A "UNIQO" HMI FOR EVERY MACHINE

MBF, a leading machine manufacturer in the beverage sector, has relied on ASEM technology to develop an HMI that adapts automatically to each machine.

The challenge

In the era of globalization of the markets, machine manufacturers must design their solutions with not only the national market in mind but also thinking of international markets, where very often the requirements have to deal with requirements imposed by different cultures in the field of technologies adopted for industrial automation systems. This is even more true for Italian manufacturers, renowned worldwide for knowing how to find cutting-edge technological solutions, very flexible and customizable. The typical case that the manufacturer must face is that in which the end customer who purchases the machinery requires the use of control systems from specific brands based on preferences or internal strategic choice.

It's no secret that the US market, for example, prefers US-made automation from Rockwell Automation (Allen-Bradley), while Europe or even often Asia favour B&R or Siemens automation.

SECTOR:
Beverage

COMPANY:
Established in 1997, MBF immediately distinguished itself for its strong identity and the ability to anticipate the needs of the bottling sector thanks to flexibility, knowledge, precision, planning, technology research, always imposing new standards and operating as excellent consultants, as well as excellent builders of machines, being today recognized as a leader in the world market.

PRODUCTS:
MBF offers a complete range of rinsers, fillers capping machines for corks, capping machines for screw closures, as well as compact and innovative combined machines such as SUPERBLOC, the compact, complete, and customized bottling line that integrates in a single machine rinser, filler cork and screw capper, capping machine and labeller.

Finally, a **responsive** operator interface makes it possible to use the same HMI project in machines mounting operator panel with different sizes and format, **greatly reducing time-to-market**.

On control systems, the manufacturer has learned to develop enough flexibility over the years to include in their offering different design options for different markets and preferences.

Visualization systems, which always accompany machinery for the realization of user interfaces, represent a crucial aspect and are always the subject of profound reflection by the technical offices.

Unlike control systems the realization efforts for these systems must concentrate not only on functional aspects, as is mainly the case in the control part, but also on user experience and effective representation of information as well as sharing both at horizontal level in M2M scenarios and possibly vertical towards management systems or even in the cloud.

The design investment for HMI systems essentially represents a cost that one would like to amortize through **full compatibility of the HMI application regardless of the control systems adopted**, therefore avoiding the need to develop and maintain aligned HMI projects created with different solutions.

This is in fact the challenge that MBF wanted to face when it got to know ASEM as a supplier not only of hardware, but above all, in this case, of advanced software solutions for human-machine interfaces.

Solution with UNIQO

The **complete dynamism** of the project is one of the peculiar characteristics of the UNIQO platform where there is no distinction between design time and Runtime. Each object and each functionality of the HMI project can also be **modified at Runtime** by means of very simple application logics that apply the necessary modifications according to the context within which the system is working.

With this in mind, MBF has structured the HMI project using relative references to the data, instead of absolute ones.

All the controls used within the project refer to so-called **"aliases"** that represent dynamic links to the machine data model that completely abstracts from the type of communication protocol that acquires data from the control system.

UNIQO object-oriented programming allows to define objects of "communication protocol" type and then instantiate them directly at Runtime according to the PLC used.

Therefore, the operator during commissioning will use a special HMI setup page to indicate the protocol to be instantiated, the references of the PLC variables will be matched to the data model and therefore to the UI controls in a completely transparent and automatic way.

The use of the same project, for example in another machine realized with a different controller, requires from a conceptual point of view, to instantiate the new protocol at Runtime - predefined as a "type" at design time- and to perform, always at Runtime through a script, the link between the new variables of the PLC and those of the data model without other changes.

Since all references in the HMI project are related to the data model, no other change is necessary.

Full support for PLC interchangeability also comes from the **internationalization** of projects and thus, of course, by the usual multilingual support, but also by the correct use of all international settings such as measurement units or date and time format.

UNIQO implements the OPC UA standard which **standardizes** data representation methodologies. The purely numeric variables of the PLC memory
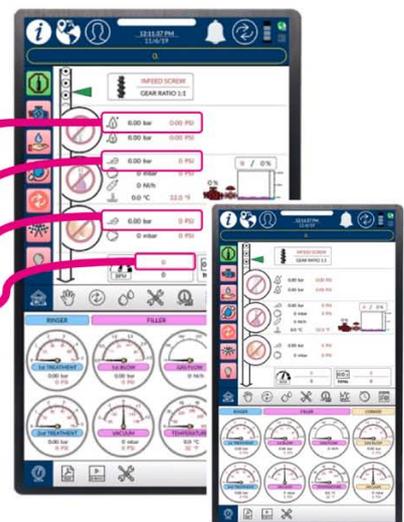

MACHINE PORTFOLIO   NEW HMI   UNIQO

SIEMENS

Allen-Bradley by ROCKWELL AUTOMATION

PLC_type

are mapped onto the so-called "analog variables" of the OPC UA that accompany the data with additional information such as engineering unit, minimum value, and maximum value.

UNIQO also provides the possibility of specifying in the master data of each user the localization information according to which the HMI system subsequently provides for the conversion of numeric values and measurement units in correspondence of the user login event.

Different users with different localization options will always be able to use the project reading the information in the format they prefer.

The user experience in HMI applications represents more and more an important activity to enhance the the machinery according to the ease of use and immediacy, features that save operators time and minimize the possibility of errors being made.

MBF wanted to capitalise on in the field of bottling machines and above all their use by end customers to create a human-machine interface that is both pleasant and effective, wisely distributing information within hierarchical screens and menus that make the system very intuitive to use without the need for manuals.

In fact, UNIQO provides a series of tools for the creation of modern and responsive user interfaces. The user interface controls are placed within containers that facilitate the organization of the elements in the s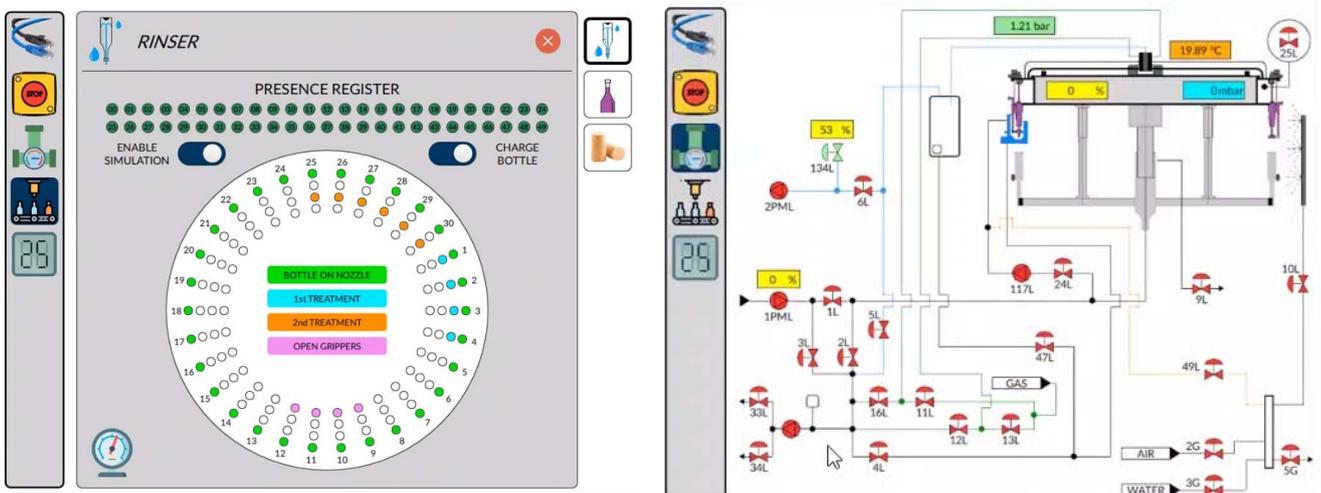creens which always have coordinates relative to the container calculated with respect to its edges, allowing to create in an extremely convenient way pages within which use the **multitouch** gestures of zoom and scroll.

The specificity of the machinery produced by MBF requires peculiar graphic devices to effectively represent the operating status of the machine in a convenient way.

The bottle rinsing and filling systems are often based on circular carousels that, during rotation, sequentially carry out the washing or filling actions. MBF technicians have used the C# programming potential of UNIQO together with the dynamic features of the graphic objects to develop a **dedicated widget** which represents in an extremely intuitive way the status of the washing and filling taps of the carousel, allowing the operators to identify the positioning of the bottles with a single glance at the interface.

Using the possibility of creating **animations**, a page has also been created where it is possible to visualize the process carried out by the machine combining the information deriving from the pneumatic and mechanical drawings, creating a **dynamic layout** that allows the user to monitor immediately the processes performed by the machine.

The possibility to integrate **multimedia contents** allows the possibility to integrate user manuals or electrical diagrams in **PDF** format directly into the operator interface. In addition, **video** tutorials have

been made available that provide the operator with additional diagnostic tools for troubleshooting.
To make the experience of finding and solving problems even more intuitive and effective, the machine can be visualized within a 3D viewer to highlight the machine parts where a problem has arisen.
Finally, with a view to providing an effective interface of data exchange with other machines both at the same level, as well as at a higher level such as MES or ERP, MBF has exploited the features of UNIQO's OPC UA server to organize the data within organic structures which display statuses, alarms and production data according to the requests of the various customers.

UNIQO enabling features	VALUE IN TOKEN
Native graphical interface	1
Alarms	1
Embedded Database	1
Data Logger	1
Event Logger	1
Retentivity	1
Integration of existing applications in C# language compatible with .Net standard 2.0	-
OPC UA client	1
Siemens S7 TIA PROFINET communication protocol	1
Ethernet/IP communication protocol	1

Token cost

The S license allows to realize the described HMI using 6 components related to typical HMI functionalities: native graphic interface, alarms, recipes, event loggers, data loggers, embedded database, and a token for the communication protocol necessary to import the variables from the machines in the case of Siemens and Rockwell PLCs or the OPC omponent UA Client for interfacing with B&R PLCs, leaving room for further functionalities such as the possibility of setting up an effective interface for data exchange with other machines both at the same level or higher level such as MES or ERP, using the **OPC UA server** component.

License S for x86 systems: 8 tokens

Variables import: 1 token

| Native graphical interface: 1 token | Event Logger: 1 token | Alarms: 1 token | Embedded Database: 1 token | Retentivity: 1 token | Data Logger: 1 token | OPC UA Server Single Client: 1 token |

OPC UA Client: 1 token