FORD IMPACT

IMPROVED MATERIALS AND POWERTRAIN ARCHITECTURES FOR 21ST CENTURY TRUCKS

The Ford IMPACT program seeks to research and develop new materials and manufacturing designs that can enable existing commercial truck platforms to meet heightened requirements of military and next-generation commercial uses. This will greatly reduce the cost of retrofitting vehicles to benefit both consumers and the military. This program is a partnership involving the National Automotive Center, Ford Motor Company, and the American Iron and Steel Institute. University partners are University of Louisville and Mississippi State University (MSU).

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FORD IMPACT

NATIONAL AUTOMOTIVE CENTER

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The focus of the IMPACT program is to design, incorporate, and validate fuel efficient, lightweight technologies for the next-generation, high volume, commercially-based truck platforms.

ARMY PARTNERSHIPS IN MOTION

NAC

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Building A Better Truck

This MSU IMPACT model is a CAD rendering of a 1998 Ford F-150 pickup truck frame. Extensive finite element work was done to identify materials and structures providing equal performance at lower weight.

Rear Engine Cover

The IMPACT project evaluated this component for design optimization. Changing materials from the current low carbon steel to aluminum or magnesium will result in reducing weight by 1.50 lbs. (aluminum) and 1.75 lbs. (magnesium).

Computer Aided Engineering/Design (CAE/CAD)

Employs full vehicle optimization models to design vehicles that meet current performance and safety standards while using lighter-weight and lower costing materials. Verifies architectural revisions that enable use of lightweight materials (high-strength steels, aluminum, magnesium, etc.)

Corrosion Avoidance Strategies

Develops a cost-effective corrosion protection strategy, so trucks can last longer in military environments. This is accomplished by:

- Comparing performance of various grades of steel, magnesium, and magnesium alloys in specific applications.
- Identifying and evaluating key system components.
- Investigating commercial materials, coatings, and processes that will meet or exceed requirements.

Tow Hook

The high-strength steel tow hook shows a 40 percent weight savings over a forged equivalent part. Developed by Oxford Automotive, the tow hook features SAE 4130, 1110 MPa, 0.195 inch thick steel sheet, hot-formed to a u-shaped hook design. The concept has a slight cost advantage over the forged construction as it save 2 lbs. per vehicle resulting in a $1.50 per vehicle cost savings.

Chassis

Reduced system weight through use of various materials. Improves fuel economy through lower rolling resistance tires.

Pickup Box and Tailgate

Use of ultra-high strength steels to obtain weight reduction and improve fuel economy.

Advanced Powertrain

Improves performance by applying technologies that reduce parasitic loss and increase efficiencies such as new engine hardware, driveline components, gearing and range modifications, and reduced-friction lubricants.

Front-End structure

Shortened by 40mm to provide weight and cost reduction and improve fuel economy.

Kuhl Wheel Design

Kuhl wheel design reduces wheel weight by approximately 24 percent by integrating the hub and spokes into a one-piece stamping. This results in an 8.4 lbs. weight savings per wheel. This simple, cost-effective configuration simplifies the manufacturing process and reduces the number of components.

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