edibon

Engineering and Technical
Teaching Equipment

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION

ROTOR DISC
Disco Rotor

COUNTERWEIGHT
Contrapeso

WEIGHT
Peso

AM-1
ROTATING MOTOR
Motor Rotativo

AM-2
PRECESSION MOTOR
Motor de Precesión
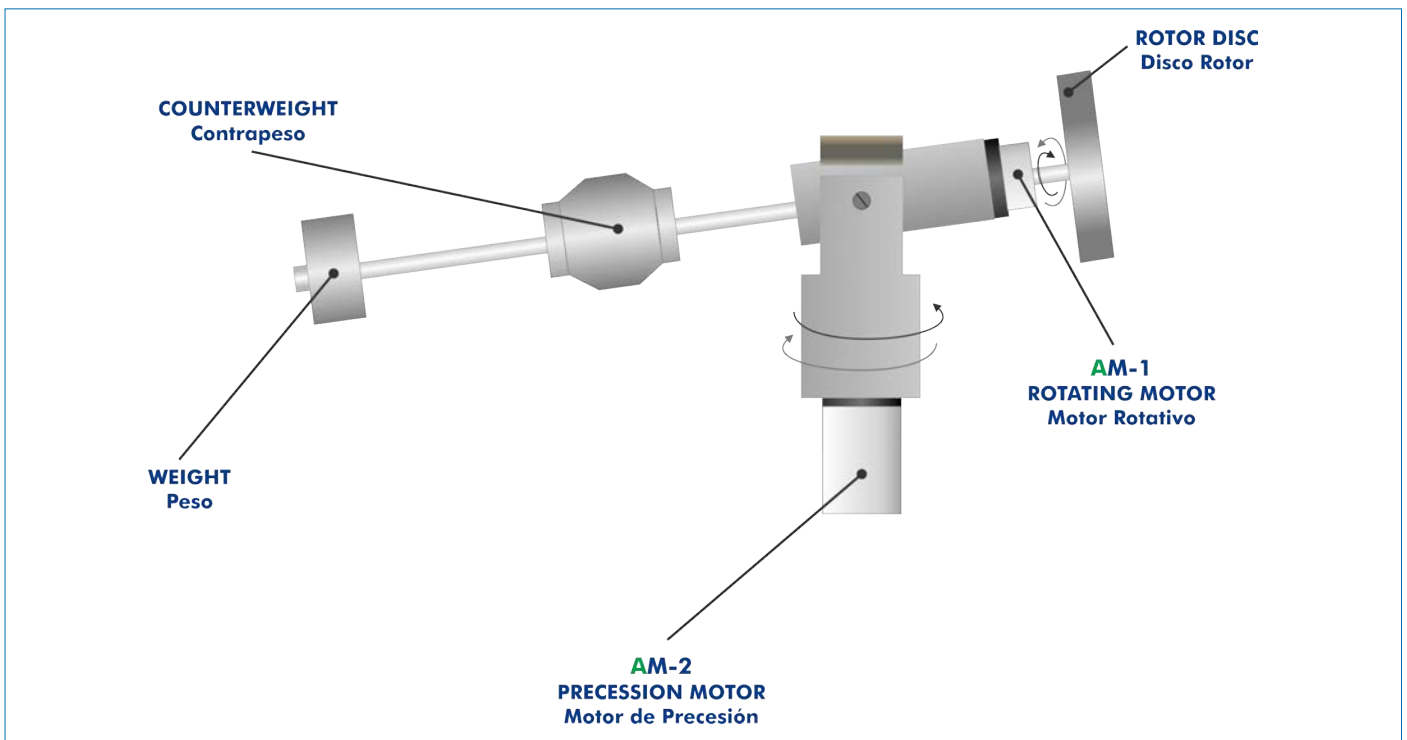
ISO 9001: Quality Management (for
Design, Manufacturing, Commercialization
and After-sales service)

European Union Certificate
(total safety)

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

Certificate and Worlddidac
Member

INTRODUCTION

A gyroscope is defined as a rigid rotating object, composed of an electrical motor rotor coupled to a horizontally supported shaft (torque arm) with a rotor disc. A second electric motor turns a turntable under the gyroscope, causing precession about a vertical axis. Precession describes a change in the direction of the axis of a rotating object, so in this case a change in the spin axis of the gyroscope is generated.

Gyroscopic action occurs whenever the axis of a rotating object (rotor disc) is made to change its direction. The angular momentum of the rotating object causes the axis of rotation to remain in the same direction as long as no external couple acts on the system. However, if a turning couple is applied to the axis, a torque reaction (or "gyroscopic couple") is produced, which tends to turn the axis in a plane at right angles to the plane in which the applied couple acts. This torque reaction results from attempting to alter the direction of angular momentum of the rotating object.

The study of gyroscopic action is important in the field of vehicle engineering. The gyroscopic couple produced by rotating components can often lead to undesirable effects which affect the stability of vehicles.

The Gyroscope, "MGI", allows the demonstration of the gyroscopic effects and enables the relationship between the gyroscopic couple and the direction of rotation (or "precession") of the gyroscope axis to be determined.

GENERAL DESCRIPTION

The Gyroscope, "MGI", allows the experimental demonstration of the different rotation modes of a gyroscope and the moments generated by the gyroscopic effect.

The rotor of the electric motor (rotating motor) shares a horizontally supported shaft (torque arm) with a rotor disc about its own axis. The rotor disc is mounted together with its motor as a yoke and forms the gyroscope. A second electrical motor (precession motor) turns a turntable under the gyroscope, causing precession about a vertical axis. The speed of both motors are electronically regulated and independently controlled. The rotational velocity of the rotating motor and the precession motor can be visualized in digital displays (in the electronic console).

The gyroscopic moment can be preselected by positioning a counterweight with retaining screws at different radii.

Additional weights can be attached to the end of the torque arm to balance the gyroscopic couple produced when the rotor disc is spinning and the gyroscope is being rotated (precessed) about the vertical axis.

A transparent protective cover provides protection against rotating parts and enables different experiments to be observed. Opening this cover automatically stops the two electrical motors.

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.

Gyroscope, consists of:

   Rotor disc, diameter: 80 mm.

   Torque arm, length: 240 mm approximately.

   Counterweight with retaining screws to preselect the gyroscopic moment.

   Two motors:

      Rotating motor, speed range: 0 – 6000 rpm.

      Precession motor, speed range: 0 – 60 rpm.

      Both motors are electronically regulated and independently controlled. They can rotate clockwise or anticlockwise.

Transparent protective cover, made of PMMA, provides protection against the rotating parts and enables different experiments to be observed. This cover includes a safety switch, which allows automatically stops the two electrical motors if the cover is opened.

A **bull's eye level** is provided to enable to level the unit.

Weights:

   1 x 250 g, 1 x 200 g, 1 x 150 g, 1 x 100 g, 1 x 50 g.

Electronic console:

   Metallic box.

   Main on/off switch.

   Motors connections.

   ON/OFF switch for the rotating motor.

   ON/OFF switch for the precession motor.

   Rotating motor direction switch.

   Precession motor direction switch.

   Rotating motor speed controller.

   Precession motor speed controller.

   Digital display for the rotating motor speed.

   Digital display for the precession motor speed.

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 Manual.
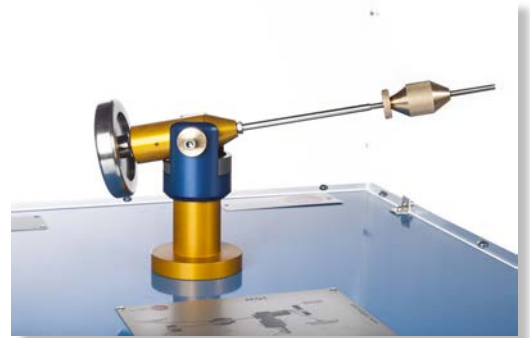
MGI detail

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Study of the laws of gyroscopes.

2.- Demonstration of the precession and stability of a gyroscope system.

3.- Investigation of gyroscopic couple direction for each combination of the rotor and the precession directions.

4.- Study of the magnitude of gyroscope couple in function of the rotor velocity and the precession velocity.

5.- Determination of the moment of inertia of the gyroscope rotor.

6.- Demonstration of the independent influence of precession velocity with the gyroscope couple.

7.- Demonstration of the independent influence of rotor velocity with the gyroscope couple.

REQUIRED SERVICES

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

DIMENSIONS AND WEIGHTS

MGI:

Unit:

-Dimensions: 600 x 600 x 540 mm approx.

(23.62 x 23.62 x 21.26 inches approx.)

-Weight: 20 Kg approx.

(44 pounds approx.)

Electronic console:

-Dimensions: 300 x 190 x 130 mm approx.

(11.81 x 7.48 x 5.12 inches approx.)

-Weight: 3 Kg approx.

(6.6 pounds approx.)

MGI/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.
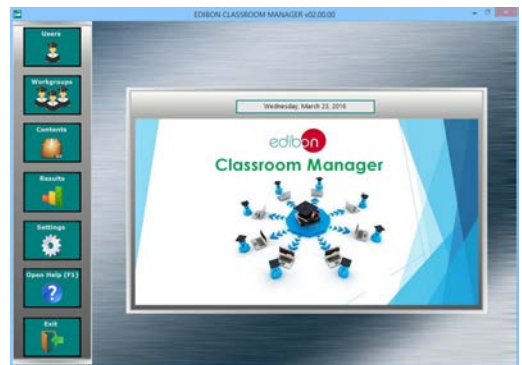
Instructor Software

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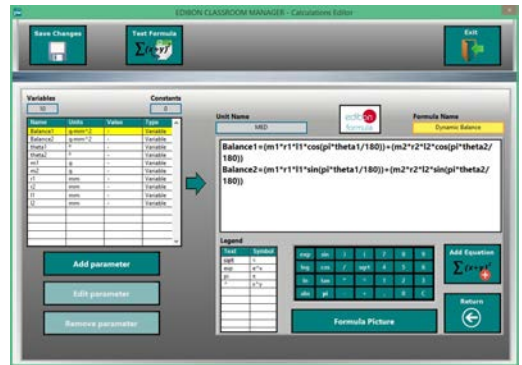
ECAL. EDIBON Calculations Program Package - Formula Editor
Screen
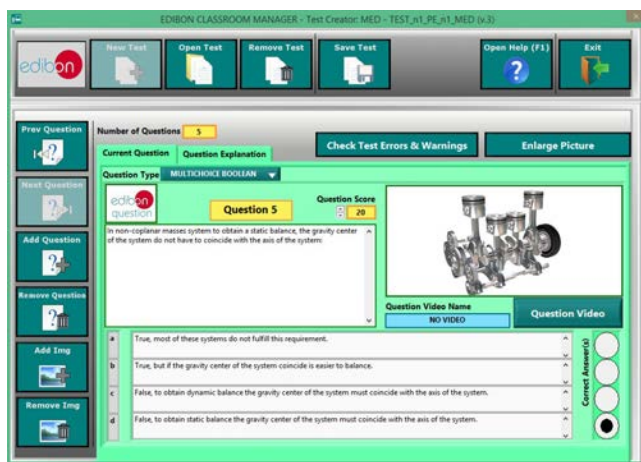
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with
Numeric Result Question

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

- 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.

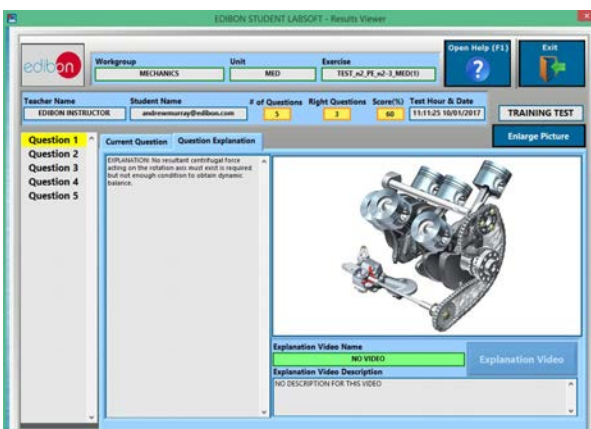For more information see ICAI catalogue. Click on the following link:
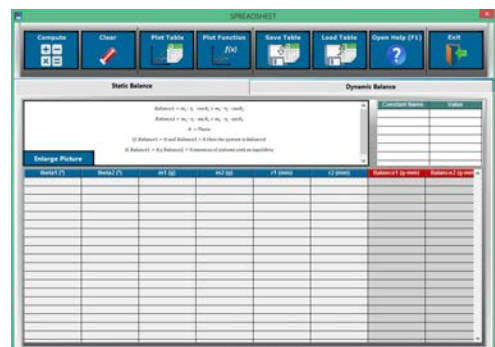www.edibon.com/en/files/expansion/ICAI/catalog

ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen
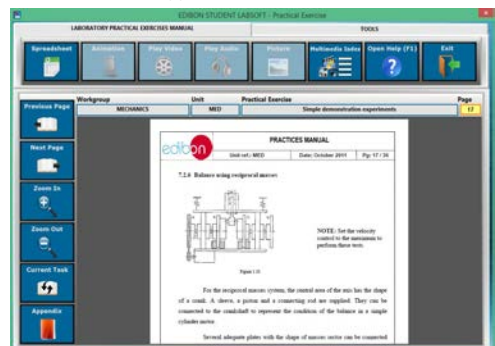
EPE. EDIBON Practical Exercise Program Package Main Screen

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.

edibon
INTERNATIONAL

REPRESENTATIVE: