

Module 3: Sectors for cork products, cork properties, future trends for cork

IO1 – Educational Curriculum



Description of the module

The aim of the module is to present in an attractive, visual and technically credible way which and how various properties of cork material influences, creates and drives the sector of cork production. In the module, the participants will enquire knowledge about the characteristic combination of cork's properties which leads to certain applications of cork material.

Beginning with characterization of cork material with respect to other materials and underlining its advantages/disadvantages, the participants will possess knowledge about proper application of cork material in accordance with real-world requirements and particularly case studies.



Description of the module

In this module participants will be at first introduced into a set of properties which makes cork unique and exceptional material. Further, the path of the module will be turned into an explanation based on examples why cork is the right choice in material selection process for presented application. The module will enable the participants to start with or improve computer-aided design skills on a case study.

Upon the advancement of the group, there will be a possibility to use advanced numerical models of cork materials in professional systems such as Abaqus and LS-DYNA. Besides technical skills, the participants will be encouraged to actively present their ideas through a Design Thinking session and present the go-to-market approach via Business Model Canvas concept session.

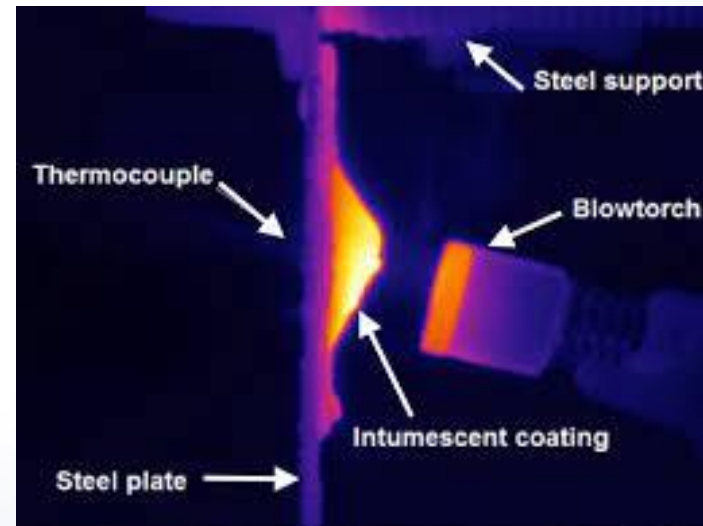


Description of the module

Cork properties:

Workshop 1: Flame resistance and dynamic temperature measurement.

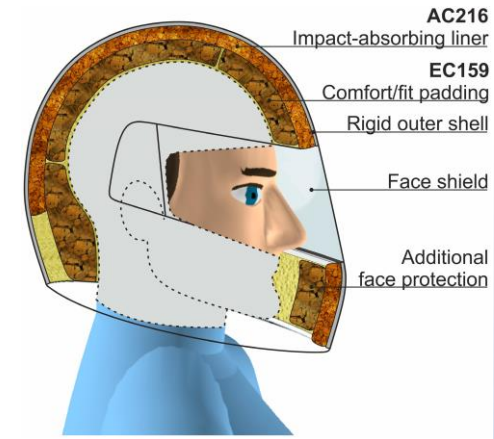
Workshop 2: Experimental testing of cork specimen with High Speed camera, Infrared camera, and Digital Image Correlation measurements



Description of the module

Sector of cork products

Workshop 3: Computer-aided design (CAD) with 3D scanning and finite element analysis of cork materials subjected to static and dynamic loading - case study



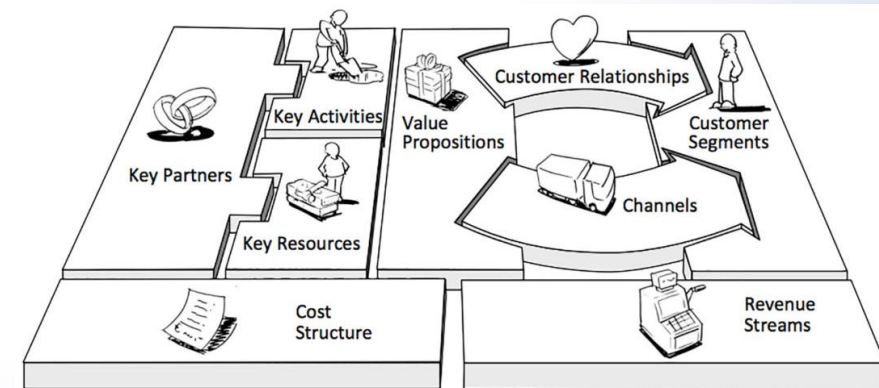
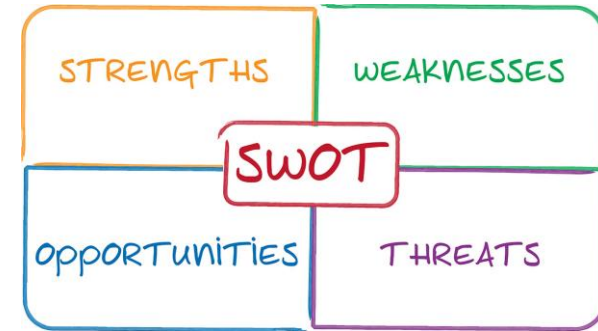
Workshop 4: Design Thinking focused on cork material and material forming capabilities



Description of the module

Future Trends for cork material:

Workshop 5: Strength, Weakness, Opportunity, and Threat (**SWOT**) of implementation of cork material with **Business Model Canvas** for future trends in cork applications



Target Groups

- Engineering students from:
 - Aerospace Engineering
 - Aeronautical Engineering
 - Materials Engineering
 - Mechanical Engineering
- Engineers
- Technical staff
- Leaders



Learning Objectives (outcomes)

- Assess the capabilities of cork material and justify its applications in various sectors.
- Wisely implement cork material for engineering application focused mostly on aerospace and aeronautical sciences.
- Create a CAD model of a structure where cork is utilised.
- Create a finite element model subjected to static and dynamic loading in a dedicated FE software such as Abaqus or LS-DYNA*
(* the module advancement will depend on the group background and skills)
- Plan and assess results of mechanical testing experiments for cork materials.
- Present the obtained data in a form of scientific publication
- Use various approaches such as Design Thinking and Business Model Canvas to create more human-oriented cork-based products



Learning Resources

- Scientific open-access publications or publications available via free repositories
- Meeting with experts via teleconferences
- Conference proceedings
- Completed BEng/MSc/PhD theses
- Unpublished know-how via technical reports for industries accessible at WUST library
- Repository for CAD models



Self-assessment and Learning Activities

- Module summary
- Pre/post assessment test
- Summing up video lectures
- Business model canvas elevator pitch (quick presentation scheme)

