NHTSA Status Report on Q3s Dummy Development
February 9, 2011

Objective:
Evaluate the Q3s dummy to determine if it is sufficient for incorporation into Part 572 and use in a potential upgrade to FMVSS 213. Evaluation criteria include the dummy's biofidelity, durability, and repeatability and reproducibility.

Background:
The Q3s dummy was developed in collaboration with FTSS to address durability and performance deficiencies of the Q3 dummy. NHTSA has actively been testing and pursuing improvements of the dummy for since 2005. Over the last two years, NHTSA has focused primarily on two items: (1) thorax durability; and (2) neck performance.

Status:
The biggest concern with the dummy has been thorax durability. After testing nearly a dozen different versions of the thorax and conducting over a thousand tests, a working solution appears to have been identified. The thorax will now utilize a Thermoset plastic construction. Test results indicate that the thorax is capable of surviving in excess of 100 impacts at the certification severity, as well as, additional high speed impacts without degradation of response or permanent deformation of the thoracic structure. Additionally, the thorax meets component-level biofidelity response requirements.

Agency testing of the original Q3s neck provided poor results in the lateral bending mode. As a consequence, NHTSA funded a program with FTSS to install a neck design that NHTSA had previously developed. Although not entirely completed at this time, NHTSA expects that the neck performance issues have been resolved with the new design.

Future Work:
At this point, NHTSA believes the dummy durability and performance issues have been resolved. NHTSA now intends to upgrade all of its dummies to include the revised neck, thorax, and other components, and to then commence the testing necessary to support a potential Rulemaking effort. This testing includes the following elements:

- Biofidelity Testing - Component Level. Conduct component level tests to assess the dummy's ability to provide biofidelic responses. The Irwin 2002 Stapp paper will serve as the technical reference.
- Certification Testing. Conduct repeat component tests on the dummies to establish repeatability and reproducibility of the dummies' responses. The component tests will include the head, neck, shoulder, thorax, lumbar spine, and pelvis. Based on these results, NHTSA can then establish preliminary certification corridors.
- Biofidelity Testing – Sled Tests. Conduct select sled tests to further assess the dummy's biofidelity, again using the Irwin 2002 Stapp paper as a reference.
- Dummy Inspection and Drawing Review.
- User's Manual (PADI) and Reports. Provide the documentation necessary to initiate a Rulemaking action by NHTSA.

NHTSA will strive to complete these activities by the end of 2011 (calendar year).