N°7 - 1/2004

# osmos NEWS

## Editorial

Bernard Hodac, CEO of the OSMOS Group

### OSMOS comes to Switzerland

OSMOS monitoring is, henceforth, available on the Swiss market. The engineering firm of BASLER & HOFMANN AG, based in Zurich, has become an OSMOS Affiliate. From the time of its creation 40 years ago, BASLER & HOFMANN has enjoyed continual growth and, today, is one of the leading firms of the Swiss engineering community the know-how and expertise of which is well known both at home and abroad.

In another development, it has been exactly ten years since OSMOS secured the market for real-time structural surveillance of the Eiffel tower. Little by little, OSMOS has since become a monitoring standard. Its monitoring systems keep close watch over world-renowned structures, such as the Channel tunnel and the Manhattan Bridge, as well as over lesser-known structures nonetheless important to us insofar as safety is concerned.

The OSMOS system operated in real-time on the Eiffel Tower since 10/27/1993.

To celebrate the 10th anniversary of the auspicious event, an entire issue of OSMOS NEWS will be devoted in spring 2004 to this most landmark in the world, so closely associated with the OSMOS Group.

In still another development, OSMOS - by enabling the integration of all commercially-available sensors- is exercising a pioneering role in the creation of an universal structural engineering monitoring system to be piloted over the Internet.

Optical strand regulation prior to housing installation

## Front page news

# The Köhlbrand Bridge

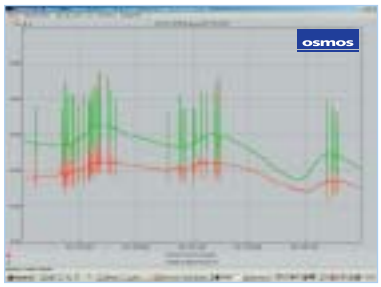
***Spanning a branch of the river Elbe since 1974, the Köhlbrand is an exceptional engineering structure that has graced the Hamburg landscape over the past 30 years.***

At the time of its construction, this 4-Km long bridge with a central span of 325 m, made headlines for being the largest cable-stayed bridge in Europe. While it may not be the largest such bridge today, it still enjoys state-of-the-art status in the world of engineering structures thanks to TÜV-OSMOS.
Following the revelation of age-related fissuration in the prestressed concrete bridge decking of the bridge's western access ramp, the city of Hamburg which administers the Köhlbrand immediately carried out the necessary repairs. In order to monitor the structure's behaviour over the coming years, the city of Hamburg has contracted TÜV-Rheinland to install a monitoring system to document the evolution of the prestressed elements in the fissuration zones as well as the real-time statistics surveillance of traffic loading.

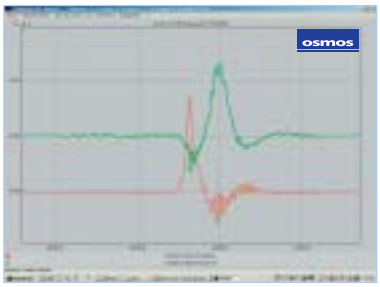
Detail of an Optical Strand at the level of connection to the fiber optic network

Flood detector in plumb with an Optical strand

Dual 2-meter Optical Strands inside bridge deck




Overlaid static/dynamic bridge behaviour




Visual display of dynamic deck deformation during passage of a heavy vehicle. (Automatic recording by vehicle category)

# Hôtel Concorde Lafayette - maintenance gantry

## OSMOS offers a verification standard for gantry rail systems

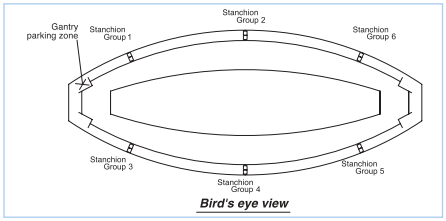
Hôtel Concorde Lafayette

Gantry track, inside and outside rails

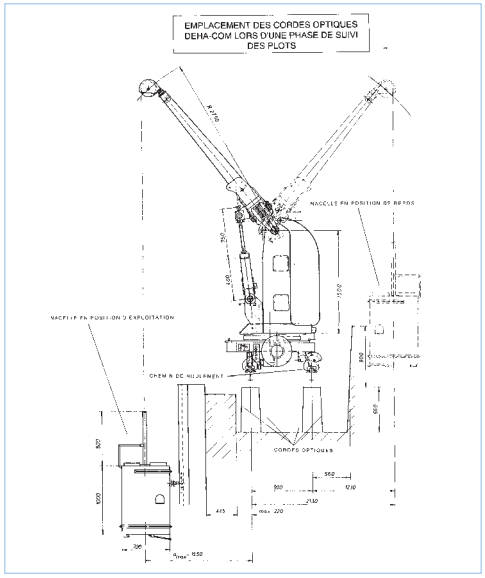
***The maintenance gantry of Paris's landmark Concorde-Lafayette hotel travels on dual parallel rails bolted 90 cm apart to reinforced concrete stanchions imbedded in the hotel's roof.***

Faced with increasingly-stringent health and security rules and regulations, the operator of the gantry was looking for a permanent, objective control device to monitor the stability of the circular track. The solution: the installation of optical sensors on facing stanchions supporting the track, under inner -and outer- rails respectively. The deviations recorded during the repeated passage of the gantry over a given period have provided a reference for acceptable parameters against which periodic checks will be carried out, the monitoring system remaining in place in a «dormant» mode and ready to be activated accordingly.

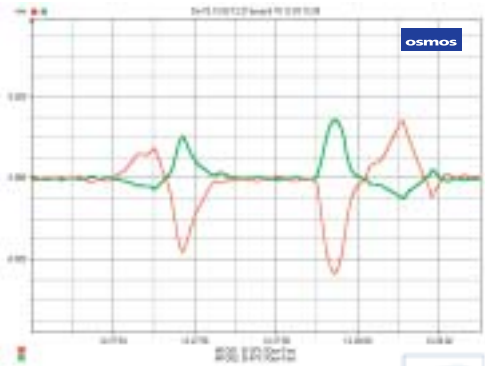
With this application, OSMOS introduces a reliable, simplified control routine to the realm of gantry travel-track verification, maintenance and repair.




Gantry rail layout




Gantry operation principle




Characteristic gantry load graph

# The Miura Kaigan slope

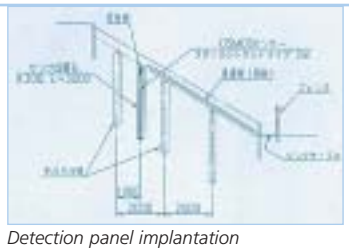
## OSMOS covers two risks with a single system

***The rail line that passes through Miura Kaigan between Tokyo and Yokohama vehicules some 600,000 passengers per day making it one of the most important lines of the Japanese rail system.***

The rail line right-of-way crosses a slope that is continually fragilized by periodic heavy rains raising fears of landslide in this zone subject, moreover, to regular seismic activity.

The operator, Keikiu Line, commissioned JGC to place this particular section of the Tokyo-Yokohama line under continual surveillance. JGC designed an early-warning system able to detect the slightest modifications in subsoil characteristics due to leaching and/or seismic activity.

The solution: a battery of inter-connected panels planted directly into the right-of-way substrat of the slope. Each panel is outfitted with an Optical Strand. Any modification in the substrat is picked up by the panel positioned in function of the identified risk. The Optical Strand reacts immediately to even the slightest earth movement.
To date, the slope's stability remains confirmed even though several micro-seismic events have been recorded following installation by JGC.
Insensitive to telluric currents, the system is buried over several hundred meters and is connected to its monitoring consoles in the Miura Kaigan station that responds to and manages alarms.



Detection panel implantation

Panels arranged in staggered rows

Control point coverage

Panel referencing prior to burial

Stable and less stable zone display after seismic event

# The Dunkirk Port Authority

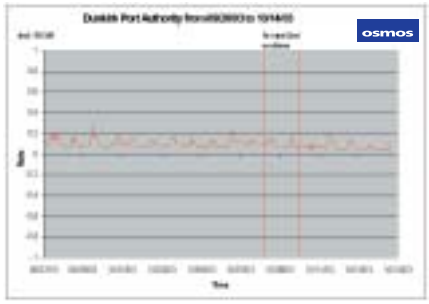
## Absolute and relative measures in the service of a complex operation

***The suction duct to be used to refrigerate the Port of Dunkirk's DK6 heat plant has to pump cooling water from a canal located 22 meters below ground. The duct is comprised of tubes inserted between 30-meter long sheet pilings. To install them beneath the concrete slab at the bottom of the «pit», it was necessary to section restraining crossbraces.***

OSMOS Affiliate, COPRA, respectively installed an optical extensometer and an inclinometer at different points ; the inclinometer was directly attached to the inside wall of the wharf and the extensometer, on either side of spots selected to section the crossbraces.

With a resolution of 1 µm for the optical extensometer and of 0,01 arc-s for the inclinometer, it was possible to precisely document the before/after states of this delicate operation.

*Optical extensometer on crossbrace*



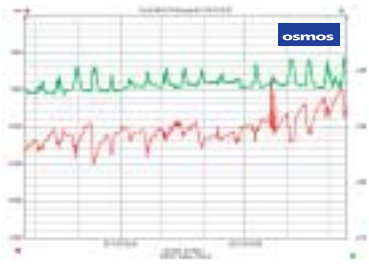

*Extenso-/inclinometric relationship display before, during and after sectionning operation*

*Extensometer -cum-inclinometer tandem*

*Sectionning of a crossbrace*

*Fixation and protection (detail)*

*Alain Heringuez of Copra conducting crossbrace sectionning follow-up on site and via Internet.*




*The inclino-/extensometric display perfectly documents the before/after states of both crossbrace and warf siding.*

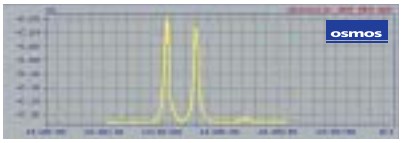
# Skovdiget Bridge

## OSMOS participation in the Brite Euram «Smart Structures» program

*The Skovdiget bridge, near Copenhagen*

***Inspection and repair costs weigh the heaviest on the expense accounts of Europe's inventory of engineering structures.With the implementation of an integrated, automatic monitoring system, such costs could be considerably reduced. That is why a group of 8 European companies and institutions -OSMOS among them- has been created for this purpose within the framework of the European Union's so-called «Smart Structures» project.***

One aspect of the project entails the use of the Skovdiget Bridge near Copenhagen to experiment the concept prior to establishing a protocol. As such, a combination of some 100 probes, sensors and gauges -10% of which are OSMOS products- have been installed to document the numerous parameters in play, such as deformation, strain, corrosion, carbonation, vibration, temperature, humidity, pressure, etc… By reason of OSMOS's extensive know-how and expertise in the field of real-time structural monitoring, the OSMOS Group has been selected from the project partners to manage acquisition and storage of the data generated by the various and sundry data acquisition instrumentation to be integrated (cf. page 4 «All acquired monitoring data on a lone OSMOS monitoring console»).

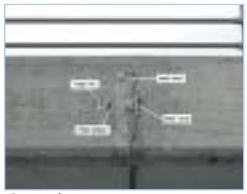



*Optical Strand weight-load display of passing traffic*

*Hygrometers and corrosion sensors*

*OSMOS Optical Strand*

*Hygrometers and corrosion sensors (detail)*



*Corrosion sensors*

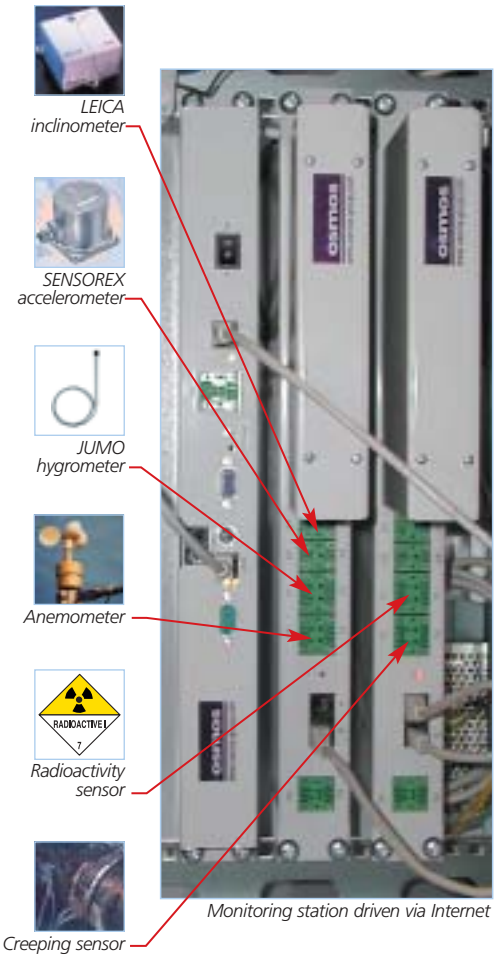
see also www.samco.org

# All acquired monitoring data on a lone OSMOS monitoring-console

*Dr. Jürgen Braunstein*
*Production and Delevopment Manager*

***Users of OSMOS products worldwide all know that our optical sensors are unequaled for real-time monitoring of structural deformation, strain, and displacement. But -while monitoring the effects of structural modifications may be the central role of OSMOS systems insofar as structural security is concerned- equal concern is also accorded to what we call «the causes» of observed modifications, indispensable for diagnosis purposes. This is why the OSMOS system has the capacity for integrating all conventional parameters other than extensometry using data acquired from the entire range of commercially-available instrumentation. Be it a question of temperature variables -systematically included in all monitoring installations- of inclination, of humidity, of vibration, of pressure, but also of any and all chemical, climatic or environmental parameters.***

By reason of its universal compatibility, OSMOS monitoring equipment is able to process electrical, as well as optical, data more often than not without the need for additional interfaces. Non optical sensors are «patched in» via one of the 4 analogue data-entry buses on each data-acquisition module (0-10 V or 0mA4mA-20mA).
Their signal being read and acquired with a resolution of 16 bits, the sampling frequence standard can reach 100 Hz.
The external analog signals are perfectly synchronized with the optical channels and can equally be used for alarm activation.
Display and processing of signals acquired from all external sensors are carried out exactly as for the optical sensors. Where necessary, external sensors can be tied in to OSMOS monitoring stations via RS-432, RS-485 or USB-BUS digital input jacks.
The extensions of appropriate software are supplied by OSMOS at the moment of installation.




Worldwide leader in structural monitoring, OSMOS henceforth offers a complete system which, in parallel with the field of building and public works, will prevail by virtue of both its reliability and conviviality for industrial and environmental monitoring applications.

| OSMOS Monitoring Station | | | |
|---|---|---|---|
| **Geometrical sensors** | **Meteorological sensors** | **Physical and mechanical sensors** | **Environmental sensors** |
| - Extensometer<br>- Optical Strand<br>- Strain gage<br>- Crackmeter<br>- Inclinometer<br>- Tiltmeter | - Temperature gage<br>- Hygrometer<br>- Anemometer<br>- Pressure meter | - Accelerometer<br>- Weight<br>- Flowmeter<br>- Force detector<br>- Shocks detector<br>- Manometer<br>- Vacumeter | - Water quality<br>- Air quality<br>- Gas analysis<br>- Pyrometer<br>- Acidity (ph)<br>- Noise pollution<br>- Radioactivity |

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## New OSMOS Affiliates

**BASLER & HOFMANN**

Visit the Affiliates Area
www.osmos-group.com

*Dominik Courtin, Member of the Board*

*Peter Zwicky, Head Structural Monitoring*

Basler & Hofmann was created in 1963 and, today has 250 collaborators.
With its home offices in Zurich, Basler & Hofmann is present throughout Switzerland and also has a subsidiary in Singapore.