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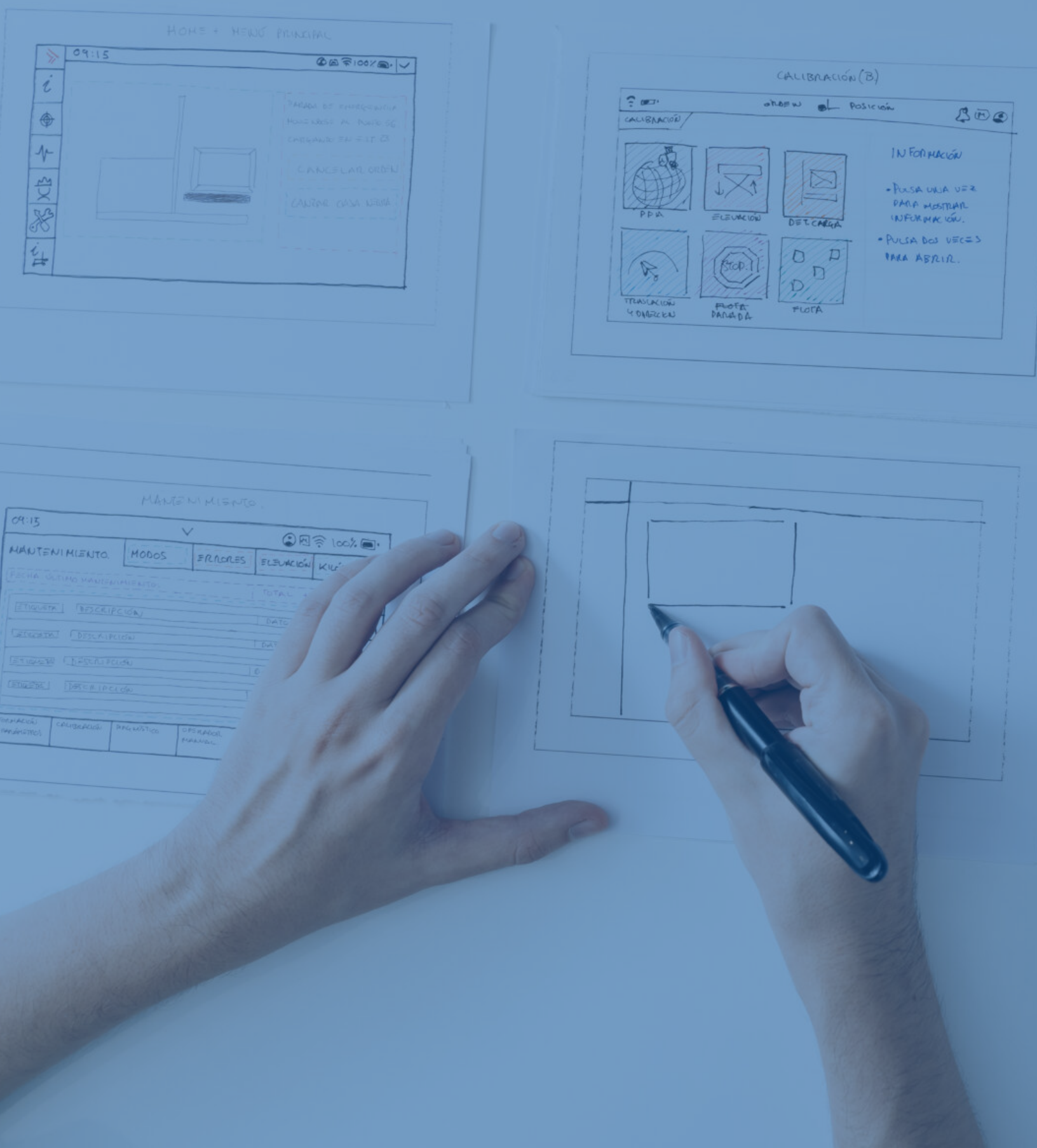
Digital design

bigD

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Freedom begins with data visualisation

The global HMI market was valued at three billion euros in 2020 and is expected to reach a value of more than seven billion euros by 2026. It is expected to bring a number of added benefits to a facility in terms of safety, operations and production. HMI is expected to reduce operating costs by replacing traditional push buttons, indicator lights and selector switches and reduce the requirement for panels and further improve machine monitoring.

The importance of user interfaces has become increasingly clear in recent years. Many industrial corporations have come to the conclusion to focus more on the quality of the user interfaces of their products. Higher levels of functionality, as well as multi-touch screens and high-quality displays, are expected to drive market growth.

HMI, in combination with PLCs, are the mainstay of the production line in various industries, greatly improving operations and enabling supervisory control and data acquisition throughout the system, making parameter changes possible according to the operator's choice. For example, when processing metal, the HMI can control the method and speed at which a metal is cut and bent.

On the other hand, the importance of IoT should be highlighted. According to the World Bank, the number of IoT-connected devices is expected to reach more than 51,000 by 2023, so the need for HMIs to become more sophisticated is growing. In addition, the rise of Industry 4.0 and the Industrial Internet of Things (IIoT) has made this more accessible, increasing its accessibility and ease of use.

Advanced HMI, and its unconditional support for workers, is a reality. Where monitoring and control of plant information has long been done by operators working with fixed PCs, installed inside control rooms offering limited functionality, the reality is now very different. Employees have greater high-performance mobility, laptops and mobiles, giving workers the power, freeing them from being tied to the control room and allowing them to manage operations and troubleshoot problems in the field or on the shop floor. While some applications may require a fixed HMI, a large number of them may already be mobile. For example, if the operator requires maintenance assistance, he can contact other operators via the mobile HMI and work together to solve the problem.

“The importance of user interfaces has become increasingly clear in recent years”.



And a complement that should be highlighted is Augmented Reality, which is redefining the human-machine interface. AR technology is introduced to enhance the user's physical environment with computer-generated content. By integrating AR (Augmented Reality) it is possible to add real-time information to the environment, which is extremely useful for assessing current circumstances in order to improve decision making. This complementary audiovisual information is provided by electronic or computer-generated devices.

“Augmented Reality is redefining the human-machine interface”.

RA is suitable for both manufacturing and process industries, and allows the necessary actions to be taken at different stages, improving production efficiency, reducing errors and minimising production or maintenance downtime. In addition, it allows operators to be informed at the moment of any problem or need that may arise in the plant. Because receiving relevant information in real time and performing step-by-step guided operations and configurations directly on site is the cornerstone.



**“The need for HMIs
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The AR device connects to the PC with Wifi, which manages the monitoring system, to which the field devices are connected. The devices usually come in the form of a kit, which includes glasses or helmets equipped with displays, cameras and audio equipment. The device's screen can display real-time dynamic information relevant to the task at hand as well as process data, system status, alerts, actions required according to the work to be performed and other useful information. And depending on the alerts, operators can trigger the necessary commands, such as start, stop, modifications and alert-based instructions. As technology advances, AR systems tend to be complementary solutions, they

will never replace traditional work process workstations, but it is true that the “hands-free” option offers much more flexibility and speed during operational phases than is possible with standard systems. AR and mixed reality systems simplify operational activities, providing a solution that integrates seamlessly with monitoring technologies.

2 HMI, the importance of its integration

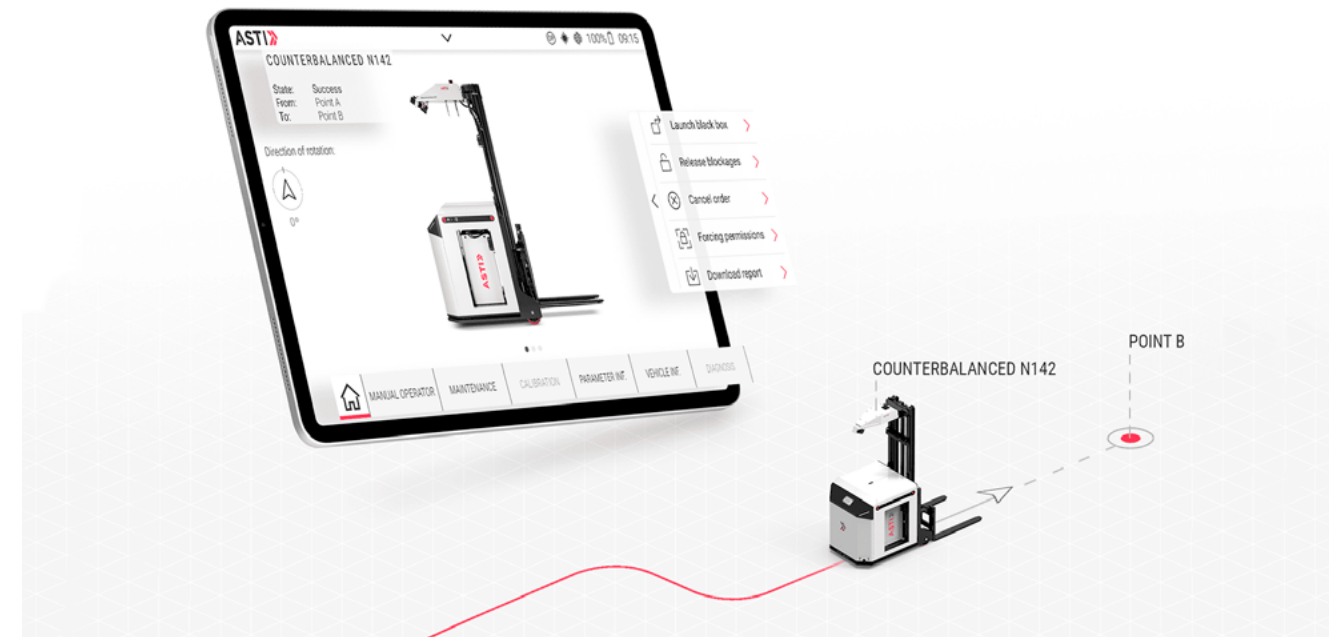
Human Machine Interface (HMI) is one of the most prominent aspects of industrial automation because it is a user interface or control panel that connects a person to a machine or device. Although the term can technically be applied to any display for performing control functions and receiving feedback on those actions, HMI is used in the context of industrial processes that control and monitor production machines.

Human-machine interface systems enable technology operations in every application, including machining centres, semiconductor production equipment and medical diagnostic equipment, for example.

In short, the HMI interface encompasses all the elements that a person will use. For example, if a maintenance operator controls or monitors machinery from the HMI, it can include information such as temperature, pressure, exact positions of production lines or the control of raw material tank levels, among many other functions.

In addition, these control panels can be connected to PLCs and display their problem-solving behaviour to the maintenance technicians to improve times.

“The HMI interface encompasses all the elements that a person will use”.



[HMI Interface for ASTI designed by bigD](#)

Thanks to this technology, automation is incorporated and many problems caused by lack of information or human error are reduced. In addition, the basic functions to be highlighted are: Data visualisation, production time tracking, monitoring of KPIs and machine inputs and outputs.

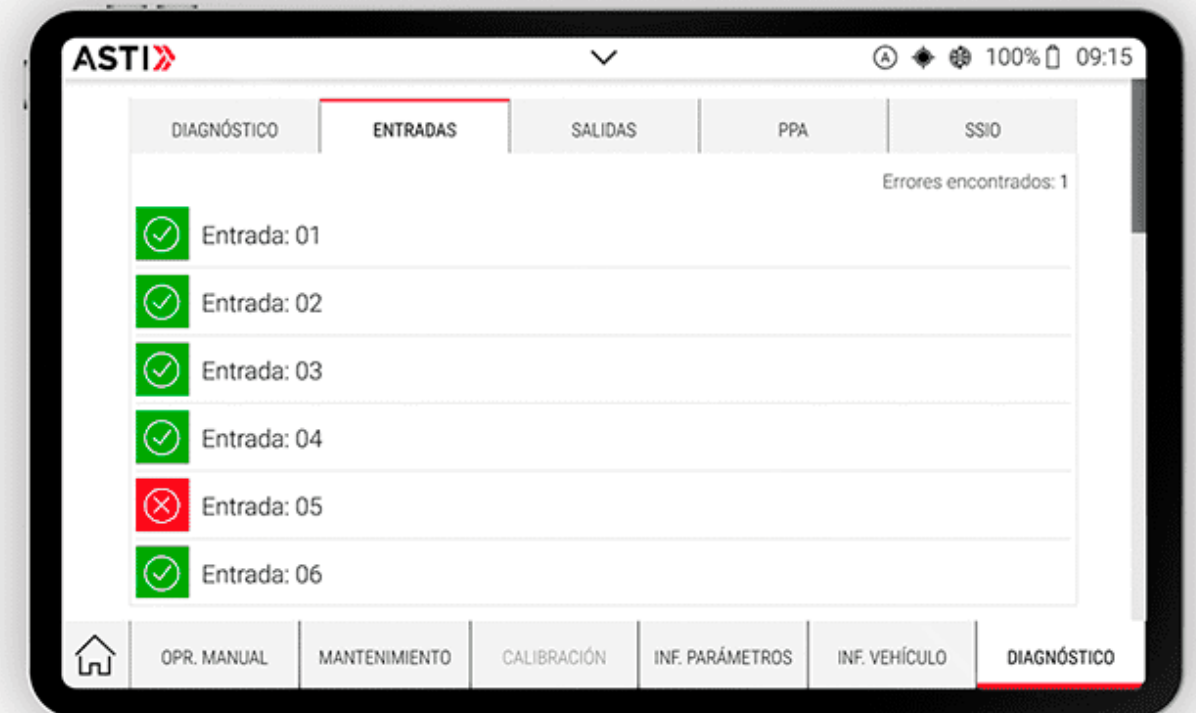
As data takes on an increasingly essential role in manufacturing, the future looks bright for HMI operator panels. The technology may have come a long way, but its growth potential remains virtually limitless.

An important point for good adoption is to get a design for HMI displays that is simple, effective and functional for operators. If it has a good interface,

the degree of acceptance will be very high. Using light-coloured or gradient backgrounds is less tiring for the eyes and this is an important point to take into account. We should not think about how our smartphone works in order to apply it here because neither the purpose is the same nor the functionality.

The screens have to be clear and allow quick interactions to access any part, taking into account that an organisation has to be the basic pillar within the HMI and the menus have to be clear.

What must be clear is that the HMI does not collect or record information, nor does it connect to databases. The interface provides a communication tool that works in conjunction with a SCADA system.





3 No evolution without HMI design

Due to the current needs of companies, technological development has accelerated to such an extent that the Industry 4.0 or 5.0 debate has already arisen. But what we are really seeing is the interconnection of digital sensors for the analysis and management of machine-generated data as well as the use of SCADA and HMI systems.

When designing a human-machine interface system, we must always think about a functional and simple design that incorporates enough information for machine operators to be able to use it correctly without any margin for error.

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[HMI Interface for IED Electronics
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“The end result of any kind of design is only the tip of an iceberg”.



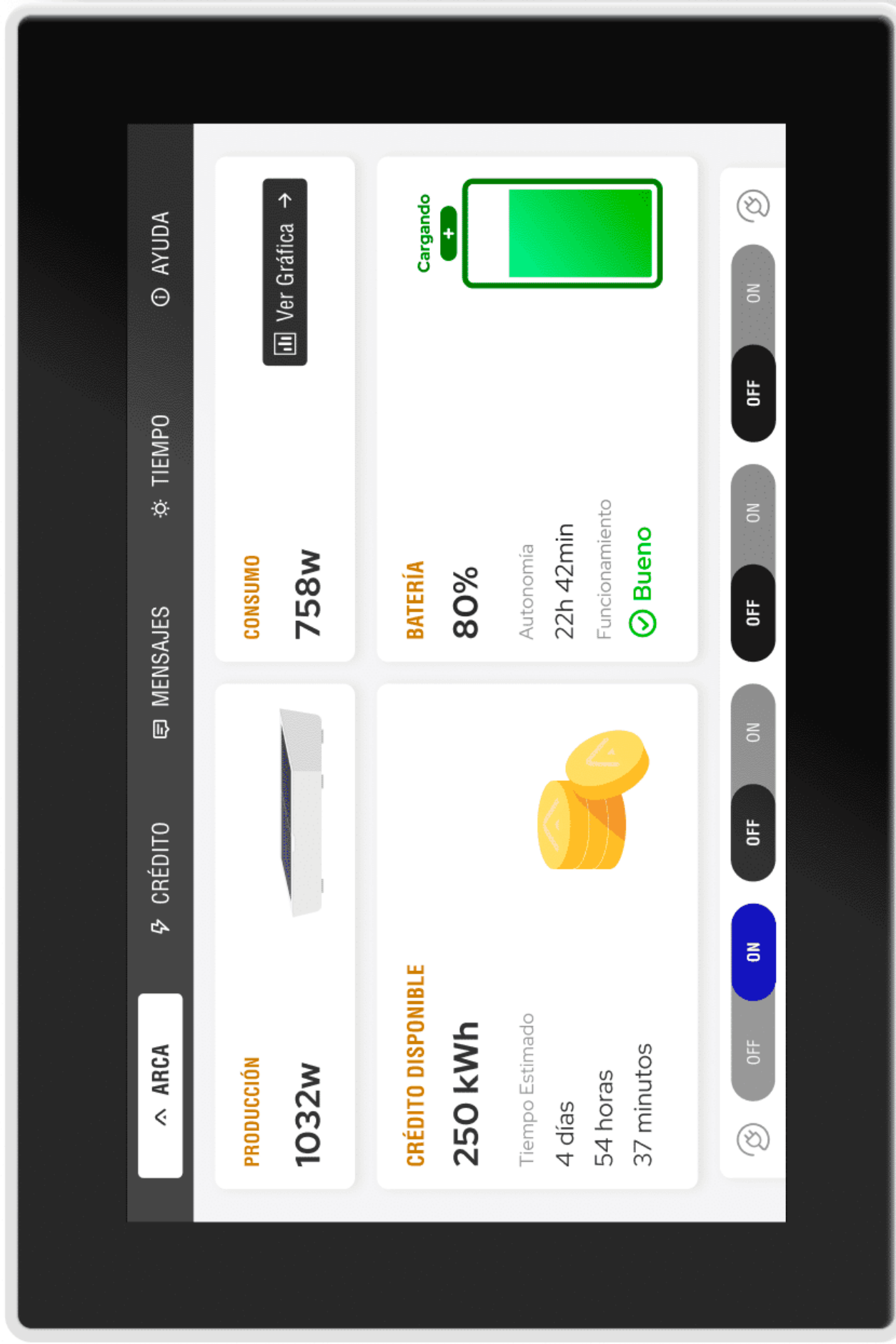
Simplicity and attractiveness should not be at odds, an HMI design is the image and value proposition of the brand as well. That is why machine manufacturers are paying more and more attention to their design. Design, an ambiguous term, but with the clear objective of transmitting and providing a solution. The end result of any kind of design is only the tip of an iceberg. What we do not see is difficult and intensive work in terms of development, but in the long run it will be a great advantage for the organisation and its operators.

The elements of functional design is the process of responding to the needs or desires of the people who will use this system in a way that meets their needs in a simple and understandable way. Functional design is both an outcome and a process.

In order to achieve a simple, effective and functional design for HMI machine screens for operators, the following must be taken into account.

The screens that are installed in the applications must have, in some cases, customised designs adapted to the needs of the operator. In addition, it is possible to install HMI screens with Internet connection, allowing it to send messages in the event of anomalies or for our technical service to connect remotely to carry out the corresponding services in each specific case.

It is important to have clear sections and ideas. If we are going to divide the screen navigation, it must be supported by a diagram that allows us to see the flows between screens. In the case of personalisation, dividing the screens into the following sections could be of great help.



- Work focus: 95% of time will be spent on this screen, with access to data entry and basic visualisations.
- Editing pillar: configuring machine or system parameters is important, but should be reserved to a few profiles. In other words, restricting their access should be considered for better functionality.
- Alarms: having access to a history of alarms and visualisation of the current alarms we have, as well as information on how to resolve incidents is key.
- Production and maintenance. Designed for machine production data complemented with a much more complex analysis by shifts and data. In addition to incorporating manuals and data on machine maintenance.

Being able to integrate different types of documentation such as manuals or machine diagrams on the screen is very useful and effective, even incorporating videos. Designing the HMI should be personal if we can choose, but the most important thing is that the design should be simple, clear and functional.

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