FAMU/FSU College of Engineering

EML 4551/4552
SENIOR DESIGN 2003

TEAM #3

SAE MINI-BAJA
POWERTRAIN

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PROJECT SCOPE

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Mini Baja (powertrain) Project Scope

The Mini Baja powertrain project consists of the design and build of the drive train for an off-road vehicle that will survive the severe punishment of rough terrain and must propel itself through water. The goal is to transmit maximum power from a Briggs & Stratton 10 hp engine to the wheels of the vehicle while integrating a water propulsion system into the powertrain. The project also must meet all requirements for the annual Mini Baja competition in April (http://www.sae.org/students/minibaja.htm). Dr. Hollis is the team’s faculty advisor; while the customer for the project is the FAMU-FSU SAE Club whose main contact is Pat Middleton (Mini Baja President). The entire SAE Mini Baja 2003 competition rules, including those concerning powertrain (see Appendix), are the general guidelines for which the team has to abide with. The powertrain must also comply with other major systems of the vehicle, i.e. the design of the suspension system (which is TBA). Other than the SAE Club, corporate sponsors such as Ford Motor Company are included on the team’s business service chain; therefore, it is necessary for the team’s product to be presentable and acceptable.
GENERAL VEHICLE RULES
(relevant to powertrain)

1. Maximum vehicle width: 152.4 cm (60”), measured at widest location, including tires. Maximum vehicle length: 243.84 cm (96”), measured at point of greatest length.

2. The vehicle must have four (4) or more wheels. Three (3) wheeled vehicles are expressly prohibited from this competition. The vehicle must be capable of carrying one (1) person 190.5 cm (6 foot 3 inches) tall weighing 113.4kg (250 pounds).

3. The vehicle design should be attractive to consumers because of its visual appearance, performance, reliability and ease of operation and maintenance. It should also be easily manufactured using predominantly semi-skilled labor and standard machine tools. Safe operation must be an essential consideration in your design.
SAFETY RULES  
(relevant to powertrain)

1. All rotating parts such as belts, chains, and sprockets that rotate at the rate of the drive axle(s) or faster must be shielded to prevent injury to the driver or bystanders should the component fly apart due to centrifugal force. These guards/shields must extend around the periphery over any area that is in-line toward the driver, bystanders, fuel tank or fuel lines, in accordance with Figure below, “Guards.“ They must be made of 1010 steel at least 1.524 mm (0.06 inch) thick or material having equivalent energy absorption at rupture, per unit width of shield. The energy absorption should be based on the area under the stress strain curve of the substituted material. Students should be prepared to present equivalency documentation upon request.

2. All moving power train components must, in addition, be guarded so that a finger cannot be inserted into them as in Figure on following page.

3. Propellers, if used for water propulsion, must be located or shrouded so that direct contact with the propellers is not possible.
MISCELLANEOUS RESTRICTIONS
(relevant to powertrain)

1. To provide a uniform basis for the performance events, all vehicles must use the
same engine: a stock four cycle, 7.46 kw (10 horsepower), air-cooled, Briggs &
Stratton OHV Intek Model 205432 type 0036-e1 engine. This engine must remain
completely stock in all ways, with the following qualifications: see complete rules
for qualifications.

2. Briggs & Stratton Technical Representatives will set the governors of all vehicles.
Vehicles must be presented for governor setting with (A) the drivetrain
disconnected and (B) the engine shaft clear. SAE Mini Baja Officials may order a
recheck of the governor setting of any vehicle at any time.

3. Any attempt to defeat the engine governor so as to increase the engine speed will
result in immediate disqualification. Each engine is equipped with a governor.
Before the performance events, each engine will be set to a maximum speed of
3600 rpm by means of the governor. Random inspection of the governor may be
conducted at any time. GOVERNOR SETTING NOT TO EXCEED 3600 RPM!