SENSORS FOR RESEARCH & DEVELOPMENT

EXPERIENCE IS THE BEST TEACHER

DEVELOPING TOMORROW'S ENGINEERS
MECHANICAL ENGINEERING LABORATORY PROGRAM

DISCOUNTED SENSOR KIT ■ EXPERIMENTS (INSTRUCTOR'S GUIDE) ■ INDUSTRY EXPERT LECTURE ■ POSTER

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PCB PIEZOTRONICS INC.
MTS SYSTEMS CORPORATION

MECHANICAL ENGINEERING LABORATORY PROGRAM

Mechanical Engineering is a field that applies the principles of physics, material sciences, and engineering in the design, analysis, and manufacture of mechanical components and systems. This Mechanical Engineering Program provides commonly used sensors and accessories and a step-by-step Instructor's Guide for a variety of experiments. These experiments include examining Newton's second law (F=ma), identifying resonance frequencies, and damage detection. The program also includes an industry expert lecture and technical poster.

INCLUDED PRODUCTS	MODEL	QTY
Impact Hammer 500 lbf, 10 mV/lb	086C03	1
Accelerometer 100 mV/g, 0.5 to 3 kHz	333B30	4
Force Sensor 100 lb comp., 100 lb tension, 50 mV/lb	208C02	2
Cable - 10 ft. (BNC to BNC)	002T10	2
Cable - 10 ft. (10-32 to BNC)	002C10	12

All sensor kits and optional products are new and within specification.

OPTIONAL PRODUCTS	MODEL
Handheld Shaker	394C06
Acoustic Calibrator	CAL200
1/2" Array Microphone, BNC connector 24 dBA to 122 dB and 10 Hz to 20 kHz	130F20
1/2" Microphone Holder	079A11
Smart Shaker	K2007E01
Tachometer (LT2 Kit)	LT2
Force Sensor 10 lb comp., 10 lb tension, 500 mV/lb	208C01
Digiducer	333D01
4-Channel Signal Conditioner	482C15
1-Channel Battery Powered Signal Conditioner	480E09

LABORATORY EXPERIMENTS

Learning Objectives

#1 - SINGLE DEGREE OF FREEDOM OSCILLATOR

Learn about the concepts of natural frequency and damping through a single degree of freedom system.

#2 - FORCE MEASUREMENTS

How to measure force on a structure and how different modes of a structure result in different reaction forces.

#3 - VIBRATION OF MECHANICAL DEVICES

Learn about the vibration signatures of mechanical devices.

#4 - NEWTON'S SECOND LAW

Learn about Newton's Second Law, mass loading, and comparison calibration.

#5 - DAMAGE DETECTION AND STRUCTURAL HEALTH MONITORING

Learn about structural health monitoring using surface acceleration on bridge-like structures.

#6 - MODAL ANALYSIS

Learn about the modes of structures including natural frequencies and mode shapes.

#7 - BEAM MOTION IN THREE DIRECTIONS

Learn about transverse and longitudinal waves in beams to understand the system.

#8 - IMPACT HAMMER

How to properly use an impact hammer for impulse force excitation.

#9 - RESONANCE

How to measure vibration signals of a mechanical device with a tachometer (optional).

Step-by-step Instructor's Guide to experiments is provided.

POSTERS

- Acoustics
- Pressure
- Vibration
- Force & Industrial Strain

INDUSTRY EXPERT PRESENTATIONS

- Acoustics - Overview of how and why to measure sound, source-path-receiver theory, coherent and incoherent sources, and microphone sensor options.
- Pressure - Overview of sensor design, key specifications, common applications, mounting, and pressure sensor options.
- Vibration - Overview of piezoelectric theory, common terminology, accelerometer construction, mounting, and accelerometer sensor options.
- Force & Industrial Strain- Overview of sensor construction, key specifications, operational basics, mounting, and force & strain sensor options.

ADDITIONAL UNIVERSITY PROGRAM BENEFITS

- Sensor samples (non-functioning) as available
- Discounted PCB® seminar registration fees for professors and students
- “White Papers for Sensors” program for professors and students
- “Share your experiments” (photos and step-by-step) for discounts against future sensor purchases

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