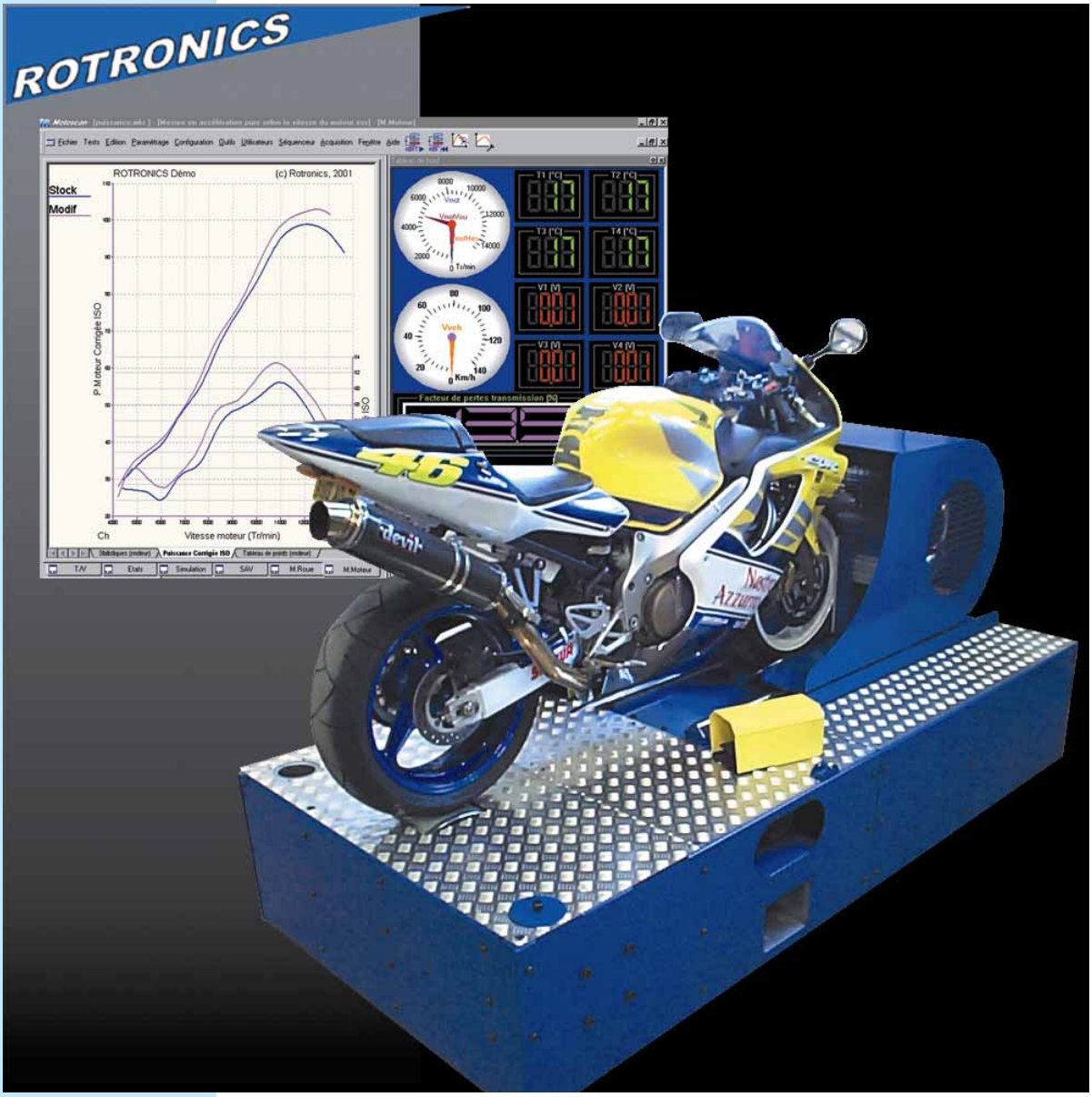
MOTOSCAN II

Motorcycle chassis dynamometer



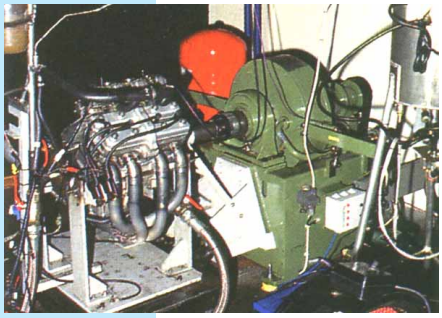
- Fi technology for inertial and braked versions
- Compatible with all 2 wheeled vehicles
- High accuracy digital data acquisition
- Optimised ergonomics
- Modern and user-friendly software interface
- Highly safe in use

INCORPORATE A DYNAMOMETER IN THE WORKPLACE

For nearly 15 years, Rotronics has designed and manufactured motorcycle dynamometers. Originally the data acquisition technology was developed for high end motorsports customers but has gradually been taken up by professional engineers so that today, a dynamometer is an impressive diagnosis tool in the service of the mechanic.
It considerably reduces road tests and proves commercially very effective, in particular for second hand vehicles. Reduced risks, less lost time, a credible and efficient workshop, an increased range of services and improved customer confidence : a dynamometer really stimulates your business.

ROTRONICS KNOW-HOW

Rotronics manufactures engine test beds and roller test beds for professionals, competition and technical teaching. Since its creation, the company has always used technical innovation to answer requirements of its customers and today offers powerful and new solutions in many fields.
Each new development has been tried and tested and incorporated into the Rotronics tesbench Motoscan // and this is why it is so different and effective.

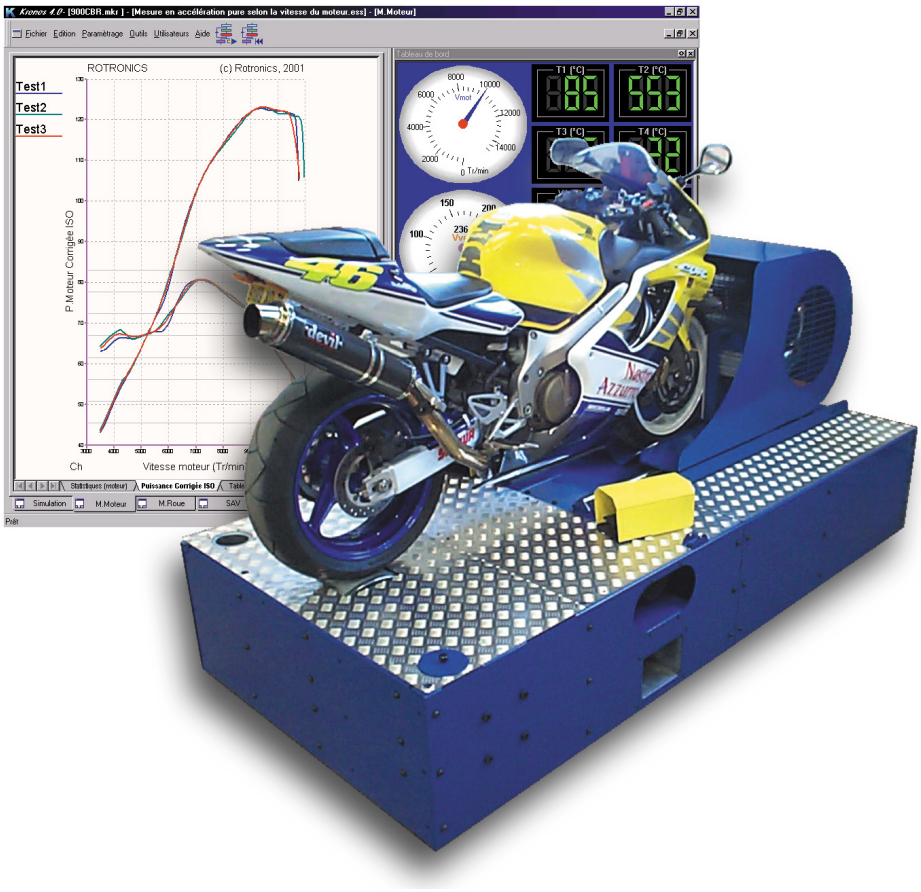


SKILLED TECHNICAL SUPPORT

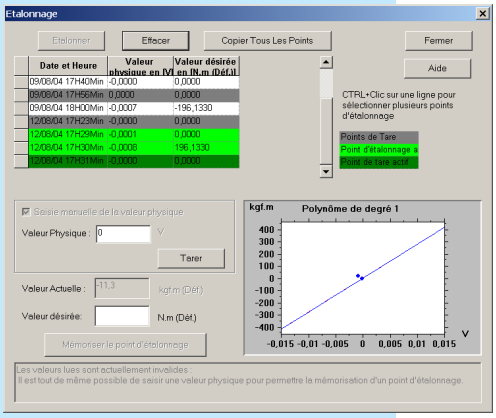
Experienced technicians are ready to listen to any questions about the test bench operation, and offer advice on particular measures or After Sales Service. The people you will talk to took part in the design and the production of Motoscan II, and they will be able to answer your questions.

LOW INERTIA LOADED MOTORCYCLE CHASSIS DYNO

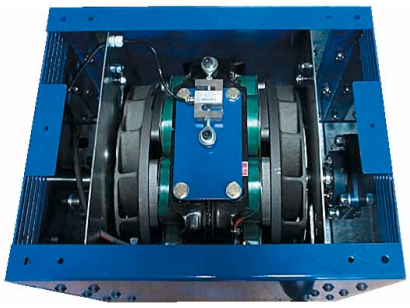
MOTOSCAN II Fi



Motoscan II Fi was conceived from the beginning as an application of loading using an electric brake. The brake is integrated into the bench and the roller is hollow in order to reduce the inertia of the revolving elements. This technology, associated with fast operating electronics, allows very precise and extremely reactive management of the load applied to the vehicle. The instruction changes in stabilised mode are net and precise and Motoscan II Fi has a particular aptitude to reach and quickly stabilise around selected engine speed mapping points.
However, it is in transient state (acceleration) that the Motoscan II Fi capacities really impress: thanks to the Fi technology, the load applied is controlled by a 'road law' without shift or time lag, which ensures an exact reproduction of real conditions. Motoscan II Fi is equipped with an automated front support which reinforces the ergonomics of the whole design.



The setting and calibration procedures are very easy and fast, thanks to a specific software procedure. It is thus very easy to preserve the precise measuring qualities of the instrument. The operation does not take more than 10 min, including installation time of the calibration accessories.

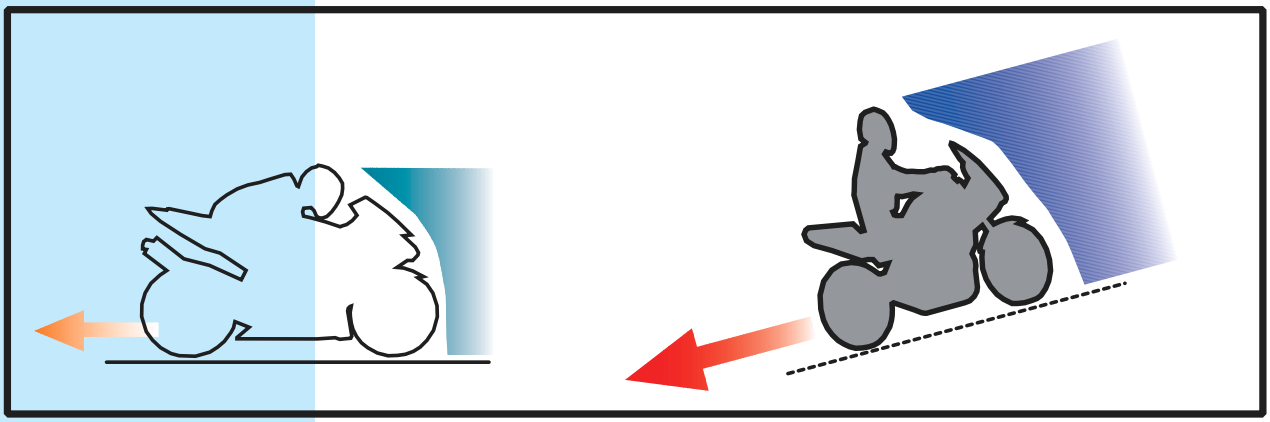


EASY AND REPRESENTATIVE TESTS...

Tests procedures for each need
To manually optimise mapping points, measure the performance of a vehicle in real conditions and draw the curves of characteristic values (power, torque, temperatures, air/fuel ratio…) or to make a rolling test, the Fi places at your disposal easy procedures adapted to your technical requirements.

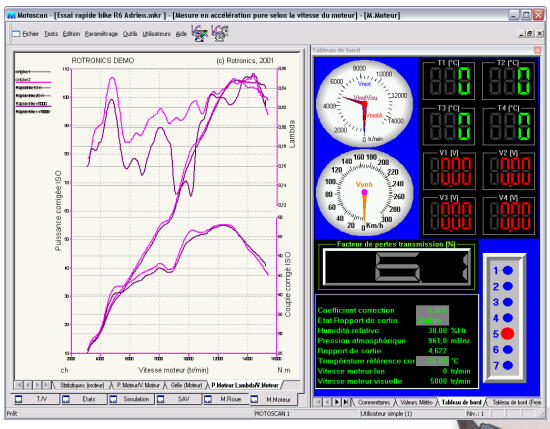
Why test an engine in transient state?
On road or track an engine runs in transient state almost permanently. It is thus of primary importance to reproduce this operating mode on the bench in order to work on representative engine behaviors. This is why Motoscan II Fi offers the test procedure in acceleration under load controlled by a road law.

Why apply a load under road law ?
A road vehicle under power tries to progress, but it also undergoes resistances. The principal ones are : the total weight of the vehicle, the resistance which the ground applies to the wheels, the aerodynamic force generated by the speed and the gradient of the ground. To sum up, a heavy and bulky vehicle will have more difficulty advancing on rough ground and on a hill than a light and compact vehicle moving on smooth and flat ground. To complicate the matter, these resistances are not constant ; they change according to the speed of the vehicle, in a nonlinear manner.
Motoscan II Fi uses a road law to control the load brake and thus to create engine resistance on the bench. This mathematical law takes into account the various parameters and their evolution according to the speed of the vehicle. That way, the tested engine undergoes the same resistance on the bench as on the track.

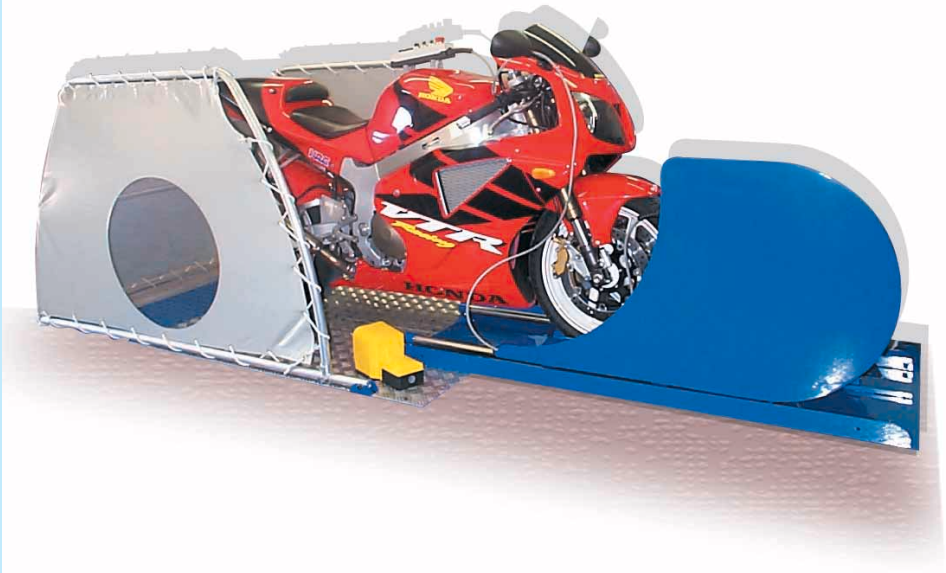


THE AIR/FUEL RATIO MEASUREMENT

To obtain perfect combustion is always a top priority in engine optimisation. One of the most reliable means of controlling the effectiveness of this combustion is to measure the air/fuel ratio with a wideband Lambda sensor. This type of sensor, associated with the Rotronics conditioning module delivers exact information. The user sees a real value of the air/fuel ratio, without ambiguity nor approximation. The responsiveness of the system makes it possible to ensure the measurement in transient stages and thus to superimpose the curve of richness to the curve of the torque.



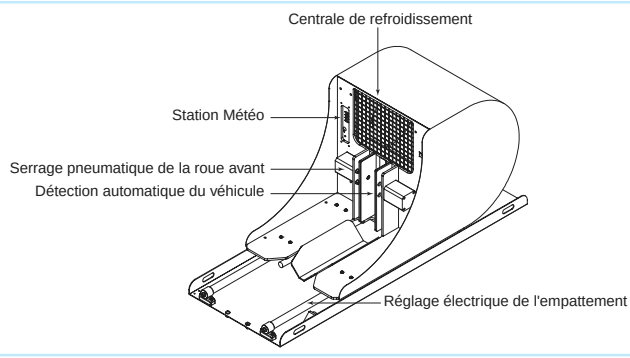
INERTIAL TEST BED WTH AUTOMATIC LOADING



MOTOSCAN *II* is an inertial test bed designed with the aim of optimising testing whilst requiring the least manipulation possible. The automated front wheel support plays a large role in this concept by ensuring : loading of the vehicle, its support, its positioning and cooling. Equally it allows the test procedures to be carried out in record time : tests are easier and shorter!

Loading the vehicle : the vehicle is brought forward in a V shaped track until automatically detected and clamped, securing it by the front wheel. Elapsed time: 5 seconds! ... without getting out of the saddle!
Using the RCU, the operator is able to control the electric jack that sets the wheelbase and precisely positions the vehicle's rear wheel over the test bed roller.

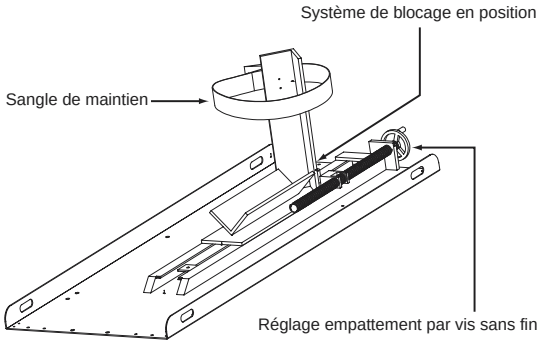
Integrated equipment : a blower with a capacity of 9000 m3/h ensures protection of the vehicle against overheating the engine, the exhaust system and the transmission. This also guarantees the repeatability of measurements by maintaining a stable vehicle temperature during testing.
The automated front wheel support also contains an environment monitor allowing, thanks to its location, precise measurement of the air entering the engine.



MOTOSCAN *II* Lite offers the same measurement and testing possibilities as **MOTOSCAN *II*** in a simpler package. The manual front wheel support that characterises this version ensures great efficiency for a modest budget.

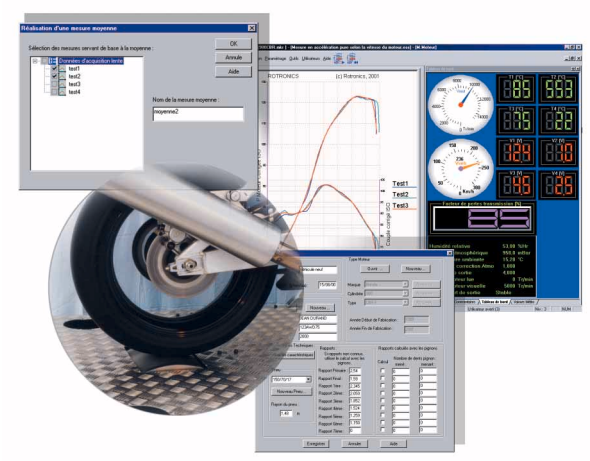
Loading the vehicle : the vehicle is held at the front wheel by two V shaped tracks, which secure it in an upright position. The wheel is clamped using a strong, safe, rachet tightened belt. The operator then adjusts the wheelbase using a screw mechanism. A locking system secures the vehicle's position in order to guarantee stability during testing.
Straps fixed to the rear of the vehicle finalise the loading operation and ensure its safety during testing. These also add to measurement accuracy by restraining the rear suspension of the vehicle.

An upgradeable version : MOTOSCAN *II* Lite is a simple and cost effective configuration, which can be upgraded in line with increases in business volume by the addition of accessories (cooling unit, environment monitor...) or of modules (automated wheel support, engine load brake...).



ACCURATE AND REPEATABLE MEASUREMENTS

Motoscan II uses precise sensors : 360 points of measurement to each turn of the roller for the speed sensor and 0,02% error for the loadcell sensor which measures the braking torque. Along with the data acquisition system and entirely digital control of the brakes, the unit constitutes an extremely accurate and stable piece of measuring equipment : less than 0,1% of error!
This technology ensures optimal measurement quality whatever the vehicle speed. The accuracy of the results is identical if you test a large-engined motorcycle or a moped.
Moreover, the acquisition card is of a multichannel synchronous type that makes it possible to simultaneously acquire the speed of the roller and the engine speed with the same accuracy. The evolution of the transmission ratio (or slip) can thus be visualised in a realistic way.

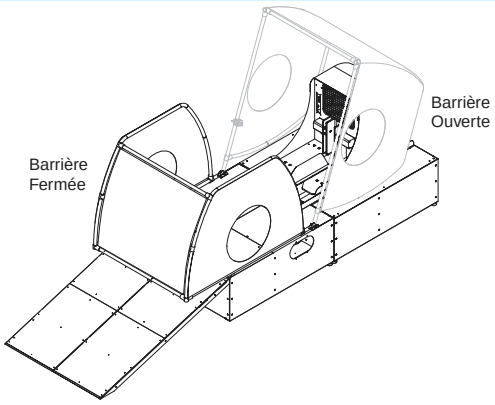


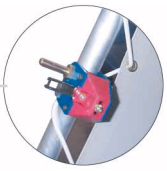
POWERFUL AND USER-FRIENDLY SOFTWARE

Increasing a workshop's productivity with new diagnostic and customer file management tools has been one of the major objectives in developing the new Motoscan II software.
The management of tests is straightforward thanks to a client database which permits the user to compare current test results with those obtained from the same machine during a previous service or even with results from another motorcycle.
The technical characteristics of each motorcycle are cataloged. A powerful search engine allows selection of the machine to be tested with just a few clicks of the mouse. Exclusive new analytical tools allow yet greater depth of analysis; engine, ignition, clutch, transmission, machine geometry are checked in a few minutes without the need to remove the motorcycle from the test bed.

EFFECTIVE OPERATOR PROTECTION

Light and easy to handle, a protective barrier screens the work zone and physically prevents access to moving parts. Its rounded form and construction materials provide optimum protection against flying objects (notably gravel particles) by deflecting their trajectories towards the ground and absorbing part of their kinetic energy.
An inspection port allows observation of the transmission components in total security. The barrier is governed by automated safety procedures. A mechanical lock prevents its removal during testing.
With the barrier raised there is free access to the vehicle allowing work on the machine without the necessity of removing it from the test bed.





TESTING UNDER CLOSE SURVEILLANCE

The test bed's safety systems (roller braking, barrier locking, vehicle support clamps, extraction of exhaust gas) are automatically controlled, in accordance with information from onboard sensors (vehicle presence, barrier in place, roller speed). The test bed will only operate if all security conditions are satisfied. In any event, the operator maintains overall control and can trigger an emergency stop at any time.

PRACTICAL AND SIMPLE OPERATION…

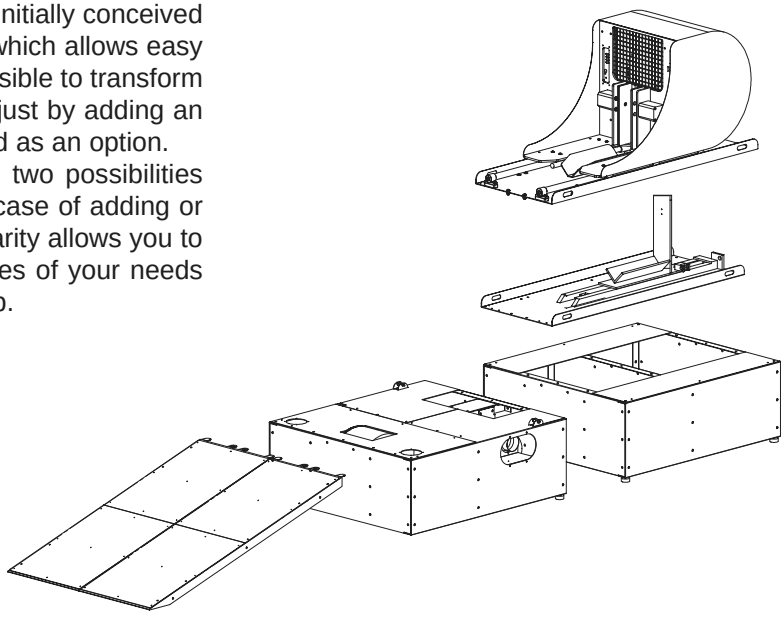
A remote control unit (RCU) allows the technician to carry out a test without dismounting from the motorcycle. Dialogue between the operator and the software is acheived with two communication buttons that allow answers to onscreen dialogue boxes.
The RCU also goups together those service controls such as exhaust extraction, cooling, adjustment (by electric motor) of the test platform, as well as the emergency stop button.
The remaining test bed controls (service brake, unlocking and starting the vehicle) are controlled by foot pedals in order to ensure total autonomy for the user.

EFFICIENT EXHAUST EXTRACTION

Conical collectors, designed so as not to scratch the silencer, allow the accomodation of different exhaust pipe diameters. The gases are drawn into the test bed base by large section flexible hoses (80 cm²) that are resistant to high temperatures.
This exhaust collection “at source” ensures effective recovery and transfer of noxious gases to an extractor (built-in or not) and an evacuation device.

FRAME OR GROUND EMBEDDED VERSION?

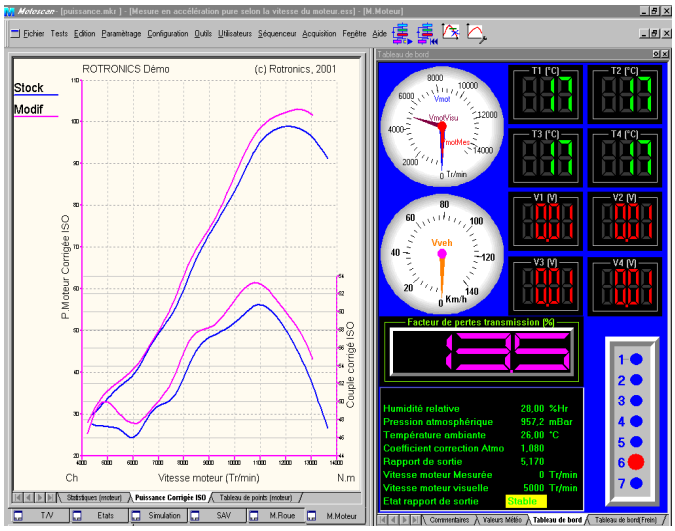
All the Motoscan II versions are initially conceived to be embedded in the ground, which allows easy and safe use . However, it is possible to transform Motoscan II to a frame version, just by adding an removable additional box, offered as an option.
You can choose between these two possibilities whenever you need, it is just a case of adding or removing the frame. This modularity allows you to adapt the test bed to the changes of your needs and constraints of your workshop.

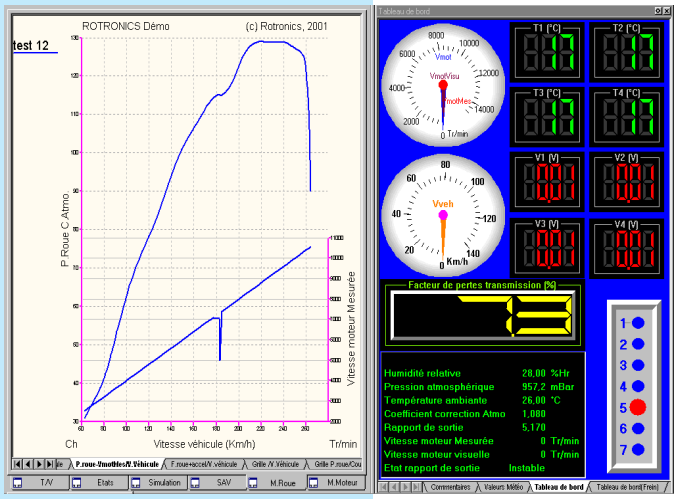


EXPLOITATION OF MEASUREMENTS AND DATA ANALYSIS

The many graphs and tables offered for a single series of measurements allow easy diagnosis of faulty performance and detection of items requiring tuning.

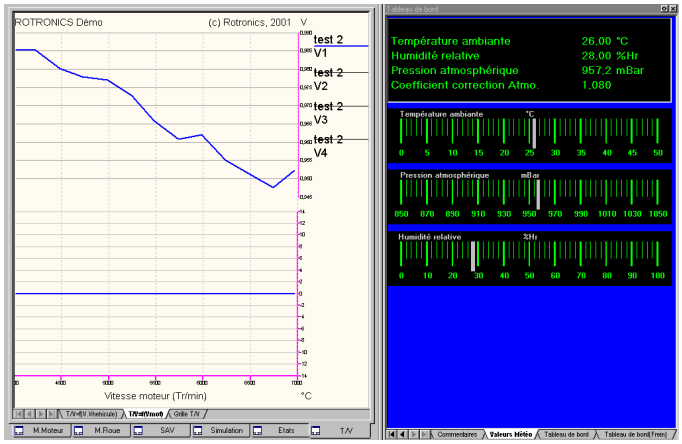
Power and torque curve from a 600cc sportsbike. The improvements possible by replacing the exhaust system and modifying the carburation are clearly evident. The high level of power loss indicates pronounced wear of the chain drive.

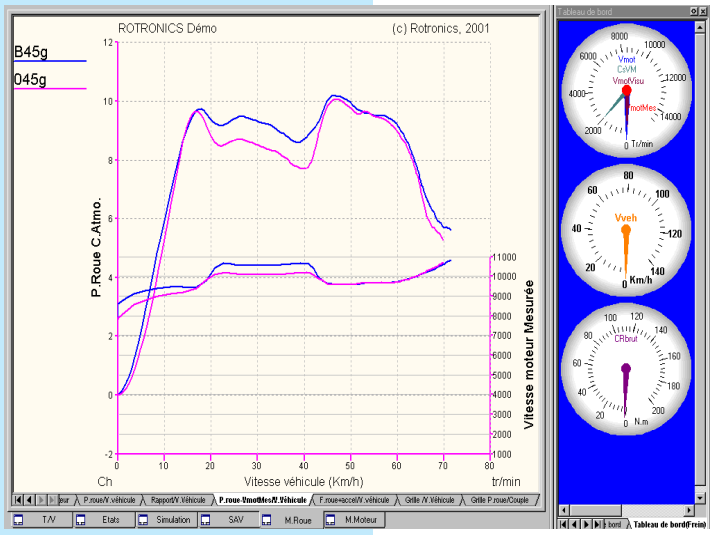




Ignition defect in a four cylinder engine, the curve indicates a loss of power at 112 mph or approximately 7000 rpm. Thanks to the engine speed kit, an ignition anomally is identified (transient problem in cylinder 3).

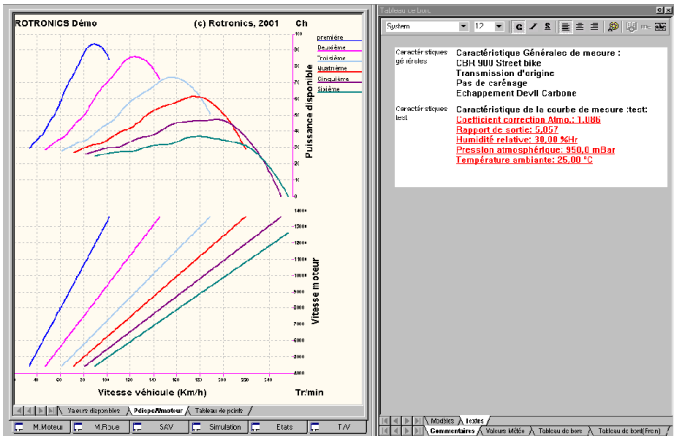
The change in signal from a lambda sensor located in the exhaust system of a 600cc single cylinder engine. One sees that the mixture is too lean at high revs, which results in a power loss and an increased risk of engine failure. All data sets can also be presented in tabular form, which facilitates isometric mapping.





Power curve at the wheel and the change of engine speed as a function of vehicle speed for a 50 cc scooter. Fitting stiffer clutch springs increase the engine speed at which gears change up. Better dimensioned automatic clutch rollers allow an improved match between the transmission ratios and engine power output.

Simulation of aerodynamic resistance for a 900cc street bike. The transmission was not changed when the bike was modified, one discerns that the gear ratio is too high, with sluggish acceleration in 6th gear. The overall gearing should be changed so the maximum speed coincides with maximum power output.



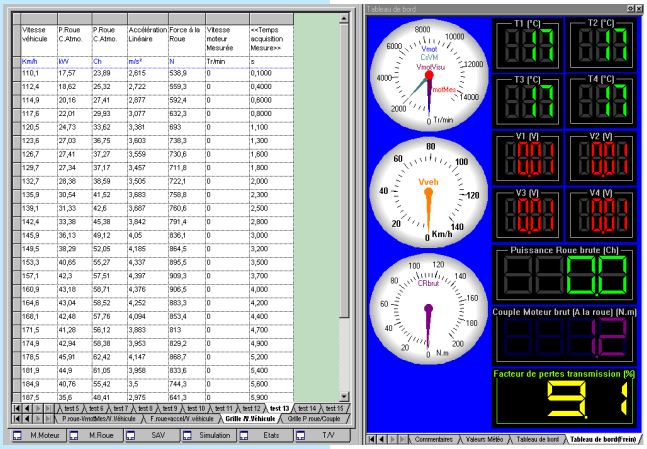
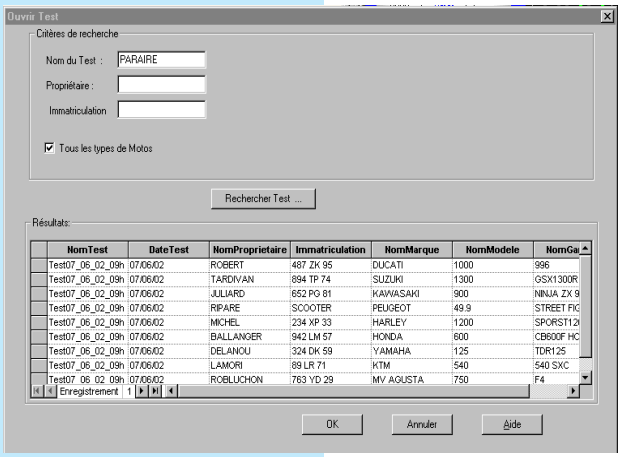
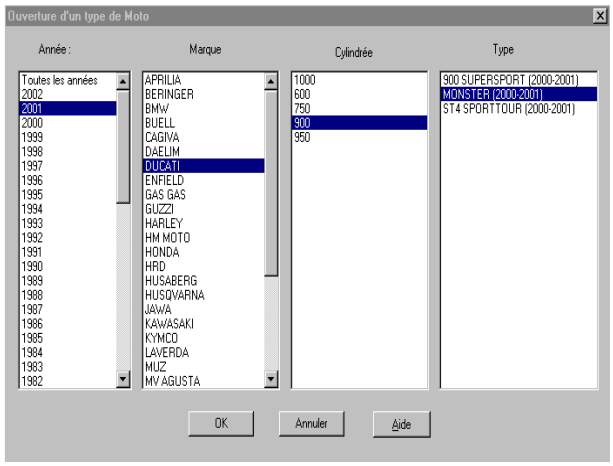


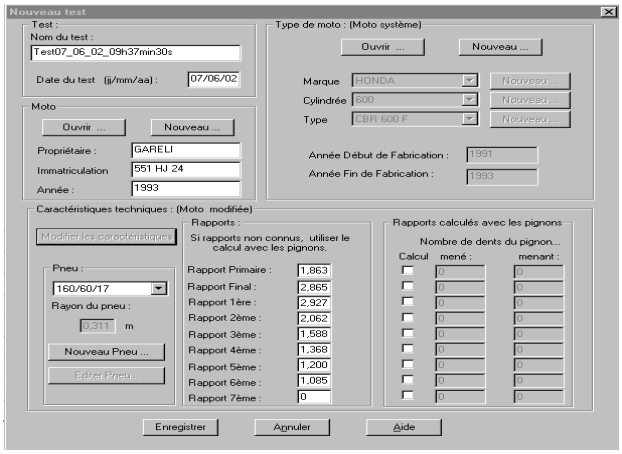
Table of power development and acceleration for this two-cylinder two-stroke. Also available in a graphical format, this diagram allows the identification of possible losses of traction. The power at the wheel depending upon the chosen gear, in the case of “wheel spin”, the test will be carried out in a higher gear in order to limit the stresses applied to the tyre.





The software search engine allows fast retreival of the technical characteristics of the motorcycle under test as well as the test history of the machine. In addition, measurements can be compared with those from previous tests, from comparable machines or from other motorcycles in the database.

Each test is accompanied by a data sheet recording customer details and motorcycle characteristics (for example, change of gear ratios or rear tyre). This data sheet can be recorded and automatically retrieved during subsequent testing.



EQUIPMENT AND ACCESSORIES

Depending on the installed version, it is possible to incorporate the following accessories :

Cooling unit : An option for the Lite version, it protects the condition of the vehicle (against overheating) and provides optimum conditions for repeatable measurements by stabilising the temperature of the various elements of the vehicle (engine, transmission, exhaust system).

Exhaust extraction unit : Built into the test bed, it draws off the exhaust gasses to blow them to the exterior. The small distance between the collection pipe and this equipment considerably reduces the pressure losses hence ensuring optimal efficiency.

The Environment Monitor Lite SML101 : Simple Environment Monitor, measuring temperature, humidity and pressure thanks to its 3 very accurate sensors. It automatically transmits the data to the software which determines the corrections to apply to results.

The Environment Monitor SME301 : The SME 301 has the same functions as the SML 101, but offers 4 acquisition inputs for temperature sensor K type and 4 analogue acquisition inputs (0-10V) for complementary sensors (hydraulic pressures for example).

Engine speed kit : The engine speed kit includes sensors designed to measure and transmit an engine's ignition frequency to the data acquisition card. Using this sensor, the software automatically calculates the transmission ratio by synchronizing the engine speed and roller speed signals. This equipment is applicable to all two wheeled vehicles and allows, in the case of scooters, visualisation of the impact of gearing changes.

Starter : A high performance and robust 380 Volt electric motor with suitable coupling allows the most reticent motors to be started. It will also allow engines requiring a lengthy heating period to be run-up to operating temperature; in the case of highly viscous oil or bikes subjected to long-term storage.

Workshop cabinet : Pratical, solid and attractive, It accomodates computer hardware and all test bed accessories (engine speed kit, temperature probes, ear protectors...).

Gas analyser : Available in four or five gas versions (CO,CO2, O2, HC, optionally NOx), this analyser also calculates corrected CO content, lambda and the stoichiometric ratio. It can moreover input engine speed and oil temperature data in order to adjust the fuel mixture under various regimes and engine loads.

Chassis option: This mechanical option allows transformation of a built-in MOTOSCAN II into a free-standing model. Thus configured, the installation requires no further civil engineering work. This modification or a return to the original configuration can be carried out at any time.

Air / Fuel Ratio acquisition system, CMR101 : The CMR101 kit allows wide band O2 sensor (UEGO) management, a digital display of the calculated values like average richness, air/fuel ratio, air excess (lambda) or oxygen rate. These datas are transmitted to the software and allows it to draw Air/Fuel ratio or lambda curves according to the engine speed.

EQUIPMENTS AND CHARACTERISTICS

	MOTOSCAN II Fi	MOTOSCAN II	MOTOSCAN II Light
Loading method	Eddy current brake	Inertia	Inertia
Max. power at the wheel under inertial load	>220 kW (300Hp) instantaneous	>220 kW (300Hp)	>220 kW (300Hp)
Max. power at the wheel at constant speed	160 kW (210 Hp) on 2 min	-	-
Maximum allowable speed	> 350 km/h	> 350 km/h	> 350 km/h
Roller inertia	3,2 m².kg	8,16 m².kg	8,16 m².kg
Roller diameter	450 mm	450 mm	450 mm
Roller width	180 mm	235 mm	235 mm
Front support	Automatic	Automatic	Manual
Frame configuration	Option	Option	Option
Workshop cabinet	Option	Option	Option
Starter	Option	Option	Option
Exhaust collection system	Standard	Standard	Standard
Exhaust extraction unit	Option	Option	Option
Cooling unit	Série	Série	Option
Computer and printer	Option	Option	Option
Environment Monitor Lite SML 101	-	-	Option
Environment Monitor SME 301	Standard	Standard	Option
Temperature sensor	Option	Option	Option
Engine speed kit	Option	Option	Option
Air/fuel Ratio kit : CMR 101	Option	Option	Option
Gas analyser CO, CO2, HC and O2 (Nox is an option)	Option	Option	Option

INSTALLATION DATAS

	MOTOSCAN II Fi	MOTOSCAN II	MOTOSCAN II Light
Clearance required in front of test bed base	240 mm		0 mm
Clearance required behind test bed base	530 mm		
Length of ramp (frame version)	1700 mm		
Dimensions (embeded)	L 3390 mm x w 1200 mm		L 3150 mm x w 1200 mm
Dimensions (frame)	L 4485 mm x w 1200 mm		L 4245 mm x w 1200 mm
Dimension of excavation (embeded)	L 1340 mm x w 1230 mm x D 480 mm		
Total weight	700 kg	750 kg	650 kg
Electrical power; single phase	-	-	220 V 16 A
Electrical power; three phases	380 V 16 A		
Compressed air supply	Dry Air 8 bars		

Computer configuration (minimum) :

Motoscan II Fi : PC Pentium 1,5 GHz (or equivalent) - 1 network card ethernet - 1 free serial port if CMR101 - Color ink jet printer and operating system Windows 2000 or XP.
Motoscan II and II Light : PC Pentium 800 MHz (or equivalent) - 1 free serial port or 2 if SML or SME - Color ink jet printer and operating system Windows 2000 or XP.

The different measurement elements of the dynamometer are calibrated in our workshop before delivering.

Guarantee : 1 year (return to workshop)
Technical assistance : free during the guarantee period : fax and email.

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