APROSYS FINAL EVENT

Integrated Project on Advanced Protection Systems

New Assessment and Test Tools

Test methods for vulnerable road users

New upper body mass design for improved biofidelity of legforms

FUNCTIONALITY

Improving biofidelity as well as injury evaluation ability of existing legforms, in order to reflect the real situations of car-to-pedestrian accidents more precisely in tests.

EXPLOITATION

Improvement of current legform impactors to better reproduce the behavior of a pedestrian leg.

SOCIO-ECONOMIC IMPACT

Ability to address a wider range of leg injuries in pedestrian accidents as basis to improve pedestrian safety performance of vehicle fronts.

TECHNICAL DESCRIPTION

Objective

In car-to-pedestrian processes, the Upper Body Mass (UBM) tends to lift up knee joint and leg in crash, and also inhibit thigh movement, which results in an improvement of the ability to reproduce the behavior of a pedestrian leg for current legform impactors.
Two new (UBM) designs to improve the biofidelity and injury evaluation ability of existing legforms, for a better evaluation of a car front-end with respect to pedestrian leg protection capability.

Conclusions

The upper body mass designs improve the kinematic performance of the legforms during impacts to high bumper vehicles

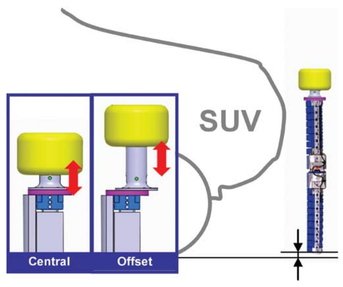
Further work

Evaluation of the legforms during impacts to a range of vehicle sizes.

Results

UBM Design 1: for FlexPLI

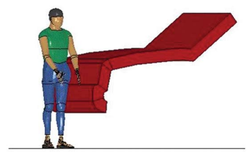
FlexPLI UBM:
To better reflect real kinematics and mirror realistic impact loads especially on the femur and knee section of the pedestrian in case of an impact with the car front-end, in particular SUVs. The mass and dimensions are determined based on parameter study of torso, with consideration of its geometrical compatibility with vehicle front structure and launching requirements. Related parameters are already verified by simulation results.
The assembly is also designed to be with adjustable C.G. location for different types of vehicles.

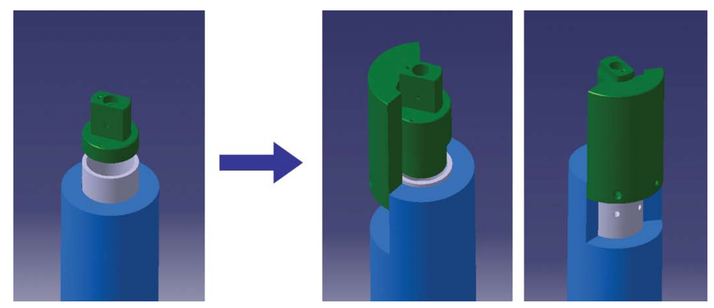


The UBM assembly with adjustable C.G. locations for the FlexPLI.

UBM Design 2: for EEVC leg

To improve the biofidelity of EEVC legform based on simulation results with new SUV vehicle model. The FE model of EEVC leg has already been built up with required knee bending stiffness. The UBM validation is also to be carried out.
The UBM design is realized by modifying the legform upper structure partly, including a new design of the “Hip end” and additional fixation holes in the “Femur tube”, as well as modifications on flesh and skin geometry.





Modification on the upper part of EEVC legform.

SIXTH FRAMEWORK PROGRAMME

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