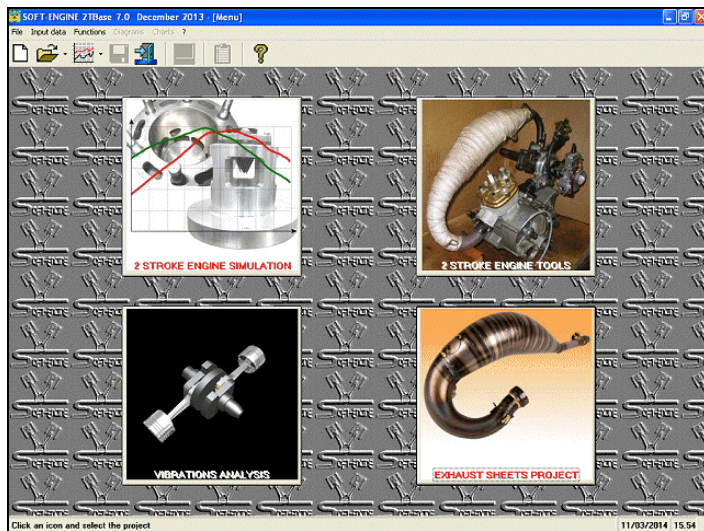


Soft-Engine - Software 2TBase Seven

Main features

2TBASE is a **simulation software** by **Soft-Engine** for **2-stroke engines** with spark plug ignition up to 500 cc (30 in³) and 20,000 r.p.m. Enter data relevant to engine, **cylinder** geometric layout, intake and exhaust layout, **combustion**, and, above all, the **ports configuration** (geometrical ports or any-shape ports). Moreover, **interest factors like the port parameters** are computed even if the simulation is not run.



The main window

Data input is easy and intuitive. Results are in terms of **torque** and **horsepower** in the range of revolutions per minute previously set. The engine model can be customised and geometrical data, such as **intake** and **exhaust** pipes length can be modified. Moreover power and torque curves can be superposed and displayed, so that you can observe them as if you were in front of a power test bench. This software can compare up to 6 power and torque curves simultaneously. Intake by piston port and by rotary valve systems is also included in the program. Muffler cones to be entered are max. 8 (divergent) and max. 4 (convergent).

Cylinder and ports parameters (e.g.: time-area, specific time-area, angle area etc...) can be calculated too. Charts and graphics can be printed. The software computed also the **reed valve** intake system; during the simulation it's possible to observe the pressures or the reed valve movement at full screen.

The software is totally re-styled in the graphic aspect and several function are added. Software is compatible with Windows (Xp, Vista, Seven, Eight).

Data input

A main window is used to select the engine simulation, or to run other software about 2-stroke engine.

There are some dialog-windows to input the data, starting by the port areas configurations.

Port areas computing

The first thing to do is to input the port area data, because they are the most important for a good simulation. Firstly, it's possible to enable / disable the port by clicking the corresponding shape in the port areas configuration window, adding secondary transfert port, boost, bridges etc... Later, it's possible to input the timing (the ports phases and durations), and finally each port can be directly planned giving its own shape. This shape can be a regular figure (rectangle, circle, ellipse, trapetium) or not. In this second case, it's possible to design any kind of shape by placing control point in a milimetric background, or by modifying an elliptical figure.

Timing diagram

T.D.C. = 0°

B.D.C. = 180°

EXHAUST

	Init. Op.	Max. Op.
Main ports	90.0	180.0
Secondary ports	60.0	160.0

TRANSFER POINT

	Init. Op.	Max. Op.
Main ports	70.0	170.0
2" port	70.0	170.0
1" port	70.0	170.0
Boost out		

INTAKE

	Init. Op.	Max. Op.
Main ports	80.0	180.0
Boost out	70.0	

Opening Closing

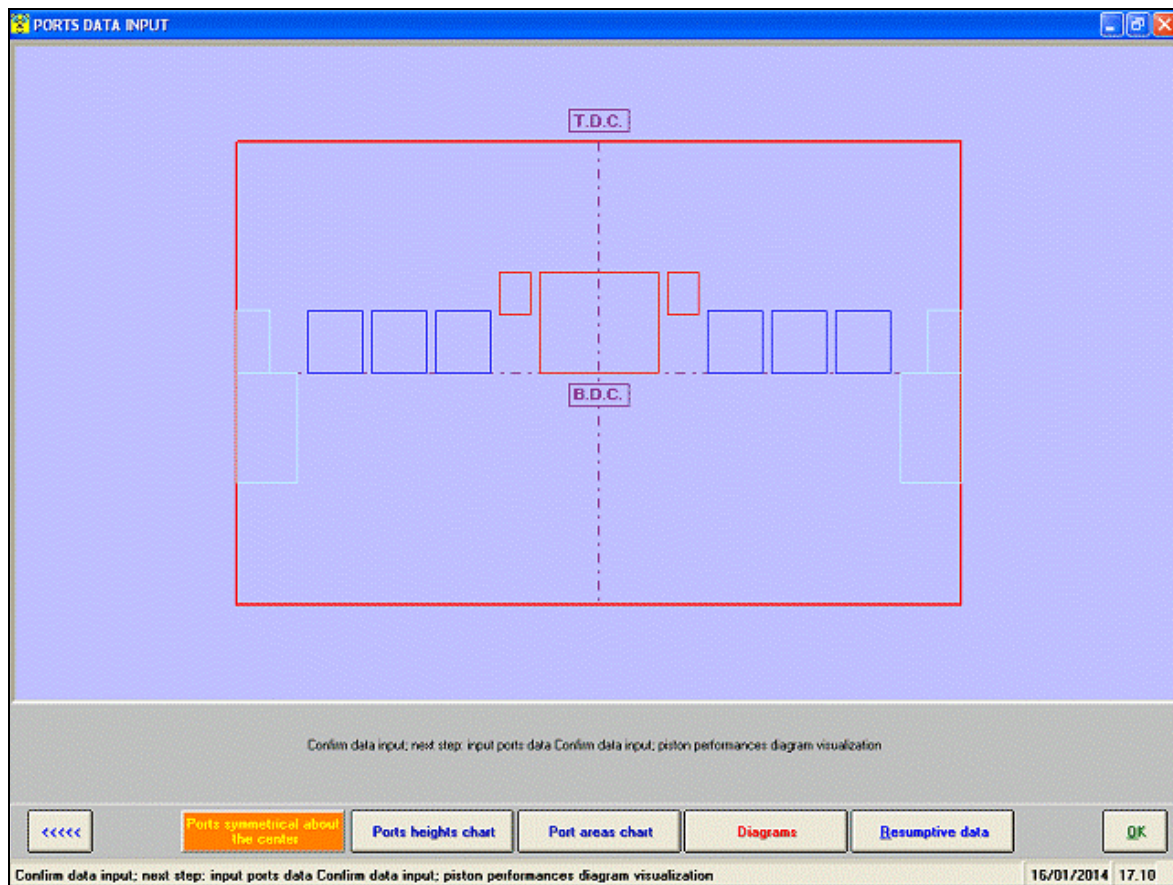
Observe Close

Confirm data input: back to previous window

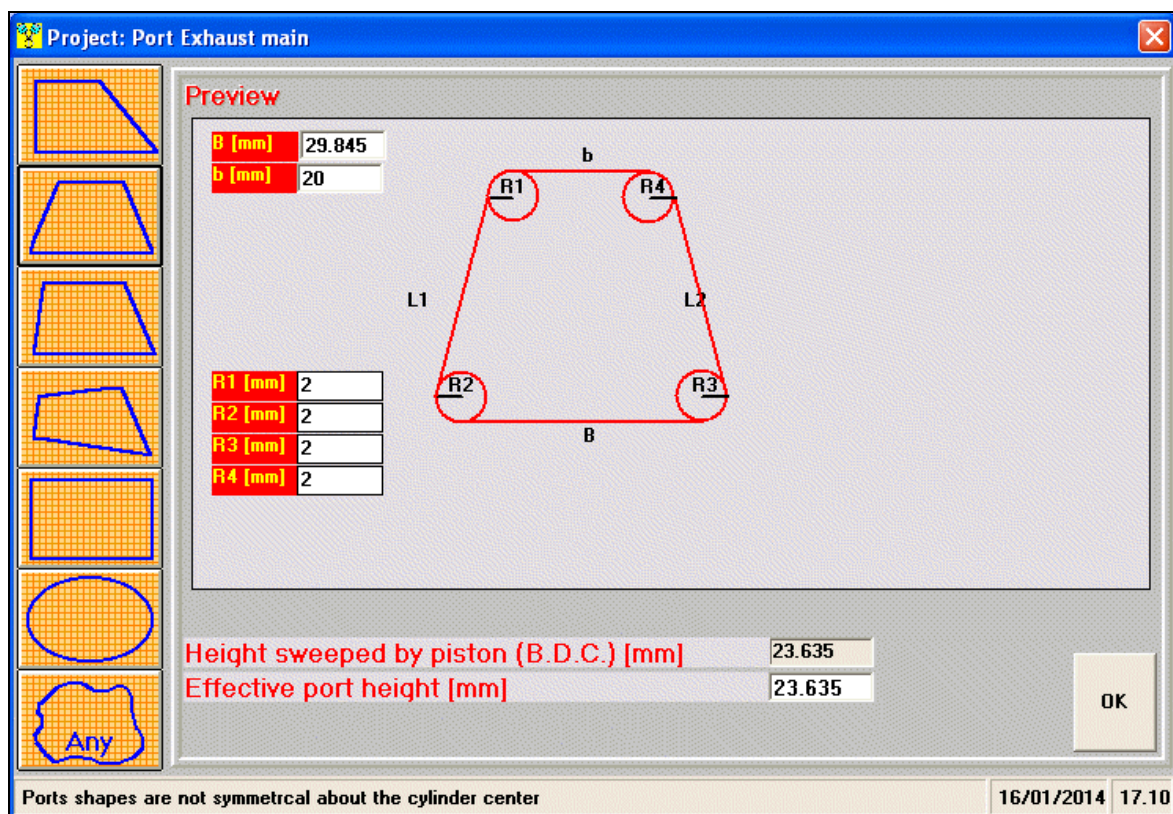
15/01/2014 17:09

The timing

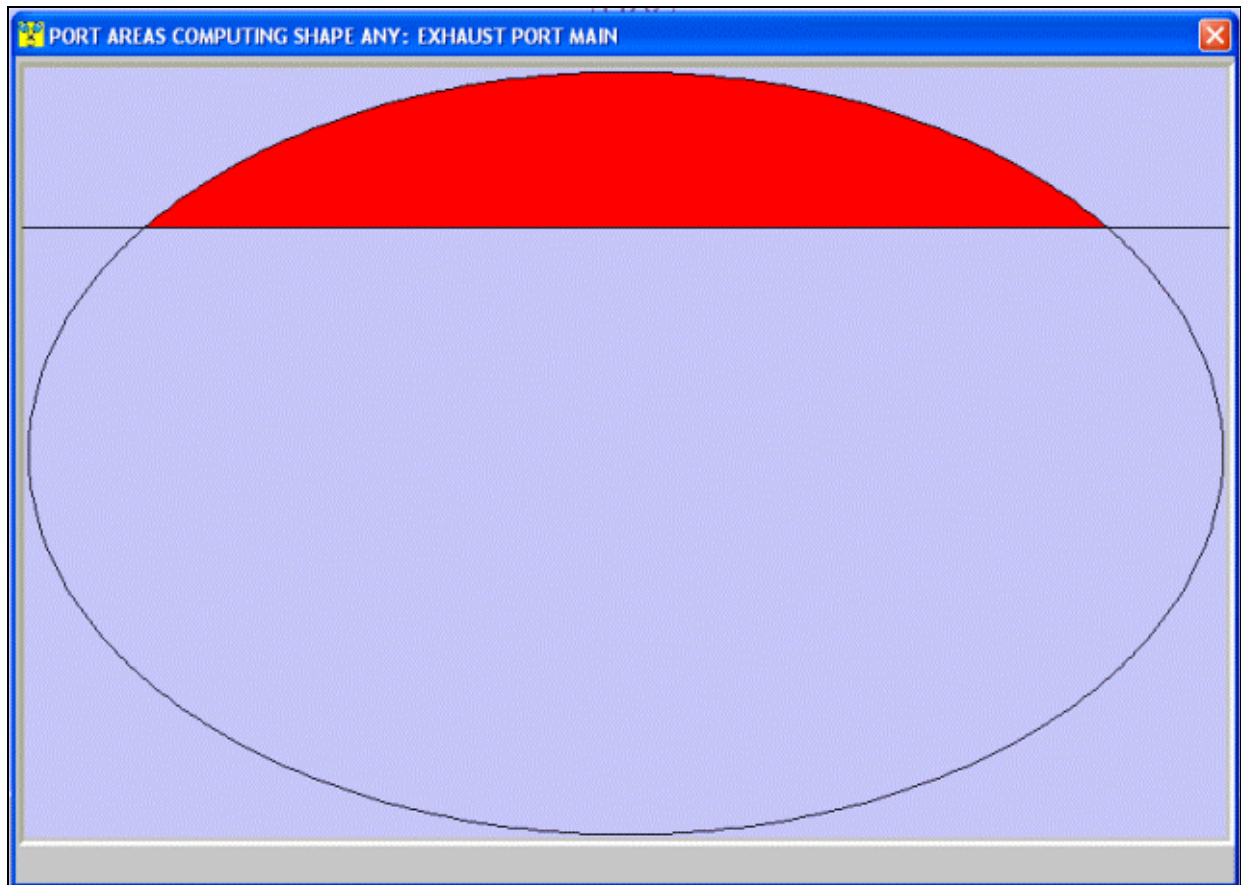
Soft-Engine engine simulation software – software “2Tbase Seven”



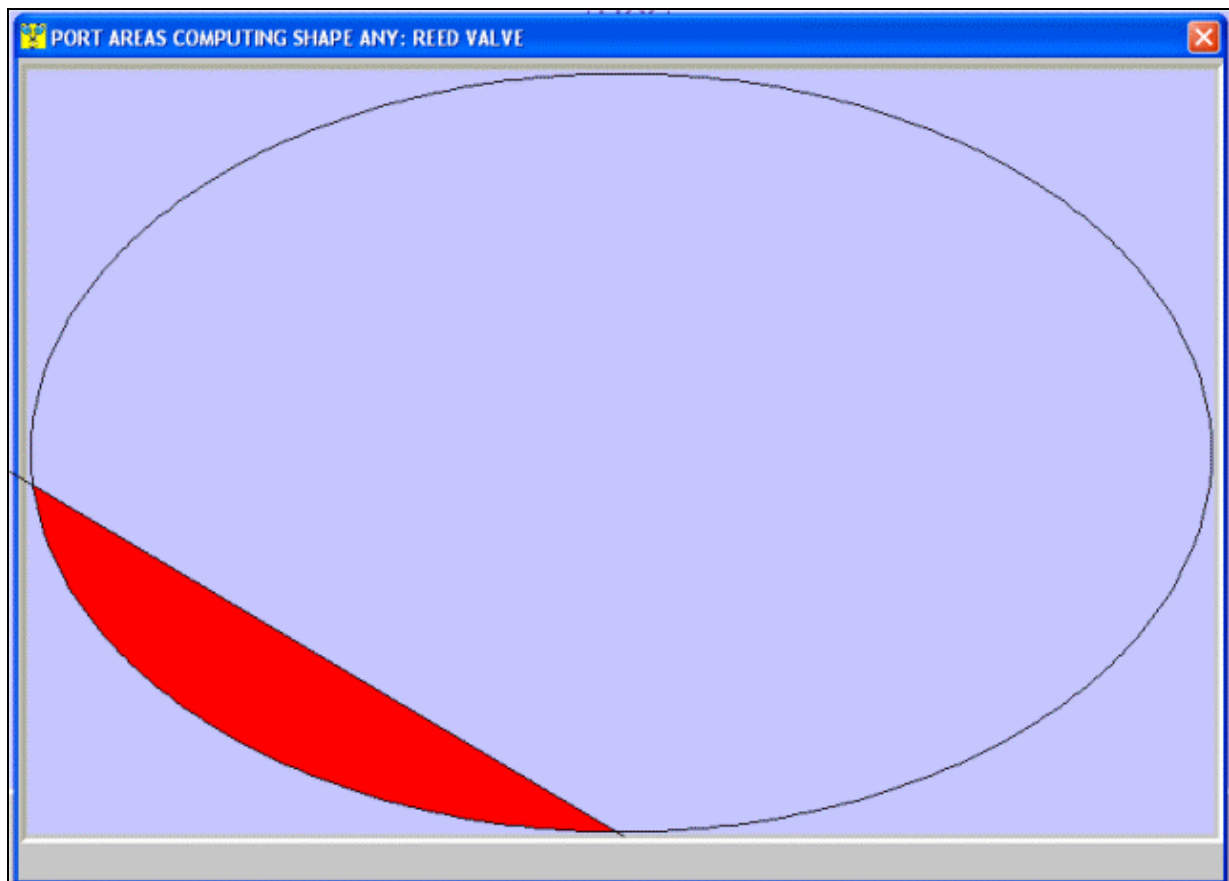
Port areas main configurations



Geometric shape ports planning



Area computing for any shape port (in this example, the exhaust port)



Area computing for the reed valve

Reed valve computing

If there is the reed valve it's possible to input all data about reeds, petals and port stop, so the "reed valve" model can be imposed to simulation:

Reed valve data input

Intake and combustion computing

Input these data to simulate the combustion during the engine simulation:

Intake data input

COMBUSTION DATA

Effective compression ratio (exhaust closing): 8.45
 Ignition advance [B.T.D.C.] [°]: 10.0
 Air-fuel ratio: 13.0
 Combustion efficiency [%]: 0.85
 Fuel inferior calorty power [KJ/Kg]: 44000.0

Diagram: Two cross-sectional views of a cylinder. The left view shows the cylinder with labels 'CCV' (Crankcase Vent Valve) and 'ECV' (Exhaust Valve). The right view shows the cylinder with labels 'ECV+CCV' and 'RDCE = (ECV+CCV)/CCV'. The text 'Effective compression ratio (exhaust closing)' is written in red above the right diagram.

Air/Fuel Gauge: A circular gauge with a needle pointing to 'OPTIMAL'. The scale ranges from 'LEAN' to 'RICH'. Below the gauge, it says 'Air-fuel ratio stoichiometric: 14.7'.

Navigation buttons: <<<<, Close, >>>>

Input data, OK to confirm...

12/03/2014 15.22

Combustion data input

Exhaust system configuration

The exhaust system configuration is most important to get a good result, so it's possible to input all muffler parts. It's possible to input up to 8 divergent and 4 convergent cones. For each part it's necessary to input diameters and lengths.

EXHAUST DATA

Length exhaust pipe into cylinder [mm]: 50.0

Length initial part [mm]: 150.0
 Initial diameter initial part [mm]: 38.0
 Final diameter initial part [mm]: 38.0

Length central part [mm]: 150.0

Length final part [mm]: 200.0
 Final diameter final part [mm]: 10

Exhaust system total length [mm]: 1094.0

Do the exhaust port have a variable phase?
☒ Yes ☐ No

Minimum phase RPM [RPM]: 5000.0
 Minimum phase angle B.D.C. [°]: 180.0
 Maximum phase RPM [RPM]: 10000.0
 Exhaust port pipe / Cylinder plane angle [°]: 15.0

Divergent part [mm]

Final D.:	54.0	108.0
Length:	200.0	200.0

Partition number of divergent part: 2.0

convergent part [mm]

Final D.:	22.0	18	10
Length:	150.0	100	120

Partition number of convergent part: 3.0

Image: A photograph of a curved exhaust pipe with a muffler.

EXHAUST SHEETS PROJECT

Navigation buttons: <<<<, Close, >>>>

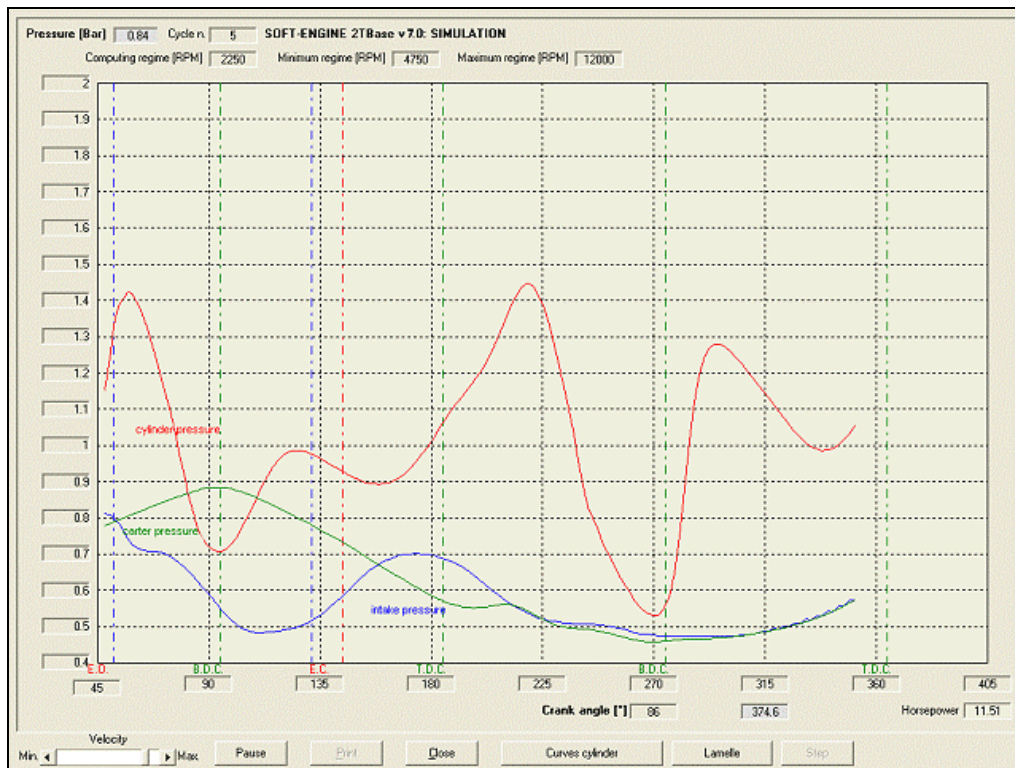
LIMITS [15.0; 2000.0] mm

11/03/2014 16.54

Exhaust data input

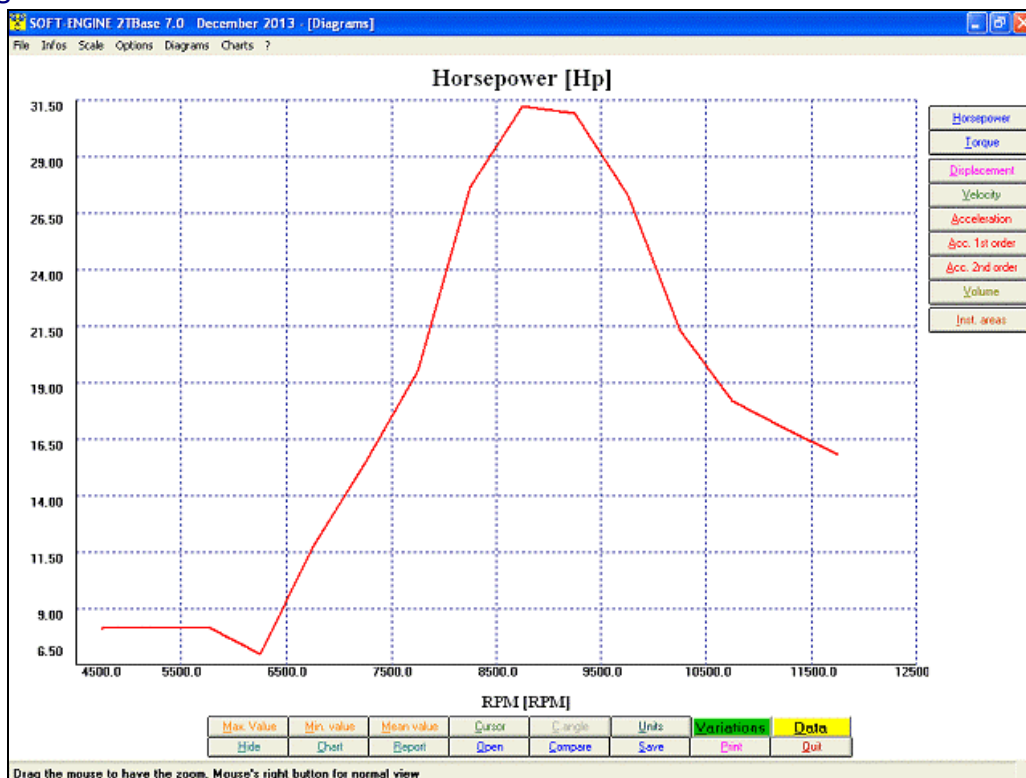
Simulation

After all data introduction, the software is ready to simulate the engine! During the simulation you can see the pressure curves in the cylinder.



The simulation

Results



Horsepower diagram, the result of the simulation procedure

2TBASE gives several results, shown by printable diagrams and charts. There is also a special chart, "**Resumptive data**" showing the main parameters values.
The main quantities computed by the software are:

ENGINE DIAGRAMS:

- 🔧 **Horsepower**;
- 🔧 **Torque**;

CRANKSHAFT - KINEMATICS:

Diagrams and charts of:

- 🔧 Piston **Displacement, Velocity, Acceleration** (1st order and 2nd order components);
- 🔧 **Volume** swept by piston (its peak value is the cylinder cubic capacity);

PORT AREAS:

- 🔧 **Port areas** (diagrams and chart);
- 🔧 **Port heights** (charts);
- 🔧 **Max. Area, Average Area, Angle-Area, Specific Angle-area, Time-area, Specific Time-area** (numeric values in the "Resumptive charts");
- 🔧 **Blowdown range** (numeric values in the "Resumptive charts").

Diagrams, charts and other features

For each ENGINE, CRANKSHAFT and AREAS FACTORS computed quantity (the most important) the following options are available:

- 🔧 **Max., min. and mean** value; **cursor** to read all curve points;
- 🔧 **Zoom**, graph scale management;
- 🔧 Sizeable graphics window with **complete colors management**;
- 🔧 **Comparison** of different "2TBASE" projects (max 6 projects);
- 🔧 File section: it is possible to create directories to classify projects in a single session;
- 🔧 Long filename management;
- 🔧 Different projects **compared charts**;
- 🔧 **Printing page setup**, with remarks, logo and graphics management;
- 🔧 Chart of all quantities.

Versions

Version
2TBase Seven

Soft-Engine engine simulation software – software “2Tbase Seven”

PC minumum 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 512 MB 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 1 USB port free (to connect the printer).
Printer:	Any ink-jet printer. Total compatibility with laser printers.
Total compatibility with notebooks and cases minitower PC.	