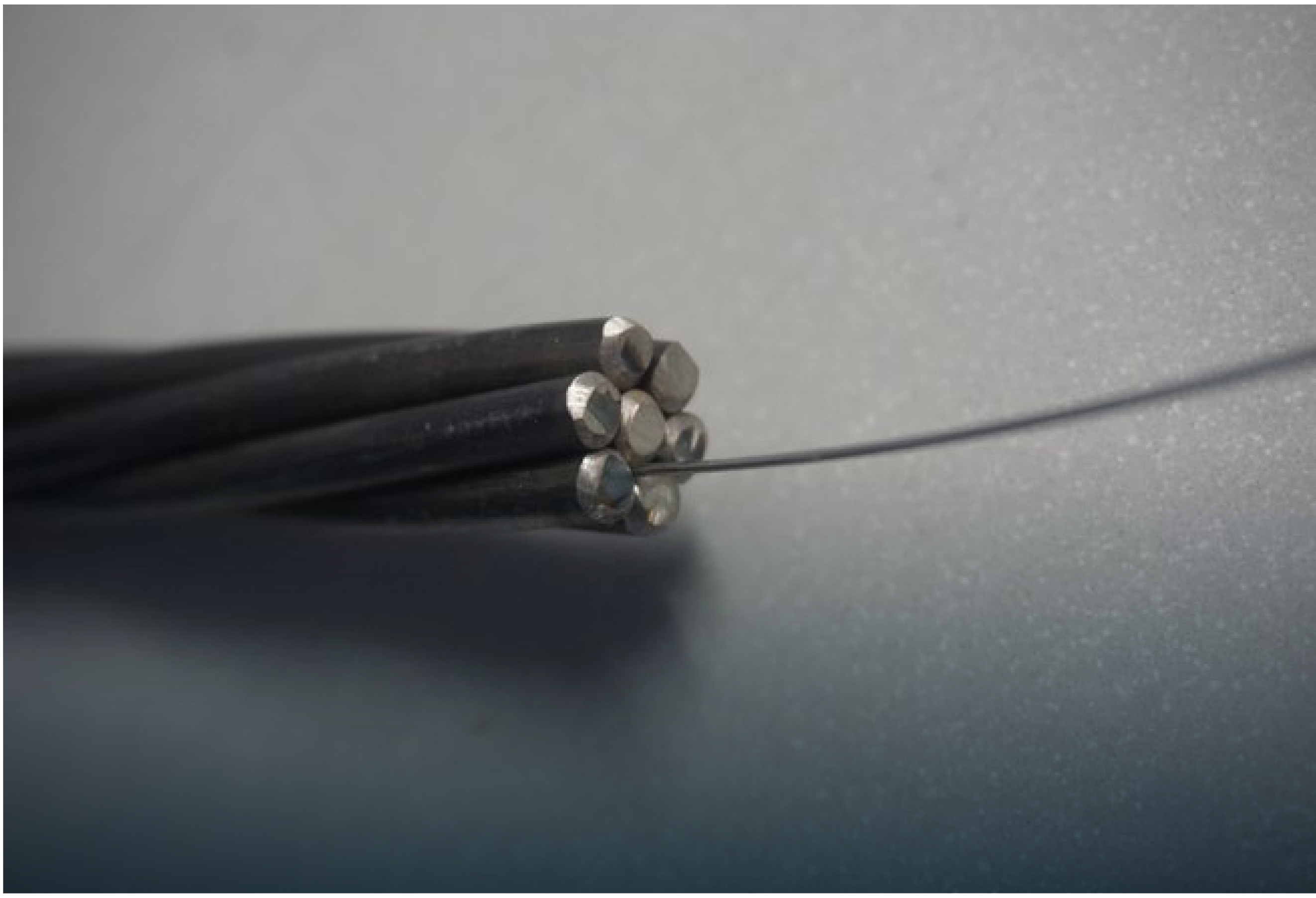
DYWIDAG



# Enhanced Structural Monitoring with DYWIDAG

DYWIDAG Smart Tendon

dywidag.com

# DYWIDAG Smart Tendon

**DYWIDAG Smart Tendon will allow the monitoring of structural parameters such as local defects or stress peaks by integrating a fiber optical sensor system in DYWIDAG bonded multistrand tendons**

The fiber optical sensor system by DYWIDAG allows a monitoring or inspection from the point of the installation of the structure.

## Key Parameters

- Localization of local defects.
- Longitudinal variation of friction losses.
- Local stress variation in the tendons due to life loads.
- Local stress peeks due to cracking of the concrete
- Local voids in the grouting of the bonded tendon.

## Key Benefits

- Cost-effective inspection method.
- Enables measurement of parameters which could not be measured before.
- Minimizes disruption to regular construction processes, ensuring minimal impact on tendon installation.

## Fields of Application

**Post-tensioning**

- Bonded multistrand tendons
- Unbonded Tendons

**Prestressing**

- Identifying changes in the bearing behavior and getting knowledge of the prestressing load after transferring the load from the stressing rig to structure

**Geotechnical anchors**

- Strand Anchors; in particular by getting knowledge of the real load transfer, the bond length of anchors can be optimized





# DYWIDAG Smart Tendon Overview

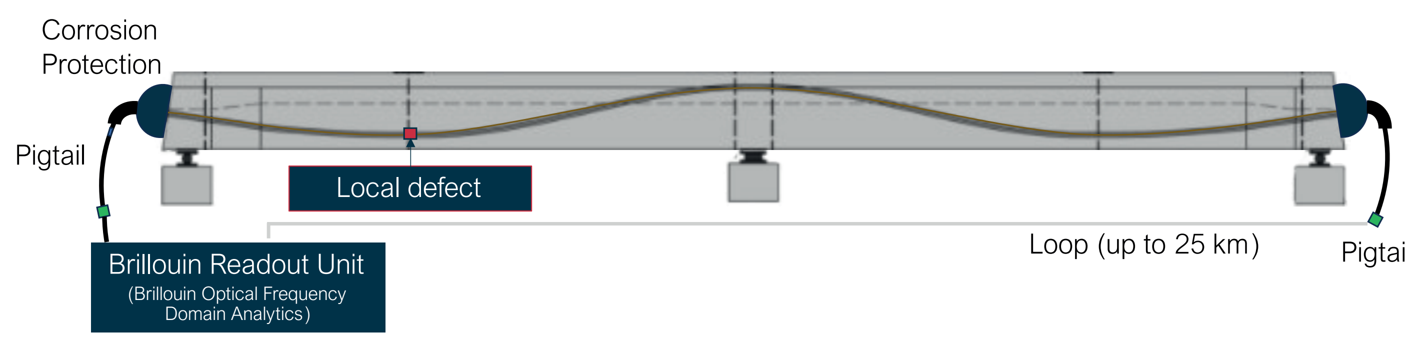
Compared to conventional readings of, e.g. a strain gauge the fiber optical sensor system can locate failures along the tendon remotely as well as measure parameters which previously could not be quantified. Other than strain gauge sensors the fiber optical sensor lifetime is comparable to the lifetime of the structure.

DYWIDAG Smart Tendon technology integrates an optical fiber in the form of a FIMT within the strand to collect localized, long-range strain measurements. Strain data is obtained through a process known as Stimulated Brillouin Scattering (SBS). DYWIDAG employs Brillouin Optical Frequency Domain Analysis (BOFDA) to achieve high-resolution measurements.

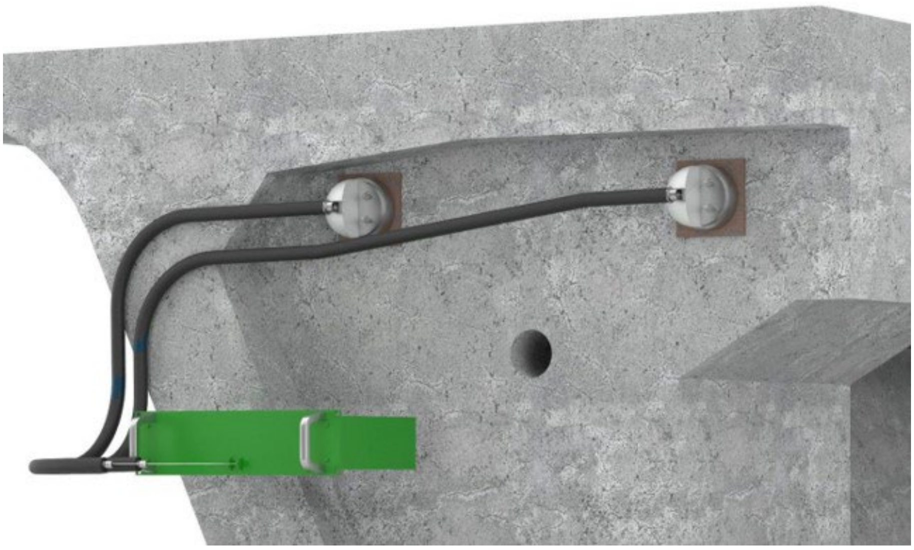
Light waves are injected into the fiber (probe light and pump light) tuned to different optical frequencies. At the characteristic optical frequency difference between probe and pump light called Brillouin frequency shift the stimulated Brillouin scattering occurs causing light to be backscattered and collected at the readout unit. The readout unit performs a scan of the Brillouin frequency shift at every point of the fiber. The Brillouin frequency shift depends not only on the properties of the optical fiber but also on the medium through which the signal travels, allowing for the detection of strain changes.

## System Specification

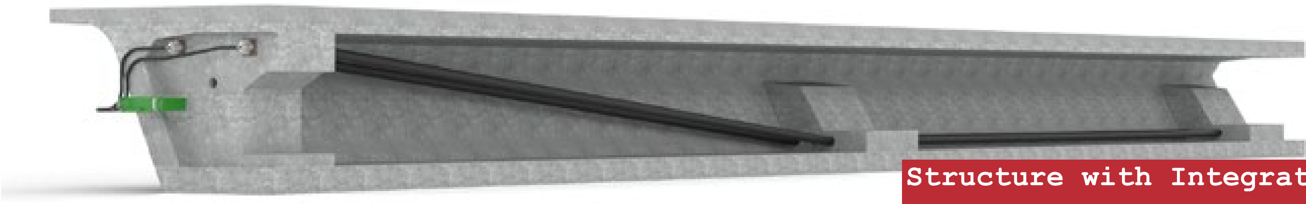
| | |
|---|---|
| **Measurement method** | Brillouin Optical Frequency Domain Analytics |
| **Strain sensitivity [dfB / dε]** | ~ 0.045 MHz/μstrain |
| **Spatial resolution** | min. 20 cm |
| **Measurement repeatability** | 2 μm/m |
| **Measurement Range** | Up to 25 km |
| **Spatial accuracy** | 0.05 m |



# DYWIDAG Smart Tendon



Readout Unit



Structure with Integrated Smart Tendon

# Get in touch.


**Europe**
**DYWIDAG-Systems Int. GmbH**
Neuhofweg 5, Unterschleissheim 85716
+49-89-30 90 50-100
sales.de@dywidag.com

**Americas**
**DYWIDAG-Systems Int. USA Inc.**
320 Marmon Drive , Bolingbrook IL 60440
+1-630-739 1100
sales.us@dywidag.com

**Australia**
**DYWIDAG-Systems Int. Construction Pty. Ltd.**
17 Nelson road, Cardiff, NSW 2285
+61 (2) 4081 5500
sales.au@dywidag.com

**Asia Regional HQ**
**DYWIDAG Asia Co. Ltd.**
2F-1 No. 15, Lane 48
Xing Shan Road, Taipei 114, Taiwan, R.O.C.
+886 2 2748 1076
sales.tw@dywidag.com

**DYWIDAG (Shanghai) Systems Engineering Co., Ltd.**
Room 704, Tower A Far East International Plaza - 319 Xian Xia Road, Chang Ning District, Shanghai 200051, R.P. China
+86 21 6235 0183
sales.cn@dywidag.com

**DYWIDAG-Systems Int. Far East Ltd. Room**
2103, 21/F, Office Plus @Wan Chai, No. 303 Hennessy Road, Wanchai, Hong Kong
+852 2833 1913
sales.hk@dywidag.com

**DYWIDAG-Systems Korea Co. Ltd.**
B-605, Digital Empire B/D,
383, Simin-daero, Anyang-si, Gyounggi-do,14057, Rep. of Korea
+82-2-34 72 01-41
sales.kr@dywidag.com

**DYWIDAG-Systems Int. Saudi Arabia LLC**
Salah Ad Din Al Ayyubi Rd, Ad Dubbat Riyadh 12623, KSA
+966-11-4553123
sales.sa@dywidag.com

**India**
**DYWIDAG-Bridgecon India Pvt. Ltd.**
265, Okhla Industrial Estate
Phase III, New Delhi-110020, India
+91-11-41052207
sales.in@dywidag.com