



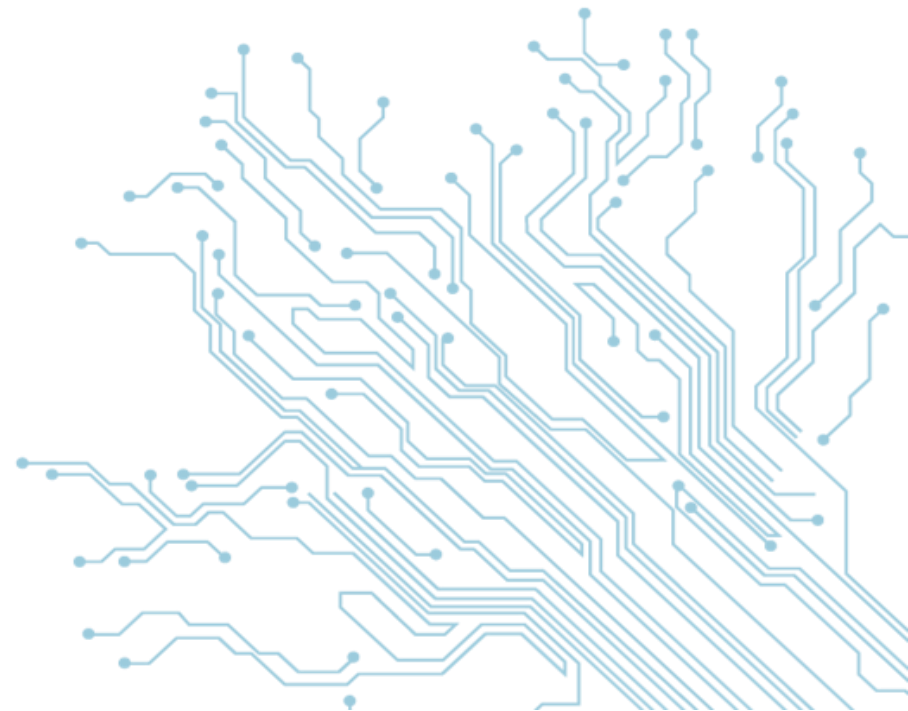
Your ConTech Innovation Partner

Corporate
Presentation
/2021

Global Technical Solutions

Witeklab develops technological solutions in the fields of **telecommunications, electronics and integrated computer systems**. Our mission is to turn knowledge and **daily innovation into solutions that simplify and make easier the industrial, work and service processes**, in line with Industry 4.0 and Smart Cities, and that have an **impact on social good and environmental protection**.

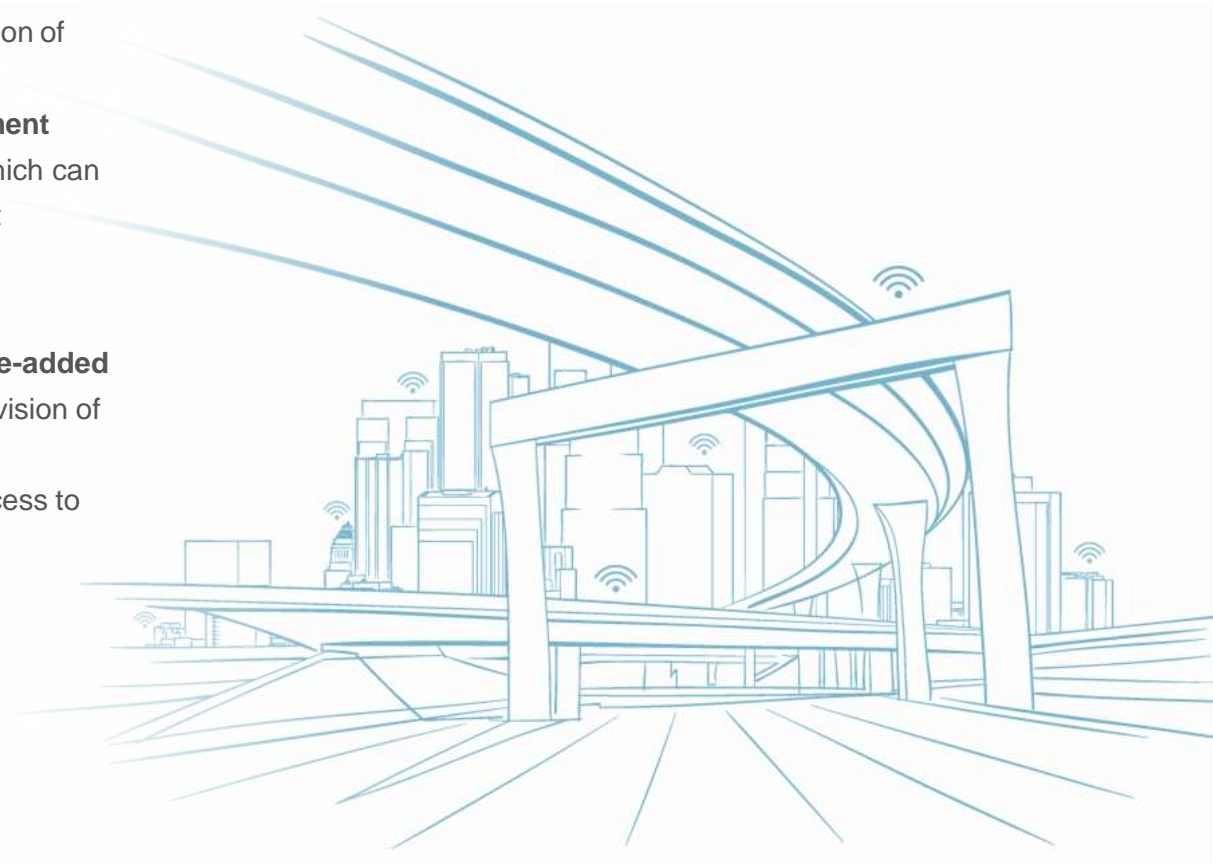
Witeklab's IoT (Internet of Things) solutions **explore the potential of short, medium and long-range radio communications, combined with the advanced sensing and connectivity of mobile devices**. In **addition to our self-developed products**, we provide consulting services and design tailor-made projects to provide advanced technological solutions to companies in various sectors. Our work is always based on a rigorous and strategic market analysis, combined with the application of innovative compact technologies.



R&D&I in construction and infrastructure management

The application of sensor technology and wireless data transmission, together with the processing and presentation of data through the cloud, offer great advantages for the **construction, civil works and infrastructure management sectors**, which are areas with very specific needs and which can benefit in many aspects from the integrated solutions that combine these technologies.

Witeklab develops **innovative, profitable and high value-added IoT solutions** for these sectors, which simplify the supervision of processes linked to the construction and maintenance of infrastructures, improving aspects such as security or access to information and facilitating decision making.



IoT developments based on:



Smart sensors

Advanced sensorics of long duration and ultra low consumption with energy harvesting techniques, developed in our laboratory.



Wireless power transmission

We incorporate detection systems with wireless devices and wireless power transmission, a clean, efficient and easy to deploy technology.



Radio communications

We are experts in short, medium and long range wireless systems, which are very efficient for real-time data transmission and in harsh environments.



Integrated systems

Our solutions include the development of data collection, processing and processing systems, as well as dashboards for its visualization.



Engineering and Technology Consulting

Witeklab **offers consulting services to companies and entities** in various sectors and **develops solutions focused on data collection, transmission and processing**, inspired by the concepts of the Internet of Things (IoT), Industry 4.0 and smart cities and communities.

Highly specialized team

We develop **advanced solutions for the construction, infrastructure and civil works sectors and also for logistics and the control of movable property**. Thanks to the collaboration with research teams from different disciplines, we have the capacity to develop projects in a growing number of areas, both private and public.

Witeklab has an **interdisciplinary technical team** with the capacity to **analyze specific requirements of the construction sector**, such as structural problems or

the detection and monitoring of pathologies, and support the adoption of the most suitable techniques and materials to solve structural resistance problems.

Our Own laboratory of advanced sensorics

We have our own advanced sensor laboratory, which allows us to offer a wide range of **integrated solutions to provide connectivity to all types of structures**, through the integration of sensors and the design of communications networks that allow the transmission of data for remote monitoring of structures.



Experience and innovation

Our team has a solid experience in R+ D+i (since 1998), forged in multinationals located in Silicon Valley, Holland, Japan and Barcelona, and focused on the development of radio frequency (RF) and energy efficiency technologies.

The innovative character of Witeklab is evident in a large number of patents and scientific publications.

We maintain a close collaboration with research centers and universities, in order to stimulate the search for new solutions to very diverse challenges. Innovation and the contribution of young talent are our keys to maintain adaptation to such a changing world and stand out internationally.



Manel Torrentallé

CEO



Ignasi Cairó, PhD

CTO



Román Bataller, PhD

ENGINEER IN CHARGE
OF PROJECTS

Solutions by application area

Connected infrastructures and industry 4.0

Monsec

Online monitoring of the quality of concrete setting in real time.

Corrochip*

Autonomous system for the control and evaluation of corrosion in reinforced concrete.

RockChip*

Deployment of detachment detector sensors on different screens, dynamic barriers and anchors.

**Product in validation and pilot testing phase.*

Location, identification and control of assets

Trenchip

System of location and information of assets, trenches and underground pipes and installations between walls, with instant inventory.

Community

Digital, IoT and sensor solution for real estate developments and communities of owners

Logistics

Inventory system for the control and identification of stocks based on a long-lasting passive radio frequency (RF) chip.





Connected infrastructures and industry 4.0

Corrochip

Corrochip

Corrosion control in reinforced concrete structures in real time

Corrochip allows to remotely monitor the progress of corrosion in reinforced concrete structures and to know the state of the structures in real time, to anticipate situations of deterioration that may compromise the integrity of the structure and be able to carry out corrective actions.

Why Corrochip?

Corrosion is one of the most worrying processes in terms of the deterioration of steel embedded in concrete structures, and the one with the greatest economic impact. Being a process that occurs internally, when it manifests itself visibly on the surface the level of deterioration is usually very severe.

Accurate measurement of corrosion in reinforced concrete is essential to analyze the serviceability and durability of the structure. Detecting corrosion in time and acting proactively extends the life of the structure, significantly reduces maintenance costs and guarantees its safety.

Developed with the Polytechnic University of Valencia

Corrochip is the result of the R&D project carried out by the Interuniversity Research Institute for Molecular Recognition and Technological Development (IDM) and the Department of Architectural Constructions of the Universitat Politècnica de València (UPV) on behalf of Witeklab, for the design of a new generation sensor for the early detection of corrosion in reinforced concrete structures.



Corrochip

Characteristics

The Corrochip system consists of **measurement sensors embedded with the reinforcement armatures**, an **internal Corrochip station**, which collects the measurements made by the sensors and **an external station** with autonomous power, connected to **the Corrochip server in the cloud**.

The Corrochip server software allows **the visualization of the measured physical parameters** and incorporates an alarm system via email or SMS. The system is accessible via **webapp** from any device, which greatly facilitates the assessment of the situation of the structure and decision making.

Corrochip sensors are designed to be used in both pre-existing structures and new construction projects.





TRENCHIP



Location, identification and control of assets

Trenchip

Trenchip

Comprehensive system for locating and tracking underground assets

Trenchip is an integral solution that allows to mark specific points in trenches and underground pipes by means of passive sensors, locate them later with precision, record all the information related to them and keep it updated, always available in the cloud.

Trenchip solves the main problems of underground asset management, which are mainly the fragmentation of information and the lack of security in the actions. The use of **RFID sensors** facilitates the precise location of marked assets and provides greater security when reopening the tracks, while the registration and processing of data in the cloud ensures the traceability of information related to the marked assets.

Trenchip allows to mark and identify trenches and underground pipes up to 110 cm deep (verified in real conditions), which makes it suitable for application in all types of pipes and installations.

Trenchip is a commercial development based on the project Detection and identification of pipes and trenches using RFID technology in the UHF band (DETECT-TUBE), carried out jointly with the Metamaterials Research Center for Innovation in Electronic and Communications Technologies (CIMITEC) of the Universitat Autònoma de Barcelona (UAB).



Technology awarded at the Galileo Masters Catalonia 2020

Winning project of the Galileo satellite category, in the Galileo Masters Catalonia Challenge 2020.

Trenchip

Characteristics

LONG-LASTING PASSIVE SENSORS

Trenchip RFID sensors require no power and can last more than 25 years. Their band-shaped design also makes them highly resistant.

GIS INTEGRATION

Trenchip's software is integrated with a Geographic Information System (GIS), which allows to visualize all active sensors and recognize traces.

ACCESSIBLE AND UPDATABLE DATA

Mobile and web applications allow the recording and updating of data, which makes it possible to maintain a history of assets.

INTEGRABLE ON DEMAND

Trenchip can store the data in its own cloud, or integrate on demand into the infrastructure of the company managing the underground facilities.



Trenchip

Advantages

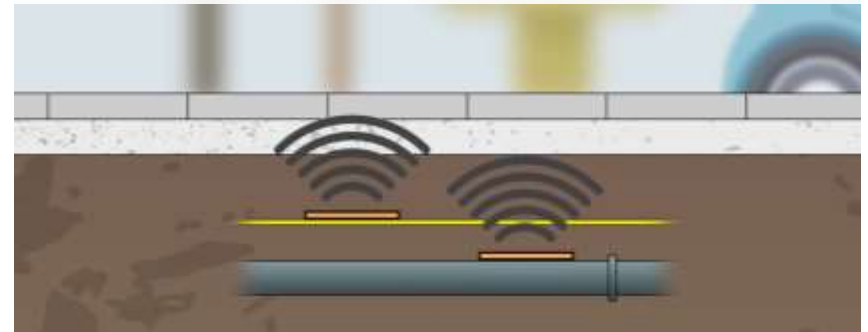
Trenchip provides full control of buried installations and pipelines with a single system, throughout their lifecycle. Its application avoids unnecessary works, facilitates information management and reduces asset maintenance costs.

Its main advantages are:

- ▶ Safe excavation: reduces the risk of accidents
- ▶ Avoid damage to other facilities.
- ▶ It shortens the affectations of the public road.
- ▶ Easy to implement. Very short learning curve.
- ▶ High cost efficiency.

SUITABLE FOR ALL TYPES OF PIPELINES

- | | |
|------------------------|----------------------|
| _ Lighting | _ Drinking water |
| _ Telephony | _ Sewage |
| _ Fiber optics | _ Rainwater |
| _ BT and MT power grid | _ Irrigation systems |
| _ Gas Natural | _ Sewer system |





WITEKLAB
community



Digital, IoT and sensor solution for real estate
developments and communities of owners

Community

Community

Digital, IoT and sensor solution for real estate developments and communities of owners

Community offers Property Developers and Administrators a complete digital solution for the management of information and communication in the Communities of Owners and for the control of facilities and maintenance, all integrated into a single platform.

Community allows access at any time to all the information of the facility and the community through a web application and keep it updated, facilitates communication and solves the problem of the transfer of information between developer, administrator, owners and service companies.

- ▶ **Integrated document management.** It allows to keep all kinds of documents in the cloud, both of the building (plans, deeds, licenses, images, etc.) and of the Community (statutes, minutes, communiqués and others).
- ▶ **Management of maintenance of common areas.** Everything related to maintenance and repairs is centralized and archived in Community.
- ▶ **Configuration of user profiles.** Community allows you to configure different levels of access so that interested parties can access relevant information and download documentation.
- ▶ **Communication between the members of the Community.** Through the announcement panel and through a messaging service between owner and administrator or between Administrator and maintenance or services company.



REAL ESTATE DEVELOPMENTS AND COMMUNITIES OF OWNERS

Community

Location and information system of hidden installations through advanced sensing

Applying Witeklab's sensor technology, Community allows to locate hidden installations by incorporating sensors at key points and to inventory goods. This system facilitates inspection and maintenance tasks, as it allows access to information with a single click and reduces the risk of damage to the facilities. It is also possible to integrate other types of sensors for the detection of pathologies such as corrosion or humidity.

- ▶ **Quick identification of all types of elements** with easily integrated and long-lasting passive sensors.
- ▶ **Application for the registration of information** on the marked elements, visualization of sensors on plan, consultation and updating of data.
- ▶ **Hidden item detection and information retrieval** using the Community reader device.



Community

Advantages throughout the value chain

For the Promoter

- ▶ Innovation, transparency. Added value to the promotion.
- ▶ Guarantees the transfer and availability of the technical and legal documentation of the property.
- ▶ Facilitates the location of the hidden facilities of the facility.
- ▶ Greater efficiency and lower cost in maintenance.
- ▶

For the Property Administrator

- ▶ Added value to the service: transparency, efficiency and innovation.
- ▶ Simplification of administration tasks.
- ▶ All buildings in a single solution.
- ▶ Direct and permanent contact with owners and service companies.

For the Owner

- ▶ Access to the documentation of the house and the Community, in digital format.
- ▶ Easy location of hidden installations in common areas and in the house, in case of repair or maintenance.
- ▶ Instant communication of notices from the bulletin board.
- ▶ Direct communication with the administrator, by chat.
- ▶ Cost savings for the Community of Owners.

For the Service Company

- ▶ Access to up-to-date technical information, with a single click.
- ▶ Direct contact with the administrator: solves the problems of dialogue for the provision of services.
- ▶ Availability of an intuitive system to inform about the services provided.





Connected infrastructures and industry 4.0

Monsec

**Product in validation and pilot testing phase.*

Monsec

Online monitoring of concrete setting in real time

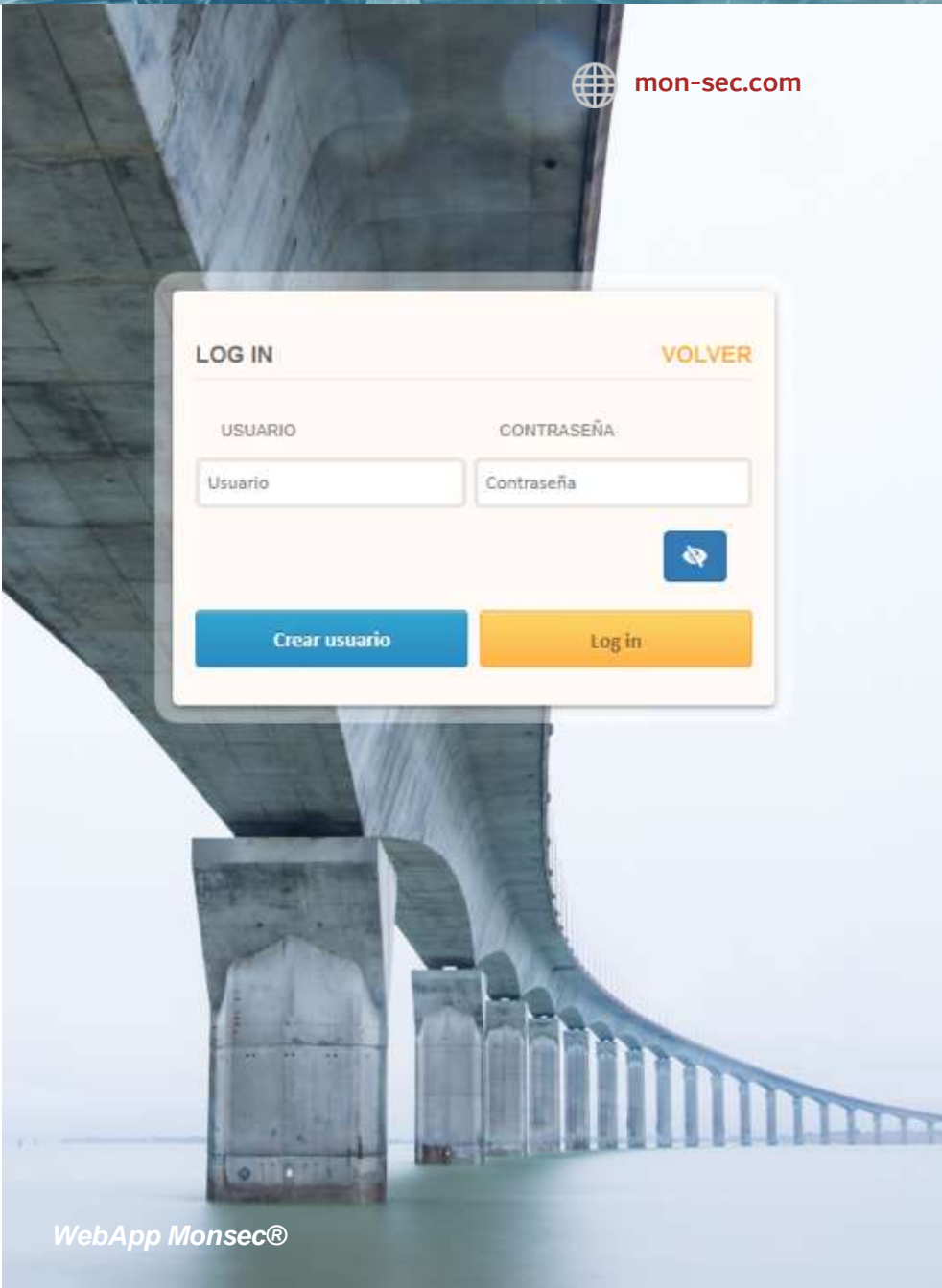
Monsec® is a solution for monitoring the setting of concrete in construction projects, which records key parameters inside the formwork in an automated way and offers accurate information, in real time, on the strength and maturity of the concrete during the setting process.

By sending the data via the internet and presenting them through a web application, Monsec® allows remote control of the setting process of an unlimited number of construction projects, facilitating the evaluation of the state of the concrete and offering reliable support to the management of the projects in the decision making for the interventions in the formwork, based on real data.

Monsec® is a solution developed jointly with Smart Engineering, a spin-off of the Universitat Politècnica de Catalunya (UPC).




mon-sec.com



LOG IN VOLVER

USUARIO CONTRASEÑA



Crear usuario
Log in

Monsec

Construction site implementation

The **Monsec®** system requires the insertion of **wireless sensors** in the mesh before the concrete is emptied. These are responsible for measuring key parameters inside the formwork and sending them to the **Monsec Station**, previously installed at the construction site. The data collected by the station is processed in the cloud by **Monsec's advanced software®**, which performs an accurate calculation of the instantaneous strength of Rc concrete (MPa) from the temperature and relative humidity records made by the sensors.

The introduction and configuration of formwork in the system is done with the **Monsec® mobile application**. This application allows to parameterize the measurement intervals of the sensors independently and to program automatic alarms in case of deviation of the expected values.



Sensor Monsec® y Monsec® Station



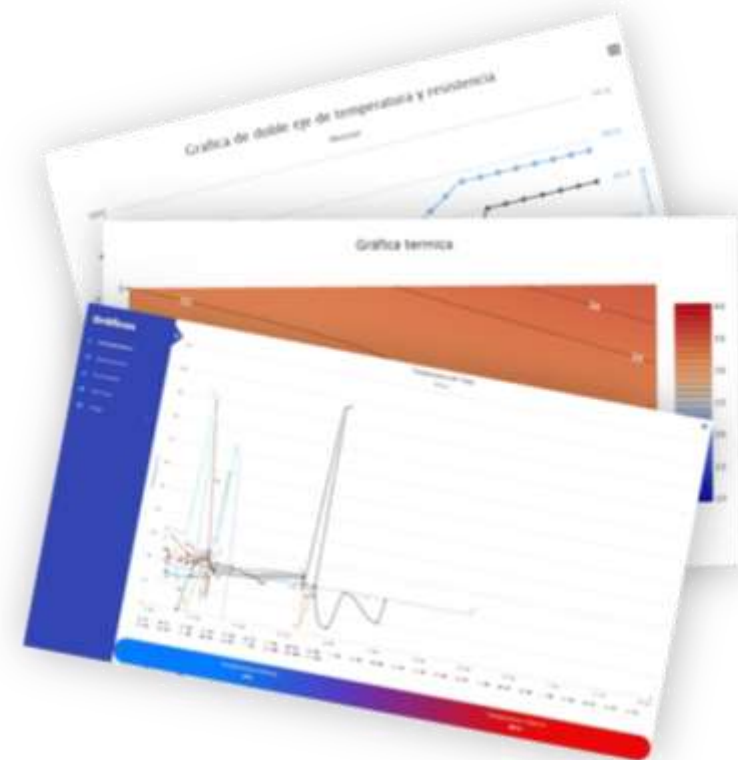
App móvil Monsec®

Monsec

Remote monitoring

Concrete status information can be consulted in real time and from anywhere via the **Monsec web application**, which displays the **curves of temperature, relative humidity, strength and maturity of the concrete**. It also allows you to generate and download reports at any time during the process.

When several sensors are arranged in the same formwork, the Monsec® software generates a thermal diagram from the values recorded by each sensor, which provides a graphic image of the state of the concrete setting at different points.



Monsec

Advantages

- ▶ Integrated and automated system.
- ▶ Accurate information in real time.
- ▶ Unlimited number of formwork.
- ▶ Parameterization of the data logging interval for each sensor.
- ▶ It allows you to program alarms via SMS.
- ▶ Accessible cloud information 24/7.
- ▶ Decision making based on real data.
- ▶ It allows you to optimize deadlines and costs.
- ▶ Facilitates the coordination of teams.
- ▶ Easy and quick to implement.
- ▶ An affordable solution in relation to performance.

Why Monsec®?

With Monsec® unnecessary waiting time for formwork is saved and the risk of non-conformity in specimen compression tests is reduced.

The automation of data collection and processing saves time and human resources, while remote access to information allows processes and decision making to be streamlined.



ROCKCHIP
by WITEKLAB



Connected infrastructures and industry 4.0

RockChip

**Product in validation and pilot testing phase.*

RockChip

Active remote monitoring of slope and landslide protection systems

RockChip is an autonomous telemetry system that detects changes in slope protection systems and provides automated data on the status of the monitored element, its integrity and the evolution of the stresses to which it is subjected.

Surveillance by integrated sensors

Unlike other remote inspection systems, RockChip employs autonomous sensors and an efficient mixed connectivity system, to record parameters in the field, transmit them to the cloud server and present the data in real time on a web platform. In this way, it is possible to know at all times what the state of the slopes is, receive alarms and have relevant parameters to be able to anticipate problems in the protection systems.

Thanks to its high reliability, the RockChip detection system can replace or complement visual inspections and solve inspection problems in hard-to-reach areas.

Integrable in various slope protection structures

SLOPE STABILIZATION AND PROTECTION SYSTEMS:

- ▶ Reinforced meshes
- ▶ Triple twist meshes
- ▶ Cable network
- ▶ Ring nets

DETACHMENT PROTECTION SYSTEMS:

- ▶ Dynamic barriers



CONNECTED INFRASTRUCTURES AND INDUSTRY 4.0

RockChip

The keys to the ROCKCHIP detection system



Sensors of different types: movement, displacement and effort.



Mixed connectivity via ultra-low power long-range radio network and data connection.



Power supply system with long-lasting solar panels recharge.



Remote adjustment of detection thresholds for sensors.



With ROCKCHIP's autonomous monitoring system, the slope goes from being a passive element to being an active element.

CONNECTED INFRASTRUCTURES AND INDUSTRY 4.0

RockChip

Guaranteed connectivity in any environment

The RockChip detection system has a great capacity to adapt to all types of configurations and complicated terrain, thanks to the different types of sensors and the flexibility of the communication system, which allows the capture of the parameters registered by the sensors and the sending of the information to the central server in the cloud in any circumstance.

It is possible to configure the communication system centrally or distributed, depending on the specific requirements, determining the optimal distribution of sensor elements and the most suitable communication system to provide the system with the necessary connectivity between its elements.

RockChip sensors are developed in Witeklab's own Advanced Sensors Laboratory. All of them allow the modification of the remote detection thresholds, individually.



RockChip

Benefits and advantages

- Autonomous system with sensors integrated into the protection system.
- Remote and real-time monitoring.
- Presentation of information and configuration using Webapp.
- Adaptation to all types of configurations and complicated terrains.
- Proactive security: detection of changes and anticipation of integrity issues.
- Solves the inspection of protection systems in hard-to-reach areas.
- Cost reduction in surveillance and face-to-face inspections.



LOCATION, IDENTIFICATION AND CONTROL OF ASSETS

Other solutions



WITEKLAB LOGISTICS

Inventory system for the control and identification of stocks based on a long-lasting passive radio frequency (RF) chip.

Publications (I)

PRODUCT

ARTICLE

<i>Trenchip</i>	Upper Bounds on the Bandwidth of Electrically Small Single-Resonant UHF-RFID Tags https://ieeexplore.ieee.org/document/8278149 Gerard Zamora ; Simone Zuffanelli ; Pau Aguilà ; Ferran Paredes ; Ferran Martín ; Jordi Bonache
<i>Trenchip</i>	A Compact Split-Ring Resonator Using Spiral Technique For UHF RFID Tag https://ieeexplore.ieee.org/document/8364444 Mahdi Abdelkarim ; Gerard Zamora ; Ferran Paredes ; Jordi Bonache ; Ferran Martín ; Ali Gharsallah
<i>Trenchip</i>	Analysis of the Split Ring Resonator (SRR) Antenna Applied to Passive UHF-RFID Tag Design https://ieeexplore.ieee.org/document/7368877 Simone Zuffanelli ; Gerard Zamora ; Pau Aguilà ; Ferran Paredes ; Ferran Martín ; Jordi Bonache
<i>Trenchip</i>	Broadband UHF-RFID Passive Tag Based on Split-Ring Resonator (SRR) and T-Match Network https://ieeexplore.ieee.org/document/8276294 Gerard Zamora ; Simone Zuffanelli ; Pau Aguilà ; Ferran Paredes ; Ferran Martín ; Jordi Bonache
<i>Trenchip</i>	Bandwidth limitations of ultra high frequency–radio frequency identification tags https://ieeexplore.ieee.org/document/6576950 Gerard Zamora ; Ferran Paredes ; Francisco Javier Herraiz-Martínez ; Ferran Martín ; Jordi Bonache
<i>Trenchip</i>	Interference Sources in Congested Environments and its Effects in UHF-RFID Systems: A Review https://ieeexplore.ieee.org/document/8292886 Josep-Ignasi Cairó ; Jordi Bonache ; Ferran Paredes ; Ferran Martín

Publicaciones (II)

PRODUCTO

ARTÍCULO

<i>Corrochip</i>	Compact design of UHF RFID and NFC antennas for mobile phones https://ieeexplore.ieee.org/document/7935593 Ferran Paredes ; Ignasi Cairó ; Simone Zuffanelli ; Gerard Zamora ; Jordi Bonache ; Ferran Martín
<i>Corrochip</i>	Reconfigurable System for Wireless Power Transfer (WPT) and Near Field Communications (NFC) https://ieeexplore.ieee.org/document/8290762 Josep Ignasi Cairó ; Jordi Bonache ; Ferran Paredes ; Ferran Martín
<i>Corrochip</i>	NFC system optimization for simultaneous powering and communication with wireless sensors https://ieeexplore.ieee.org/document/8874796 Josep Ignasi Cairó ; Jordi Bonache ; Ferran Paredes ; Ferran Martín
<i>Monsec</i>	Variable Capacitive Antenna Loading for Embedded RFID Sensors https://ieeexplore.ieee.org/document/8739840 Giselle González ; Lluís Jofre ; Jordi Romeu ; Ignasi Cairó
<i>Monsec</i>	Debye Frequency-Extended Waveguide Permittivity Extraction for High Complex Permittivity Materials: Concrete Setting Process Characterization https://ieeexplore.ieee.org/document/8924780 Giselle González-López ; Sebastián Blanch ; Jordi Romeu ; Lluís Jofre

Intellectual property

PRODUCT

LICENCE

Trenchip
Monsec

Sistema de transmisión entre un medio de trabajo y un medio de destino con diferentes permitividades.

Número de solicitud: P202030087
Fecha de recepción: 04.02.2020
Oficina receptora: OEPM Madrid
Referencia: P 2019/52622

Corrochip

Sensor, red de sensores, método y programa informático para determinar la corrosión en una estructura de hormigón armado.

Número de solicitud: 201530614
Fecha de presentación: 06.05.2015
Fecha de concesión: 12.01.2016

Collaborators

Witeklab innovates together with:

- ▶ Universitat Autònoma de Barcelona – Centre d'Investigació en Metamaterials per a la Innovació en Tecnologies Electrònica i de Comunicacions (Cimitec).
- ▶ Universitat Politècnica de València – Institut Universitari d'Investigació de Reconeixement Molecular i Desenvolupament Tecnològic (IDM) – Departament de Construccions Arquitectòniques.
- ▶ Smart Engineering.
- ▶ National Taiwan University of Science and Technology (NTUST).
- ▶ Leitat Technological Center.
- ▶ Universitat Politècnica de Catalunya BarcelonaTECH – Escola Tècnica Superior d'Enginyeria de Telecomunicació de Barcelona.
- ▶ Universitat Politècnica de Catalunya BarcelonaTECH – Escola Tècnica Superior d'Enginyeria de Camins, Canals i Ports.
- ▶ Institute of Microelectronics of Barcelona IMB-CNM.
- ▶ Cambra de Terrassa



Escola de Camins
Escola Tècnica Superior d'Enginyeria de Camins, Canals i Ports
UPC BARCELONATECH



TAIWAN TECH
NATIONAL TAIWAN UNIVERSITY OF SCIENCE AND TECHNOLOGY



**SMART
ENGINEERING**

UNIVERSITAT
DE VALÈNCIA



Institut Interuniversitari d'Investigació
de Reconeixement Molecular i
Desenvolupament Tecnològic (IDM)



ESCOLA TÈCNICA SUPERIOR
D'ENGINYERIA
D'EDIFICACIÓ



Institute of Microelectronics of Barcelona IMB-CNM

LEITAT
managing your technologies

**Technological
Center**
member of **TECHNO**



**Escola Tècnica Superior d'Enginyeria
de Telecomunicació de Barcelona**

UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH



Cambra de Terrassa



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