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DESIGN STUDY FOR A PUBLIC SPACE CLOCK

Abstract: *The time measuring elements evolved during time, both from technological perspective and design, as much as nowadays, exact time is available to everyone. Through technological development, every device tends to have a function of measuring and displaying time. Due to this reason, an important element in manufacturing of the watches is the design, no matter if we are considering a hand watch, a wall watch or a public one. This thesis is aiming to present the development of a new design, modern and unique, for a public watch that shall become a symbol of the Polytechnic University of Bucharest.*

Key words: *public watch, product development, requirements list, graphic representation.*

1. INTRODUCTION

After conducting a research in the campus of more universities, from different countries, the author came up to the conclusion that an important element, in the design of those, is represented by a public watch. The most common type of clock, the one that perfectly completes the pleasant aspect of the campuses is the tower clock.

Noticing that most of the clocks found in the campuses of universities have become symbols for these, I consider beneficial the building of such type of clock inside the Polytechnic University campus.

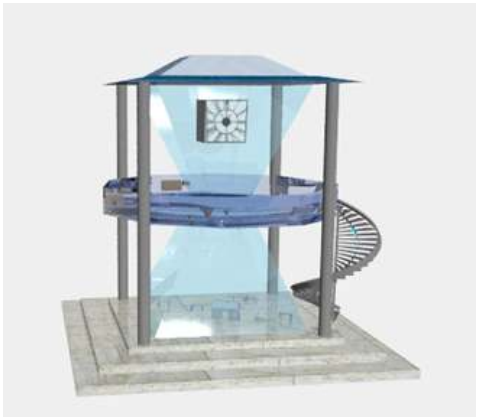

Fig. 1 Design proposed for public clock

And since I wanted something very different from the ones discovered during the research, I decided to consider more aspects, which is why, being built inside the campus of a university with technical profile, the entire design with be composed from the most common geometrical figures square, trapeze and circle. The shape is going to be inspired by an hourglass, considering that the device itself is a symbol of time.(fig.1). It will be divided into 3 areas: time measuring, leisure, info Centre and each area will have a different function.

2. PRODUCT DEVELOPMENT

Since this product is aiming to fulfil more functions, the elements used for its manufacturing have to be suitable for each function [1]. For this to be possible, I created a list of characteristics of the product, in order to better understand what the needs are it has to meet (table 1).

Table 1

List of requirements

Requirements		
Mandatory requirements	Fulfilling technical functions	1. Time measurement 2. Correct indication of time 3. Offering correct and precise information 4. Periodical update of information 5. Fully functional 24/24 6. Accessible relaxing area for all people in the campus 7. Has to respect the construction standards 8. Integrating within and completing the already existing design of the campus 9. Weather resistant 10. Visible from different angles and from long distances
	Safety in operation	1. To offer security when used both for leisure activities and as info center. 2. Able to be used by more people in the same time 3. The materials used for manufacturing have to be long lasting while also being secure. 4. The elements of the building have to be proportional
Optional Requirements	Maintenance requirements	1. Easy to clean and maintain 2. Realised from parts easy to replace when broken, without affecting the entire construction.

Requirements		
	Cost	1. Minimum consumption of raw materials 2. Minimal investments 3. Avoids extra expenses
	Fitting	1. The assembling part has to be realised in a logical way logica
	Ergonomic requirements	1. Constructive form 2. Suitable furniture for all 3 areas. 3. Soundproofed 4. Pleasant design no matter the angle it is being looked at from

After analysing the list of demands, I decided that the final product shall have a height of 12 m, with a design inspired by an hourglass, the symbol of the hourglass suggesting the passing of the time. For the product to meet all the needs from above table, a complex formed by 3 areas, very well split, will be built. These areas can be seen in the figure 2. The 3 areas are to have the following functions:

Main function will be time measuring and displaying. This function will be realised by the top part of the product, since the higher the display will be positioned, the easier will be to be seen for more people.

One of the 2 secondary functions will be to help people within the campus relax. The area of the product designed to fulfil this need will be positioned in the centre of the hourglass shape, more precisely, at a height of 6m, in the exterior, so the beneficiaries will be able to get fresh air.

The 2nd secondary function of the product is information. The 3rd area, positioned at the base of the hourglass is assigned for this. The reason for choosing the base of the building for establishing the info centre is its practicality, being very easy to access.

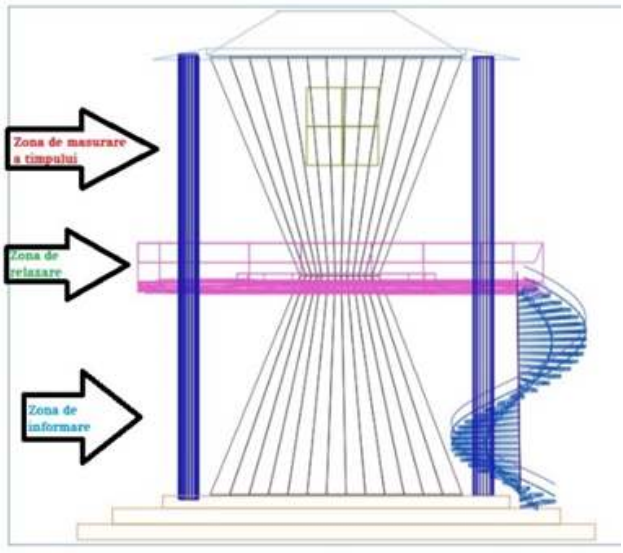

Fig. 2 The 3 areas of the product

3. STEPS FOR OBTAINING THE SHAPE OF THE FINAL PRODUCT

For starters, the foundation will be realised. This process involves digging ditches. In the ditches will be introduced pillars and supporting walls from iron and stirrups (fig. 3) [2].

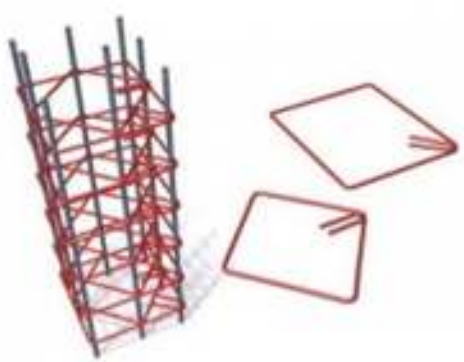

Fig. 3 Fittings used in foundation [4]

After the armature is assembled, concrete and cement need to be added. The top part of the foundation consists in 3 stairs that lead to the clock. As can be seen in Fig 4, they will have the shape of a square with the following measurements:

The biggest plate will be: 8.8 x 8.8 m^2, the next one: 8.4 x 8.4 m^2 and the last one: 8 x 8 m^2 and all will have 20 cm in height**.**

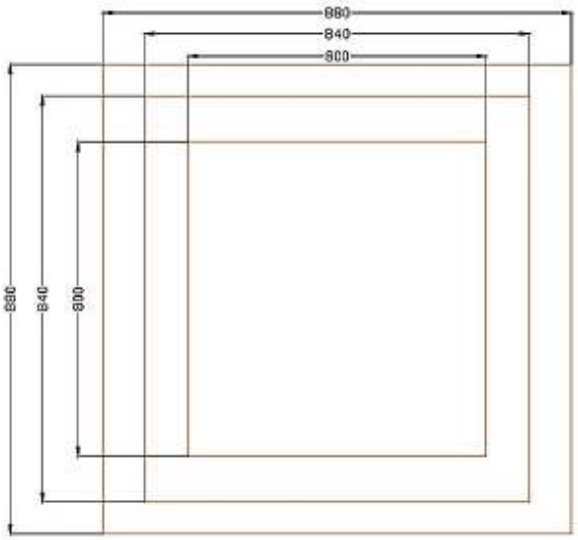

Fig. 4 Stage Graphic Representation

Fig. 5 The steps in the foundation

After the foundation and the stairs are ready (fig. 5), four sustaining steel pillars will be assembled. They will have the height of 12.1 m and a diameter of 50 cm (fig. 6).

They will have the role of sustaining the roof top and the terrace around the clock. For fixing, they will be positioned in the concrete of the foundation with stainless steel spikes**.**

Fig. 6 Support bars fixed in the foundation

The next stage will be assembling of the metal structure, that will sustain the glass of the building's facade, and also the assembling of the metal structure of the terrace around it.

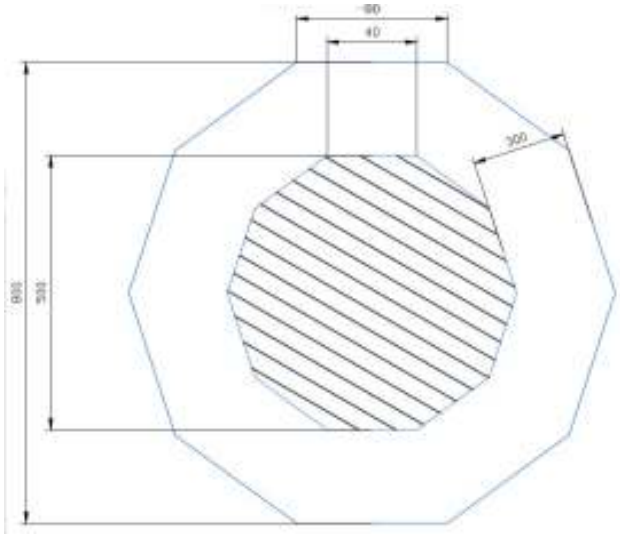

Fig. 7 Graphic representation of the terrace

The structure of the terrace represented in the figure 7, will have a space of 300 cm width. That space can be used for walking or for installation of pieces of furniture for rest. The metal plates used for the terrace floor will have the shape of a trapezoid with a large base of 80 cm and a small base of 40 cm.

The metal structure of the hourglass (fig. 8) will be from steel, will have a 12m height and will be 6m long, at both, the base and the superior part. The middle part will have 4 m.

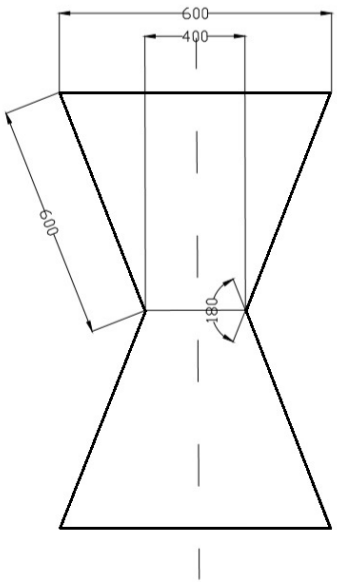

Fig. 8 Graphical representation of the metal structure of the hourglass

The metal structure is made of floor beams, wall panels, spacers and roof farms. These are to be fixed between each other using zinc-coated self-tapping screws, zigzagged at distances of max. 25 cm between them. The fixing of the metal structure in the concrete foundation will be realised with Stainless steel spindles, attached to the foundation plate at a maximum distance of 10 cm vertical, with maximum distances of 100 cm between them [5].

The figure below shows how to clamp and fix the metal structure (fig. 9).

Fig. 9 The way of catching metal structures [6]

After the metal structure will be fixed, will proceed with assembling the roof top. This is not going to be realised from glass, since a solar panel will be placed above it, for generations the electricity of the entire building.

So the roof top will be made of oriented Strand Board (OSB) metal farms on the outside, over which metal tiles are added. The sealing will be made of steel bars, place one next to the other for better sustaining the clock [5].

The size of the roof, as seen in Figure 10, will be 800x800 cm at the base and 200x200 cm at the top, where the solar panel will be installed (fig. 11).

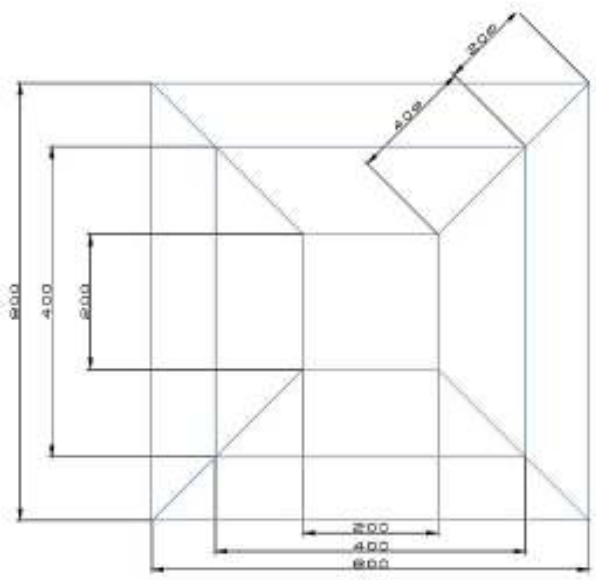

Fig. 10 Roof Graphic Representation

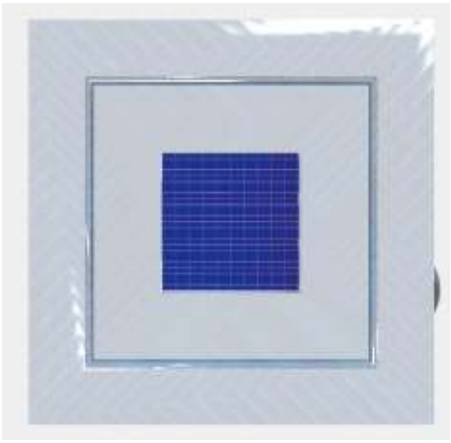

Fig. 11 Solar panel mounted on the roof [3]

After all the metal elements had been assembled, (fig. 12) the secured glass boards will be placed. The metal stair case will be assembled last and will allow the access to the leisure area.

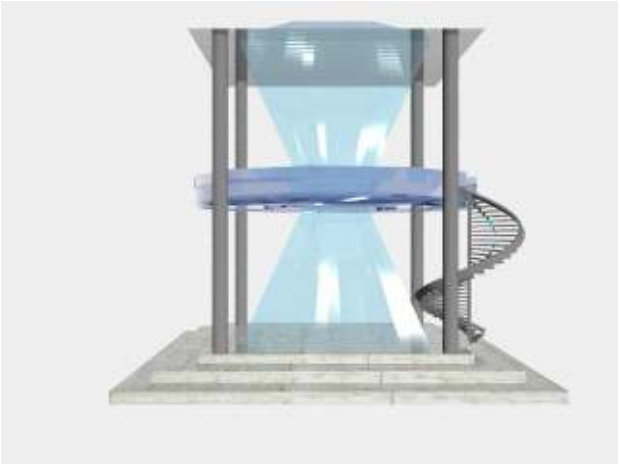

Fig. 12 Clock structure after assembly

Figure 13 is a graphical representation of staircase made of steel and has a height of 6.2 m, while the stairs are made of steel and are 80 cm long, 25 cm wide and 5 cm high.

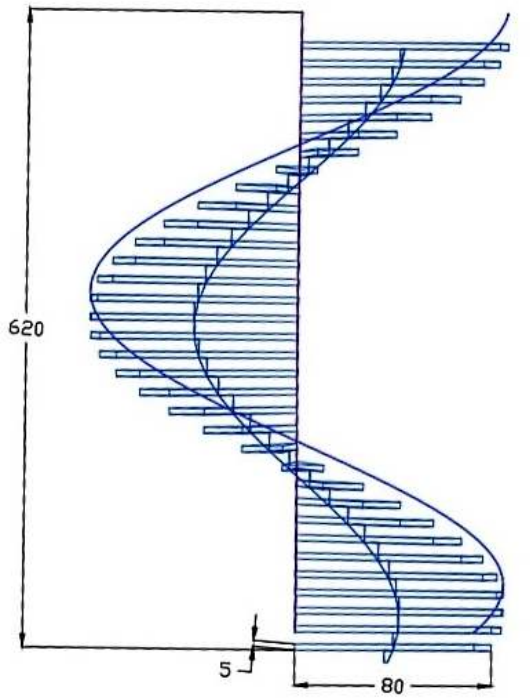

Fig. 13 Graphic representation of the metal ladder

Once the building in finished, the assembling of the clock in the top area follows (fig. 15). This will be attached to the sealing by metal cables. This type of cable is represented in the figure 14.

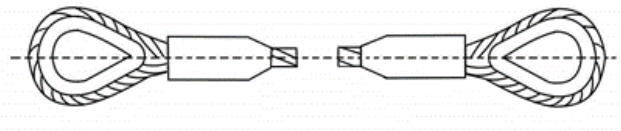

Fig. 14 Metal cable clamps [7]

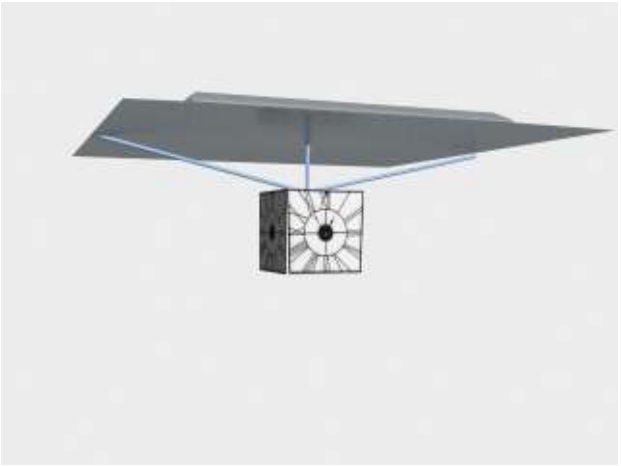

Fig. 15.Mounted clock

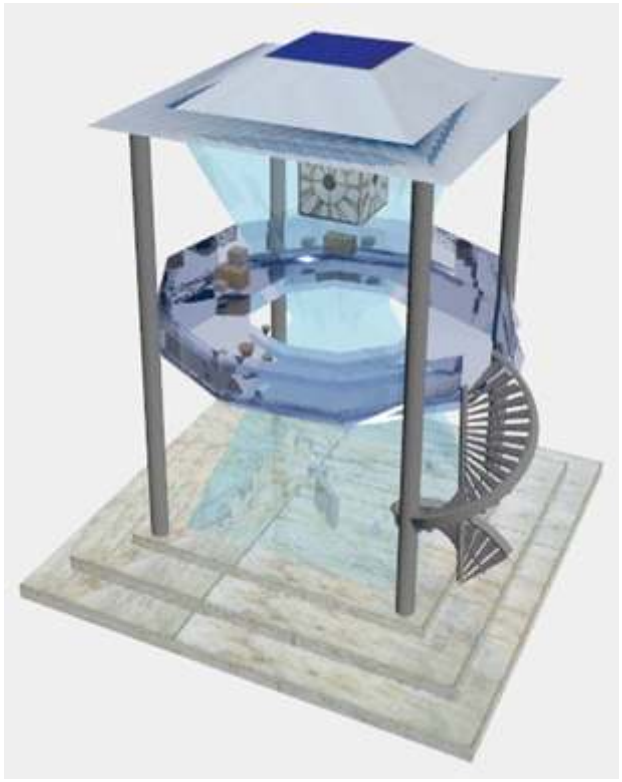

Fig. 16 Final design of the clock after assembly

4. FUNCTIONS OF THE PRODUCT

For fulfilling more functions, the product (fig. 16) was split within 3 separate areas as follows:

The function of measuring time (fig. 17), remains the primary one and is positioned in the top part of the construction. The mechanical clock, positioned in the centre is fulfilling this function. For this function to be fulfilled no matter the moment of the day, I chose to assemble a lighting sealing, made of LED, which will be powered by the solar panel.

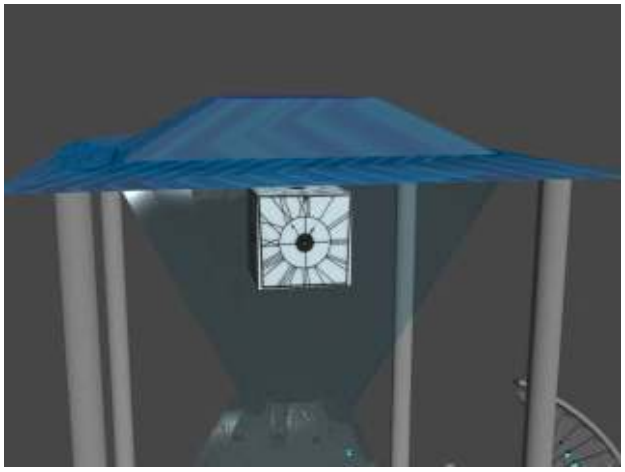

Fig. 17 The area responsible for the time measurement function

The leisure function occupies the exterior of the hourglass building and it's positioned at a distance of 6m from the ground (fig 18).

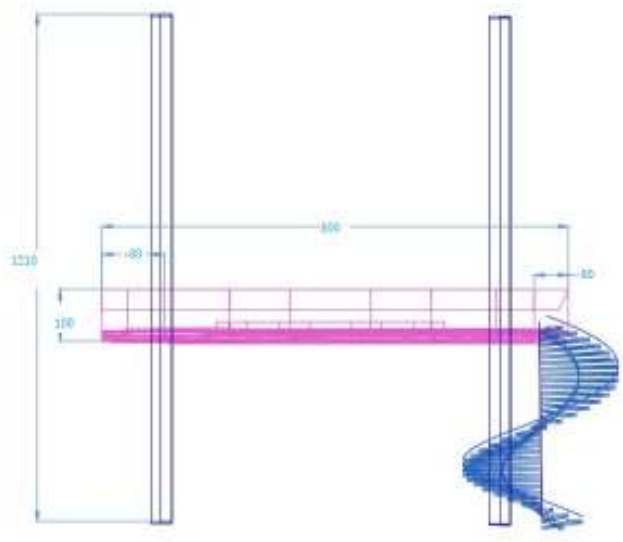

Fig. 18 Visual representation of the relaxation area

Far from the classrooms, it will be a good retreat for both students and teachers when breaks between courses are longer, or even after they are over. Here you will find several tables with banquets, suitable for groups seeking tranquillity and relaxation or for solving the projects in group because it is an area more protected from the agitation and agglomeration of the faculties' hallways.

Access to the relaxation area will also be done outside the building so that this area does not intersect with any other area created (fig. 19).

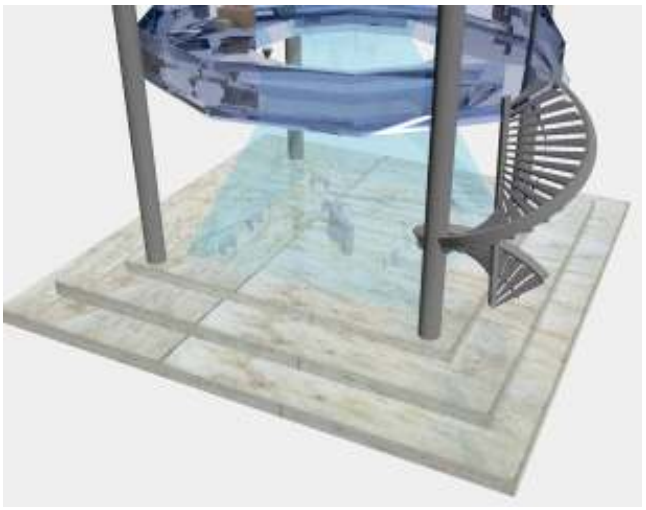

Fig. 19 Access to the relaxation area

4.1 The information function

This will be realised at the base of the hourglass building, in a room of 6m^2, equipped with modern technologies of information and with study furniture (fig. 20).

Both the information equipment and the furniture in the room will be carefully chosen and will reflect all the ergonomic conditions so as to satisfy the needs of everyone coming to this area.

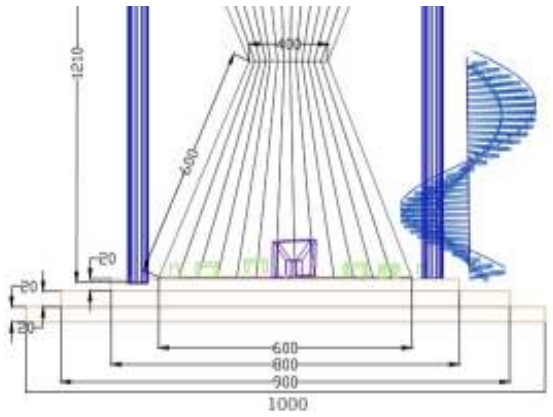

Fig. 20 Graphic representation of the information area

This area, represented in fig. 21, will be equipped with an info kiosk type device and will contain:

- ✓ All the necessary info for students and visitors (details on faculties, maps or small landmarks for finding their way within the campus; details about teachers and the subjects;
- ✓ Required request patterns and the ability to send them as soon as they were completed on the device;
- ✓ The possibility of sending feedback to the university regarding teachers, the courses or any changes they might think would be suitable;
- ✓ Internet connexion.

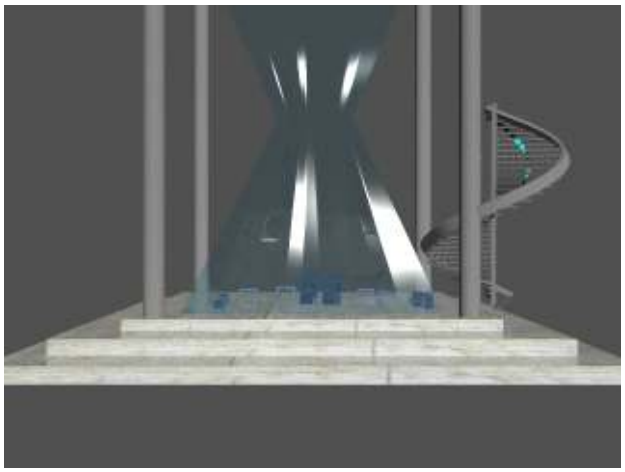

Fig. 21 Information area

5. CONCLUSIONS

The new clock assembled in the campus of University Polytechnic of Bucharest is not only going to be a simple clock that will be showing time, but also a "new friend" of the ones coming in this campus, because:

- the unique design will attract visitors in the campus and can be beneficial for increasing the popularity of the university;
- the secondary functions can make the time spent in the campus more enjoyable. People can find all needed information easier and faster or they can relax in a quiet place during the breaks between courses;
- being equipped with free internet it will be good to use for group assignments.

Students can come here before or after classes, avoiding the struggle of finding a place for group assignments. It can be a good place to go during the long breaks, for watching a movie, reading a book, study for exams or simply hanging out with their friends without disturbing other courses in the faculty's buildings.

The materials used also bring advantages such as:

- ✓ Aesthetically pleasing look;
- ✓ Sound and thermal protection;
- ✓ Natural light that will enter the interior more easily and faster, offering a more pleasant and comfortable environment, but also allowing for an optimal temperature;
- ✓ Construct much easier, unlike concrete and bricks;
- ✓ Higher comfort;
- ✓ Protect the environment.

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