

Machine Design Laboratory

Prof. Mark Nagurka

Dept. of Mechanical Engineering
Marquette University

April 20, 2012

Machine Design Laboratory



Prof. Nagurka

Engineering Hall 161, Marquette University, Feb 25, 2012

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Machine Design Laboratory

- A teaching laboratory and resource for research and projects.
- Equipped with machines, tools, components, computers, instrumentation.
- Laboratory experiments foster student learning through application.

Machine Fault Simulator



Machine Design Laboratory

- “MEEN 3250: Design of Machine Elements” course.
- Students gain real-world experience through laboratory experiments, analysis, computer simulation and engineering methods.
- Students become familiar with current engineering practice.

Experiments

- Labs developed and deployed Spring 2012:
 - **Lab 1: Introduction to Design of Machine Elements**
 - Lab 2: Stress Measurements and Concentrations
 - Lab 3: Press and Shrink Fits
 - Lab 4: Gear Lab
 - Lab 5: Flexible Components
 - Lab 6: Computer Tools Lab
 - Lab 7: Bearing Lab
 - Lab 8: Bolt Lab

Intro Laboratory



Drill Press

Intro Laboratory



Intro Laboratory

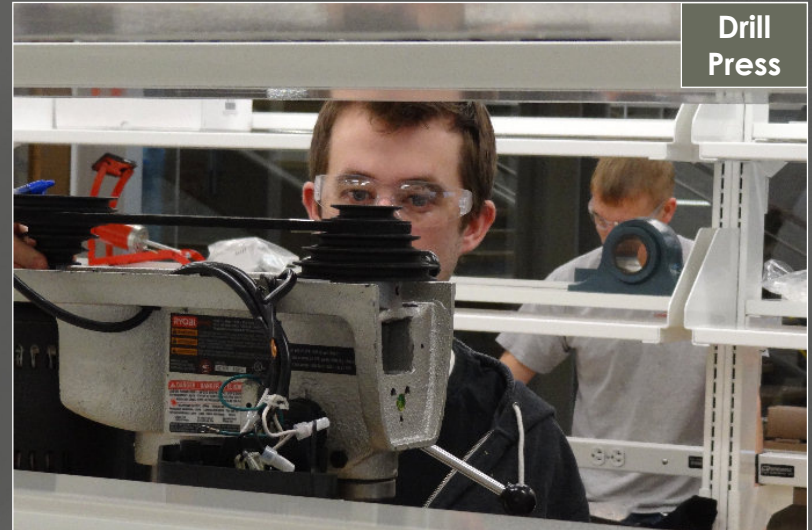


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Intro Laboratory

Drill
Press



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Intro Laboratory



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Intro Laboratory



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Intro Laboratory

Chainless Bicycle



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Intro Laboratory

Buell Blast Engine



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Intro Laboratory



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Experiments

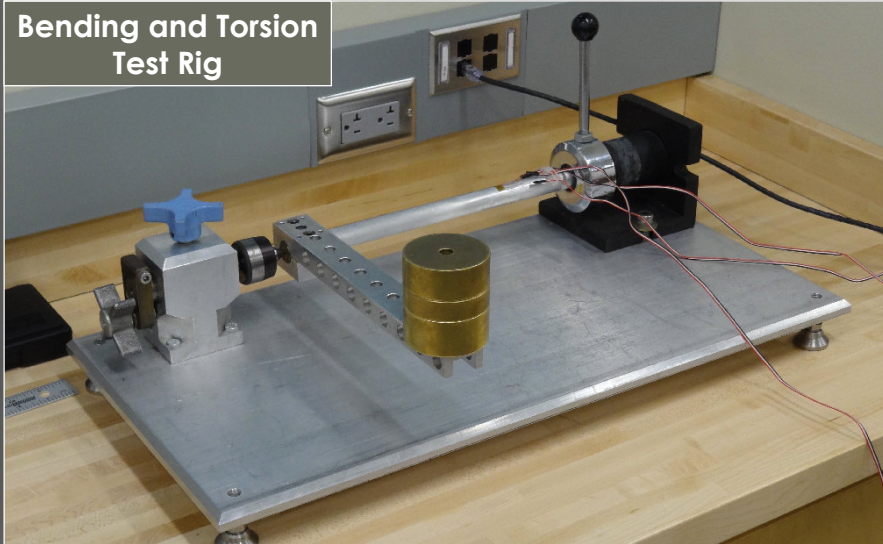
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Stress Measurements

Bending and Torsion Test Rig



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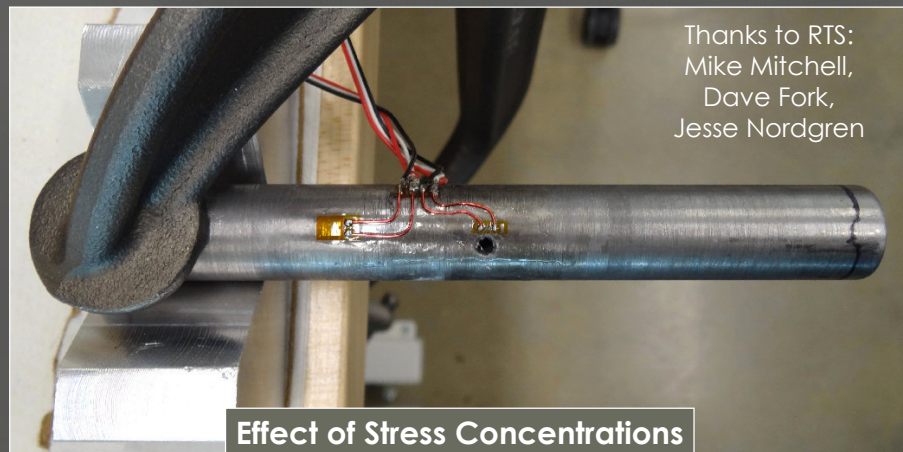
Stress Measurements



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Stress Measurements



Thanks to RTS:
Mike Mitchell,
Dave Fork,
Jesse Nordgren

Effect of Stress Concentrations

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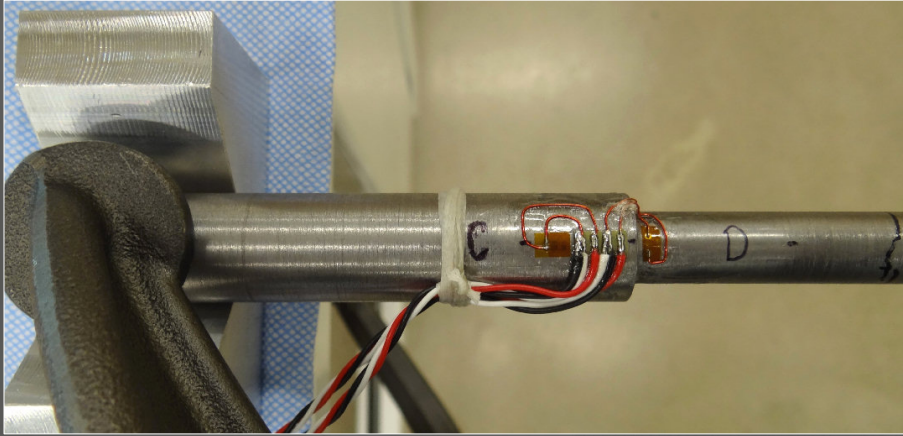
Stress Measurements



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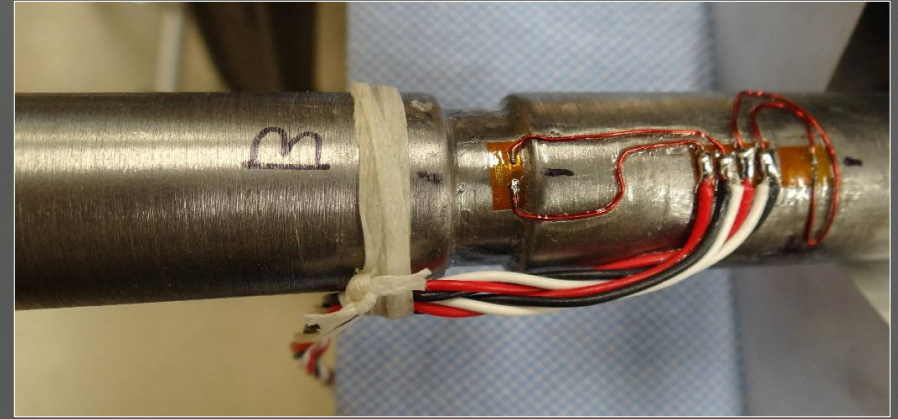
Stress Measurements



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Stress Measurements



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Stress Measurements



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Stress Measurements

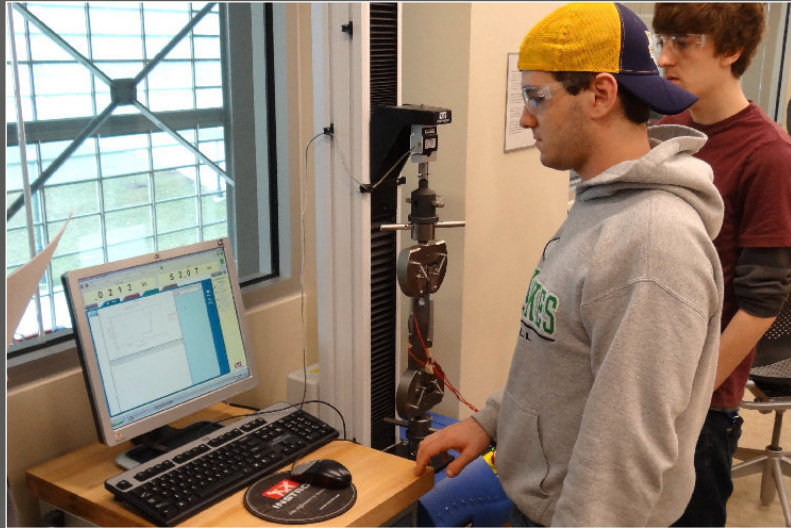
Measuring Strain at
Stress Concentration
in Bar in Instron



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Stress Measurements



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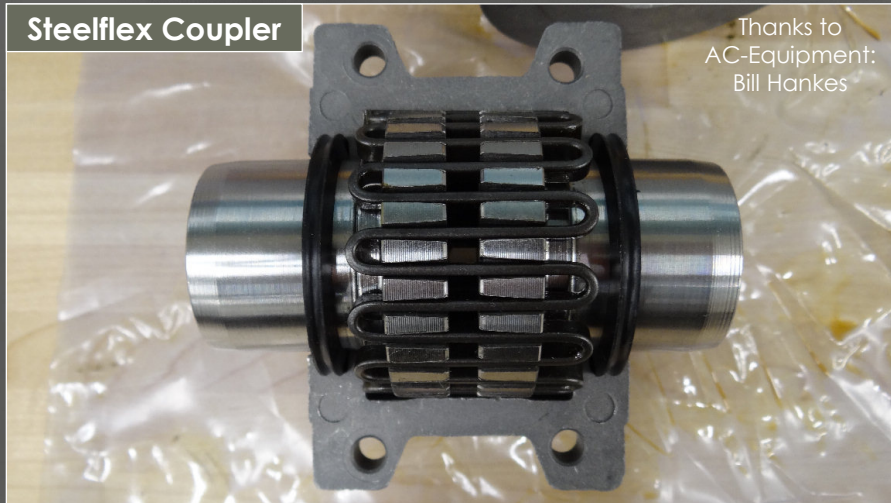
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Press and Shrink Fits

Steelflex Coupler

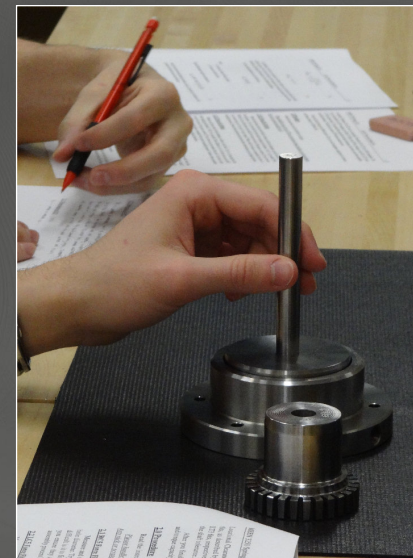
Thanks to
AC-Equipment:
Bill Hanks



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Press and Shrink Fits



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Press and Shrink Fits



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Press and Shrink Fits



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Press and Shrink Fits



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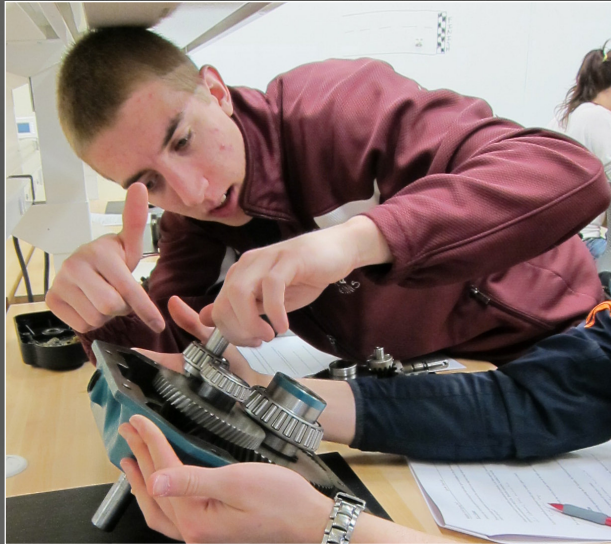
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Gear Lab



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Falk Gearbox



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Gear Lab



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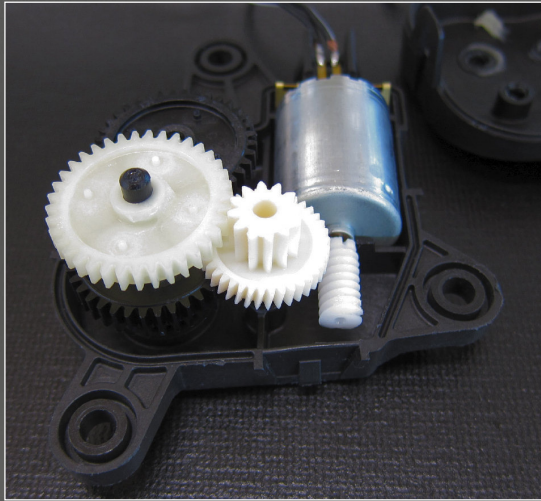
Gear Lab



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Gear Lab



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Gear Lab



Measuring
Speed of
Motor

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Gear Lab



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Gear Lab



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Gear Lab



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Experiments

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Flexible Components Lab



Characterizing Chains

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Flexible Components Lab

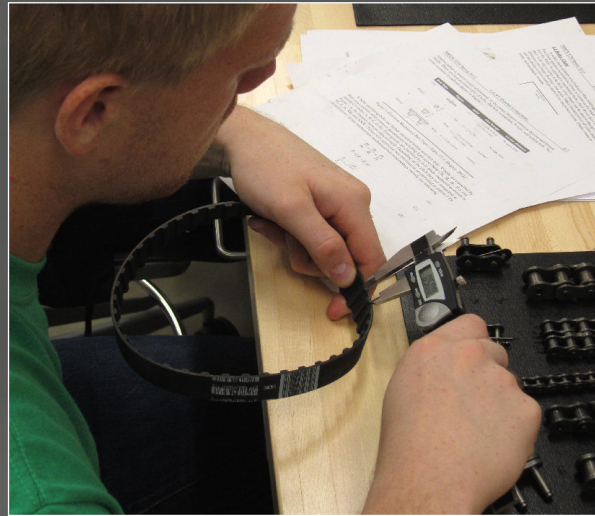


Characterizing Belts

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Flexible Components Lab

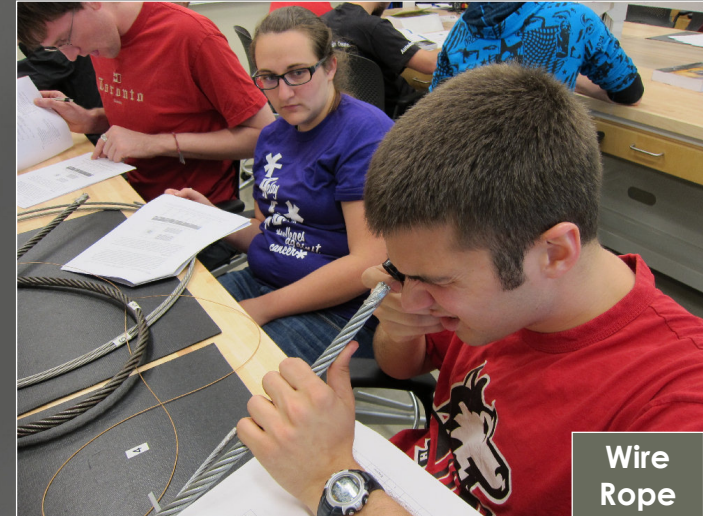


Timing
Belt

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Flexible Components Lab

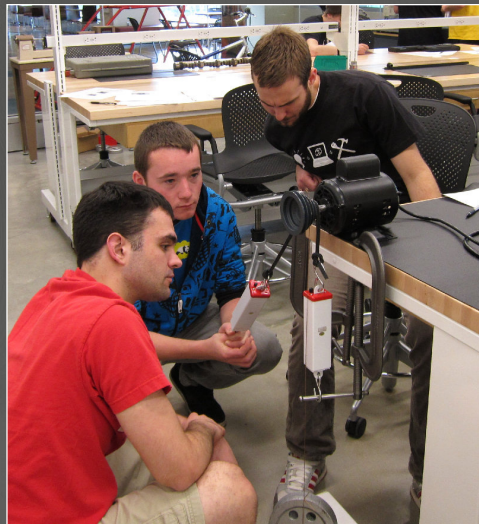


Wire
Rope

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Flexible Components Lab



Measuring
Belt
Tension

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Flexible Components Lab



Measuring
Belt
Tension

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Flexible Components Lab



Triple Strand
Chain in
Buell Blast
Engine

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Bearing Lab



Thanks to
Timken:
Joe Pack

Bearing Lab



Thanks to
Iljin:
Brian Lage

Bearing Lab



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Bearing Lab

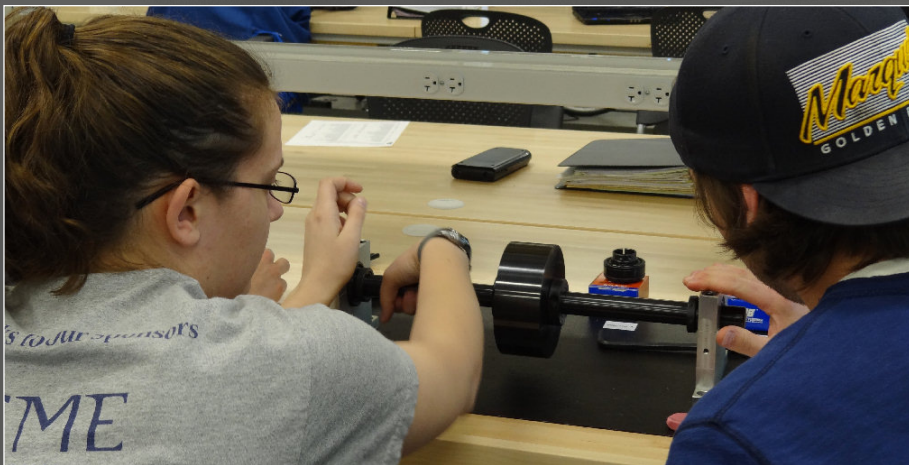


Thanks to
Harley-Davidson:
Paul Murray

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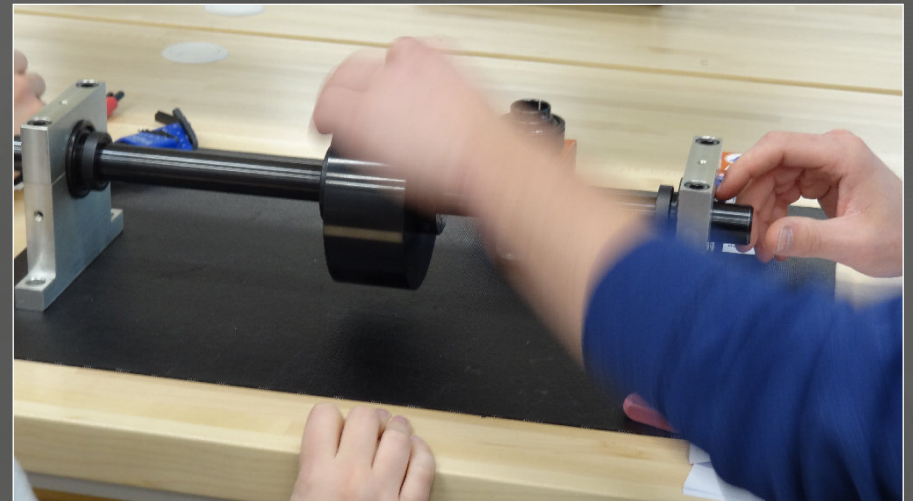
Bearing Lab



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Bearing Lab



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Experiments

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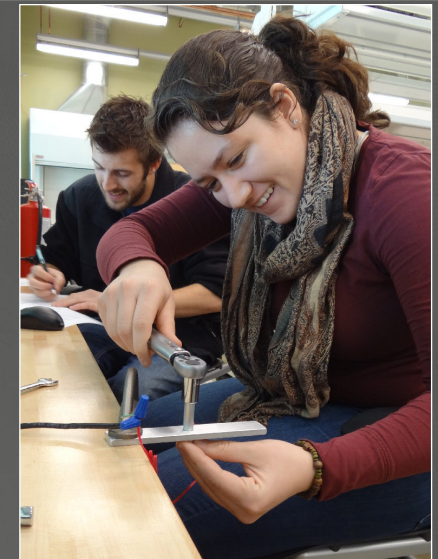
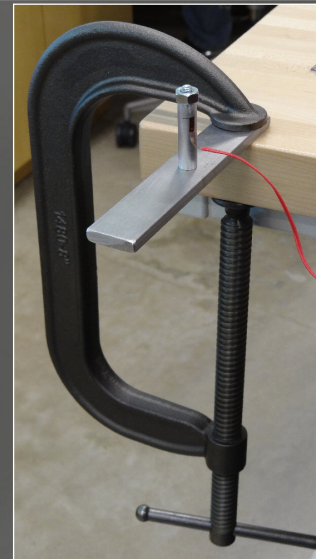
Bolt Lab



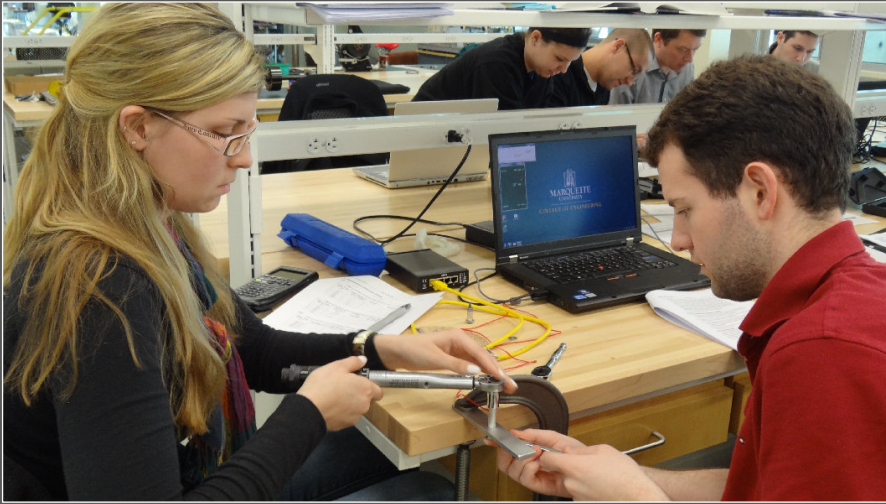
Bolt Lab



Bolt Lab



Bolt Lab



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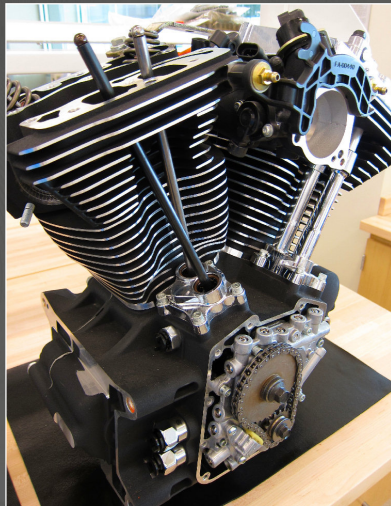
Bolt Lab



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Harley-Davidson Engine



Thanks to
Harley-Davidson:
Paul Murray

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**Thanks to all who
contributed.**

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