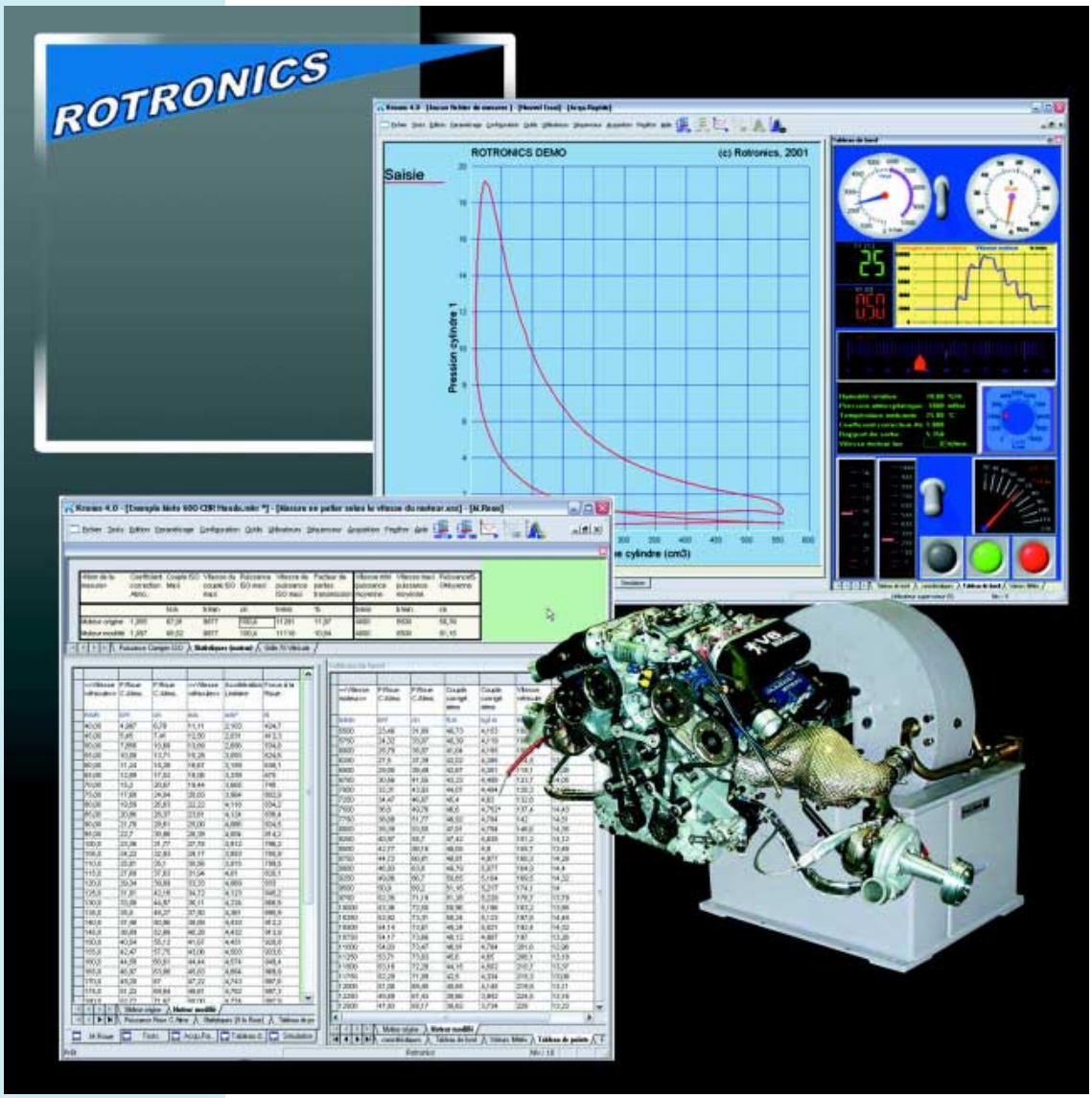
KRONOS V4

Engine Test Bed Software



KRONOS : A multitude of applications.

Rotronics has designed test benches related to the internal combustion engine for more than 10 years in the field of industry, competition or technical teaching. Experience gained during these years enabled Rotronics to develop software for test bench management which is perfectly adapted to the needs of our customers. This entirely configurable version of Kronos makes it possible to manage any type of bench : engine test bed, roller test bed, on-board chassis dyno, braked test bed, inertial test bed and dynamic machines.

KRONOS 4 : An advanced and open acquisition system

An open system due to the driver concept :

The core of data acquisition is designed around the concept of the acquisition driver, making it possible to guarantee the independence of the software compared to the material. These drivers allow the software to be interfaced with an substantial quantity of existing acquisition systems. The diversity of the drivers makes it possible to interface with the majority of the equipment which one finds in this sphere of activity. One can quote, amongst other things, the following drivers :

- **Modbus Drivers, serial and TCP/IP** : a big standard of the industrial automatism.
- **Low level CAN Driver** : indispensable in the automotive industry.
- **OPC Driver** : OPC : OLE for Process Control : an international standard which permits interfacing with all the acquisition systems compatible with this standard, and with all the well known brand systems.
- **AK Driver** : A German origin protocol present in a great number of materials dedicated to test benches : Exhaust analysis, balances consumption, smokemeter…
- **OBD II Driver** : A standard allowing interfaces with the management box of recent vehicles.
- **ASAM/ASAP3 Driver** : A standard allowing interfaces with calibration software compatible with this standard, and to maintain the different engine settings.
- **Profibus DP Driver** : Another great standard of the industry.
- **CanOpen and DeviceNet Drivers** : Two software protocols often used in the industry, based on a CAN Connection.

From 1 Hz to more than 1 MHz

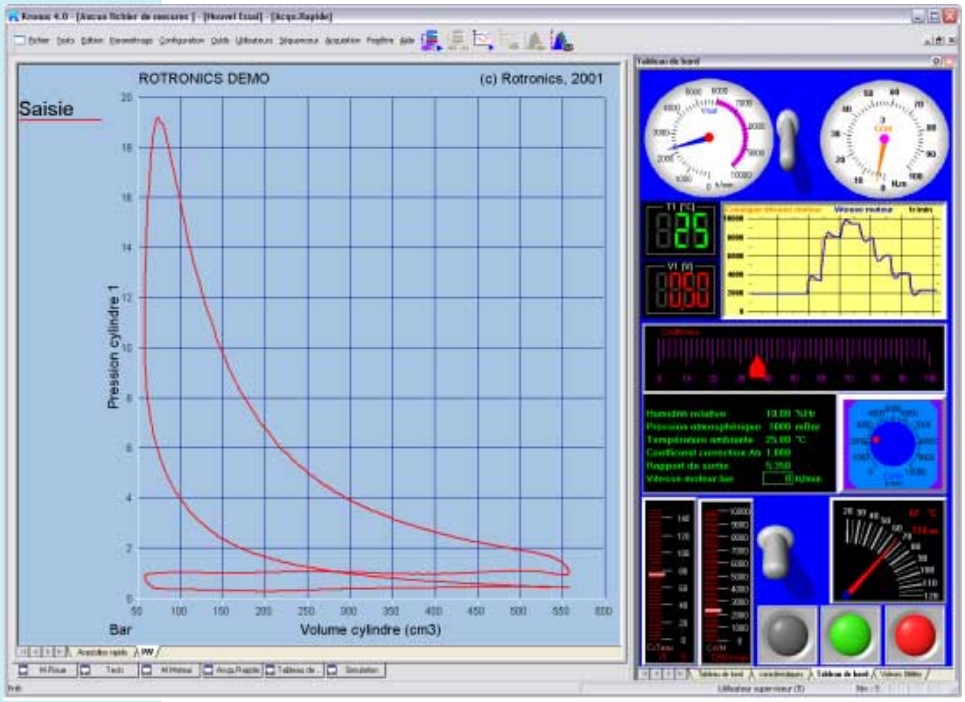
Data acquisition is managed by several modules with distinct functions :

- The stationary acquisition module allows perfect management of the measurement made at static or constant speeds.
- The transient acquisition module allows transient measurements, for example during acceleration or deceleration.
- The different monitoring acquisistion modules allow measurements to be saved when making a post-mortem or to make statistics in an endurance test.
- The fast acquisition module allows acquisitions at very high frequency, for example carrying out a combustion analysis by drawing Pressure / Volume diagrams.

A real time graphic display of the data

Several graphic instruments are available to display the data in real time;

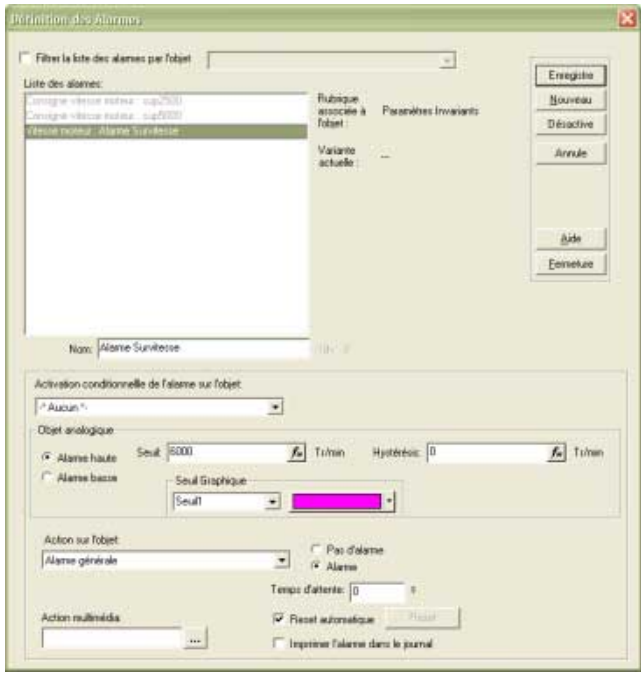
- Digital or alphanumeric displays,
- Linear or angular gauges,
- Running graph,
- Graphic button with two states,
- Data table



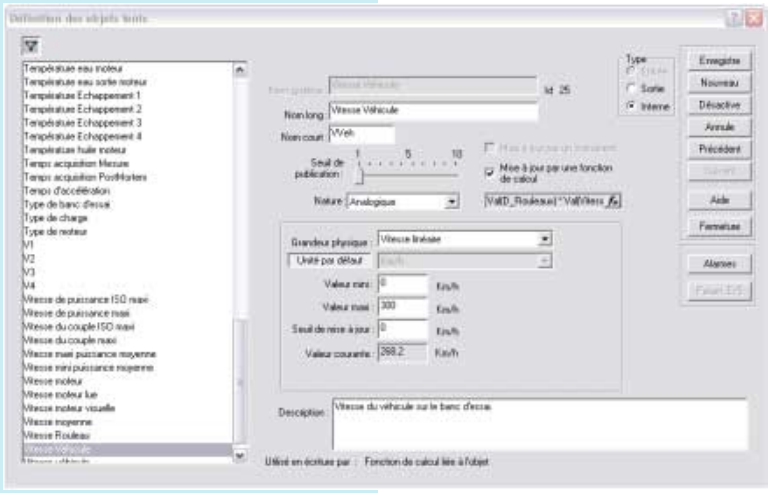
- These different instruments are entirely configurable (display size, color, font, style…) and allow the personalisation of the display of data following customer's needs and preferences.
- The flexibility of the display allows creation of as many dashboards as necessary, being only reliant on the graphics card of your PC.
- The instruments also make it possible to change variables with the mouse; also we can easily start an engine or change an instruction with the mouse.

Powerful alarm management.

Each variable gathered or calculated can be associated with an unlimited number of alarms, whose threshold can be fixed or variable according to other values. A history file allows the conditions of appearance and disappearance of each alarm to be investigated. Each alarm can also start any action available (stop a test, cut the contact…).



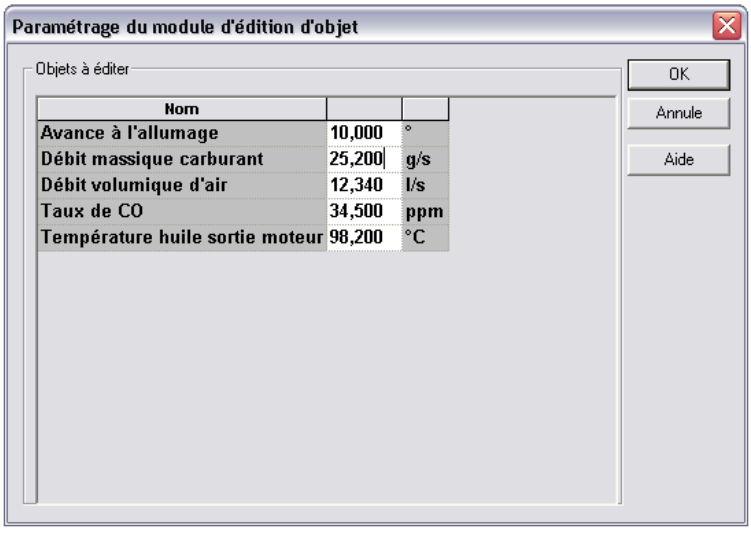
An unlimited number of variables.



Contrary to other software of the same type, Kronos makes it possible to manage an unlimited number of inputs / outputs. This number is only limited by the material installed. The number of calculated variables is also unlimited.

Manual acquisition during a measurement.

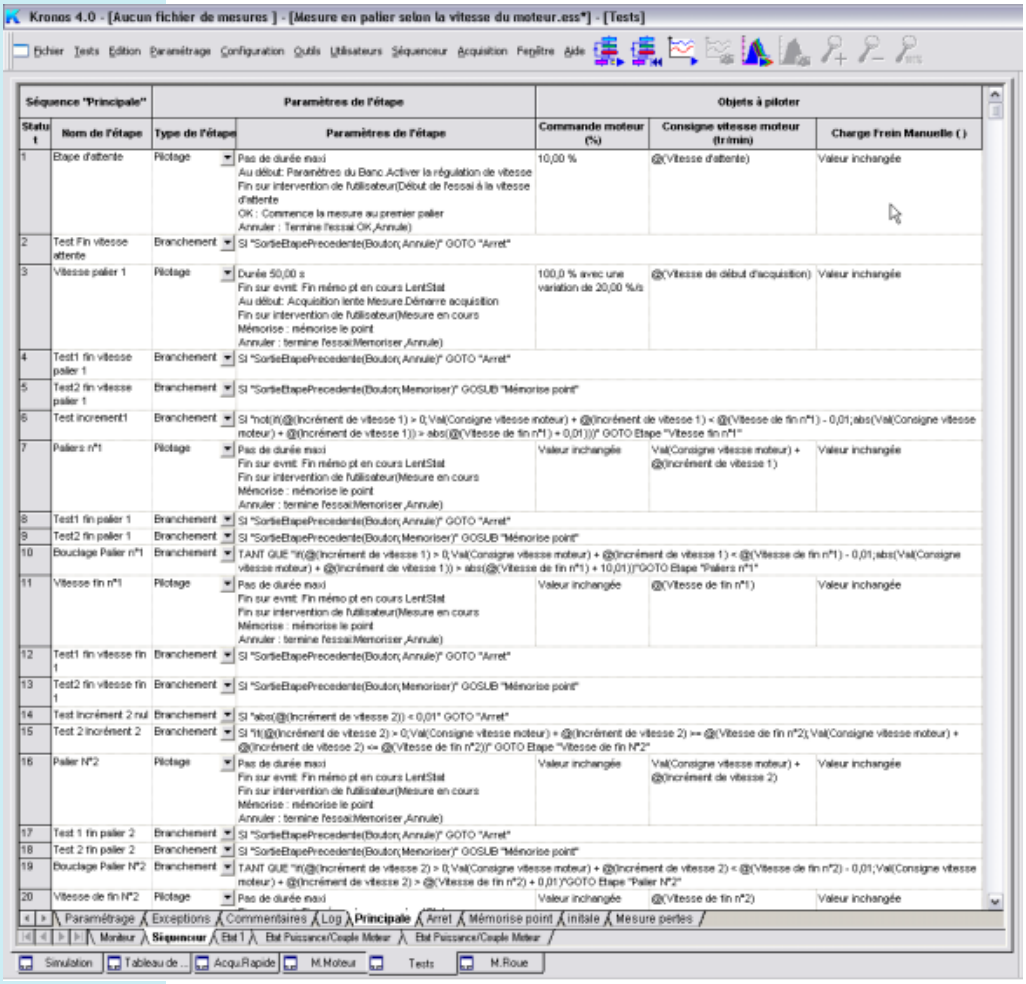
Even if some systems are not connected to Kronos, you can easily enter the measurement values with the keyboard.



KRONOS : An integrated and powerful driving module.

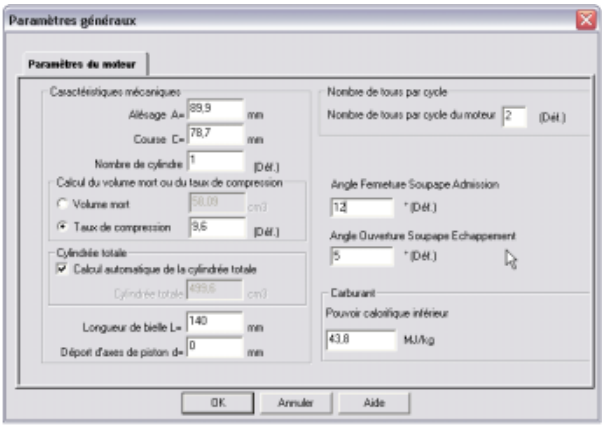
Kronos has a driving module : the sequencer. Completely integrated with the software, it allows the automation of the software. The goal is to entirely automate measurement procedures or to realise endurance tests without any human intervention.
The definition of these tests is entirely visual and does not require any knowledge in programming. It is the same environment for definition and execution of the tests.
The essential functions of the sequencer are :

- Driving all the instructions and orders during the test,
- Automation of the acquisition modules,
- Taking into account the alarms and others exceptions during the test.
- Interaction with the user during the test in order to define values or take decisions.

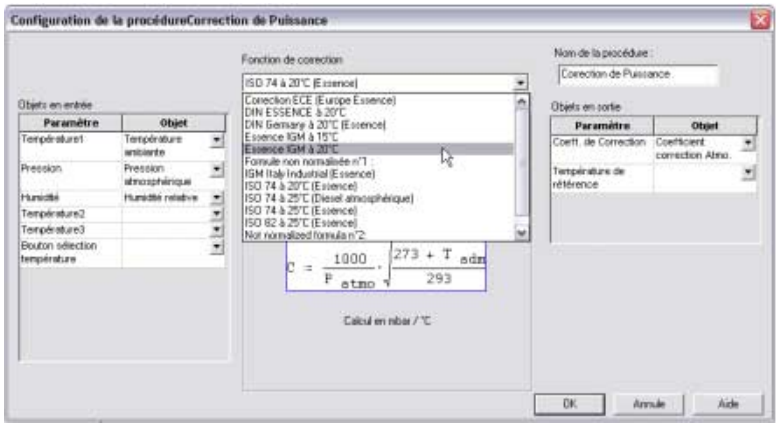


KRONOS : A library of functions related to the test bench.

Kronos is dedicated to test benches. It integrates a complete library of specific functions for test benches, which allows management of any requirement of a test bench. The principal functions are :
- A module with automatic calculation of specific variables linked to an engine : automatic calculation without configuration of the various power curves (rough and corrected) of the engine speeds, the engine torque, the specific consumption, the vehicle speed, the MEP (Mean Effective Pressure), linear acceleration, the wheel force,…



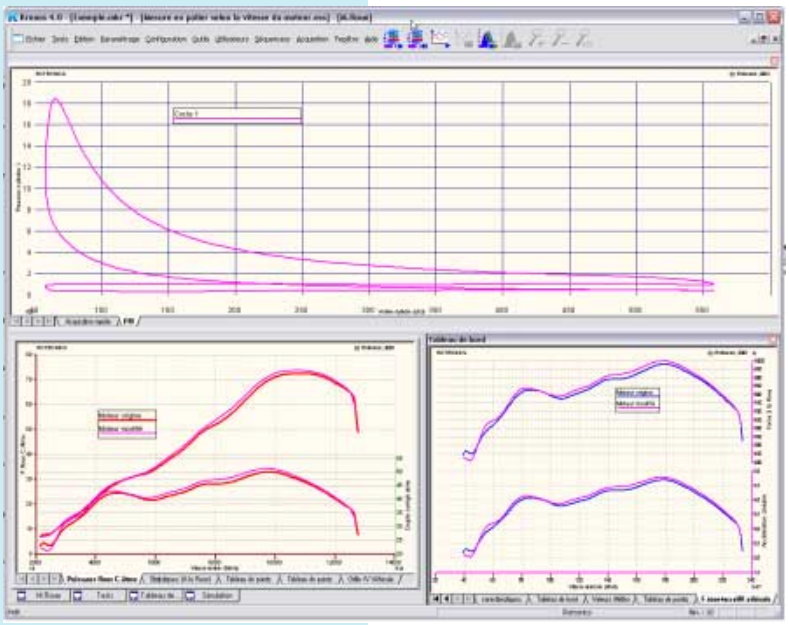
- A power correction module, automatically correcting the power and the torque based on the normalized correction formulas. (DIN, SAE…)
- A statistical module calculating automatically the power maximum, the torque maximum and the corresponding speeds.
- A module to manage the transmission ratios.
- 4 PID regulators availables to control regulation loops.
- Calculation module for the combustion analysis : calculation of the IMEP (Indicative Mean Effective Pressure), the FEP (Friction Effective Pressure), various works and efficiency, statistical values on the IMEP (standard deviation, average, min, max)

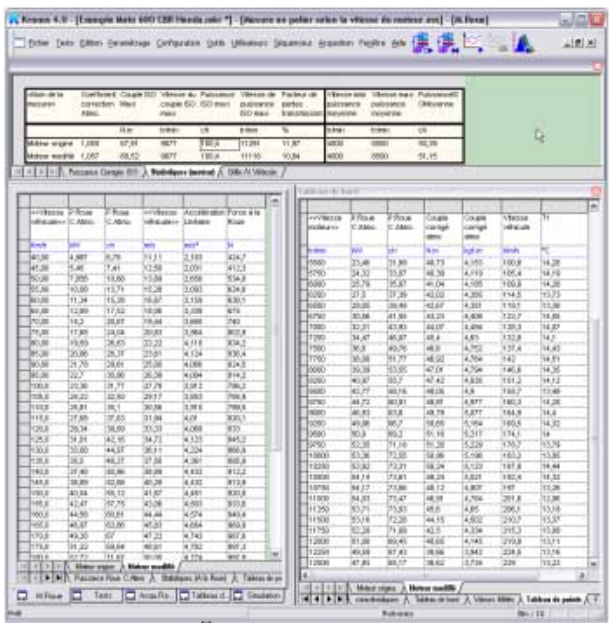


KRONOS : Infinite display possibilities for the data.

The data can be displayed in the form of graphs or numercial tables of values. The number of screens is unlimited, each one can be entirely set up according to the display needs.

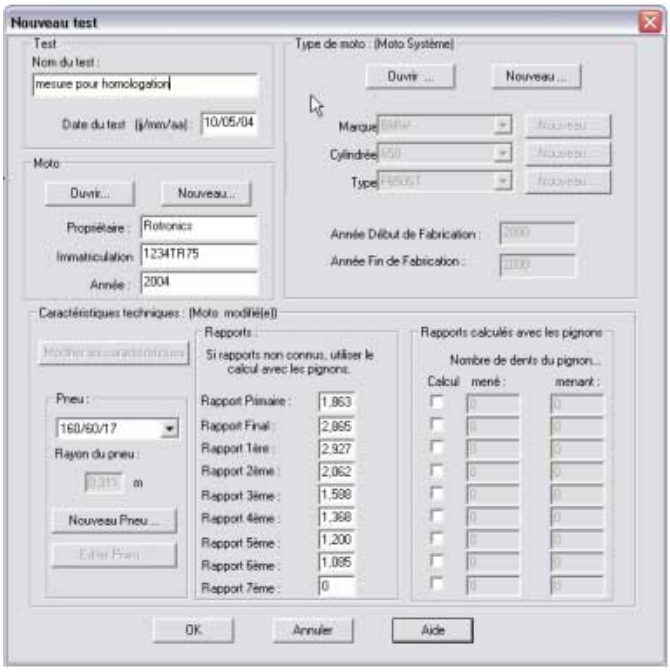
- Each graph can display up to 16 measurements on 3 different axes, being able to display from 1 to 8 variables. We can, for example, create a graph displaying on the left axis the engine power, on the right axis the torque, and on the other the 4 exhaust temperatures of the 4 cylinders.
- The tables of values have an unlimited number of columns, and can display any variables in any unit.



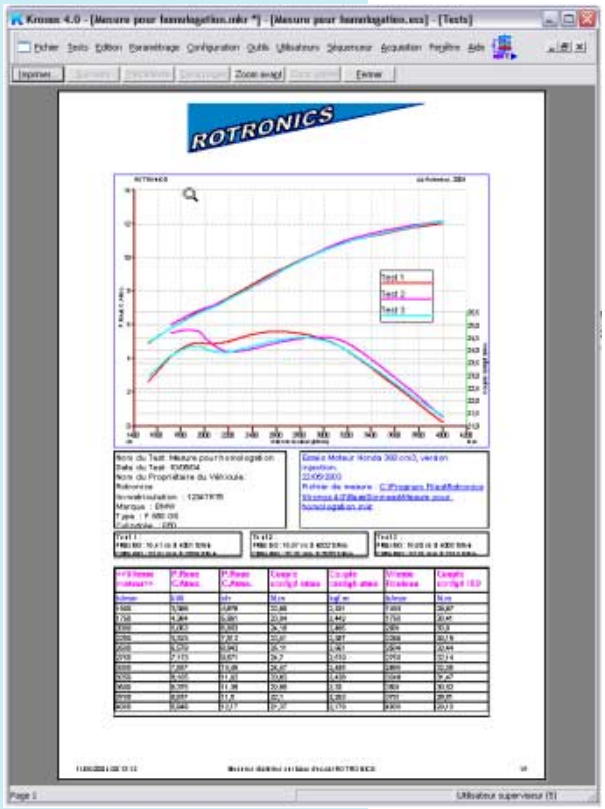


KRONOS : Database of results.

A data base is integrated with the software. It allows the storage of measurements and tests in a very structured form. This database allows association of each measurement with the vehicle owner name or the engine serial number, or according to the brand or the vehicle type.



KRONOS : Easily create test reports.



A powerful report generator is integrated with Kronos. It makes it possible to automate generation of complete test reports with an unlimited number of graphs, tables of comments on the tests, statistical values linked to measurements. The report generator also contains headers and footers that you can customise with, for example, the logo of your company.
All the results can be exported to other external systems to feed test reports in specific format. In this case, the user has the choice to make the export entirely automatic.

KRONOS : Start testing quickly and easily.

The sequencer allows automatic execution of the tests programmed by the user. However, to make tests as quickly as possible, Kronos is delivered with various standard tests, allowing tests for principal measurement procedures of an engine test bed without programming.

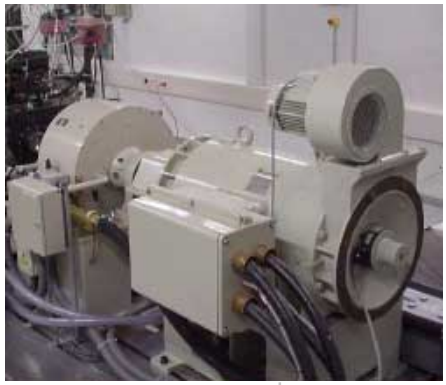
EXAMPLES OF APPLICATIONS :

ROLLER TES BED FOR CARS OR MOTORBIKES : PERFORMANCE, ENDURANCE, POLLUTION...

TRADITIONAL ENGINE TEST BEDS FOR TEACHING, COMPETITION AND INDUSTRY

EMISSIONS
2 STROKE
ENGINES

TEST BED FOR AGRICULURAL MACHINES



DYNAMIC MACHINES
AND TANDEMS

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