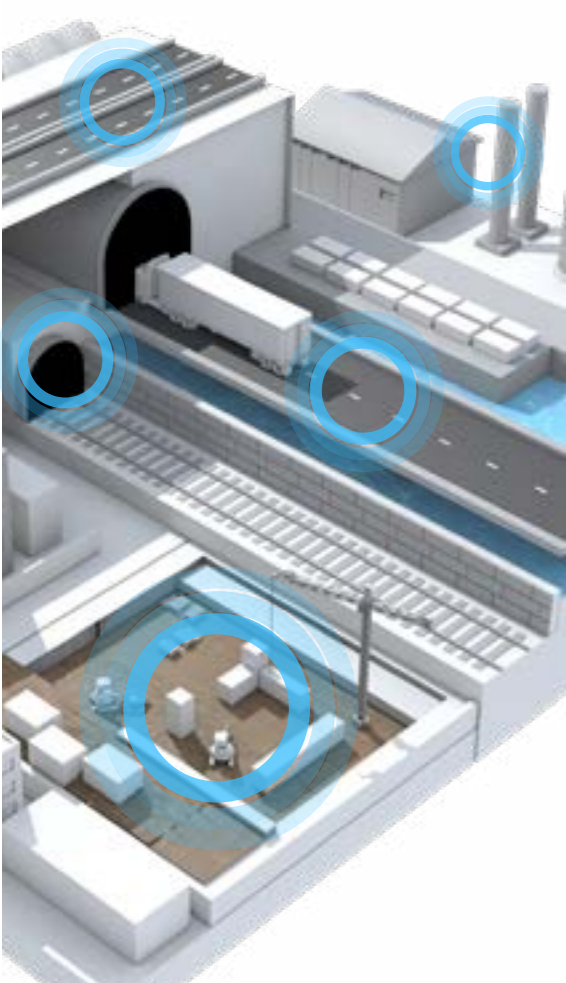




STRUCTURAL HEALTH MONITORING & STRUCTURAL ASSET MANAGEMENT

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STRUCTURAL BEHAVIOR INFORMATION WITH UNIQUE TECHNOLOGY



TURNKEY
Monitoring & decision tools



IOT
Proprietary technology & secured cloud



SPECIALIZED
Team members



+1,000
References around the world

OSMOS is a company specialized in structural behavior analysis. We give structural asset managers, engineering and construction companies the ability to continuously track the health of their structures in real time.

Our fiber optic solutions called Optical Strands™ enable our clients to reduce their costs through a predictive maintenance approach.

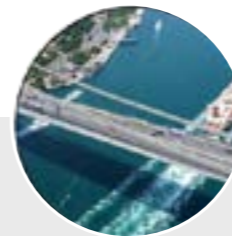
- **Comprehensive overview of structures tracked by OSMOS**
- **Customized reports and event alerts**
- **Guidance and support throughout the structure's life cycle**



OSMOS Group is a subsidiary of EREN Group, an expert in the natural resource economy, with its group of companies:



STRUCTURAL HEALTH MONITORING FOR SAFETY WHILE OPTIMIZING MAINTENANCE



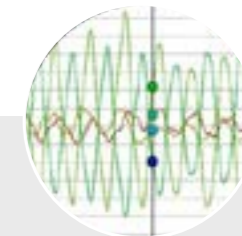
STRUCTURAL SAFETY

OSMOS provides key information on the stability and overall behavior of structural assets so managers can make decisions on the asset's operability, availability and maintainability and ensure its safety.



CUTTING-EDGE TECHNOLOGY

In order to detect changes in the structure, OSMOS installs various types of sensors. These include our Optical Strands™ composed of braided fiber optics which, when subjected to strain such as compression or tension, form micro-curvatures which are converted into deformation measurements.



UNIQUE DATA ALGORITHMS

The digital signals and data are transmitted either through wired-based systems (OSMOS EDAS) and/or wireless systems (LIRIS). This information is then processed using advanced hardware, software systems and innovative mathematical and statistical algorithms to produce valuable information for structural asset management.

OUR SUPPORT

Structural assessments based on the measurement of physical parameters

- Identification of the critical points to monitor on each structure
- Definition of the appropriate type of monitoring



Data analysis and diagnostics

- Use of algorithms to process data and generate rapid alerts on the state of structures
- Data correlation and structural behavior modeling



Structural behavior reporting

- Regular reporting
- Communication of analyses
- Event management including alerts



Project support

- Supervision of monitoring and technical assistance
- Aftersales and support





ANALYSIS & REPORTING

THERMAL CORRECTION

WEIGH-IN-MOTION & DEFORMATION

FATIGUE ANALYSIS

STATIONARITY TEST

REVERSE MODELING

DATABASE & STORAGE

SECURE CLOUD

DATA SERVERS IN FRANCE

DATA TRANSFER

4G/5G LAN PUSH

ONLINE & LOCAL ACCESS

ON SITE ALARM

EMAIL/SMS ALERT

REAL TIME CAMERA

ON SITE RADIO ACCESS

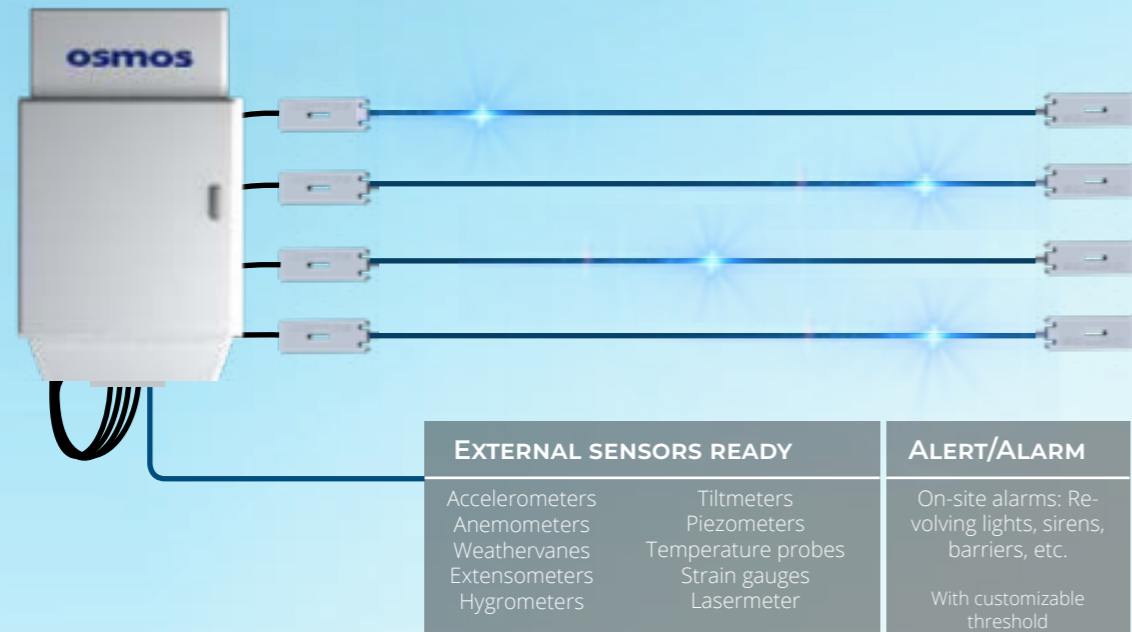
ONLINE REMOTE ACCESS WITH LIRIS BOX

SMS ALERT PUSH

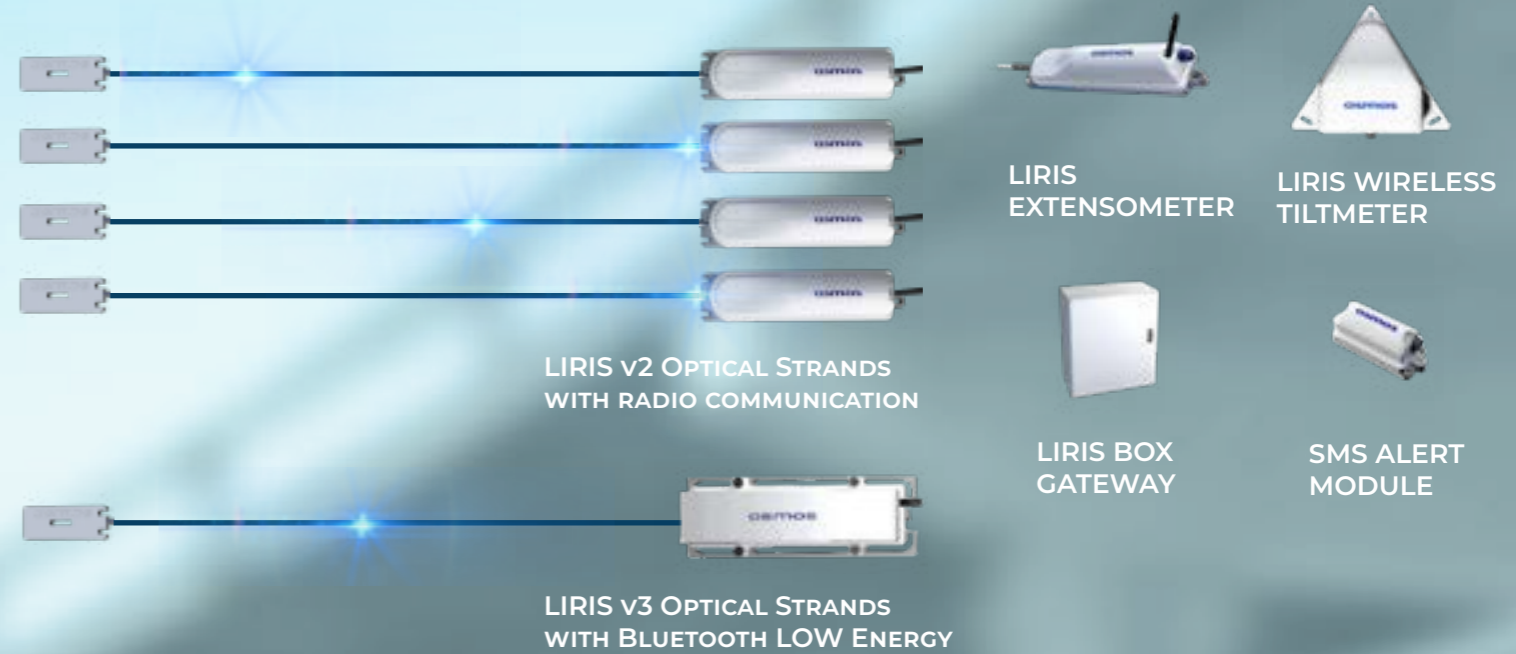
MONITORING DEVICES



OSMOS EXPERT DATA ACQUISITION SYSTEM WITH WIRED OPTICAL STRANDS



LIRIS WIRELESS DATA ACQUISITION SYSTEM



MAINS POWERED

REAL TIME DATA

CONTINUOUS MONITORING UP TO 100HZ ACQUISITION

UP TO 12 OPTICAL STRANDS & 18 EXTERNAL SENSORS

SYNCHRONISATION

WIRELESS

PORTABLE MINI STATION & POWER SUPPLY

UP TO 18 MONTHS BATTERY LIFE

6 MONTHS INTERNAL STORAGE

UP TO 100HZ DATA ACQUISITION

PROJECT RISKS

EVOLVING PATHOLOGY

LATENT PATHOLOGY

DYNAMIC EFFECTS

AGING OF THE STRUCTURES

VARIABLE LOADS

SUPERIMPOSED LOADS

SELF WEIGHT

SUBSOIL EFFECTS

SEISMIC EFFECTS

CLIMATE EFFECTS

EFFECTS OF NEARBY OPERATIONS



ICONIC STRUCTURES, BUILDINGS & INDUSTRIAL FACILITIES



CONTROL STRUCTURAL RISKS & MAINTAIN SAFETY

- DETECT AND ANTICIPATE RISKS AND EMERGING PATHOLOGIES
 - Detection of structural problems
 - Deformations & cracks
 - Bearing conditions
 - External stresses



MAINTAIN GOOD OPERATING CONDITIONS

- AVOID HAVING TO CLOSE AND/OR SHUT DOWN OPERATIONS
 - Anticipate changes
 - Climate events
 - Atypical situations
 - Earthquakes



EXTEND STRUCTURAL LIFESPANS

- EXTEND THE LIFE OF YOUR STRUCTURES THROUGH TARGETED CORRECTIVE ACTIONS
 - Maintenance/Rehabilitation
 - Adjacent structure monitoring
 - Neighboring survey procedure
 - Underpinning



DEFER MAINTENANCE AND MAJOR WORK

- PERFORM MAINTENANCE AND/OR REHABILITATION WORKS AT THE RIGHT TIME, AND MANAGE PRIORITIES
 - Schedule corrective operations and significantly reduce major maintenance costs



CHANNEL TUNNEL, FRANCE

Security availability in areas of strategic focus



BEAUVAIS SAINT-PIERRE CATHEDRAL, BEAUVAIS, FRANCE

Monitoring the monument's structural behavior, specifically that of the pillars supporting the front struts



LA SAGRADA FAMILIA, BARCELONA, SPAIN

Monitoring tunneling work below the monument



BATIGNOLLES URBAN DEVELOPMENT ZONE, PARIS, FRANCE

Monitoring the construction of residential complex



MONT-BLANC TUNNEL, FRANCE-ITALY

Monitoring a strategic road tunnel



SAINT-LÉGER CHURCH, SAINT-CHAMAS, FRANCE

Monitoring disorders affecting the bell tower and helping with renovation operation decisions



EUROPE & CHARTIS TOWERS, LA DÉFENSE, PUTEAUX, FRANCE

10 years' monitoring of internal stress. Monitoring of all tower blocks during nearby construction work



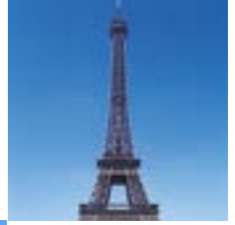
WIND FARM, GREECE

Evaluating structural performance of wind turbine towers and foundations



STADE DE FRANCE, SAINT-DENIS, FRANCE

Monitoring the stadium's guyed roof since its construction 20 years ago



EIFFEL TOWER, PARIS, FRANCE

Monitoring for 25 years to guarantee smooth operations Risk prevention, user safety, maintenance optimization



DÔME DES INVALIDES, PARIS, FRANCE

Monitoring the church, dome, crypt and cour d'honneur [court of honour]



AUSTERLITZ VIADUCT, PARIS, FRANCE

Dispelling doubts and drawing up a behavior logbook



CHAMPLAIN BRIDGE, MONTREAL, CANADA

Monitoring a highly-stressed structure (traffic, inclement weather conditions, corrosion, etc.)



SEYSSEL BRIDGE, FRANCE

Checking structural behavior under live loads



FONDATION LOUIS VUITTON, PARIS, FRANCE

Monitoring towers before and after laying the megastructure



YARA LE HAVRE BERTH, FRANCE

Tracking the structural behavior of support girders on the structure



OVERHEAD TRAVELING CRANE, GERMANY

Counting fatigue stress cycles of the overhead traveling crane



LE LOUVRE - GALERIE D'APOLLON, PARIS, FRANCE

Dispelling doubts about the supporting capacity of the framework

YOUR ASSETS ON THE RIGHT TRACK

- OSMOS is specialized in the early detection and identification of abnormal behavior on high-use structures.
- Our monitoring system lets you check structural risks and maintain assets in operating condition.
- We provide key information that enables our clients to carry out maintenance and preemptive repairs instead of reacting to emergencies.

INFRASTRUCTURES

EXAMPLES OF OUR WORK

AUSTERLITZ VIADUCT, PARIS, FRANCE
DISPELLING DOUBTS AND DRAWING UP A BEHAVIOR LOGBOOK

RAISED ACCESS ROAD TO CRUISE SHIP PIER AT PORT ATLANTIQUE LA ROCHELLE, LA ROCHELLE, FRANCE
CHECKING THE ACCESS ROAD'S STRUCTURAL BEHAVIOR BEFORE DISMANTING THE LAND SECTION

STONE BRIDGE, LIBOURNE, FRANCE
MONITORING A HIGHLY-STRESSED STRUCTURE (TRAFFIC, WEATHER CONDITIONS, CORROSION, ETC.)

SOLID KNOWLEDGE OF AN INFRASTRUCTURE'S STRUCTURAL BEHAVIOR IS CRUCIAL FOR OPTIMIZING ITS MAINTENANCE AND USE.

To accurately qualify the actual behavior of civil engineering structures over time, OSMOS offers an approach that combines continuous measurements taken on-site with statistical and mathematical analyses and models. The exhaustive measurements taken over time provide an overview of the actual effects of different phenomena on the structures: temperature, live loads, variations, vibrations, etc. Pertinent interpretation can then identify the infrastructure's real characteristics and study their evolution.

HOW TO MAINTAIN SERVICEABILITY

Avoid structural problems caused by improper operations

Infrastructure is exposed to a significant number of specific constraints linked to operating conditions, traffic and environment. Monitoring those structures ensures ongoing operation and better use.

Target structural issues and necessary remedial work

OSMOS solutions can be used to detect signs of instability and monitor changes in the most sensitive components of the structure to help managers make decisions and plan remedial work.

Continuously track structural deformation

OSMOS real time monitoring also stores static measurements, corresponding to the structure's long term behavior. Continuous tracking is necessary to anticipate trends and preserve the structure's availability.



ALL-WEATHER MONITORING



SAFE WEIGH-IN-MOTION & DEFORMATION



STRUCTURAL MONITORING



TRAFFIC & EVENTS



REAL TIME CAMERA



REAL TIME ALERT



HOW TO PRESERVE HIGH-RISE BUILDINGS



ALL-WEATHER MONITORING

Avoid permanent damage caused by structural factors

At different stages of their life cycle, structures face many internal constraints that may affect their mechanical behavior and stability and cause irreversible consequences. OSMOS provides objective and conclusive information on the structure's behavior, analyzes the cause and origin of damage, and removes doubt to support managers in their decision-making process.

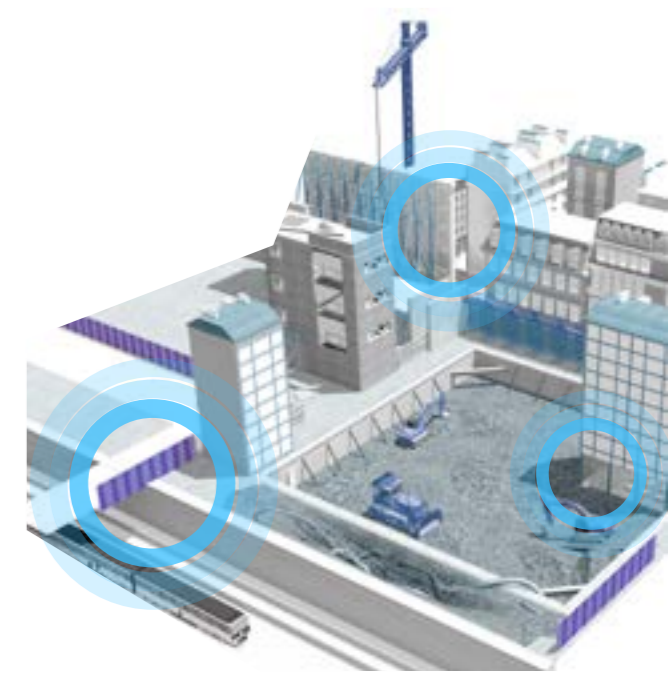
Avoid permanent damage by monitoring the environment's impact on the structure

Temperature, loads, earthquakes and strong winds are examples of external constraints that may cause irreversible damage to buildings. OSMOS provides solutions to measure the impact of the environment and assess the actual effect on the structure. Our reports provide managers with key information enabling them to optimize maintenance and maintain their buildings in good operating conditions.

Our solution for structures located in potential risk zones



In the case of structures exposed to earthquake risk, the SANLIEN PAlert+ (part of our OSL solution system) detects early structural risks and send alerts to warn and protect people, and to protect the structure before the event occurs.



BUILDINGS

EXAMPLES OF OUR WORK

ICONIC TOWERS IN THE LA DÉFENSE BUSINESS CENTER (EUROPE/CHARTIS/ATLANTIQUE/GRANITE/AREVA TOWERS, COLLINES DE L'ARCHE, ETC.), PARIS, FRANCE
MONITORING WHILE PERFORMING ADJACENT WORK AND PREVENTIVE MONITORING

EUROPEAN PATENT OFFICE COMPLEX, RIJSWIJK, NETHERLANDS
MONITORING OF DIFFERENT CONSTRUCTIONS OF THE EUROPEAN PATENT OFFICE IN RIJSWIJK DURING DEMOLITION AND CONSTRUCTION WORK

OSMOS SOLUTIONS ENABLE MANAGERS TO OPTIMIZE STRUCTURE MANAGEMENT-RELATED COSTS AND MONITOR THE REAL IMPACT OF THE ENVIRONMENT.

Buildings such as high-rise structures, historical monuments, plants and schools are complex structures subject to specific constraints including a special sensitivity to climate variations and differential settlement. In the case of high-rise buildings, structural failures can have serious consequences for user safety and involve significant strengthening and maintenance costs. OSMOS solutions can optimize maintenance operations and ensure the continuity of operations.



In the case of buildings situated in seismic areas, OSMOS SANLIEN «OSL» is a worldwide recognized solution provider to offer an integrated solution. OSL features a system to monitor your assets before, during and after an earthquake, in addition to providing early warning of earthquakes to protect your structures and equipment.



SAFE EARLY EARTHQUAKE DETECTION

 STRUCTURAL MONITORING	 EMERGENCY SHUTDOWN	 EQUIPMENT PROTECTION	 RECOVERY EFFICIENCY
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HOW TO MAINTAIN AND OPTIMIZE OPERABILITY

Avoid accelerated deterioration of facilities

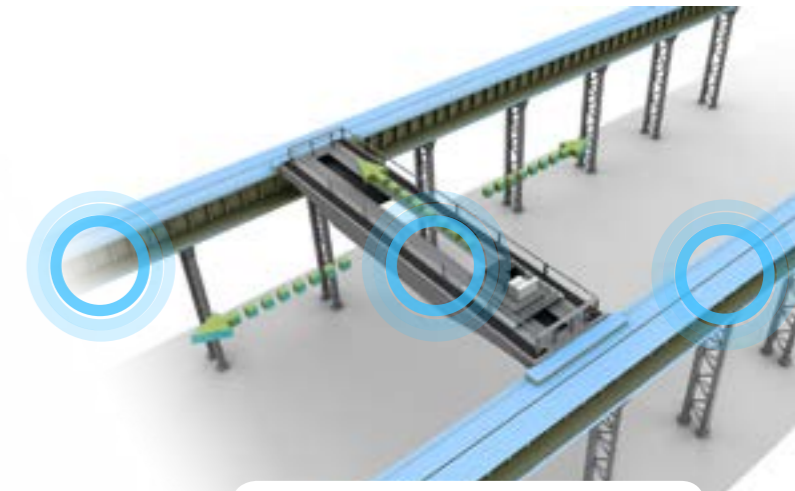
The system monitors actual facility behavior during operation. The installation of OSMOS monitoring solutions in industrial facilities helps to define the best operating conditions.

Avoid rough shutdowns

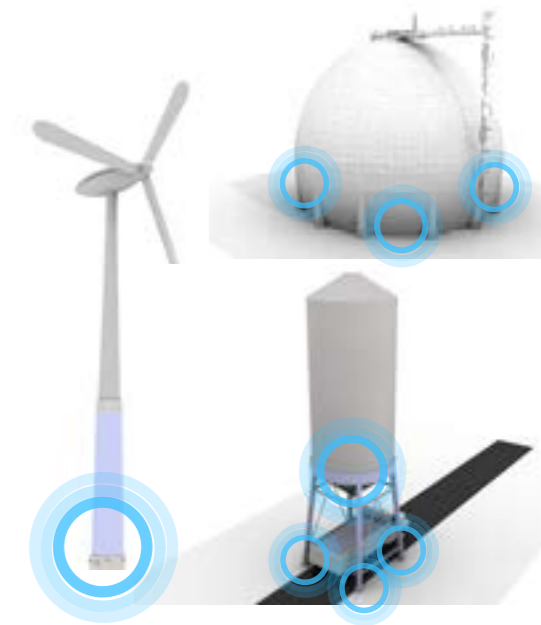
OSMOS real time monitoring aims to improve how the facilities are run, bolster decision-making regarding conditions of use, and guide the client's future management of the facilities. OSMOS provides key information that allows managers to anticipate breakdowns and helps them to optimize their maintenance.

Optimize maintenance costs by tracking

By continuously tracking the evolution of structural deformations on industrial facilities, OSMOS enables managers to optimize their maintenance costs and significantly improve their availability rate. At the same time, OSMOS reports help managers decide whether to extend their facility's lifespan.



ALL-WEATHER MONITORING



SAFE INDUSTRIAL FACILITIES

- 
FACILITY MONITORING WITH OSL
- 
EARLY DAMAGE DETECTION
- 
MULTILEVEL THRESHOLD ALERT
- 
CONTROL ENGINEERING INTEGRATION



INDUSTRIAL FACILITIES

EXAMPLES OF OUR WORK

OVERHEAD TRAVELING CRANE, CEMENT PLANT, FRANCE
 EXTENDING THE USEFUL LIFE OF THE OVERHEAD TRAVELING CRANE BY DRAWING UP A BEHAVIOR LOGBOOK

LIQUID GAS TANKS, HAMINA, FINLAND
 MONITORING FATIGUE IN THE TANKS

OSMOS ANALYZES THE REAL CAPACITY OF FACILITIES BY INFORMING THE MANAGER ABOUT THE STRUCTURAL CHARACTERISTICS.

Industrial facilities fulfill essential functions. Regular mandatory checks are designed to verify the condition of the structure and assess the impact of its stresses. OSMOS supports managers in servicing and maintaining industrial facility operability to ensure the continuity of economic, agricultural and industrial activities.



In the case of plants situated in seismic areas, OSMOS SANLIEN offer an integrated solution to monitor your assets before, during and after an earthquake, in addition to providing early warning of earthquakes to protect your structures and equipment, by offering the possibility to shutdown the critical equipment prior to the incoming destructive shock wave.

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Password

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SAFE SHM

On SAFE Works, you can enjoy access to a complete structure management toolbox: securing operations, optimizing maintenance, postponing major work, viewing behavioral monitoring logs, etc.



SAFE WEIGH-IN-MOTION AND DEFORMATION

If your structure is exposed to frequent exceptional convoys crossing, you can use SAFE WIM+D module which analyses the dynamic measurements to monitor the convoys passing over your infrastructure. It can be enriched by the installation of real time cameras to identify vehicles.

DATA ANALYSIS
& INTERPRETATION
PRODUCTS

FULL WEB DASHBOARDS



SAFE EARLY EARTHQUAKE DETECTION

OSMOS SANLIEN "OSL" is equipped with an SMS or email notification system to signal early earthquake detection or a set threshold breach, as defined on SAFE Works.



SAFE INDUSTRIAL FACILITIES

In order to protect your industrial facilities, SAFE Works brings you key information about the structural health of each facility. In the case of an imminent risk, you can perform an emergency shutdown to preserve your assets.

MONITORING STRUCTURES FOR SAFETY IS OUR BUSINESS

