



MONITORING OF DYNAMIC BLADE LOADING

FOR AEROSPACE ENGINES

Application: Aerospace Engine Dynamic Blade Loading Monitoring

Wireless torque telemetry of strain gage signals on inducer and quill shafts of an axial flow pump

Industry: Aerospace

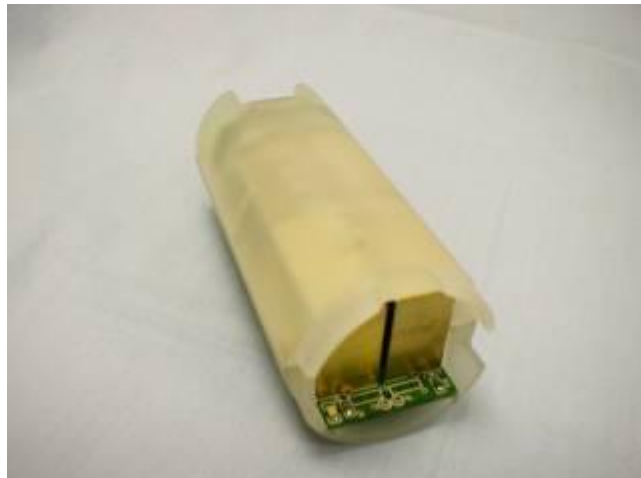
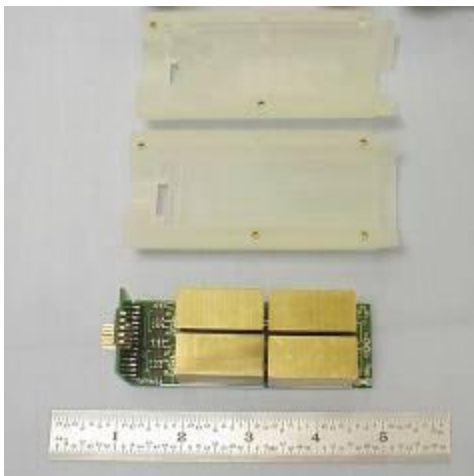
Product: [AT-7000](#)

Parameters measured: Torque

A major aerospace company needed a reliable and compact method of monitoring the dynamic blade motion of a rocket's pump at 6000 RPM. The wireless transmission of strain measurements through use of a center-of-shaft mounted AT-7000 multichannel digital telemetry system provided the desired dynamic torque information. With an easy to operate turn-key installation, signals were measured, digitized, and transmitted from eight channels of 350 ohm strain gages. The AT-7000 provided all excitation and signal conditioning necessary for the strain gages, and also provided remotely controlled shunt calibration for all channels. Sample rates of 5888 samples per second provided DC to 2 kHz bandwidth signal reconstruction at the remote Receiver.

Benefits:

- Compact center of shaft design for high G force
- Induction powered- no batteries
- EMI resistant digital telemetry
- Anti-aliased data
- Precision measurements with good bandwidths
- No slip rings; nothing to wear or maintain





The picture above-left shows the Transmitter's electronics modular design for the 8 strain measurements; on the upper right, the electronics are shown in a rapid-prototype housing prior to insertion in a metal coupling. The exterior of the coupling, with a glass laminate induction power pickup coil assembly is shown in the lower left picture. The Receiver (digital to analog outputs device) is shown on the lower right.

The AT-7000 can also be configured in a clamp collar for mid-shaft mounting, and can be used to measure rotor temperatures, voltages and currents, detection of ground faults, and torsional vibration.



6 British American Boulevard Suite 103-F, Latham, NY 12110 USA
Toll-Free in the USA: **888 684 0012**
Phone: **1 518 393 2200** | Email: **telemetry@pcb.com**

Accumetrics, Inc. provides digital telemetry systems used in a variety of applications such as aerospace, marine, defense, agriculture, transportation, milling operations, energy, and power generation. Systems transmit sensor data from rotating structures using wireless techniques, preserving the integrity of the data even in environments with high levels of electromagnetic interference. Measurement solutions range from single channel products, such as strain gage torque measurements, to advanced custom multichannel systems. Accumetrics, Inc. is a subsidiary of PCB Piezotronics, Inc., and PCB® is a wholly owned subsidiary of MTS Systems Corporations.

© 2019 Accumetrics, Inc. In the interest of constant product improvement, specifications are subject to change without notice. PCB®, ICP®, Swiveler®, Modally Tuned®, and IMI® with associated logo are registered trademarks of PCB Piezotronics, Inc. in the United States. ICP® is a registered trademark of PCB Piezotronics Europe GmbH in Germany and other countries. UHT-12™ is a trademark of PCB Piezotronics, Inc. SensorLine™ is a service mark of PCB Piezotronics, Inc. SWIFT® is a registered trademark of MTS Systems Corporation in the United States. All other trademarks are property of their respective owners.

MD-0405 revNR 0719



MTS Sensors, a division of MTS Systems Corporation (NASDAQ: MTSC), vastly expanded its range of products and solutions after MTS acquired PCB Piezotronics, Inc. in July, 2016. PCB Piezotronics, Inc. is a wholly owned subsidiary of MTS Systems Corp.; IMI Sensors and Larson Davis are divisions of PCB Piezotronics, Inc.; Accumetrics, Inc. and The Modal Shop, Inc. are subsidiaries of PCB Piezotronics, Inc.