

TOVEY

ENGINEERING INNOVATION

CALIBRATION SYSTEMS & SERVICES



株式会社 大手技研

本社：茨城県つくば市千現2-9-1

Tel: 029-855-8778 Fax: 029-855-8700

関西営業所：兵庫県明石市松の内2-1-8 6F

Tel: 078-926-1178 Fax: 078-926-1180

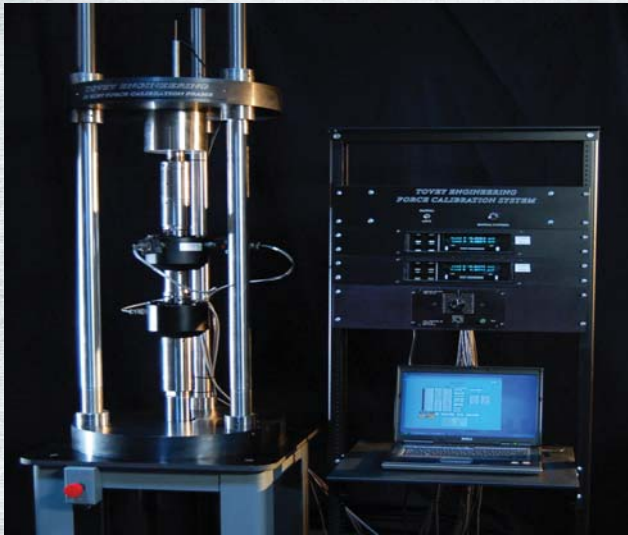
<http://www.ohtegiken.co.jp/> main.sales@ohtegiken.co.jp

Load Cells, Force and Torque Calibration Systems
When Performance and Quality Matter Most

AUTOMATED FORCE CALIBRATION SYSTEMS

Tovey Automated Systems.

Tovey Engineering is the industry leader in force transfer standard calibration systems. TEI developed the first automated systems on the market and has the largest installed base in the US. Over the years, we have continued to engineer and refine our systems for maximum performance and custom-

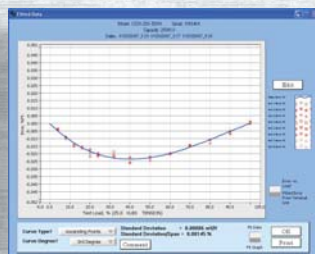


55K lbf System

er ease-of-use. Tovey systems are designed specifically for metrology grade calibration, rather than being modified test systems, and achieve the lowest measurement uncertainties of any competitive systems. All key components of our systems are manufactured by the company in-house to meet exacting standards for metrology use. Reliability is excellent, and the alignment is second to none. TEI automated systems closely approximate results from deadweight calibrators.



10 Point Calibration Data



Tension Error Data

System Features:

- Systems include load frame, transfer standard load cells, hydraulic power unit, automated control, and data analysis software.
- Durable multi-column load frames exhibit high frame stiffness, highly symmetric stiffness, and exceptional alignment.
- Universal fixturing allows tension and compression calibration without changeover.
- Systems feature Tovey CS Series metrology grade transfer standards, which meet the highest performance standards of any load cell manufacturer.
- Systems enable fully automated calibration, exercise transducers automatically with specified forces and number of cycles.
- Calibrate transducers in load sequences using up to thirty different load points with simultaneous measurement of up to three bridges (standard) or up to 8 bridges (optional).
- Automated closed-loop system calculates performance parameters and performs data evaluations per ASTM E74 and/or ISO 376.
- Model 9150 ratio-metric instruments provide excitation of 5 or 10 Volts, signal conditioning and A to D conversion with 24 bit digital resolution and a useable resolution to < 100 nanovoltz.
- Model TS-10-2 Transducer Simulator with 30ppm measurement uncertainty (1 year) simplifies instrument calibration and provides an instrument check standard.
- Data files and graphs for calibration records are produced and stored.
- Data analysis and output is compliant with national and international standards



1000K lbf System

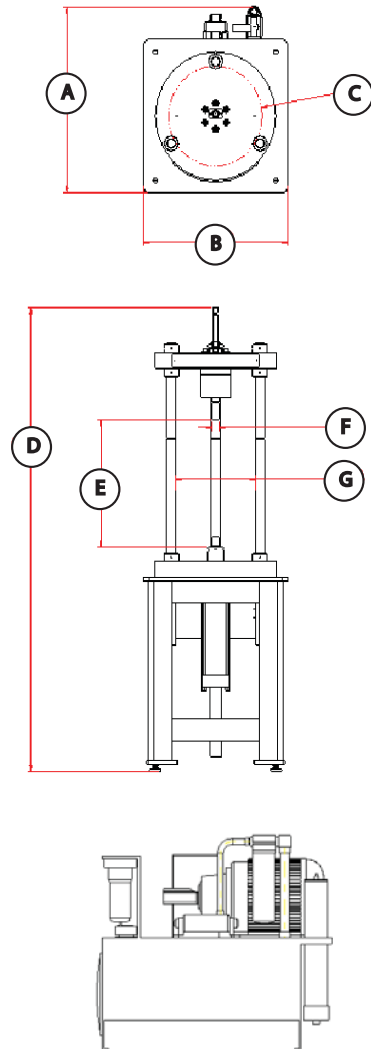
System Capacity and Performance.

Tovey Engineering transfer standard force calibration systems are available in capacities ranging from 20 lbf to 1 million lbf. These versatile automated calibration systems reduce calibration time and cost, permitting efficient in-house transducer calibration. Systems meet ASTM E74 required measurement uncertainty of applied forces of less than 0.005% of range, or overall measurement uncertainty of 0.025%-0.050% of reading. Systems feature Tovey CS Series metrology grade load cells, with industry leading performance.



11K and 110K lbf System

DIMENSIONS					
Load frames 3K-55K					
Dimension	Capacity >	3K	11K	55K	
A	Base Depth	29 in (74 cm)	29 in (74 cm)	29 in (74 cm)	
B	Base width	24 in (61 cm)	24 in (61 cm)	24 in (61 cm)	
C	Working diameter	12.9 in max (32.8 cm)	15.3 in max (38.9 cm)	14.9 in max (37.9 cm)	
D	Overall height	76 in (193 cm)	83 in (211 cm)	98 in (249 cm)	
E	Vertical working space	21.5-30.0 in (54.6 cm-76.2 cm)	21.0-30.0 in (53.3 cm-76.2 cm)	29.0-40.0 in (73.7 cm-101.6 cm)	
F	Thread size	1/2-20 UNC 3A (Both ends)	1-14 UNS 3A (Both ends)	1 3/4 -12 UN 3A (Both ends)	
G	Column opening	10.8 in max (27.4 cm)	13.2 in (33.5 cm)	12.6 in (32 cm)	
	Weight of load frame	480 lbs (219 kg)	920 lbs (419 kg)	1,380 lbs (628 kg)	
Load frames 110K-1M					
Dimension	Capacity >	110K	220K	1M	
A	Base Depth	29 in (74 cm)	36 in (92 cm)	38 in (97 cm)	
B	Base width	24 in (61 cm)	36 in (92 cm)	38 in (97 cm)	
C	Working diameter	14.9 in max (37.8 cm)	21.0 in max (53.4 cm)	34.5 in max (87.6 cm)	
D	Overall height	95 in (242 cm)	117 in (298 cm)	149 in (379 cm)	
E	Vertical working space	29.0-38.0 in (73.7 cm-96.6 cm)	28.0-41.0 in (71.2 cm-104.2 cm)	21.5-30.0 in (54.6 cm-76.2 cm)	
F	Thread size	1 3/4 -12 UN 3A (Both ends)	2 3/4 -8 UN 3A (Both ends)	6 -8 UN 3A (Head) 5 1/2 -8 UN 3A (Cyl)	
G	Column opening	12.6 in max (32.0 cm)	17.9 in max (45.4 cm)	23.5 in max (59.7 cm)	
	Weight of load frame	1,820 lbs (828 kg)	4,900 lbs (2,228 kg)	32,000 lbs (14,545 kg)	
Hydraulic pump					
Length	Width	Height	Weight	Electrical	Pressure
44 in (112 cm)	30 in (77 cm)	38 in (97 cm)	660 lbs (300 kg)	10 HP	4000 psi max (282 kg/cm)



PORTABLE CALIBRATION SYSTEMS

Tovey provides self-contained mobile platforms for remote system verification with reference standard load cells and/or dead weights. These systems provide everything an operator needs to perform a verification at a testing machine or in a stress lab test cell. Portable systems include several reference load cells, cables, fixtures, an instrument, a load cell simulator and a laptop computer. Systems are calibrated at the factory as an integrated unit. Software is provided to acquire data and verify that the system under test produces measured forces within a specified tolerance band. The calibration system also provides a measurement of non-repeatability. Tovey's portable systems are often used to perform verifications consistent with ASTM E4 or other requirements. Push cart or carry case formats are available.



System Accessories Cart

CALIBRATION ACCESSORIES

- **Adapters and Loading Fixtures.** Tovey manufactures a wide variety of standard thread adapters and custom made fixtures to satisfy the requirements of our customers. All parts are heat treated to provide high strength and wear resistant surfaces. All parts are engineered to provide excellent alignment. Premium materials are utilized in manufacture. Rod end bearings, clevises, compression load plates, and special adaptors for many applications are also provided by Tovey.
- **Rotation washers** are designed to provide for rotation of the unit under test for ASTM E-74 /ISO 376 calibrations. These washers allow precise rotation of the unit under test and permit quick setups for significant time savings.



System Accessories

SYSTEM ALIGNMENT VERIFICATION

- **Alignment dynamometers.** Tovey alignment dynamometers permit high accuracy misalignment measurement. Dynamometers have three or four strain gages equally spaced around the circumference of the part at either two or three axial positions. When installed in a load frame and a force is applied, readings from the individual strain gages can be used as a measure of misalignment, providing a quantitative measure of that misalignment.
- **Multi-axis load cells** measure force and moment in orthogonal planes. The moment readings from these load cells provide information that permits alignment adjustments to be made and also quantifies the amount of moment that may be applied along with the axial force. Tovey's standard and special multi-axis load cells are among the world's most accurate.



Dynamometers

SHUNT CALIBRATION PRODUCTS

Shunt calibration is often used to provide a means of setting up an instrument in the field. Tovey offers two options to meet this need. An automated shunt cal module features four separate shunt calibration values. Any number of these resistor values can be switched into the circuit in sequence or used individually. This instrument is capable of performing shunt calibration on single, double, or triple bridge load cells simultaneously and in a fully automated manner. A lower cost option consists of shunt calibration adapters that attach directly to the connector of the unit under test.

TORQUE CALIBRATION SYSTEMS

Tovey Engineering transfer standard torque calibration systems are available in capacities ranging from 200 in-lb to 100,000 in-lb. These versatile automated calibration systems reduce calibration time and cost, permitting efficient in-house transducer calibration.

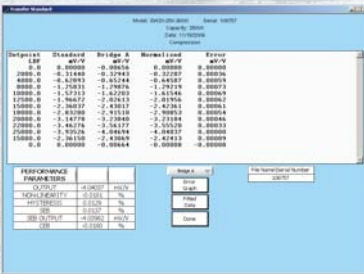
FEATURES:

- System includes torque frame, transfer standard load cells, hydraulic actuator, automated control and data analysis software.
- Precision torque arm and meticulously machined components.
- Efficient transition from clockwise to counterclockwise calibration.
- True zero deadband measurement.
- Alignment couplings to reduce transducer misalignment errors.
- Metrology grade transfer standards with industry leading accuracy, or dead weight hangers and weights for primary standard torque calibrations.
- Fully automated calibration; exercise transducers automatically with specified forces and number of cycles.
- Comprehensive software for data acquisition and data reduction.
- Data files and graphs for calibration records are produced and stored.
- Data analysis and output is compliant with national and international standards.

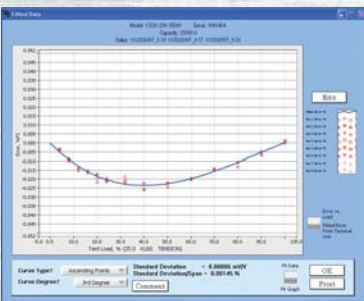


6,000 in-lb System

CALIBRATION & TEST SOFTWARE



10 Point Calibration Data



Tension Error Data



ISO 376 Compression Data

Tovey Engineering offers several software packages to support calibration and testing. The software is applicable to strain gage based force, torque, and pressure transducers.

Available software packages include:

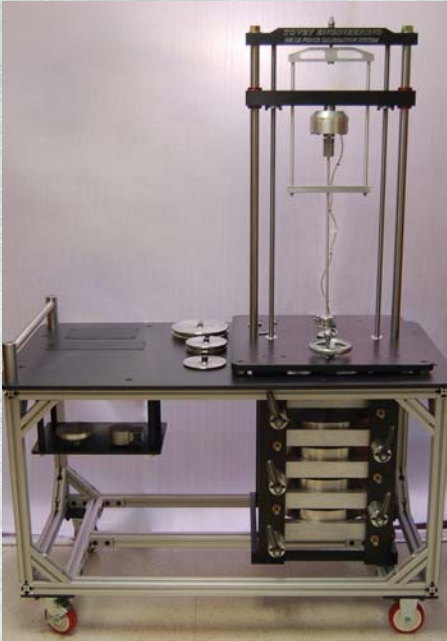
- CalSoft-DW for dead weight calibration systems.
- CalSoft-FTS for transfer standard calibration systems.
- CalAnalysis for comprehensive data analysis.
- CalSoft-Test for test applications.

Software Features:

- Supports automated or manual exercise cycles.
- Supports automated or manual load setting.
- Automated data acquisition.
- Performs standard performance analysis including determining non-linearity, hysteresis, and static error band.
- ASTM E74 Analysis.
- ISO 376 Analysis.
- All data presented graphically or in tabular form.
- Statistically determines degree of curve fit according to ASTM E74 procedure, or user may override to select from 1st to 5th degree.
- Calibrates stand-alone systems with independent readout instruments.
- Allows simultaneous calibration of bridges in multi-bridge transducers.
- Can be customized to meet special customer requirements.

ACCREDITATIONS:
NVLAP Lab Code 200662-0
ANSI Z540, ISO/IEC 17025
ASTM E74, ISO 376

DEADWEIGHT FORCE CALIBRATION SYSTEMS



Portable Deadweight Rig

Tovey Engineering offers fully automated, as well as manually operated, dead-weight calibration systems. Designed specifically for the most stringent calibration labs, university settings, and government facilities, these systems provide the most accurate calibration of load cells in both tension and compression. System capacities available from 50 lbf to 10K lbf.

Features:

- System includes load frame, certified weight stack, pneumatic hand operated or automated control system, data acquisition and analysis software.
- Accurate to as low as .002% of applied force (acceptable for ASTM Class AA calibration requirements).
- Easy setup hardware allows tension and compression calibration.
- Automated data acquisition, analysis, and storage.
- Simple file export and report writing.
- Data analysis and output is compliant with national and international standards.

Options include:

- Wide variety of mounting adapters.
- Metric capacities.
- Custom designs- based on customer specific application requirements.



Deadweight System

MANUAL FORCE CALIBRATION SYSTEMS

Tovey Engineering now offers a very economical, manually operated calibration system. Designed specifically for smaller calibration labs, these systems provide accurate calibration of load cells in both tension and compression. Capacities available from 2klbf to 100klbf.

Features:

- System includes load frame, transfer standard load cells, hydraulic hand operated pump, data acquisition and analysis software.
- Universal fixture hardware allows tension and compression calibration without changeover.
- Easy setup and operation.
- Automated data acquisition, analysis, and storage.
- Simple file export and report writing.
- Data analysis and output is compliant with national and international standards.

Options available include:

- Hydraulic power unit.
- Wide variety of mounting adapters.
- Metric capacities.
- Custom designs- based on customer specific application needs.

