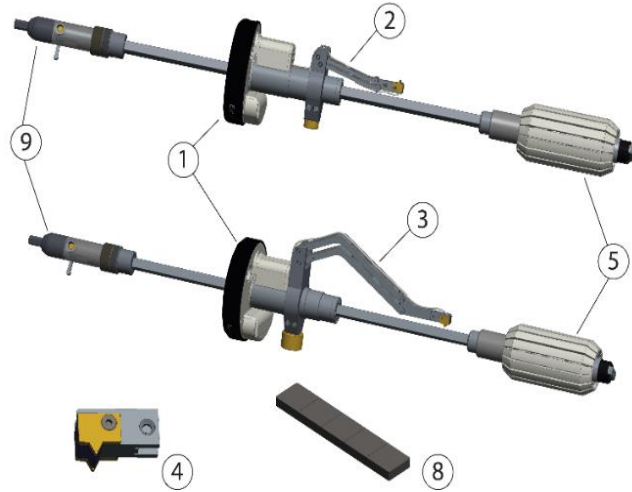


TJEX – Eddy Current scanner for pipe connection inspection



TJEX kit

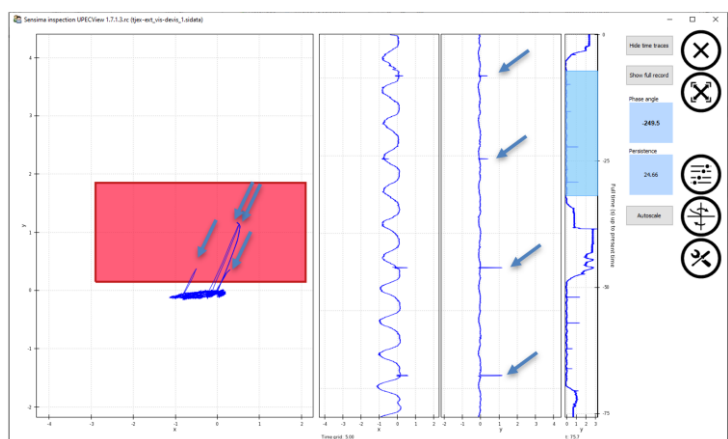
1. 2 rotary tools with measuring units (1), one for the box and one for the pin threads.
2. 1 spring loaded arm with an eddy current probe for the box thread
3. 1 spring loaded arm with an eddy current probe for the pin thread
4. 1 spare eddy current probe
5. 1 set of expanding anchoring tools
6. 1 Windows 10 tablet PC or equivalent with installed UPECView software
7. 1 USB key with the UPECView software
8. 1 calibration sample (carbon steel with 3 notches 0.5-1-3 mm deep)
9. 1 mechanical adaptor to drive the TJEX with a drill (the drill is not provided with the kit)
10. Batteries with charger (Warning: please consider the airline restrictions for batteries if you plan to travel with the system)
11. Documentation (calibration certificate, manuals)
12. 1 Waterproof Pelica case containing items 1 to 11

TJEX by Sensima Inspection is a rotary inspection device primarily aimed at measuring cracks in the threads of drill pipes or other threaded components using the Eddy Current (EC) technique. It takes advantage of Sensima’s miniaturized UPEC technology, which is directly integrated in the rotary component with a wireless communication to the PC control unit running the UPECview software.

TJEX is used to detect surface breaking cracks in the threads made in carbon steel (ferromagnetic) and austenitic stainless steel (non-ferromagnetic). The device can be used for the pin and box and for diameters in the range NC23 to NC70 thanks to its spring loaded arm carrying the probe. The inspection can be performed in the workshop, at the storage location but also at the drilling site itself. The device and the method are protected by a patent.

Cracks in the threads/connections of drill pipes are one of the main mechanisms for drill string failures. These result in huge costs for the drilling company. These components have therefore to be carefully tested. TJEX is an attractive alternative to the magnetic particle technique (MT), reducing the inspection time per thread from about 7 min to 15 seconds. The gain in time is even more significant for stainless steel where dye penetrant (DP) inspection is applied. Additional advantages include ease of use compared to MT and DP, no use of liquids, no EHS issue, reduced cleaning requirements, simplified reporting, fully digital data, traceability and possibility to perform remote supervision.

TJEX is fully compliant with the ISO 15548 NDT standard. The system can be used by any Eddy Current inspector with a certification such as, but not limited to, EC PCN level 2.



UPECview print screen with data taken on a reference thread with notches

The arrows point to the signatures of four notches machined in a NC 50 thread; left plot: impedance plane; center and right plots: time charts of the in-phase and out of phase response of the probe. The notch signal (vertical) and residual lift off signals (horizontal) have been orthogonalized. From top to bottom: 2, 3, 5, and 10 mm long notches (0.3mm deep).

Measurement unit	Sensima eddy current instrument (UPEC)
Power supply	5 V USB powered, 100 mA typ. current draw
Safety	CE, FCC Part 15B, RoHS,
Technology	Signal proc.: Analogue preamplification and demodulation, Digital outputs and filtering Settings: Manual, remote controlled, stored, preset Outputs: Digital components outputs, optional TTL alarms Single frequency, multifrequency (time multiplexed)
Physical presentation	See label 1 in above "TJEX kit" picture
Environmental effects	Warm-up time: 0s for typical use, 200s for full precision Ingress protection: IEC 60529 CODE IP67 Operating temp.: -40 °C to 60 °C EMC compatibility: Compliant with CE, FCC Part 15B
Generator unit	Single frequency, multifrequency (time multiplexed) Frequency range: 20 kHz to 10 MHz 1 Hz to 10 MHz with reduced data rate Current mode: 1-10 mA, up to 9 V p-p > 10000 Ω source impedance Voltage mode: 9 V p-p, 90 mA maximum 50 Ω impedance
Input Stage	Input impedance: 100 kΩ Max. input voltage: 5V
Balance	Hardware balancing before the vector amplifier Software balancing after A/D conversion
HF amplification	Gain setting range: 2 - 20, 2.9 dB steps Bandwidth: 10 MHz Linear input range: 1.0 V
Demodulation	Bandwidth: 10 MHz Wave shape: square
Vector amplification	Gain setting range: 1 – 100, 2.7 dB steps
LF filtering	Digital filters
Phase setting	Range: 0 – 360° Step size: 0.05°
Digitized outputs	Data protocol: long range Bluetooth (wire connection USB 2.0 available for tests)
Digitization	Digitization technique: Sigma-delta Sampling rate: 375 Hz to 3 kHz A/D resolution: 14 to 16 bits Stage: After vector amplification and balancing
Probe	A probe shaped for the NC thread geometry is provided with the kit. The probe can be operated in differential/bridge or send receive mode. Other probes on demand.