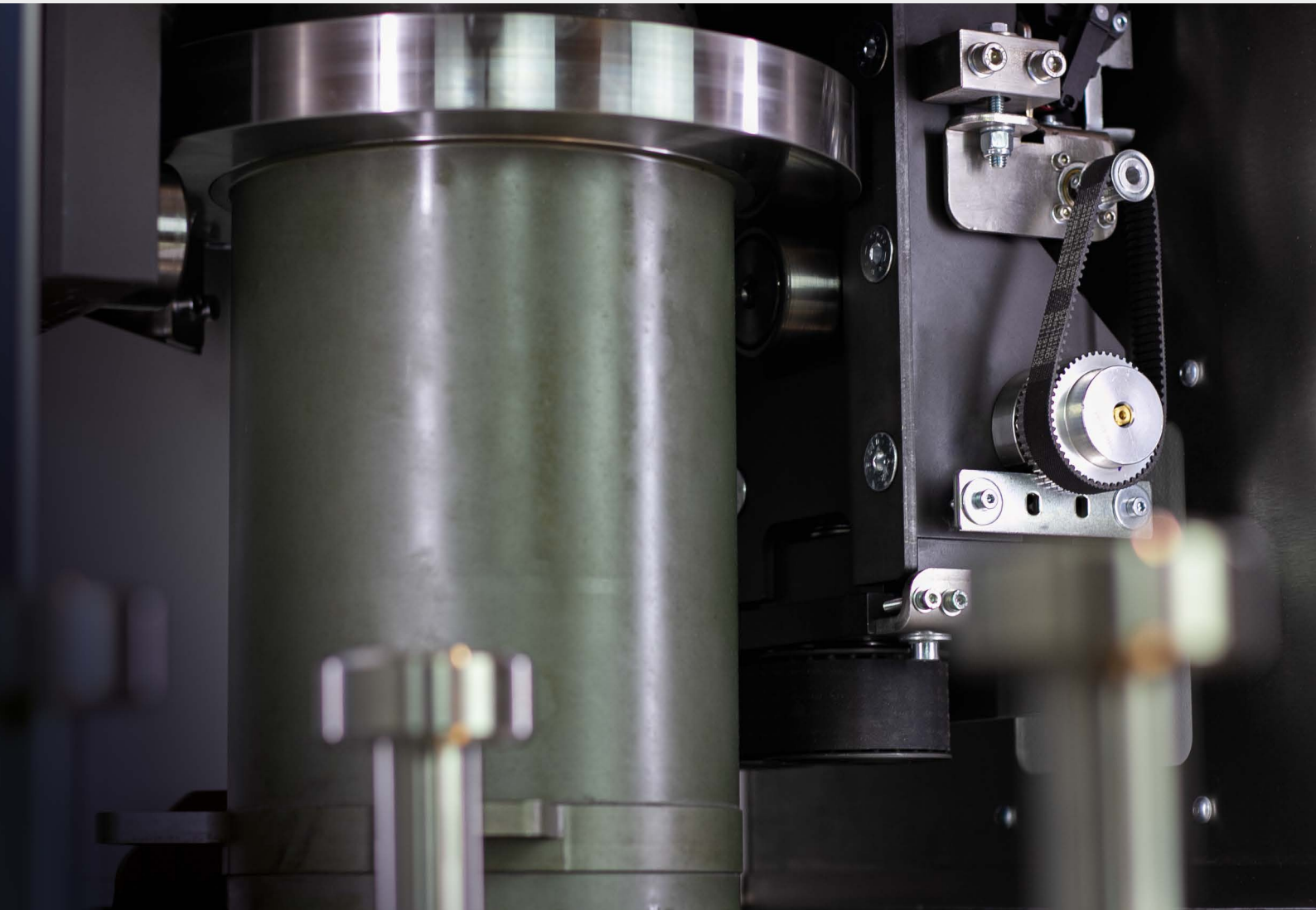


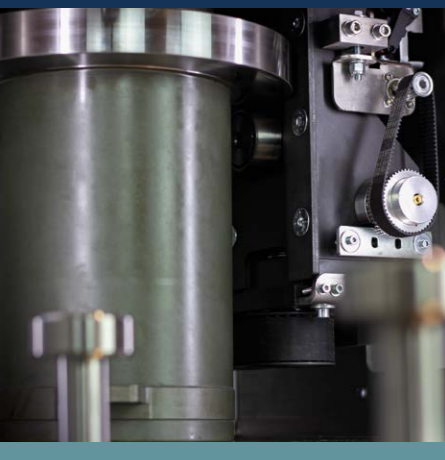


GYROMEC | GYRORESEARCH



SUPERPAVE GYRATORY COMPACTORS

ELECTROMECHANICAL | REACTIVE | RESEARCH



B045 | B045-01

GYROMEC | GYRORESEARCH GYRATORY COMPACTORS

STANDARDS: EN 12697 10, EN 12697 31 | ASTM D6925 | AASHTO T312, TP4 SHRP M 002 | AS/NZS 2891 | NT BUILD 427

Matest Gyrotory Compactors are of unparalleled performance and represent the most innovative electromechanical machines currently available on the market.

The machine is available in two versions, Gyromec and GyroResearch.

These Gyrotory Compactors have multiples uses in applications involving both concrete and asphalt.

They are used:

- To simulate and reproduce real compaction conditions of actual road paving to determine the compaction properties of asphalts in compliance with ASTM, EN and AS standards.
- To simulate and reproduce kneading action of concrete mixes and compaction in precast production lines according to NT Build 427.



MAIN FEATURES

- Rigid steel frame ensuring excellent angle control.
- Full color 7" touch screen control unit, functions like a standard PC.
- Software for PC control data acquisition and processing.
- Electronic angle positioning.
- Dual angle option with double calibration AASHTO, EN and AS at 2° and 3°.
- Automatic adjustment of the gyrotory angle is defined by the user (GYRORESEARCH).
- Shear Stress and Energy Compaction measurement (GYRORESEARCH).
- Optional integrated electromechanical extruder.
- Optional integrated balance.

TECHNICAL SPECIFICATIONS

- Gyrotory speed**
From 3 to 60 cycles/min
(other speeds up to 120 cycles/min available on request)
- Gyrotory angle**
From 0° to 3°
- Consolidation pressure**
Up to 1100 kPa for Ø 150 mm specimen
Up to 2300 kPa for Ø 100 mm specimen
- Power supply:** 230V 50-60Hz 1200W 1ph
- Dimensions:** 640x500x1400 mm
with supporting bench: 640x900x2100 mm
- Weight:** 240 kg approx.

GYROMEC

Electromechanical

- Fully electromechanical, no compressed air needed
- Electromechanical cylinder with a load cell mounted in axis with the vertical actuator
- Simultaneous compaction and extrusion of previous specimen
- Automatic final flattening cycles (0°)

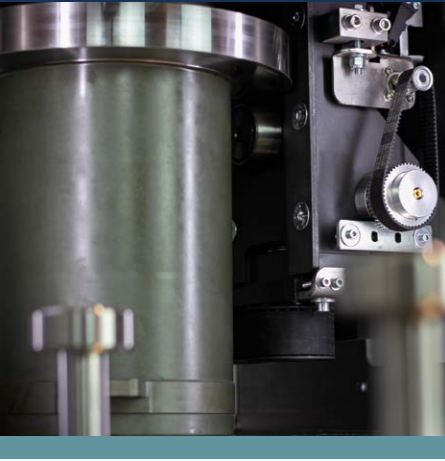
Reactive

- Concept based on American DOT principles
- Robust steel frame ensures excellent angle control
- Innovative load control to apply a consolidation pressure with high accuracy thus complying with and exceeding the requirements of the standards

GYRORESEARCH

Research

- Dynamic Angle Adjustment
- Integrated Balance
- Real time Shear Stress management



ELECTROMECHANICAL

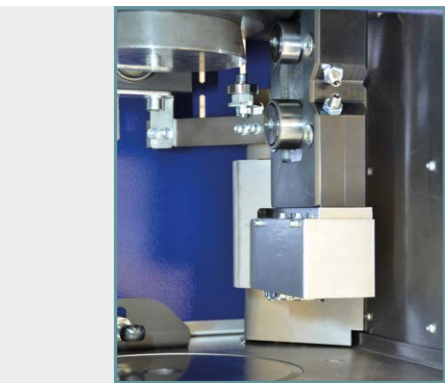
A complete electromechanical system where compressed air is not required. Electromechanical gyratory motion and vertical load for a complete and precise control of compaction and specimen extraction.

The machine can also perform **automatic final fluttering cycles at zero angle** to obtain specimens with perpendicular faces.



■ **Electromechanical actuator and extruder.**

Cylinder and load cell are installed in alignment with the actuator for higher load measurement accuracy, thanks to a reduced friction and a direct measurement of the load applied. An extruder that is completely independent from the vertical actuator enables simultaneous compaction and extrusion of samples. User can start compacting a sample while extruding previous compacted samples to save time. No air pressure is required at this stage either.



■ **Automatic final flattening cycles.**

Zero angle cycles are directly selectable from the main menu by the user before starting compaction, in order to obtain a perfectly vertical specimen. A perfect cylinder is a must to have a good repeatability and accuracy in test results. The compacted specimens will be perfect for mechanical analysis: parallelism between top and bottom plane, associated with the perpendicularity between vertical walls are fully guaranteed.

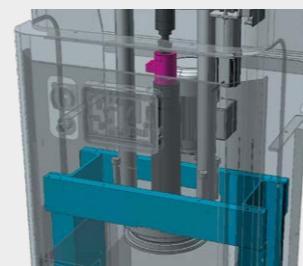
Compressed air is no longer required

Compared to pneumatic and hydraulic actuators, electromechanical ones provide significant advantages. In particular, they allow complete control over the motion profile used.

The servo-controlled electromechanical actuator improves machine performances thanks to its accurate and smooth force application.

Innovative load control.

The load cell in axis with the vertical actuator allows to apply a consolidation pressure with accuracy $\pm 0.01\text{KPa}$ to meet and exceed the standards



Last cycle

Flattening cycle

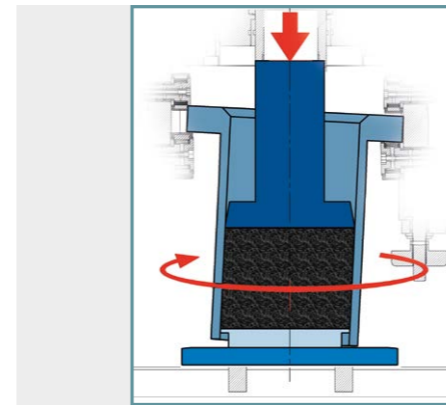
Angle adjustment.

Machine automatically allows setting of zero angle cycles to obtain perfectly parallel specimen faces.

REACTIVE

Cutting-edge machines designed to guarantee high precision during the entire compaction process, through its extremely **rigid frame and closed-loop (feedback) control**.

The closed-loop angle set-up allows the machine to rapidly reach the angle and to maintain it throughout the compaction process with very high precision.



■ **Concept based on American DOT principles.**

Gyratory compactors are based on the trial and prove concept of the Texas DOT unit and comply fully with the **Superpave principles**. Its servo-controlled mechanism guarantees a very high level of accuracy for load application, internal compaction angle, mould gyration speed and measurement of the height of the specimen throughout the test. All compaction parameters are controlled by the Cyber Plus Progress control unit and can be easily modified by user through the display.

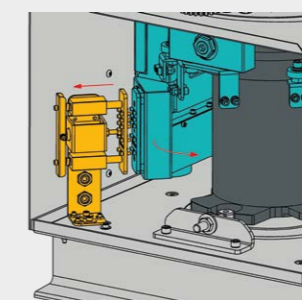


■ **Robust steel frame.**

Perfect and precise compaction is achieved through a stable mechanism integrated in a solid and robust frame. This ensures excellent angle control with its electronic positioning and automatic adjustment. The worktop is "safety-oriented": no lifting of heavy moulds thanks to the **integrated extruder and balance**. All operations can be performed by simply sliding the moulds over the machine worktop.

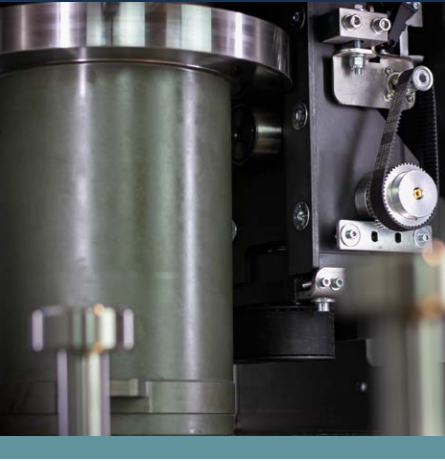
PID closed-loop control

Matest Gyratory Compactors use a state-of-the-art electromechanical actuator with PID closed-loop control and adaptive runtime control to achieve and maintain the required load for the duration of compaction. The control panel interface allows users to input, control and modify the PID parameters in order to obtain excellent results for each type of compacted asphalt mixtures.



Number of gyrations with load adjust:	5	➔
Load adjust factor:	1.0	%
Load adjust [P]d constant:	20000	➔
Load adjust p[I]d constant:	7500	
Load adjust p[D] constant:	0	

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RESEARCH

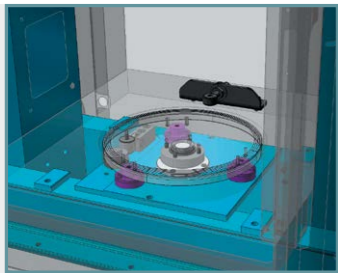
Our R&D department is committed to improving the performance of SGC compactors. Matest, thanks to a constant attention to quality, aim to meet any type of needs, whether for academic purposes or for routine testing in laboratories.

GyroResearch provides the most important parameters required to determine the main properties of asphalt mixes and to predict their suitability for practical uses. The **integrated shear stress measurement** and the **dynamic angle adjustment system** allow the user to perform tests without any additional operations.

■ Shear Stress Measurement.

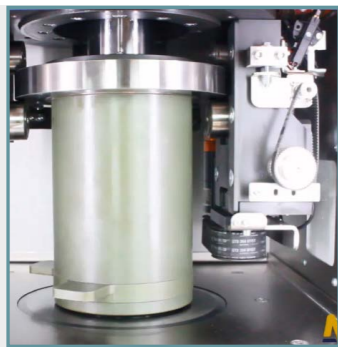
The innovative system of three extra load cells placed under the mould allows continuous measurement of the resistance of asphalt mixtures to **shearing** under gyratory loading at a fixed angle.

The system measures the eccentricity of the resultant load applied by the gyratory compactor in real time during compaction.



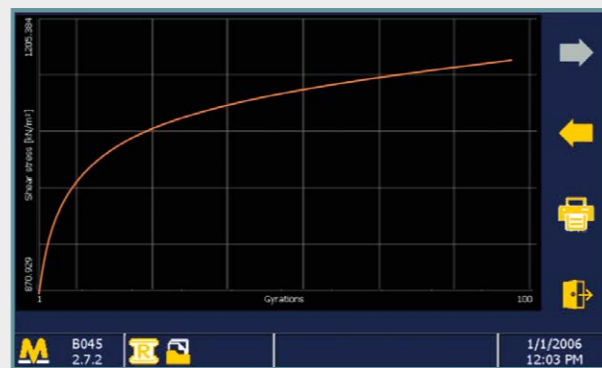
■ Dynamic Angle Adjustment.

The research model allows users to automatically define the gyratory angle from 0 to 3° before starting compaction. It is a simple parameter that can be selected as the number of cycles and desired height. A different angle will produce a different compaction. GyroResearch is able to maintain the selected angle for the whole duration of the cycles thanks to the superior control system and resulting in a more reliable performance.



Dynamic angle adjustment

- Allows a nominal angle from 0° to 3° ± 0.0005° to be obtained.
- Innovative dynamic system allows adjustment and control of the angle accuracy at each cycle, for any angle and applied load.
- The internal angle is set from the digital panel and it is displayed in real-time during the test.
- Automatic final flattening cycles can be set

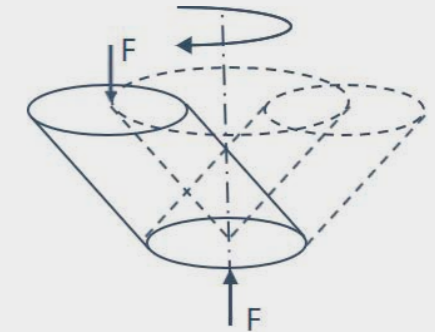


Real time Shear Stress measurement

GyroResearch includes a dedicated group of load cells to measure all the involved forces acting on the specimen. The effective shear stress value is automatically calculated through our firmware. All values can be recorded and stored for subsequent processing as needed.

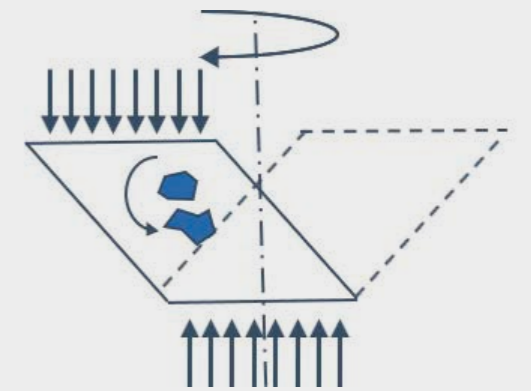
Matest Gyrotory Compactors working principle complies fully with international standard specifications as well as with Superpave principles thus avoiding any differences of interpretation.

The conical compaction on surfaces of revolution is perfectly achieved by the simultaneous action of a low static compression and the shear action as defined and required by EN and AASHTO standards.



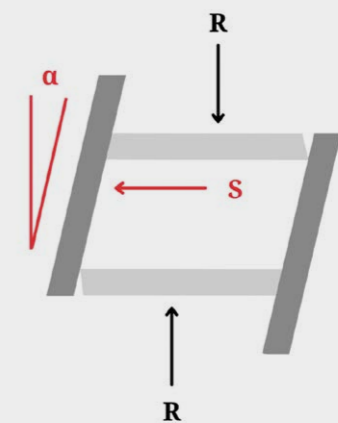
Superpave Gyrotory Compactor has been designed to simulate field compaction of hot-mix asphalts due to its capacity to apply loads at different angles generating shear forces.

Gyratory compaction determines a redistribution of the aggregates thus building new granular structures having a distribution of voids whose shape and entity is similar to that occurring on site.



The Gyrotory compactor applies a vertical or compacting pressure **R** which closely resembles that of rubber tired compactors in the field. Along with vertical pressure, a shear stress **S** is applied to the asphalt mixture.

The **Shear Stress** is a good indicator of the asphalt mixture workability and its potential resistance to rutting phenomena on surfaces subjected to traffic.



The following table clearly shows the reasons why Matest Gyrotory Compactors goes beyond the acknowledge figures

	EN	AASHTO	ASTM INTERNATIONAL	SHRP	AGPT	GYROMEC	GYRORESEARCH
CONSOLIDATION PRESSURE	600 ±18 kPa	600 ±18 kPa	600 ±18 kPa	600 ±18 kPa	240 kPa	10 to 1100 ±0.01 kPa (Ø 150 mm) 23 to 2300 ±0.01 kPa (Ø 100 mm)	10 to 1100 ±0.01kPa (Ø 150 mm) 23 to 2300 ±0.01 kPa (Ø 100 mm)
ANGLE	0.82°±0.02°	1.16°±0.02°	1.16°±0.02°	1.25°±0.02°	2±0.1° for 100 mm 3±0.1° for 150 mm	Factory calibrated 0 to 3° ±0.03°	Automatic 0 to 3° ±0.05°
GYRATION/MIN	30	30	30	30	60	3 to 60 rpm	3 to 60 rpm

CYBER-PLUS PROGRESS

Matest Cyber-Plus Progress is the latest generation digital controller for asphalt testing.

Its technology allows to control, acquire, display and transfer data while offering the possibility to connect Matest software for remote control and printout of results and certificate.

Cyber-Plus Progress is equipped with a wide, 7" touch-screen display and user-friendly interface.



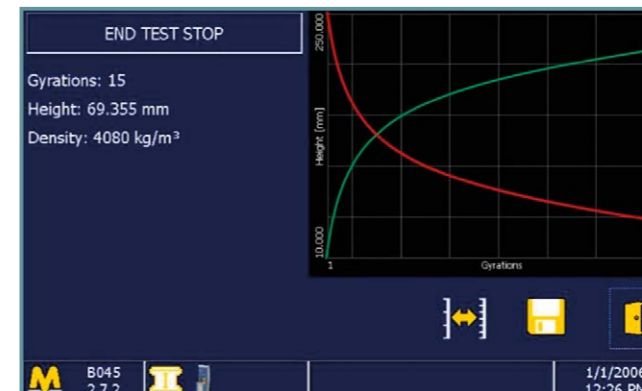
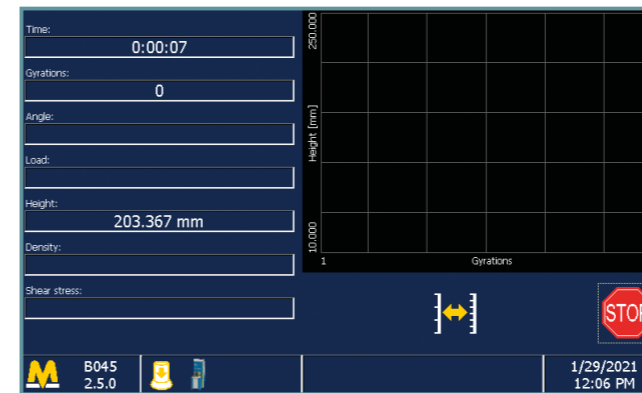
CYBER PLUS PROGRESS

THREE COMPACTION MODES

- Compaction of specimen in accordance to the selected number of rotations.
- Compaction of specimen upon reaching the selected height.
- Compaction of specimen upon reaching the selected density.

REAL-TIME RESULTS

- Control panel showing test graphs in real time.
- Display of the results in terms of height, density, angle, gyration, shear stress and compaction energy.
- Data may be saved on a USB drive or on a PC with Windows.

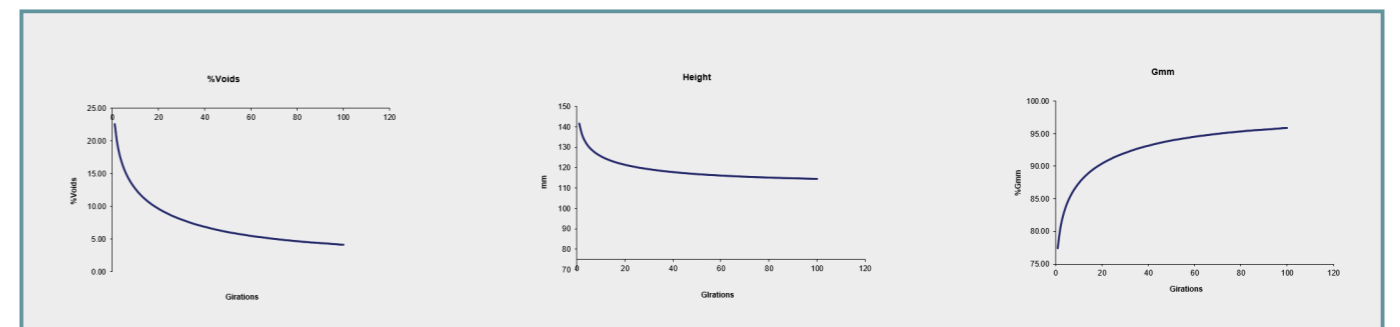


DATA ACQUISITION

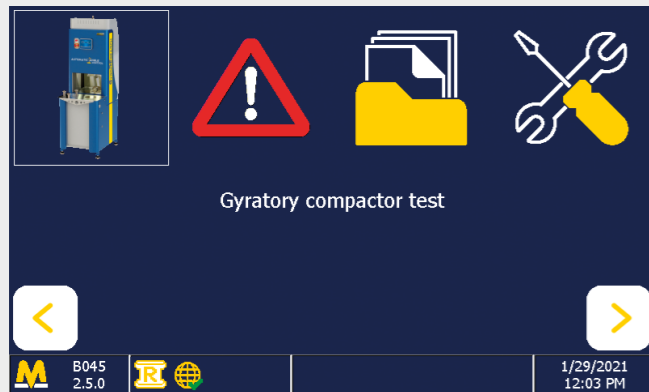
- Number of rotations.
- Specimen height.
- Density.
- Shear stress and compaction energy.

DENSITY AND VOIDS ANALYSIS

Post-processing analysis to determine mix design properties.



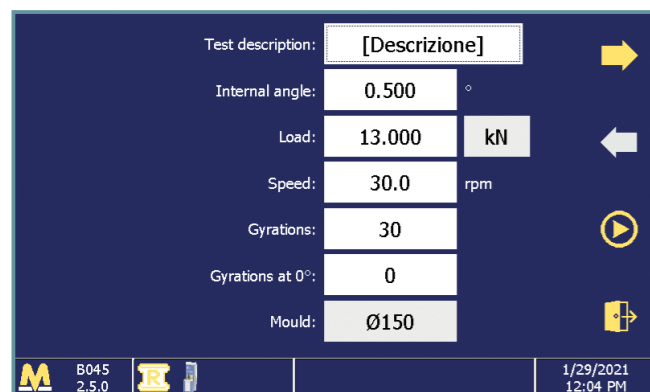
NEW INTERFACE WITH NEW ICONS



- Active alarms display**
Errors or malfunctions
- Test archive**
Saved test data / results
- System configuration**
Channels, profiles and parameters setup
- Control panel**
Date, time, language and firmware configurations

- The user can select all the test parameters required by EN, ASTM and AS standards.

The user can also set the final flatter cycles at zero angle in both GyroResearch and Gyromec models.

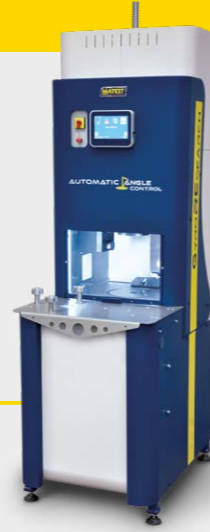


BUYER'S GUIDE

B045 GYROMEC



B045-01 GYRORESEARCH



- B041-05** HARDENED SPECIMEN CYLINDER Ø 100 mm complete with bottom plate
- B041-06** HARDENED SPECIMEN CYLINDER Ø 150 mm complete with bottom plate
- B041-08** HARDENED SPECIMEN CYLINDER Ø 100 mm with holes for cold mix compaction, complete with bottom plate
- B041-09** HARDENED SPECIMEN CYLINDER Ø 150 mm with holes for cold mix compaction, complete with bottom plate
- B041-11** TOP PENETRATION PISTON Ø 100 mm
- B041-12** TOP PENETRATION PISTON Ø 150 mm

Metallic discs to facilitate handling of the handling of specimens after the test, strongly recommended accessory for low-cohesion mixtures, such as draining asphalts:

- B041-13** METALLIC DISC for Ø 100 mm moulds. Pack of 2
- B041-14** METALLIC DISC for Ø 150 mm moulds. Pack of 2

Paper discs to prevent asphalt from sticking to the piston and the mould base plate:

- B041-15** FILTER PAPER for Ø 100 mm moulds. Pack of 100
- B041-16** FILTER PAPER for Ø 150 mm moulds. Pack of 10
- B041-17** HOLLOW PUNCH to stabilize and to mature the sample Ø 100 mm
- B041-18** HOLLOW PUNCH to stabilize and to mature the sample Ø 150 mm



B041-05 B041-06 B041-08 B041-09 B041-18 B041-17

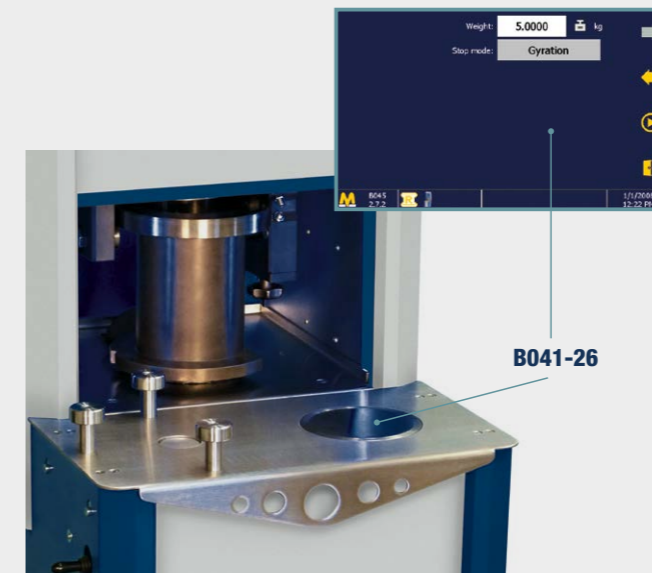
- B041-20** WORKTOP also houses the pneumatic specimen extruder (B041-23) and the integrated balance (B041-26) or:
 - B045-23** ELECTROMECHANICAL AUTOMATIC SPECIMEN EXTRUDER, it can be fixed to the worktop B041-19, B041-20, or to any bench.
 - B041-21** WHEELS (kit of 4) with brake, for ease of movement of the compactor in the laboratory.
 - B041-30** VERTICAL FORCE TESTING DEVICE with load ring.
- As alternative:
- B041-31** VERTICAL FORCE TESTING DEVICE with digital dynamometer.
 - B041-33** KIT OF 2 DISTANCE PIECES 105 and 115 mm high for the control of the height values measured by the linear transducer.
 - B041-34** ACCREDIA official vertical load calibration certificate



B041-30 B041-15 B041-16 B041-31 B041-21

WEIGHTING SOLUTIONS

B041-26
BALANCE, INTEGRATED into the worktop to facilitate sample and mould weighing by avoiding the stress of lifting them. The weighting reading values are directly and automatically displayed on the control panel of the Compactor.
 Capacity: 30 kg
 Accuracy: ± 6 g



B041-26

OR **B041-27**
BENCH mounted on the side to support a balance. Suggested balance: V075-13 Capacity 30 kg div. 0.5 g or:
B041-24 Capacity 30 kg div. 0.1g as required by EN (or customer's own balance)



B041-06 V075-13 B041-27