APROSYS FINAL EVENT

Integrated Project on Advanced Protection Systems

Advanced Protection Systems

New protection systems for Vulnerable Road Users

Thorax protector and helmet prototypes for Motorcyclists

FUNCTIONALITY

- A thorax protector for reducing the severity of injuries in the thoracic body region in case of an accident.
- A helmet with improved safety on the chin and better behaviour against impacts.

EXPLOITATION

The most suitable exploitation goal of these two results is the 'Protective equipment industry' related to Powered Two Wheelers. The thorax protector will be on the market at the end of 2009.

SOCIO-ECONOMIC IMPACT

Important contribution through the development of these new protective and advanced devices, related directly to minimise the severity of injuries in the thoracic and head body region in case of accidents.

TECHNICAL DESCRIPTION

Thorax prototype

Accident Analysis

Starting from the in depth accidents data collected, the impact conditions have been defined and from these, the tests that have to be performed in order to verify the effective protection offered by this new safety device.

Material

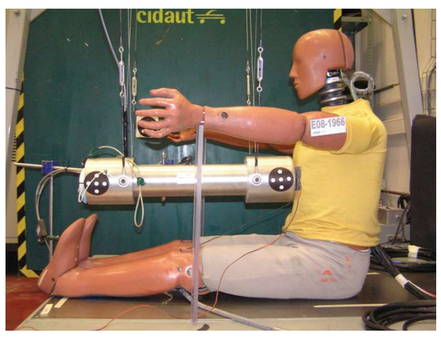
Materials selected for the prototype manufacturing are: polypropylene for the rigid shell and aluminium honeycomb for the shock absorption.

Simulations

All these materials were characterised and a series of simulations with HUMOS model were conducted. The protector reduces the risk to become injured and the injury severity.

Tests

A series of thorax protector prototypes was manufactured and tested in terms of comfort (ergonomic tests) and protection against impact. A series of real tests impacts were carried out.



Different Garments

Finally, different garments have been manufactured with the aim of showing the flexibility of this new protective device.

Conclusions

The new Thorax protector developed within APROSYS, shows that its use increase the level of safety of a motorcycle riders by reducing the risk of sustaining thoracic injuries in case of accidents. It is ready to be put on the market, covering all the type of two wheels users.

Helmet prototype

Material

Selection of two possible materials to be used in the new prototype: polypropylene foam for the liner and aluminium honeycomb for the chin guard.

Optimisation

Shape optimisations were done with the objective to minimise overall head accelerations (overall HIC) and head rotational accelerations.
A chin part capable to absorb impact energy was developed.

Simulations

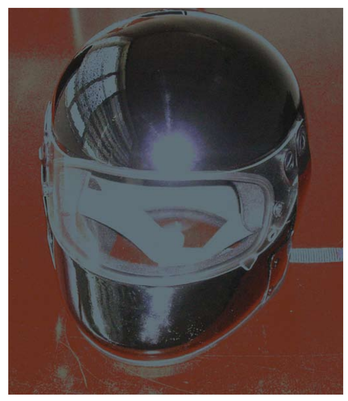
Development of a helmet prototype FE model with the aim of carrying out simulations, to come to an optimised geometry.

Tests

After the simulations, the prototype was manufactured according to the best designs obtained in the simulation phase.
Different tests were done according to the suggested procedure to improve the R22/05 regulation (another APROSYS result).

Also, an assessment of the new model (validated) was done in terms of biomechanical criteria.

Finally, an assessment in terms of ergonomics and comfort by motorcycles users.



Conclusions

Comparison of the different behaviour of the prototype and a commercial helmet through several tests and simulations shows the benefit of the prototype's helmet compared to commercial's helmet.

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