SUMMARY

- ENERGY EFFICIENCY: The main benefit is to have full control of both facilities. To be able to act and control independently any device of the installation; with what we manage to have a real efficiency on the building simultaneously that obtains a level of very high comfort. All this entails the best development of the working day of the workers there.

Twilight, hourly and astronomical turns on and off are performed, totally and/or partially. The air conditioning is turned on before the working day so that the appropriate temperature is reached for workers, efficiently (depending on the time, outside and inside temperature).

The lights and the air conditioning automatically turn off in a scaled way as the workday ends, as well as at noon (partially), if no one has turned it off before manually (through scenes of total and partial shutdown per floor) . Also the shutdown of the air conditioning and lights is done by geolocation of the offices of the bosses.

The ELECTRIC VEHICLE CHARGING CONTROL (two charging stations in the parking lot) is also carried out, estimating the CO_2 not emitted to the environment

- SAVING WIRED COSTS AND LABOR: thanks to the knx system, and the great compatibility of communication with many more standards, a lot of wiring has been saved as well as labor to install it (to have the total control that is needed).

- REFERENCE AS AUTOMATED BUILDING: The company is an eminently commercial company, dedicated to the supply and sale of electrical equipment. As a company in the sector, it promotes actions for the sale of material, devices and global solutions in DOMOTICS and INMOTICS. With what this type of facilities are the best example of success to show customers in the automation and management of homes and buildings.

In the SHOWROOM we have the AUTOMATED HOME and THE LINGHTING ROOM. Apart from the home automation that does the example functions mentioned above, we also have the lighting room, with which you can control more than 100 luminaires from any mobile device and touch screens. With what supposes a saving in wiring very very big and of space in the control.

- FIRST OFFICE BUILDING WITH <u>AUGMENTED REALITY</u>: To handle ignitions, scenes and see temperatures and metering.

- OFFICE BUILDING WITH VOICE CONTROL: The most of all functions are controlled by voice control (Google HOME).

- COMMERCIAL REINFORCEMENT: initially there are these platforms so that each commercial agent can show customers from their tablet or smartphone, and they can sell this kind of products with more than a catalog.

- STRATEGY WITH MANUFACTURERS: It consists of trying to reach agreements with manufacturers for the transfer of devices that can be integrated in both the Cadielsa building and the ShowRoom. We could acquire a commitment to programming and integration in the installation, and report experiences in its use to the manufacturer: integration reports (errors and improving in their products through our experience). Announcement of collaboration on the Web.

PROYECT DESCRIPTION:

It is a TOTAL INTEGRATION PROJECT of a three-floor office building and a one-floor Showroom. Both installations performed completely in KNX and other protocols. The total integration of the two facilities into a **Building Management System (NETx)**, as well as the reprogramming of many elements in KNX, and the installation of many new ones (in KNX) was carried out in 2018.

The building of three plants is used as offices of a warehouse of electrical equipment located in an industrial estate in Valladolid**, CADIELSA VALLADOLID**. The building is completely realized in KNX: lighting, air conditioning, blinds (in Showroom), alarms, metering and air extraction. The manufacturers we work with here are **ABB, GEWISS, SCHNEIDER and ZENNIO** at KNX. This work was done about 12 years ago, and last year, in 2018 many elements have been added such as, for example, IP/KNX gateways, metering devices, push button interfaces to collect alarms, SERVER/PC for BMS NETx AUTOMATION and some other KNX device.

The installation also has a **PHOTOVOLTAIC SYSTEM** (solar panels) without battery support. We control the metering through analyzers with MODBUS communication.

The **SHOWROOM** is formed by a plant located 200 meters from the Cadielsa Valladolid building, in a different building. This showroom consists of a lighting room with more than 100 luminaries, as an exhibition, and an attached home automation house. This home automation house consists of a hall, a bathroom, a kitchen and a living room; its use is also an exhibition and home automation sample. All this is done in KNX with several manufacturers: **GEWISS, SCHNEIDER** and ABB. In home automation there are several systems that have nothing to do with the KNX: **NIESSEN PLANNER and DELTA DORE** X3D wireless system, all integrated in KNX; absolutely everything is automated with KNX internally. In these two rooms there are a total of 5 screens of which 4 of them are tactile and two of them have a web server; There are display screens of various KNX manufacturers. This installation was done 5 years ago, and last year 2018 new elements have been incorporated into knx, such as IP/KNX gateway, LIFEDOMUS server and TYDOM 1.0 from Delta Dore, KNX push-button interfaces.

In this project the TOTAL INTEGRATION of the building and showroom is carried out with a BMS Building Management System from NETx. This system completely controls and manages the Cadielsa Valladolid building and the Showroom, while all processes and controls are visualized through different devices: PCs, Smatphones and Tablets. Modifications are also made to the initial KNX program in ETS to make the most of this integration. With the system, greater energy efficiency is achieved through the control of individualized metering, which can affect those devices that have the highest consumption, or where there is an inappropriate use of the installation, such as, for example, downtime of work, where it is not necessary to consumption equal to the rest of the day.

VIDEO-REALISM: control of different rooms of the building (laboratory, training/meeting room and Showroom). Using IP cameras with movement, these rooms can be controlled live, while we see in the image the actions you perform, using any device.

Control by **AUGMENTED-REALITY** luminaires and scenes. Visualization of temperatures and metering inside the building, and turn on/off lights and scenes. We

do this with the mobile, pointing in each case with the mobile camera to the specific point programmed to give us the information through augmented reality, and doing de specific action through this image in augmented reality.

- **Metering Control** per plant: control consumption by electrical panel. Metering of lighting and air conditioning.

- **Control of photovoltaic**, instantaneous and historical production. METERING-PRODUCTION comparisons (daily, weekly ...).

- **Electric Vehicle Recharge Control**:

      Graphs of recharge times vs kilometers traveled (manual, or estimate).

      Graphs of photovoltaic production relationship with vehicle recharging.

      Graphs of kilometers traveled vs pollutant emissions saved.

- **Control of total lighting and air conditioning** of the building efficiently: Constant and manual regulation of the offices (depending on the daylight). Control of lights and air conditioning off at the end of the day in a general and partial way (noon). Air conditioning ignition control to start the workday based on the ambient temperature.

- Control of exterior perimeter lighting: directly linked to sunset and dusk.

- **Management and visualization of ALARMS** of both fire detection and intrusion, as well as its connection with the rest of the building. For example: lighting of perimeter lights when there is an intrusion into the warehouse (including global lighting of office lights).

- Specific fast-action scenes: scenes of general and partial shutdowns, for saving, manually in each floor and in the entire building.

- Visualization of all processes and states in SCADA BMS NETx via web, smartphone and tablet.

- Laboratory (room located on the second floor of the CADIELSA building): PTZ camera in laboratory: control of industrial automation elements (frequency inverter - motor) by VIDEO-REALISM: from any device you can choose the position of the camera, that focus directly on one of the elements (presets), and through the live image control and see it live. Control of all the above **by voice (Google Home)**

- Meeting / Training Room: Control of lighting and climate by voice (Google Home)

- Meeting / Training Room (2nd): through a camera, and through any mobile device, you can connect to the room, and by VIDEO-REALISM, the entire room is controlled live.

- Independent offices: on and off of the air conditioning of the offices of the bosses through **GEOLOCATION**.

- SHOWROOM: With IP Cameras, lighting and air conditioning control is carried out through VIDEO-REALISM, apart from the BMS and Delta Dore, Gewiss, Schneider and ABB WEB servers. Voice control of home automation (Google Home)

- **TELEGRAM**: Sending alarm messages and reports (daily) of metering and production through TELEGRAM group.