

# Hybrid III 5th Female

The Hybrid III 5th Female crash test dummy was developed by First Technology Safety Systems and the Society of Automotive Engineers (SAE) biomechanics subcommittees, CDC and Ohio State University. The dummy represents the smallest segment of the adult population and derived from scaled data from the Hybrid III 50th dummy. Originally developed in 1988, the dummy was upgraded in 1991 to evaluate seat belt submarining. It was upgraded again in 1997 to improve the dummy's ability to evaluate airbag aggressiveness, particularly for the car driver close to the steering wheel in the "Out Of Position (OOP)" test condition. The Hybrid III 5th Female dummy is dynamically tested and proven to the latest test conditions and includes the ability to measure the thorax Viscous Criterion.

## Simulation Models

Humanetics offers highly detailed and fully validated Finite Element (FE) models of its dummies in the codes LS-DYNA, PAM-CRASH, ABAQUS and RADIOSS, along with FE modeling consultancy services.

## Dummy Features

### Head & Neck

The skull and skull cap are one piece cast aluminum parts with removable vinyl skins. The neck is a segmented rubber and aluminum construction with a center cable. It accurately simulates the human dynamic moment/rotation flexion and extension response.

### Upper Torso

Six high strength spring steel ribs with polymer based damping material attached to a ballasted spine box to simulate the human thorax. The human dynamic force/deflection characteristics are matched in the dummy. Accelerometers mounted on the sternum and in parallel locations on the spine box allow accurate measurement of the Viscous Criterion even at high compression rates. Low friction

guides restrain the vertical motion of the rib set in acute airbag loading, and bump stops prevent over compression of the rib cage. The dummy is equipped as standard with a potentiometer and arm to measure deflection between the spine and the sternum.

### Lower Torso

The cylindrical butyl rubber lumbar spine mounts on an optional six-axis lumbar load cell attached to the pelvis. The straight lumbar spine provides an erect seated posture representing the small statured person in the driving position. The pelvis is a vinyl skin/urethane foam molded over an aluminum casting in the seated position. The ball-jointed femur attachments can have bump stops to reproduce the human leg to hip moment/rotation characteristics. The iliac wings can be fitted with six load bolts to measure the lap belt load points to predict submarining. The legs can accept a full range of knee and tibia displacement and force transducers to evaluate lower leg injury. The foot and ankle is available with an improved range of motion incorporating soft stop ankles and a compressible heel.



# Technical Specifications

## Weight Specification

Body Segment	Mass (lb)	Tolerance (lb +/-)
Head Assy	8.23	.1
Neck Assy	2.00	.2
Upper Torso Assy with Jacket	26.50	.3
Lower Torso	29.20	.3
Upper Arm (Left/Right)	2.60	.1
Lower Arm (Left/Right)	1.98	.1
Hand (Left/Right)	.62	.1
Upper Leg (Left/Right)	6.90	.2
Lower Leg (Left/Right)	7.20	.1
Foot (Left/Right)	1.60	.1
Total	108.03	2.0

## Instrumentation (Standard\*)

Location	Description	Channels
Head	3 Accelerometers in a Triax Pack	Ax, Ay, Az (used for HIC)
Neck	Six-Axis Upper Neck Load Cell Five-Axis Lower Neck Load Cell	Fx, Fy, Fz, Mx, My, Mz, Fx, Fy, Fz, Mx, My
Thorax	3 Accelerometers in a triaxial array Chest Displacement Potentiometer Std Equipment Five-Axis Thoracic Spine Load Cell	Ax, Ay, Az, Fx, Fy, Fz, Mx, My
Lumbar Spine	Five-Axis Lumbar Spine Load Cell	Fx, Fy, Fz, Mx, My
Pelvis	3 Accels or 1 Triax Pack A.S.I.S. Load Cell (Iliac Wings)	Ax, Ay, Az Fx, My (per side)
Femur	Uniaxial Femur Load Cell Six-Axis Femur Load Cell Knee Shear Displacement	Fx (per leg) Fx, Fy, Fz, Mx, My, Mz (per leg) Dx (per knee)
Lower Legs	Biaxial Knee Clevis Load Cells Four Axis Upper Tibia Load Cells Four Axis Lower Tibia Load Cells	Fz, Fz (per leg) Fx, Fz, Mx, My (per leg) Fx, Fz, Mx, My (per leg)

\*Contact your local representatives for optional instrumentation

## Dimensions

Measurement	Dimension (in)	Tolerance (in +/-)
Total Sitting Height	31.00	.5
Theoretical Standing Height	59.00	.1
Head Depth	7.20	.2
Head Breadth	5.60	.2
Head Circumference	21.20	.4
Head Back from Backline	1.80	.1
Chest Depth w/o Jacket	7.20	.3
Chest Circumference w/Jacket	34.10	.6
Ref. Location for Chest Circumference	14.00	.2
Shoulder Breadth	14.10	.3
Shoulder Pivot from Backline	3.00	.3
Shoulder to Elbow Length	11.30	.4
Shoulder Pivot Height	7.60	.4
Elbow Rest Height	17.50	.5
Back of Elbow to Wrist Point	9.90	.3
Waist Circumference	30.50	.6
Ref. Location for Waist Circumference	6.50	.2
Hip Breadth	12.10	.3
Hip Pivot Height	3.30	.1
Hip Pivot from Backline	5.80	.1
Buttock Popliteal Length	16.80	.5
Buttock to Knee Pivot Length	18.50	.5
Buttock to Knee Length	21.00	.5
Popliteal Heights	14.40	.4
Thigh Clearance	5.00	.3
Knee Pivot Height	16.00	.5
Foot Breadth	3.40	.3
Foot Length	8.90	.3