Name: _____ Pd: ____

National Highway Traffic Safety Administration

Sudden Impact
Request for Proposal (RFP) – No. IS6-300
Minimum Peak Force = Maximum Occupant Safety

Background
Increases in gas prices have led more consumers to purchase smaller vehicles. However, smaller vehicles have smaller crumple zones to absorb the energy of a collision. Consumers previously focused on performance and how much time it takes a vehicle to accelerate from 0 mph to 60 mph, but with smaller vehicles consumers are now focusing on safety during a collision and how much time it takes a vehicle to accelerate from 60 mph to 0 mph. Time differences of milliseconds can save lives. The National Highway Traffic Safety Administration (NHTSA) is considering more stringent requirements for bumper designs as a trade-off for the smaller crumple zone. How effectively energy is absorbed by a vehicle or its components in comparison to the occupants in the vehicle is one of the main criteria evaluated in Insurance Institute for Highway Safety (IIHS) and New Car Assessment Program (NCAP) crash testing.

Request
The NHTSA requests proposals for a new front bumper system design that can reduce the level of peak force (impulse of force) impacting a vehicle and its occupants during a collision. The bumper system prototype that absorbs the most energy as measured by the lowest peak force will be awarded funding for further research and development. Testing involves running a vehicle down a test track into an immovable wall fitted with a force sensor. The force sensor measures the forces involved during a collision, including the peak force.

Requests for proposals must include the following:

I. Diagram
- Front, side, and top views have all components and materials clearly labeled
- Measurements are to scale and meet design constraints of mass, width, height, and ground clearance

II. Documentation/Journal
- Rationale and support for bumper system design and materials based on published research
- Explanations of why using a model or changing the mass, acceleration, or other control variables of the test track protocol could affect the results or differ from actual collision data
- Explanations of how forces acting on the cart change the motion of the cart from the time it is released from the top of the track to the time it collides with the force sensor
- Explanations of how energy is absorbed by the bumper instead of the occupants in a collision

III. Prototype
- Bumper system model to attach to test cart that meets design constraints (e.g., size of bumper, cart relies solely on force of gravity for motion, friction with track is not increased, etc.)
- Bumper system model to be used in presentation explaining how the system was designed and built to absorb energy while taking into account the constraints of the laws of motion.