

TÜV can monitor the pulse of buildings by remote control. The early warning system is good news for owners – and a serious economic advantage.

THE PULSE OF A BUILDING



Frequentiert: Die OSMOS-Technik registriert (auch) Beifallsstürme im Stade de France.

OSMOS is sensitive enough to detect the cheers at Stade de France arena.



In nature, the reed bends with the wind where a branch might break. That principle was well-understood by the French architect Alexandre Gustave Eiffel, and that is why he incorporated flexibility into the design of his greatest work, the Eiffel Tower. Built over four years and completed for the Centennial Exposition of 1889, the latticework rises 300 meters above the rooftops of the French capital. One-hundred and twelve years later, it still stands tall. If a big storm hits Paris, the tower sways in the wind – invulnerable because it absorbs wind energy by moving back and forth, swaying as much as 15 centimeters at the top.

The Eiffel Tower has something in common with the Eurotunnel that connects Britain to France by way of a high-speed rail line, and with the Edertal Dam in Germany. All are under constant observation by light. Advanced sensors register their every motion, detecting the slightest vibration.

Most buildings display less dramatic vibrations than the Parisian landmark. But every building has its pulse. And that can be used by TÜV as a measure of structural integrity and stability. Just as doctors diagnose the health of a patient based on an ECG, so too can the experts at TÜV detect dangers to structures from

afar. This is thanks to patented sensor technology from a company known as OSMOS.

Founded in 1996, OSMOS utilizes the special properties of lightwave conductors as a means of measuring structural deformation. Normally, lightwave conductors show minimal losses when they are not too seriously bent. The OSMOS system uses a special wiring system of several fibers as an "optical guitar string", guiding the lightwaves along those areas where losses may occur due to deformation. The technology utilizes shock absorption and is dependent on the variable tightness of the optical string. It yields extremely precise measurements. And TÜV Rheinland Berlin Brandenburg holds an exclusive German license for the OSMOS technology.

A Transparent View of the Patient?

"The OSMOS sensors are incredibly sensitive," says Joachim Roloff, head of structural diagnostics at TÜV's Industrial Services Division. "In the case of a bridge, we can even figure out the weight of a truck passing over it." That is a nice side effect, but the main objective lies in the early detection of threats to stability. The OSMOS system is used primarily in assuring the stability of important structures and of buildings that are subject to high loads, or that have already shown first signs of damage. "Our new method is just perfect for buildings that are on the threshold of danger," says Roloff. "For the owners, knowing the exact state of their structure is vitally important."

A Problem? Fix it in Time.

"The system tells you exactly the right time for renovation work," Roloff says. Timing is a vital factor in

Markant: Der Eiffelturm ist gesund – das zeigen die Sensoren jeden Tag. Every day, sensors reveal that the Eiffel Tower is as safe as a house.

cutting renovation costs. Premature or over-extensive renovation might end up wasting money. On the other hand, no one wants the expensive damage or accidents that might result from being too late with a necessary renovation. OSMOS can solve that.

"The OSMOS technology allows us for the first time to make the kind of precise predictions that would be impossible with mere periodic inspections," says Rüdiger Kunz, marketing expert in Industrial Services at TÜV. Only continuous observation yields a full picture instead of a series of snapshots. OSMOS information is transmitted back to TÜV computers for processing. In principle, this can be done at any distance.

Of course, there is no replacement for human judgement, so the data is always evaluated by qualified experts. "The system yields fantastic results," says Roloff. "But they don't mean anything without the right interpretation. The data gives you a clear picture of the state of the structure, but only in combination with our expertise." Those who suspect this costs a lot of money are in for a pleasant surprise. The system entails low operating costs, and the value-for-price is convincing.

TÜV Rheinland Berlin Brandenburg is proud to offer long-term structural observation as a new service for its customers. ■

