University of Dayton
Supermileage Drivetrain Team

MEE 432L - Design and Manufacturing Clinic
May 2013

Nate Link
Brendan Maelia
Kevin Giaier
Matthew Kilchenman

School of Engineering Innovation Center
Outline

• Supermileage Competition
• Design Criteria
• Drivetrain
• Dynamometer
• Frame
• Shell
• Engine
• Conclusions
• Questions
Supermileage

SAE

Eaton

Powering Business Worldwide
Sponsors

P²SI

STOLLE MACHINERY

UNIVERSITY OF DAYTON

SGA

UNIVERSITY OF DAYTON

SOLIDWORKS

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Eaton Proving Grounds

Economy Runs
- Six laps
- 9.6 miles

Vehicle
- Average: 15 mph
- Max: 25 mph
- 200 lbs

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Supermileage Competition
2010-2012

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Design Criteria

- Safety
- Performance
- Reliability
- Feasibility
- Time Scale
- Manufacturing
- Product Cost
- Weight
Deliverables

- Project Specific Research
- Design Specifications – Ideal Vehicle Operation
- Solutions Utilizing Research and Engineering Intuition
- Calculations – Prevent Failure
- Final Design - Optimized
Conceptual Design – Drivetrain (431L)
Decision Analysis - Drivetrain

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Final Design Drivetrain
Final Design Drivetrain

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Final Design Drivetrain
Conceptual Design – Dyno Stand

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Final Design - Dynamometer
Testing

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Testing

RPM Vs. Fuel Consumption and Torque

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Torque Data

Manufactures Data
MATLAB

Run Experiment
# Budget

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Part Number</th>
<th>Price</th>
<th>Quantity</th>
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**Total Budget**: $2,869.88
432L Conclusions

- Project Specific Research
- Design Specifications – Ideal Vehicle Operation
- Solutions Utilizing Research and Engineering Intuition
- Calculations – Prevent Failure
- Final Design - Optimized
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2011-2012

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## Frame

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<th>Solidworks</th>
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<th>Wall</th>
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<th>Max Strain</th>
<th>Max stress</th>
<th>Yield</th>
<th>Percent Yeld</th>
<th>Modulus</th>
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Frame

Stress analysis with 500lb loading. (5x deflection)

Deflection plot with 500lb loading. (10x deflection)
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Steering / Brakes

School of Engineering Innovation Center
Shell
Shell
Shell

School of Engineering Innovation Center
Shell

School of Engineering Innovation Center
Shell

School of Engineering Innovation Center
Shell

School of Engineering Innovation Center
Engine

School of Engineering Innovation Center
Engine
Conclusion

School of Engineering Innovation Center
Questions?

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