BioRIDII New Sled Evaluation

Data Observations from Ford Safety Lab Tests
Test Matrix

- 2 BioRIDII-G dummies tested – SN45, 70
  - Both passing current cert pre- and post-test
- Evaluation 1: Are the tests repeatable?
- Evaluation 2: Are the new tests with and without Head Restraint able to discriminate between…?
  - Dummy 45 vs. 70
  - New vs. Old vs. Repaired Jackets
  - New vs. Old Teflon Pad
  - Bolts @ base plate loose vs. tight (common mistake)
  - With vs. Without Chest Stop
Repeatability

- Mass only tests show good repeatability (link)
  - Foam impactor repeats after many runs
  - Strange sled accel on a few of tests, unknown cause, but likely due to settling at initial setup
- 6+ tests with each dummy appear to have good repeatability (plots in shown in eval 2)
  - Peaks and data traces for dummy responses
  - Peaks and data traces for pots/sled data
    - However, Pot D had 2 issues
      - Data loss due do damaged wire
      - Data variability due to pot rod contacting shoulder (also Pot C)
      - Improved mounting is recommended
Tests With Head Restraint

- **SN 70 (red) vs. SN 45 (blues)**
  - Curve differences seen in Head Az, Upper Neck LC, T1 LC/Accel, Lumbar LC/Accel, Head Cap LC (link)

- **New (blue/turq) vs. Old style jacket (red/drk turq)**
  - Curve differences seen in Head Az, Upper Neck LC, T1 LC/Accel, Lumbar LC/Accel

- Some curve shapes distinguish a difference between dummies, some distinguish the jacket type

- Differences are often revealed during rebound
Tests Without Head Restraint

- **SN 70 (reds) vs. SN 45 (other)**
  - Curve differences seen in Head Az, Upper Neck Fx, Fz, My, Mz, T1 Fx, Fz, My, Lumbar Fx, Fz, Mz, Pots A, B, C (link)

- **Jacket: New (blue) vs Old (pink/turq) vs Repaired (drk turq)**
  - Upper Neck Fx, My, Mz, T1 Fx, Fz, My, Lumbar Mz, Pot A, B, C
Tests Without Head Restraint

- **Teflon Pad: New (turq) vs Old (pink)**
  - No significant curve differences

- **Loose bolts @ base plate (drk blue vs yellow)**
  - Only Lumbar shows differences
  - Indicates that issues in the lower spine are not evaluated in this certification test

- **Chest Stop (blue vs drk blue)**
  - Lumbar MY shows large differences as the sled stops
  - Recommend addition of chest stop as standard to prevent damage to the dummy vertebrae
Observations

- Foam impactor reusability seems very good – pulse overlays well after many runs
- Repeatability for a single dummy is better than previous cert test
- 2 New tests show promise in distinguishing differences between dummies and jackets
- New test does not reveal issues in lower spine
- Additional channels should be included in the certification to distinguish issues
  - Upper Neck LC, T1 LC, Lumbar LC
- Chest Stop should be added to all tests
- Alignment of the rod between Pots C and D can be difficult
Next Step Recommendations

- Investigate the causes of dummy to dummy differences and how they can be fixed
- Create test corridors with additional promising channels
- Investigate how to characterize the lower spine dynamically
- Characterize the jacket for better manufacturing repeatability