



The system has been installed on two bridges in Texas

Spectral-densitometrical examinations of the red wrap that was fitted on the Obere Argen valley bridge on the A96 in Germany in 2012 revealed no visible changes to the typically particularly-sensitive red shade.

A total of 14,000m<sup>2</sup> of wrapped PE cable surface has been successfully implemented already on two bridges in Texas in the USA and another comprehensive application is currently being fitted on the cables of the Ingeniero Carlos Fernández Casado Bridge in Castilla Leon, Spain.

In the scope of the Spanish bridge, for the first time Atis Cableskin is being used as a reinforced wrap. Alpin Technik & Ingenieurservice was charged with sustainably restoring the badly damaged prestressed ducts of the parallel strand cables injected with grouting mortar on the cable-stayed bridge, which was opened to traffic in 1983. In addition to comprehensive robot-supported PE welding work, this also included creation of an effective long-term corrosion protection system and additional UV

systems in the scope of the licence extension at the DIBt. This solution has already been used successfully on a suspension bridge in Norway; it is in high demand and already established on the international market and is also about to grow in importance in Germany, specifically for the restoration of existing buildings.

Atis Cableskin is now approved by the DIBt for fully closed cables in which cable-filling medium escapes on the free length after installation. The high tear-resistance of the coil, which comes from the use of PE films incorporated into the butyl rubber, guarantees a high resistance against the escape of any cable-filling medium.

Alongside all these new opportunities, the system still offers its original benefit of extremely efficient long-term protection against corrosion in load-bearing cables.

It is a robust multi-layered system of resilient materials with a layer thickness of approximately 2.6mm layer thickness. It offers very good adhesion and interlocking with the cable surface and high elastic behaviour through which all temperature variations and load movements are absorbed.

It does not burst off or tear with relative shifts of the cable wires or escape of cable-filling medium, and is approved for corrosivity classes C5I and C5M. The verifiable service life is more than 60 years.

In terms of application it involves quick, cost-efficient and VOC-free application of the butyl rubber tapes; the application is highly independent of the climate and it does not require any scaffolding or housing to be erected, leading to very low traffic disturbance.

Existing coatings can be wrapped over and there is no need for any elaborate preparation of the cable surface, such as blasting or sweeping and, therefore, no disposal of environmentally hazardous substances

Inspection points for long-term monitoring can be produced, and the wrap offers very good inspection capacity of the cables, also with the MI procedure ■

# OPTIONAL EXTRA

The possibilities of rubber wrap have grown with new applications in protection, strengthening and even repair of bridge cables

**A** cable wrap system which was originally designed for corrosion protection of bridge cables is now being used to protect polyethylene cable-stay ducts from ultra-violet light deterioration, and also as reinforcement for these ducts. Atis Cableskin is a corrosion protection system in which butyl rubber tapes are applied to the cable surface in two layers. Due to the cold-welding properties of the material, a robust coating of the cable that is virtually impermeable against oxygen and hydrogen is formed.

Last spring the system gained Allgemeine Bauaufsichtliche Zulassung Z-30.11-41 approval from the Deutsches Institut für Bautechnik (DIBt) and its use has been expanded beyond the existing purpose.

The long-term corrosion protection system is now also used as UV-protection for stay cables, specifically for cables with PE ducts. The outer layer of the two-layer wrap, the covering layer, is applied along with an extremely UV-resilient PE carrier film on the outside that safely and permanently protects the existing PE duct from aging through UV effects. Tests based on DIN EN ISO 11341, in which an Atis Cableskin sample successfully resisted the required stress twice in sequence and without any damage, documented the reliable protective effect of this system.

protection with Atis Cableskin.

Another first for this application is the reinforcement of the PE duct against radial tensions by the use of carbon fibre strands. These are applied directly onto the PE surface that needs to be reinforced, using the same winding robot just before the butyl rubber bands are fitted, and then covered. Among other applications, this measure is able to considerably strengthen PE ducts that have been previously damaged by the use of high injection pressures, and hence will increase the service lives of the bridge ropes. This benefit has been successfully proven in comprehensive stress tests in the company's own test facilities.

The system was further expanded by the ability to combine it with active and passive dehumidification



Butyl rubber tape can strengthen PE ducts that have been damaged by high injection pressures