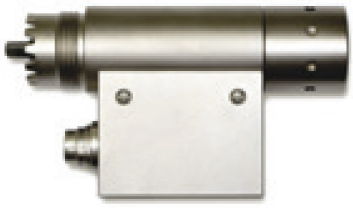
Control Systems

Torque dynamic transducer MDG



Torque / rotation angle
dynamic transducer MDW

Electronically controlled screwdriving system with current control

The screwdriving spindle is fitted with a highly dynamic AC servo-drive. The motor current consumption and rotor position of the EC drive are continuously measured during the screwdriving process. This data is then transmitted to the screwdriving process control. EC drives are equipped with rotor position monitoring which can be used instead of the measured rotation angle signal.

Electronically controlled screwdriving system with torque and rotation angle measurement

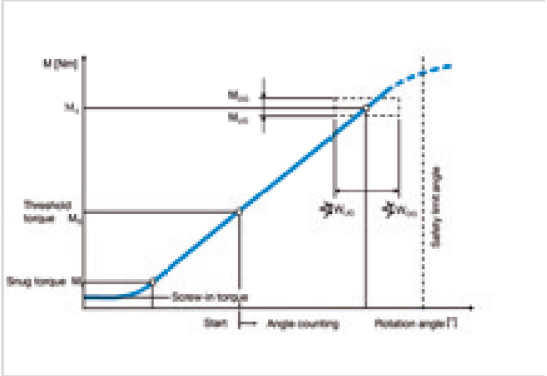
The screwdriving spindle can also be fitted with a highly dynamic electric servo-drive. The important torque and rotation angle screwdriving parameters are continuously measured during the screwdriving process by highly sensitive dynamic transducers and transferred to the associated screwdriver controller. The controller uses these collected measurements in a closed loop process to control the entire screwdriving process. The technology allows optimum precision for joining processes All recorded screwdriving processes can be documented. The same applies to torque repeating accuracy. This always provides precisely measured values and data with absolute accuracy for quality assurance of the screwdriving process.

Redundant measurement according to VDI / VDE 2862

The VDI / VDE 2862 guideline defines joint types and minimum requirements for assembly tools. In category A – danger to life and physical well-being – the control and monitoring variable must be directly measured on an automatic screwdriving system.
This means the transducer on the production system must have a second redundant transducer to constantly check the primary transducer for accuracy. WEBER screwdriving systems can cover all categories A, B and C.

Tightening Methods

The correct installation of any fastener is not only determined by the friction under the head of the fastener and in the thread but also by the accuracy of the screwdriving tool and the tightening method.



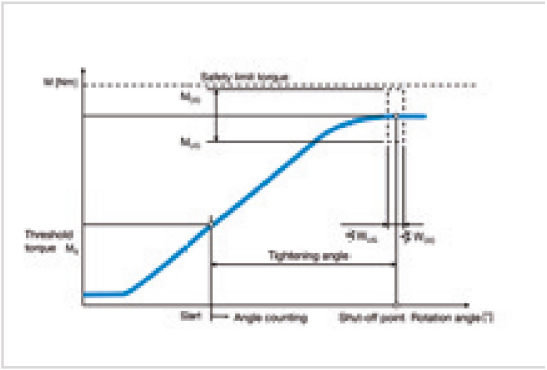
Torque-controlled tightening

The screw is tightened to a pre-load below the yield strength. Rotation angle monitoring is used in addition to verify the desired torque value.

+ Torque is easy to measure and control
– Large variation of pre-stressing force

Rotation angle-controlled tightening

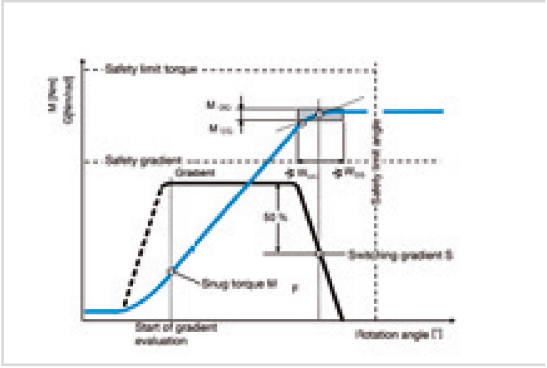
First, the screw is tightened up to a defined threshold torque M_S. Above this torque, the screw is turned further by a defined rotation angle into the plastic range. The system also monitors the shut-off torque.



+ Constant clamping force regardless of friction
+ Optimum use of material
– Screws not reusable after releasing
– Not suitable for all screw connections: requires expansion screws
– Determining screwdriving parameters is complex

Yield-controlled tightening

The screw is tightened up to the limit of plastic strain with a calculated gradient of torque and rotation angle. Tightening is stopped when this gradient drops from its maximum by a defined percentage (usually 50 %).



+ Pre-stressing force is achieved largely regardless of friction
+ Optimum use of the screw
+ No special screw shape required (e.g. expansion screws)
+ Screw can usually be reused after releasing
– Complex screwdriving and control system
– Not suitable for all screw connections

Other WEBER screwdriving process control types are drive to depth, relative torque and the patented depth gradient control method.