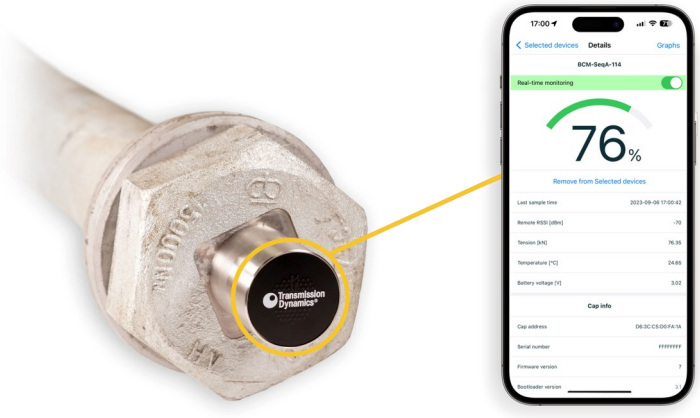
Transmission Dynamics®

Long Range Load Monitoring Fastener+®

AUTOMATED BOLT PRELOAD MONITORING



The Load Monitoring Fastener+® (LMF+) is a wireless system capable of automatically monitoring bolt preload during extended periods of operation. Transmission Dynamics are now offering a long range (LoRa) LMF+ with a wireless range of 4 km and an impressive battery life of up to 20 years, over the full industrial temperature range of –40 to +85 °C.

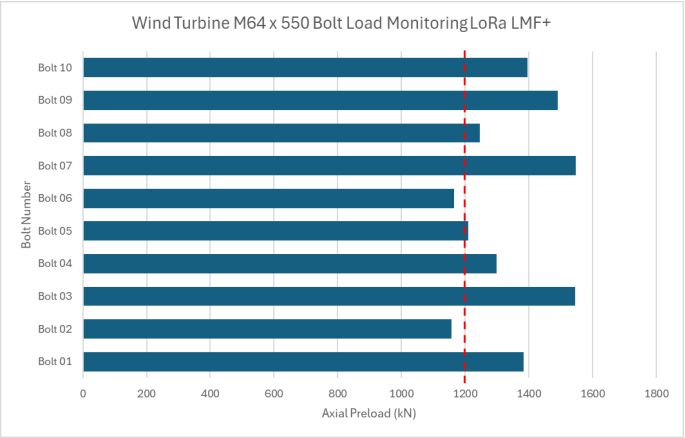
Once fitted, the LoRa LMF+ will wake for brief periods to transmit bolt preload. If the preload drops below a pre-determined level, a report will be automatically sent via email or SMS to key stakeholders detailing the bolt ID, location, and its current tension. This ensures maintenance is only conducted on bolts requiring attention, and allows immediate action to be taken on problematic bolts installed in mission critical applications.

The LoRa LMF+ can be installed in bolts and studs ranging from M16 to M80+ in size, with a minimum axial length of 40 mm. The LoRa LMF+ is installed by drilling a 2 mm diameter hole through the head of the bolt into the shank, and applying a strain gauge at the base of the hole. A PCB containing a small amplifier and memory chip to store a unique ID and calibration data is then pressed into a recess in the bolt head and connected to the gauge. The LoRa LMF+ cap with integrated battery and transmitter electronics is then screwed into place.

Data from any number of LoRa LMF+ devices is sent wirelessly to a local powered transceiver, which then transfers the data on to the Global Data Network (GDN®).

GENERAL SPECIFICATION

Size	Ø40 mm OD x 44.4 mm
Weight	240g
Communication	LoRa and Bluetooth (dual support)
Range	**LoRa:** 1-2 km (4 km in open space) **Bluetooth:** 30-40 m (up to 80 m in open space)
LoRa Frequency	915 MHz (Americas/Australia) 868 MHz (Europe)
Battery Life	Dependant on reporting frequency. Assuming 1/hr, anticipated life is 20 years.
Operating Temp. Range	-40 to +85 °C
Ingress Protection	IP68
Shock	50 g continuous (4.5 mm/s)



The above graph shows the axial preload of 10-off bolts monitored by the LoRa LMF+. The red vertical line is the minimum permissible preload threshold, so 2-off bolts have generated a report sent via email to key stakeholders.

The system is able to monitor preload simultaneously on any number of bolts, thereby reducing the requirement and cost of timely maintenance to check each bolt individually. It can also operate on rotating machinery due to its wireless capability and good resistance to NVH.

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