Photoelasticity Unit

EFO

Engineering and Technical Teaching Equipment

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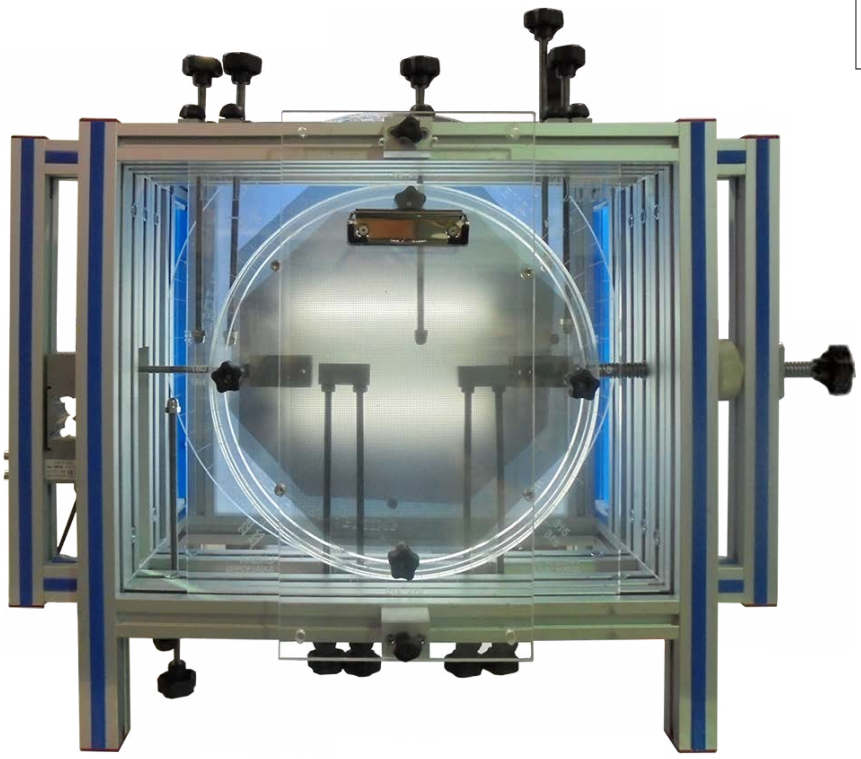
↳PRODUCTS
↳7.- MECHANICS AND 14.-BIOMEDICAL ENGINEERING



INTRODUCTION

Photoelasticity is the method of analysing and recording mechanical stresses and strains in components.

The components used are test specimens or models made of transparent special material which becomes optically double-refractive under mechanical loading.

Using polarised light, the distribution of stress in test specimens is investigated.

The polarisation filters represent the distribution of stress in colours.

By using white or monochromatic light and different configuration of linear and circular polarizer / analyzer we can obtain the principal stresses direction and the principal stresses difference.

By using strain gauges we can measure the stress in a certain position and in one direction. With photoelasticity we can observe the value in the whole element and in all directions.

GENERAL DESCRIPTION

Unit for photoelasticity practices, illustrating the subjects of the photoelasticity theory, the elasticity theory, strength of materials, and structure theory.

It is very suitable for the introduction and study of photoelasticity: optical elements, isochromatic, isoclinic, band order, band factor, edge tensionsing, etc.

Using this unit photoelastic experiments and practices of transparent test specimens (models) may be performed.

The different test specimens are subjected to loading by external forces and have poralised light shone through them.

A load application element can apply tensile, bending, compressive, and distributed and punctual loads to the specimen.

The stresses and strains occurring in the test specimen are represented as bright spots or figures of different colours, and we can visualise the distribution of stress.

We offer a wide range of test specimens for making a variety of practices and experiments.

These specimens show a full color and high contrast results and are also made of a special very hard material that avoids breaking during daily use.

SPECIFICATIONS

Bench-top unit.

Anodized aluminium structure.

Main metallic elements in stainless steel.

Light source, two fluorescent tubes of 30 cm and 8 W.

Monochromatic light 35 W.

Opalescent diffuser plate.

Double effect polarizing filters (linear polarization and circular polarization), of 30 x 30 cm and protected by methacrylate plates.

Load frame with pulling jack.

Load cell for direct force measurement.

Ten pressure screws and accessories.

The "EFO" unit includes the following elements:

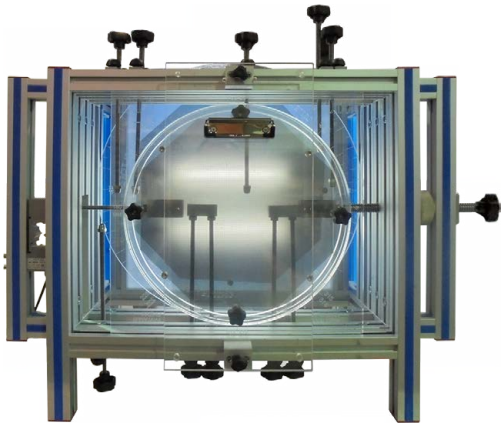
- EFO-K1. Kit of Static Test Specimens (Basic kit), formed by:
  - N°3. Stepped Rectangular Specimen.
  - N°4. Compact Circular Specimen.
  - N°5. Circular with Orifice Specimen.
  - N°9. Medium Rectangular Specimen.
  - N°13. "C" Specimen Probe.
  - N°14. Specimen with Arch Probe.
  - N°17. Square with Diagonal Bar Specimen Probe.

Additional recommended elements (Not included):

- EFO-K2. Kit of Static Test Specimens (Advanced kit), formed by:
  - N°1. Big Irregular Specimen.
  - N°2. Small Irregular Specimen.
  - N°6. Notches Rectangular Specimen.
  - N°7. Trapezoidal Specimen.
  - N°8. Big Rectangular Specimen.
  - N°10. Small Rectangular Specimen (2 units).
  - N°11. "U" Specimen.
  - N°12. Wide Rectangular Specimen.
  - N°15. Triangular Specimen (2 units).
  - N°16. Hollow Square Specimen.
  - N°18. Square with Two Diagonal Bars Specimen.
  - N°19. "T" Beam Specimen.
  - N°20. Double "T" Beam Specimen.
  - N°21. Rectangular with Hole Specimen.
- EFO-K5. Kit of Articulated Structures, formed by:
  - N°30. Articulated Structure 1.
  - N°31. Articulated Structure 2.
  - N°32. Articulated Structure 3.
- EFO-K6. Kit of Dynamic Panels, formed by:
  - N°40. Dynamic Panel 1.
  - N°41. Dynamic Panel 2.
- EFO-ICL. Accessory with Independent Circular and Linear Sheets.

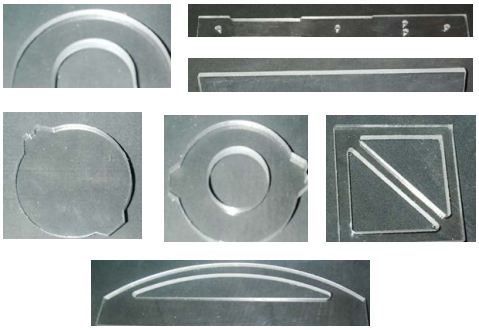
Cables and accessories, for normal operation.

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



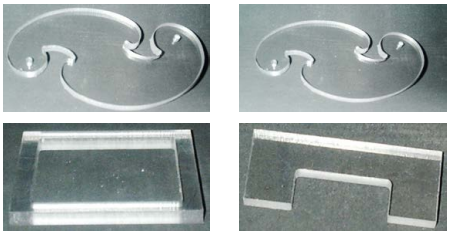
EFO. Unit

Included elements

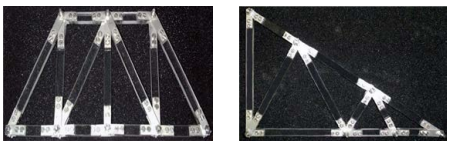


EFO-K1. Kit of Static Test Specimens (Basic kit)

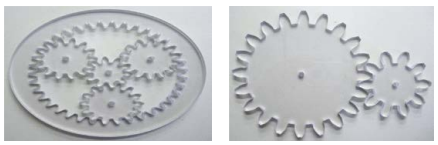
Examples some additional recommended elements



EFO-K2. Kit of Static Test Specimens (Advanced kit)



EFO-K5. Kit of Articulated Structures

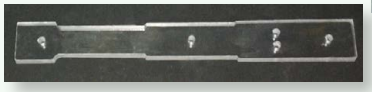


EFO-K6. Kit of Dynamic Panels

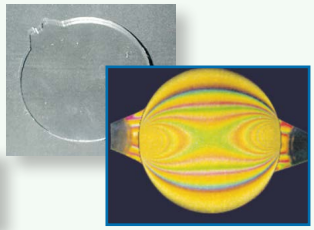
EFO-ICL. Accessory with Independent Circular and Linear Sheets

Included elements

EFO-K1. Kit of Static Test Specimens (Basic kit). Always included with the EFO/EFOC/EFOV unit.

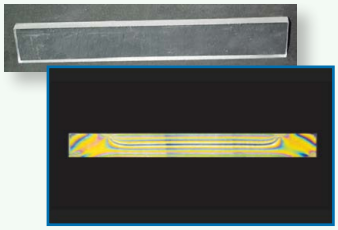


N°3
Stepped Rectangular Specimen

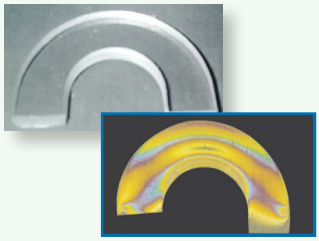


N°4
Compact Circular Specimen

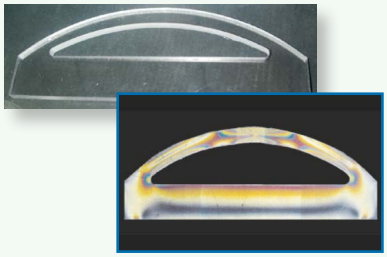
N°5
Circular with Orifice Specimen



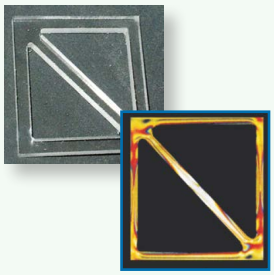
N°9
Medium Rectangular Specimen



N°13
"C" Specimen Probe



N°14
Specimen with Arch Probe



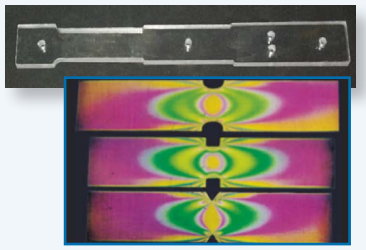
N°17
Square with Diagonal Bar Specimen Probe

Additional recommended element (Not included)

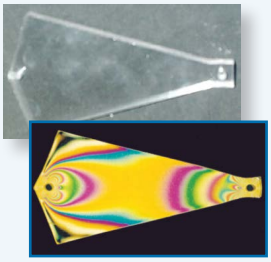
EFO-K2. Kit of Static Test Specimens (Advanced kit). Not included in the standard supply.

N°1
Big Irregular Specimen

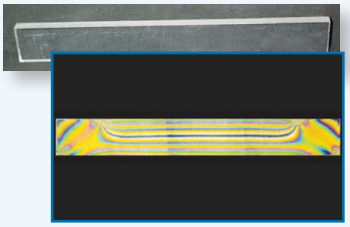
N°2
Small Irregular Specimen



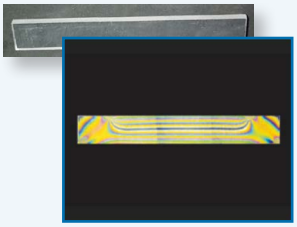
N°6
Notches Rectangular Specimen



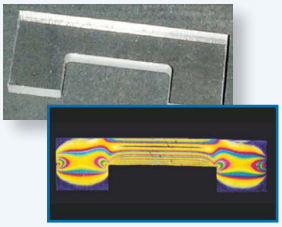
N°7
Trapezoidal Specimen



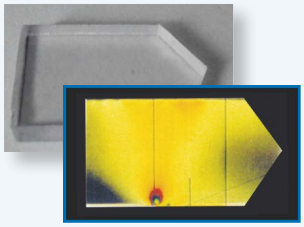
N°8
Big Rectangular Specimen



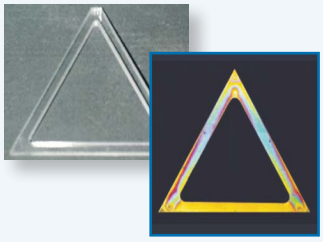
N°10
Small Rectangular Specimen (2 units)



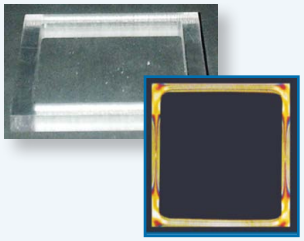
N°11
"U" Specimen



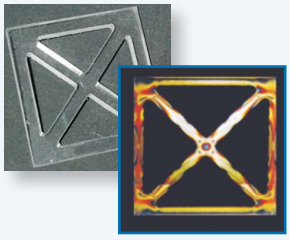
N°12
Wide Rectangular Specimen



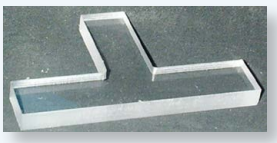
N°15
Triangular Specimen (2 units)



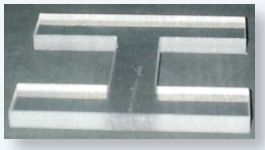
N°16
Hollow Square Specimen



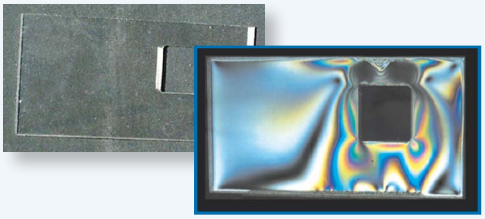
N°18
Square with two Diagonal Bars Specimen



N°19
"T" Beam Specimen



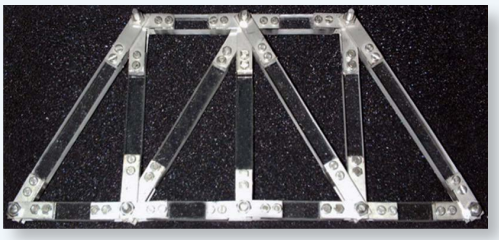
N°20
Double "T" Beam Specimen



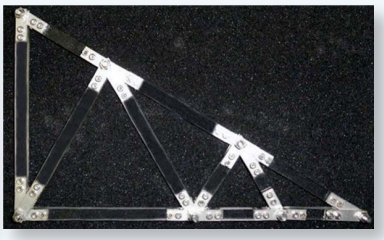
N°21
Rectangular with Hole Specimen

Additional recommended elements (Not included)

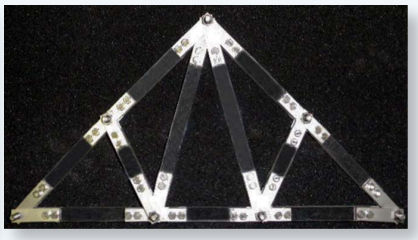
EFO-K5. Kit of Articulated Structures. Not included in the standard supply.



N°30
Articulated Structure 1



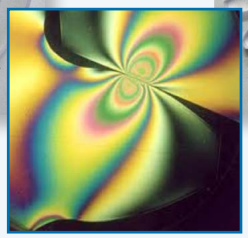
N°31
Articulated Structure 2

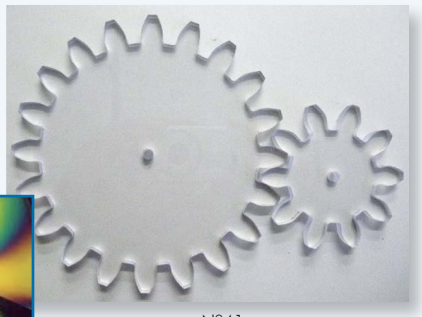


N°32
Articulated Structure 3

EFO-K6. Kit of Dynamic Panels. Not included in the standard supply.

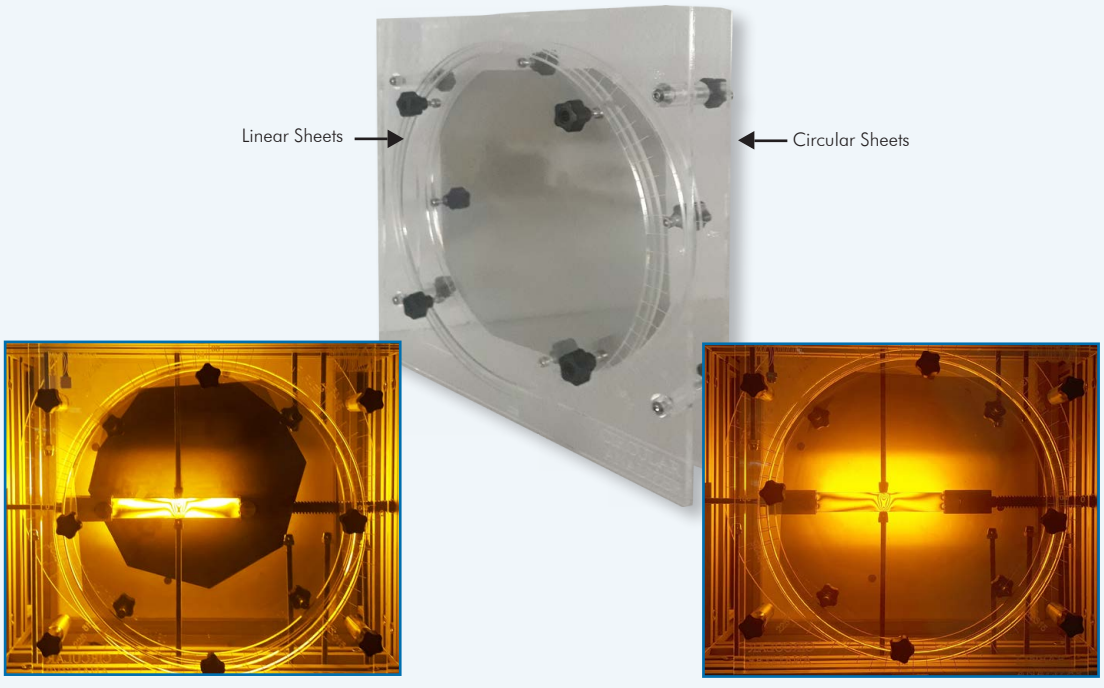
N°40
Dynamic Panel 1





N°41
Dynamic Panel 2

EFO-ICL. Accessory with Independent Circular and Linear Sheets. Not included in the standard supply.



Dark Field

Light Field

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Introduction to photoelasticity: optical elements, isochromatic, isoclinic, band order, band factor, edge tension sign, etc.
2.- Determination of principal stress difference.
3.- Isochromatics.
4.- Illustration of the themes about elasticity, strength of materials and structures using photoelastic tests.
5.- Pure traction/optical-tensional law.
6.- Diametrically compressed disc.
7.- Ring with diametrical compression traction.
8.- Ring with diametrical compression.
9.- Plate with circular drill with traction.
10.- Comparison of the effects from different engraves in piece with traction.
11.- Pure traction in a piece with section linearly variable.
12.- Pure flexion.
13.- Simple flexion.
14.- Simple flexion, compound beams.
15.- Compound flexion.
16.- Compound central core of the section.
17.- Piece with a great curvature subjected to flexion.
18.- Arch built-in with a central charge.
19.- Triangular structure.
20.- Comparison of the structures.
21.- Comparison of the effect of different notches.
22.- Tardy compensation method (requires EFO-ICL).
- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

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

DIMENSIONS AND WEIGHTS

EFO:
- Dimensions: 750 x 400 x 550 mm approx. (29.53 x 15.75 x 21.65 inches approx.).
- Weight: 20 Kg approx. (44 pounds approx.).

ADDITIONAL RECOMMENDED ELEMENTS (Not included)

- EFO-K2. Kit of Static Test Specimens (Advanced kit), formed by:
  - N°1. Big Irregular Specimen.
  - N°2. Small Irregular Specimen.
  - N°6. Notches Rectangular Specimen.
  - N°7. Trapezoidal Specimen.
  - N°8. Big Rectangular Specimen.
  - N°10. Small Rectangular Specimen (2 units).
  - N°11. "U" Specimen.
  - N°12. Wide Rectangular Specimen.
  - N°15. Triangular Specimen (2 units).
  - N°16. Hollow Square Specimen.
  - N°18. Square with Two Diagonal Bars Specimen.
  - N°19. "T" Beam Specimen.
  - N°20. Double "T" Beam Specimen.
  - N°21. Rectangular with Hole Specimen.
- EFO-K5. Kit of Articulated Structures, formed by:
  - N°30. Articulated Structure 1.
  - N°31. Articulated Structure 2.
  - N°32. Articulated Structure 3.
- EFO-K6. Kit of Dynamic Panels, formed by:
  - N°40. Dynamic Panel 1.
  - N°41. Dynamic Panel 2.
- EFO-ICL. Accessory with Independent Circular and Linear Sheets.

SIMILAR UNITS AVAILABLE

Offered in this catalog:

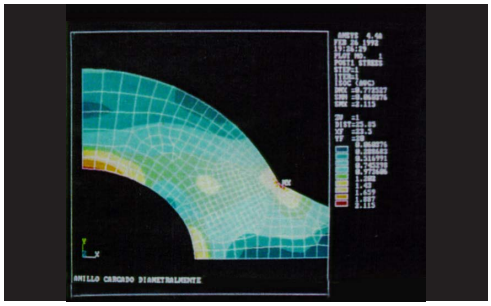
- EFO. Photoelasticity Unit.

Offered in other catalogs:

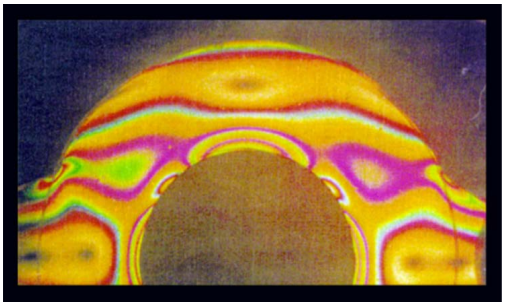
- EFOC. Computer Controlled Photoelasticity Unit.
- EFOV. Computer Controlled Photoelasticity Unit with Artificial Vision System.

1. Differences between the simulation and the photoelastic reality.

Software Simulation

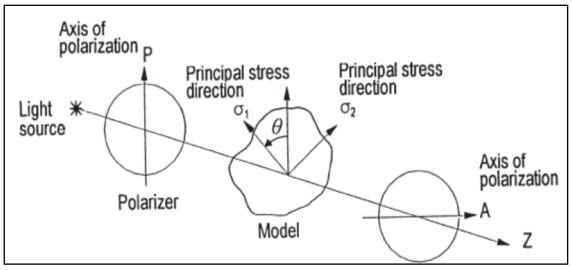


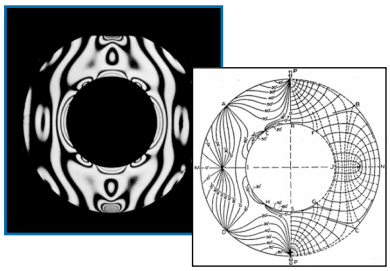
Real
(with EFO/EFOC/EFOC Units)



2. Main configurations with EFO/EFOC/EFOV Units.

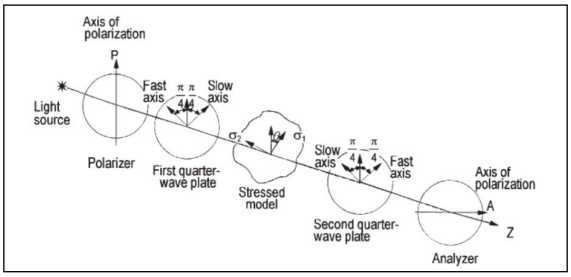
Plane Polariscope configuration

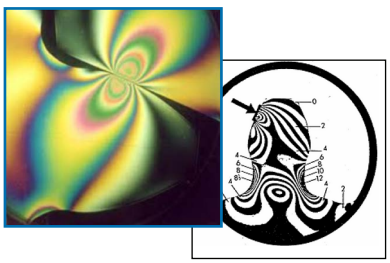




Plane polariscope configuration with monochromatic light, for isoclines and direction of principal stresses determination

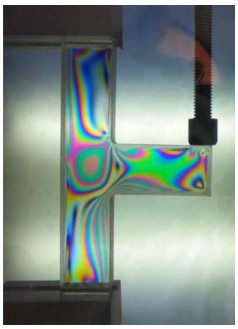
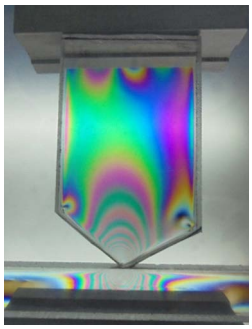
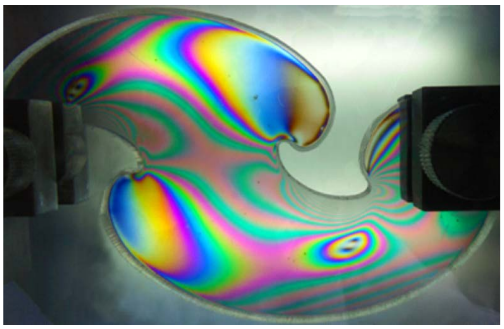
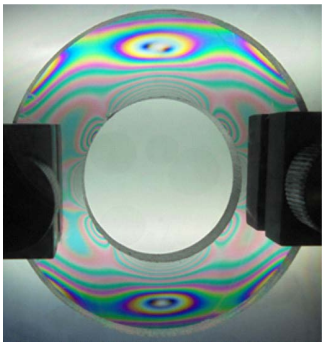
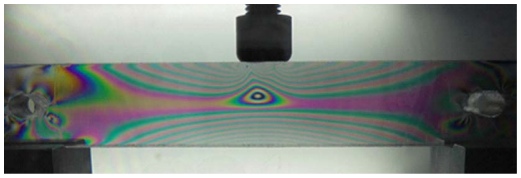
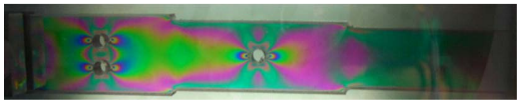
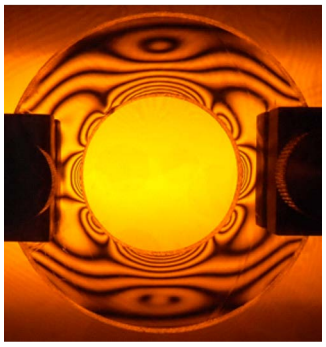
Circular Polariscope configuration



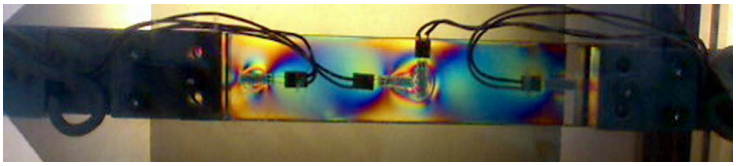


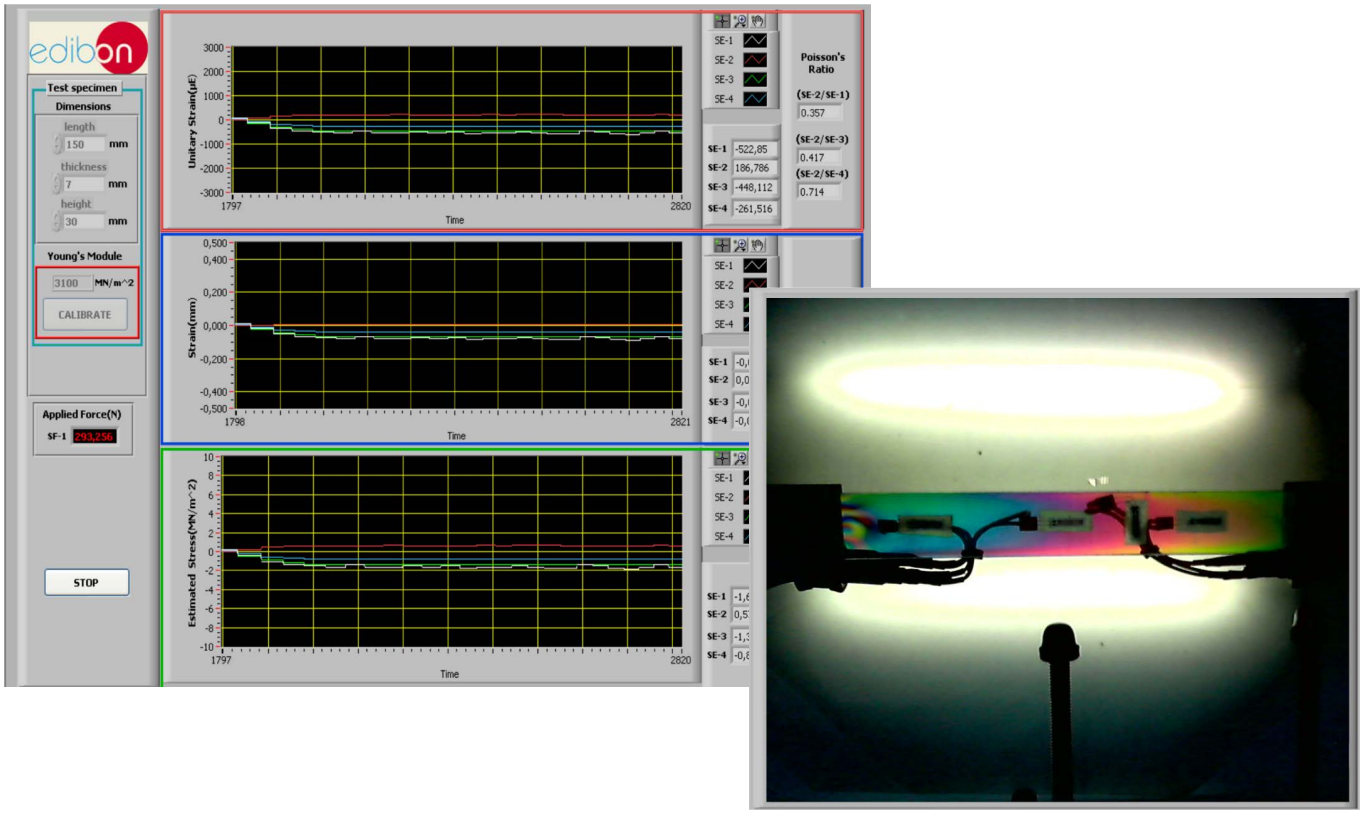
Circular polariscope configuration for isochromatics and principal stresses difference determination

3. Some real results obtained from EFO/EFOC/EFOV Units and different specimens.

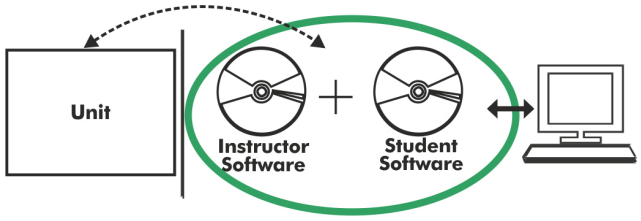








4. Some typical results for strain gauges analysis. (EFOC/EFOV)





EFO/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.

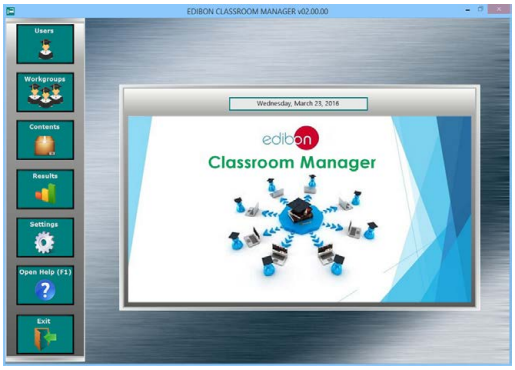
Instructor Software

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

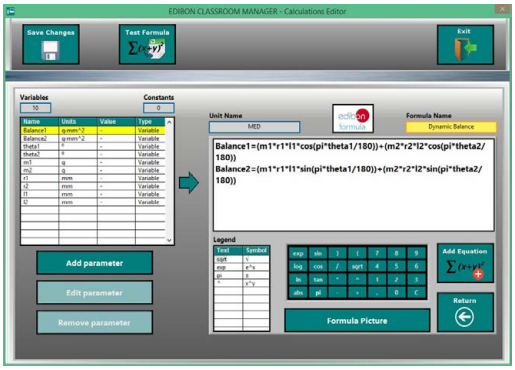
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

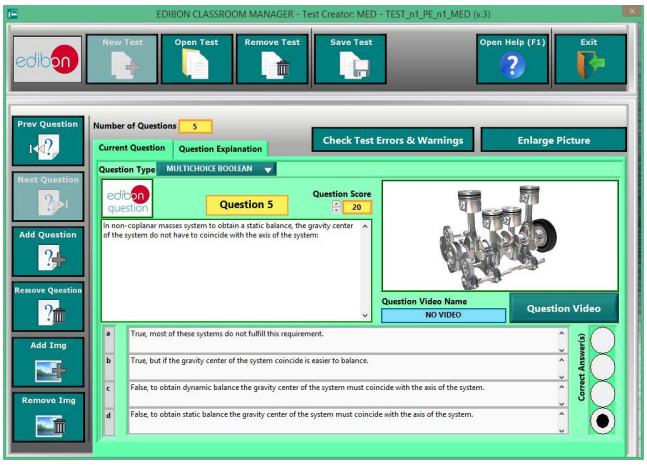
- **User Data Base Management.**
- **Administration and assignment of Workgroup, Task and Training sessions.**
- **Creation and Integration of Practical Exercises and Multimedia Resources.**
- **Custom Design of Evaluation Methods.**
- **Creation and assignment of Formulas & Equations.**
- **Equation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



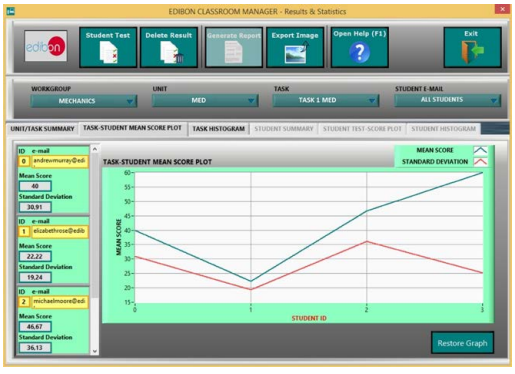
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



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).

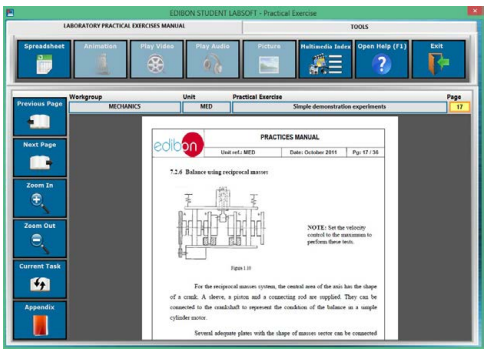
ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are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

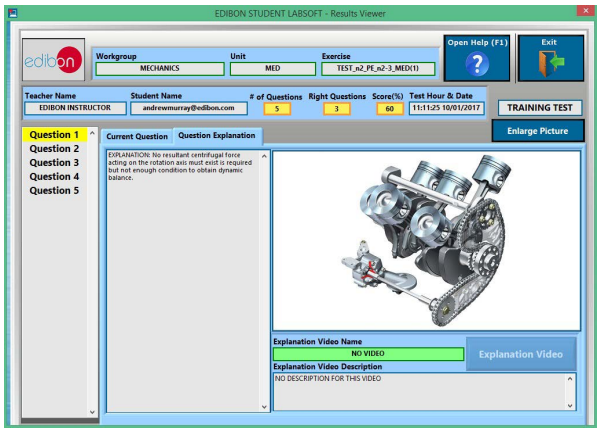
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge 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/interactive-computer-aided-instruction-software

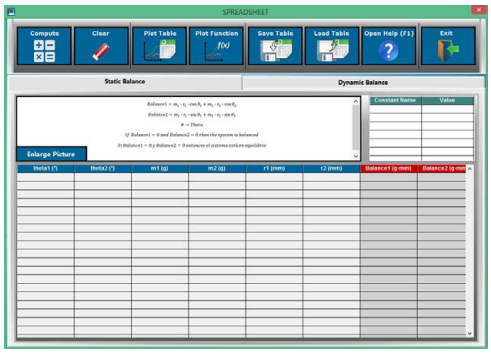
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



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: