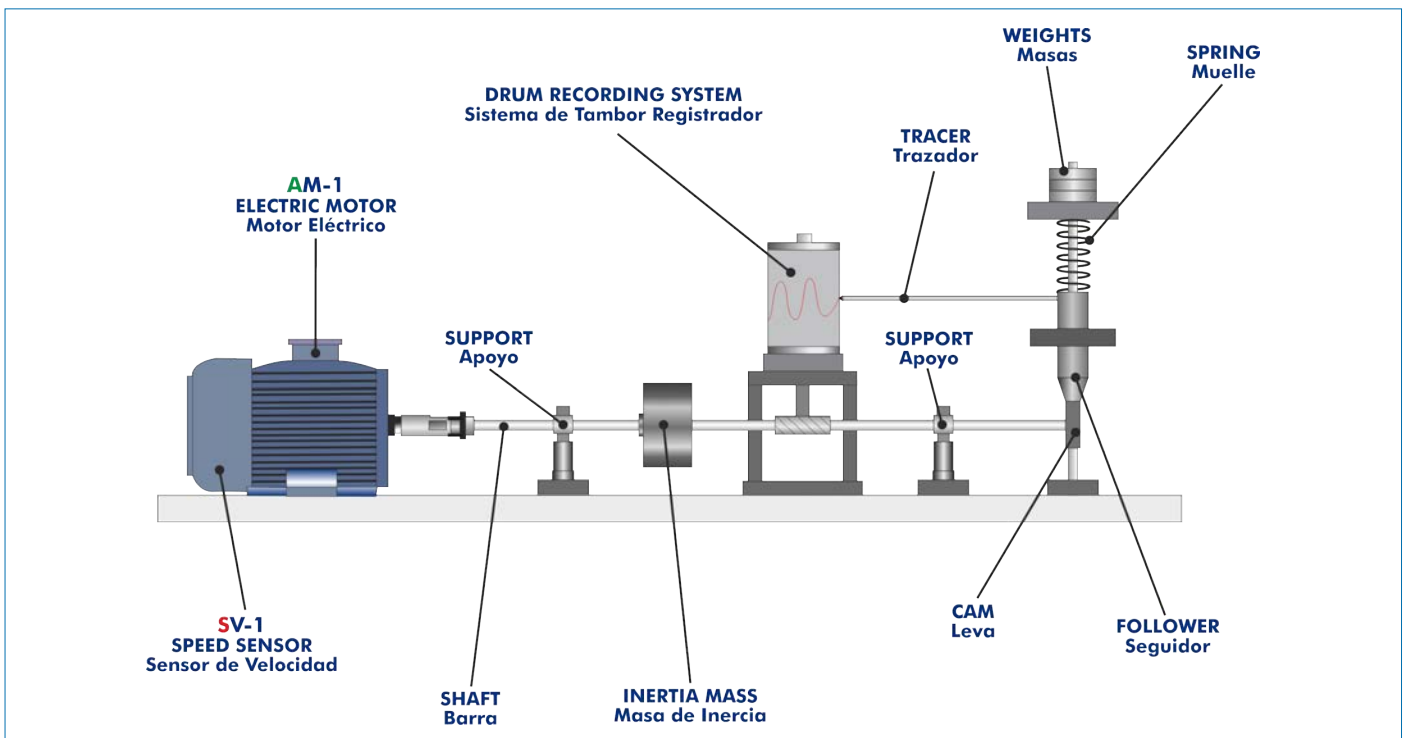


Electronic console

## 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)



"Worlddidac Quality Charter" and Platinum Member of Worlddidac

## INTRODUCTION

A cam is a mechanical element that rotates or moves forwards and backwards to create a set motion in contact with an element known as follower.

In fact, a cam can be employed to obtain an unusual or irregular motion that would be difficult to obtain with any other coupling.

The rising and falling speed of the follower can be controlled in function of the profile of the cam. When the cam completes one turn, the follower performs a series of motions that consists of rising, stopping and returning.

The Cam Analysis Unit, "MEAL", allows the students to observe and study the dynamic behavior of the cam mechanisms under several operation conditions.

## GENERAL DESCRIPTION

The Cam Analysis Unit, "MEAL", allows to observe the effect of the profile of a cam, the study of the displacement, velocity and acceleration profiles of the cam and the identification of the factors that can modify the dynamics of the cam.

This unit consists of a motor, an extension shaft, a set of interchangeable cams, several different followers, a set of springs and weights and a drum recording system to register the lifting and displacement of the cam.

The motor is coupled to an extension shaft that allows to rotate the cams. The cams are easily mounted at the end of the fixed shaft. A large inertia mass is connected between the motor and the cam to guarantee a constant operation at several speeds.

The follower is coupled to a shaft that moves vertically and includes weights and springs, employed to simulate a valve. The upper end of the spring surrounds the vertical shaft. The compression spring will push the follower on the face of the cam.

The stress of the spring and the inertia of the follower can be modified using different weights. Several interchangeable springs are supplied to change the operation of the valve and its response. To demonstrate the "oscillation of the valve", the springs, the weights and the velocity can be modified.

The tracer draws a register of the lifting and displacement of the cam on a piece of paper (displacement curves) using the drum recording system.

The paper is attached to a cylindrical drum register to represent the motion of the cam.

The design guarantees that the elements of the unit can be observed during the motion process. For that purpose, a transparent safety cover is fitted over the unit.

A speed sensor measures the speed of the motor during the practical exercises. The unit includes a console with a digital screen to show the speed of the motor.

## SPECIFICATIONS

Bench-top unit.

Anodized aluminum frame and panels made of painted steel.

Main metallic elements made of stainless steel.

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

Electric motor with variable speed:

Power: 250 W approx.

Velocity: 0 – 670 rpm approx.

Velocity controlled from the console. The unit allows to measure the velocity of the motor and visualize it in the screen of the console.

Extension shaft made of stainless steel.

Speed sensor, range: 0 – 1000 rpm.

Six interchangeable cams:

Two circular cams with different radii of lateral curvature.

Concave cam.

Tangent cam.

Eccentric cam.

Oval cam.

Two different followers:

Roller follower.

Flat surface follower.

Three interchangeable springs with different constants. Values: 5.026 N/mm, 2.601 N/mm and 0.613 N/mm.

Weight of 200 g.

Drum recording system, consisting of a tracer and a recording drum.

Transparent safety cover.

Electronic console:

Metallic box.

Connector of the speed sensor.

Connector of the motor.

ON/OFF controller of the motor.

Speed control of the motor.

Digital screen for the speed of the motor.

The unit includes rolls of graph paper and several marker pens.

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.



MEAL detail: Cams

## EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Observation of the effect of the cam profile on the dynamics of the cam.
  - 2.- Comparison of different cam designs.
  - 3.- Theoretical study of the displacement, velocity and acceleration profiles of different types of cams and followers.
  - 4.- Experimental study of the displacement profiles of different types of cams and followers.
  - 5.- Comparison of the theoretical and experimental displacement curve of the cams with different types of springs, weights and rates.
  - 6.- Study of the influence of a moving mass.
  - 7.- Study of the influence of the spring rigidity.
  - 8.- Study of the influence of the rotation axis of the cam.
  - 9.- Experimental study of the limit velocity.
- Additional practical possibilities:
- 10.-Study of the inertia of the follower and compression rate of the spring.
  - 11.-Plotting of lift curves for non-matching tracer.
  - 12.-Plotting of lift curve for skipping tracer.

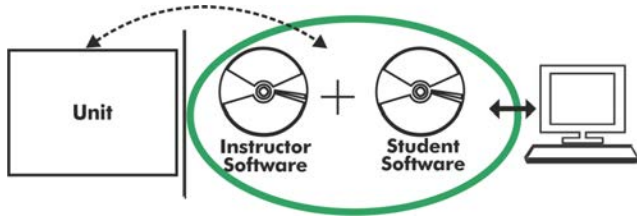
### REQUIRED SERVICES

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

### DIMENSIONS AND WEIGHTS

- MEAL:
- Unit:
- Dimensions: 750 x 500 x 500 mm approx.  
(29.53 x 19.68 x 19.68 inches approx.)
  - Weight: 70 kg approx.  
(154.3 pounds approx.).
- Electronic console:
- Dimensions: 490 x 330 x 310 mm. approx.  
(19.29 x 12.99 x 12.20 inches approx.)
  - Weight: 10 kg approx.  
(22 pounds approx.).

**MEAL/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.

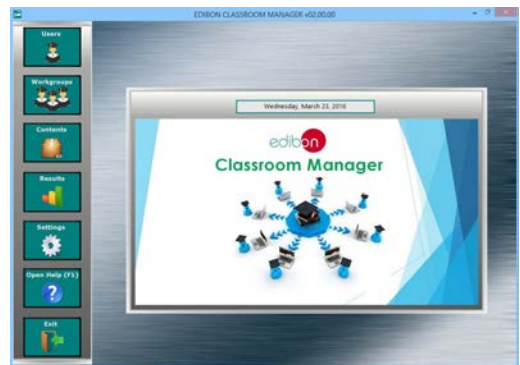
Instructor Software

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

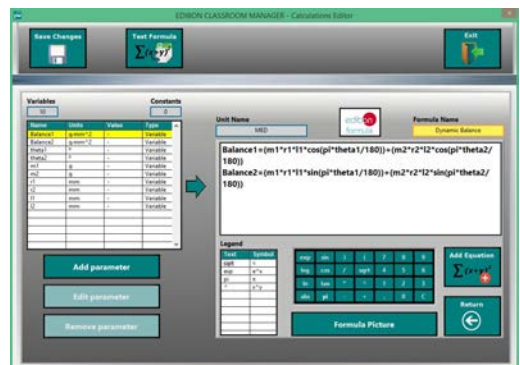
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

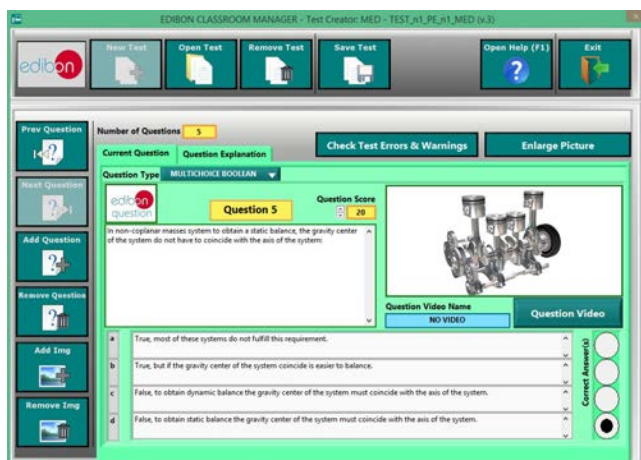
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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

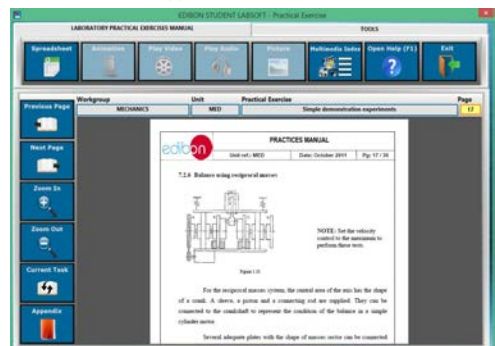
- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.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

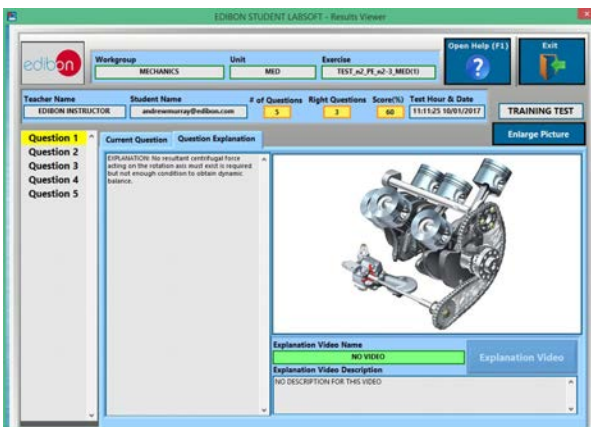
[www.edibon.com/en/files/expansion/ICAI/catalog](http://www.edibon.com/en/files/expansion/ICAI/catalog)



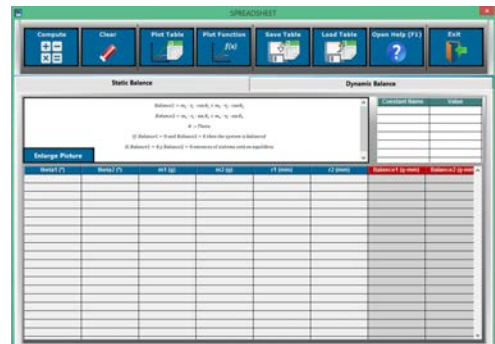
ESL-SOF. EDIBON Student LabSoft (Student Software)  
Application Main Screen



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.



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REPRESENTATIVE:

