



The force and torque group is part of the Force and Pressure Metrology Division in the Centro Nacional de Metrología (National Metrology Center, CENAM, Mexico).

The activities in charge of this group are:

- ✓ Calibration of high accuracy instruments (for Mexican secondary laboratories, mainly),
- ✓ Advice in force and torque,
- ✓ Research and development projects (for external clients and inside CENAM),
- ✓ Training (courses, in-laboratory practical training),
- ✓ Assessment of technical capability,
- ✓ Proficiency tests.

LABORATORIES.

The group is responsible for 3 laboratories:

- Dead weights force machines laboratory (Primary National Standards),
- Force transfer machines laboratory,
- Torque laboratory.

Dead weights force machines laboratory (Primary National Standards).

In this laboratory force reference standards are calibrated (e. g. force transducers, load cells, proving rings). Three dead weight force standard machines (DWFSM) are used as our national standards: a) 50 N to 2 500 N; b) 500 N to 50 kN; c) 2 kN to 150 kN.

Their maximum relative expanded uncertainty is 20×10^{-6} , relative to the reading. All machines have the capability for calibrations in tension and/or compression.



50 kN DWFSM



2,5 kN DWFSM

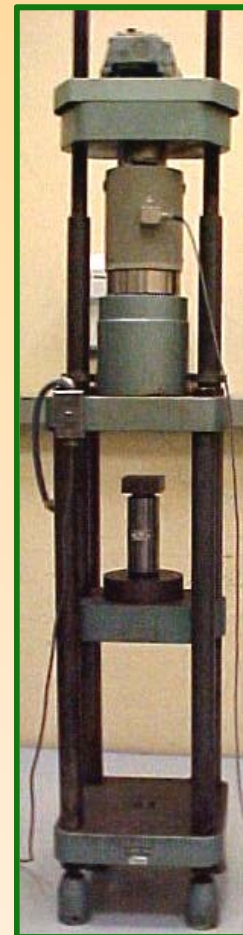


150 kN DWFSM

Force transfer machines Laboratory.

In this laboratory, 3 force hydraulic transfer machines (FHTM) are used - by the direct comparison method - to calibrate load cells, proving rings, dynamometers, Amsler capsules and tensometers. The maximum measurement range is 2 MN, for tension and/or compression. The maximum relative expanded uncertainty is 7×10^{-4} , relative to the reading.

From 2 MN and up to 5 MN, only calibrations in compression can be performed; with a maximum relative expanded uncertainty of 25×10^{-4} , relative to the reading.



3 FHTM: 500 kN, 1 MN and 2MN

Torque laboratory

It is possible to calibrate torque meters, torque transducers and torque wrenches of different types. The measurement range is from 1 N·m up to 2 kN·m, with a maximum expanded relative uncertainty of 5×10^{-4} , relative to the reading. The laboratory has dead weight torque standard machines (DWTSM) and torque transfer machines (TTM).



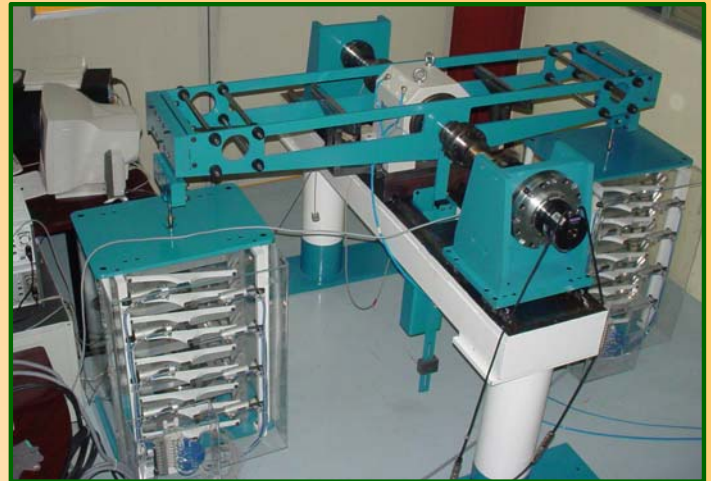
2 kN·m TTM



20 N·m TTM

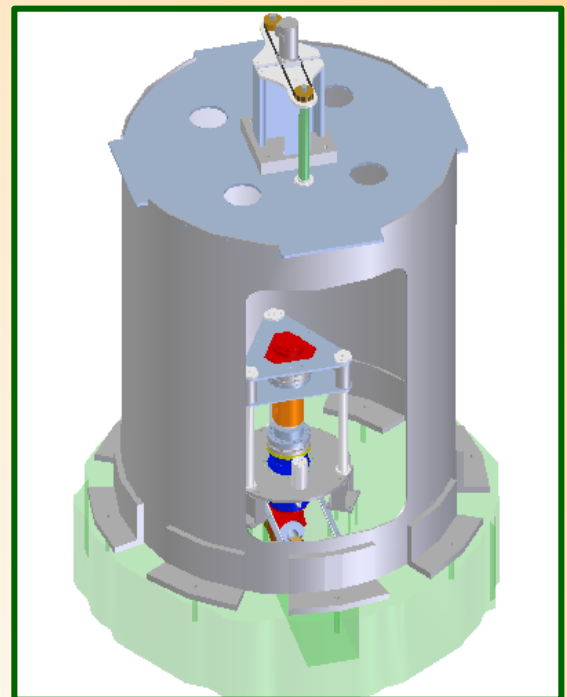


2 kN·m DWTSM



1 kN·m DWTSM and TTM

In the near future, the laboratory will expand its capabilities to a larger torques. The maximum measurement range will be increase up to 20 kN·m, with a secondary reference torque standard using a high accuracy torque transducer. With this torque transfer machine (TTM), by direct comparison, calibrations could be performed.



20 kN·m TTM

FORCE AND TORQUE GROUP

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PUBLISHED PAPERS

IN SPANISH:

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OTHER PUBLICATIONS IN SPANISH

Technical publications on sale at CENAM's Library:

Ramírez Ahedo D. A., Torres Guzmán J. C., Galván Mancilla J. J., *Metrología de Par Torsional (Torque Metrology)*. CNM-MMF-PT-002. Last edition 2005.

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