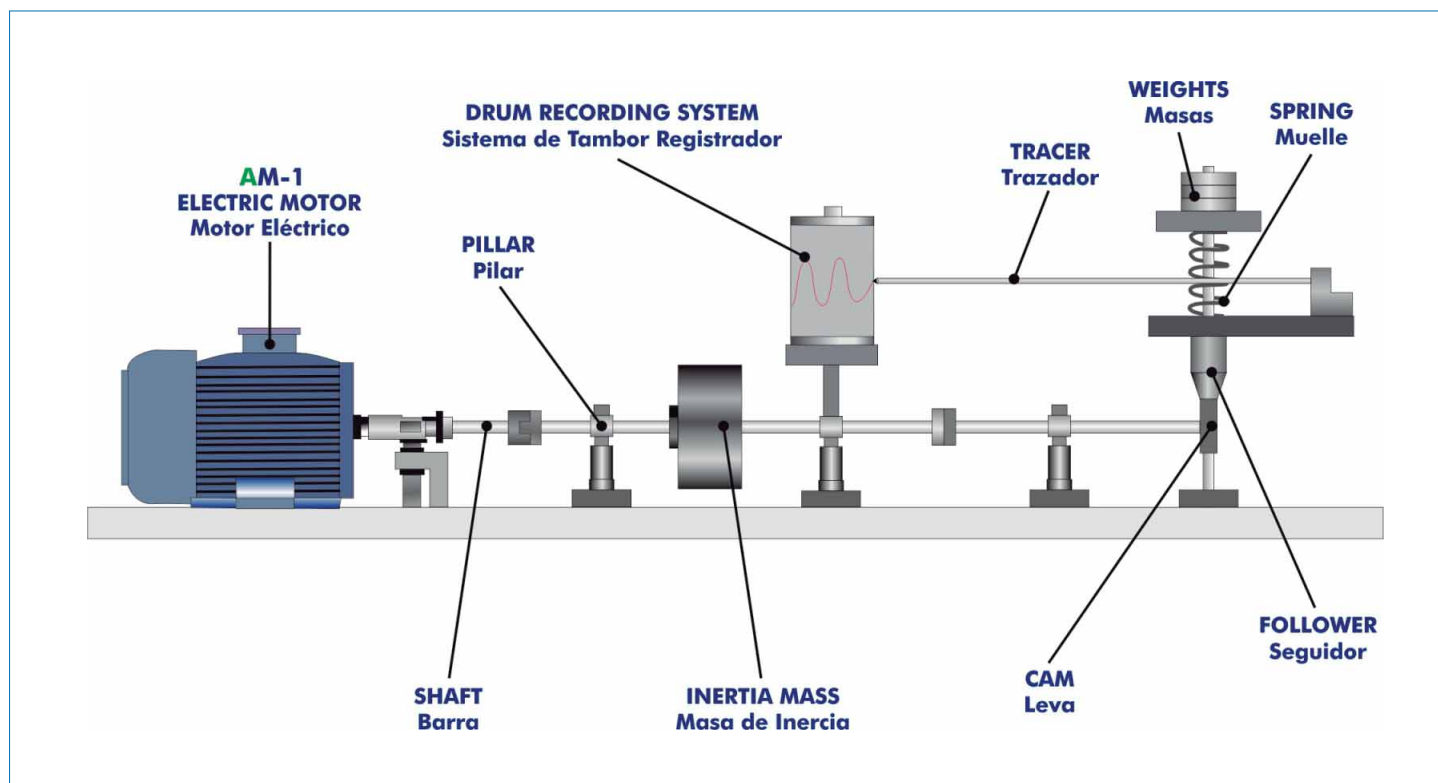




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Products
Products range
Units
7.-Mechanics & Materials

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



ISO 9000: Quality Management
(for Design, Manufacturing,
Commercialization and After-sales service)



European Union Certificate
(total safety)



Certificates ISO 14000 and
ECO-Management and Audit Scheme
(environmental management)



Worlddidac Quality Charter
Certificate and
Worlddidac Member

INTRODUCTION

A cam is a machine component that either rotates or moves back and forth (reciprocates) to create a prescribed motion in a contacting element known as a follower. In fact, the cam can be used to obtain unusual or irregular motion that would be difficult to obtain from other linkage.

The rate of the follower moving up and down can be controlled in function the profile of the cam. When the cam completes one rotation, the follower executes a series of motions consisting of rising, falling and dwelling.

The Cam Analysis Unit (MEAL), allows students to observe and study the dynamic behaviour of cam mechanisms, as used in motors for actuation of valves, under various operating conditions.

GENERAL DESCRIPTION

The Cam Analysis Unit (MEAL) allows the observation of the effect of a cam profile, the study of the displacement, velocity and acceleration profile of the cam and the identification of the factors which may modify the cam dynamics.

This unit consists of a motor, an extension shaft, a set of interchangeable cams, a follower with different tracers, a set of springs and weights and a drum recording system to record the cam elevation and displacement.

The motor is coupled to an extension shaft and allows to rotate the cams. The cams are easily mounted on the free end of the shaft. A large inertia mass is connected between the motor and the cam to ensure consistent running at various speeds.

The follower attaches to a vertically moving shaft with weights and springs, which are used to simulate a valve. The top end of the spring is supported by a crossbar mounted on two vertical pillars on the base plate. A vertical compression spring pushes the follower onto the cam face.

The spring tension and the inertia of the follower can be modified using different weights. Several interchangeable springs are supplied which allows the valve operation and response to be varied. In order to demonstrate the "valve wobble", the spring rate, mass and speed are adjustable over a wide range.

The tracer draws a record of the cam elevation and displacement on paper (lift curves), using the drum recording system. The paper is fastened to a cylindrical drum recorder to trace the movement of the cam.

The design ensures that the elements of the unit can be observed during the movement process. Safety guards are supplied, which fit over all the moving parts of the unit when running.

The unit includes a console with a digital display to show the motor speed.

A stroboscope (not supplied) can be used to provide a view of the cam movement process.

SPECIFICATIONS

Bench-top unit.

Unit mounted on an anodized aluminum structure with panel in painted steel.

Main metallic elements in stainless steel.

Diagram in the panel with similar distribution to the elements in the real unit.

Electric motor with variable speed:

Power: 250W approx.

Speed: 0-670 rpm approx.

Speed controlled from the console. The unit allows to measure the motor speed and to visualize it in the console display.

An extension shaft made of stainless steel.

Four interchangeable cams:

Two circular cams with different head radius.

One hollow cam.

One tangent cam.

Follower with 2 tracers:

One roller.

One flat face.

Three interchangeable springs with different rigidity to simulate a valve.

Five weights to simulate a valve. Weight: 40 g., each one.

Drum recording system, consisting of a drum plotter with plotting spring and coated paper.

Protective guards made of transparent plastic.

Console:

Metallic box.

Motor connector.

Motor speed controller.

Digital display for the motor speed.

The unit includes a combination wrench and blocks of plotter paper.

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.

EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Observation of the effect of cam profile on the cam dynamics.
- 2.- Comparison of different cam designs.
- 3.- Study of the displacement, velocity and acceleration profile of cam.
- 4.- Determination of the limit speed and comparison with the theoretical value.
- 5.- Study of the variable follower inertia and compression spring rate.
- 6.- Plotting of lift curves for non-matching tracer.
- 7.- Plotting of lift curve for skipping tracer.
- 8.- Comparison of the theoretical and experimental lift curve with different spring rate, tensions, tapped weight and speed.
- 9.- Study of the influence of a moving mass.
- 10.- Study of the influence of the spring rigidity.
- 11.- Study of the relationship between cam and spring force.
- 12.- Identification of the factors which may improve the cam dynamics.

REQUIRED SERVICES

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

RECOMMENDED ACCESSORIES

- Stroboscope.

DIMENSIONS & WEIGHTS

MEAL:

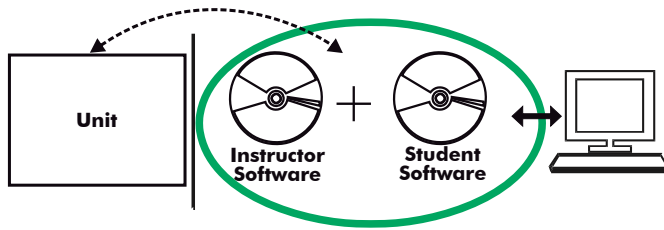
Unit:

- 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.)

Console:

- Dimensions: 300 x 190 x 130 mm. approx.
(11.81 x 7.48 x 5.11 inches approx.)
- Weight : 2.5 kg. approx.
(5.51 pounds approx.)

MEAL/CAI. Computer Aided Instruction Software System:



With no physical connection between unit and computer (PC), this complete software package consists of an Instructor Software (INS/SOF) totally integrated with the Student Software (MEAL/SOF). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

Example of software screens

Instructor Software

INS/SOF. Classroom Management Software (Instructor Software):

The Instructor can:

- Organize Students by Classes and Groups.
- Create easily new entries or delete them.
- Create data bases with student information.
- Analyze results and make statistical comparisons.
- Generate and print reports.
- Detect student's progress and difficulties.
- ...and many other facilities.

This software, working in network configuration, allows controlling all the students in the classroom.



Student Software

MEAL/SOF. Computer Aided Instruction Software (Student Software):

It explains how to use the unit, run the experiments and what to do at any moment.

- This software contains:

Theory: gives the student the theoretical background for a total understanding of the studied subject.

Exercises: divided by thematic areas and chapters to check out that the theory has been understood.

Guided Practices: presents several practices to be done with the unit, showing how to perform the exercises and practices.

Exams: set of questions to test the obtained knowledge.



For more information see CAI catalogue. Click on the following link:
www.edibon.com/products/catalogues/en/CAI.pdf

MEAL/CAL. Computer Aided Learning Software (Results Calculation and Analysis):

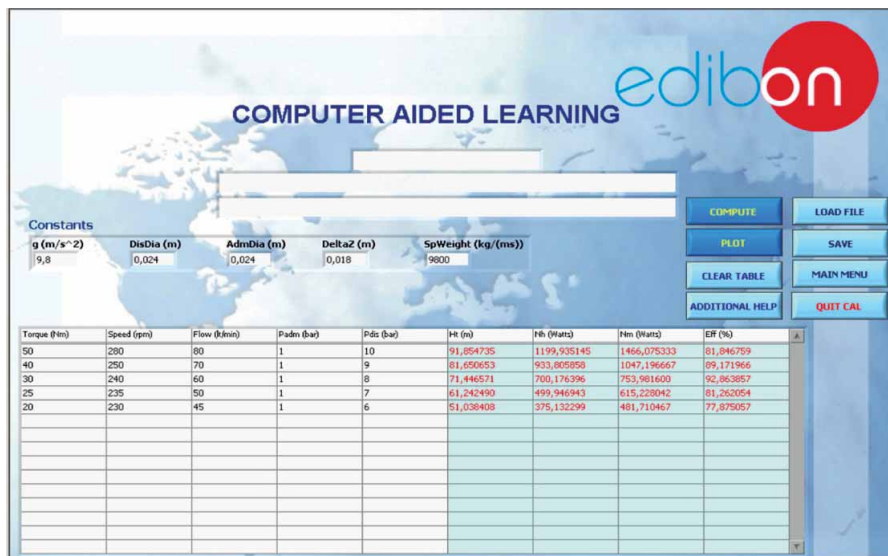
This Computer Aided Learning Software (Results Calculation and Analysis) "CAL" is a Windows based software, simple and very easy to use, specifically developed by EDIBON.

CAL is a class assistant that helps in doing the necessary calculations to extract the right conclusions from data obtained during the experimental practices. With a single click, CAL computes the value of all the variables involved and performs the calculations.

Also, CAL allows to plot and print the results. Within the plotting options, any variable can be represented against any other.

Available different plotting displays.

It has a wide range of information, such as constant values, unit conversion factors and integral and derivative tables.



On a table, we introduce data obtained during the development of the exercise.

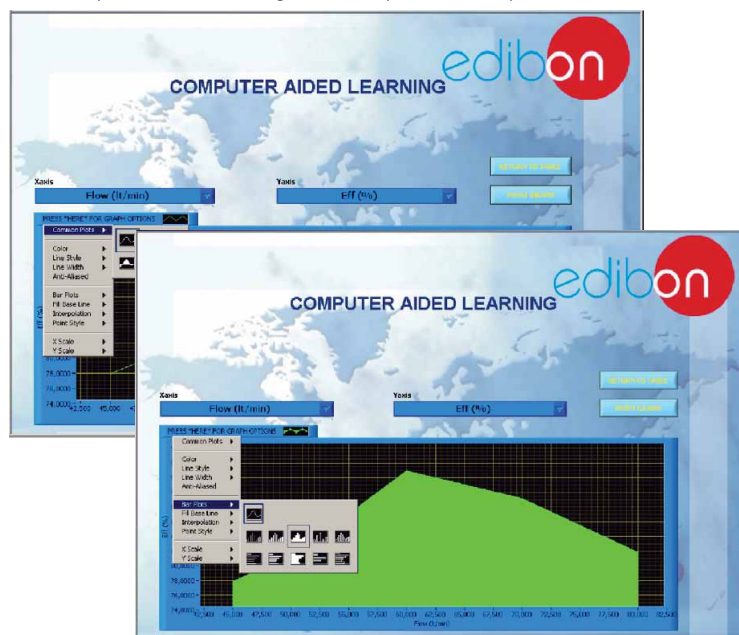
Above this table, it is shown "Constants" theoretically involved with the field of study. The values of these "Constants" may be modified to our convenience, assigning the appropriate values.

Simply, by clicking on "COMPUTE", CAL performs the calculations of the desired variables.

We can save and print the data of the experiment or calculations.

Also we can load any data file saved previously.

With the calculated variables, CAL gives the option of plotting the results. It is possible to represent any variable against any other. It has the option of representing the graph with different layouts. Screens below give an example of the multiple choices.



CAL has a wide range of help information. By clicking the button "ADDITIONAL HELP" opens a window where we have information about typical Constants, International System Units, Conversion Factors, and Table of Main Integrals and Derivatives (General), and there is other specific help for the particular unit.

General

CONSTANTS

15. UNITS

CONV. FACTORS

MAIN INTEGRALS

DERIVATES

SI base units

Name	Symbol	Quantity
metre	m	Length
kilogram	kg	Mass
second	s	Time
ampere	A	Electrical current
kelvin	K	Thermodynamic temperature
mole	mol	Amount of substance
candela	cd	Luminous intensity

SI-Prefixes

Name	yotta	zetta	exa	peta	tera	giga	mega	kilo	hecto	deca
Symbol	Y	Z	E	P	T	G	M	k	h	da
Factor	10^{24}	10^{21}	10^{18}	10^{15}	10^{12}	10^9	10^6	10^3	10^2	10^1
Name	deci	centi	milli	micro	nano	pico	femto	atto	zepto	yocto

For more information see CAL catalogue. Click on the following link:
www.edibon.com/products/catalogues/en/CAL.pdf

*Specifications subject to change without previous notice, due to the convenience of improvements of the product.



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Issue: ED01/14
 Date: July/2014

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