

Control of the Tightening Force by Ultrasound technique



Controlled tightening is one of ULTRA RS specialties. Our State-of-the-Art technology allows accurate measurement of tightening force on bolts by ultrasound.
 or studs using ultrasound.
 Principle: real time measurement

Quality: 5% accuracy or better in measured pretension
 Adaptable for different bolts and dowels,
 Practical and fast.

The device consists of:

- Torque meter or hydraulic torque wrench,
- Socket instrumented by ultrasound sensor,
- and the tailored ultrasound device.



Depending on the need of our customers, we either perform controlled tightening on their behalf or tailor-make a device and provide necessary training and hotline assistance to our clients. Moreover, Ultra RS can supply tailor-made hydraulic torque tool and combine the two devices for an efficient and accurate execution.

We engage with our customers in the following steps in each project:

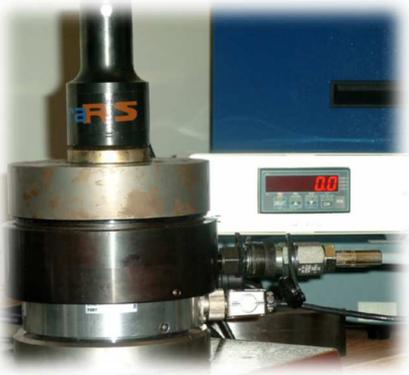
- * Study and advice on project specification and requirements
- * Development of measuring device adapted to the application
- * Parameterization of our proprietary measurement software
- * Control and fine-tuning of the end-to-end arrangement using real scale mock-ups
- * Qualification test campaign and associated reporting
- * Organization of training and hotline support

ULTRA-RS

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Control de la force de serrage par ultrasons



When a screw is tightened, two effects will increase the travel time of the ultrasonic wave. Firstly, the acoustoelastic effect, which is caused directly by the tensile stress in the screw. It tends to decrease the propagation velocity of the wave and, therefore, increase its travel time. Secondly, the effect of lengthening of the screw increases the wave path and thus increases the travel time.

Formula used :

$$(t_{11} - t^{\circ}_{11}) / t_{11} = K_1 \cdot F$$

t°_{11} : travel time of the wave before tightening screw in the axial direction,

F : Tightening force (kN),

t_{11} : travel time of the wave after tightening screw in the axial direction,

K_1 : calibration coefficient determined on a screw

Two calibrations:

1. K : on the Mock-up representative of the real assembly
2. t°_{11} : on the screw before tightening

Nota : K can be determined on the real assembly or on a mock-up.