

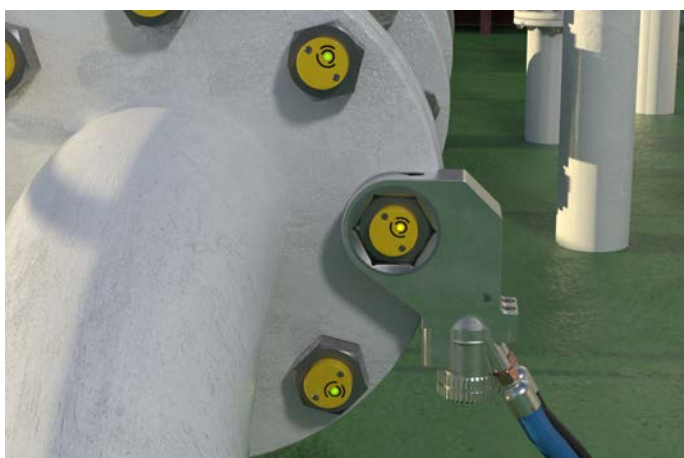
## **SERIES: InterBolt™ Intelligent Bolt Load Monitoring**



InterBolt is available in a wide range of bolts and studs, from M20 upwards. There is no maximum diameter or load that the InterBolt can be applied to.

The InterBolt technology can also be embedded into customer supplied bolts with turnaround times of less than 28 days.

**15 year battery life**  
**1 km wireless communication**



The best way to ensure high integrity of bolted connections is to measure bolt load or tension, instead of bolt torque.

Historically, direct measurement of bolt load has required specialised equipment and technicians to be on-site so is infeasible for many applications.

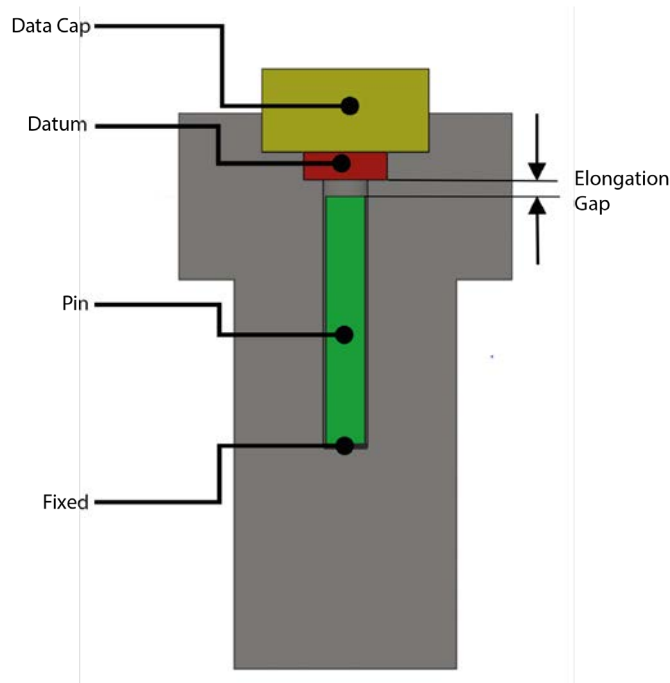
InterBolt technology integrates bolt load monitoring directly into the bolt or threaded stud itself.

InterBolt is integrated into an IIoT network so can provide real-time bolt load monitoring. The cloud platform enables asset owners to identify loose fasteners remotely and in real-time, eliminating the need for manual on-site inspection.

The technology can also provide real-time load measurements to technicians during installation and re-tightening activities to ensure bolts are tensioned to the correct preload. This is achieved through an inbuilt LED indicator that illuminates red, amber or green, as well as integration into ruggedised tablets/ HMIs.

- High accuracy (97%) bolt load measurements
- Remote monitoring through cloud platform, enabling real-time access to bolt preload data 24/7, 365 days a year
- Local bolt load monitoring through integrated LED indicator (red/ amber/ green to represent bolt load) and connectivity to ruggedised tablets/ HMIs
- Wireless communication range of 1km
- Battery powered with a 15-year battery life
- Robust design
- Ingress protection to IP68
- Shock tested to 1000g
- Extended temperature range

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**How it works**

The bolt is drilled with a small 4mm diameter hole and a measuring pin is assembled and fixed at the bottom of the hole using a specialised permanent bonding technique. The data-cap and datum is assembled into the top of the bolt or stud.

**Bolt Load  $\propto$  Bolt Strain**

When the bolt is loaded it stretches, just like a very stiff spring. This stretch, or bolt strain is completely proportional to the bolt load. The gap between the cap datum and the measuring pin therefore also changes with different bolt load. The data cap measures electronically very precisely the elongation gap and converts it into the bolt load.

**Calibrated**

The InterBolt is calibrated across the full load range of the bolt from zero to full proof stress.

**Load Verification**

The InterBolt has the target load pre-set according to the application requirements with simple LED indicator that illuminates red, amber or green. The exact load figure can also be read and recorded on a connected tablet display.

**Load Monitoring**

The InterBolt communicates the bolt load data through a LoRa low power high range wireless signal. The exceptional system and power management allows for a 15 year battery life and a 1 km or more range.

**Versatile Gateway and System Integration**

The InterBolt system includes simple gateway options to link the LoRa signal with customer requirements of cellular, Ethernet and wifi to connect to customer network or InterBolt cloud applications.

