TORQUE CALIBRATION

Norbar's torque calibration instruments are trusted to be the equipment of choice for military, airlines and equipment manufacturers around the world.

The torque measurement range starts with simple to use but accurate testers called TruCheck™ that can be sited line side in production facilities or in aircraft hangers. The main purpose of these testers is to provide a confidence check at the point of wrench use. The measurement range progresses in sophistication and accuracy through to the flagship T-Box XL™ instrument. T-Box XL™, together with its PC based Torque Data Management Software (TDMS), provides a complete torque audit and torque tool data management solution.

Aerospace customers often require control over the entire calibration hierarchy for their torque measurement equipment. Norbar have supplied several airlines with beam and weight calibration master systems for the calibration of torque measurement devices.

All Norbar torque transducers from 0.005 N·m to 108,500 N·m are supplied with a UKAS accredited calibration certificate. Since 2004 the National Institute of Standards and Technology (NIST) have confirmed to the FAA that certificates issued by UKAS accredited laboratories can be regarded as equivalent to NIST traceable. If clarification is required on this, please check on www.torquecalibration.com or consult Norbar.

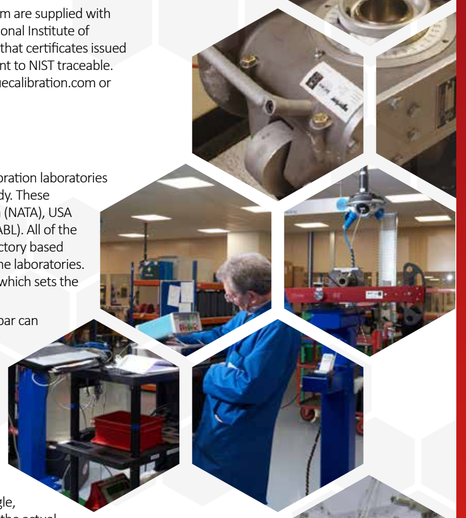
Military Torque Wrench Tester Kit containing two instruments giving a total calibrated range from 1.2 to 1500 N·m. NATO stock number 6635-99-511-0355.

Calibration of Power-Dyne multiplier with integrated torque read out

TORQUE CALIBRATION SERVICES

Norbar have established a worldwide network of torque calibration laboratories with third party accreditation by a government approved body. These laboratories are located in UK (accredited by UKAS), Australia (NATA), USA (NVLAP), Singapore (SAC-SINGLAS), China (TAF) and India (NABL). All of the laboratories are equipped to the same standard as the UK factory based laboratory ensuring consistency and repeatability between the laboratories. All of the laboratories operate to BS EN ISO/IEC 17025:2005 which sets the standard for the technical competence of laboratories.

In addition to offering calibration of torque transducers, Norbar can provide calibration for many of the special tools provided for aircraft maintenance by companies such as Hydratight Sweeney and Power-Dyne.



USM – ULTRASONIC BOLT LOAD MEASUREMENT

USM-3 uses ultrasound to measure the change in length of bolts during and after the tightening process. Unlike indirect methods of tension control such as torque or torque and angle, ultrasonic measurement of bolt load or elongation in situ on the actual joint stack-up means significantly more accurate bolt tension without costly strain gauging or the introduction of devices which will change the joint stiffness or the joint stack-up height. The net effect of the numerous causes of friction variations which determine the torque versus tension relationship can be empirically analysed; likewise, long term issues such as measuring joint relaxation, gasket creep, sealant migration and performing post flight analysis are easily achievable.

The ultimate accolade for the USM was that after over one year of testing against competitive instruments at NASA's Stennis Space Center, it was selected to replace the aging fleet of instruments which had been used on over 40 safety critical applications on the Space Shuttle Main Engines (SSME). Norbar's USM instrument have been selected for use on ultra-critical applications found on the Space Shuttle, expendable launch vehicles and satellites. These include: Delta 4 Launch Vehicles; SSME High Pressure LOX & Fuel Turbopumps, Main Combustion Chamber to Powerhead and HP Ducting; likewise, USM-3 was used for the Hardpoint bolts, Keel bolts and Trunnion bolts on the Spacelab Logistics Pallet (SLP) used for payload mounting on such missions as STS-123 (Dextre Robotics for ISS) and STS-125 (Hubble Space Telescope Servicing Mission 4).

USM-3 Measurement of Spacelab Logistic Pallet hardpoint bolts used on STS-123 at Kennedy Space Center

GLOBAL SERVICE

Norbar is the only torque equipment manufacturer capable of offering tool and instrument calibration services to the original factory standard on four continents.

Accredited laboratories in Australia, USA, Singapore, China and India operate the same equipment and procedures as the UKAS accredited laboratory within our headquarters in the UK.

NORBAR TORQUE TOOLS LTD
Wildmere Road, Banbury, Oxfordshire, OX16 3JU
UNITED KINGDOM
Tel + 44 (0)1295 753600
Email sales@norbar.com

NORBAR TORQUE TOOLS
45-47 Raglan Avenue, Edwardstown
SA 5039
AUSTRALIA
Tel + 61 (0)8 8292 9777
Email enquiry@norbar.com.au

NORBAR TORQUE TOOLS INC
36400 Biltmore Place, Willoughby
Ohio 44094
USA
Tel + 1 866 667 2272
Email inquiry@norbar.us

NORBAR TORQUE TOOLS PTE LTD
194 Pandan Loop, #07-20 Pantech Business Hub
SINGAPORE 128383
Tel + 65 6841 1371
Email enquires@norbar.sg

NORBAR TORQUE TOOLS (SHANGHAI) LTD
91 Building- 7F, No. 1122, North Qinzhou Road,
Xuhui District, Shanghai
CHINA 201103
Tel + 86 21 6145 0368
Email sales@norbar.com.cn

NORBAR TORQUE TOOLS INDIA PVT. LTD
Plot No A – 168 Khairne Industrial Area
Thane Belapur Road
Mahape Navi Mumbai – 400 709
INDIA
Tel + 91 22 2778 8480
Email enquiry@norbar.in

www.norbar.com

Part number 07512 | Issue 2

NORBAR PRODUCT PORTFOLIO

- Torque Screwdrivers
- Torque Wrenches
- Electronic Torque Wrenches
- Manual Torque Multipliers
- Pneumatic Torque Tools
- Electronic Torque Tools
- Torque Measurement Instruments
- Torque Transducers
- Ultrasonic Bolt Measurement
- Calibration Services

Distributed by

norbar®
Norbar Torque Tools

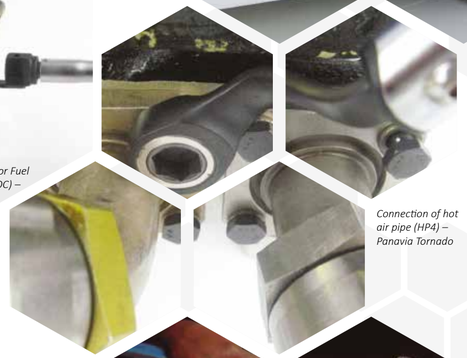
PRECISION TOOLS FOR THE AEROSPACE INDUSTRY

NORBAR IN THE AEROSPACE INDUSTRY

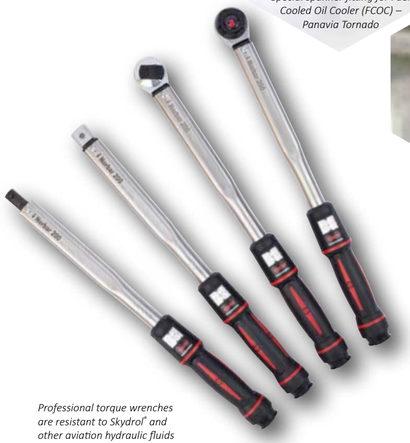
Given the often conflicting demands of aerospace for unparalleled safety whilst keeping weight to a minimum, no other industry has a greater need for the control of threaded fasteners. Norbar plays a crucial role in this industry for many of the world's aircraft manufacturers, airlines and space programmes.

From our beginnings, providing torque wrenches for the Rolls-Royce Merlin engines that powered most of Britain's fighters and bombers in World War 2, Norbar has since been involved with every step on man's journey to fly further, faster, higher – and more cost effectively.

Special spanner fitting for Fuel Cooled Oil Cooler (FCOC) – Panavia Tornado



Connection of hot air pipe (HP4) – Panavia Tornado



Professional torque wrenches are resistant to Skydrol® and other aviation hydraulic fluids

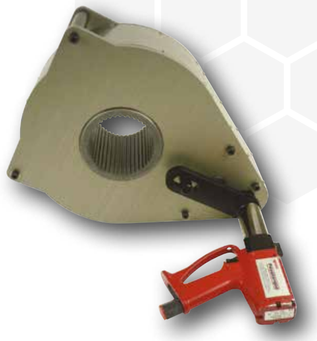
TORQUE WRENCHES

In the 1940s it was recognised that having honed the cylinder bores of aircraft engines, this precision could be undone through the uneven tightening of the cylinder head. Norbar's first torque wrenches were designed for this application and are still used for this along with a host of other applications.

Precision is key to aerospace and Norbar torque wrenches are designed to hold their calibration over many thousands of tightening cycles. The mechanism itself operates in one direction and anticlockwise operation can be achieved by means of a 'push through' square drive available on some models. Furthermore, when they need adjustment, this can normally be achieved without complete disassembly, unlike the so called 'rocking cube' torque wrench mechanisms. The bi-directional 'rocking cube' mechanisms are also notoriously difficult to maintain in calibration in the clockwise and anticlockwise directions. Only a single direction of calibration is required with the Norbar system.

Unlike the all metal torque wrenches that are very common in the aircraft industry, Norbar torque wrenches are easy to read, easy to set and comfortable to use. All of the plastics used in Norbar wrench handles are tested for their resistance to aviation hydraulic fluids.

Many aircraft fasteners are impossible to reach with standard tools and there has been an example of aircraft loss due to the simple reason that a fastener could not be reached and was therefore never tightened correctly. Norbar offer an Engineer to Order (ETO) service to manufacture special fittings to reach these fasteners.



Number 3 Bearing Lock Nut Tool, GE CF6-80 engine

HandTorque® modified for Boeing CH-47 Chinook transmission

HAND OPERATED AND POWERED TORQUE MULTIPLIERS

Torque multipliers are geared devices that allow very high torques to be accurately produced from a compact tool package. Take for example Norbar's HT-52 multiplier which can produce 1000 N·m from a package weight with a suitable torque wrench of around 3 kg – around half the weight of a typical 1000 N·m torque wrench. Given the tight confines of most airframes, the fact that this tool package utilises a wrench length of around 300 mm will also be a major advantage.

The most common use for Norbar HandTorque® multipliers in the aircraft industry is helicopter rotor blade bolting. Norbar's 'Chinook Kit' was the first purpose built example but Norbar multipliers have since been adapted for several helicopter models.

Powered multipliers exchange the torque wrench input of the HandTorque® multiplier for a pneumatic or electric motor input. This gives a tool with low noise, exceptionally low levels of vibration (less than 2.5m/s²) and high torque accuracy. In their more sophisticated form, these tools are fitted with a transducer measuring the torque at the output coupled with a control system that will shut-off the tool at a pre-determined torque. These tools achieve accuracies of better than 2% of reading.

Aircraft wheel rim bolting is an excellent application for Norbar's PneuTorque® pneumatic torque multipliers. The use of a tool fitted with a transducer allows torque data to be retained for quality control purposes.

Aircraft turbine maintenance requires a host of special offset torque multipliers for applications such as the main bearing retaining nut. A growing application for the PneuTorque® pneumatic multiplier is to provide the drive unit for these torque multipliers, as it is critical that the bearing retaining nuts are not over or under torqued. The use of the PneuTorque® as the driver offers a more precise solution than the gearbox vendor's pneumatic motor.

PneuTorque® is also ideal for the disassembly of turbine stages. This is because although installed to a modest torque, the break out torque after the engine has seen service can be extremely high, often causing the bolt to shear. With Norbar's special reaction tooling, a PneuTorque® makes light and easy work of this otherwise difficult task.

T-Box XL™

Turbine Stage Disassembly Tool, GE CF6-80