didalab
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Cooperates with Education

Automation

SIEMENS

SYSTEMS AND RENEWABLE ENERGIES

2017 EDITION

Equipements & Solutions for Education

› TVET

› STEM

MADE IN FRANCE
FABRICATION FRANÇAISE

didalab

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ISO 9001
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SOMMAIRE

Electrotechnics - Power electronics

System

Renewable Energies

BIC SIN 300 : Load emulation

Highlights

- *Emulation of several realistic industrial scenarios*
- *Real time 3-D animation*
- *Creation of new scenarios with NX (Siemens software)*
- *Analysis (torque, speed, power)*

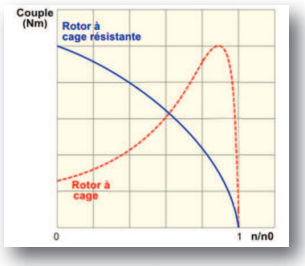
Topics

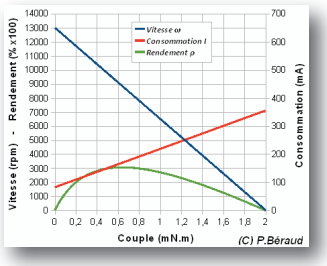
- *Electrotechics*
- *Power electronics*
- *Servo systems*
- *Automatic control*

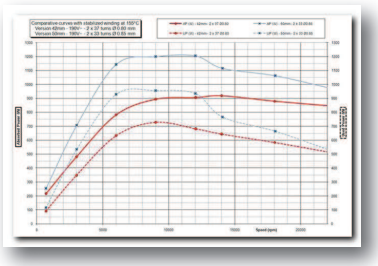
General description :

BICSIN EL320 is a part of our LV 300-W range. It is especially designed for :

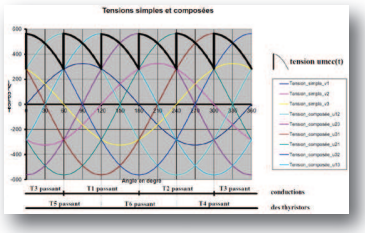
- ***ELECTROTECHNICS,*** *study of characteristics of electric motors (relation between speed and voltage, current and torque, efficiency, cos φ ...)*

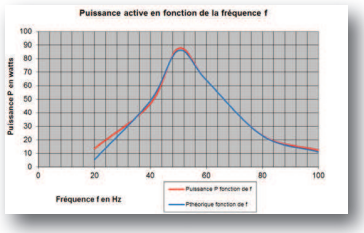


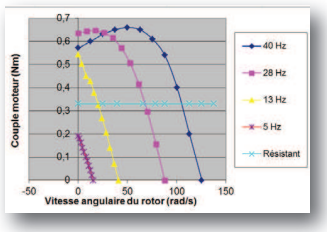




- ***POWER ELECTRONICS,*** *it is designed to be used with EP100, EP200 ranges, LV power converters (rectifiers, AC converters, choppers, inverters) and industrial servo drive (Siemens Sinamics V90 with EL306000 brushless motor)*



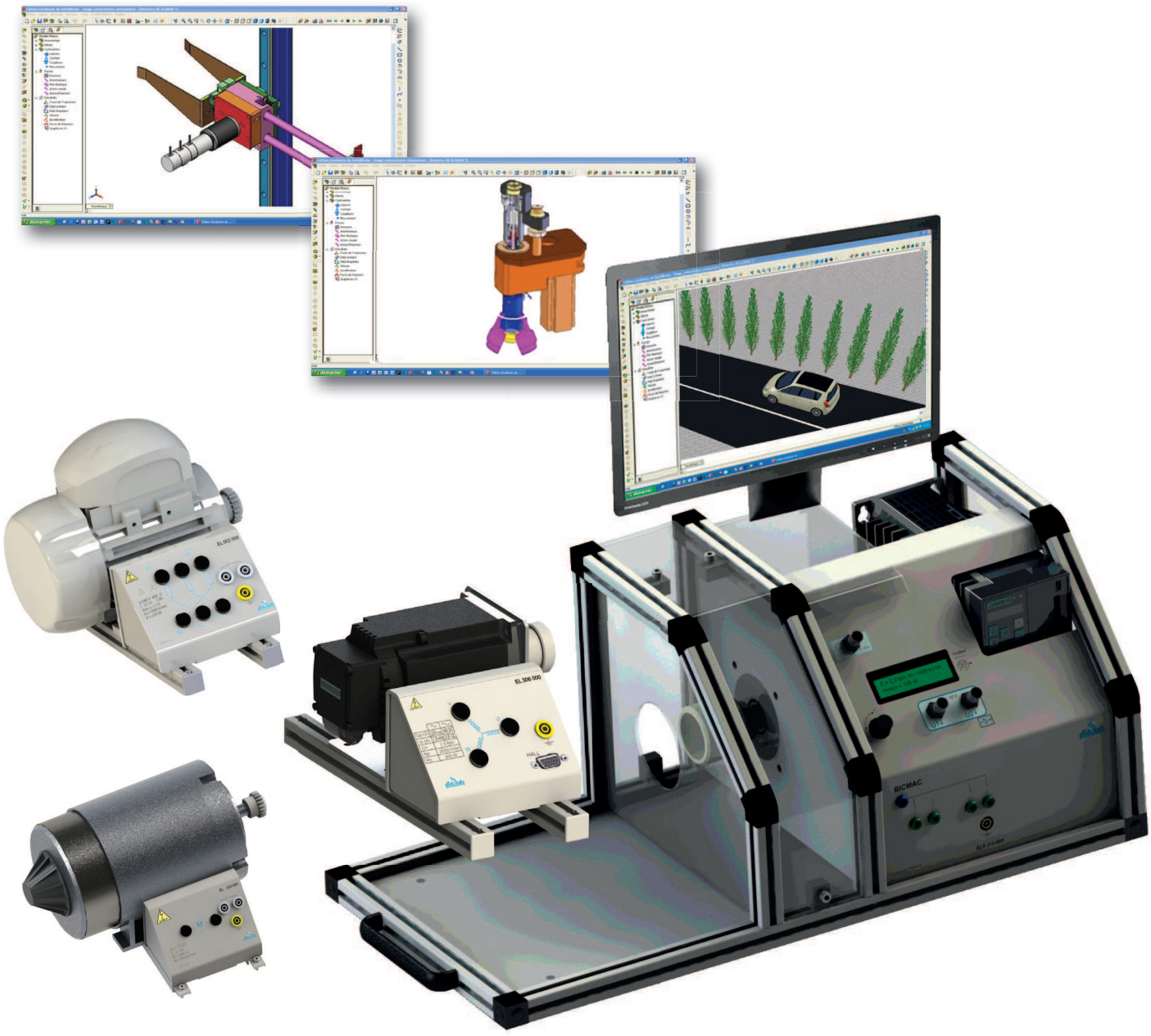




- ***SERVOSYSTEMS****, load generation :*
  - *Passive load of braking kind, linear or non-linear (ventilator, drill, travel of load with friction, driving vehicles ...)*
  - *Driving load, linear of non-linear (overhead crane, fast elevator, fly wheel, implying driving and energy recovery phases)*
  - *Allowing to get, in real time, mechanical values generated by the tested motor (speed, torque, power ...)*
  - *Operating under LV standards (Low Voltage, 170 Vdc and 240 Vdc)*

- ***AUTOMATIC CONTROL*** *, implementation of a control unit including several parts (industrial variator with brushless motor, PLC, HMI ...) in order to control a emulated automatic control (servo digital axis, ventilator, parking gate ...).*

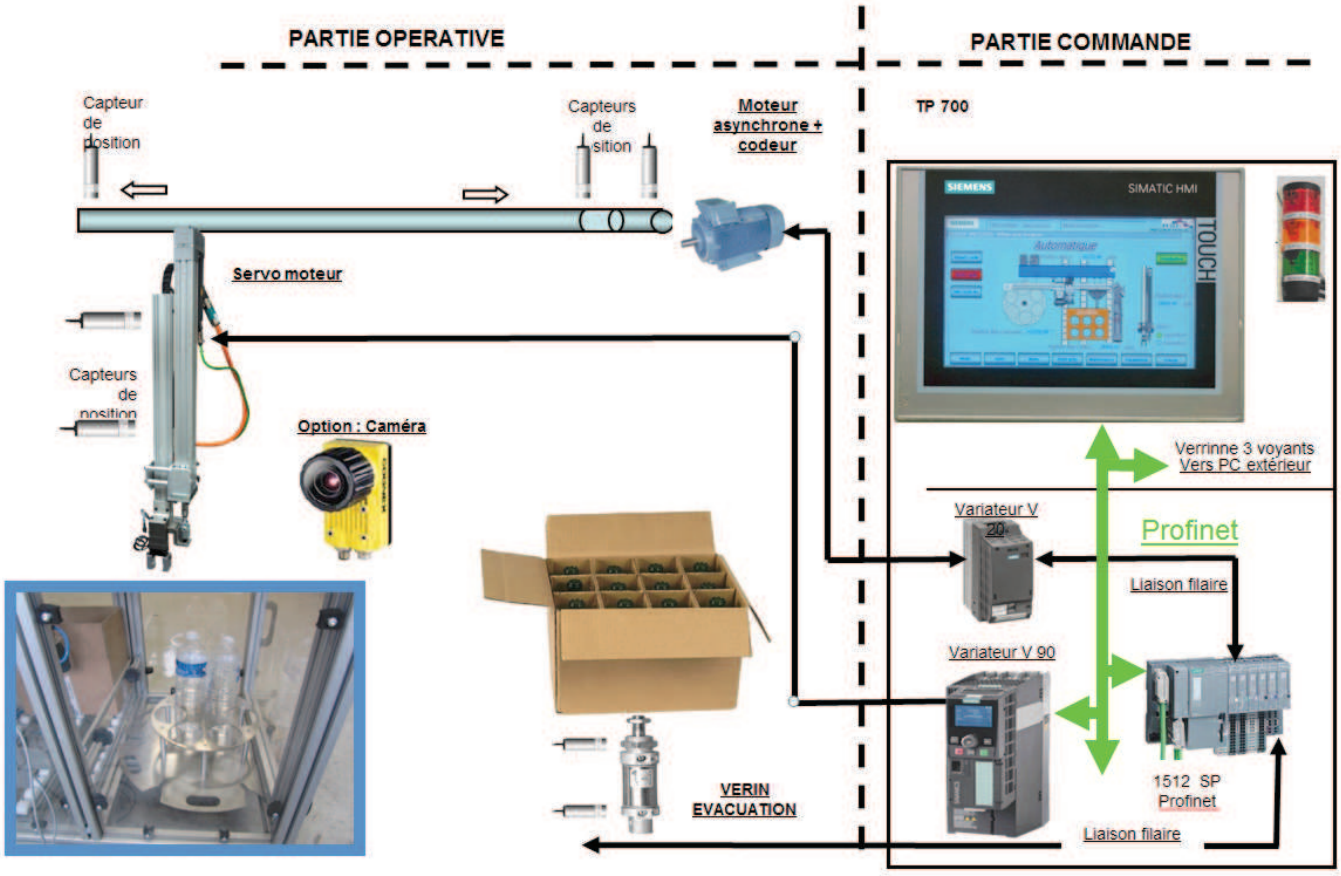
BIC SIN 300 : Load emulation



BIC SIN : Instrumented load bench with digital industrial system emulation

Reference	Ref 32_B	Description
Instrumented load bench with digital industrial system emulation including :		
EL	320 000	Load generation bench with brushless motor, control motherboard, SINAMICS V90 servo converter, with power supply, aluminium frame with handles
EL	320 100	Basic program, creation of loads and acquisition of mechanical variables (speed, torque, power)
		Motors :
EL	302 000	300-W DC motor, 170 Vdc with permanent excitation
EL	303 000	300-W 3-phase asynchronous motor, 240/400 Vac
EL	306 000	300-W Brushless motor, 230 Vdc
EL	30X 000	Special motors, ask us
		Optional extra :
EL	320 200	System for industrial process emulation in real time

Bottles Packaging Unit : DidaSam



Learning Targets :

- *Different network technologies: Ethernet, Web…*
- *Different kind of sensors (motion sensor, matter sensor)*
- *Speed variation and positioning with brushless motors or asynchronous motors with a variator*
- *Setting the parameters of a Brushless axis according to a load*
- *Use of 2 energy types: electrical and pneumatic*
- *Modification of the equipment settings locally or remotely via the networks*

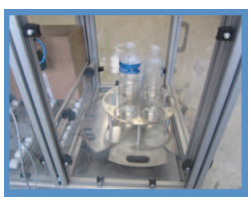
Optional extra : Camera for bottles control

- *Control of the corks' placement and the liquid level with a COGNEX video cameraBack*
- *Back light type lighting 100 x 100mm*
- *Dialog between of the video camera and the automation system via Ethernet*
- *Video camera settings via Ethernet with the provided software*

Optional extra : Motorization of the turntable

- *Gear motor of 0.12 kW for the turntable*
- *Reflex cell to detect the position of the bottle*

Asynchronous motor cell



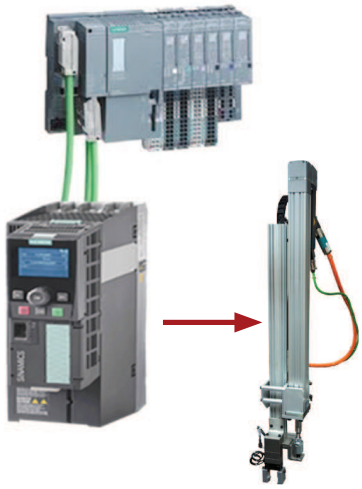
Bottles Packaging Unit : DidaSam

This bottles packaging system is an automation system to control the quality of bottles and place them in a package. It is based on a real machine made for the wine industry.

Technical Description :

Operating Part :

- *Bottles are placed on manuel turntable with 6 places*
- *Standard bottles are lifted by a vertical axis by BRUSHLESS motor with speed variator. 50W*
- *Translation axis between the control unit and the packaging unit : Belt conveyor with a 0,12-kW gear motor. Positioning with a 24-VDC encoder, 1024 pts/turn. Control of the horizontal axis with a speed variator linked to the logic and analog outputs of the PLC.*
- *Forward move of the cardboard with pneumatic jacks (pilger),Cardboard box translation and positioning axis for a placement in rows and columns (3x2)*
- *Safety : Compact system all streamlined to avoid the contact of human hand on mobile parts*
- *All the control equipment are mounted in an electrical cabinet with a lock*
- *General On/Off switch can be blocked with a padlock for the shutdown of the system*



Control Part :

- *PLC Siemens S7-1500 with integrated Ethernet/Profinet ports.*
- *SIEMENS TP 700 Operator panel with a 7" graphic and color screen, touch sensitive and keyboard. Integrated Web server, communication via Profinet with the PLC.*
- *Industrial supervision software Win CC flexible pro (computer not included).*

3 energies power plant, autonomous : Hydrelec 3E

Learning Targets :

Energy

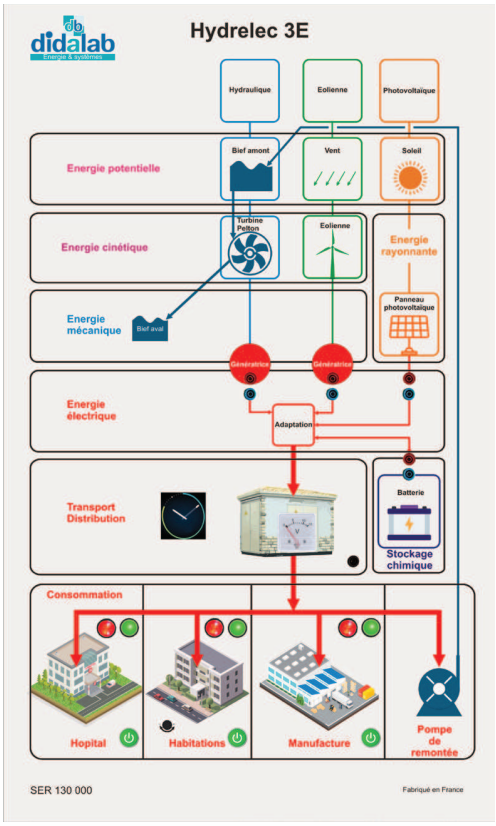
- ***Producing electricity***
  - *Hydropower (waterfall)*
  - *Fluid energy (wind power)*
  - *Solar energy (photovoltaic)*
- ***Storing electricity***
  - *Potential energy (water retention)*
  - *Chemical (battery)*

Innovation

- ***Material & Structures : Turbine Study***
  - *Choice of material within the constraints*
  - *prototyping (3D printing)*

Communication

- ***Information…***
  - *Acquiring : Pressure sensors, Flowmeter*
  - *Addressing : Siemens PLC*
  - *Communicating information : Ethernet Network*



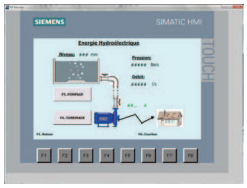
Optional extra : PLC and Control Panel

Control part :

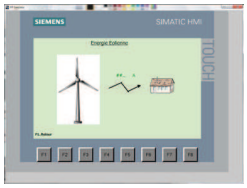
- *PLC S7 1200 Data acquisition*
- *Operator terminal KTP 700 touch color graphic 7 "*
- *Measurement and display :*
  - *Electric power supplied by generator wind turbine and solar panel*
  - *Pressure*
  - *Flow in turbine circuit*
  - *Level in water tank*
  - *Speed of generator*

SmartGrid Technologies

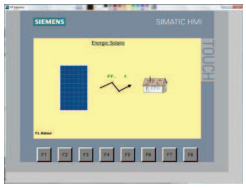
Study of 3 energies in autonomous mode :



Hydropower

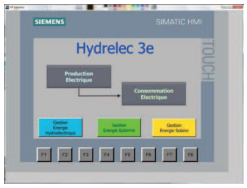


Wind power

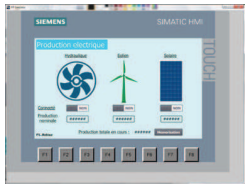


Sun

Management of an electric network (Smart Grid)



Instrument panel

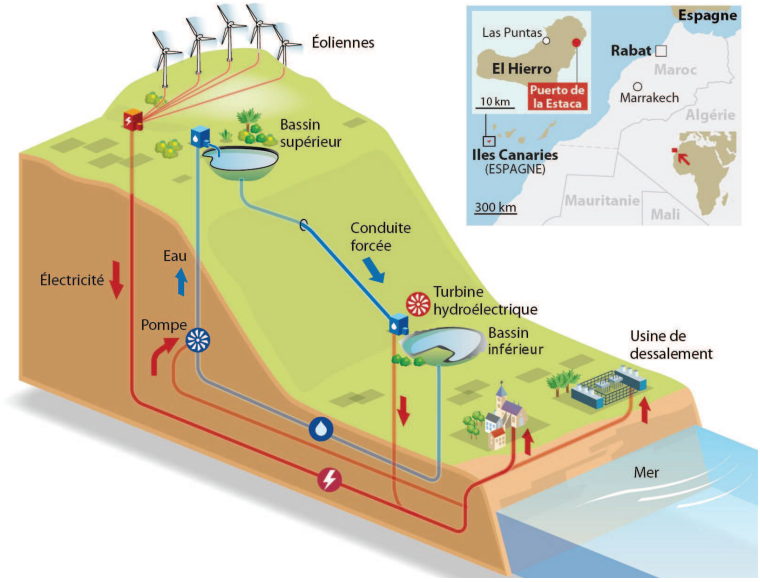


Production

Consumption

3 energies power plant, autonomous : Hydrelec 3E

Contextualization: Energy Independence : « Sun, water and wind serving El Hierro island ».

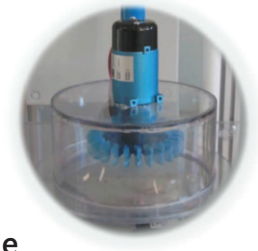


SmartGrid Technologies

Technical description :

Operating part :

- *Top tank (potential energy)*
- *Penstock (waterfall height of 30 meters)*
- *Transmitters of flow and pressure*
- *Pelton type turbine with a nozzle*
- *DC generator with 12VDC voltage regulator*
- *Pump with a 15-l/min flow*
- *Wind turbine 90 W,*
- *Solar panel 20 W*

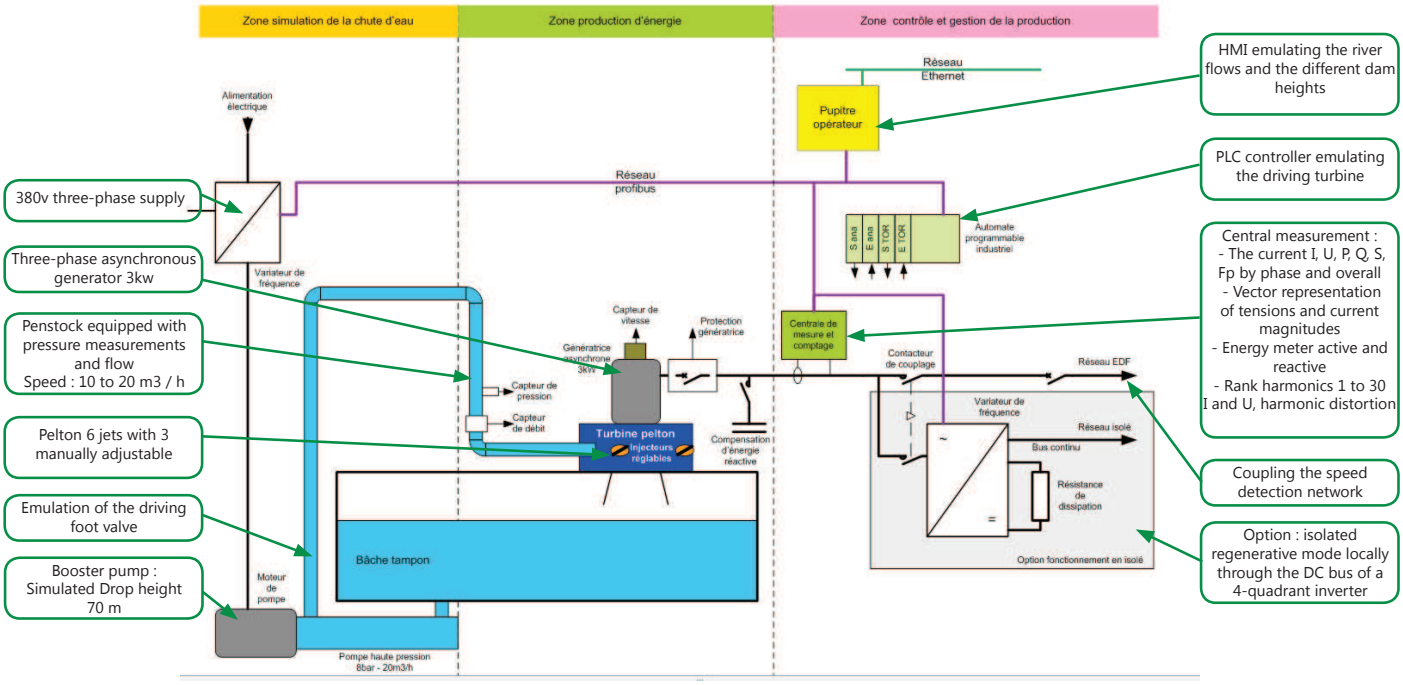


Study of the turbine

- *Design (solidworks)*
- *Choosing a material based on constraints*
- *Prototyping (3D printing)*

Hydroelectric power plant 2500 W : Hydrelec 2500

Schematic diagram :

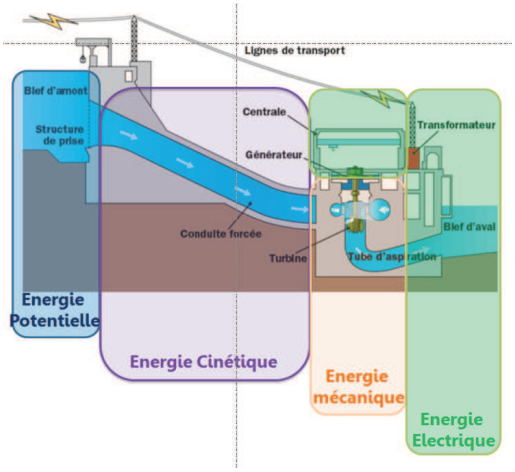


Learning Targets :

Implementation of a renewable energy solution.
For the study of :

- *Hydrelec 2500 hydro power plant contextualization*
- *Electrical security of people working in a power plant*
- *Several process of hydro electrical energy conversion*
- *Conversion from hydro power to electric power*
- *Electrical reversibility linked to the power grid*
- *Energetic sizing in autonomous systems*
- *Energy quality (harmonics) and electrical efficiency (electric lines sizing), influence of a polluting load*
- *Economical study and amortization*
- *Servo-systems and process control*
- *Communicating devices (remote control)*

Energy Transformation :



Optional extra :

Isolated Mode : isolated operation - Production of resistance through a four-quadrant inverter; Adjustable speed turbine to change the operating point.

Hydroelectric power plant 2500 W : Hydrelec 2500

This power station is the reduced model of a hydro-electrical power station driven by a Pelton turbine. It is composed of all the components needed to simulate a river with a penstock pipe and the production of electrical energy through a Pelton turbine

Didactics hydroelectric plant is geometrically similar representation of the actual plant. The hydraulic quantities and electrical powers are reduced in order to be compatible with the infrastructure and equipment of establishments.

The operation, behavior and setting methods are nevertheless similar to what occurs in the real system.

The components of the educational system such as the turbine and generator are directly from the industrial world and are commonly used in real micro hydro projects.

This approach allows to users of the system under actual operating conditions of a micro hydro.

Technical description :

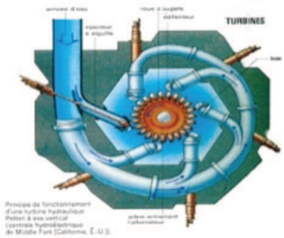
Operating part :

- *Tubular stainless steel square frame Size: 1500 x 850 x 1500 mm*
- *Hydraulic pump 7,5 kW with asynchronous phases motor : Simulation of a waterfall from 40m to 70m*
- *Pressure sensor with a piezzo membrane from 0 to 10 bars.*
- *Micro flow sensor with pulse for a range a fluid velocity from 0.8 to 10 meters/second*
- *Turbine PELTON with Asynchronous 3 phases motor with maximum power of 3 kW*
- *System performance calculation by comparing the hydraulic and electrical power network*
- *Coupling, lift measurement (voltage, current, active power, apparent power, power factor*

Control Part :

- *PLC Siemens S7-1500 with integrated Ethernet/Profinet ports.*
- *SIEMENS TP 700 Operator panel with a 7" graphic and color screen, tactile and keyboard. Integrated Web server, communication via Profinet with the PLC.*
- *Industrial supervision software Win CC flexible pro (computer not included).*
- *Three-phase inverter-type G120 driven Profinet network*

Pelton Turbine :



Heat Pump System, air/water : DidaPAC

Learning Targets :

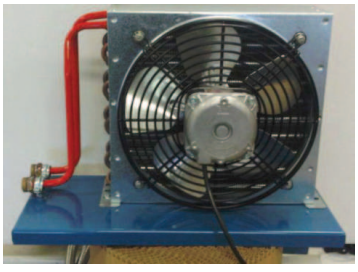
- *Learning and deepening technologies to ensure production from renewable energy*
- *Exploitation of renewable energy from the aerothermal technology*
- *Management and analysis of values measured in local or remote mode (Ethernet)*

Optional extra : Control Panel

Control Panel, KTP 700, touch sensitive, color, graphic, 7"

Optionnal extra : Heater

- *An optional heater allows the dissipation of the heat energy of the heat pump; this heater is connected to the side of the heat pump; the water flows is done through the internal distribution of the heat pump.*



Packing :

Dimensions : 700 x 600 x 700 mm
Weight : 40 kg à vide

Heat Pump System, air/water : DidaPAC

Pedagogical bench, homothetic to home heating applications, renewable energy (aerothermal) with domestic hot water and heating functions (reversibility option)

This system is designed from standard components of an industrial heat pump. It allows to demonstrate the effectiveness of this type of energy.

Heat pump allows a temperature rise of water in its tank from 20 °C to 45 °C in less than 45 minutes. and a cooling time of the same orde.

Technical Description :

Operating Part :

- *1 evaporator, 1 compressor, 1 expansion valve, 1 plate exchanger*
- *1 pump for water circulation*
- *1 set of sensors (8 temperature sensors, 2 safety pressure switches)*
- *2 analog switches to read the LP and HP pressures*
- *1 flowmeter (water flow in the tank or in the external load in real time)*
- *1 electric power pulse counter with display of current consumption*
- *1 water tank of about 20 liters mounted under the system*
- *1 output on the side of the heat pump for the connection of an external consumer*
- *Reversibility valve : the 4-way valve on the fluid part ensures reversibility by successively rising temperature and cooling of the water in the tank or of the external circuit*

Control Part :

- *S7 SIEMENS PLC 1200 Data acquisition with web server function (optional)*
- *Ethernet port for programming and reading of data systems*

Energetic Efficiency House : DidaBati

Learning Targets :

Built on the principle of a wooden house, it allows to study the energy efficiency of different materials and the operation of a double flow CMV (Controlled Mechanical Ventilation).

Students activities

- *Determining the characteristics of a material*
- *Studying heat bridges and infrared viewing*
- *Determining losses by air exchange*
- *Phase shift of the envelope, notion of thermal inertia*
- *Depressurization of the room and smoke test*
- *Comparison of single and double flow CMV (incidence of heat recovery)*
- *Solar gain, impact on buildings and bioclimatic approach*
- *Passive room (test in real conditions)*

Links to program :

- *Rational use of resources*
- *Behavior of materials*
- *Energetic behavior of systems*
- *Energy Storage*
- *Information acquisition and encoding*

Developed objectives

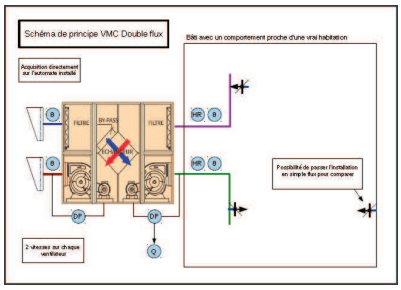
- *Characterize systems favoring use functions*
- *Identify elements in order to limit environmental impact of a system and its components*
- *Decode the functional, structural and software organization of a system*
- *Use a role model to predict or validate operation performance*

Skills developed

- *Justify the choice of materials*
- *Identify the flows and forms of energy, characterize the changes and/or modulation and estimate the overall energy efficiency of a system*
- *Identify and characterize technical solutions for materials, structure, energy and information (acquisition, processing, transmission) of a system*
- *Rate a difference between the behavior of the real and the behavior of the model, depending of the parameters*

Optional extra :

Instrumented double flow CMV

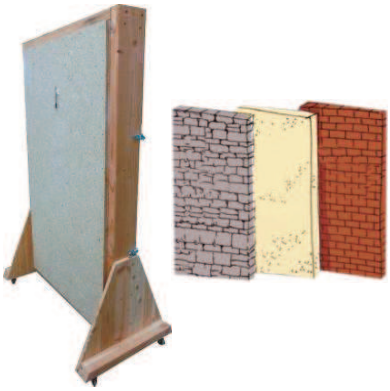


Separate control of fresh air and exhaust air circuits :

- *4 temperature sensors (input and output of each circuit)*
- *analog moisture sensors*
- *Differential pressure on the air extract and air supply circuit*

Supply of 2 interchangeable opening (single and triple glazing)

Various additional removable walls



- *Cellular concrete siding*
- *Honeycombed brick siding*

Packing :

Overall dimensions : 2 000 x 850 x 1 900 mm
Weight : 185 kg

Energetic Efficiency House : DidaBati

Constructive: wood frame, insulation, vapor barrier, rain barrier, exterior chipboard siding

1 insulated roof with a 10% slope

1 system for fixing the removable front panel, seal and timber frame

1 removable double glazed window

1 fan coil for a rapid rise of temperature (temperature diffrence with the outside of about 20 °C)

1 underfloor heating (for the eventual connection of a heat pump)

3 Room temperature sensors (2 outdoor and 1 indoor)

Instrumented double flow CMV

- *4 temperature sensors (input and output of each circuit)*
- *Analog Humidity Sensors*
- *Differential pressure of the air extract circuit and supply air circuit*

Control box :

- *Mounted at the rear of the frame*
- *Protection with circuit breakers*
- *Data acquisition and control via PLC S7-1200 with Ethernet port and integrated Web Server (including programming software)*
- *Recording of all analog data of the frame over a period of 2h (creating a .csv file)*

Removable facing :

- *45/145 framing wood frame*
- *2 trapezoidal side aisles*
- *1 100mm insulating glass wool*
- *1 vapor barrier on the indoor side*
- *1 interior facing made of gypsum plate Fermacell kind*
- *1 outdoor siding made of OSB*
- *3 temperature sensors integrated into the wall (internal, external, internal)*

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FABRICATION FRANÇAISE

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