

DE MATTIA FATIGUE CHECK - A.I. CAMERA

INSTRUMENT FOR FATIGUE RESISTANCE TESTS IN BENDING AND IN TENSION
AT CONTROLLED TEMPERATURE ($-40 \div +200^{\circ}\text{C}$) WITH AUTOMATIC
INSPECTION OF THE SPECIMENS THROUGH VIDEO CAMERAS



Standards the instrument complies with:

ASTM D813; ASTM D430-B; ISO 132; ISO 6943; JIS K_6260;

Overview & Regulation

The instrument is built according to International Standards about fatigue, which describe test methods for the determination of the resistance of vulcanized rubbers under repeated deformations. This instrument permits to perform:

- **Flex cracking/crack growth test**
- **Tension fatigue test.**

According to test specification, the instrument can be easily adjusted by setting

- **Test frequency (60 to 300 rpm)**
- **Test stroke (0 to 60 mm)**
- **The distance of the grips (up to 100 mm)**
- **The number of cycles before automatic stop** can be set (up to 1.000.000)

Temperature Range

The sample holding system is located in a Environmental chamber which permits to set the temperature between -40°C and 200 °C.

The environmental chamber is fitted with inspection window and internal led lighting which permit to inspect the sample without opening the chamber.



Image acquisition system

The instrument is equipped with **6 BW video cameras with a resolution of 600x450 pixels** that allow you to simultaneously acquire the images of all 12 mounted specimens (each video camera acquires the image of 2 specimens).

A **LED lighting** device has been developed which guarantees the correct illumination of the specimens and, in combination with the software setting of the exposure of the cameras, allows to obtain optimal images for specimens of various colors.

Image acquisition and lighting are synchronized with the movement of the specimen to always acquire the image in the same position (settable) without interrupting the operation of the instrument

The frequencies of acquisition and saving of the images before the crack is identified and after its identification can be set by the user based on the characteristics of the product to be tested (minimum frequency per sample 20 seconds)



Control device

The complete control of the instrument is carried out through the powerful software installed in the PC inside the machine and through the 15" touch-screen control panel.

The software allows you to:

- Set the frequency, the temperature and the number of cycles to be carried out
- Identify the 12 specimens
- Record the images of each of the 12 samples with set frequency
- Analyze images with Artificial Intelligence algorithm for automatic detection of the crack start
- Perform a slide-show of the images recorded for each sample
- Download the images via USB port to an external support

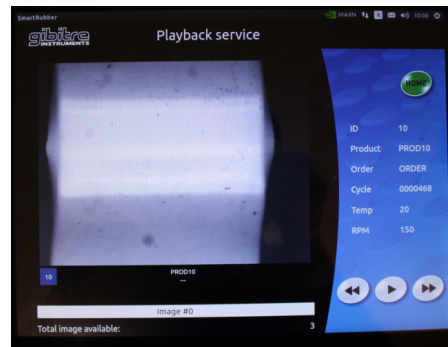


Management of Sample Images

The images related to each specimen are saved in the internal memory of the device (up to 10,000 images can be stored)

The software allows you to view all the images related to each specimen in sequence

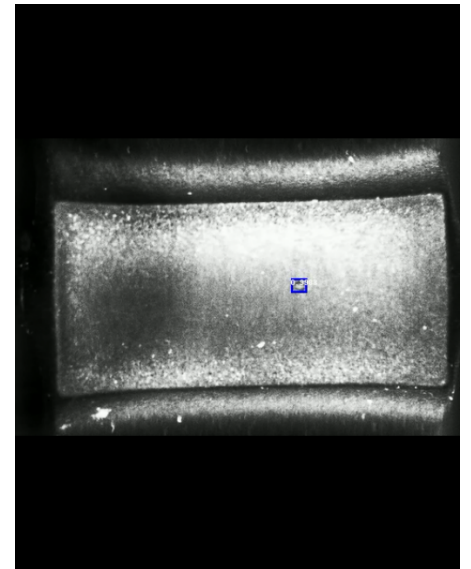
The name with which each image is saved includes the position, the identification, the number of cycles performed at the time of setting, the presence of crack.



Artificial Intelligence Algorithm

The analysis algorithm analyzes all images to identify the presence of cracks.

The algorithm was educated in acquiring images of specimens with different colors and polymers. When the algorithm identifies the presence of a crack, **the software records the number of cycles at which the crack identification occurred** and automatically changes the image saving rate based on the settings.



Sample holders

The sample holder permits to test 12 samples simultaneously.

The exclusive movement system with both sample holders moving in opposite directions ensures extremely low levels of noise and vibrations.



Instrument Regulation

According to test specification, the instrument can be easily adjusted by setting

- Test frequency (60 to 300 rpm)
- Test stroke (0 to 60 mm)
- The distance of the grips (up to 100 mm)
- The number of cycles before automatic stop can be set (up to 1.000.000)

Cooling system

The instrument produced by Gibitre uses a Refrigeration Unit to reduce the temperature.

The use of the refrigeration unit, compared to cooling by liquid nitrogen, allows to:

- control the test temperature perfectly, avoiding oscillations that may alter the results.
- Carry out long-term tests without risking to end the liquid nitrogen supply before finishing the test
- Eliminate the hazards related with manipulation of nitrogen



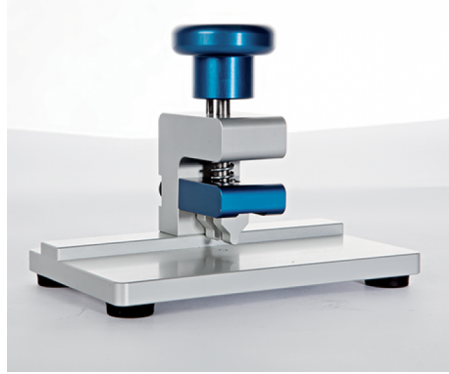
Mould for De Mattia Flexure test

Mould for De Mattia dynamic tester according to ISO 132, ASTM D 430-method B, DIN 53 522 standards.



Piercing tool

The piercing tool allows to realize the standard notch to carry out crack-growth tests.



Development and production

The instrument is totally developed and produced in the plant of Gibitre Instruments in Italy.

All the mechanical parts are produced in the company workshop using modern CNC machines.

Components and sensors from well-known brands are selected in order to ensure the maximum reliability in the measures

Internal trained personnel takes care of all the production stages: **assembly, start-up, calibration, packing, shipment and installation.**

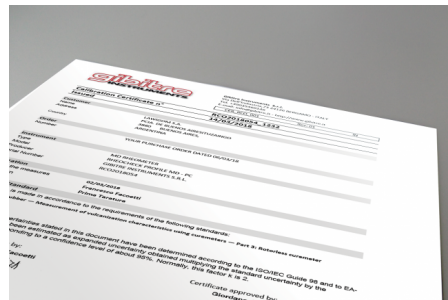


Standard Calibration service for De Mattia Fatigue Check

The calibration is performed with reference to the requirements of ISO 132 standard.

The service includes:

- Ordinary maintenance of the instrument
- Calibration of the oscillation speed.
- Calibration of the dimension of the templates.
- Calibration of the temperature inside the environmental chamber at 4 temperatures (for flexometers with environmental Chamber)
- Issue and e-mail shipment of the Calibration Certificate with traceability to primary standards.



Safety devices

- Safety protection doors fitted with safety switch.
- Safety Push-button
- Digital Motor controller with torque overload control.
- CE labelling



Instrument Characteristics

Speed adjustment from 60 to 300 Cycles/min - 1 to 5 Hz

Run adjustment Between 0 and 60 mm

Set of the number of cycles before automatic stop Between 1 and 10⁹

Distance of the grips Maximum 100 mm

Sample holder 12 samples can be tested at the same time

Maximum force in traction 700 N (at 1 Hz oscillation speed)

Environmental Chamber

Test temperature (without optional refrigerator) From room temperature to 200°C (1°C resolution).

Air Flow Internal air recirculation without air exchange

Test temperature (with refrigeration unit) From -40°C to 200°C (1°C resolution).

Control display and Software

Control display and Software Touch-screen Display 15"

Software Functions Setting of temperature, frequency and number of cycles, identification of specimens, storage of images with settable frequency, slide-show of recorded images, storage of the number of cycles at crack start, images download

Video cameras for image acquisition	6 BW video cameras with resolution 600x450 pixels. Each camera captures the image of 2 samples
Lighting system	Led lighting system. Ignition synchronized with oscillation
Lighting system	
Image Analysis through Artificial Intelligence	The algorithm identifies the presence of cracks with specimens of different colors and polymers
Safety Devices	
Safety Devices	Safety protection doors with safety switches Safety Pushbutton Motor controller with torque overload control CE labelling
Labelling	CE Labelling
Calibration	
Calibration	Calibration Report conforming to ISO 132 and ISO 6943 and Enviromnetla chamber temperature calibration, with traceability to primary references
Technical specifications	
Power supply	220 VAC \pm 10%, 50 Hz \pm 3, 14 A -single phase - 110 VAC \pm 10%, 60 Hz \pm 3 on request
Electrical Power (instrument + 3 kW environmental chamber)	
Instrument Dimensions	(Width x Depth x Height) 960 x 900 x 1750 mm
Thermal Chamber Internal dimensions	(Width x Depth x Height) 240 x 230 x 600 mm
Weight	300 Kg (optional refrigeration unit: 40 Kg)
Noise level	< 50 dB



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