

Bachelor project/Master semester project – Spring 2025

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Towards a circular economy for composite materials using de-bondable adhesives and reprocessable resins.

In the composites world, sandwich structures play a major role in various industries, such as sports and leisure, marine, automotive and construction. As part of an Innosuisse project in collaboration with Huntsman, we aim at developing and testing novel and sustainable polymer resins for composite parts (impregnation resins and adhesives).

In complex composite structures, such as sandwiches, a thin layer of adhesive is needed to allow good adhesion between the skins and the core. Current adhesive solutions cannot be reprocessed and de-bonded and it therefore limits the recyclability of these parts, which is needed for a circular economy. Similarly, in high performance applications, composite materials (fiber reinforced polymers – FRP) contain conventional thermosetting resins (e.g. epoxy resins), that can barely be recycled/reused.

The goal of this semester project is to explore de-bondable adhesives and reprocessable resins, test new formulations of in-situ cured thermoplastic resins, bringing improved adhesive properties compared to hot melt glues. Different testing methods will be assessed: rheological and curing properties of the resins, thermo-mechanical properties, adhesion properties in different configurations and reprocessing of composite materials.

In the scope of the Net Zero emissions by 2050, environmental impact and recyclability will be emphasized.