SOLID WASTE SELECTION PLANT

DL GR03

The **DL GR03** Simulator allows you to study the challenges of the urban solid waste collection and sorting process.

It consists of a panel displaying the complete system schematic, which houses a series of mini consoles displaying the values of the relevant parameters.

The Simulator can be connected to a PC for monitoring, graphical display of the relevant parameters, etc., via a dedicated USB interface.

The Simulator is accompanied by the Windows **DLworkspace** application, which provides an integrated learning environment for using the Simulator itself.

WASTE MANAGEMENT

The Simulator is accompanied by the Windows **DLworkspace** application which provides an integrated teaching environment for using the Simulator itself.

This previous application brings together, in a single graphical user interface, all the tools required to use the Simulator:

- the Training Software (i.e., the teaching materials) with the theoretical guide to the study topics, the exercise guide, and the questionnaires,
- the tools for graphically displaying the quantities acquired by the Simulator.

It is also possible to connect the Simulator to an **MQTT Broker** to publish all the information using Internet of Things techniques and view it remotely on other computers.

It has the following technical characteristics:

- Synoptic panel with color system diagram,
- 6 mini consoles with 2.8" TFT displays, 240 x 320 resolution, and 5-key keypad,
- USB interface,
- DLworkspace Windows application,
- Management and graphics processing software,
- Training software with text, images, videos, and questionnaires,
- Power supply: 220 Vac ± 10%, 50 Hz.

The curriculum includes the following topics:

- **Urban Solid Waste (USW)**.
  - Division into categories,
  - The fundamental parameters.
- **Selection plants.**
  - Dimensional reduction,
  - Manual, dimensional, gravimetric, magnetic, electrical, and optical separation.
- **Waste energy.**
  - Calorific value,
  - Calculation of incineration parameters.

The system is provided with technical manuals for theory and exercises.

DL GR03 Simulator

For the Simulator to function, data relating to the distribution of the various categories of solid waste must be provided as input, thus defining the composition of the material to be recycled or disposed of.

The values have been divided into the following main categories having similar characteristics:

- organic,
- plastic,
- paper and cardboard,
- wood/textiles,
- inert materials.

In the simulator it is possible to define the percentages of separate waste collection for each waste category.

The simulator automatically calculates and displays the percentages, for each category, of waste destined for sorting plants.

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The separation percentages obtainable for each waste category can be set as desired via the relevant mini-console.

The percentages of the different waste components, which have not been separated during the separation phases, are automatically calculated by the Simulator and displayed in the mini Console 'UNSORTED WASTE'.

This residual waste fraction can be sent to two different treatment options:

- Landfill for final disposal,
- Waste-to-energy for energy production.

For waste-to-energy, the Simulator provides the 'WASTE TO ENERGY PLANT' mini Console which shows the main parameters needed to calculate the energy obtainable from waste.

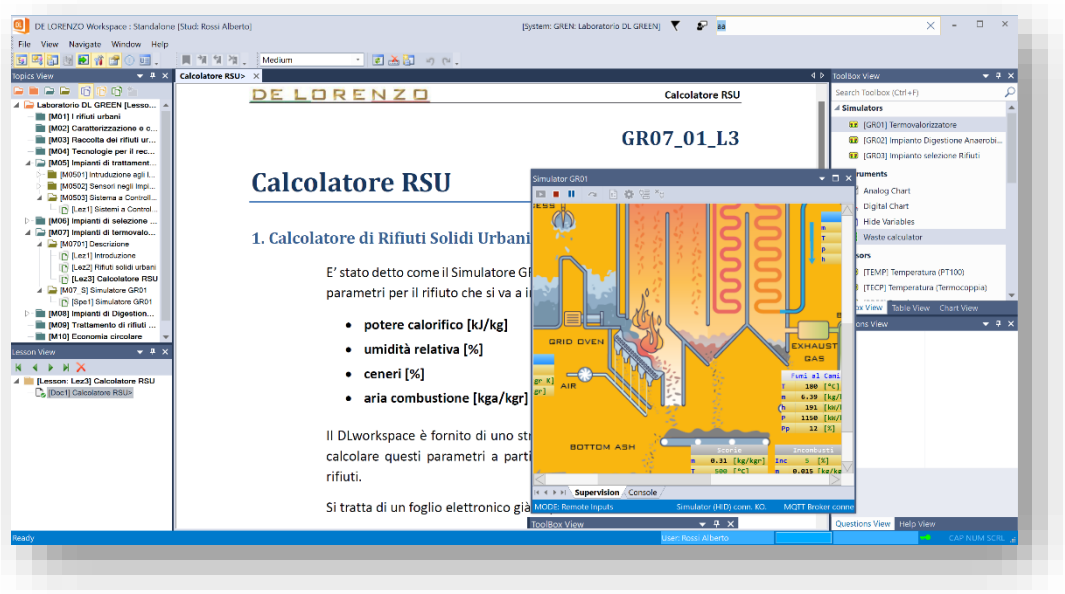
This information can then be entered into the DL GR01 Simulator for waste-to-energy.

WASTE MANAGEMENT

DLworkspace IDE

De Lorenzo Workspace is a Windows application that provides an Integrated Learning Environment (**IDE**) for training. It brings together, in a single graphical user interface, all the tools students need for studying and experimenting, and teachers for teaching and assessing learning.

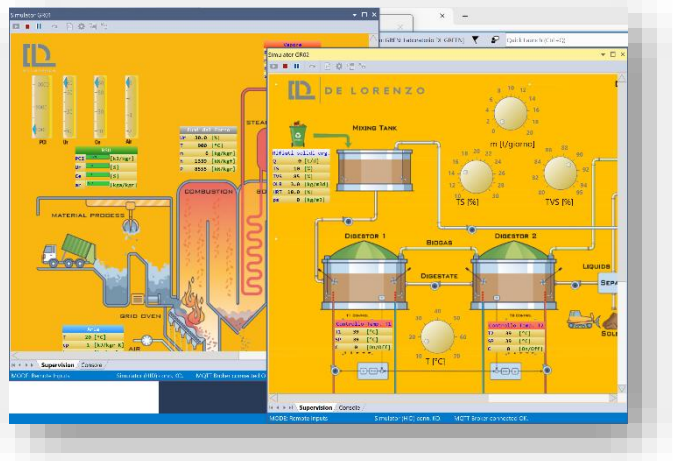
The figure shows an example.



You may notice:

- the list of topics and lessons on the left,
- the lesson pages in the center,
- the supervision tools, videos, and question management on the right.

The same environment also houses the Simulator's tools for supervision and graphic processing.



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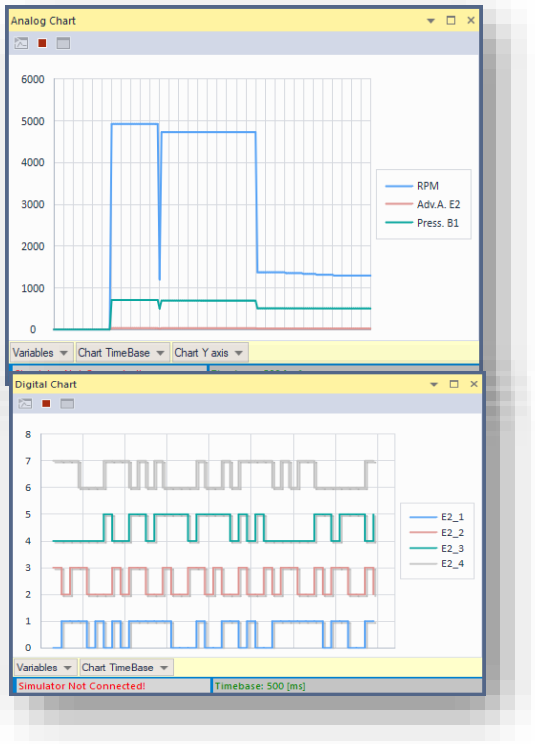


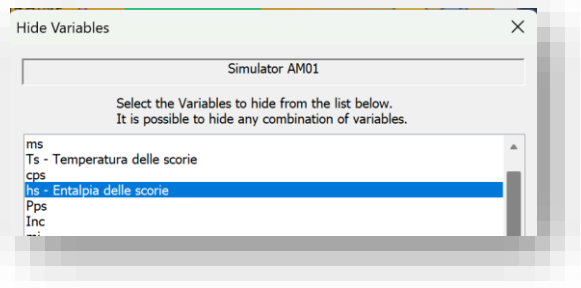
The **Analog Chart** allows you to view the real-time behavior of analog quantities during the simulation. Multiple quantities can be selected simultaneously.

The **Digital Chart** allows you to view the real-time trend of ON-OFF quantities during the simulation.

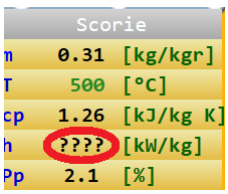
Interactive questions

The **DLworkspace** environment allows the teacher to ask students interactive questions during the simulation. It is possible to hide the values of the variables displayed by the simulator and request that the student calculate them.

A special window allows the teacher to select the variables to hide.



The value of the variable no longer appears to the student on the simulator. He or she must calculate its value using mass, energy, or other balances depending on the type of variable.



In this way it is possible to directly verify the student's level of learning.

Implementation of DL GR03 simulator in the DL GREENLAB laboratory

The **DL GR03** simulator, here proposed in individual mode complete with its management software, can be integrated into the laboratory **DL GREENLAB (COURSE FOR THE STUDY OF URBAIN WASTE DISPOSAL)** which also includes two other simulators **DL GR01 (Waste to Energy Plant)** and **DL GR02 (Anaerobic Digestion Plant)** with the aim of having an in-depth and complete course on the processes of urban waste disposal.

Specifically, the student acquires comprehensive training on all the following topics:

- **The product composition of urban waste.**
- **The main processes and flows of urban waste management.**
- **The main urban waste treatment processes.**

And thanks to the three simulators mentioned above, the **DL GREENLAB** laboratory allows for the faithful reproduction of urban waste disposal plants with the aid of a **DL WORKSPACE** learning tool which consists of a multimedia teaching platform.

For more detailed information, please refer to the catalogue **DL GREENLAB**.