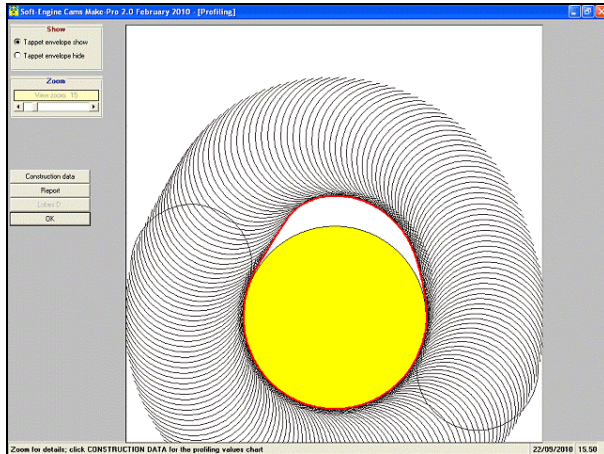


Soft-Engine - Data store software: Cams Make-Pro

Software description

The software "**CAMS MAKE-PRO**" measures the **cam lift curve** vs rotation angle (cam angle). In this way it's possible to calculate an **existing cam profile construction data** and **to export them** in any format compatible with CAD software, cutting-machines, and, moreover, with Soft-Engine simulation software (principally **CAMS** and **4TBASE** - 4-Stroke engine simulator).



Cams Make-Pro: Cam profile stored by curve tappet

From the main window choose a phase (Intake or Exhaust); immediately the acquisition window appears on the screen and you can measure the cam lift. The main software characteristic is the **great versatility and the extreme simplicity to use**. In-fact the only things to do are:

- ☞ Choose the cam phase (intake or exhaust);
- ☞ Measure the lift, without inputting particular data;
- ☞ The test result (cam lift curve) is shown in the screen;
- ☞ Save the test;
- ☞ Print test eventually.

There are some adding calculation, for example::

- ☞ **Cam speed** and **acceleration** (both quantities are derivated from lift derivated);
- ☞ **Cam profile** and its construction data, **X-Y coords** and **polare coords**.

There are some adding calculation, for example:

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- ☞ **Cam profile** and its construction data, **X-Y coords** and **polare coords**.

Finally, each chart is exportable as **Excel** or **DXF** file format, for datasheet, CAD, cutting-machines compatibility.

It's possible to compute, also in a second time after acquisition, the speed, acceleration, cam profile and oits construction data. In this case is necessary to input some data for computings:

- ☞ Max RPM (for cam speed and acceleration calculation);
- ☞ Cam basic radius (for profile and construction data calculation).

Test and cam lifi measurement

Test is extremely simple and easy to do: after the cam phase choice (Intake or Exhaust) the **acquisition data window** appears immediately.

Click "**Start**" and rotate the camshaft in the mechanic support for 360 degrees, at the end click the button "**End**".

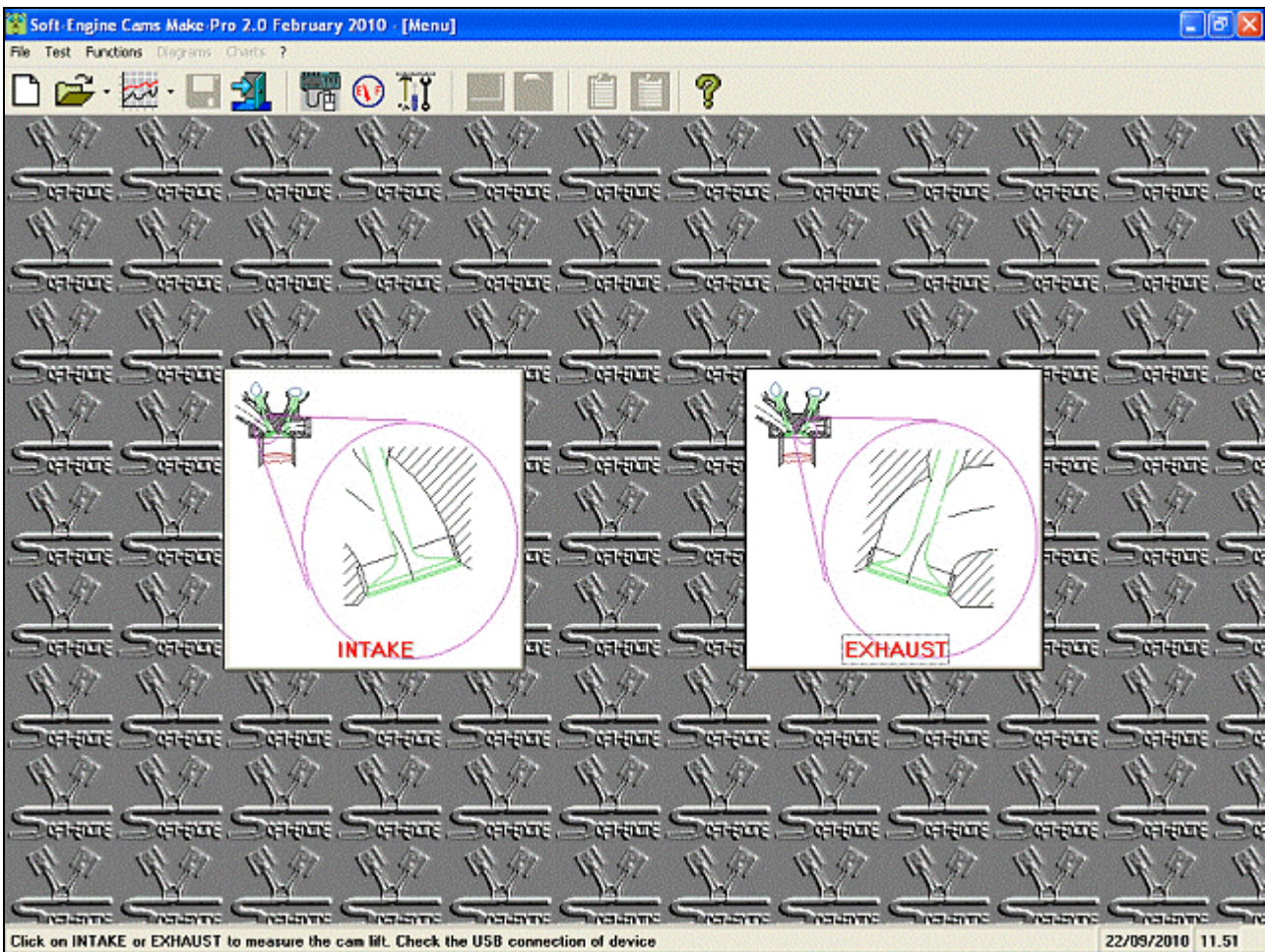
Immediately, the cam lift diagram appears.

It's possible to use a **planar** or a **curvilinear tappet**, according to the exigences.

THE SENSOR ACCURACY is **always 0.1 degrees for encoder** and **1 micron for linear displacement sensor**. The results can be managed with a different step, 1° , 0.5° and 0.1° according to the exigences. **The step of results can be changed also in a second time after the acquisition, even if they are saved with a different step.**

BASIC VERSION (2.0) KIND OF TEST

In the software **BASIC VERSION (2.0)** the available tests are **INTAKE** and **EXHAUST**, the corresponding phase cam lift measuring and (optional) computations of contour, construction data and velocity - acceleration of tappet.



Cams Make-Pro: the main window (basic version 2.0)

EXTENDED VERSION (3.0) KIND OF TEST

In the software **EXTENDED VERSION (3.0)** are available **INTAKE** and **EXHAUST** like in the basic version, but also:

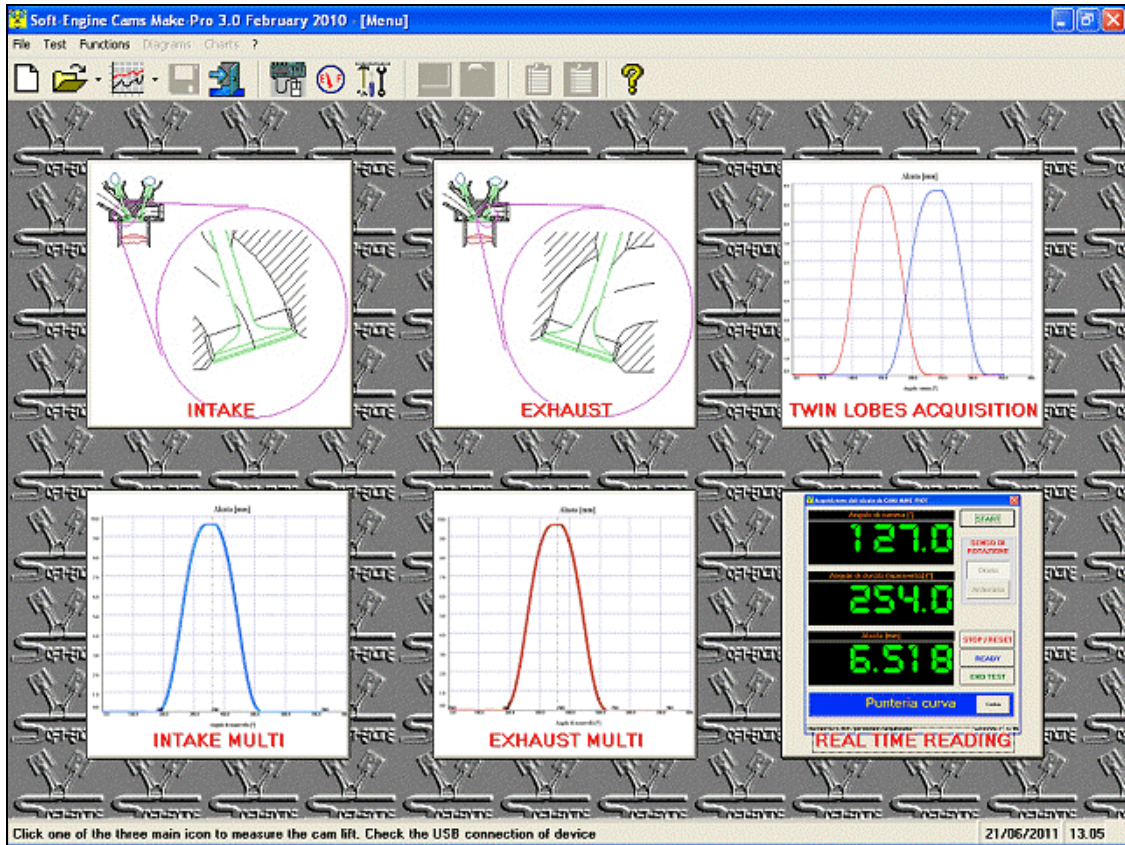
TWIN LOBES ACQUISITION: this test measures both intake and exhaust cam lift and the **difference of cam angle phase is stored** and reported. Watch the diagram about lift vs cam angle to get this difference of phase.

INTAKE MULTI: the same of intake test but it's possible to repeat the intake cam lift acquisition six times max. This option is possible also repeating the run but by this test the repetition procedure is faster.

EXHAUST MULTI: like intake multi test but suitable for exhaust cams.

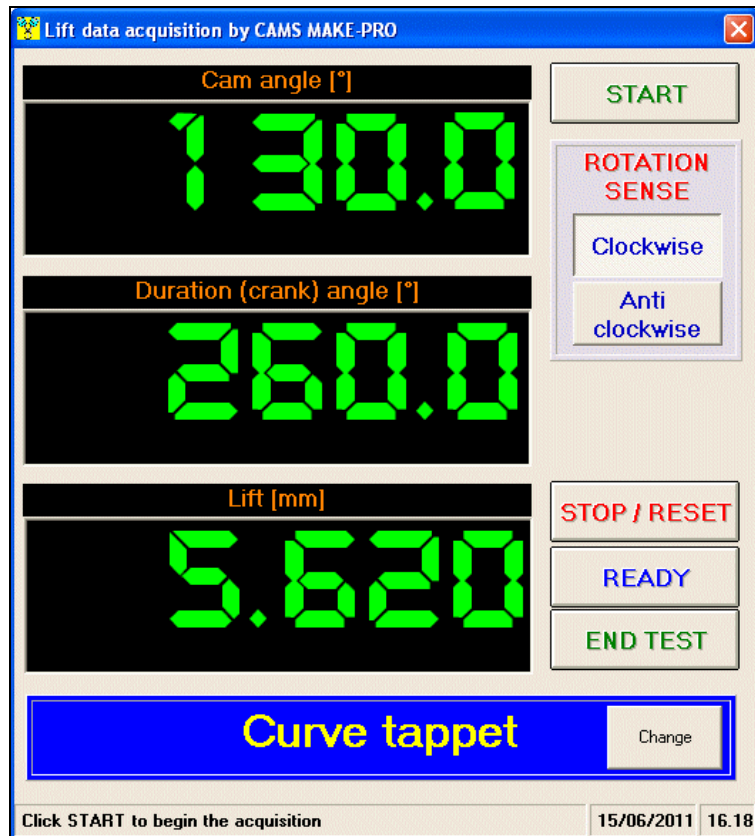
REAL TIME READING: by this test it's possible a free cam rotation and to observe cam lift and the maximum cam lift. Any diagram, chart and contour is computed.

Soft-Engine Cams profile device systems – software “Cams Make-Pro”

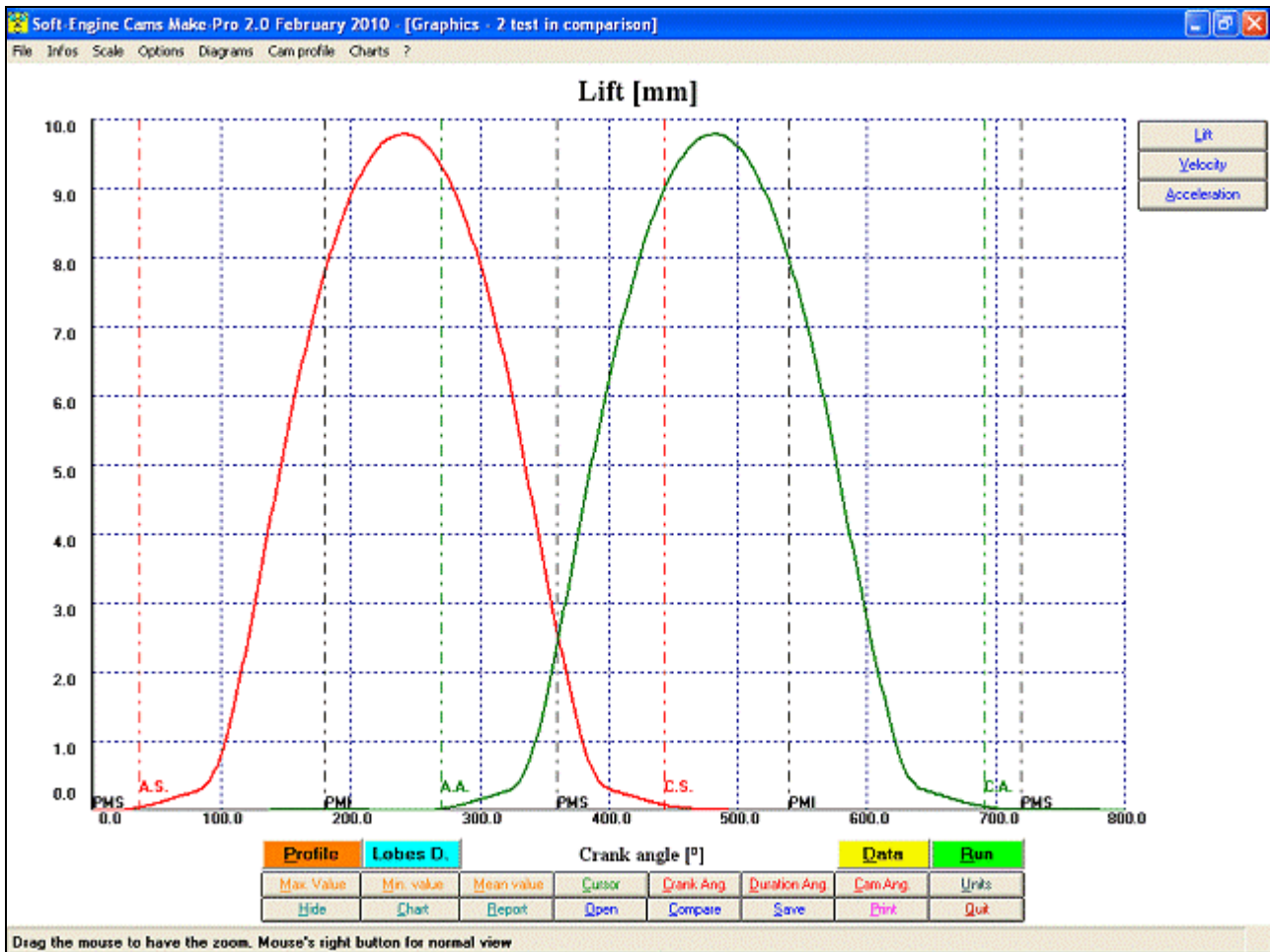


Cams Make-Pro: the main window (extended version 3.0)

Data store and diagram windows



Cam lift acquisition window



Cam lift diagram (intake and exhaust)

Diagram analysis tools

All the diagram tools are available from two toolbars, horizontal and vertical. The Horizontal toolbar buttons are for analysis functions, the vertical toolbar buttons are for the quantity choice (Cam lift, speed and acceleration).

The most important functions are:

- ☞ **Diagram cursor:** reads the diagram values every 0.1 degrees.
- ☞ **Maximum, minimum, mean value:** gives immediately the peak, minimum and average value of displayed quantity.
- ☞ **Chart:** chart of displayed quantity. In the menu it's possible to find also the all quantities chart and the construction data chart. All quantities can show more than a single test and obviously they can be printed..

Others tools:

- ☞ **Zoom;**
- ☞ Computing and visualization of **cam profile** and its **construction data;**
- ☞ **Units management** (International System, British system and their combinations);
- ☞ **Report** of the most important data;
- ☞ **Diagram and charts printings** with the possibility to manage the page printing areas (choice of which notices print, diagram area dimensions, import a logo etc...).

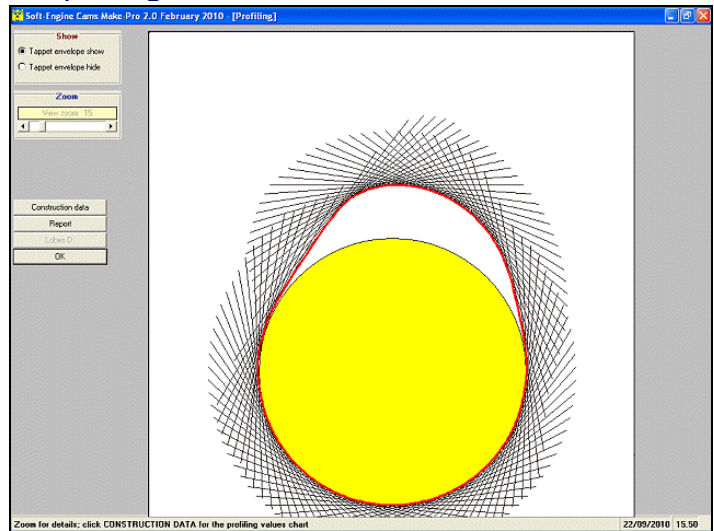
Test repetition and comparisons

It's possible to acquire up to **six cam lifts for each session of tests**. Is enough to click the key "Run" to acquire a new lift. All the analysis tools (curve cursor, peak values, charts, cam profile calculation etc...) are extended to every acquired quantity and they work to the comparisons. It's possible therefore to open in up to six tests together memorized in the hard-disk to be able to **compare them**.

Cam profile and its construction data computings

It is enough click on "Profile" to calculate the cam profile and the chart of the construction data in **Cartesian coordinates** (X, Y - the point 0,0 are the center of the basic circle of cam) or **polar** (angle rotation and radial distance from the center of the circle of base).

IMPORTANT: THE PROFILE AND THE CONSTRUCTION DATA CAN ALSO BE CALCULATED "IN A SECOND TIME" ON TEST PREVIOUSLY MADE AND ALREADY SAVED.



Cams Make-Pro: cam profile stored by a plane tappet

Cam Ang [°]	X Profile [mm]	Y Profile [mm]	Angle Fi [°]	Radial dist. [°]
0.0	9.9652	3.1032	107.2966	10.4372
1°	9.965	3.0677	110.3946	10.5247
99.0	9.7291	4.3462	114.091	10.6565
100.0	9.5683	5.1021	118.0677	10.8436
101.0	9.3734	5.9162	122.2589	11.0843
102.0	9.1671	6.7909	126.3689	11.3847
103.0	8.9349	7.6253	130.4784	11.7464
104.0	8.6873	8.5083	134.4635	12.1590
105.0	8.4257	9.3662	138.0250	12.5904
106.0	8.1652	10.1632	141.238	13.0416
107.0	7.9085	10.9297	144.1113	13.4909
108.0	7.6465	11.6561	146.7340	13.9404
109.0	7.3922	12.3415	149.0797	14.386
110.0	7.1445	12.9622	151.1373	14.8000
111.0	6.9104	13.5207	152.9285	15.1843
112.0	6.684	14.0362	154.5394	15.5482
113.0	6.4674	14.5156	155.9840	15.8912
114.0	6.2580	14.9522	157.2862	16.2093
115.0	6.0667	15.3274	158.4058	16.4844
116.0	5.8945	15.6675	159.3824	16.7397
117.0	5.7281	15.9776	160.2767	16.9733
118.0	5.569	16.2582	161.0917	17.1855
119.0	5.4222	16.512	161.821	17.3795
120.0	5.2870	16.7505	162.4565	17.5424
121.0	5.1620	16.9652	163.0063	17.6951
122.0	5.0386	17.1595	163.5963	17.8417
123.0	4.9217	17.2897	164.1096	17.9756
124.0	4.8067	17.4542	164.6031	18.104
125.0	4.7030	17.5924	165.0395	18.2104
126.0	4.6043	17.7237	165.4375	18.3112
127.0	4.5094	17.8483	165.8239	18.4089
128.0	4.4134	17.9641	166.1969	18.4983
129.0	4.3201	18.0655	166.5212	18.5772

Cams Make-Pro: construction data chart

CAD software, cutting machines and others simulation software compatibility

All the charts, therefore that of the construction data, can be exported also in:

- ☞ **Excel file** and:
- ☞ **Text file**

In this way is possible to communicate **with database and CAD software**.

Soft-Engine Cams profile device systems – software “Cams Make-Pro”

The cam profile can be saved also in:

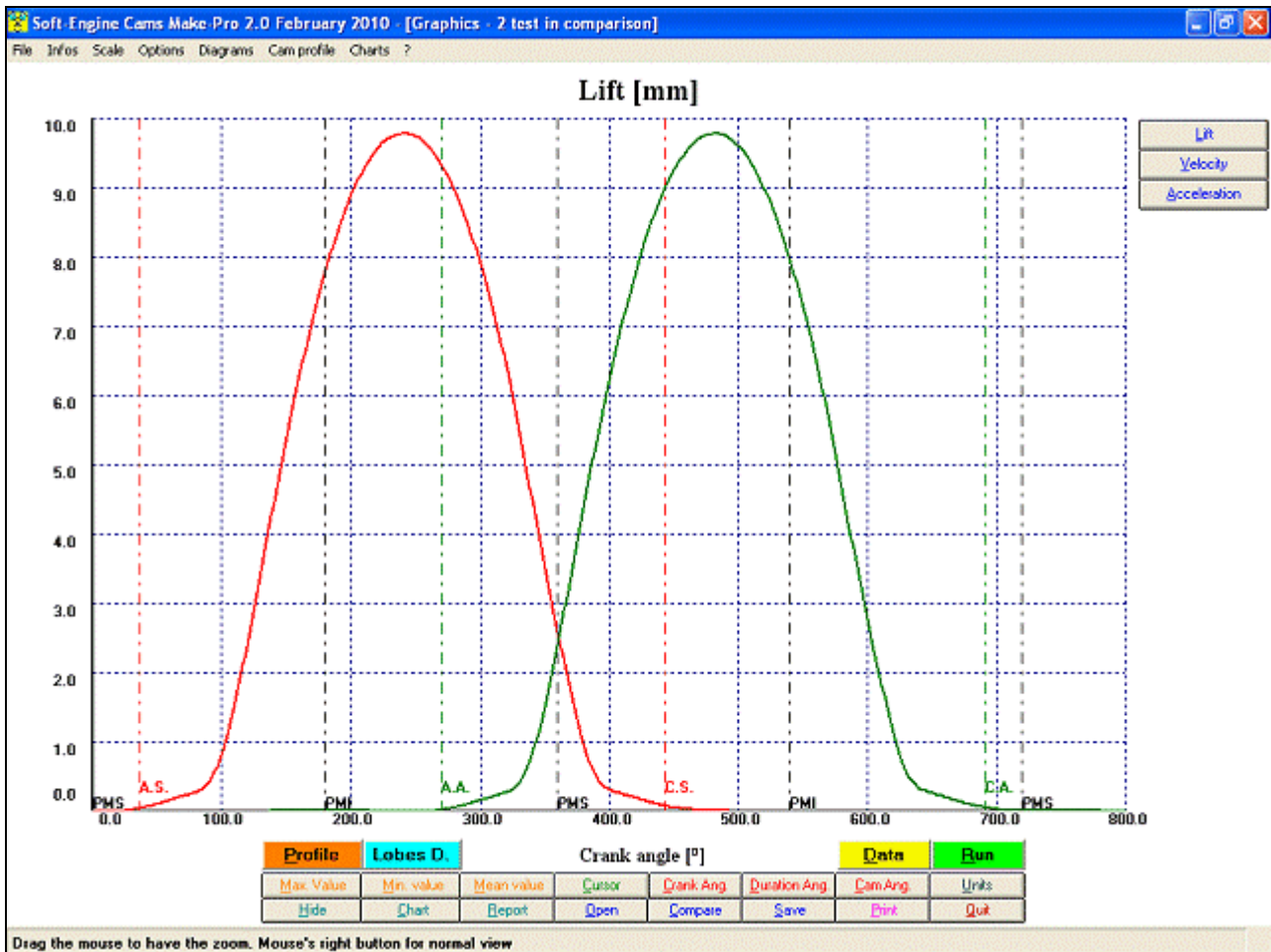
- ☞ **DXF file** and:
- ☞ **ISO file.**

There are other file format, to communicate with others Soft-Engine software:

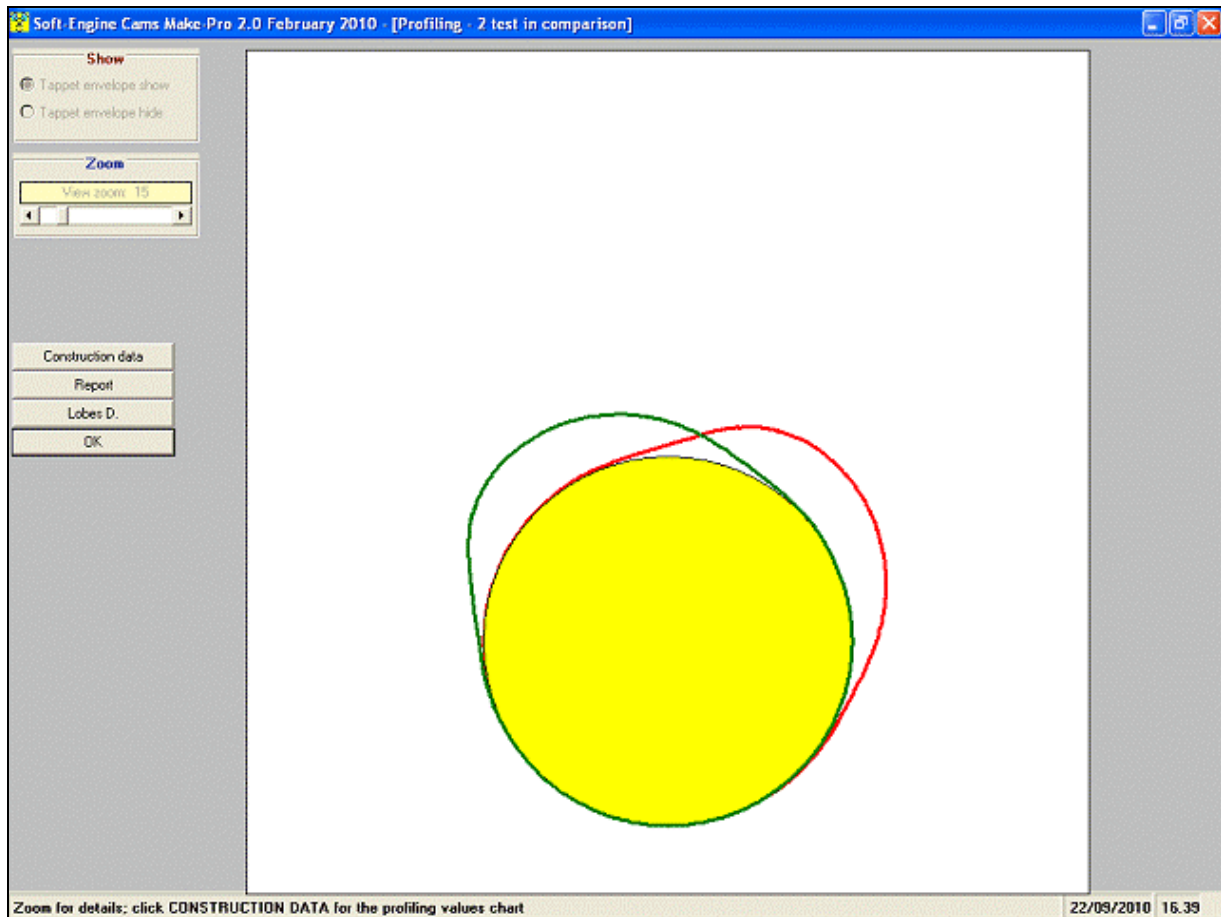
- ☞ **CAOS file format:** to calculate then other quantities of interest for the cam, example the different balance effects, the Hertzian pressure, the inertia and spring forces and many others.
- ☞ **4TBASE file format:** the cam lift can be open by 4TBase, the Soft-Engine 4-stroke engine simulator, so that the existing cam can be stored and remade, but also simulated into an engine!

Lobecenter line management

Use this function when to get further the lobes of the intake and exhaust lift curve from **TDC** point, fixing the phases of intake and exhaust. This function also calculates the value of the lift at TDC and the total cross angle. To activate this function is enough click on "Lobe centers" and to give the values of the angles vs. the TDC.



Lobe-centers line management effect in the diagrams



Lobe-centers line management effect in the cams profiles

Software versions

VERSION 2.0

- ☞ Intake and exhaust cam **lift acquisition**;
- ☞ **Cam profile** computing and **construction data**;
- ☞ Optional speed and acceleration computings;
- ☞ Data export in **DXF, Excel, Doc, Txt** and **Html** format.

VERSION 2.0 PLUS

The same of 2.0 version, but including **ISO** file format data export and communication with Soft-Engine “**4Tbase**” software (4 stroke engine simulation software).

VERSION 3.0

This is the extended version, it is the same of 2.0 plus version but including:

- ☞ **Twin lobes acquisition**: intake and exhaust lift contemporary measurement with related difference of phase;
- ☞ Intake and exhaust profiles **multiple acquisition**;
- ☞ Cam lift **real-time reading**.

Soft-Engine Cams profile device systems – software “Cams Make-Pro”

PC mininum configuration

Feature	Description
Processor:	Any personal computer IBM compatible.
System:	Windows ME, NT, Xp, Vista, Seven, Eight, Ten. 32 or 64 bit systems.
Memory RAM and Hard Disk:	At least 1 GB RAM and 2 GB free in the hard disk (for best Windows performances).
CDrom or Dvdrom device:	Speed at least 52X.
Graphic card:	VGA, SVGA and compatible cards, set at least 32 bit, Min. resolution: 1024x768.
Miscellaneous:	Keyboard, mouse, at least 2 USB ports free (to connect the data store electronic unit and the printer).
Printer:	Any ink-jet printer. Total compatibility with laser printers.
We suggest:	1) To remove the internet connection and the antivirus systems; 2) To remove the Blue-tooth connection; 3) To add an UPS to PC and data store electronic unit; 4) To make periodically the saved tests backup.
Total compatibility with notebooks and cases minitower PC.	