



CEMENTO 4.0

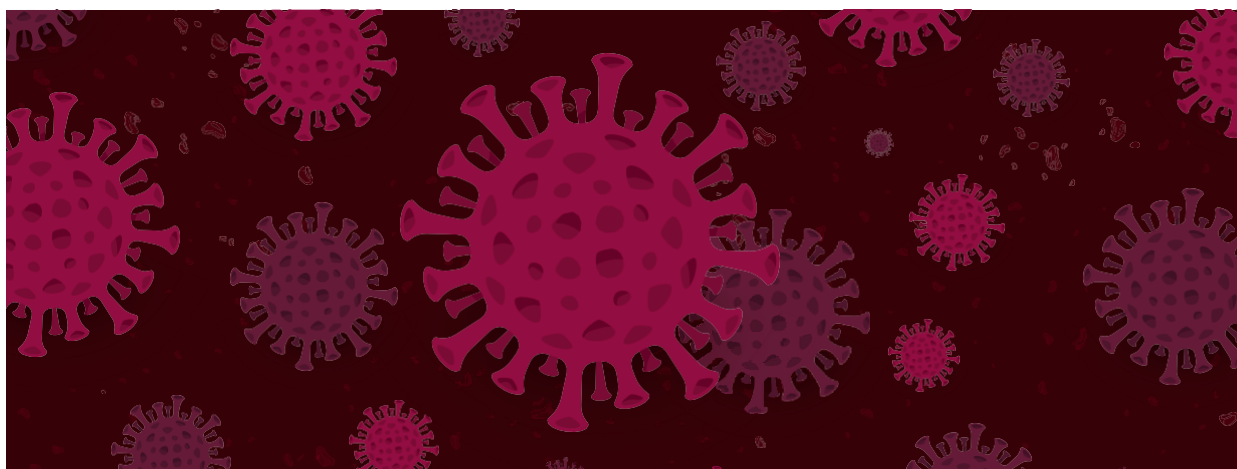
OUR SERVICES

- Commissioning
- Production Process Optimization Production
- Management Optimization Technical Audits
- Information Engineering
- Advice on the implementation of the physical and chemical laboratories design of the crude oil for the manufacture of different types of cement.
- Information Engineering in Quality Management to have online information for decision making
- We design the business information system of your company, adding to the input data a degree of information and / or knowledge for this system to be effective and efficient, providing the necessary information and reducing resources
- Process Management
- Technical Audits IT
- Application Design
- Realization of mass and energy balances
- Technical training and training in Operations Management
- Quality variability reduction projects from quarrying to packing
- Information Technology Implementation

Post-Pandemic Work Paradigm

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The wind has changed abruptly and we must adjust the sails to try to get as close as possible to our goal: the change in the working paradigm. The pillars of change must be digitalization, respect for the environment and biosafety. This article describes some of the tools that Cemento 4.0 Enterprise proposes in relation to the cement industry.



The COVID-19 pandemic has dealt a severe blow to people and industry.

D Since the arrival of bread, there has been a change in our way of working that has resisted tending to take place. Overnight, many companies considering teleworking as an option for a near future have had to make an effort to go digital and send their workforce to work from home. Without doubt, the push has not been desired, but we must take advantage of the impulse to take a step forward towards a new work paradigm based on the digitalisation of content, of the means of production, of people trained in information and communication technologies, of respect for the environment and the biosecurity of our workers and clients.

1. The change of paradigm: objectives

The paradigm shift in the industry encompasses innovation in business models, optimization of human resource training and development, but also optimization of the flow of materials by operating by process and not by function, optimization of the flow of information and most importantly, the transformation of data into knowledge. This will be the future of the industry in general. All this will result in the creation of greater added value for the customer.

Climate change, sustainability, the circular economy and digital transformation as indicators of change will be

those who will guide us in this transformation of the future.

The cement industry must give a boost to its transformation into an intelligent industry that is collaborative with its peers, but its differentiation with the client will be imposed by its knowledge and its capacity to adapt to change.

We must tend to create intelligent raw materials, capable of interacting with the machines that transform them in order to obtain a product within better technical specifications as a benefit for the end customer.

By being online, suppliers will be able to respond to their customers' requirements, eliminating delays or excessive storage of materials in intermediate warehouses.

This intelligent stock management will help reduce bureaucracy and support services, optimizing the value of the final product. Production can be planned and adjusted in real time.

The maintenance will be more preventive and predictive (at present it is already in cement industries as the Spanish), will have knowledge to know what will happen in the future, thus reducing maintenance costs, which would be carried out by remote control.

As for quality control, all off-line quality measuring equipment must be connected to the network. Quality control as we know it today will disappear, giving way to an online quality control, predictive and supported by the management of operations by process. This is an issue that does not lose weight although in many cement factories process control has been based on quality indicators for many years (robotic systems such as Polab or QCX are implemented in many plants).

All of this is focused on the creation of intelligent products, which in the case of the kiln, for example, is capable of informing how much effort it is subjected to and how much more it will endure, with what type of cement it is made, under what characteristics, etc. A good example of this is the 'Digital Identity of Cement' initiative (part of the '12 Challenges for Industry 4.0' programme) promoted by the Spanish Institute of Cement and its Applications (IECA) and financed by the European Social Fund and the Spanish Ministry of Industry, Tourism and Trade (<https://bit.ly/3ehEMlz>).

2. Proposals for change

Cemento 4.0 Enterprise has been testing the need for a change and has been studying for some years proposals that will be useful for what we believe should be the future in manufacturing processes in general and in cement in particular, such as the following:

- Management of operations by process and not by function.
- Design of the information flow in the whole production process.
- Digital transformation and its integration in the manufacturing process.
- The Internet of things.
- Intelligent processes.
- Smart products.
- Online quality control.
- Actual design of the mission and vision, which should be the guide for day-to-day work in companies.
- Conversion of data into information and knowledge using artificial intelligence
- Online inventory management.
- Online industrial security management.

Due to the pandemic, general containment measures have been decreed, which has meant that a high percentage of the industry has been stopped, including the cement industry. Many countries have their plants completely shut down, some have taken advantage of this to carry out minimum maintenance and operation with the proper precautions and



The use of MOBILE DEVICES will be key to the digital transformation.



The digital transformation will allow us to know in advance the resistance of the concrete we are pouring today.

a minimum of security personnel in the plants. More specifically, this situation will require rapid adaptation and a small, well-planned commission, observing and complying with the restrictions on the flow of personnel into the plants that governments will impose for new mobility and bio-security protocols.

The works we are promoting are those detailed below.

2.1 Remote monitoring of operations

Remote monitoring of operations aims to minimize the physical presence of technical staff, online assistance. This can be achieved by implementing technologies such as Team Viewer, ConnectWise Control, RemoteSupport, AnyDesk, NinjaRMM, VNC Viewer. Not all plants are automated and have some processes independent of each other. To overcome these limitations, a technical team is being considered to implement an automation module, whose objective is the integration and dependence of the system.

The aim of this system is to prevent the operator from wasting time on these processes and concentrating on other processes of greater value.

2.2 Online and remote updating of inventory

Use of image processing to update the inventory of bags, big bags, pallets and bulk packaging.

In addition to using TV cameras to update inventory, each product would leave the warehouse with a special bar code, so that when a full load is scanned by a large volume reader, the product would be traceable and all products in that area would be accounted for, so that the inventory would be discounted and the adjustment made.

This would include the integration of the company's online demand to automate orders.

2.3 Online optimization

It is proposed to make a remote diagnosis of operations for optimisation purposes, including the rapid realisation of energy and mass balances in line in the following areas:

- Quarrying and crushing.
- Crude oil grindings.
- Solid fuel grinding.
- Clinkerization.
- Cement grinding.

The data generated by the equipment needed for this online optimisation (online samplers, particle analysers or hand samplers) would be uploaded to a database that would be integrated with the operation, which would allow audits of the system's goodness to be established.

2.4 Security systems and remote access control

Design and implementation of a security and access control system with remote monitoring, based on biometric data for access to factories.

The company is also working on the creation of more intelligent perimeter and area safety systems.

2.5 Remote commissioning

Through the analysis of historical data on the plant, stoppages and their causes, knowledge will be generated for the optimization of the action times of teams of high-level technicians and those reduced in number, whose mission will be to shorten start-up times. The digital transformation will make it possible for these tasks to be carried out remotely, avoiding the need for technicians to travel and improving the training of the plant technicians who will assist in these tasks.

2.6 Technical training plus biosafety

One of the pillars of the change must be the people who must carry it out. To do so, they must be trained in personal digital skills, as well as in operations, process, quality, industrial safety and biosecurity. Plant operations must have a biosafety component, which is supported by a specialist in the field.

2.7 Design of information flows - knowledge of a company

On-line evaluation of a company's data, review of the information flow, and the realization of a complete information engineering based on artificial intelligence with the potential to add knowledge in the areas that merit it as a result of the study.

This will result in a high value contribution to the final product, ensuring a better quality of these, better internal services and better service to the final customer. In fact, manufacturing costs will be reduced, because it eliminates bureaucracy in the production chain.

This is a very important area, with the great transformation that is coming with 5G and the internet of things, companies must prepare themselves from today to be competitive tomorrow.



The way forward leads to 'Industry 4.0'.

4. Conclusion

Both climate change and the potential for future pandemic phenomena are looming, and the cement industry sector must undertake the necessary reforms for the establishment of 'Industry 4.0' in an accelerated manner. The transformation process must make the factories more efficient, reliable and ecological.

Digitisation must be considered as a variable for competitiveness. The effort required for change is both enormous and irremediable. All the actors involved in this industry must be involved in different ways:

- Consumers: demanding an industry that produces the best quality cement, respecting the environment and the bio-safety of people to the maximum.
- The technologists: introducing the paradigm shift in their new designs.
- The producers: betting on the re-shape of the existing facilities

and the creation of new ones with a fully digital content and training their staff for the new competitions.

- The service companies: they offer customized solutions.
- Government authorities: promoting and sponsoring eco-friendly investments to be made.

In addition to all the above, one of the documents that can undoubtedly serve as a reference in everything concerning the digital transformation of the cement sector is the one entitled 'Ce - mento 4.0. Connected Industry'. Created by the Spanish Association of Cement Manufacturers (Oficemen), the study gathers some of the examples of digitalization already existing in the cement industry, as well as the valuable re-flexions on the challenges faced by the sector, which can and should be guided by adapting its processes, products and business models to the new technologies, in an increasingly competitive and complex environment, but at the same time, with many new opportunities (<https://bit.ly/36wDyGB>).