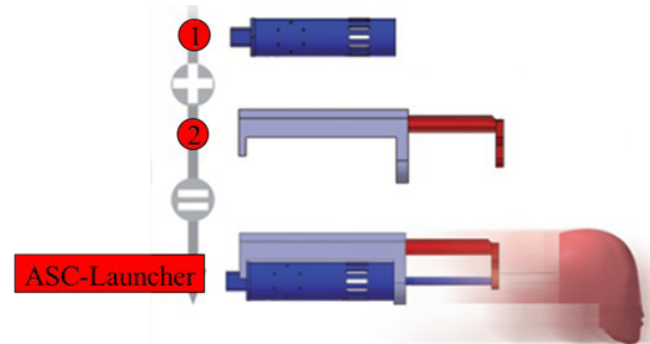




Universal Impactor Test System

- Best in class accuracy by high speed closed loop control
- Controlled by *Microsys* SureFire & Low operating cost (\$ 1/Launch)
- No hydraulics means low maintenance cost & minimum downtime
- Fast change between different launchers & tests (< 30 min)
- No pretest required for speed adjustment

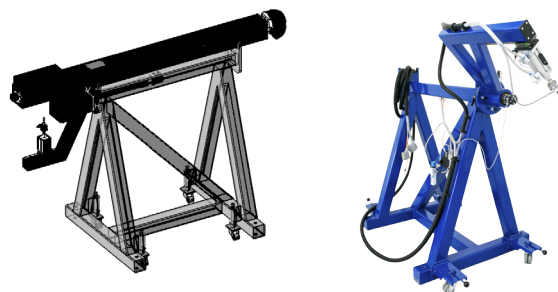
Universal Impactor Test System



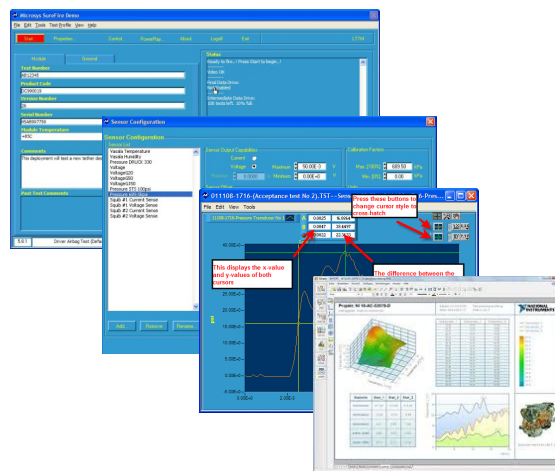
Launcher equipped with ASC



Control Unit UIT System



Calibration Tool Ejection Mitigation



Microsys SureFire

Advanced Speed Control (ASC)

In addition to the nitrogen driven launcher a small electronic engine unit is used as a high speed closed loop control solution (up to 80 control loops over the launch process) to reach the target velocity "first shot right" with a minimum tolerance of ± 0.2 km/h.

Gravity and Angle compensation

The test system automatically performs gravity and angle compensation for free flight objects to guaranty a minimum deviation from the target location.

No Hydraulics

- Low maintenance cost & minimum downtime

Hydraulic systems have the disadvantage of high maintenance costs and long downtimes due to necessary services. Over their lifetime many hydraulic systems tend to leak oil and perform with reduced accuracy.

No Hydraulics

- Quick change between different launchers

To change a launcher on a hydraulic system, requires detaching the hydraulic lines. The issue with this procedure is that hydraulic oil leaks out of the system and then the air needs to be bled out of the system. This takes two people about 3 to 4 working hours. To change a launcher on the **Microsys** fully pneumatic system needs less than 30 minutes.

System Control by SureFire Software

Like all **Microsys** products, the Universal Impactor Test System is controlled by the **Microsys** SureFire software. SureFire provides a common test platform for **Microsys** impactor and airbag testing, which reduces the time and cost for training of technical personal. **Microsys** PowerPlay software is implemented into SureFire as a powerful data analysis and data processing tool. It can be used for post processing and automated reporting. DIAdem can be optionally included. SureFire can also be upgraded to manage high speed cameras and lighting, as well to provide data acquisition and facility safety management.

Wireless Remote Control

The wireless remote control is used to close doors, move seats and remove parts without interference and without any danger to damage the remote control cable. The large display and programmable buttons on the own build remote control allow easy interaction with the test equipment and free position.

Calibration & Safety Equipment

All required safety and calibration equipment is included in the system price.

The Universal Impactor Test System provides the customer with all the flexibility it needs during daily testing, and it can easily be updated for future legislation or customer specific requirements.

Vehicle Coordinate Mode

The system supports two types of coordinate systems:

- Equipment coordinate system
- Vehicle coordinate system

The vehicle coordinate system can learned in by contacting three known reference points on the test object.

Repositioning Function

When the test system moves or rotates the software records and shows the coordinates of the positions. Once a test position has been predefined, the system can automatically save and reposition to the last 10 configurations.

User Training

- Microsys** offers a wide range of user training to support the customer during the system installation, testing and during the engineering process:

Customer On-Site Training

- Basic understanding of system components
- System setting, testing, maintaining, troubleshooting
- Control software and relevant setting
- Hands on testing according to the relevant legislations and technical requirements
- Impactor calibration training

User to User Training

During "User to User" training experienced **Microsys** test engineers train customers to:

- Understand and work with the regulations
- Prepare and test the vehicle
- Perform pre and post processing of test data

Crash Simulation Training (LS-Dyna, Pamcrash)

During "Crash Simulation Training" experienced **Microsys** simulation engineers train customers in:

- Pedestrian Protection Simulation
- Free Motion Headform Simulation
- Pendulum Impact Simulation
- Any safety related CAE Simulation on customer request



Universal Impactor Test System

System Description

The **Microsys** Universal Impactor Test system is the best and most flexible solution for interior and exterior impactor testing.

Basic System Specifications

- Work and Control Medium: technical Nitrogen N2
- Supply Pressure N2: up to 16 bar
- Control System: B&R
- Required Power Supply: 3-phase AC 2.5 kW
- Standard Weight: approx. 5.000 kg

System Performance

- Accuracy of speed at the impact:
(on customer request down to): $< 1\%$
 $\pm 0.2 \text{ km/h}$
- Accuracy of velocity measurement: $\pm 0.036 \text{ km/h}$
- Trigger and running precision: $\pm 1 \text{ ms}$
- Testing angles: all axes fully rotatable

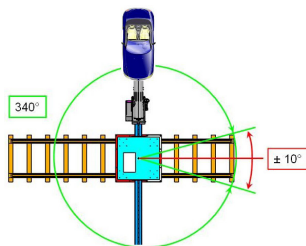
System Performance: Productivity

The following is the typical number of tests can be performed by a team of 1 system operator and 1 assistant within an 8 hour period:

- Headform tests: 8-10 tests/day
- Legform tests: 5-6 tests/day
- Upper leg tests: 5-6 tests/day

(These numbers take into account the required time for changing test parts between two tests and the time needed for light and camera position changes - technically 1 test per minute is feasible)

Travel of System

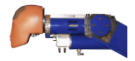


- X-direction: 2100 mm/accuracy $< 0.1 \text{ mm}$
- Y-direction: 4000 mm/accuracy $< 0.1 \text{ mm}$
- Z-direction: 2200 mm/accuracy $< 0.1 \text{ mm}$
- Rotation: 340° $< 0,1^\circ$
- Accuracy of impact location: $\pm 0.5 \text{ mm}$
(All Travel can be modified to customer request)

Load Cases

Free Motion Headform:

- FMVSS 201u/TP 201U



Pedestrian Protection Headform:

- 2009/78/EC (EC 2003/102; EEVC WG17)
- EuroNCAP - Pedestrian Protection Protocol 5.2
- GTR 09 - Pedestrian Protection
- TRIAS 63-2004 Japanese PedPro
- GB 24550-2009



Pedestrian Protection Legform and Upper leg:

- 2009/78/EC (EC 2003/102; EEVC WG17)
- EuroNCAP - PedPro Protocol 5.2
- GTR 09 - Pedestrian Protection
- JARI Flex PLI
- GB 24550-2009



Ejection Mitigation:

- FMVSS 226
- Customer specific



H - Pendulum & Knee Pendulum Impact:

- ECE-R21, -R80, -R25
- ECE-R17
- TRIAS 34
- 74/60/EC
- GB11552-2009
- FMVSS 201
- Customer Specific



Torso Launch:

- ECE-R12
- FMVSS 203
- GB 11557-1998



Linear Head Form Impactor:

- ECE-R12
- FMVSS 203
- GB 11557



Pedpro Active System Objects:

Any user defined object can be launched
max. mass = 18.5 kg, max. velocity = 40 km/h
max. mass = 13.5 kg, max. velocity = 55 km/h

