

MOTORcycle

Rider

Integrated
SafeTy



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Neck protection development and a proposal of the associated standard for the motorcycle riders



*Speaker | Mohammad Nasim
Early Stage Researcher*

Presentation for Approval of Research

Background

- Bachelor of Science in Mechanical Engineering (Islamic University of Technology, Bangladesh).
- European Masters in Engineering Rheology (EURHEO) [Univerza v Ljubljani (Slovenia), Universidade do Minho (Portugal) and Université catholique de Louvain (Belgium)]
- Masters thesis title: "Viscoelastic properties of PTHF based well defined thermoplastic elastomers". (in cooperation with DSM, the Netherlands)

Work Experience

- Officer, Engineering (Aristopharma Ltd., Bangladesh)
- Trainee Engineer (Aerospace) (United Airways BD Ltd., Bangladesh)
- Lecturer, Department of Electrical and Electronics Engineering (American International University – Bangladesh)



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- To develop and validate innovative PPE with focus to neck-protection (coupling human models with protective systems) contributing the research outcome to the other ESRs of the MOTORIST project.
- To propose an associated standard (for neck protectors)
- To obtain the PhD degree at the University of Padova.

Three Work Packages (WPs)

WP1 - To improve the rider's skills by training strategies.

WP2 – To model the interaction between the rider and the PTWs.

WP3 – To develop Personal Protective Equipment (PPE) .

Type*	Description	Host	Dur.
L, W	Training on existing items of PPE, design process, manufacturing procedures and standardization. Particular emphasis will be given to virtual testing and prototyping within the development phase of new items of PPE	DAI inter. with UNIPD	12 Ms
S+L	The protection of the neck, biomechanical issues	LMU	2 Ms
S+W	The protection of the neck, new materials	SWC	6 Ms
TtR	Different possible configurations will be studied for the neck protection (integrated with helmet, or integrated with jacket, or stand alone components), a trade off based on simulation results will be performed. The use of airbag elements might be considered. Virtual testing, lab testing and proposal for standard of neck protections	DAI inter. with UNIPD	16 Ms

→ Phase I

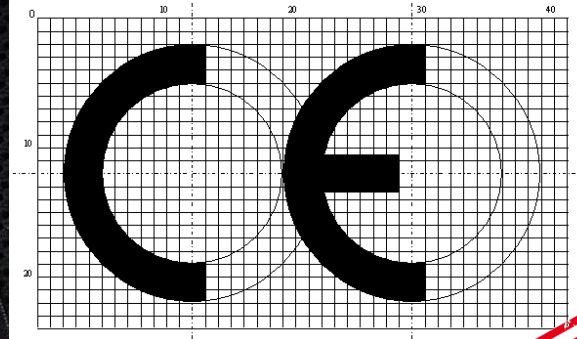
→ Phase II

- Functions of prototyping of the PPE.
- Material properties based on impact.
- Innovative design process.
- Knowledge on the different items of PPE.
- Virtual testing, lab testing and proposal for standard of neck protections.
- Italian language
- Presentation skill
- Communication skill

- Course on injury biomechanics at LMU (Part-I).
- Analysis of material properties based on impact.
- Visit of crash test facility (ADAC)
- Autopsy (LMU)
- Helmet manufacturing process (Mavet).
- Lecture on Product development process with particular reference to innovative product / product design (Dainese).
- Review of European testing and standards in PPE.
- Review of the MAIDS reports.
- Impact properties of different cellular solids used for PPEs.
- Understanding the airbag technology.
- WG9 meeting held in Pastrengo on September 23-24.

Standards

- Preparing the deliverable on "A survey of standards in PPE"



Standard n°	Subject
EN1621-1	Limb protectors
EN1621-2	Back protectors
prEN1621-3	Chest protectors
EN1621-4	Inflatable protectors
Disciplinary 13595	Protective clothing
EN13634	Protective footwear
EN13594	Protective gloves
EC 22.05	Motorcycle Helmets

- **Sweara**, Sweden (4 months) – New materials for neck protection, testing procedure.
- **Ludwig-Maximilians University**, Germany (2 months) – Biomechanical issues.
- **University of Strasbourg**, France (1 month) – Biomechanical issues.

Estimated Activities

- Course on biomechanics in Pilzen at the University of West Bohemia.
- Impact properties of plastics and sandwiches used for PPEs.
- Shape analysis of back protectors with FEM analysis.
- Simulation of foams.

EDUCATIONAL ACTIVITIES ACTIVATED BY THE STMS PHD COURSE							
Course/Seminar (Period/Date)	Teacher	Duration (hours) of course / seminar	Attainable ECTS credits	Frequency (YES/NO)	Exam (YES/NO and type)*	Date of exam**	Attained ECTS credits
Preparation of a research proposal	Prof. Naletto	10	2	YES	YES		
Mechanical and Thermal properties of material for aerospace constructions	Prof. Galvanetto / Prof. Zaccoriotto	20	4	YES	YES		
Aerospace propulsion	Prof. Pavarin / Prof. Manete	20	4	YES	YES		
Exploring the solar systems and its environment	Prof. Cremonese / Prof. Marzari	20	4	YES	YES		
Fundamentals of measurements and PC Based Applications for engineering	Prof. Debei / Prof. Lancini	20	4	YES	YES		
BioMechanics (Part I)	Prof. Jeff Crandall	36	1.44	---	NO		
BioMechanics (Part II)	Prof. Luděk Hynčik	12	0.48	---	NO		
Composite of materials for PPE		12	0.48	---	NO		
Vehicle safety systems		12	0.48	---	NO		
Space optics and detectors	Prof. Naletto / Prof.ssa. Pelizzo	20	0.8	YES	NO		
Spacecraft Dynamics and Control	Prof. Francesconi / Prof. Lorenzini	20	4	YES	YES		
OTHER EDUCATIONAL ACTIVITIES							
Title of the activity (Date/Period)	Teacher	Duration (hours) of activity	Attainable ECTS credits	Frequency (YES/NO)	Exam (YES/NO and type)*	Date of exam**	Attained ECTS credits
Presentation of research program			0.5	YES	YES (Colloquium)		
Presentation for admission to 2 nd year			0.5	YES	YES (Colloquium)		
Presentation for admission to 3 rd year			0.5	YES	YES (Colloquium)		
Presentation for admission to final examination			0.5	YES	YES (Colloquium)		
Participation to WG9 (EU standardization) meeting			0.5	YES	NO		
Participation at Congress			1	YES	NO		
Participation at Seminars			1	YES	NO		
Total of ECTS credits attainable in educational activities (>30):			30.18	Total of ECTS credits attained in educational activities: date DD MM YYYY			

Work Breakdown Structure(WBS)

Level	Activity Description (WP Title)		I year			II year			III year		
Presentation for approval of research			■								
1	0	0	Literature review								
	1	0	Injury biomechanics								
	2	0	Standards in existing PPEs								
	3	0	Materials used in PPEs								
2	0	0	Different items of PPE								
	1	0	Design protocol								
	2	0	Functional analysis								
3	0	0	Physical testing								
4	0	0	Software learning								
	1	0	FEM analysis								
	2	0	Advanced 3D drawing								
Admission to II year						■					
5	0	0	Biomechanical issues								
6	0	0	New material search								
Admission to III year									■		
7	0	0	Innovative PPE (focus on neck)								
8	0	0	Standard development								
	1	0	Virtual and lab testing								
	2	0	Drafting								
Admission to final examination											■
9	0	0	Writing Thesis and reports								
Final Examination											☒



THANK YOU FOR YOUR ATTENTION

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