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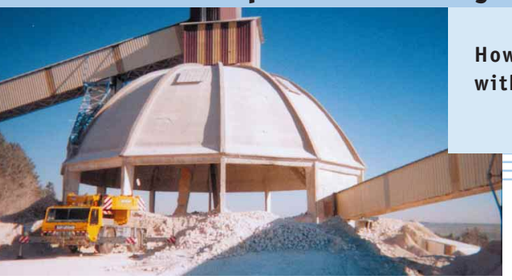
osmos NEWS

Civil engineering solution

The lime pit at Sorcy



How to reconcile safety with cost optimization

Monitoring can be a valuable decision-making tool for a Production site manager, because it makes safety compatible with cost optimization. In France, the Osmos system enabled the Lhoist group to successfully undertake a preventive maintenance program in just this way.

In 1998, the forty-year old concrete dome over the chalk inventory at the Sorcy industrial site posed a probable risk of collapse in the medium term: the supporting pillars were completely cracked. It was obvious that the dome would have to be replaced at some point. The question was when.

Placement of Osmos sensors on the dome's posts

The answer to this question was of crucial significance to the company. Reconstruction means production will be suspended for six months.

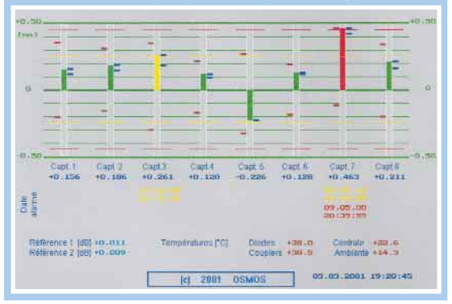
Intent on adapting absolute security to cost optimization, the Lhoist group, the sector's world leader, asked Osmos to produce a report on the dome's current condition.

What is the advantage of monitoring? Monitoring derives its efficiency from its ability to understand the real life of the dome behind its simple visible signs. One structure can actually appear healthy despite hidden weaknesses, while another can show all the external signs of an impending collapse without posing any risk.

The dome has been fitted with the Osmos system since January 2000. As a result of this monitoring, its life can be extended by at least three years. This gives the operator more foresight with which to plan building up new inventory, with the added benefit of substantial optimization of the maintenance budgets.

Pushing back the dome's replacement date enables him to make provisions for the halt in production.

"DASH-BOARD" - principle for safety monitoring performance



In brief

Osmos decentralizes its strike force.

Dirk Söte joins the Osmos Cologne branch as sales manager. He held managerial positions for seven years within ABB, the world's second-ranking electrical engineering company, followed by a two-year stint at General Electric.

Osmos has been established in Germany since 1996 and monitors a number of structures, including several bridges in Saxony and numerous towers in Frankfurt.

In France, Osmos is opening a branch in the Rhone-Alpes region, where it is experiencing strong growth, in order to better serve the companies there.
The branch will be managed by Thierry Ravigneaux.

He began his career as a technician with Metra Vib, a company that performs vibrational analyses. He later took a sales and marketing job with a major company in the Lyon region.

Previously, Osmos successfully monitored the stadium structures of Lyon's Stade Gerland during the 1998 World Soccer Cup. Osmos has also been monitoring a railway viaduct in the Ardèche since 1994 and in June 2001, won a bid to monitor an overpass in Haute-Savoie.

Editorial

A truly unique idea with international distribution

Bernard Hodac, Chairman and CEO, Osmos Group

After twelve years of research and four years of existence, the unique idea of around-the-clock monitoring has entered a phase of industrialization and international distribution.

How can we predict the way a structure will respond when subjected to an active force like wind, rain, landslip, or retaining work?

Only recently, this was estimated mathematically with an inherent margin of error. Today, the quiet revolution of real-time engineering is capable of recording the vibratory, elastic, and progressive characteristics of a structure through on-site measurement.

From historical monuments to contemporary buildings, from bridges and tunnels to ships, the Osmos black box containing live memory equips all kinds of structures. Widely deployed in Europe and Japan, this system offers a suitable solution for both public as well as private builders.

Osmos News, now in its first issue, has been created to showcase these projects.

Feature story

The Shizuoka water tunnel in Japan to be equipped with the Osmos system

Interview with Hiroaki Wakesu, General Manager – JGC's Osmos Department

In 1999, one of Japan's largest freeways had reached its maximum capacity and the government contractor decided to begin construction on a second freeway alongside the first.

Located near famous Mount Fuji, the Shizuoka tunnel was part of this new construction site. Its construction, launched in September 2000, is scheduled for completion in March 2003. The government contractor decided to turn to the Osmos system.

■ *What made you decide to monitor this work site?*

A 400-meter long hydraulic pipeline that supplies energy to a paper producer runs six meters underneath the freeway tunnel.

The foundations were considered to be unstable alongside this water tunnel. Additionally, we were afraid that the digging of the Shizuoka tunnel would damage the hydraulic tunnel. There was a risk of soil compaction due to the new tunnel's excavation.

It was therefore a matter of placing this tunnel under surveillance for the duration of the work. The tunnel was monitored on an hourly basis by an installed Osmos system.

■ *Why did you specifically choose the Osmos system?*

Because we found that Osmos, with 10 years of experience, was the only system that responded to these three requirements: a system that could be installed within the tunnel walls; that was waterproof; and that had a two or three-year lifespan.

This long-term measurement system enables us to obtain average deformation values because it is independent of local random phenomena involving all sorts of materials. This 24-hour monitoring of the construction site guarantees optimal safety.

30 optical strands for a 493-meter tunnel

For JGC, it is a matter of monitoring the response of the hydraulic tunnel under new stresses: ground and water pressure before, during, and after the construction phase of Shizuoka.

What is the primary risk involved? The distortion of the tunnel wall and apron as a result of the intrusion is the main risk.

JGC suggests measuring the tunnel with a limited number of two-meter long sensors running through the concrete on the tunnel's exterior surface.

Thirty optical strands encased in flexible steel will be sufficient to equip the entire tunnel.

This system is unique in that it is both extremely sensitive and offers great longevity and resistance. Acceleration tests have demonstrated that the sensors, when tested in a saline environment, have a lifespan of 4 to 5 decades.

It provides a baseline for conservation that will record the structure's actual response during and after the work.

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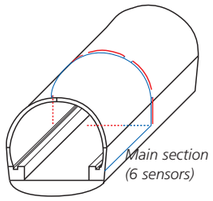


Cross-section of sensor installation showing an Osmos set-up at every 25 meters

JGC, the first Osmos license holder

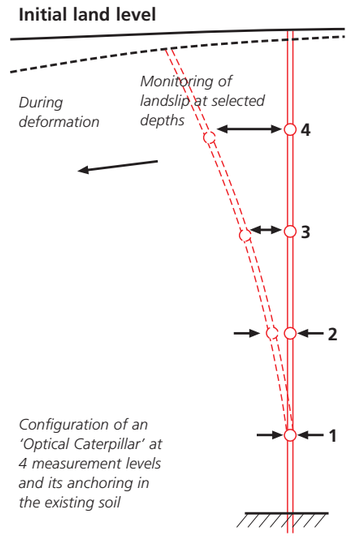
JGC, the Osmos license holder in Japan with 3 billion US dollars in sales, is ranked fifth among the world's engineering and construction groups and is Japan's top engineering group.

Since its establishment in 1928, it has undertaken over 10,000 projects in oil refining, petrochemicals, nuclear energy, LNG, pharmaceuticals, and pollution control.

JGC gets involved in a project from start to finish, undertaking feasibility studies, planning, engineering, supply, equipment set up, and unit start-ups.

For further informations: **www.jgc.co.jp**

The Optical Caterpillar and the EX-Large for wide measuring ranges



Configuration of an 'Optical Caterpillar' at 4 measurement levels and its anchoring in the existing soil

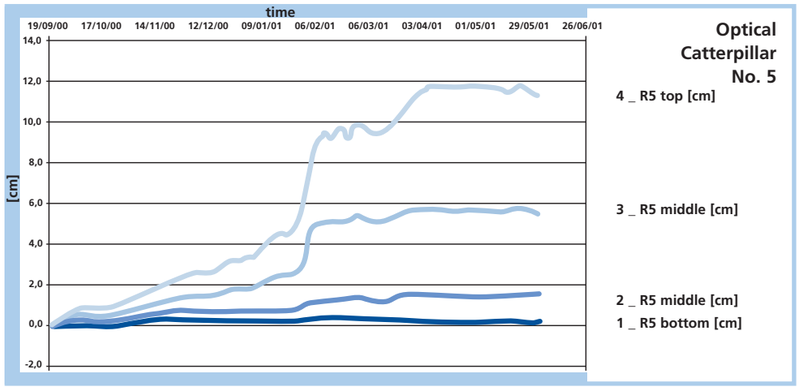
These two devices, developed late in the year 2000, bring the number of patents Osmos holds to 54.

The Optical Caterpillar

The code name «Optical Caterpillar» refers to a horizontal measurement system for soil.

This technology is already in use in the household garbage landfill of Beselich, Germany (between Frankfurt and Cologne).

The Optical Caterpillar, which is made up of one or more articulated parts, is slipped into a shallow hole that has been dug for it. The measurement of the angle extrapolated from the top of the Caterpillar by an Osmos optical device indicates soil movement in centimeters.



The 'Optical Caterpillar' is sunk into its hole

The Extensometer for wide measuring ranges: "EX-Large"

An instrument for measuring cracks and breaks, the "Extensometer for wide measuring ranges" is especially called for when a movement is likely to exceed more than one centimeter.

A traditional Extensometer can measure from nearly a micron up to 5 millimeters, but it cannot monitor greater changes. This is precisely what is needed, however, for a whole group of applications, in particular geotectonics, cliffs, cracks, and contractions, where it is a matter of measuring large scale movements, always going in the same direction.

Designed to respond to these cases, the EX-Large takes a 5 mm movement and turns it into a half-meter by a patented transmission system, which is repeatable and stable over time.

For example, it could be used to monitor the foundations of a building under construction. The progressive stages of construction can produce contractions of several mm, even several cm, which could be measured by this sensor.

Aftershock monitoring is another application. The sensor is designed to withstand extreme conditions and can be installed as a preventative measure.

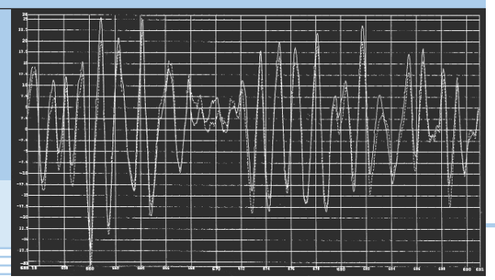
During an earthquake, construction undergoes such violent and significant displacement that any sensor would likely be destroyed.

Because it can extend to 50 cm, the Osmos sensor can monitor movement at the start and finish of a quake with the same precision.

Safety

Maritime safety offers a new application of the Osmos system

A black box is preferable to a double hull.



Monitoring sea swells effects on a single-hull vessel using optical strands (French National Navy Test)

Amoco Cadiz, Exxon Valdez, Erika, and Ievoli Sun have become synonymous with ecological disaster and point to the inadequacies of European maritime safety regulations.

Today, there is a genuine awareness. But when it comes to which safety methods should be adopted, and in particular the necessity of double hulls, experts disagree with the European commission. Experts doubt the reliability of double hulls.

The prohibition of single hulls for oil tankers and their replacement with double hulls by the year 2015, one of the European Union's key initiatives aimed at improving ocean safety, sparked controversial reactions in maritime circles.

According to maritime experts, the double hull would not have actually prevented oil spills. In France, the Ievoli Sun, the Italian chemical tanker that ran aground last October polluting the entire Normandy coast offers the best proof: it was duly equipped with a double hull.

The report of the investigation into the causes of this shipwreck will cite a number of shortcomings, "stemming, for the most part, from the vessel's maintenance."

The double hull proposal, which is a simple response to the idea of taking precautions, maintains an illusion of complete safety. The equipment is definitely excessive; what's more, essential information is lacking. For instance, how do double hulls age?

The Osmos system, which is applicable to any type of sea vessel, makes known a vessel's exact degree of wear.

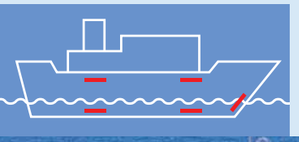
The effects of sea swells, the primary cause of hull degradation, are continuously recorded in a black box that becomes the ship's living memory.

Monitoring around the clock, it ensures that deterioration is kept to an acceptable level.

In the final analysis, the Osmos system is the best safety guarantee that does not involve the double hull system, and it is obtained at a much lower cost.

A thirty-year old Navy ship has been equipped with this system since 1997.

Optical strands on a Japanese merchant marine ship



Five Osmos sensors were also installed on the Chioji-Maru, a Japanese merchant marine teaching vessel. The "Tokyo University of the Merchant Marine" in cooperation with Janus (Japan Nuclear System), a JGC sub-licensee, is using the Osmos system to study swell effects. At the end of the study, the Osmos system could receive the recommendation of the International Marine Organization (IMO).

Optical strands provide 24-hour monitoring of the hull's static and dynamic deformation thresholds