

INTRODUCTION

An arch is a structure that spans a space and supports structure and weight above it. One of the most common arch configurations is the three-hinged arch. This configuration has two hinges at each end and a third hinge at the highest point (crown) or anywhere in the rib of the arch. The hinges at each end absorb vertical and horizontal forces and are known as abutment hinges or side hinges. The connecting line is the spring line. The crown hinge or central hinge renders the system statically determinate.

The Three-Hinged Arch Unit "MART" allows to investigate two statically determinate three-hinged arches (symmetrical or unsymmetrical) that simulate two different types of bridges.

GENERAL DESCRIPTION

The Three-Hinged Arch Unit "MART" allows the student to become familiar with three-hinged arches, to calculate the bearing forces (for point load, for uniformly distributed load and for moving load), to investigate the influence of the load on the horizontal thrust in the supports, to determine the influence lines and to calculate support reactions.

The unit includes two long arch segments and one short segment, of which two at a time are connected by a central hinge, producing a symmetrical or unsymmetrical three-hinged arch. The arch segments are easily interchangeable. Moreover, the arch segments have two side hinges at their support, thus creating the three hinges.

The left hand hinge allows the arch section to rotate and move horizontally. The right hand hinge is held in position although it allows rotational movement of the arch section.

The arch under investigation can be loaded using a point load, a uniformly distributed load (by weights) or two moving loads, which simulate a vehicle.

The set of weights compensates for the support reactions of the side hinges, thus enabling a comparison between calculated and actual measured values.



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)



"Worlddidac Quality Charter" and Platinum Member of Worlddidac

SPECIFICATIONS

The unit includes:

Frame of anodized aluminum.

Three arch segments to produce a symmetrical or unsymmetrical three-hinged arch:

Two long segments (they make a symmetrical arch together). Length of each long segment: 350mm. Total arch length: 700m.

One short segment (it makes an unsymmetrical arch together with one long segment). Length of the short segment: 160mm. Total arch length: 510m.

Arch height: 178mm.

Three hinges:

One central hinge.

Two side hinges.

Two pulleys with fixture.

One support.

Set of weights with pulleys to compensate for the support reactions of a side hinge and to add load along the bridge:

9 weights of 5N.

12 weights of 2N.

10 weights of 1N.

8 weights of 0.5N.

It includes ten 0.5N weight hangers and two moving loads to produce two point loads of different magnitude (10N+20N).

Storage case for the weights and hangers.

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

EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Familiarization with three-hinged arches.
- 2.- Understanding the characteristics of symmetrical and unsymmetrical three-hinged arches.
- 3.- Study of the method of sections.
- 4.- Application of the method of sections and the conditions of equilibrium to calculate the horizontal thrust for a point load.
- 5.- Application of the method of sections and the conditions of equilibrium to calculate the horizontal thrust for a uniformly distributed load.
- 6.- Application of the method of sections and the conditions of equilibrium to calculate the horizontal thrust for a distributed load.
- 7.- Comparison of the calculated and measured horizontal thrust for a point load.
- 8.- Comparison of the calculated and measured horizontal thrust for a uniformly distributed load.
- 9.- Comparison of the calculated and measured horizontal thrust for a distributed load.
- 10.-Study of the influence line for the supports under a moving load and a point load.
- 11.-Comparison of the influence line for the supports under a moving load and a point load with the calculated values
Additional practical possibilities:
- 12.-Simulation of a vehicle passing over an arch.
- 13.-Investigation of the relationship of the applied loads on the horizontal thrust in the supports.

DIMENSIONS AND WEIGHTS

MART:

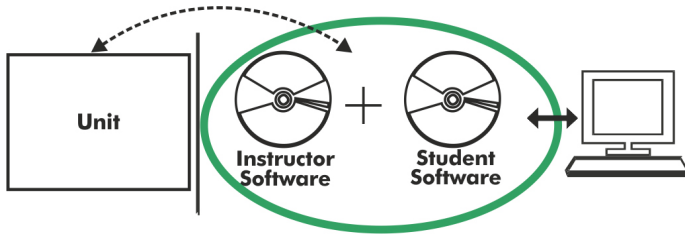
Unit:

- Dimensions: 900 x 400 x 700 mm. approx. (35.43 x 15.75 x 27.56 inches approx.).
- Weight: 40 Kg. approx. (88 pounds approx.)

Storage case for the weights and hangers:

- Dimensions: 350 x 300 x 170 mm. approx. (13.78 x 11.81 x 6.69 inches approx.).
- Peso: 10 Kg. approx. (22pounds approx.)

MART/ICAI. Interactive Computer Aided Instruction Software System:



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.

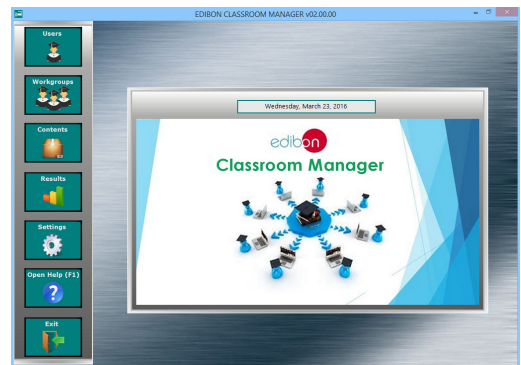
Instructor Software

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

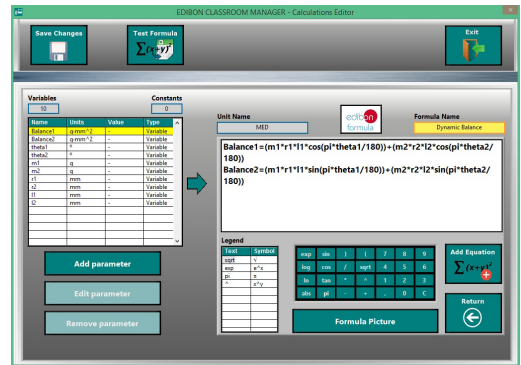
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

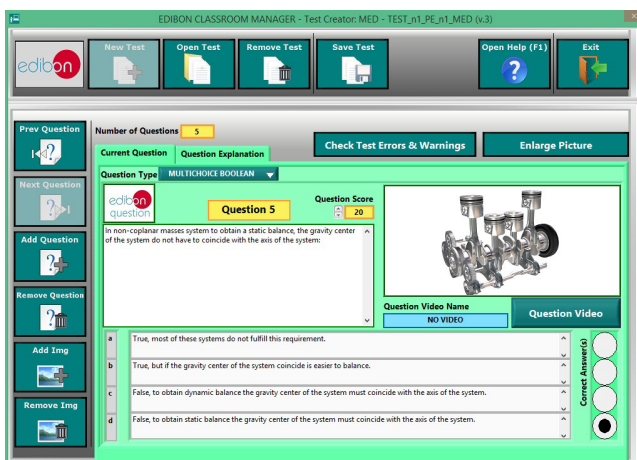
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



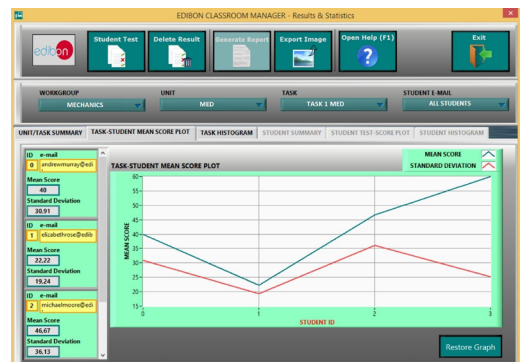
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



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).

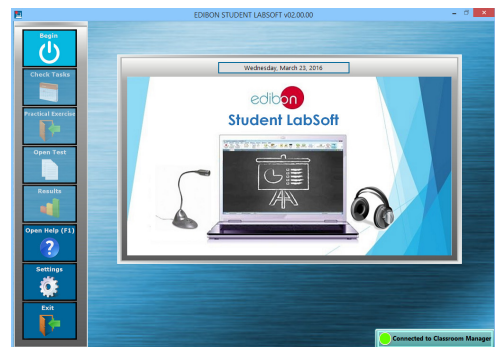
ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are 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:

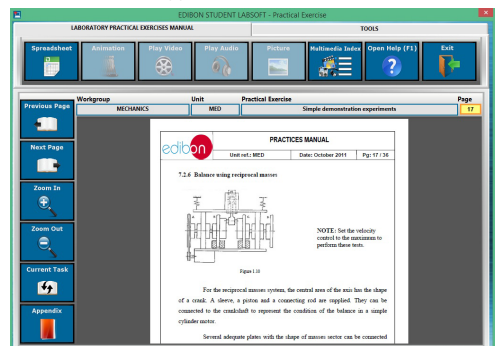
- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.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

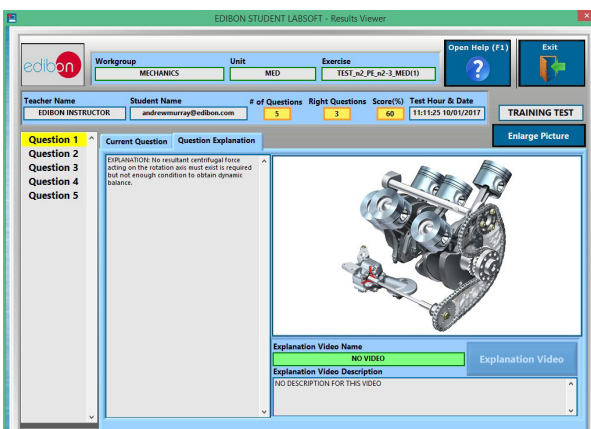
www.edibon.com/en/files/expansion/ICAI/catalog



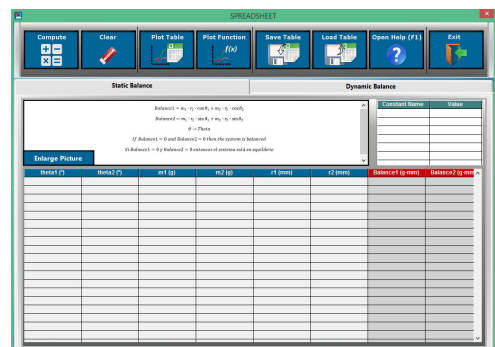
ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen



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/ Julio Cervera, 10-12-14. Móstoles Tecnológico.
28935 MÓSTOLES. (Madrid). ESPAÑA - SPAIN.
Tel.: 34-91-6199363 Fax: 34-91-6198647

E-mail: edibon@edibon.com Web: www.edibon.com

Edition: ED01/18
Date: September/2018

REPRESENTATIVE:

