LOG OF MEETING
DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: Recreational Off-Highway Vehicles (ROVs) – Meeting requested by the Recreational Off-Highway Vehicle Association (ROHVA) to discuss their progress on dynamic test development and their progress on revising the ROHVA standard.

DATE OF MEETING: October 7, 2010

PLACE OF MEETING: U.S. Consumer Product Safety Commission, Bethesda, MD

LOG ENTRY SOURCE: Caroleene Paul, ESME C.P.

COMMISSION ATTENDEES: See attached attendance list

NON-COMMISSION ATTENDEES: See attached attendance list

SUMMARY OF MEETING:

Representatives of the Recreational Off-Highway Vehicle Association (ROHVA) met with CPSC staff to discuss ROHVA's latest standards development work and safety initiatives.

CPSC staff opened the meeting by setting the following ground rules:

- ROHVA requested this meeting with CPSC staff so although the meeting is public, discussions are limited to ROHVA representatives and CPSC staff/representatives.
- The opinions or views expressed by CPSC staff have not been reviewed or approved by the Commission and may not reflect the views of the Commission.
- The discussions during the meeting will be treated as comments to the ongoing rulemaking and will become part of the public record.

ROHVA representatives presented an overview of their approach to addressing occupant protection in ROVs, their position on dynamic vehicle testing as it applies to ROVs, and their development of dynamic tests to evaluate rollover propensity for ROVs (see attached presentation).

The following points were made regarding occupant protection:

- An analysis of top incident factors by Heiden Associates (product safety consultant retained by ROHVA) found that seat belts were not worn in 85% of ROV incidents and helmets were not worn in 83% of ROV incidents.
- ROHVA intends to update and standardize warning labels that will warn users to wear seat belts and helmets.
- ROHVA proposes zone based requirements to address foot/leg area (Zone 1), shoulder/hip area (Zone 2), hand/arm area (Zone 3), and head (Zone 4). Passive and active systems will be considered and include roll over protective structures (ROPS), seat belts, hand holds, foot/leg retention, hip/shoulder retention, and seats/headrests.

- Occupant Retention considerations include visibility, mobility, usage, and environmental effects.

The following points were made regarding dynamic testing of ROVs:

- Dynamic Research Institute (DRI) was retained to design a simple and repeatable dynamic test to evaluate rollover resistance of ROVs.
- A repeatable and reproducible off-highway surface does not exist.
- DRI developed the Roll Resistance Margin equation which uses a tire/soil coefficient defined as the maximum lateral acceleration achievable on soil. The value of this coefficient (0.55) is based on measurements made by DRI at 20 ATV ride sites in the late 1980s. The roll resistance equation is:

$$\text{Roll Resistance Margin} = \left(\frac{\text{Lateral Acceleration}_{\text{2 wheel lift}}}{\text{tire/soil coefficient}} - 1 \right) \times 100\%$$

- DRI believes a roll resistance margin of 9% (minimum lateral acceleration at two wheel lift in the region of 0.60 g) provides an appropriate balance between roll resistance and off-highway mobility.
- DRI is opposed to using the test protocols in SAE J266 *Steady-State Directional Control Test Procedures for Passenger Cars and Light Trucks* because SAE J266 measures steering characteristics and not roll stability.
- DRI is opposed to using J-Turn type tests such as ISO 7401 because the maneuver involves a transient steer input and the use of a steering robot (which adds complexity and cost to the testing), and repeatability would be difficult to achieve. DRI also believes speeds above 30mph on pavement introduces undesirable dynamics (such as loss of traction at rear wheels) that are not encountered in off-highway environments.
- DRI developed a constant steering wheel angle test where the steering wheel of the test vehicle is locked at a small steer angle (20 ft radius circle) and accelerated by a test driver until 2 wheel lift occurs or 2 wheel spin/spiral-in occurs. The tests were conducted on asphalt.
- DRI tested the Arctic Cat Prowler 700 XTX (MY 2010), Can Am Commander (MY 2011), Polaris Ranger RZR 800 (MY 2011), Polaris Ranger RZR S 800 (MY 2011), and the Polaris Ranger XP 800 (MY 2011).
- CPSC staff asked if DRI had performed any J-turn tests. DRI replied that they have not.
- CPSC staff asked what the pass/fail criteria is for DRI's proposed constant steer test. DRI responded that a pass/fail criteria has not been established yet.
- CPSC staff asked for a draft of the test protocol used by DRI. DRI replied that a copy would be forwarded to CPSC.
- CPSC representative, Dr. Greg Schultz (Aberdeen Test Center), made the following comments:
    - DRI's proposed dynamic test is essentially the constant steer angle test described in SAE J266 (Method 2 – *Constant steering wheel angle test*).
    - By limiting the test to such a small radius, the vehicles are power limited and the results will not reflect the full range of the vehicle's characteristics.

    - There is a fundamental correlation between vehicle stability and vehicle steering gradient.

- CPSC representative, Gary Heydinger (SEA Limited), made the following comments:
    - The J-Turn maneuver is very useful in evaluating tip over.
    - J-Turn tests can be done without steering robots and still give repeatable results.
    - Loss of traction at the rear wheels is an oversteer condition. DRI cannot cite this condition as an example of why oversteer is good and then use it to say oversteer is bad.
    - Steady-state tests are good for overall vehicle characteristics but there are dynamic properties of a vehicle that will not be captured. A transient test like the J-Turn is required to capture those dynamic characteristics.
- CPSC staff made the following comments:
    - There is continuing disagreement between ROHVA and CPSC staff regarding the importance of steering characteristic (oversteer/understeer).
    - Staff is encouraged that ROHVA is looking at dynamic testing on asphalt.
    - Staff is putting data together on J-Turn tests that were performed on several model ROVs. As soon as it is ready, the information will be made public.

The ROHVA representatives summarized that the development of the constant steer dynamic test was in response to CPSC staff's concerns with low speed quarter rollovers of ROVs. ROHVA is committed to studying the issues and would like to return in 60 days for a progress report and continued dialogue with CPSC staff.

MEETING ATTENDANCE RECORD
ROHVA / CPSC Staff – October 7, 2010

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