APROSYS FINAL EVENT

Integrated Project on Advanced Protection Systems

Advanced Protection

New protection systems for vulnerable road users (VRU)

Energy dissipating passive safety bonnet

FUNCTIONALITY

- Innovative system that replaces the existing bonnet structure.
- Advanced energy absorption system dissipates energy under compression.
- Reduction of injuries by eliminating regional bonnet reinforcements.
- Maintaining and in some cases enhancing bonnet stiffness.
- Could be used in conjunction with active systems.

EXPLOITATION

- Potential to apply material concepts to production model with little further development.
- Exploitable benefits:
  - Enhanced pedestrian protection – Specifically targets most hazardous areas.
  - Simple design (low cost).
  - Lighter weight & increased stiffness.
  - Greater design freedom for car designers.
- Development with manufacturers to effectively design, manufacture and apply the concepts.

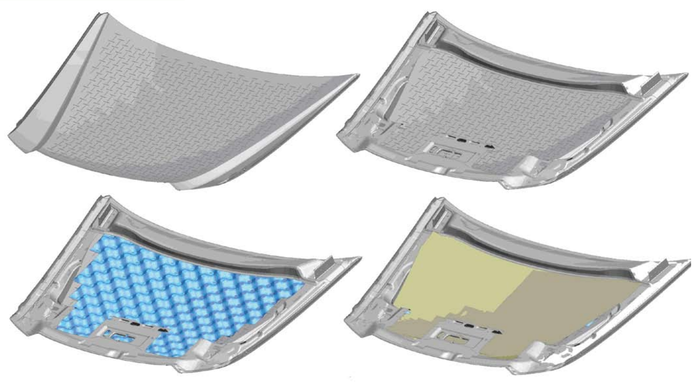
SOCIO-ECONOMIC IMPACT

- Reduction of pedestrian fatality (7000 / year in EU according to IRTAD 2005).
- Reduced costs and impacts of casualties on society through the reduction of the severity of pedestrian injuries.
- Accessible to a wide audience. Can be used by low cost manufacturers through to premium manufacturers because of its low development and production costs.

TECHNICAL DESCRIPTION

Objective

To develop a new passive safety bonnet, reducing impact severities whilst maintaining structural integrity and design flexibility.

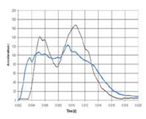


Approach

- Development of a new “sandwich” material concept which uses:
  - PressLoad : a unique energy absorbing structure designed to work under compression.
  - GridLoad : bonnet skin concept which prompts local deformation, reducing peak loads.
- Developed and assessed using FE analysis
- Initial tests were carried out at component level to evaluate the effectiveness of the materials.
- First full-scale prototypes were built and tested.

Accident analysis

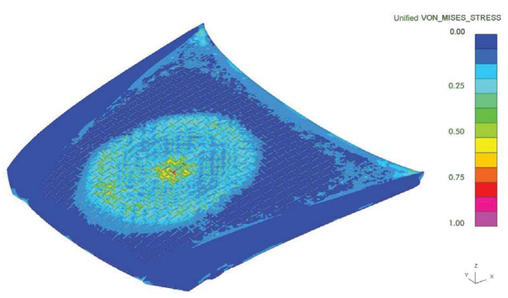
- Most head to bonnet impacts involve children, thus child head forms were used.
- Standard bonnets often show large variation in HIC depending on impact location.
- High values are typically caused by bottoming out onto hard points and structural features of the bonnet. The developed design aims to target these.



Concept Bonnet (HIC 990)
Standard Bonnet (HIC 1306)

Evaluation &Testing

- FE analysis demonstrate the potential of the system, showing significant improvement in peak loads.
- Tests confirm that significant improvements to HIC can be obtained in the most hazardous areas of the bonnet. (see graph – impact near to reinforcement)
- Structural testing showed very good structural performance, despite reduced weight.



Conclusions

- Significant improvements can be achieved in “high risk” areas of bonnet. e.g. low engine clearance, bonnet structural elements etc.
- The extent of use can be adjusted to suit vehicle design & hazardous areas.
- Suitable for low cost and low volume manufacture.
- Could be used in conjunction with active systems
- Can enhance bonnet stiffness.
- Low weight.
- Any vehicle could benefit.

Further work

- Standardise system and produce “design” guidelines.
- Further enhancement of FE models.
- Summarize results in order to be used during the commercialization phase.

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SIXTH FRAMEWORK PROGRAMME