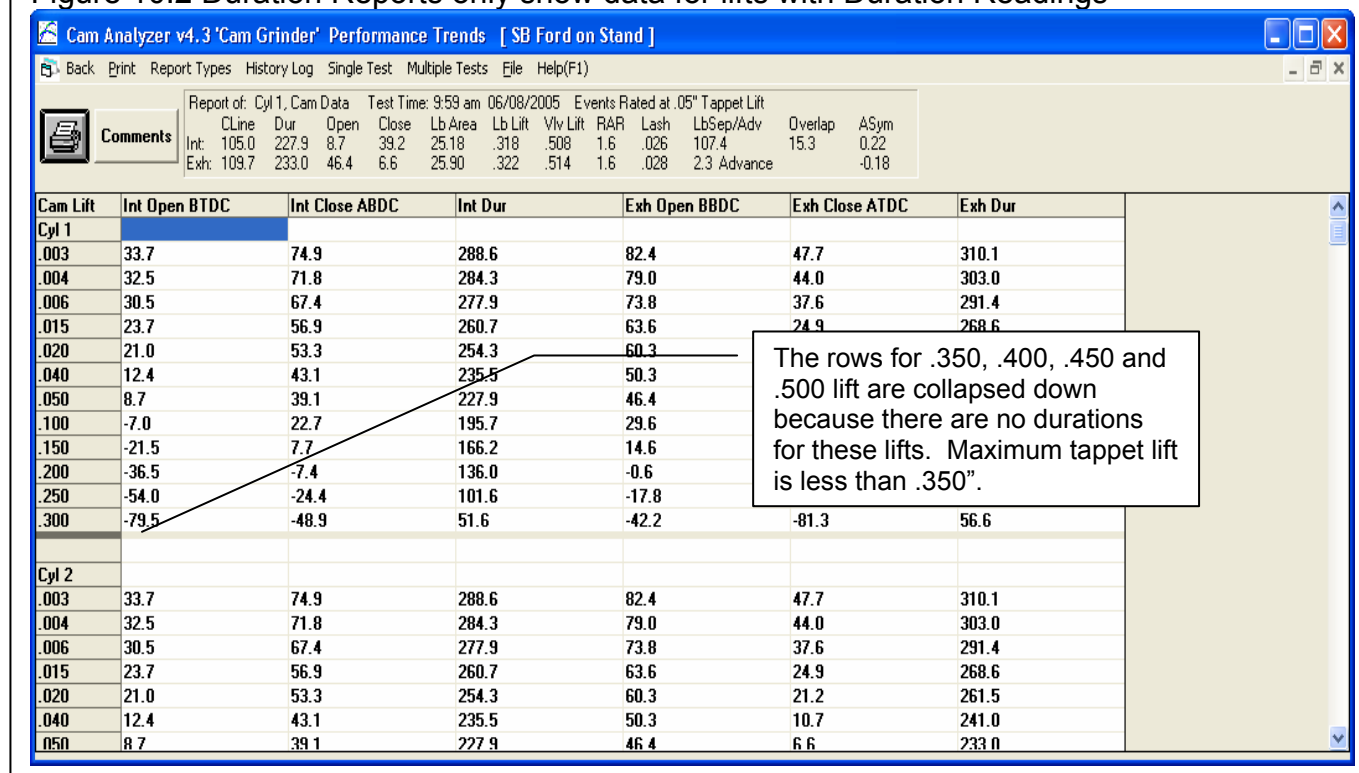


Figure 10.3 Engine Log Book Pro Pulling Data from Cam Analyzer v4.3 B

Engine Build Log Book 'Pro' v1.1D - Performance Trends Inc. [3565-14572c-Example w Bore Thickness.ebt]

File Edit Options Calculators/Reports Preferences Help Reg To: Kevin GG

Customer/Basic Info **Rotating Assembly** **Machined Block/Short Block** **Complete Short Block**

Complete Head **Complete Engine** **Ignition/Fuel/Dyno** **Engine Math**

Int Lifter # [] Exh [] Int Lifter Wt [] Exh [] Int Lifter Offset [Yes] Amt [06] Exh [Yes] Amt [06]

Head Fasteners [Bolts] Head Fastener # [hfast 123] Head Basket # [hgasket 123] Head Basket Thickness [033]

Head Gasket Bore Dia [4.02] Int Pushrod Diameter [323] Exh [325]

Int Pushrod Wt [] Exh [] Int Rocker Arm Type [Stud] Exh [Stud] Int Pedestal [] Exh []

Int Stud # [int ras 123] Exh [exh ras 123] Int Stud Size [625] Exh [625] Int Rocker Arm # [irar 123] Exh [erar 123]

Intake Ratio [1.73] Exh [1.6] Intake RA Wt [] Exh [] Int Guide Plate # [igp 123] Exh [egp 123]

Int Guide Plate Size [44] Exh [45] Int Valve Lash [007-.014] Exh [020]

Int Poly Lock # [ipl 123] Exh [epl 123] Intake Gasket # [ig 123]

Intake Bolt Torque [45] Int Piston-Valve Clearance [330-360] Exh [260-278]

Valve Cover Fasteners [Bolts] Valve Cover Fastener # [vcf 123] Qty [5]

Valve Cover # [vc 123] Exhaust/Header Gasket # [ehg 123] Exhaust/Header # [ehheader 123] Exhaust Bolts # [ehb 123] Qty [5]

Exhaust Bolt Torque [25] Cam Data File [C:\Program Files\Performance Trends\Cam A] Exh Data File []

Technician [Larry Smith] Add

Under Complete Engine tab

Click here if this engine has a separate Exhaust cam.

Click here for the Intake cam or a cam with both Intake and Exhaust lobes. Click on Start up Cam Analyzer for the screens shown in Fig 10.3.

Browse to Find File
Start up Cam Analyzer
Close this List

Figure 10.4 Engine Log Book Pro Pulling Data from Cam Analyzer v4.3 B, continued

Cam Analyzer v4.3 Performance Trends []

File Edit Graphs Reports Test/Cam Setup Find TDC Settings Help Record(F5) Registered To:

Difference Found

Specification	Log Book Value	Cam Analyzer Value
Exhaust Cam	0	na
Engine Layout	V GM OHC	na
Cam Number	cam 123	CC 124770
Cam Serial Number	cam sn 123	Kevin 12345-t
Cam Type	3 Solid Roller	2 Mild Solid Flat
Events Measured At	0 .050	0 .050 inch (1.25 mm)
Intake Max Lift	.345	.3177
Exhaust Max Lift	.355	.3215
Intake Duration	240	227.85
Exhaust Duration	250	232.96
Lobe Separation	110	107.35
Intake Centerline	106	105.00

Close this screen

File Name: C:\Program Files\Performance Trends\Cam Analyzer v3.8\camdata\examples\SB Ford on Stand

When you close the Cam Analyzer, you will be given the option to copy these Specs (or any changes you make to these Specs) back to the Engine Log Book 'Pro' program, or Abandon all changes.

Program called with English units from Engine Log Book 'Pro' and must stay in English units.

When you enter the Cam Analyzer, you are given a summary of the current Cam Analyzer settings and Engine Log Book Pro settings. Click on "Close this screen" to proceed into the program.

Cam Analyzer

File:

C:\Program Files\Performance Trends\Cam Analyzer v3.8\camdata\examples\SB Ford on Stand

has been opened. When you close Cam Analyzer, you will be returned to the Engine Log Book 'Pro'

OK

Here is a message to explain what happens now that you are in the Cam Analyzer program. Click OK to Proceed.

Difference

Specification	Log Book Value	Cam Analyzer Value
Exhaust Cam	0	na
Engine Layout	V GM OHC	na
Cam Number	cam 123	CC 124770
Cam Serial Number	cam sn 123	Kevin 12345-t
Cam Type	3 Solid Roller	2 Mild Solid Flat
Events Measured At	0 .050	0 .050 inch (1.25 mm)
Intake Max Lift	.345	.3177
Exhaust Max Lift	.355	.3215
Intake Duration	240	227.85
Exhaust Duration	250	232.96
Lobe Separation	110	107.35
Intake Centerline	106	105.00

Copy File Name and these Cam Analyzer Specs back to this Engine Log Book 'Pro' File

File Name: C:\Program Files\Performance Trends\Cam Analyzer v3.8\camdata\examples\SB Ford on Stand

Copy ONLY the File Name back to this Engine Log Book 'Pro' File

Copy Nothing back (make No changes) to the Engine Log Book 'Pro' File

When you exit the Cam Analyzer, you are given a summary of the current Cam Analyzer settings and Engine Log Book Pro settings. Here you can choose what to do with the Cam Analyzer settings.

Figure 10.5 New Report Option – TDC Lifts, Set Cam Timing

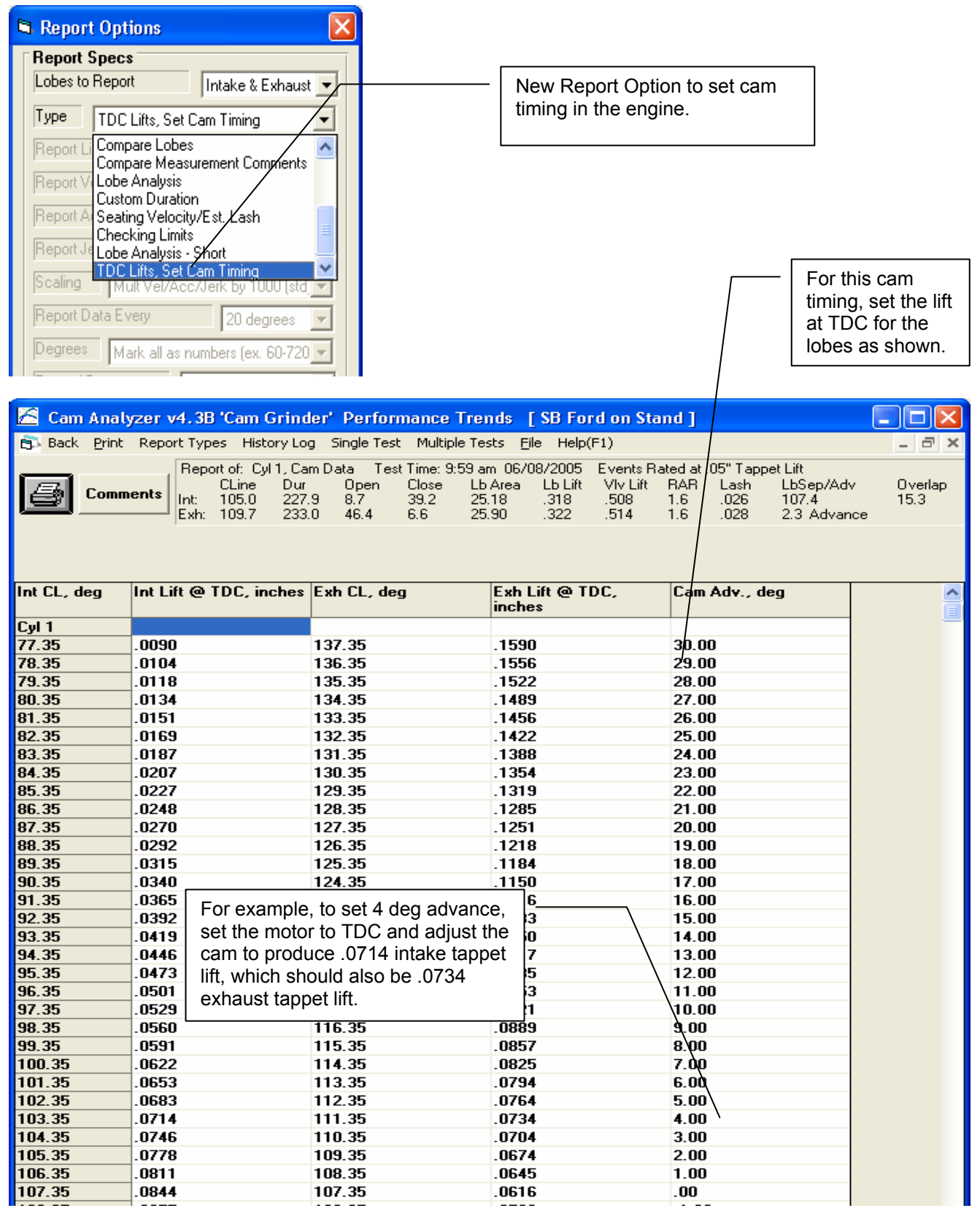
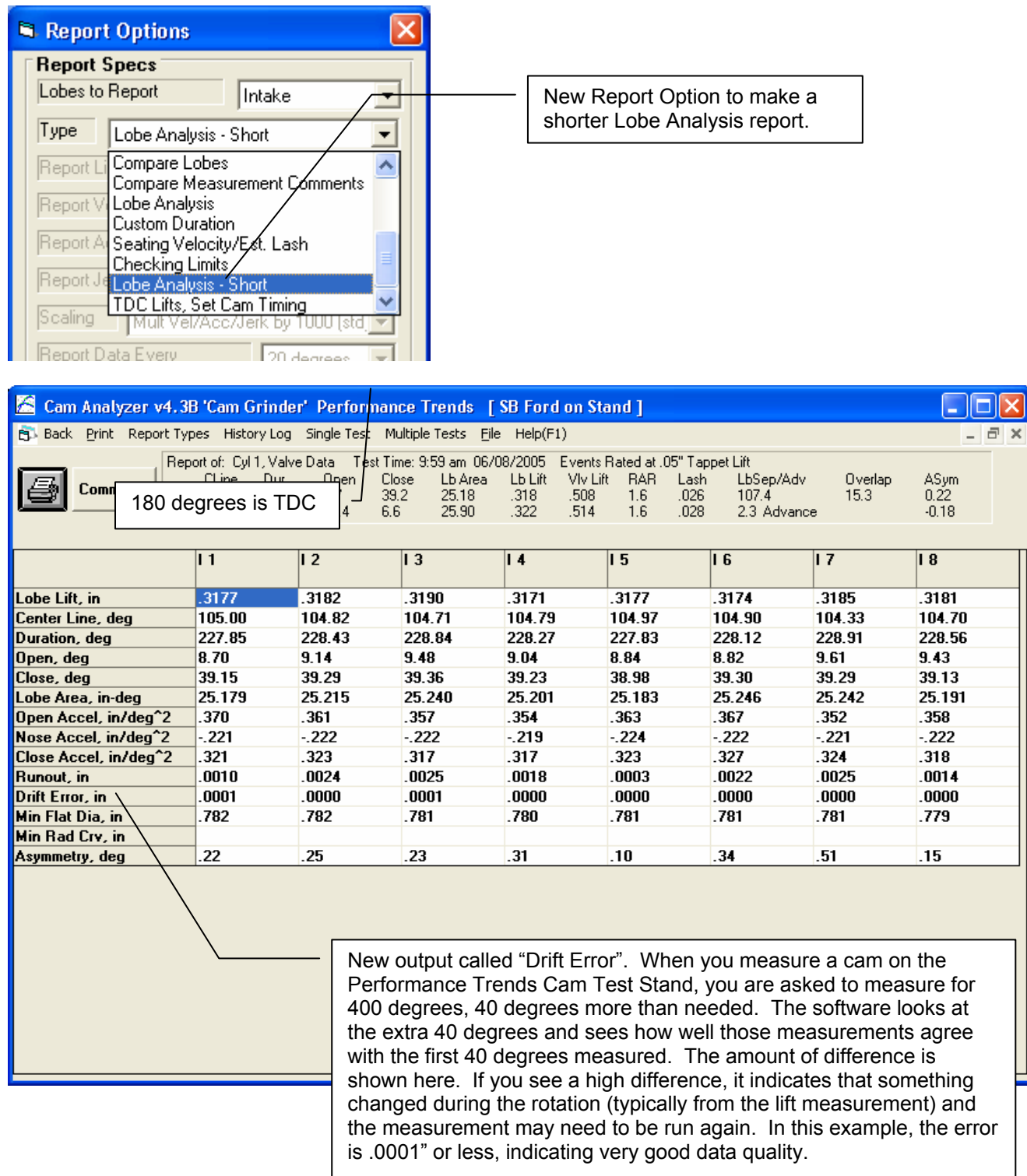


Figure 10.6 New Report Option – Lobe Analysis - Short



Report Options

Report Specs

Lobes to Report: Intake

Type: Lobe Analysis - Short

Report L: Compare Lobes

Report V: Compare Measurement Comments

Report A: Lobe Analysis

Report J: Custom Duration

Scaling: Seating Velocity/Est. Lash

Report Data Every: Checking Limits

Report Data Every: TDC Lifts, Set Cam Timing

Report Data Every: Mult Vel/Acc/Jerk by 1000 [std]

Report Data Every: 20 degrees

Cam Analyzer v4.3B 'Cam Grinder' Performance Trends [SB Ford on Stand]

Back Print Report Types History Log Single Test Multiple Tests File Help(F1)

Report of: Cyl 1, Valve Data Test Time: 9:59 am 06/08/2005 Events Rated at .05" Tappet Lift

180 degrees is TDC

	I 1	I 2	I 3	I 4	I 5	I 6	I 7	I 8
Lobe Lift, in	.3177	.3182	.3190	.3171	.3177	.3174	.3185	.3181
Center Line, deg	105.00	104.82	104.71	104.79	104.97	104.90	104.33	104.70
Duration, deg	227.85	228.43	228.84	228.27	227.83	228.12	228.91	228.56
Open, deg	8.70	9.14	9.48	9.04	8.84	8.82	9.61	9.43
Close, deg	39.15	39.29	39.36	39.23	38.98	39.30	39.29	39.13
Lobe Area, in-deg	25.179	25.215	25.240	25.201	25.183	25.246	25.242	25.191
Open Accel, in/deg^2	.370	.361	.357	.354	.363	.367	.352	.358
Nose Accel, in/deg^2	-.221	-.222	-.222	-.219	-.224	-.222	-.221	-.222
Close Accel, in/deg^2	.321	.323	.317	.317	.323	.327	.324	.318
Runout, in	.0010	.0024	.0025	.0018	.0003	.0022	.0025	.0014
Drift Error, in	.0001	.0000	.0001	.0000	.0000	.0000	.0000	.0000
Min Flat Dia, in	.782	.782	.781	.780	.781	.781	.781	.779
Min Rad Crv, in								
Asymmetry, deg	.22	.25	.23	.31	.10	.34	.51	.15

New output called "Drift Error". When you measure a cam on the Performance Trends Cam Test Stand, you are asked to measure for 400 degrees, 40 degrees more than needed. The software looks at the extra 40 degrees and sees how well those measurements agree with the first 40 degrees measured. The amount of difference is shown here. If you see a high difference, it indicates that something changed during the rotation (typically from the lift measurement) and the measurement may need to be run again. In this example, the error is .0001" or less, indicating very good data quality.

Figure 10.7 Specifying up to 6 Lobes per Cylinder

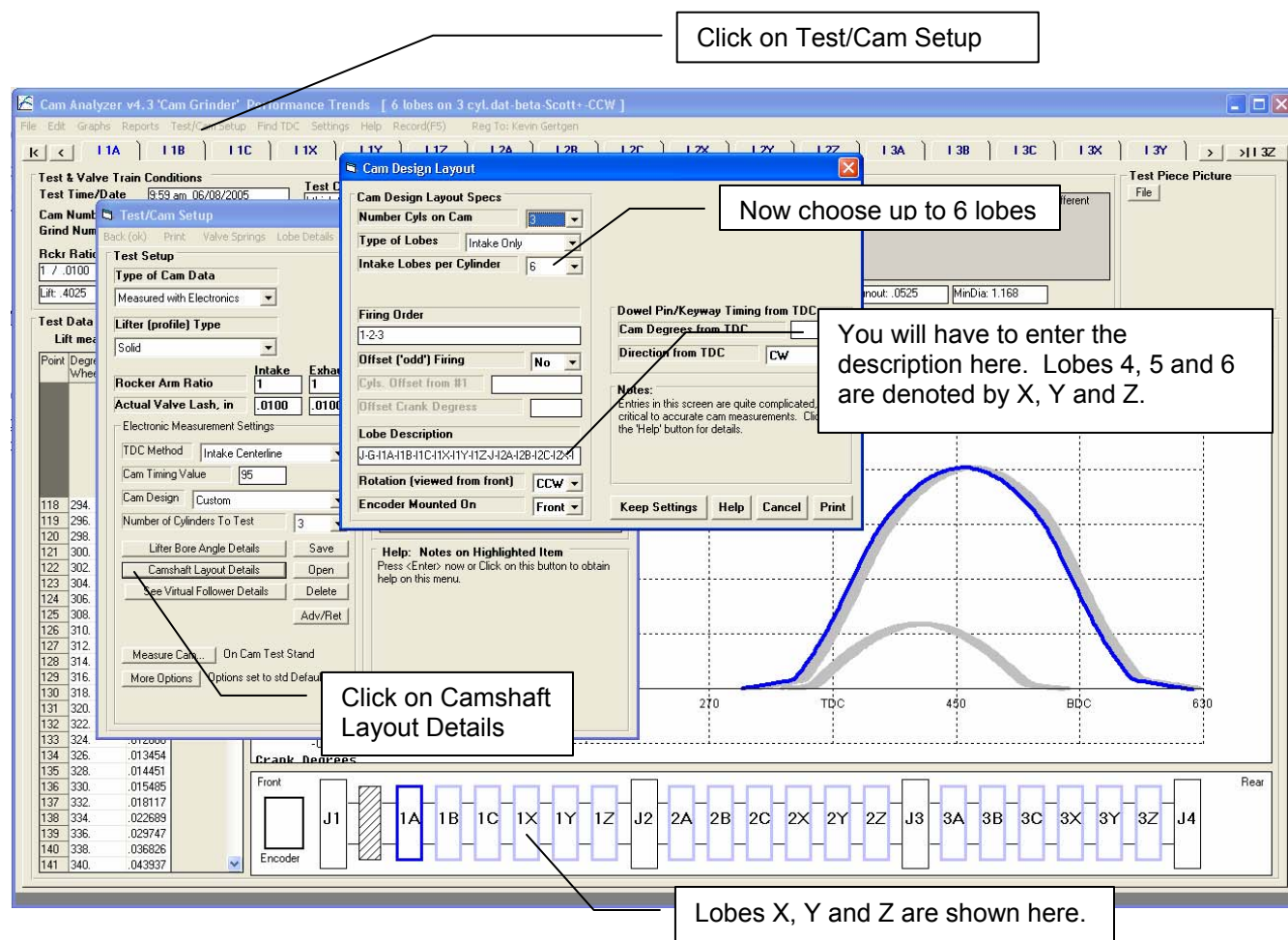


Figure 10.8 More Details for Generating a Cam Profile

Click here to open screen below.

Choose one of the "Create..." Types

Choose one of the "Spec..." follower types.

Fill in all these specs, the same as used in earlier versions of Cam Analyzer for creating a profile.

Note these comments about the profile the program will produce.

Test/Cam Setup

Back (ok) Print Valve Springs Lobe Details Help Refresh

Test Setup

Type of Cam Data Create from .050" Cam Specs **Deg Steps** 2 deg

Lifter (profile) Type Spec Solid Roller **For Cyl #** #1

Mild Solid Flat
Aggr Solid Flat
Mild Solid Roller
Aggr Solid Roller
Spec Hyd Flat
Spec Hyd Roller
Spec Solid Flat
Spec Solid Roller

Intake **Exhaust**

Duration @ .050 " 240.0 246.0

Open @ .050 " 10.0 58.0

Close @ .050 " 50.0 8.0

Max Lobe Lift, in .385 .400

Gross Valve Lift, in .578 .640

Designed Vlv Lash, in .020 .022

Total Cam Advance 2.5 Advance

Lobe Separation, deg 112.5

Lift for Rating Events .050 inch (1.25 mm)

Degree Wheel

Type TDC - 90 - BDC - 90 - TDC

TDC 45 45 90 90 BDC

Help: Notes on Highlighted Item

Click on arrow to select type of lifter and/or cam profile. 'Mild' means gentler ramps, 'Aggr' stands for Aggressive and means steeper ramps, 'Invtrd' stands for Inverted Flank and means very steep ramps. p 22

These profiles are not precise enough for creating master cams for cam grinding.

Intake and Exhaust Lobe Details have NOT been set. Click on 'Lobe Details' at top of screen to enter them to produce accurate lobes, or 'Ramp Rating' of 30 will be assumed.

Figure 10.9 More Details for Generating a Cam Profile, cont

Test/Cam Setup

Back (ok) Print Valve Springs Lobe Details Help Refresh

Test Setup

Type of Cam Data

Create from .050" Cam Specs 2 deg

Lifter (profile) Type

Spec Solid Roller For Cyl # #1

Rocker Arm Ratio

Intake 1.5 Exhaust 1.6

Actual Valve Lash, in

Intake .020 Exhaust .022

Rating Events

.050 inch (1.25 mm)

Wheel

Type TDC - 90 - BD

Click here to add more details to the cam profile the program will create.

Intake Calc Ramp Rating, %

Intake Calc Ramp Rating, % 62.6

Dwell Over Nose, deg 0

Duration @ Seat Timing 263

Lobe Details

Use These Details Yes

'Cheater' Profile No

Dwell over the Nose 16

Use Ramp Rating Yes

Based On Duration @ .050" (1.25 mm) & .200" (5.08 mm)

Description Mild

Duration @ Seat (.003", .076 mm)

Duration @ .050" (1.25 mm) 240.0

Duration @ .200" (5.08 mm) 178

Ramp Rating

Constant Velocity Ramp (lobe lift"/cam deg) .0005

Notes:

Choose if you want to use these additional details to generate a cam lobe profile, then enter the details. These settings will adjust the profile based on:

- Lifter (profile) Type = Spec Solid Roller
- Max Lobe Lift, in = .385
- Designed Vlv Lash, in = .020

Set to "Yes" to have these details enabled.

Set to "Yes" to let the profile have some "Dwell" over the nose of the cam, where the lift does not change at peak lift. These types of cams are typically used in classes of racing where the maximum lift of the cam is limited.

Set this to "Yes" so you can specify how aggressive the ramps will be. Your choice here will determine which other inputs are enabled to calculate a particular "Ramp Rating".

For solid lifter cam profiles, choose how gentle or aggressive you want the ramp leading up to the lash point of the profile.

Keep Settings Help Cancel Print

Figure 10.10 More Details for Generating a Cam Profile, cont

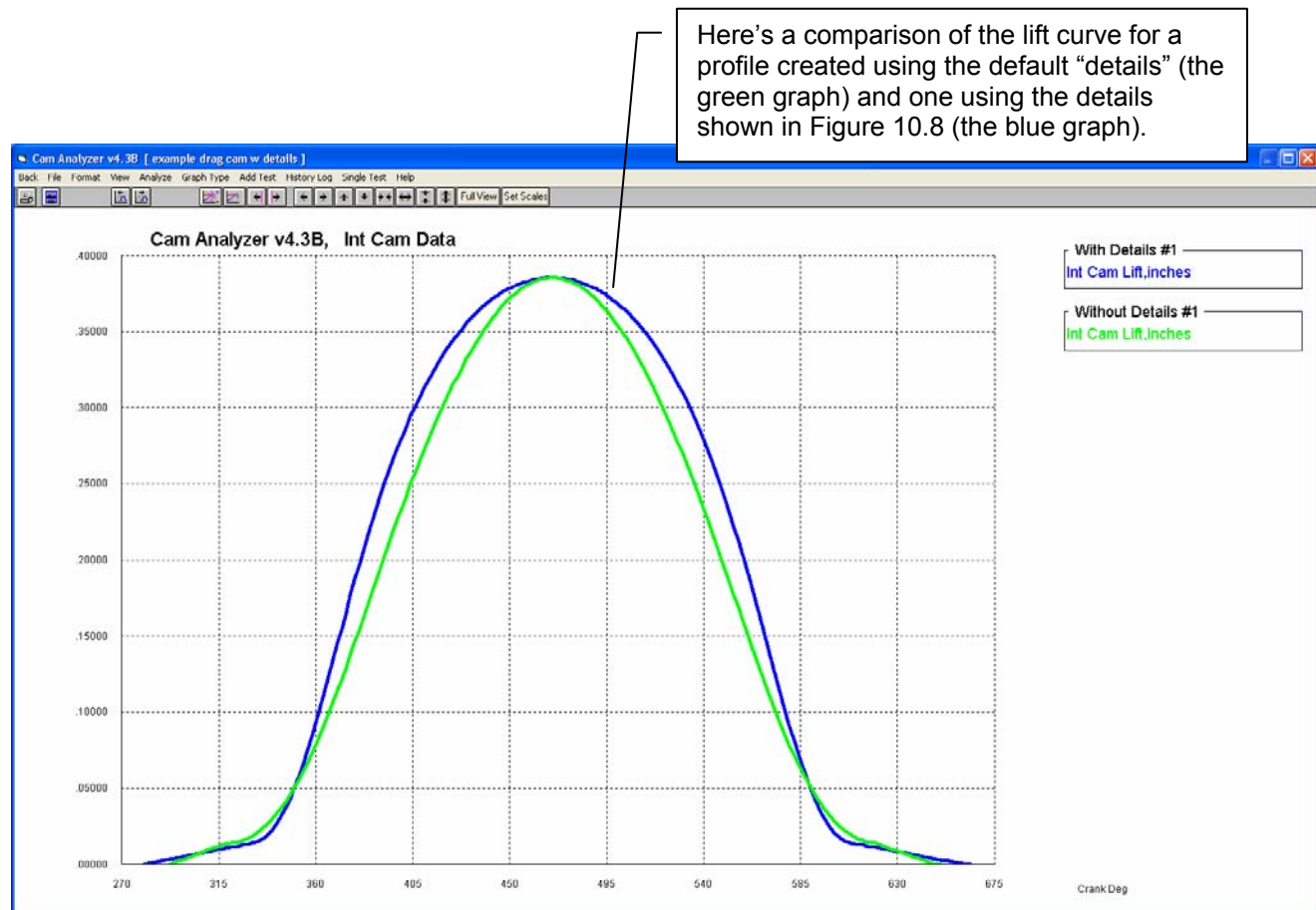


Figure 10.11 New “Rotation” Options for OHC Rocker Arm Virtual Follower Feature

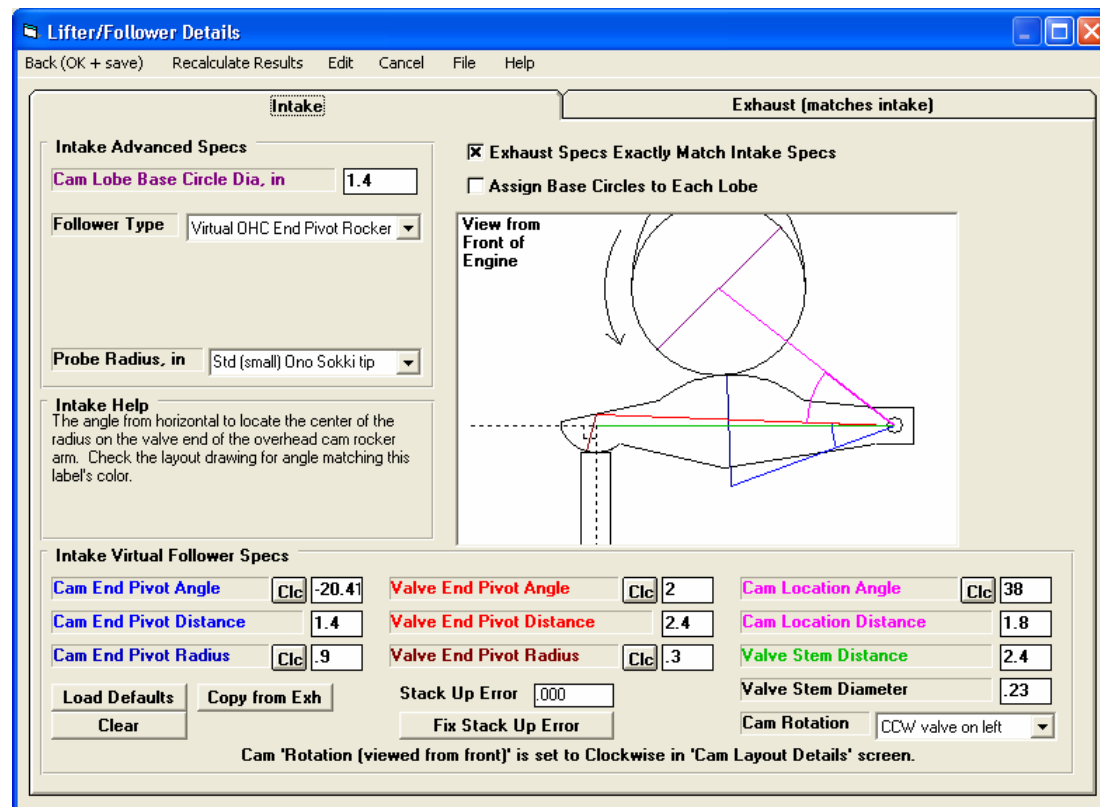
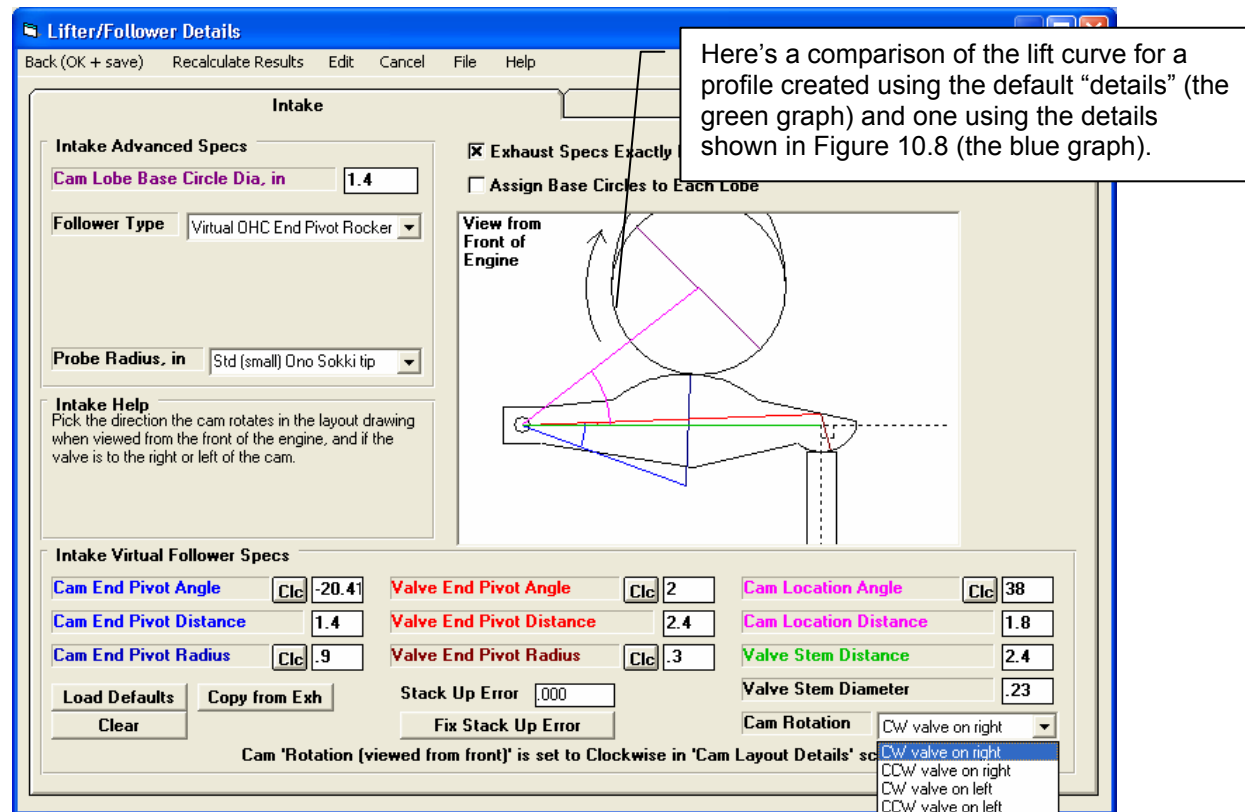


Figure 10.12 New "Rotation" Options for OHC Rocker Arm Virtual Follower Feature

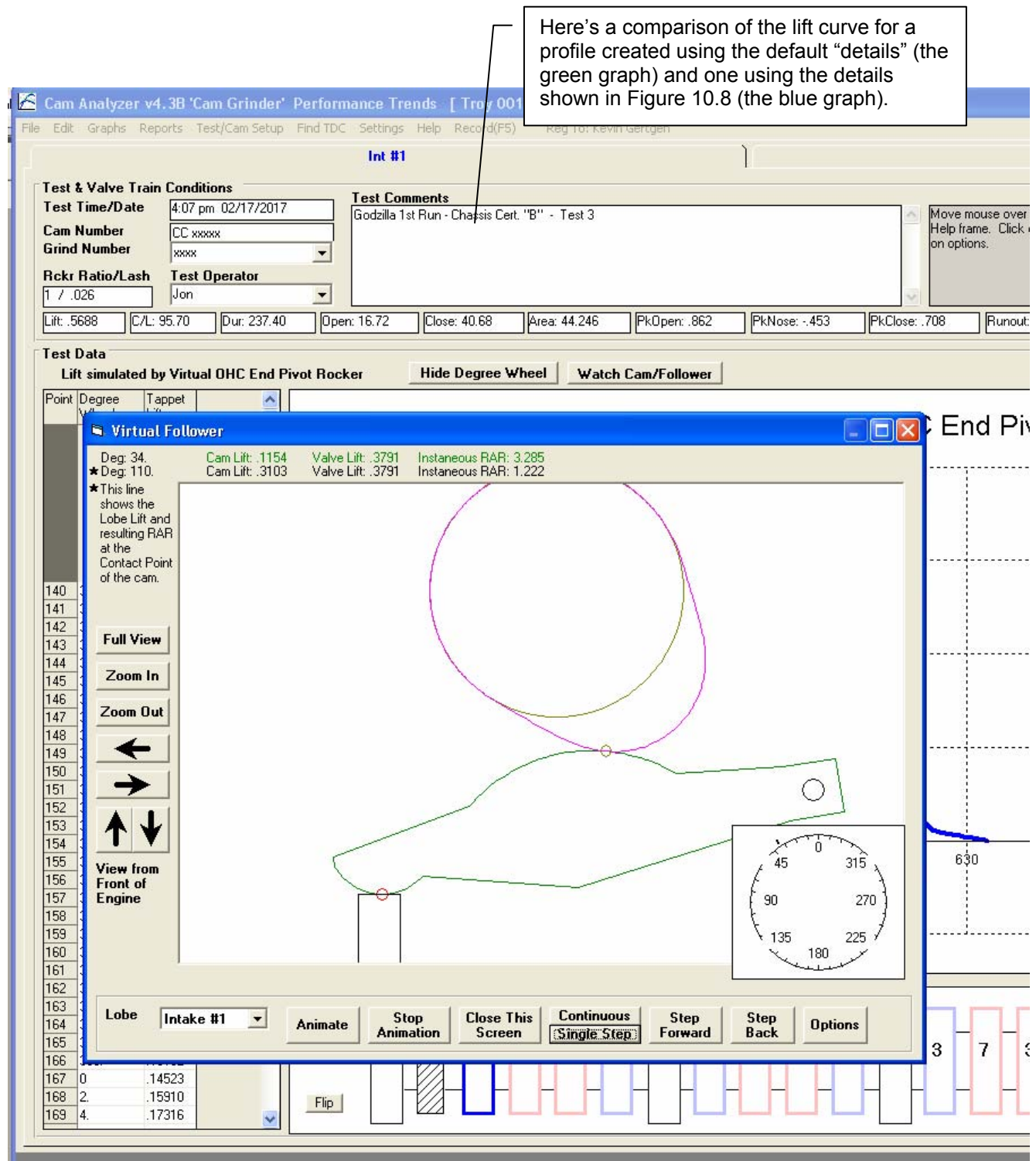
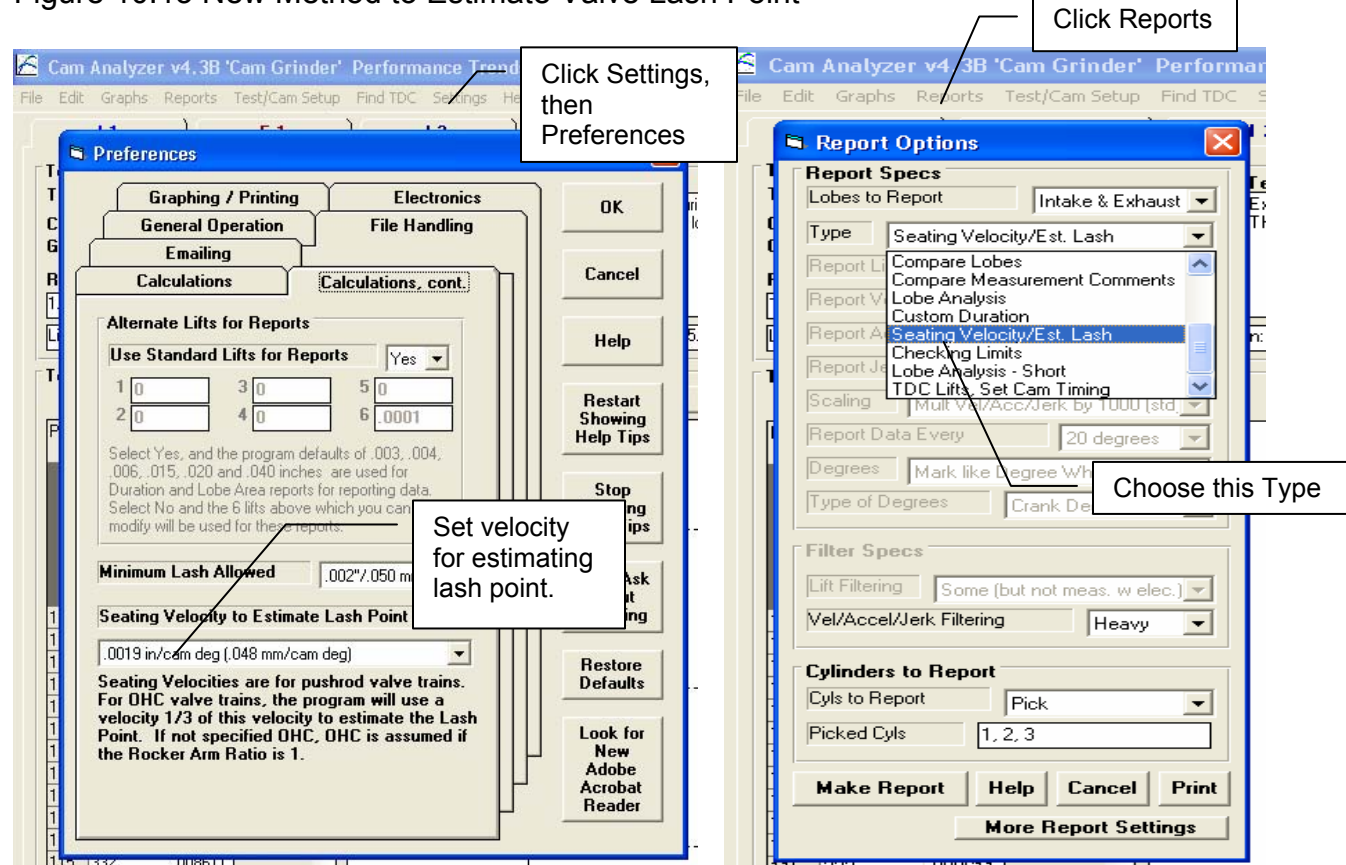


Figure 10.13 New Method to Estimate Valve Lash Point



Cam Analyzer v4.3B 'Cam Grinder' Performance Trends [sb ford on stand]

Back Print Report Types History Log Single Test Multiple Tests File Help(F1)

Comments

Report of: Cyl 1, Valve Data Test Time: 9:59 am 06/08/2005 Events Rated at .05" Tappet Lift

CLine	Dur	Open	Close	Lb Area	Lb Lift	Vlv Lift	RAR	Lash	LbSep/Adv	Dw
Int:	105.0	227.9	8.7	39.2	25.18	.318	.508	1.6	.026	107.4
Exh:	109.7	233.0	46.4	6.6	25.90	.322	.514	1.6	.028	2.3 Advance

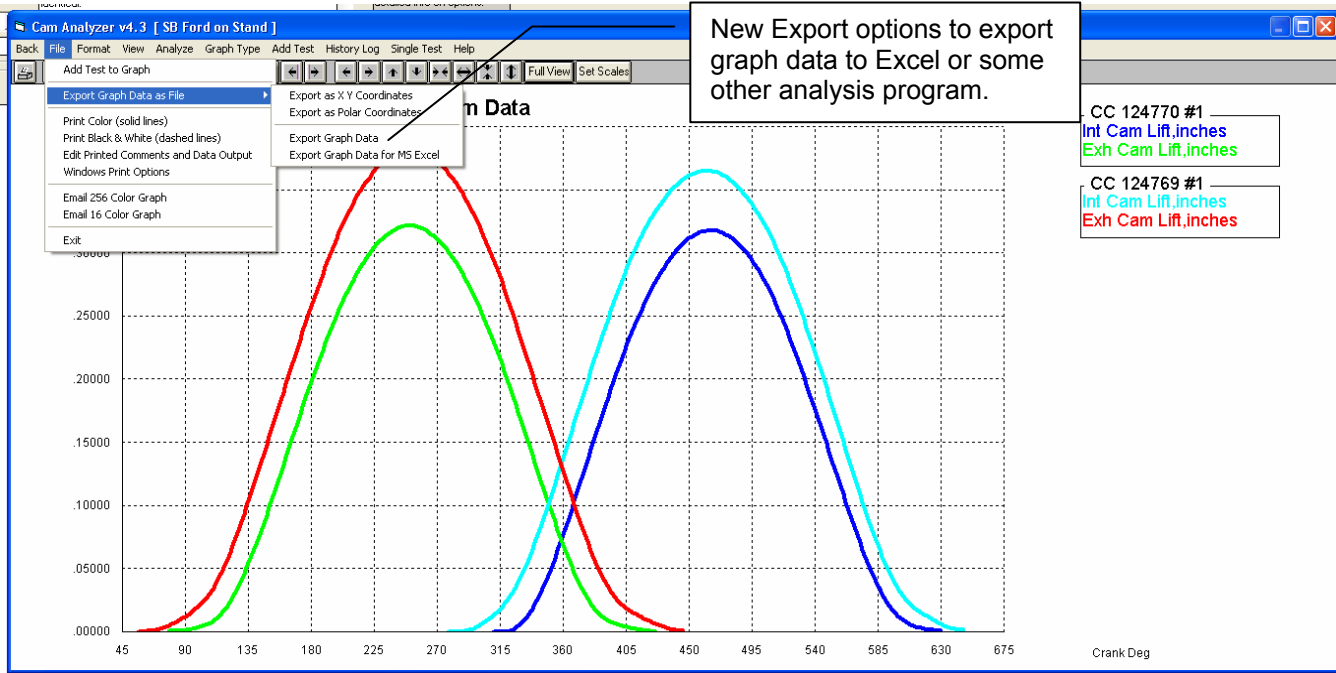
See Fig A59 page 177 for more details on this type of report.

Lash	Vel @ 5000 RPM, int	Vel @ 6000 RPM, int	Vel @ 7000 RPM, int	Vel @ 5000 RPM, exh	Vel @ 6000 RPM, exh	Vel @ 7000 RPM, exh
Cyl 1						
.005	21.33	25.59	29.86	15.20	18.24	21.28
.010	36.69	44.03	51.37	31.03	37.24	43.45
.015	48.20	57.84				
.020	57.65	69.18				
.025	65.91	79.09				
.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00
Lash/RAR	? Open	.0007 Close	1.60 RAR	.0059 Open	.0073 Close	1.60 RAR
Lash	.008	.017	@ .0019 in/cam deg	.016	.019	@ .0019 in/cam deg
Cyl 2						
.005	17.26	20.72				
.010	33.46	40.16				
.015	45.69	54.83				
.020	55.74	66.89				
.025	64.04	76.84				
.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00
Lash/RAR	? Open	.0024 Close	1.60 RAR	.0055 Open	.0063 Close	1.60 RAR
Lash	.006	.018	@ .0019 in/cam deg	.015	.018	@ .0019 in/cam deg
Cyl 3						
.005	17.24	20.69	24.13	11.87	14.25	16.62
.010	33.17	39.81	46.44	27.64	33.17	38.69
.015	45.24	54.29	63.34	42.22	50.66	59.11
.020	55.12	66.14	77.17	52.63	63.15	73.68
.025	63.38	76.05	88.73	61.05	73.26	85.47

This first line shows lash based on the "zero velocity" point. The "?" indicates the program could not find this point, and that lash based on zero velocity is not reliable.

This second line shows lash based on .0019 in/cam degrees velocity. Int open shows .008, less than the other 3 lashes of .017, .016 and .019. A good estimate for lash on this cam would be about .017.

Figure 10.14 New Graph Export Options



Exported file opened up in Excel

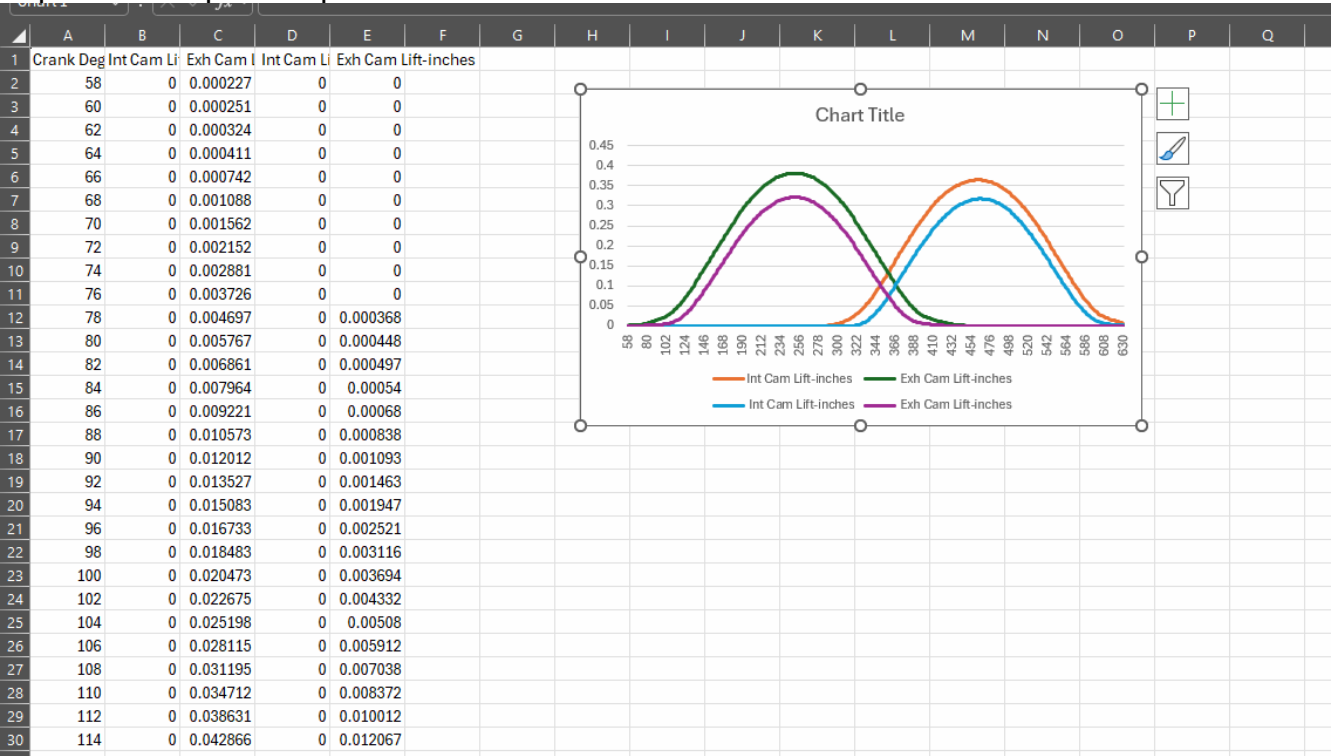


Figure 10.15 Specifying Individual Base Circle Measurements

Click on Test/Cam Setup

Click on See Virtual Follower Details. This feature is only available for Virtual Follower.

Check this option and Multiple Base Circles appears here.

Choose which lobe to set the Base Circle. Then enter the Base Circle measurement. Click the Keep button to keep this measurement

Base circle measurements are shown for each lobe you have entered. Click the Print button to print this screen and all individual base circle measurements.

When done entering data, click here to keep your changes.

Individual Base Circles

Set All Intake Base Circles
Set All Exhaust Base Circles

Individual Base Circles

Lobe E 1 Base Circle = 1.109

Base Circle, in 1.109

Keep

Notes:
Choose the 'Lobe' for setting each 'Base Circles', then enter the 'Base Circles', then click on the 'Keep' button. Then when you click on the list of Lobes, you should see that 'Base Circle' assigned to that Lobe. Click on one of the 'Set all' buttons at the top to set Base Circles for several Lobes at once.

Keep Base Circles Help Cancel Print

Individual Base Circles

Set All Intake Base Circles
Set All Exhaust Base Circles

Individual Base Circles

Lobe 1 2 Base Circle =

Base Circle

1 1 Base Circle = 1.105
E 1 Base Circle = 1.109
1 2 Base Circle =

Notes:
Choose the 'Lobe' for setting each 'Base Circles', then enter the 'Base Circles', then click on the 'Keep' button. Then when you click on the list of Lobes, you should see that 'Base Circle' assigned to that Lobe. Click on one of the 'Set all' buttons at the top to set Base Circles for several Lobes at once.

Keep Base Circles Help Cancel Print

Figure 10.16 Specifying Individual Base Circle Measurements. cont

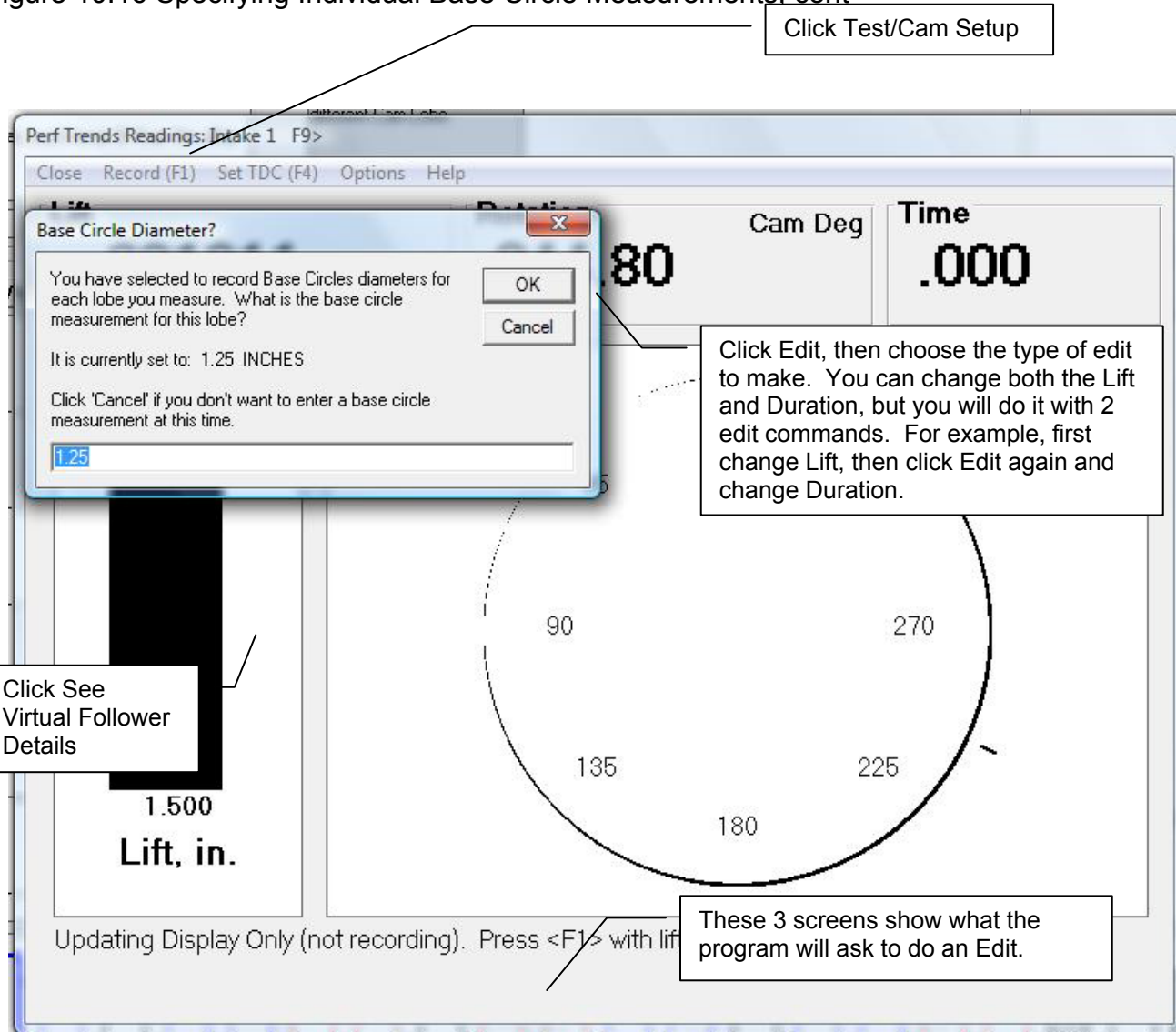
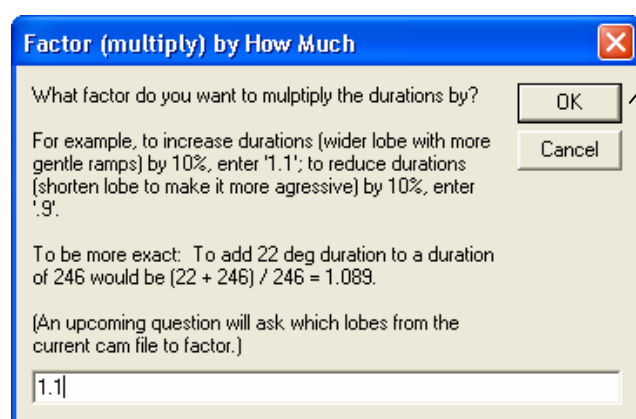
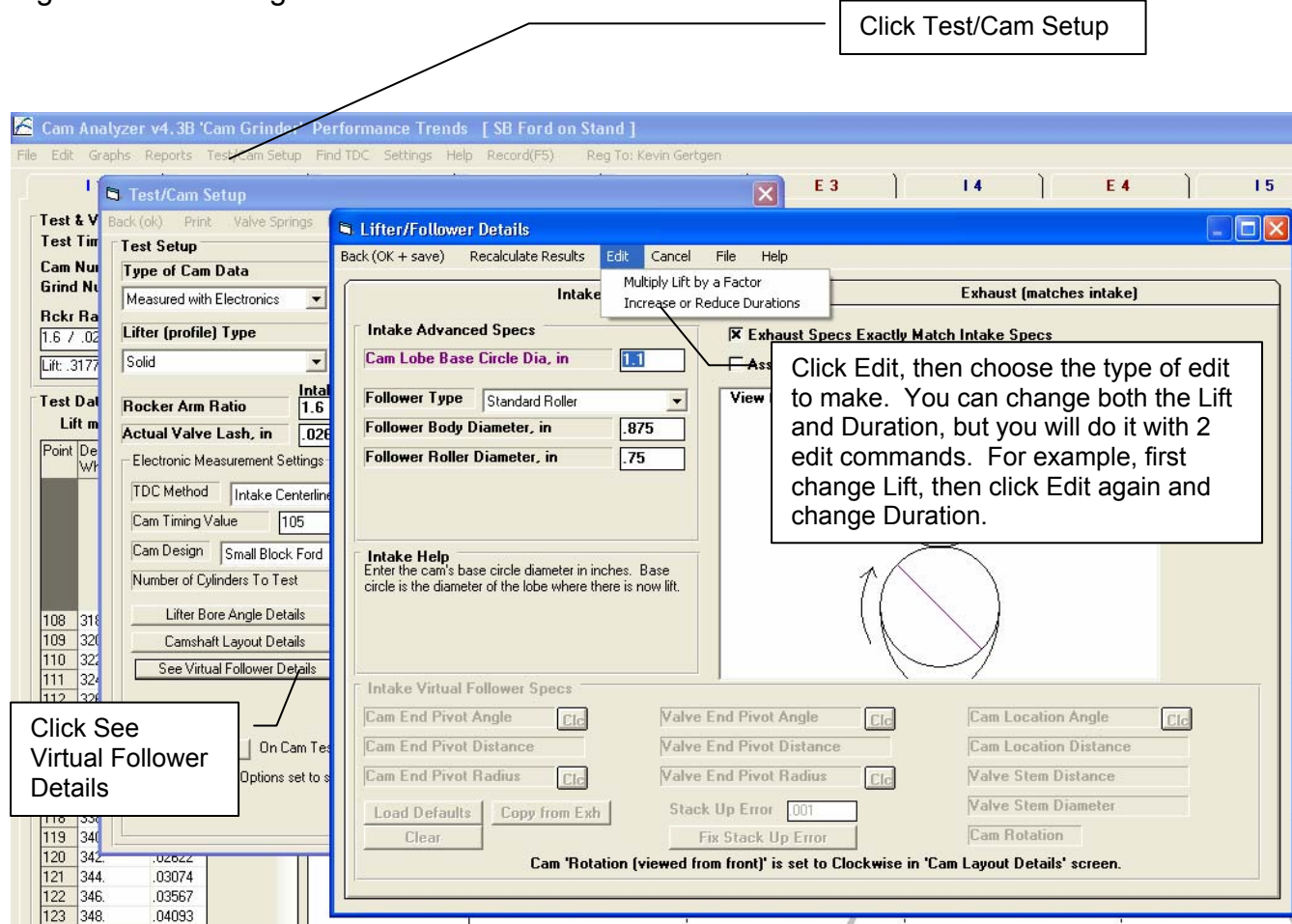


Figure 10.17 Editing a Profile Measured with Electronics



These 3 screens show what the program will ask to do an Edit.

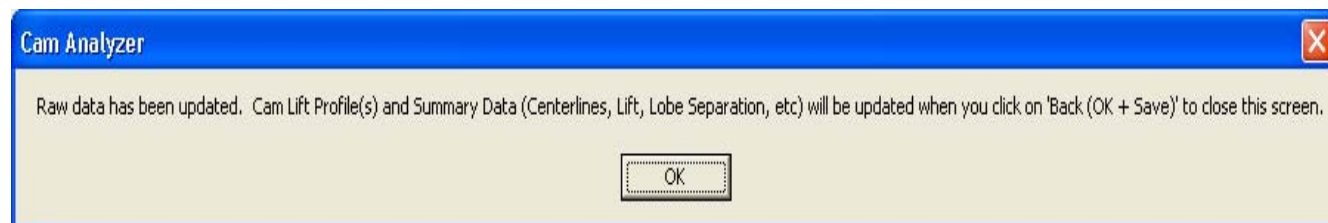
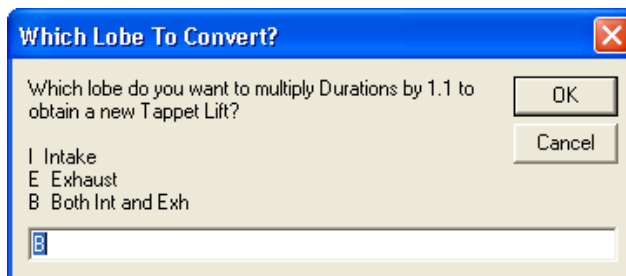
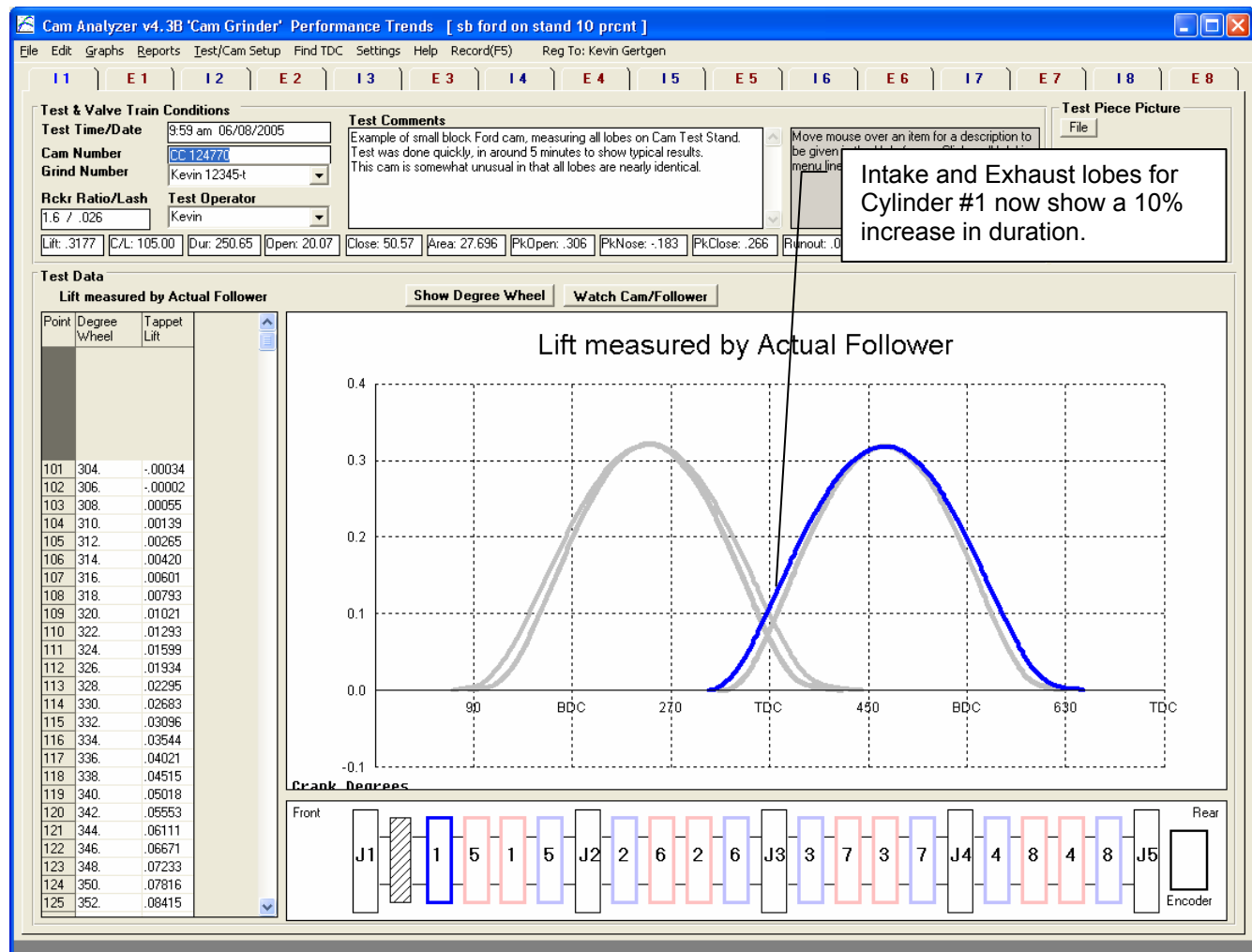


Figure 10.18 Editing a Profile Measured with Electronics, cont



Edits are only made for the first Intake and first Exhaust lobes.

#1 Intake Duration at .050" was 227.85 and is now 250.65, a 10% increase

#1 Exhaust Duration at .050" was 232.96 and is now 256.15, a 10% increase

Click on a section of a report while holding down the Ctrl key for these options to be presented. A “section” is a column that either starts at the top or a blank row and extends down to a blank row or the bottom of the report. Here we clicked on the Exhaust Lobe Lift section.

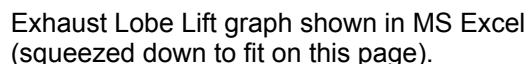


Figure 10.20 Generating 3D .igs Manufacturing Files

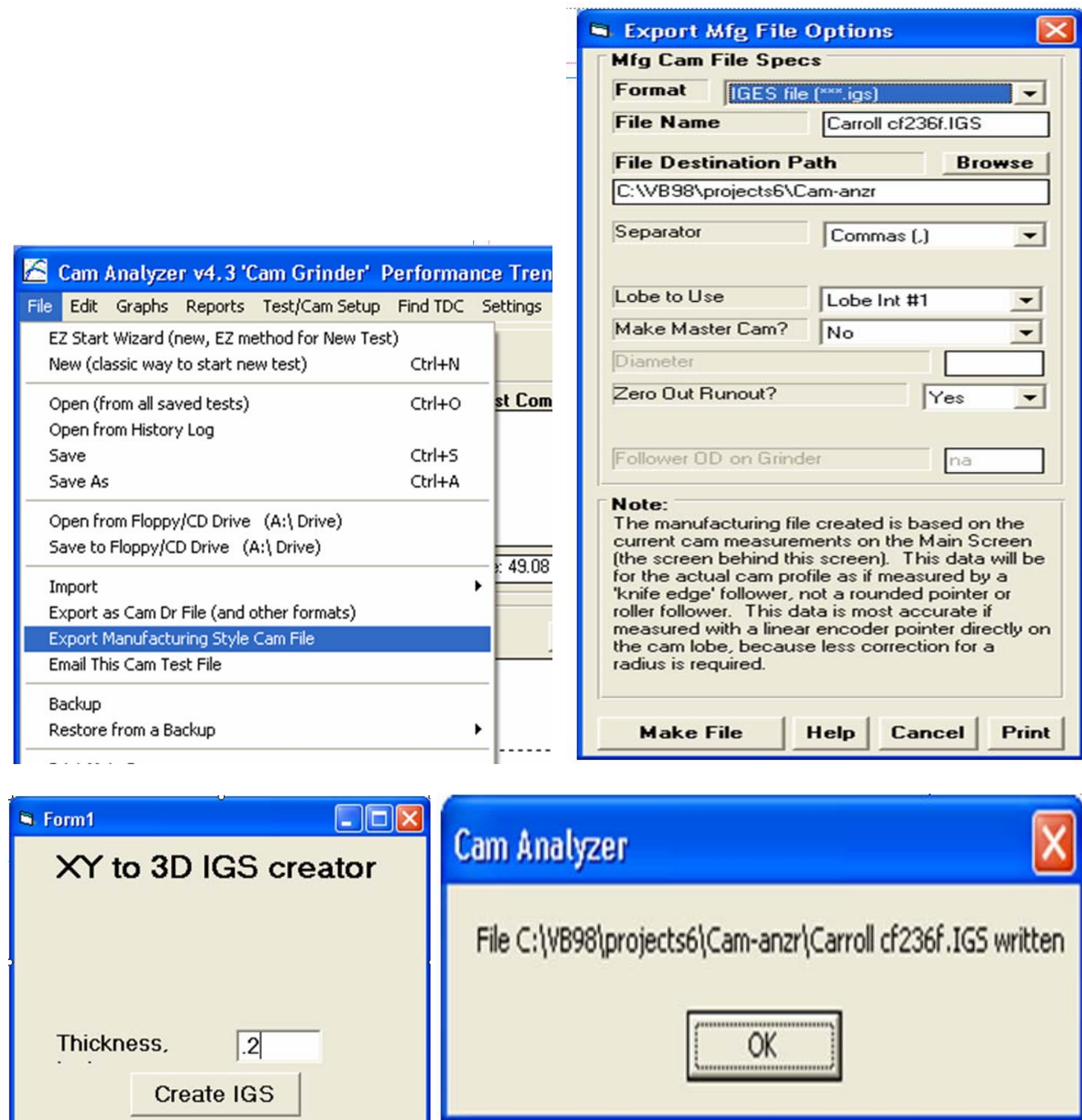
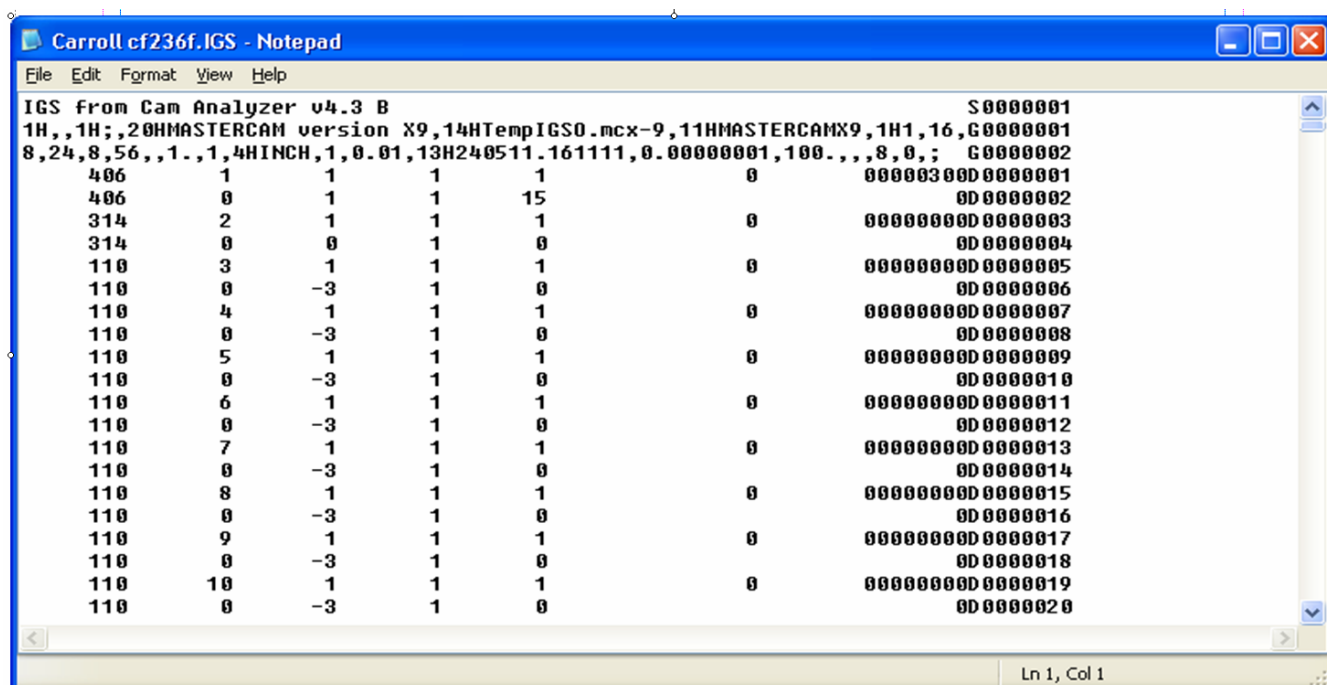


Figure 10.21 Generating 3D .igs Manufacturing Files, cont



```
IGS from Cam Analyzer v4.3 B
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 0000030000000001
406 0 1 1 15 0 000000002
314 2 1 1 1 0 0000000000000003
314 0 0 1 0 0 000000004
110 3 1 1 1 0 000000000000005
110 0 -3 1 0 0 000000006
110 4 1 1 1 0 000000000000007
110 0 -3 1 0 0 000000008
110 5 1 1 1 0 000000000000009
110 0 -3 1 0 0 000000010
110 6 1 1 1 0 000000000000011
110 0 -3 1 0 0 000000012
110 7 1 1 1 0 000000000000013
110 0 -3 1 0 0 000000014
110 8 1 1 1 0 000000000000015
110 0 -3 1 0 0 000000016
110 9 1 1 1 0 000000000000017
110 0 -3 1 0 0 000000018
110 10 1 1 1 0 000000000000019
110 0 -3 1 0 0 000000020
```

