edibon

Engineering and Technical
Teaching Equipment

Universal Material Testing Unit

EEU/20KN

www.edibon.com
↳PRODUCTS
↳7.- MECHANICS

Key features:

- **Compact bench-top unit for experiments on material testing.**
- **Ideal for classroom or laboratory demonstrations and students experiments.**
- **Shear tests. Brinell hardness tests. Compression tests. Tensile tests. Deep draw (cupping) tests. Bending tests. Disc and helical spring tests.**
- **Wide range of accessories and specimens the different material testing.**
- **Easy and quick changing of accessories.**
- **Computer Data Acquisition System.**

LRQA CERTIFIED ISO 9001
Certificate of Approval of the Quality Management System

CE
European Union Certificate
(total safety)

UL and CSA Regulations
(All our products are manufactured according to current UL and CSA regulations)

LRQA CERTIFIED ISO 14001
Certificate of Approval of the Environmental Management System

WQC worlddidac
Worlddidac Association Certificate of Membership

INTRODUCTION

Material testing allows determining the strength of a material, verifying its properties and establishing its behavior under external influences.

Shape and dimensions of a body, specific weight and density, humidity content, etc. are generally determined with physical tests, whereas strength, elasticity and plasticity, ductility, tenacity and fragility, etc. are determined with mechanical tests.

GENERAL DESCRIPTION

The Universal Material Testing Unit, "EEU/20KN", designed by EDIBON, is a didactic bench-top universal material testing unit. It is distinguished by its rigid construction, accurate control and a precise hydraulic system to apply loads of up to 20 kN, which enables demonstrations of phenomena undetectable under smaller loads.

With this unit the student can perform these material tests:

Shear test.

Brinell hardness test.

Compression test.

Tensile test.

Deep draw (cupping) test.

Bending test.

Disc and helical spring tests.

It allows achieving testing forces up to 20 kN with very little physical effort.

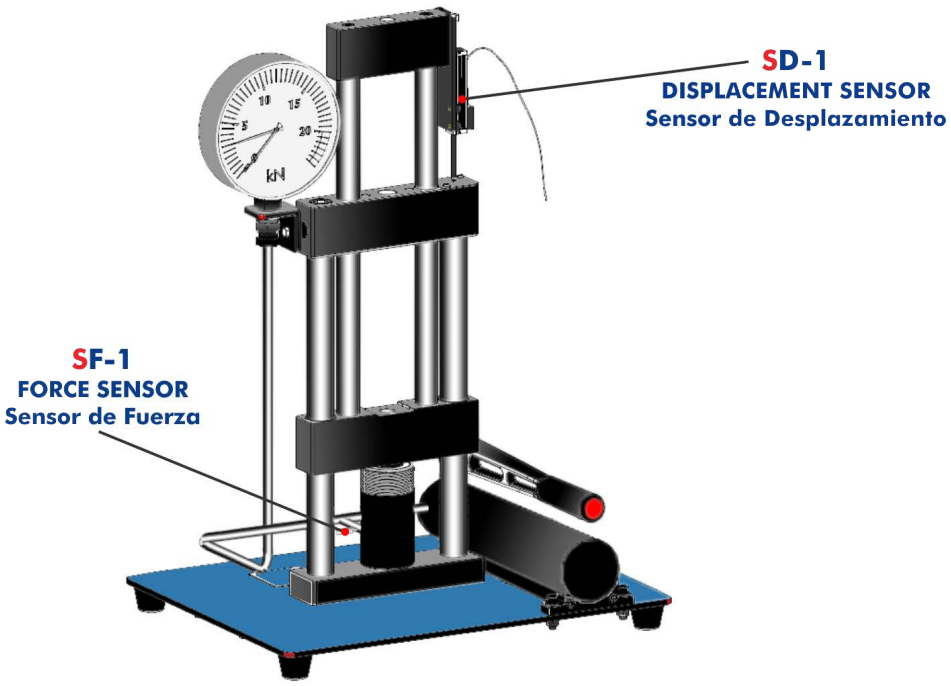
The measurements can be obtained either manually through an elongation gauge and a dynamometer or through the computer data acquisition system giving accurate real-time data capture, monitoring and display, calculation and results representations on the computer.

EEU/20KN detail

The Universal Material Testing Unit, "EEU/2OKN", includes the following elements:

1. EEU/20KN-UB. Base Unit with Hardware and Software for Data Acquisition.
2. EEU/20KN-1. Shear Tests Accessories & Specimens.
3. EEU/20KN-2. Brinell Hardness Tests Accessories & Specimens.
4. EEU/20KN-3. Compression Tests Accessories & Specimens.
5. EEU/20KN-4. Tensile Tests Accessories with Standart, Flat and Round Specimens.
6. EEU/20KN-5. Deep Draw (cupping) Tests Accessories & Specimens.
7. EEU/20KN-6. Bending Tests Accessories & Specimens.
8. EEU/20KN-7. Disc and Helical Spring Tests Accessories & Specimens.

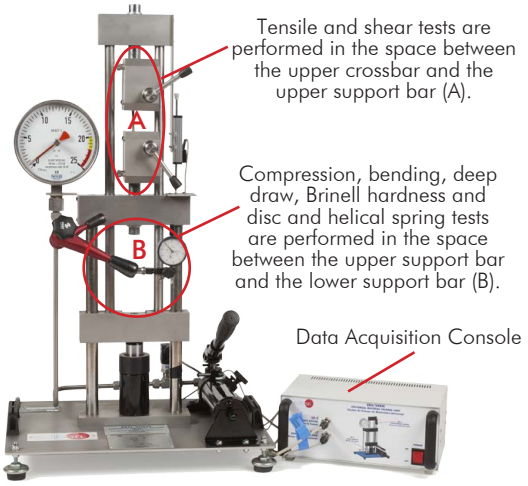
PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



SPECIFICATIONS

EEU/20KN-UB. Base Unit with Hardware and Software for Data Acquisition:

- Main metallic elements made of stainless steel.
- Base unit with feet.
- Upper crosspiece.
- Lower crosspiece.
- Frame pillars.
- Test load is generated using a hand operated hydraulic system.
- Maximum stroke: 45 mm.
- Maximum test force: 20 kN.
- Dynamometer: 0 – 20 kN. Graduations: 0.5 kN.
- Elongation gauge: 0 – 10 mm. Graduations: 0.01 mm.
- Fastening elements for accessories.
- Methacrylate protective covering.
- Force sensor.
- Deformation displacement sensor, range: 0 – 50 mm.
- Computer Data Acquisition System:
  - Data Acquisition Console:
    - Metallic box.
    - Connections for the force and deformation displacement sensors.
    - USB connection to computer.
  - Data Acquisition and Calculations Software:
    - Compatible with actual Windows operating systems.
    - Compatible with the industry standards.
    - Processing, comparison and storage of data.
    - Graphics and curves representation.
    - Measurement of the force applied.
    - Measurement of displacement generated by deformation.
    - Shear strength calculation.
    - Diameter of the imprint for Brinell test.
    - Brinell hardness calculation.
    - Compression strength calculation.
    - Tensile strength calculation.
    - Drawing depth (cupping) calculation.
    - Bending strength calculation.
    - Elastic constant for a helical spring.
    - Elastic constant for a disc spring.



Cables and accessories, for normal operation.

Manuals: This unit is supplied with the following manuals: Required services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices manuals.

Required elements (at east one) (Not included):

- EEU/20KN-1. Shear Tests Accessories & Specimens.
- EEU/20KN-2. Brinell Hardness Tests Accessories & Specimens.
- EEU/20KN-3. Compression Tests Accessories & Specimens.
- EEU/20KN-4. Tensile Tests Accessories with Standart, Flat and Round Specimens.
- EEU/20KN-5. Deep Draw (cupping) Tests Accessories & Specimens.
- EEU/20KN-6. Bending Tests Accessories & Specimens.
- EEU/20KN-7. Disc and Helical Spring Tests Accessories & Specimens.

Additional recommended elements (Not included):

- EEU/20KN-SP. Spare Parts for Universal Material Testing Unit.
- EEU/20KN-8. Accessories and Specimens for Compression Tests: Gypsum, Wood, and Plastic.

Required elements (at least one) (Not included)

EEU/20KN-1. Shear Tests Accessories & Specimens

Device for shear tests.

Set of 12 specimens for shear tests made of brass, aluminum and copper (four units per material).

EEU/20KN-2. Brinell Hardness Tests Accessories & Specimens

Device for Brinell hardness tests.

Penetrating ball: 10 mm.

Set of Brinell specimens made of steel, brass, aluminum and copper (one unit per material).

EEU/20KN-3. Compression Tests Accessories & Specimens

Set of two compression plates with fastening elements.

Set of 16 specimens for compression tests made of steel, brass, aluminum and copper (four units per material).

EEU/20KN-4. Tensile Tests Accessories with Standard, Flat and Round Specimens

Jaws for tensile tests with flat and round specimens.

Set of 16 flat specimens to measure tension made of steel, brass, aluminum and copper (four units per material).

Set of 16 rod specimens for tensile tests made of steel, brass, aluminum and copper (four units per material).

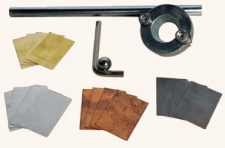
Device for tensile tests with standard specimens.

Set of 16 standard specimens for tensile tests made of steel, brass, aluminum and copper (four units per material).

EEU/20KN-5. Deep Draw (cupping) Tests Accessories & Specimens

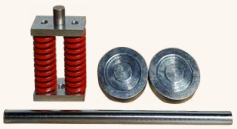
Device for deep draw (cupping) tests.

Set of 16 specimens for deep drawn (cupping) tests made of steel, brass, aluminum and copper (four units of each material).



Required elements (at least one) (Not included)

EEU/20KN-6. Bending Tests Accessories & Specimens	
Device for bending tests. Set of specimens for bending tests made of steel, brass, aluminum and copper (one unit per material).	

EEU/20KN-7. Disc and Helical Spring Tests Accessories & Specimens	
Disc springs (two units). Helical springs (two units).	

Additional recommended elements (Not included)

EEU/20KN-SP. Break and Load Unit

12 Specimens for Shear Tests:
- Four brass specimens.
- Four aluminum specimens.
- Four copper specimens.

Four Specimens for Brinell Hardness Tests:
- Steel specimen.
- Brass specimen.
- Aluminum specimen.
- Copper specimen.

16 Specimens for Compression Tests:
- Four steel specimens.
- Four brass specimens.
- Four aluminum specimens.
- Four copper specimens.

48 Specimens for Tensile Tests:
- 16 flat specimens:
  - Four steel specimens.
  - Four brass specimens.
  - Four aluminum specimens.
  - Four copper specimens.
- 16 rod specimens:
  - Four steel specimens.
  - Four brass specimens.
  - Four aluminum specimens.
  - Four copper specimens.
- 16 standard specimens:
  - Four steel specimens.
  - Four brass specimens.
  - Four aluminum specimens.
  - Four copper specimens.

16 Specimens for Deep Draw (cupping) Tests:
- Four steel specimens.
- Four brass specimens.
- Four aluminum specimens.
- Four copper specimens.

Four Specimens for Bending Tests:
- Steel specimen.
- Brass specimen.
- Aluminum specimen.
- Copper specimen.

EEU/20KN-8. Accessories and Specimens for Compression Tests: Gypsum, Wood, and Plastic

Compression accessories with fastening elements.

Set of 16 specimens for compression tests made of gypsum, wood and plastic (four units of each material).

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Learning how to use the instrumentation required to perform the main tests on materials.
2.- Study and familiarization with universal material testing machines.
3.- Tensile strength tests.
4.- Compressive strength tests.
5.- Brinell hardness tests.
6.- Bending tests.
7.- Shear tests.
8.- Deep draw (cupping) tests.
9.- Tests with disc springs.
10.- Tests with helical springs either in series or in parallel.
11.- Recording stress-strain diagrams.
12.- Using the computer data acquisition system.

REQUIRED SERVICES

- Electrical supply: single-phase 200 VAC – 240 VAC/50 Hz or 110 VAC – 127 VAC/60 Hz.
- Computer.

DIMENSIONS AND WEIGHTS

EEU/20KN:
- Dimensions: 550 x 500 x 800 mm approx.
  (21.65 x 19.68 x 31.49 inches approx.)
- Weight: 60 Kg approx.
  (132.27 pounds approx.)

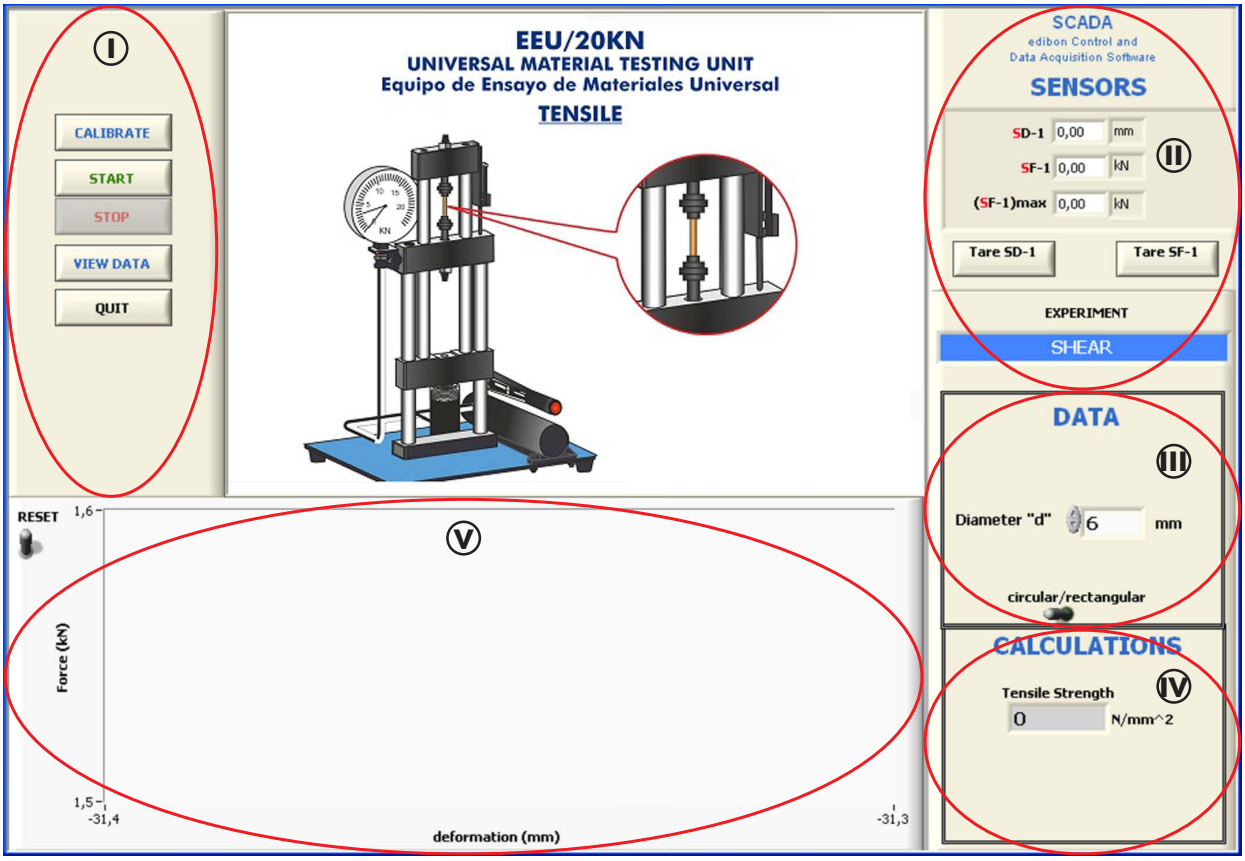
REQUIRED ELEMENTS (Not included)

Required (at least one):
- EEU/20KN-1. Shear Tests Accessories & Specimens.
- EEU/20KN-2. Brinell Hardness Tests Accessories & Specimens.
- EEU/20KN-3. Compression Tests Accessories & Specimens.
- EEU/20KN-4. Tensile Tests Accessories with Standart, Flat and Round Specimens.
- EEU/20KN-5. Deep Draw (cupping) Tests Accessories & Specimens.
- EEU/20KN-6. Bending Tests Accessories & Specimens.
- EEU/20KN-7. Disc and Helical Spring Tests Accessories & Specimens.

ADDITIONAL RECOMMENDED ELEMENTS (Not included)

- EEU/20KN-SP. Spare Parts for Universal Material Testing Unit.
- EEU/20KN-8. Accessories and Specimens for Compression Tests: Gypsum, Wood, and Plastic.

Main screen



Ⓘ Main software operation possibilities.

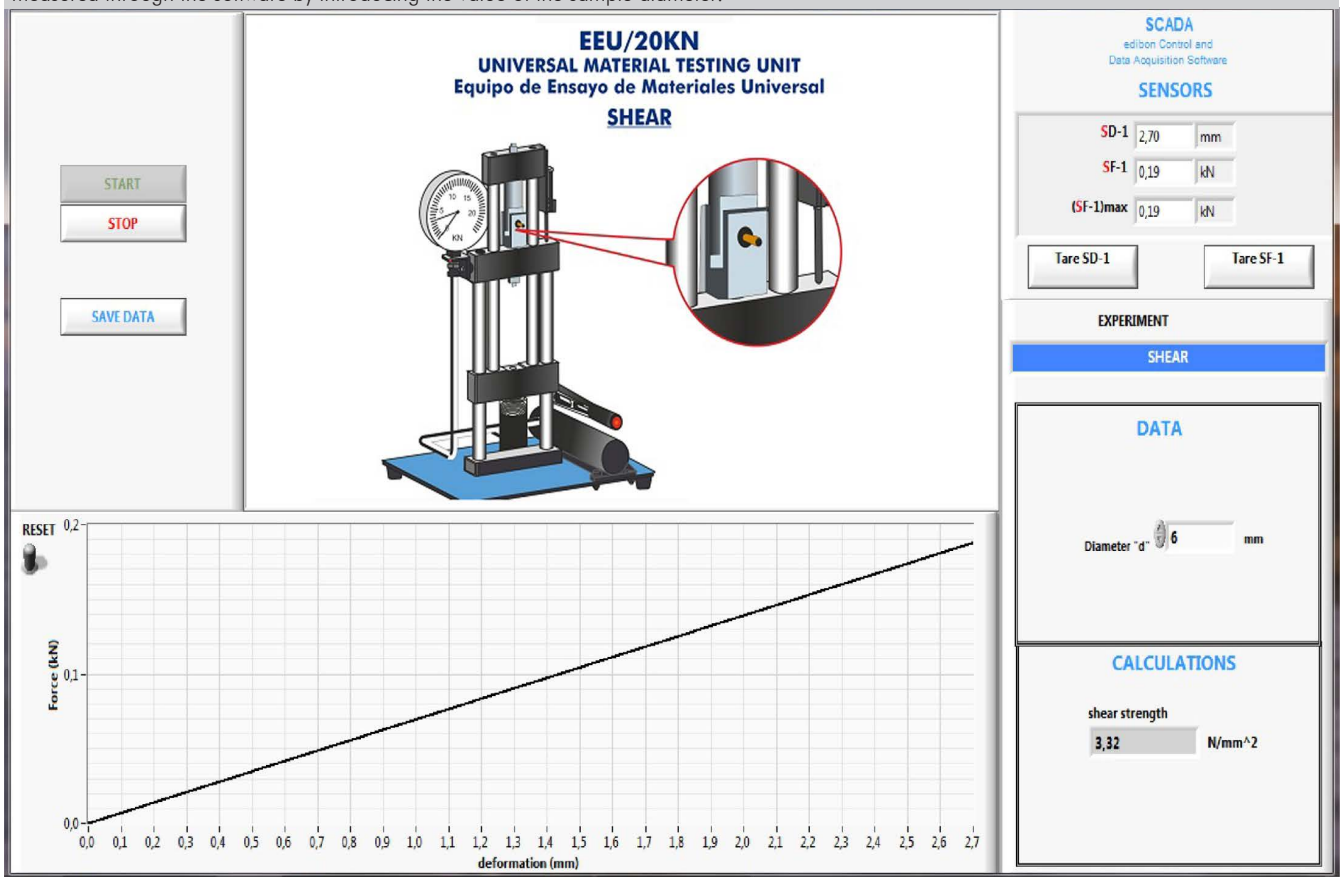
Ⓘⓘ **Sensors displays, real time values, and extra output parameters. Sensors:** SF=Force sensor. SD=Displacement sensor.

Ⓘⓘⓘ Characteristic data to perform the corresponding calculations.

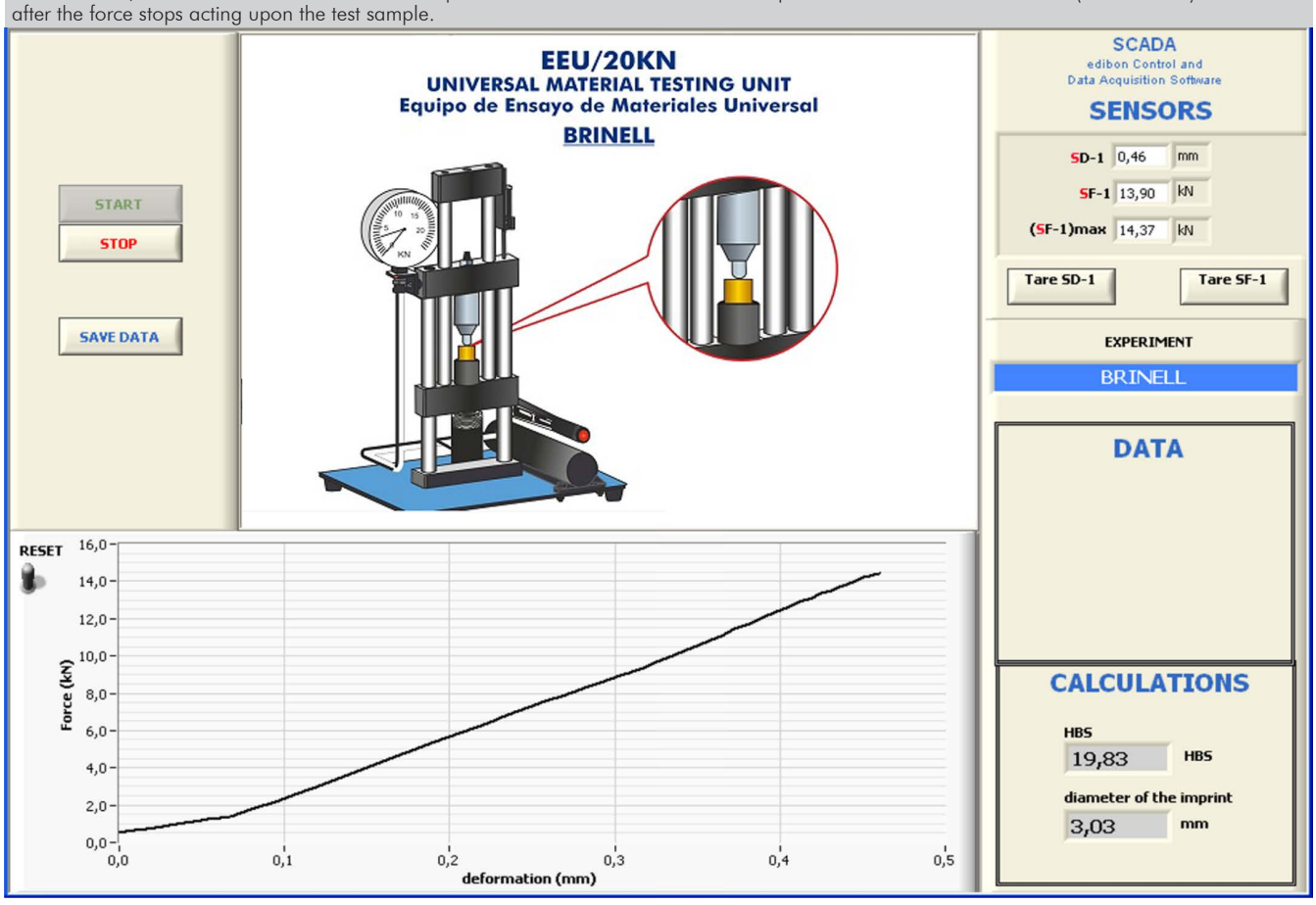
Ⓘⓥ Main results from each test.

Ⓥ Graphics displays.

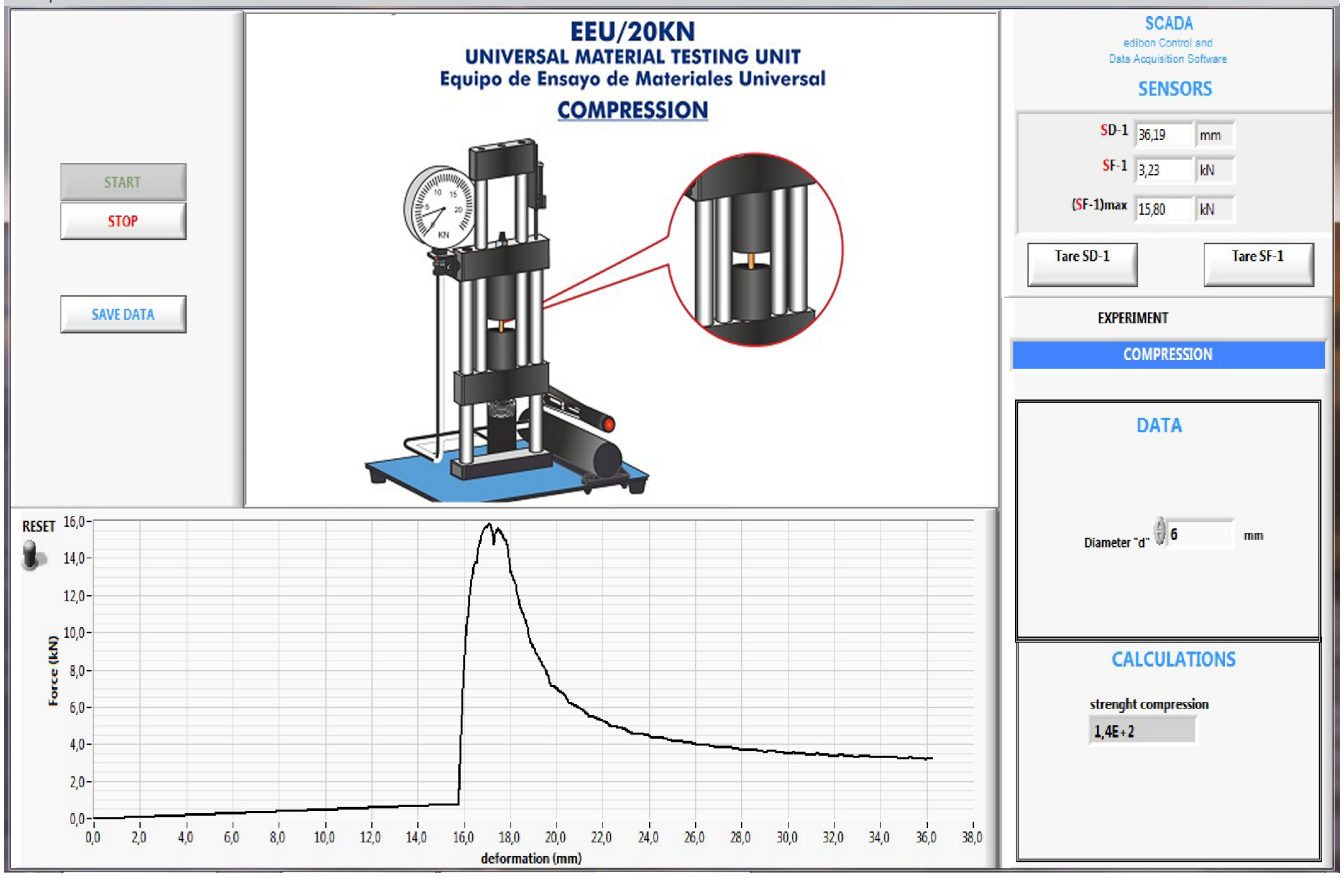
Shear test device is made according to DIN 50141. It consists of a shear jaws and hardened shear knives. Shear strength in several samples is measured through the software by introducing the value of the sample diameter.



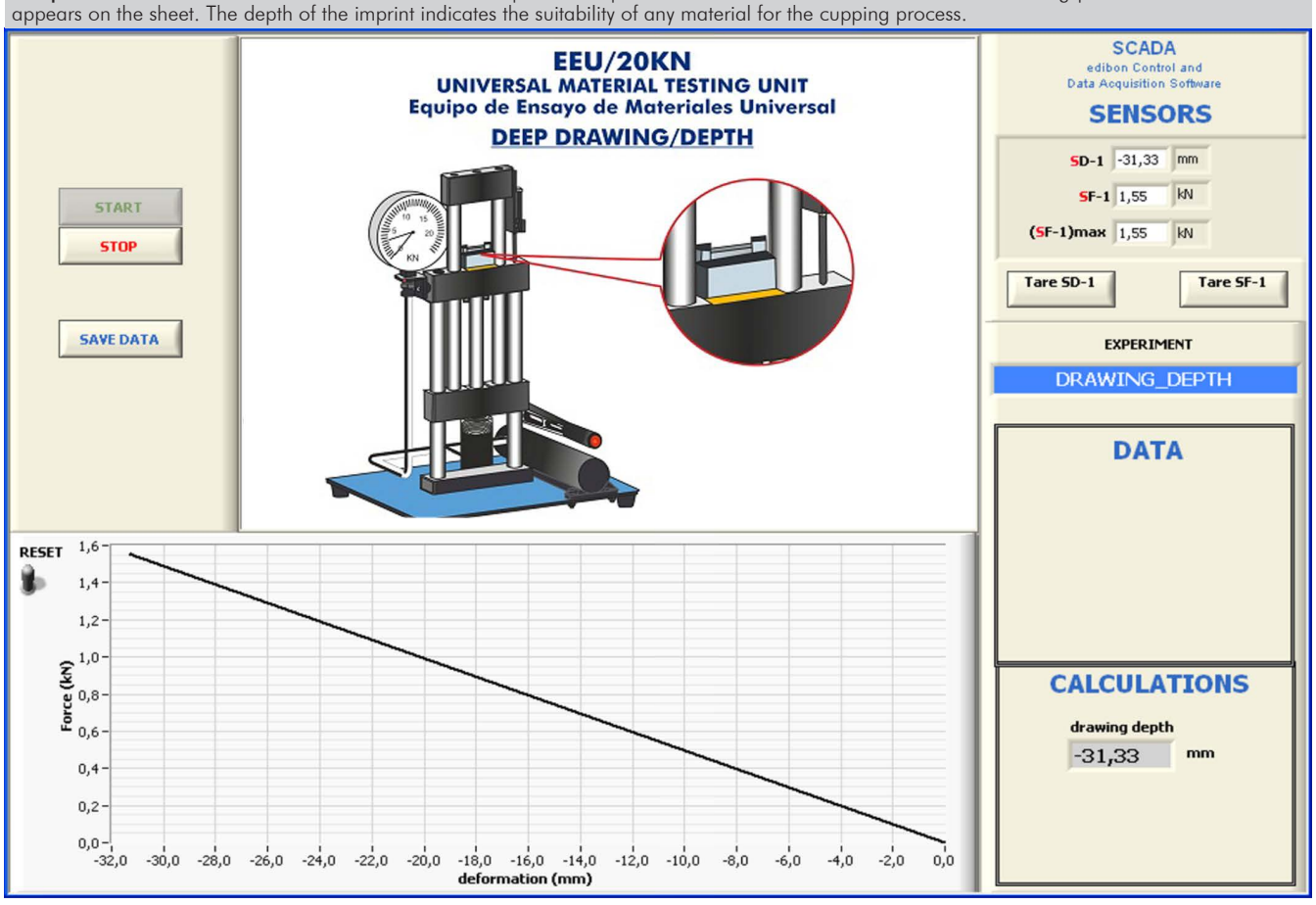
Brinell hardness test is carried out in accordance with DIN EN 10003. A 10 mm diameter hardened steel sphere is pressed into the sample surface with a force F, so that a 2.4 to 6 mm. diameter imprint is formed. The diameter of the imprint "d" and the Brinell Hardness (HBS number) is measured after the force stops acting upon the test sample.



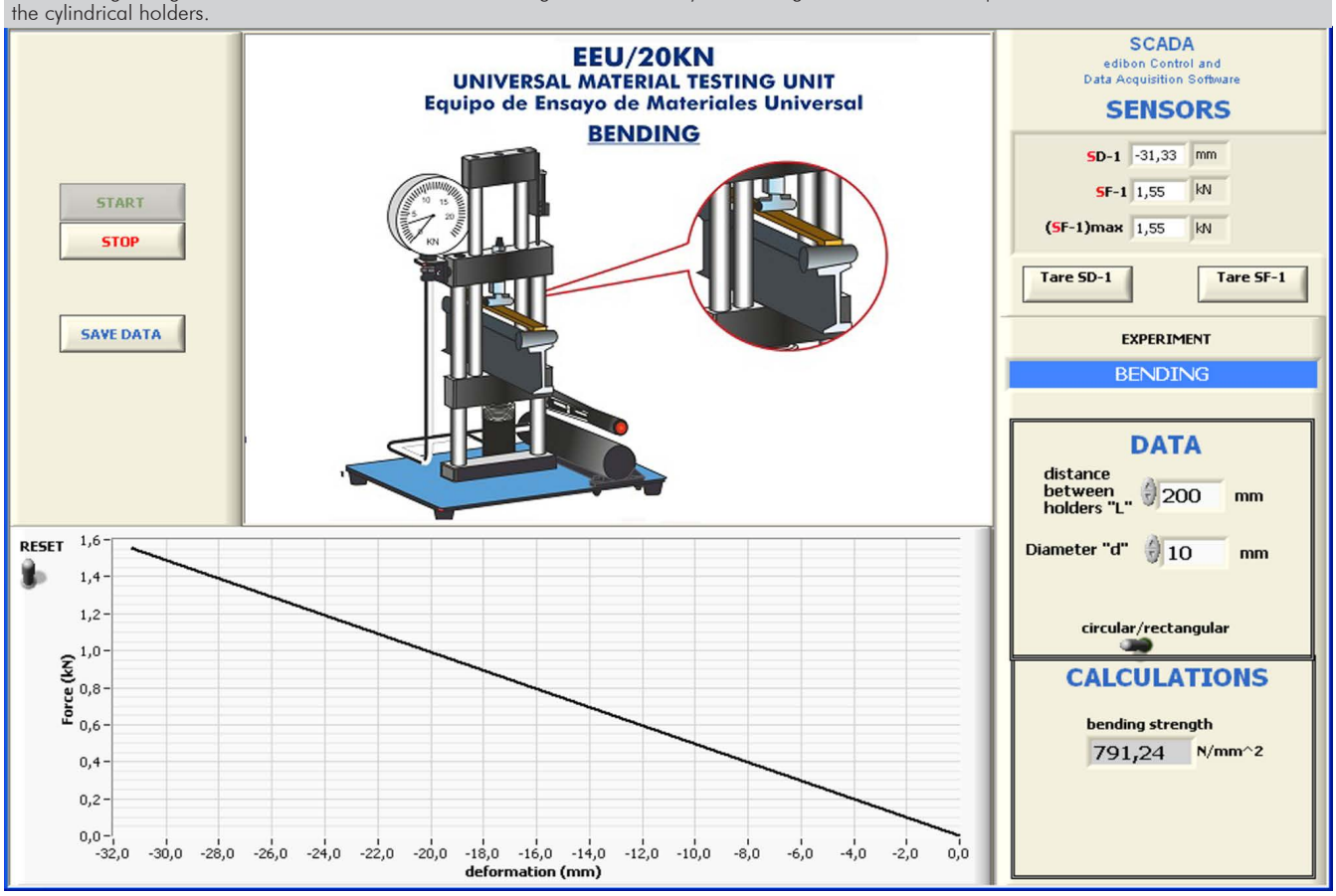
Compression test device is made according to DIN 50106 and test is used to determine the strength of materials, primarily intended for compression loads as well as for brittle materials that do not withstand tensile deformations.
Compression strength of brittle material that breaks up when compressed can be determined through the software by introducing the value of the sample diameter.



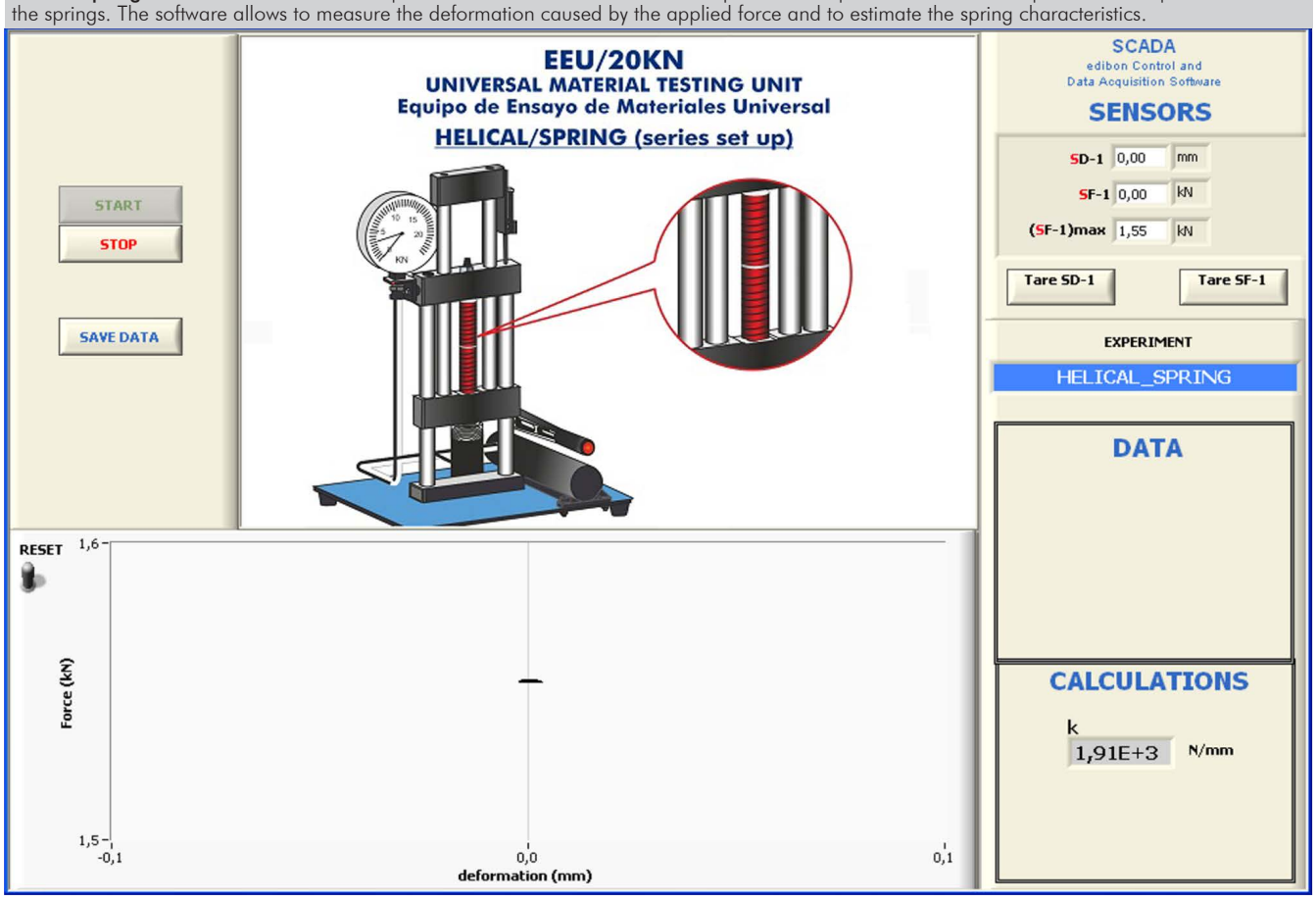
Deep draw test is used for thin sheet metals. A metal sphere is imprinted into a metal sheet mounted in the mounting jaws until the first fracture appears on the sheet. The depth of the imprint indicates the suitability of any material for the cupping process.



Bending test demonstrates the relationship between elastic deformation of the sample and a load. The influence of axial moment of inertia on the size of elastic deformation can be demonstrated by using samples of various shapes. The test is carried out up to a certain deformation or the material would break up.
The bending strength of the material can be measured through the software by introducing the value of the sample diameter and the distance between the cylindrical holders.

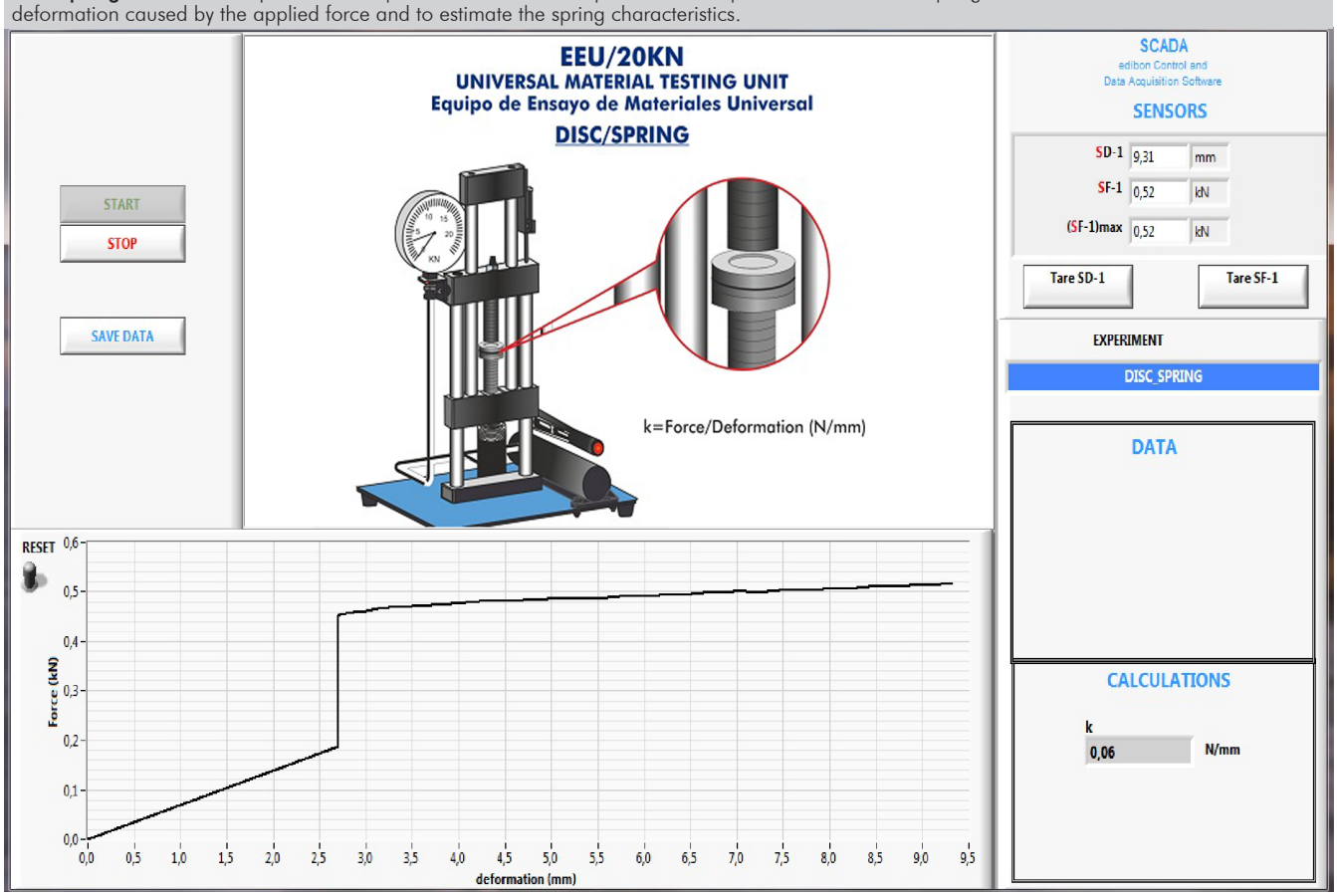


Helical springs can be assembled either in parallel or in series for this test. The objective of this practical exercise is to perform a compression test with the springs. The software allows to measure the deformation caused by the applied force and to estimate the spring characteristics.

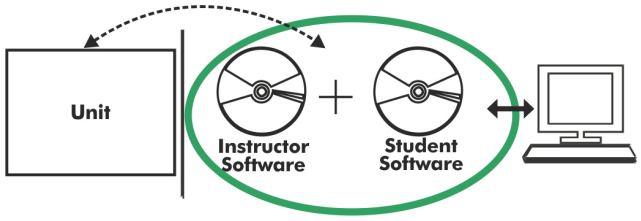


Some **real** results obtained from this unit

Disc springs tests. The objective of this practical exercise is to perform a compression test with the springs. The software allows to measure the deformation caused by the applied force and to estimate the spring characteristics.



EEU/20KN/ICAI. Interactive Computer Aided Instruction Software:



With no physical connection between unit and computer, **this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF)**. Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

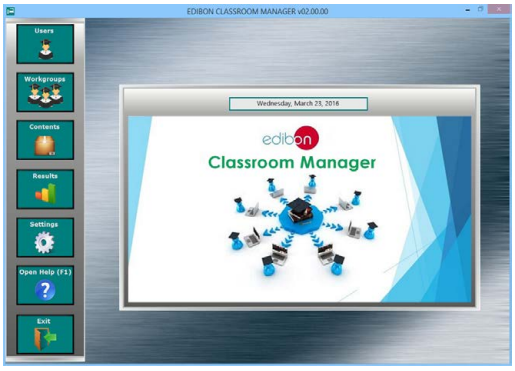
Instructor Software

- ECM-SOF. EDIBON Classroom Manager (Instructor Software).

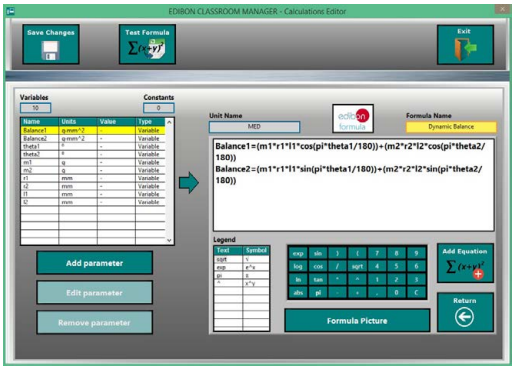
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

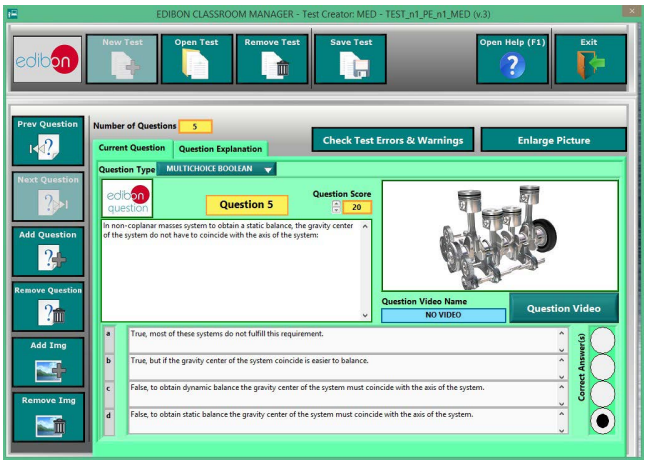
- **User Data Base Management.**
- **Administration and assignment of Workgroup, Task and Training sessions.**
- **Creation and Integration of Practical Exercises and Multimedia Resources.**
- **Custom Design of Evaluation Methods.**
- **Creation and assignment of Formulas & Equations.**
- **Equation System Solver Engine.**
- **Updatable Contents.**
- **Report generation, User Progression Monitoring and Statistics.**



ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



ECAL. EDIBON Calculations Program Package - Formula Editor Screen



ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

Optional

Student Software

- ESL-SOF. EDIBON Student Labsoft (Student Software).

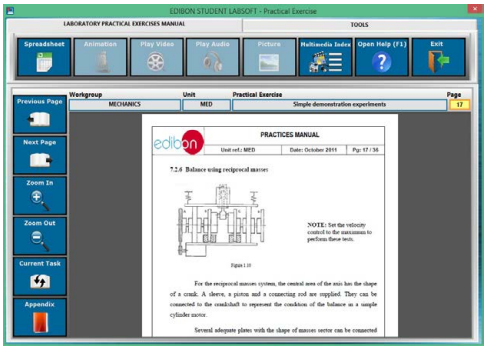
ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

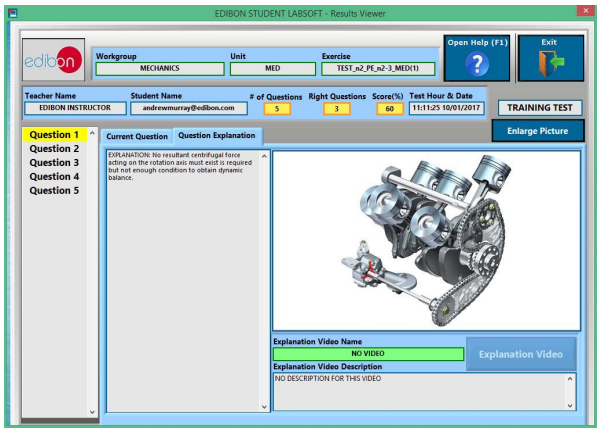
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge and progression.**
- **Test self-correction.**
- **Calculations computing and plotting.**
- **Equation System Solver Engine.**
- **User Monitoring Learning & Printable Reports.**
- **Multimedia-Supported auxiliary resources.**

For more information see **ICAI** catalogue. Click on the following link:
www.edibon.com/en/interactive-computer-aided-instruction-software

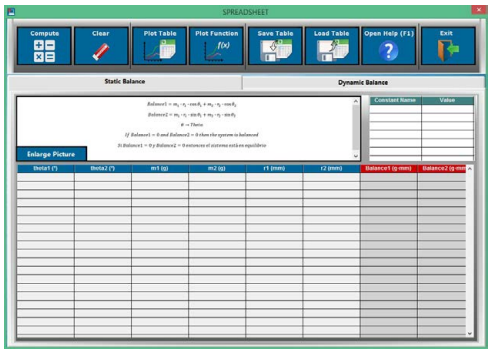
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

✱ Specifications subject to change without previous notice, due to the convenience of improvement of the product.

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REPRESENTATIVE: