

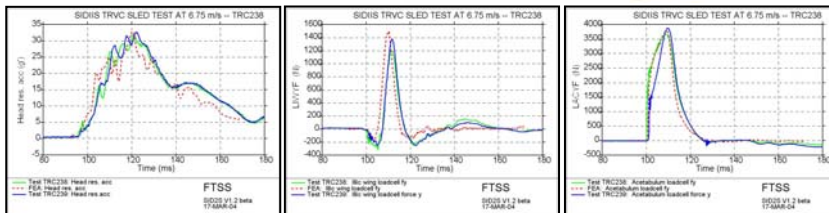
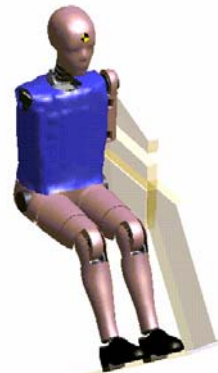
Side Dummies Latest Developments

Page 1



SID-IIs Dummy Model – NHTSA VRTC Sled test

Latest Release: v1.4

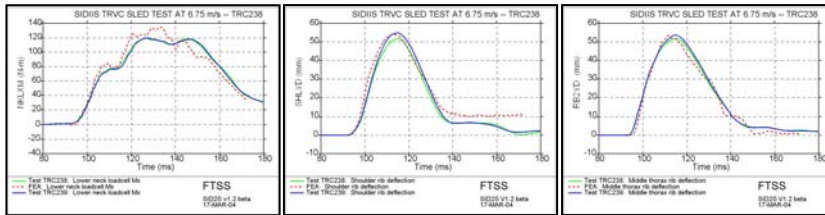
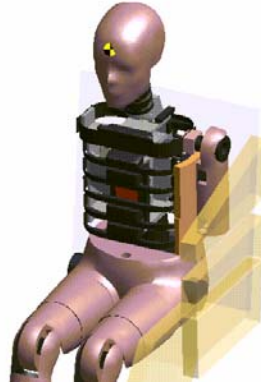


— Test
- - - Simulation

Page 2



SID-IIs Dummy Model – NHTSA VRTC Sled test



— Test
 Simulation



SIDIIs FRG Model Validation

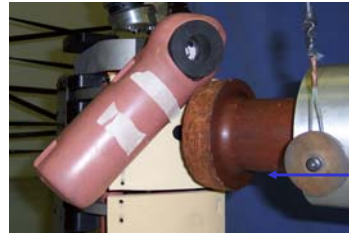
- SIDIIs FRG for FMVSS 214 NPRM
- FTSS carried out additional lateral and oblique impact testing to the standard calibration tests to validate the SIDIIs FRG model.
- Non-standard Pendulum Tests
 - Lateral impacts with armrest shaped impactor
 - Thorax without arm
 - Oblique impacts
 - Thorax, impact at 30 degrees to the lateral direction
 - Abdomen, impact at 30 degrees to the lateral direction



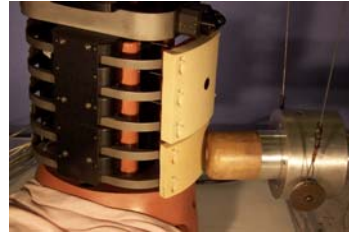
SIDIIs FRG Validation – Non-standard Tests



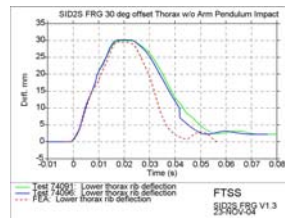
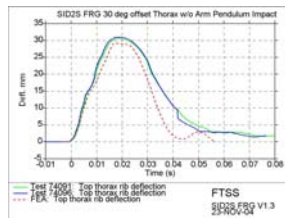
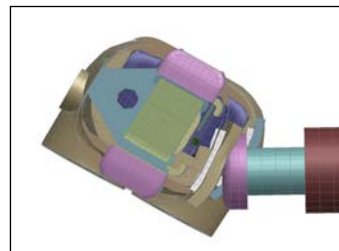
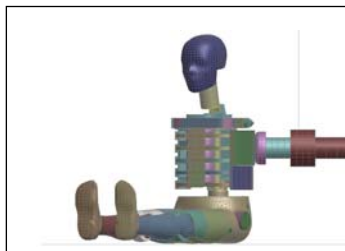
Arm-rest shaped impactor



30° oblique impacts



30 Degree Oblique Pendulum Impact - Thorax



— Test
- - - Simulation



WorldSID 50th Model



- Released March 15th 2005
- Model Statistics
 - Nodes ~ 83,000
 - Elements ~ 130,000
- Finite Element Validation Process
 - Material test and characterisation
 - Component impact test correlation
 - Pendulum impact test validation
 - Sled test verification



Page 7

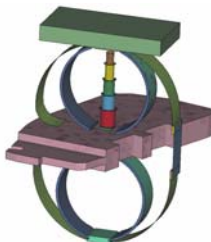


WorldSID 50th Rib Material Development

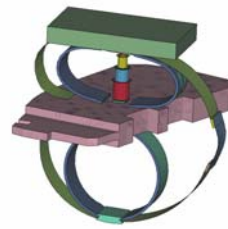
- Development of the rib material using drop tower type single rib tests.
- Impact speeds: 4, 5, and 6 m/s and the shoulder at a further 7 m/s.
- Nitinol uses MAT_24, *MAT_PLASTIC_KINEMATIC for the time being.
- LSTC supporting FTSS with development of MAT_30, *MAT_SHAPE_MEMORY for shell elements in next release of LS-Dyna.



Test set-up



Model – initial set-up



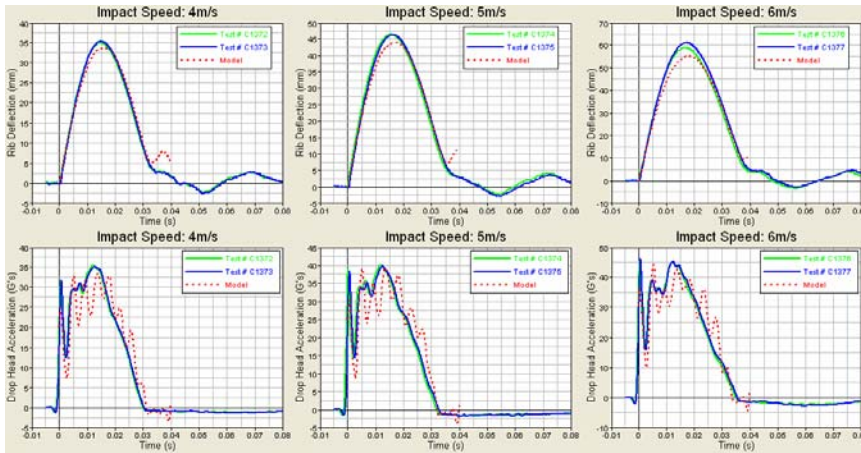
Model – maximum rib deflection at 15ms

Page 8

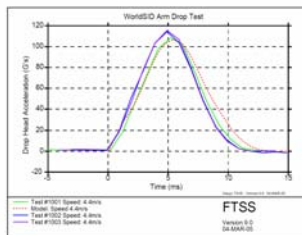
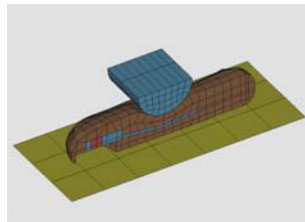
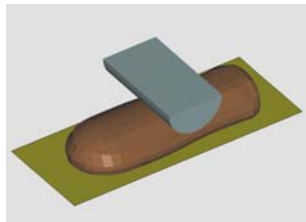


WorldSID 50th Rib Material Development

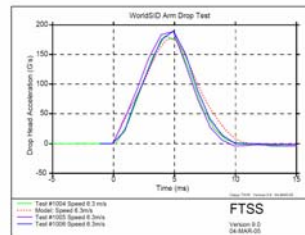
Thorax single rib drop test – Rib deflection & Drop head acceleration correlation



WorldSID 50th Arm Drop Correlation



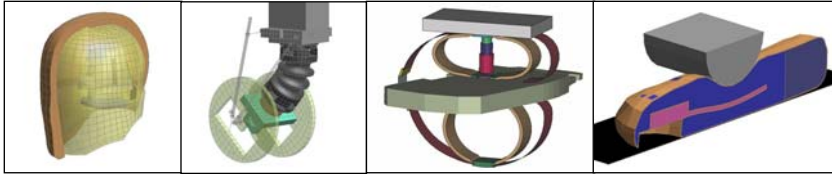
Drop head acceleration (Impact speed: 4.4m/s)



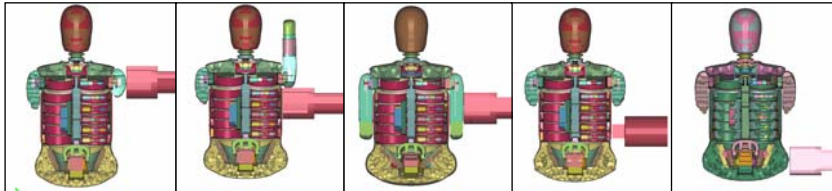
Drop head acceleration (Impact speed: 6.3m/s)

WorldSID-50th Model Development

- Component validation and Pendulum verification completed



Component tests: Drop weight and neck pendulum tests



Dummy Pendulum tests: 23.4kg, Impact speed: 4.3 m/s/6.7m/s

WorldSID 50th Sled Test Verification

