



Our Products Include:

- Load Cells
 - Custom
 - High Capacity
 - Multiaxes
 - Underwater

- Torque Sensors
 - Custom Torque
 - OEM
 - High Capacity
 - Underwater

Calibration Kits

Our In-House and Field Services Include:

In-House Services

- Sensor Design
- Calibration and Gaging Services

Field Services

- Measurement of torque and horsepower in rotating equipment
- Stress/Strain Measurements of Plant Components
- Measurements in Harsh Environments
- MOV and AOV Strain Gage Instrumentation
- Measurement of Thrust and Torque on Valves and Rotating Equipment
- Structural Integrity Tests (SITs)
- Permanent and Temporary Monitoring Systems
- Design and Manufacture of Custom Sensors

Our measurement services are used to quantify operating parameters, aid with diagnostics and preventive maintenance, and troubleshoot causes for equipment failure.

Sensing Systems specializes in conducting measurements and manufacturing sensors to operate in harsh environments such as:

- High Temperature
- Low / Cryogenic Temperature
- Underwater / High Humidity
- High Magnetic Fields
- Chemical / Corrosive

Power plants, process plants, ship operators, movable bridge owners and pharmaceutical labs require accurate knowledge of torque and power in their rotating machinery to monitor or control their operation. The power delivered and consumed by engines, motors, turbines, propellers or waterjets provides an indication and diagnostics of several operational parameters including:

- Efficiency
- Relationship between driving and driven equipment
- Changes or deterioration over time
- Torsional vibration induced fatigue
- Misalignment
- Fuel consumption
- Torque/Horsepower vs. RPM curves
- End Point Mixing determination

Sensing Systems performs accurate torque and horsepower measurements using bonded strain gages and wireless telemetry systems. We also install permanent systems in critical components to constantly monitor torque and power.

We have performed these measurements on industrial equipment and a number of vessels. Industrial customers include several steel manufacturers, fossil, hydroelectric plants and several pharmaceutical companies. Many projects have included permanent installations. Vessels have included 900 ft. long Navy Destroyers, supplies boats, high speed ferries, fishing vessels and pilot boats.

Technology

The technology to measure torque and power is the same regardless of customer, equipment size or application. Two measurements must be obtained: Torque and Rotational Speed (RPM). Torque is measured using bonded strain gages whereas RPM is measured using hand held devices, encoders, magnetic pickups or any other rotational pulse type signal.

For **Field Measurements**, torque is measured by bonding a full Wheatstone strain gage bridge to the shaft selected for testing. The signal is sent to the data acquisition equipment using a wireless/telemetry system. The signal, which is proportional to torque, is acquired by data acquisition equipment consisting of a computer, data loggers or multimeter. Horsepower is obtained by combining the torque and RPM measurements in the equation: Horsepower = Torque (lbs.ft) x RPM / 5250. Any valid units may be used for torque and power measurements.

CONTACT US FOR YOUR CUSTOM APPLICATIONS

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For **Permanent Installations**, torque and RPM are measured using the same sensors. Using inductively coupled transmission systems or slip rings (when appropriate) accomplishes transmission of the signal. The data acquisition system typically consists of a display meter with an analog or digital output for connection to a computer based installation.

Permanent Installations

Permanent installations are performed to constantly monitor torque and power when the use of standard rotating torque sensors is not possible. Such is the case when additional length in the drive train is not available to accommodate a standard transducer. The existing shaft is converted into a sensor with the installation of strain gages. In several projects Sensing Systems has instrumented and calibrated a drive train shaft in the laboratory prior to its installation in the equipment. In most cases, however, the permanent installation is performed in the field.

Applications

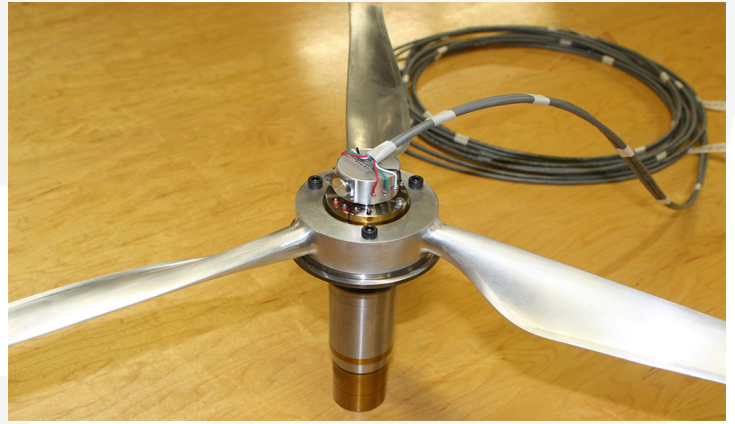
Torque and power measurements are used throughout industry in a wide variety of applications. Sample projects include monitoring engine performance, balancing movable bridges, pharmaceutical mixing operations and racecar testing. Any applications involving transmission of power using rotating shafts are candidates for torque and power measurements.

Field Measurements

Sensing Systems personnel travel anywhere in the world to effect torque and power measurements. We have pioneered the use of in-situ calibrations to increase the accuracy of field measurements to a level equivalent to laboratory measurements.

Strain Gage Installations:

Sensing Systems installations are unique and different from other companies. Sensing Systems installs a minimum of four strain gages arranged 180 degrees apart. This configuration cancels unwanted effects (i.e. bending) from the measurement. The use of four gages provides inherent temperature compensation. We also perform zero balancing in the field (instead of shunting) to utilize the full range of wireless/telemetry and data Inquisition equipment. All installations are coated or waterproofed as required by the surrounding environment.



In-Situ Calibrations:

In-situ calibrations consist of applying known torque loads to a drive shaft instrumented in the field. In-situ calibrations require the design and manufacture of fixtures based on the individual requirements of each project. Loading arms and NIST traceable load cells are used to apply known torque loads. These loads are correlated to the signal obtained from the strain gages to generate a calibration factor.

Accuracy

The accuracy of torque and power measurements is different for non-calibrated and calibrated installations. The accuracy also depends on the shaft material where the strain gages are installed. Typical accuracies for non-calibrated installations are between 3% and 5% of full scale and depend on how well the shaft material properties are known. Accuracies for calibrated (laboratory or in-situ) installations are between 0.25% and 1% of full scale and depend on the quality of the shaft material. Knowledge of shaft material properties is not required for calibrated installations.

Technical Assistance

Our engineers are ready to discuss specific applications and measurement requirements. A brief description of your equipment, maximum expected torque and rotational speed are all that is necessary to provide a technical recommendation. We will also discuss your accuracy requirements to determine if a calibration is required. At your request we will submit a technical and financial proposal for your consideration.

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