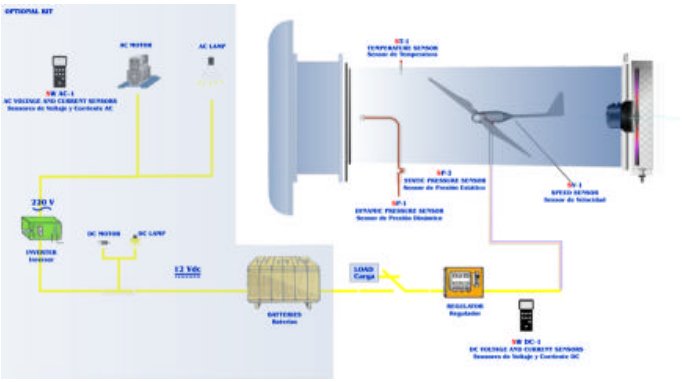
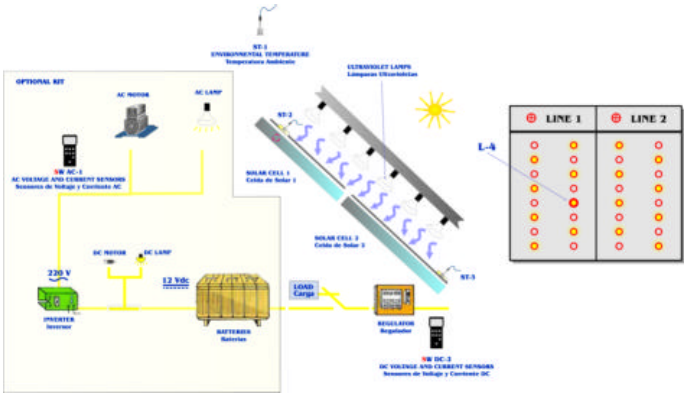
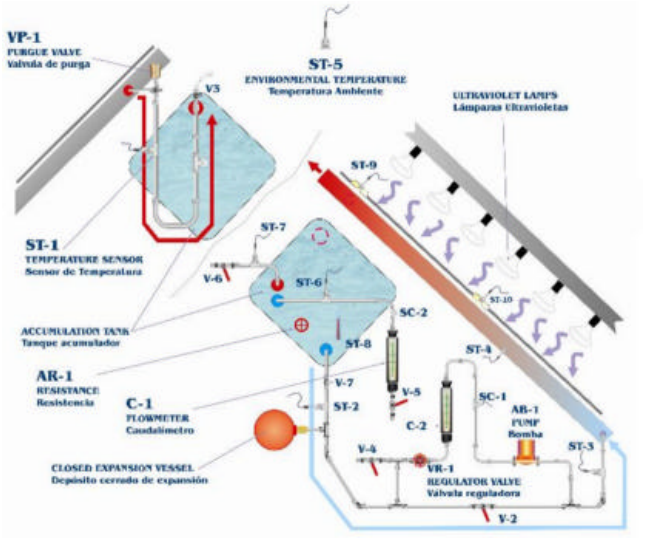
ENERGY TRAINING CENTRE
(5TC)







* Centre:
* Country:
* Date:
* Issue:

Quality Certificates:

ISO9000:QualityManagement
(forDesign,Manufacturing, CommercializationandAfter-salesservice)

EuropeanUnionCertificate
(totalsafety)

CertificatesISO14000 and **ECO-ManagementandAuditScheme**
(environmentalmanagement)

WorlddidacQualityCharter Certificate
(WorlddidacMember)

Energy Training Centre
(5TC)

1) General Matters:

- General Description.
- Objectives.
- Key Features.
- Vision.
- Mission.
- Main Beneficiary Users.
- Project General Targets.
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- Training and Education Possibilities.
- Curriculum Development.
- Learning Resources and Development.
- National Grid Simulation.

2) Technical Matters:

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3) Project Conditions:

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- Examples of Classroom and Laboratory Lay Out "for some laboratories" (3D)
- Economical Proposal (Complete and/or partial).

4) Technology Used:

- Teaching Techniques used by EDIBON.

Annex:

I.- Technical Information "Summarized" (on request).
II.- Complete Technical Information (on request).

1) General Matters:

- General Description:

The EDIBON Energy Training Centre is formed by several laboratories in a single training place, with most of the required facilities available in the market, by using state of the art technology in order to give practical and real training to:

- Engineers, as in Electrical, Mechanical and others.
- Technicians, who are today students and tomorrow workers in the complex Energy industry.
- Employees at any technical level today working in all types of Energy Industry and Industry services.
- Other professionals with responsibilities at any Energy industry (Maintenance, Specialist, etc...).
- Research, related with Energy companies.
- ... and all responsible to prevent disasters such as Black Out, Electrical Situation verifications, the Domino Effect under Black Out situations, etc.

In order to get maximum efficiency this Energy Training Centre is supplied complete:

- Units (Power Plants with advanced and complex SCADA´s):
  - Complete Electrical and Mechanical Power Plants.
  - Complete Smart Grid, including utilities and user possibilities.
  - Electrical Special units related to Power Plants.
  - All required accessories.

- Units (Individual units with SCADA or SCADA with PID Control)
  - Electronics.
  - Electricity.
  - Automation and Systems.
  - Thermodynamics.
  - Process Control.

- ESN. EDIBON SCADA NET allows 30 students to work simultaneously in a Classroom integrated into a Laboratory, and managed by only one teacher in a single environment.

- Training Materials
  - Manuals.
  - Multimedia.
  - Top Level Training by EDIBON designers and engineers.

- All services, in order to guarantee full success operations and sustainability.

Very Important! All Teaching Technical Units offered in this Energy Training Centre have been totally designed and manufactured, at EDIBON's premises, by using industrial components.

- Objectives:

The major operational objectives of the Energy Training Centre can be considered as the following:

- To train students and technicians at any level, by using "real" and "safe" components and systems.
- To demonstrate most of the possible conditions since the rod material producing energy to the consumption by the user, verifying the complete cycle from production to consumption.
- To use simultaneously all elements used in a National Grid and its connections, influences, actions and reactions, etc.
- To equip all laboratories with the latest technology in order to GIVE A REAL AND PRACTICAL TECHNICAL TRAINING, DEVELOPMENT AND RESEARCH facilities for future top technical professionals.
- To offer Universal Technical Training, for all technical levels (all kinds of Technical trainers, students, workers, etc.)
- To train 30 students/workers/professionals at simultaneously.
- To act as a Centre for offering quality training programmes for professionals as per need of the client system, covering the entire range of technical, vocational and management education, at regional, national and international level.
- To arrange for practical training for Engineers and Technicians in industries on a cooperative education plan.
- To design new a instructional system and strategies for designing and use of modern laboratories using state of the art technology.
- To offer courses-programmes for technical and vocational teachers to meet overseas demand.
- To collaborate with the Community and Industry in organising Continuing and Non-formal education programmes and providing extension and consultancy services.
- To provide support services to National and International Institutions.
- To undertake Consultancy and Extension work for industry, technical institutions and organisations.

- Key Features:

a) Related with Power Plants and Smart Grid:

Black-out and restoration situations

- System restoration after black-out.
- Real simulation of all actions for restoring the system to its normal state.
- Optimal values analysis, current, voltage, power, etc. for setting the best and shortest restoration of this system.
- Analysis of the system, inertia influence and its stability.
- Analysis of some types of Power Plants, for choosing the best one for restoration of the system.
- How to choose the best sequence to connect loads for obtaining stability of the system.
- Connection procedures for the other parts of the system.
- The Domino Effect as Black Out consequences.

Validation conditions

- Validation of all situations mentioned in the black-out.
- Validation of most actions to be done in the National Grid.

National Grid

- Real Electrical situation of the Power System.
- Real Mechanical situation of the Power System.
- Actions in the Mechanical Power System and reactions in the Electrical Power System.
- Actions in the Electrical Power System and reactions in the Mechanical Power System.
- Complete grid restoration simulation by using TWO OR THREE POWER PLANTS. (Several options).

Electrical possibilities

- SCADA Control for Generation, Transformation, Transport, Distribution and Consumption (loads); with all parameters involved.

Mechanical possibilities

- SCADA Control for all 12 real Power Plants available.

Multipost possibilities

- SCADA-NET System for 30 students working simultaneously.

FACTS
(several FACTS can be used to improve the capacity at the grid)

- SVC (Starting Voltage Compensator).
- STARTCOM.
- UPFT (United Power Flow Transmission).
- Phase shifter.
- TCSC (Thyristor Controlled Series Compensator).

Smart Grids

- Smart Grid for utilities.
- Smart Grid for final user.
- Smart Grid accessories.

b) Related with units operation involved in any industry as:

Several units, all concepts controlled using SCADA or SCADA with PID Control will demonstrate individual processes in the following areas:

- Electronics.
- Electricity.
- Renewable (Alternative) Energies.
- Automation and Systems.
- Fluid Mechanics
- Thermodynamics & Thermotechnics.
- Process Control.

- Vision:

The Energy Training Centre vision is to be the lead resource Centre for promoting excellence in Technical Electrical Education, as Higher, Technical and Vocational Education and any Technical practical Training and facilities, by using the latest technology with new and modern Technical Teaching Techniques for training all kinds of students and workers, in advanced National Grid.

- Mission:

- To give the students and workers access to the latest technology for producing professionals as the industry demands.
- To introduce emerging scientific technologies for development of effective teaching-learning systems in technical education related with all Energies.
- To increase the outreach of training by adopting flexible & open learning technology.
- To give all the trainers all modern and complete laboratories with modern tools in order to provide very qualified professionals a state of the art knowledge.
- To integrate the World of Work with the technical education system.
- To assist policy makers as a think tank in formulating new strategies.
- To offer extension services and consult an appropriate new system, in collaborating with industry and community partnership.
- To develop in the students and workers a mentality for doing practical and applicable research.
- To share experience and collaborate with national and international agencies involved in technical education for mutual benefits.
- To develop and introduce the Quality Management System.

- **Main Beneficiary Users:**

  - Engineering Faculties (Trainers).
  - Teaching Researchers (Scholars).
  - Technical Managers.
  - Supervisors (Trainers).
  - Lab Assistances.
  - Engineering Students.
  - Industrial Maintenance Technicians.
  - Skilled Workers.
  - Any other Technical Trainers at any Technical Level.

- **Project General Targets:**

  - To help the students:

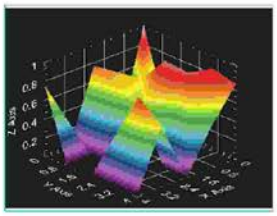
    - By "quick" understanding.
    - By "clear" understanding (clear concepts).
    - By "saving" time.
    - By "extending" the laboratory to their homes.

  - To help the teachers:

    - By "easy" teaching.
    - By increasing the teaching "efficiency".
    - By "reducing" teaching costs (less time consume).
    - By "integrating" classroom and laboratory in the same place.

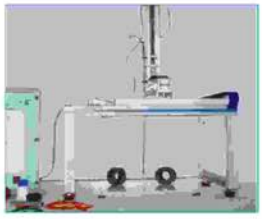
Laboratory Philosophy

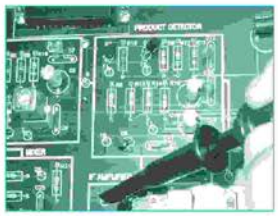
Modern Design



Main Technology Blocks

Extended Product Range





Available Units, Design and Manufactured by EDIBON

- **Training and Education Possibilities:**

  For providing training, EDIBON develops its Programme Calendar on the basis of Training Need Analysis of the various stakeholders like Technical Institutions, Directorates of Technical Education, industry etc. The Calendar so developed is shared with all concerned parties to enable authentication of the right kind of programme, before implementation.

  EDIBON will use top level trainers with its own Teaching Equipment Designers, Manufacturers and Technical and Commercial managers.

  We are considering the following Short Term Training Programmes also:

  - In-House Training Programmes.
  - Special Training Programmes.
  - Collaborative Training Programmes.

  In all cases, we will offer simultaneous training with theoretical and practical training by using Classroom and Laboratory in the same place.

- **Curriculum Development:**

  Curriculum development activities could be related with, among others:

  - Introducing flexibility by using several students and/or Teachers working simultaneously.
  - Reviewing, revising and developing/modernising existing curricula for Higher, Technical and Vocational Education and workers.
  - Preparing new curricula in engineering and non-engineering areas.
  - Preparing new curricula in non-conventional and vocational courses to meet the socio-economic needs of the region.

- Learning Resources and Development:

The main target is related with real and practical training with a wide range of modern units using the latest technology at the laboratory (Classroom and Laboratory in same place) .

Learning resources development activities include promoting development of multi-modal instructional resource materials to cater to individualised needs of learning. A good number of learning materials in print and non-print forms including text books, manuals, monographs, multimedia learning packages.

The Energy Training Centre additionally will allow Research Studies and Development Projects in engineering education, management and technology areas for generating new knowledge and to develop methods and strategies for solving the problems of the user system.

- National Grid Simulation:

The EDIBON Power Plant and Smart Grid have the capability of simulating the complete National grid globally or partially by using the real values of the parameters involve. This can have the complexity the end user requires.

2) Technical Matter:

- **The practical training in laboratories, as main target:**

  Energy Training Centre has been designed for giving the future beneficiary main user a REAL, PRECISE and PRACTICAL Training.

  Technical areas and laboratories included, using real units for 30 students working simultaneously, in a Classroom and Laboratories allocated in same place and for any discipline:

  - Electronics.
  - Electricity.
  - Energy as main area (Power Plants, Smart-Grid, Renewable, etc.)
  - Automation and Systems
  - Fluid Mechanics.
  - Thermodynamics & Thermotechnics.
  - Process Control.
  - Complements, instruments and tools.

- **Energy Training Centre Infrastructure:**

  - Our classroom and laboratory where the Power Plant Simulator and Smart Grid are allocated. Units and student post in same place (30 students).

    See page 14.

  - Several other laboratories, one for each discipline.

    In any laboratory we will supply all required units in each laboratory and all student post (30 students)

    See page 13

  - In all laboratories the theory and the practise is connected at same time by only one teacher or trainer.

  The EDIBON Energy Training Centre not only is supplied complete in Turn Key conditions, but even custom made units can be designed by EDIBON.
  EDIBON can offer several soft finance possibilities and several finance and grants options, if necessary.
  We guaranty the success and sustainability for a long time.

3) Project Conditions:

- **Project Supply Conditions:**

The Energy Training Centre includes the following technical and commercial conditions:

a) Technical Conditions:

- Laboratories adaptation.
- Installation of all units supplied.
- Starting up for all units.
- Training about the exercises to be done with any unit (in EDIBON factory and/or locally).
- Teacher training related with the teaching unit and the teaching techniques used (in EDIBON factory and/or locally).
- Technology transfer.

b) Commercial Conditions:

- Packing.
- Financing Charges.
- C.I.F. Charges.

c) Other Conditions:

- 8 Manuals for each teaching equipment:

. Required services manual.
. Assembly and installation manual.
. Interface and software/control console manual.
. Set in operation manual.
. Safety norms manual.
. Practices manual.
. Maintenance manual.
. Calibration manual.

- **Project Possibilities:**

The Energy Training Centre will cover the following:

a) To train students at laboratory.
b) To teach trainers.
c) To be used for training and update educators in current teaching technologies.
d) To give courses or to train to workers in the industry, as it simulates real Power Plants till generation, transport lines and industrial and residential loads.
e) To be used for carrying out real industrial simulations.
f) To be used as research tool for international projects.
g) To train teachers workers from other countries.

Example of Classroom and Laboratory Lay Out
"for some laboratories"

- Economical Proposal:

Teaching Units:

"Priority 1"

0400. Electricity :

0450: Power Systems and Smart Grid Technology: Generation, Distribution & Transmission, Loads and Relays Protection. Basic Module

0500. Energy:

0510: Modular Smart Grid and Power Systems Simulator.Basic Module.

0530: Renewable Energies.Basic Module.

0595/ESN: Edibon Scada-Net for Being Used with Energy Units.

"Priority 2"

0400. Electricity :

0451: Power Systems and Smart Grid Technology: Generation, Distribution & Transmission, Loads and Relays Protection. Medium Module

0500. Energy:

0511: Modular Smart Grid and Power Systems Simulator.Medium Module.

0531: Renewable Energies.Medium Module

"Priority 3"

0200. Electronics:

0210: Elementary Electronics. Basic Module

0211: Elementary Electronics. Medium Module

0212 Elementary Electronics. Advanced Module

0230: Transducers and Sensors. Basic Module

0231: Sensors Instrumentation. Basic Module

0232: Controllers. Basic Module

0240: Control Electronics. Basic Module

0250: Digital Electronics. Basic Module

0260: Industrial Electronics. Basic Module

0270: Microprocessors. Basic Module.

0400. Electricity :

0410: Electrical Installations: Home, Industrial and Professional Wiring Practices. Basic Module

0411: Electrical Installations: Home, Industrial and Professional Wiring Practices. Medium Module

0412: Electrical Installations: Home, Industrial and Professional Wiring Practices. Advanced Module

0420: Home Automation Systems: Wired and wireless systems. Basic Module.

0421: Home Automation Systems: Wired and wireless systems. Medium Module.

0422: Home Automation Systems: Wired and wireless systems. Advanced Module.

0430: Electrical Machines. Basic Module

0431: Electrical Machines. Medium Module

0432: Electrical Machines. Advanced Module

0440: Electromechanical Constructions. Basic Module.

0441: Electromechanical Constructions. Medium Module

0442: Electromechanical Constructions. Advaced Module

0452: Power Systems and Smart Grid Technology: Generation, Distribution & Transmission, Loads and Relays Protection. Advanced Module

0500. Energy:

0512: Modular Smart Grid and Power Systems Simulator.Advanced Module.

0532: Renewable Energies. Advanced Module.

0600. Automation & Systems:

0610: PLC Trainer (Panasonic or any other brand)

0611: PLC Trainer and PLC Process Emulators. Basic Module

0612: PLC Trainer and PLC Process Emulators. Medium Module

0613: PLC Trainer and PLC Process Emulators. Advanced Module
0620: PLC Trainer and PLC Small Real Applications.
0630: Industrial PLC Applications.
0650: Automation and Systems. Basic Module.
0651: Automation and Systems. Medium Module.
0652: Automation and Systems. Advanced Module.

0800. Fluid Mechanics & Aerodynamics:

0810: Fluid Mechanics (Elementary). Basic Module
0811: Fluid Mechanics (Elementary). Medium Module
0812: Fluid Mechanics (Elementary). Advanced Module
0820: Fluid Mechanics (General). Basic Module
0821: Fluid Mechanics (Channel 80mm Section). Basic Module
0822: Fluid Mechanics (Channel 300mm Section). Medium Module
0830: Hydraulic Machines (Pumps). Basic Module
0831: Hydraulic Machines (Pumps). Medium Module
0832: Hydraulic Machines (Pumps). Advanced Module
0833: Hydraulic Machines (Fan- Centrifugal). Basic Module
0834: Hydraulic Machines (Fan- Axial). Medium Module
0835: Hydraulic Machines (Compressor- Centrifugal). Basic Module
0836: Hydraulic Machines (Two-Stage Compressor). Basic Module
0840: Hydraulic Machines (Turbines-Water). Basic Module
0841: Hydraulic Machines (Turbines-Water). Medium Module
0842: Hydraulic Machines (Turbines-Air). Advanced Module
0850: Aerodynamics. Basic Module
0851: Aerodynamics. Advanced Module
0895/ESN: EDIBON Scada-Net for Being Used With Fluids Mechanics units

0900. Thermodynamics & Thermotechnics:

0932: Air Conditioning (Automobile). Advanced Module
0940: Heating and Ventilation. Basic Module.
0941: Heating and Ventilation. Medium Module.
0943: Sanitary.
0950: Heat Transfer. Basic Module
0951: Heat Transfer. Medium Module
0952: Heat Transfer. Advanced Module
0953: Heat Exchange. Basic Module
0954: Heat Exchange. Medium Module
0955: Heat Exchange. Advanced Module
0960: Steam Module. Basic Module
0961: Steam Module. Medium Module
0970: Nozzles Module
0980: Combustion. Basic Module
0981:Turbines (Gas) Basic Module
0982:Turbines (Gas-Two-Shaft) Medium Module
0983:Turbines (Gas-Axial Flow) Advanced Module
0990: Engane Test Bench. Basic Module.
0991: Engane Test Bench. Medium Module
0992: Engane Test Bench. Advanced Module. .
0995/ESN: EDIBON Scada-Net for Being Used With Thermodynamics Units

1000. Process Control:

1010: Process Control. Basic Module
1011: Process Control. Medium Module
1012: Process Control. AdvancedModule
1020: Industrial Process. Basic Module
1095/ESN: EDIBON Scada-Net for Being Used With Process Control units

"Priority 4"

0900. Thermodynamics & Thermotechnics:
0910: Refrigeration. Basic Module.
0911: Refrigeration.Medium Module.
0912: Refrigeration.Advanced Module
0920: Heat Pumps. Basic Module.
0921: Heat Pumps. Medium Module.
0930: Air conditioning. Basic Module.
0931: Air conditioning. Medium Module

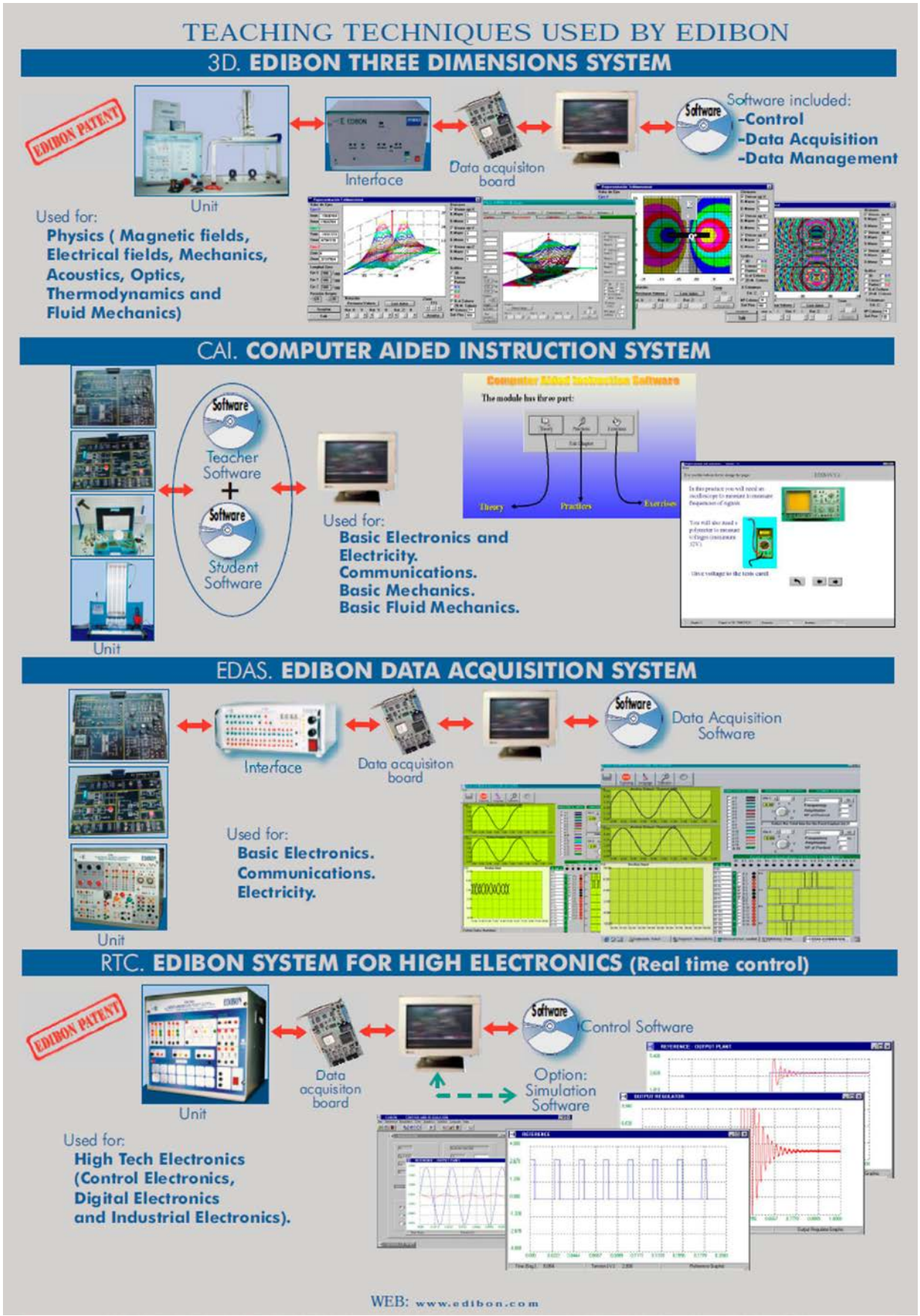
Complements, Instruments and Tools:

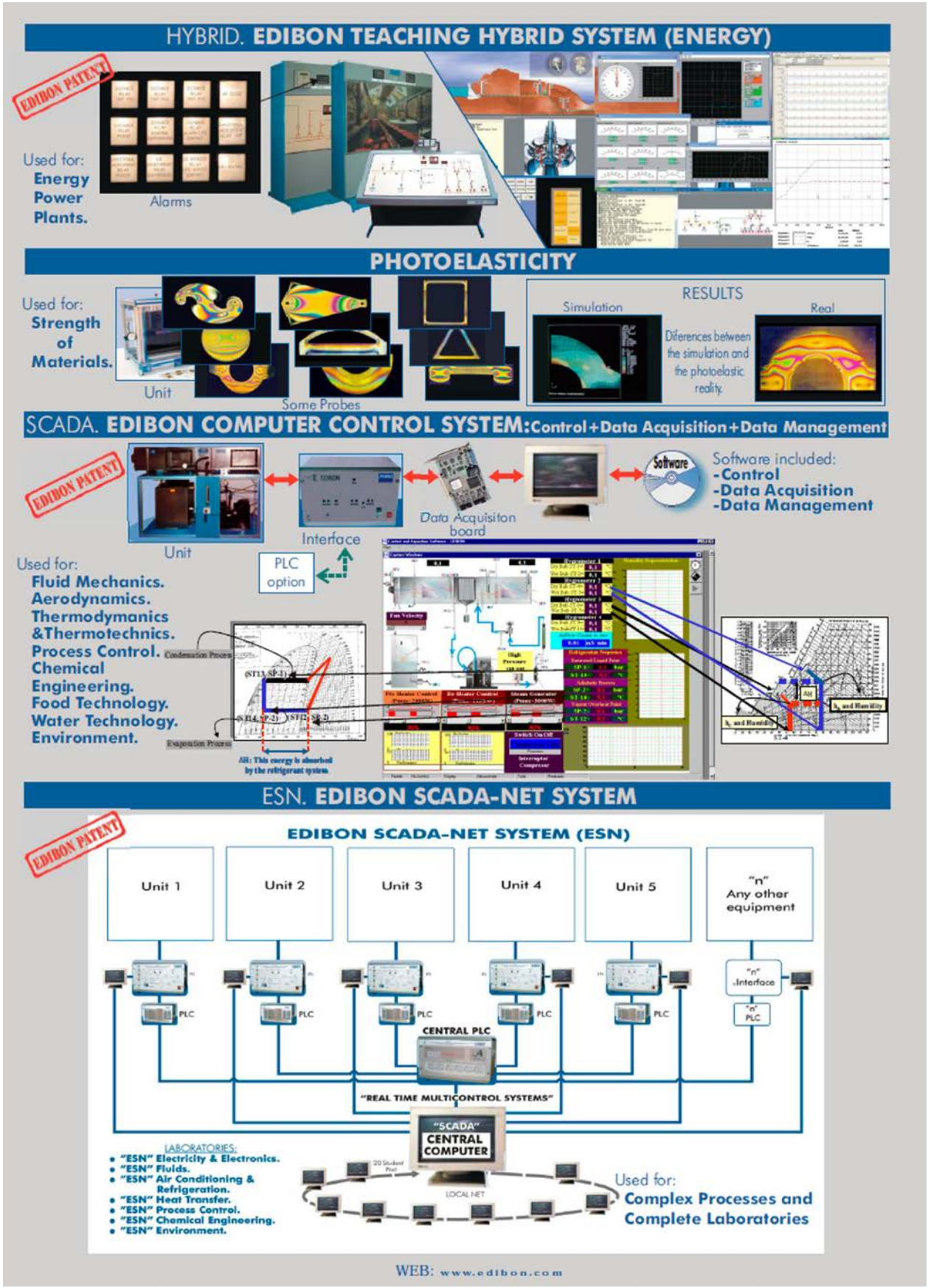
5100. Complements, Instruments and Tools:
5110-1: Cupboard & Shelves Module
5120-10: Computer Module
5122: Teaching Aids Module
5124: Complete Health & Safety
5142-1: Electricity Toolkit Module
5143-20: Electronics Toolkit Module

Services:

- Furnitures:
- Electrical, Water and Air Installation and others laboratory services
- Installation of all units supplied, Starting up, Training, Teacher Training and Technology Transfer

4) Technology Used:




HYBRID. EDIBON TEACHING HYBRID SYSTEM (ENERGY)
EDIBON PATENT
Used for:
Energy
Power
Plants.
Alarms
PHOTOELASTICITY
Used for:
Strength
of
Materials.
Unit
Some Probes
RESULTS
Simulation
Real
Diferences between the simulation and the photoelastic reality.
SCADA. EDIBON COMPUTER CONTROL SYSTEM: Control+Data Acquisition+Data Management
EDIBON PATENT
Unit
Interface
Data Acquisiton board
Software
Software included:
-Control
-Data Acquisition
-Data Management
PLC option
Used for:
Fluid Mechanics.
Aerodynamics.
Thermodymanics &Thermotechnics.
Process Control.
Chemical Engineering.
Food Technology.
Water Technology.
Environment.
ESN. EDIBON SCADA-NET SYSTEM
EDIBON PATENT
EDIBON SCADA-NET SYSTEM (ESN)
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
"n"
Any other equipment
PLC
"n" Interface
CENTRAL PLC
"REAL TIME MULTICONTROL SYSTEMS"
"SCADA"
CENTRAL
COMPUTER
LOCAL NET
LABORATORIES:
"ESN" Electricity & Electronics.
"ESN" Fluids.
"ESN" Air Conditioning & Refrigeration.
"ESN" Heat Transfer.
"ESN" Process Control.
"ESN" Chemical Engineering.
"ESN" Environment.
Used for:
Complex Processes and Complete Laboratories
WEB: www.edibon.com

Annex:

I.- **Technical Information "Summarized".** (on requested)