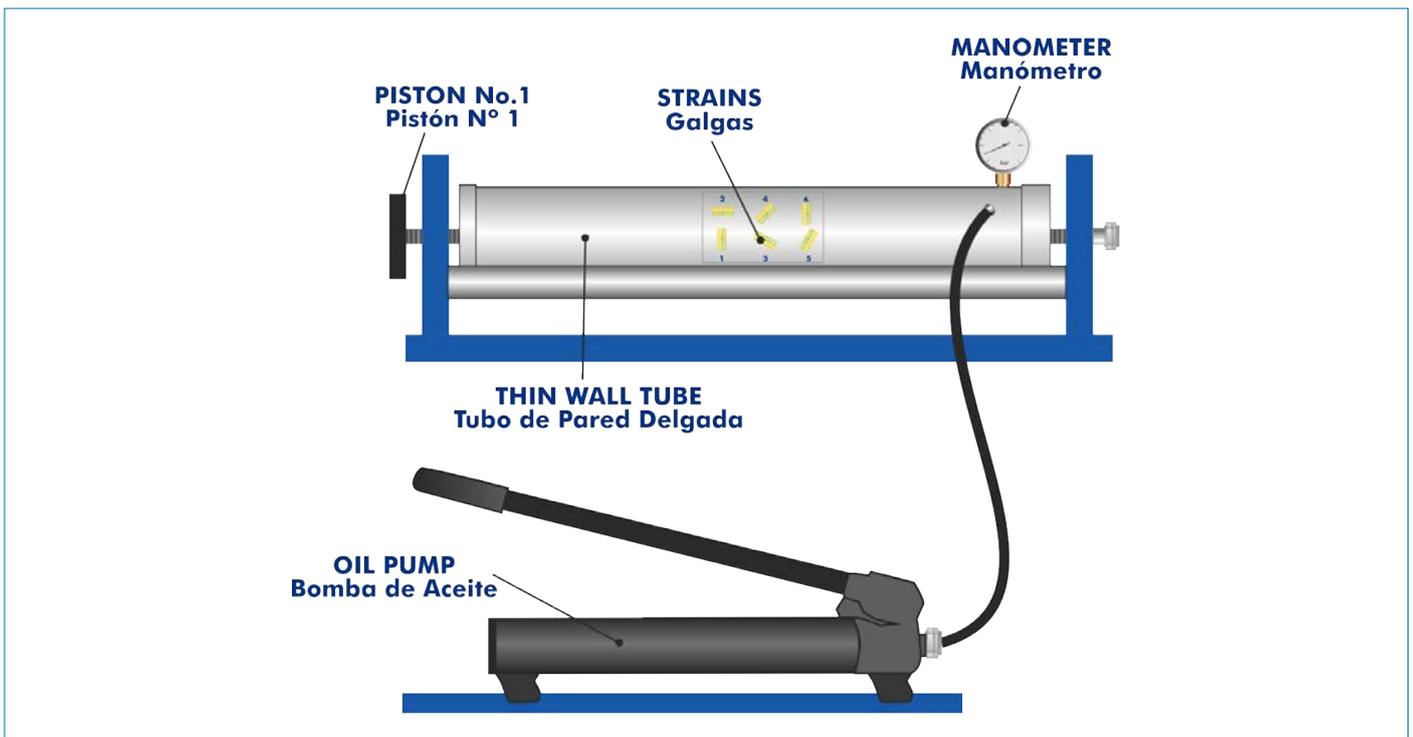




## PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



ISO 9001: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate (total safety)



Certificates ISO 14001 and ECO-Management and Audit Scheme (environmental management)



Certificate and Worlddidac Member

## INTRODUCTION

The wall of a cylinder or vessel is thin when there is a great difference between the thickness of the wall and the diameter of the cylinder or vessel.

Thin wall vessels are used for the analysis of stress and strain. As the walls offer little bending strength, it can be assumed that the internal forces exerted on part of the wall are tangent to the surface of the vessel.

The main stresses are the decisive magnitudes in the calculation and design of these vessels.

The Thin Cylinder Unit, "MCD", permits the study of the stress and strain in a thin wall cylinder under internal pressures.

## GENERAL DESCRIPTION

The Thin Cylinder Unit, "MCD", has been developed to enable the student to verify various analytical formulae with actual measured results. Strain gauges mounted in various positions and orientations on the cylinder provide an opportunity for students to interpret the strains and stresses for a biaxial stress system.

Means are provided in the unit to relieve the cylinder of all longitudinal stress, so that Poisson's Ratio and Young's Modulus for the cylinder material may be accurately determined.

The Thin Cylinder Unit is supplied with a hand operated oil pump.

There is a piston located axially in the thin wall cylinder. It is drilled to suit a pressure gauge and a high pressure resistant flexible rubber hose that connects the hand operated pump to the unit. Besides, this piston has an in-built pressure relief valve and oil from the relief valve returns to the pump reservoir by means of a flexible tube.

The travel outwards is limited by caps.

The cylinder unit, which rests on the four pins, is located axially and supported on a frame by fixed stop and adjustable stop. When the adjustable stop is screwed out, the pressurized oil in the cylinder forces the piston against the caps. When the stop is screwed in, it forces the piston away from the caps and the axial load is taken on the frame, thus relieving the cylinder of all longitudinal stress. Pure axial load transmission from cylinder to frame is ensured by the hardened steel balls located at each end of the cylinder.

Six active strain gauges are attached to the cylinder to record strains generated.

## SPECIFICATIONS

Bench-top unit with adjustable legs.

Anodized aluminum frame and panels made of painted steel.

Diagram in the front panel with distribution of the elements similar to the real one.

### The "MCD" unit mainly consists of:

Cylinder made of an aluminum alloy:

Modulus of elasticity =  $(65 \pm 5) \cdot 10^6$  [N/m<sup>2</sup>].

Poisson's ratio =  $0.34 \pm 0.04$ .

Inside diameter = 70 mm.

Length = 400 mm.

Wall thickness = 3 mm.

Manometer, range: 0 – 40 Bar.

Hydraulic pump:

Capacity: 2.2 cm<sup>3</sup>.

Maximum pressure: 40 Bar.

Safety pressure: 40 Bar.

Reinforced coupling. Maximum pressure: 40 Bar.

Six strain gauges.

Electronic console:

Metallic box.

Connectors of the strain gauges.

Selector of the strain gauges.

Display of the strain gauges measurement.

Switch to tare the strain gauges measurement.

Main switch.

Cables and Accessories, for normal operation.

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



MCD detail

## EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Study of rigidity in the elastic range. Hooke's law and determination of the modulus of elasticity E in an aluminum alloy.
- 2.- Indirect strain due to Poisson's effect. Poisson's ratio ( $\nu$ ).
- 3.- Study of strain under uniaxial application of force. Mohr's circle.
- 4.- Study of strain under biaxial application of force. Mohr's circle.

### REQUIRED SERVICES

- Electrical supply: single-phase, 220 V/50 Hz, 110 V/60 Hz.

### REQUIRED CONSUMABLES (Not included)

- Castor oil: >80% content of ricinoleic acid.

### DIMENSIONS AND WEIGHTS

MCD:

Unit:

-Dimensions: 660 x 400 x 300 mm approx.  
(25.98 x 15.74 x 11.81 inches approx.)

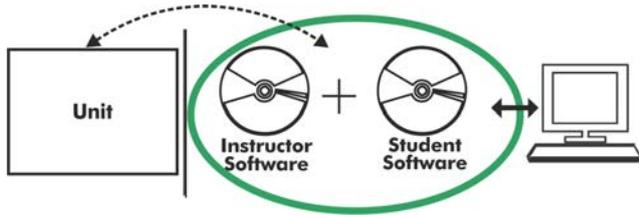
-Weight: 20 Kg approx.  
(44.09 pounds approx.)

Electronic console:

-Dimensions: 310 x 220 x 145 mm approx.  
(12.20 x 8.66 x 5.70 inches approx.)

-Weight: 2 Kg approx.  
(4.4 pounds approx.)

**MCD/ICAI. Interactive Computer Aided Instruction Software System:**



With no physical connection between unit and computer (PC), 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:

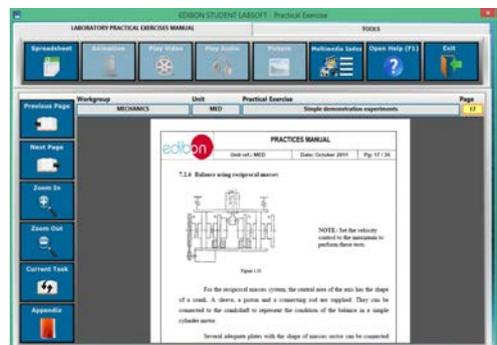
- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.
- 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:

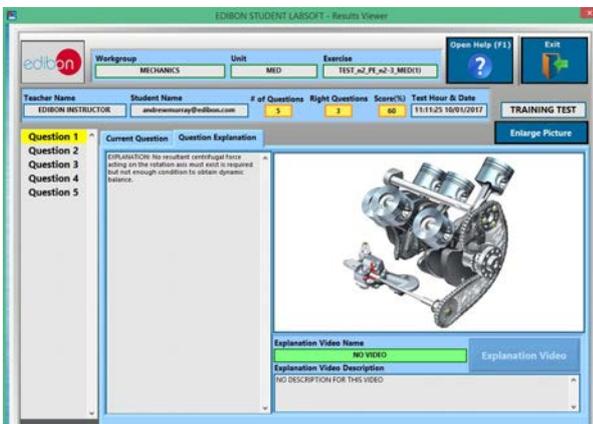
[www.edibon.com/en/files/expansion/ICAI/catalog](http://www.edibon.com/en/files/expansion/ICAI/catalog)



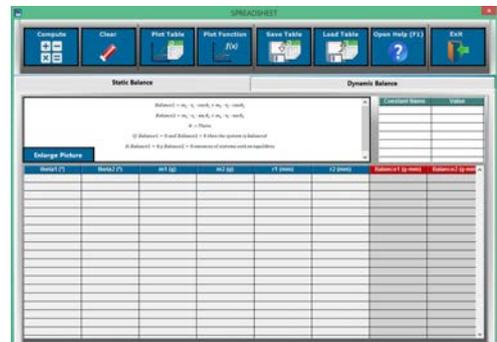
ESL-SOF. EDIBON Student LabSoft (Student Software)  
Application Main Screen



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.



C/ Del Agua, 14. Polígono Industrial San José de Valderas.  
28918 LEGANÉS. (Madrid). ESPAÑA - SPAIN.  
Tel.: 34-91-6199363 Fax: 34-91-6198647  
E-mail: edibon@edibon.com Web: [www.edibon.com](http://www.edibon.com)

Edition: ED01/17  
Date: December/2017

REPRESENTATIVE:

