The new Minnesota smart bridge
Kistler helps avoid disasters like the August 1, 2007 collapse by providing vital parts of the new bridge's early warning and security system.

The US has 578,000 highway bridges, which are the lifelines of US commerce. The average life span of highway bridges is about 70 years and the majority of bridges currently in use were built after 1945.

Sperce Wenda, Chris Smyth (KNA)

However, significant environmental damage requiring repair typically occurs before the average bridge reaches mid-life. Corrosion, cracking, and other damage can all affect a bridge's load carrying capacity. Therefore, all of the elements that directly affect perfor-

In the aftermath of the Minneapolis bridge, the official inquiry into the causes of the bridge's collapse soon disclosed hint that some vital parts of the structure, dating from the early 1940s, had been grossly understated due to some obvious design flaws. Several court cases are expected to be filed追究 around the critical issues of state funding. It's no secret that the I-35W bridge collapse was no isolated incident, but that many of the US's infrastructure is in a deplorable state, a large part of bridges, dams power supply lines etc., being over 50 or over 100 years old. An MIT estimate says that, over the next few years, costs for repairs and retrofit amount to roughly $600 billion dollars a year.

The division...

On August 1, 2007, the I-35W bridge over the Mississippi River in Minneapolis, MN collapsed during rush hour, plunging dozens of cars and their occupants into the river. Thirteen people were killed and 145 were injured. The calamity disrupted transportation and aimed a spotlight on public infrastructure, specifically methods of inspection.

... and its teachings...

In the aftermath of this event, the Minnesota Department of Transportation decided to design a replacement bridge that could easily and accurately detect structural issues.

The Kistler portion of the project began when the bridge contractors placed a call to Minnesota Measurement Engineering (the local Kistler sales representative). They were looking for accelerometers. In true sales fashion, Minnesota Measurement Engineering also uncovered requirements for data acquisition, linear potentiometers and sensor installation assistance. Working with the contractors, Kistler Type 831082 accelerometers were chosen — primarily for their low frequency range.

In the hollow space under the deck MAGNE installed and wired 12 accelerometers Type 831082, each one at the midpoint of the girders, for constant vibration monitoring. A further 14 accelerometers will be used for modal analysis. The Kistler equipment is part of the first US smart bridge’s impressive safety system.
The new bridge
The replacement bridge consists of separate north and south lanes supported by common piers. Each lane has three main spans composed of two hollow concrete box girders. Twelve Type B31082 accelerometers are used to monitor the vibration at the mid point of each concrete box girder. Accelerometer cables ranged in length from 10 to 39 meters. The remaining 14 accelerometers are used for periodic modal studies.

When the new Interstate 35W bridge opened on September 18, 2008, it included safety features exclusive to this project. The SmartBridge technology has 300 sensors that monitor the structure of the bridge. The various sensors are buried in the concrete across the expansion joints, attached to bridge girders and attached to wires routed to a central computer.

Engineers from the Minnesota Department of Transportation and the University of Minnesota will monitor the information to detect any early warning signs of problems and advance the art of bridge design.

The sensors measure how much the bridge moves or compresses from traffic, wind or air temperature. They can also measure the level of corrosion.

With the success of this project, along with the increased awareness of technology available for long-term structural monitoring, we anticipate further business in this industry in the years to come.

The new I-35W bridge over the Mississippi river in Minneapolis was opened on 18 September 2008.