Humanetics Acquires DSD Testing
expands into active safety

Earlier this year, Humanetics has advanced into the field of active safety by acquiring DSD Testing GmbH. DSD Testing is one of the leading providers of advanced active and passive safety test equipment, serving an extensive list of top automotive OEMs, Tier I suppliers and Euro NCAP labs.

DSD Testing’s product portfolio includes cutting-edge safety equipment such as the Ultra-Flat Overrunable (UFO) platform robots, soft target vehicle dummies, steering/pedal self-driving robots, intrusion cylinders, Advanced Side-Impact Systems (ASIS) and mobile crash blocks. In addition, DSD Testing provides indoor testing services, equipped with a 2MN Hyper-G catapult system and Controlled Application for Structure deformation System (ConAS) to test structural components of car bodies.

Founded in 1990 in Linz, Austria, DSD has built a reputation as one of the most highly respected providers of advanced test equipment. DSD Testing was previously a part of Dr. Steffan Datentechnik GmbH (DSD GmbH), which also includes the PC-Crash software business and specialty outdoor testing services, both of which will remain with DSD GmbH. Markus Schmidl, current DSD Testing COO will lead the business with the current team in Linz, while DSD founder, Dr. Hermann Steffan will continue to support the company post-transition. For more information on DSD Testing products, please visit www.dsdtesting.at.

Introducing Humanetics’ Elite Delivery Program

Humanetics is pleased to announce the launch of a new Elite Delivery Program. The complimentary service is being introduced with the intention to provide best-in-class support and a personal hands-on delivery experience for customers who’ve purchased an integrated ATD. The new program will not only increase communication and understanding of the customer’s needs, it will also increase the quality level of the ATDs delivered. During an Elite Delivery, the customer can expect face-to-face interactions with an on-site ATD specialist to address any questions and provide real-time feedback. Additionally, an initial consultation can be conducted in advance to assess hardware and software compatibility to ensure “plug-n-play” readiness on the day of the delivery.

“The introduction of our new Elite Delivery Program is just another step we are taking to provide the best service possible to our customers.” said Mr. Michael Jarouche, VP of Global Sales and Marketing. “We are fully committed to exceeding customers’ expectation by continuously listening and incorporating invaluable feedback through our initiatives to enhance customer experiences.”

The Elite Delivery Program is currently being rolled out globally. For more information on the Elite Delivery Program, please contact your local sales representatives.
**THOR-50M Lifting Bracket**

Currently the THOR-50M ATD can be lifted by attaching a fixed bracket or by a lifting strap to the rear of the upper thoracic spine box. While these methods are stable, the strap does not support the lower body or flexible rubber elements, and the bracket is fixed on one spine setting and distorts the pelvis. For that reason, Humanetics has developed a new lifting bracket to support the lower body or flexible rubber elements, and the spine box. While these methods are stable, the strap does not need to be changed from these positions between tests or long term storage, reducing overall handling efforts.

**Available Now**
- Lifting Bracket [472-8130-PR]
- Head/Neck Support [472-8120-PR]

**Product Maintenance**

Proper storage of rubber and vinyl components can protect valuable inventory and prolong the life of your ATDs.

Humanetics recommends that all certified rubber parts, such as necks and knee sliders, be exercised regularly to keep them pliable and in peak working order. This is especially important for rubber parts that are kept in the spare part inventory. Due to the natural aging process of rubber, certified rubber parts should be stored in their original UV resistant packaging and then re-certified at least every three months to ensure that the parts remain compliant.

It is also recommended that all spare vinyl dummy jackets be removed from storage and fitted to an appropriate dummy on a quarterly basis. The jackets should be left on the dummy for at least twenty four hours and then re-certified. It is important that the jackets have not been subjected to any adverse shrinkage conditions. This practice will prolong the life of your products when in storage.

All vinyl and rubber parts should be stored at a temperature of 15°C to 32°C.

**THOR-5F updates**

**THOR 5th Female Advanced Crash Test Dummy Now Available**

With the THOR 50th percentile midsize male (THOR-50M) Anthropomorphic Test Device (ATD) design nearly mature and a large population of the dummies having been extensively tested, there’s now a high demand to expand the advancement in performance to other occupant groups such as the fifth percentile small female. The National Highway Traffic Safety Administration (NHTSA) awarded Humanetics a contract in September of 2015 to produce three THOR 5th percentile small female (THOR-5F) ATDs: one was delivered in April of this year (2018), and the remaining two are scheduled to be delivered in June 2018 for further evaluation.

**DESIGN CONCEPT**

The overall design specifications of the THOR-5F were guided by the University of Michigan Transportation Research Institute’s (UMTRI) Anthropometry of Motor Vehicle Occupants (AMVO). Before a large database of tests can be accumulated to set the official corridors, Humanetics is currently taking necessary steps to increase manufacturing capacity to satisfy the industry’s expected demand to test the THOR-5F alongside the THOR-50M.

**FE SIMULATIONS**

Alongside the hardware development of the THOR-5F, the development of the THOR-5F FE model by Humanetics is also well underway.

The THOR-5F head and neck designs shadowed the same concept as the THOR-50M, with a few minor modifications in the neck for better manufacturability. The complexity of the shoulder assembly was reduced while retaining its functionality, and the arms were redesigned to better coincide with the AMVO SF data. The breast and sternal are integrated together to deliver more accurate and consistent chest positioning within the dummy assembly. Range of Motion (ROM) limitters are incorporated for the lower spine adjustable joint to prevent the upper torso from tipping over during dummy handling. In place of IR-TRACCs, Abdomen Pressure Twin Sensors (APTS) are utilized in the upper and lower abdomen as an alternative way to predict abdomen injury and submarining.

While the upper legs and knees remain similar in design to the THOR-50M, more significant changes were made to the lower leg and ankle in order to comply with the UMTRI AMVO SF data. A newly shaped foot is utilized to better represent the metatarsal bones, while the restructured leg design allows for stand-alone testing capabilities of the Achilles assembly. Torque cylinder rubber elements (“ROSTAC”) were eliminated to reduce the overall ankle package size, whereas the ankle bumpers were redesigned to allow even compression and eliminate the high local strain.

Unlike the THOR-50M, the THOR-5F is DAS-ready (on-board Data Acquisition System) with 168-channel capabilities; this provides a solid baseline for more channels to be added in the near future.

**WHAT’S NEXT**

Three Prototype ATDs were built and tested. One of the ATDs went through 24 different biofidelity tests. According to NHTSA’s latest BioRank method, the overall bioRank score is less than 1.50, corresponding to “good” biofidelity. The details will be presented at the upcoming IRCOBI Conference in the Fall.

Certification tests are being conducted to benchmark this biofidelic prototype for the following ATDs which will be built to match these responses. Preliminary certification corridors will be established and used as a manufacturing guideline before a larger database of tests can be accumulated to set the official corridors. Humanetics is currently taking necessary steps to increase manufacturing capacity to satisfy the industry’s expected demand to test the THOR-5F alongside the THOR-50M.
The first FE model of the THOR-SF V0.5 is currently available and users have been providing invaluable technical feedback for continuous developments. The model consists of a state-of-the-art mesh and appropriate connectivity, detailed instrumentation, realistic material models from available knowledge, and a simulation tool for accurate positioning. The model has been validated against the ten existing and key biofidelity load cases to ensure its performance; it showed agreeable responses compared to the physical counterpart tests. In addition, the model has been rigorously tested for numerical stability and robustness and will be further validated against additional load cases as they become available. In vehicle applications with different load cases, the kinematics shown were also reasonable. The newest release (V0.5) reflects the latest prototype hardware status including updated head and chest foams, and it is being heavily utilized in the development of its hardware counterpart.

With ongoing development, the next release V1.0 is planned for mid-2019.

**THOR 50th model update**

Since its first release, the THOR 50th FE dummy model has been continuously refined and updated to elevate performance and to reflect the latest hardware build-levels. It is available in all FE explicit solver codes widely used by OEMs and is compliant with both US and Euro NCAP requirements. With applicable features for user-friendly handling and positioning, and with greater accuracy and robustness, the model is able to replicate advanced test setups for even non-regulated postures and impact cases. Humanetics is committed to working with users to further improve the usability of THOR 50th FE model in all crash safety applications.

**Flex-PLI w. UBM**

The Flexible Pedestrian Legform Impactor (Flex-PLI) is being used in the regulatory and consumer test procedures to assess lower extremity injury risk of pedestrians during a collision with a vehicle. Within the external road user safety branch of the EU project SENIORS (Safety-ENhancing Innovations for Older Road userS), the Flex-PLI has been revised with the addition of an Upper Body Mass (UBM) component using a flexible connector between the femur and the UBM.

The UBM Finite Element model was developed subsequently, and has been integrated into the existing fully-validated FE model of the regulated Flex-PLI GTR impactor. The geometry and connectivity for the UBM model were obtained from the hardware design and modeled in detail. Material testing was also carried out to obtain the material properties for the rubber element representing the hip-joint stiffness during rotation of the UBM. The Flex-PLI UBM model includes femur, tibia and knee instrumentations, with all available optional channels based on the Flex-PLI GTR tool in the current test procedures. Both the Flex-PLI UBM FE model (beta V1.0) and the hardware is now available to customers for evaluation.

**Benefits of Flex-PLI with UBM**

- Easily adaptable to the existing FLEX-PLI hardware test procedures
- Represents partial inertia of the torso mass
- Comprises of a rubber element to simulate hip rotation and damped time lag
- Brings response closer to human lower extremity kinematics (enhanced biofidelity)
- Enables injury risk assessment for the femur
- Enables assessment of vehicles with higher Bonnet Leading Edge (BLE)
- Reduces rotation of the legform during impact on angled surfaces