AG49
RISE
17 oktober

Pågående FoU-projekt
RISE Tillverkningsprocesser

ELYFOG FFI Circularity
Reliable electrical contacts in EVs - application phase and beyond [2023-2025]

Syfte och Mål

- Huvudmålet är att minimera energiförluster i elektriska anslutningar på grund av nedbrytning av lederna av termiska, miljömässiga och mekaniska belastningar, för primära och återvunna materialströmmar. Skapa förutsättningar för långsiktigt stabila elektriska anslutningar i elbilar under hela applikationsfasen och därefter. **Projektet kommer att tillämpa en helhetssyn för att optimera fogkonfiguration, tålighet, hållbarhet, kostnader, återanvändbarhet och återvinningsbarhet.** Resultaten kommer att finnas tillgängliga som webbaserade riktlinjer.

Förväntade effekter och resultat

- Att minska livscykelns miljöavtryck för de applicerade materialen och processerna för elektriska anslutningar och minimera kostnaderna. Slutsatser om korrelation mellan konfiguration och funktionell och mekanisk livslängd, vilket möjliggör bedömning av återanvändnings- och återtillverkningsmöjligheter. Instruktioner och riktlinjer för testning, materialval och montering för att förbättra anslutningens livslängd och riktlinjer för återanvändning av anslutningsdelar och användning av återvunnet material i elektriska anslutningar.

QABB FFI-Cirkularitet 2023-2024 Förstudie
Quality assurance (QA) and quality control (QC) of adhesive bond joints in battery packs.

Sammanställa och testametoder för kvalitetskontroll IN-line och i färdig produkt.

Skall resultera i ansökan. Troligtvis till FFI under 2025.

Konsortiumbildning pågår.

(RobuCap) Vinnova FFI-Cirkularitet [2023-2025]

Robust mechanical joining of cast aluminium components Purpose and goal

Purpose and goal

- The goal of the project is to create stable, **reliable and verified concepts for mechanical joining processes of die-cast aluminium components.** This will improve and enable an increased usage of cast aluminium materials. The project will thereby contribute to increasing circular material flow, enabling of circular manufacturing, prolonged lifetime of products and parts, and create the premises for robust production with cast aluminium parts. The project aims to facilitate the assembly and introduction of these materials and improve quality of joining of these materials.

Expected effects and result

- The collaboration within this project will distribute and implement the created knowledge along the whole supply chain and will lead to better understanding for design and production of cast parts as well as strengthen the knowledge towards cast materials which provide substantially different requirements for joining. **Being able to join low ductile alloys will increase the usage of recycled aluminium alloys** in future and increase circularity in the material usage for structural components in car manufacturing. For mega castings this increased circularity will be substantial.

Fortsättningsprojekt kommer att ske !!!

(DIJON) FFI- Cirkularitet [2023-2026]
Disassembly methods of joints for circular battery packs

Purpose and goal

- This goal of this project **is to develop new joint design solutions, including disassembly and re-assembly methods** which enable a circular flow of next generation's EV battery packs. Today's battery packs are joined with a combination of adhesive joints, mechanical joints, and thermal joints all with their pros and cons in terms of different properties such as performance, manufacturability, cost, etc.

Expected effects and result

- **The results may be presented as an industrial demonstrator.** Moreover, a summary of the joints that can be improved in terms of disassembly and re-assembly and the joints that are difficult to improve will be generated. The work will also include benchmarking of other commercial products.

Prebond [Finansiär Lighter 2022-2024]

central fogningsmetod inom lättviktskonstruktion eftersom den kan användas för att foga många olika material och geometrier. Ett avgörande problem är vidhäftning mot viktiga högpresterande material (tex belagt UHSS, rostfritt stål och aluminium).

Detta kan överbryggas med förbehandling med laser. I dagsläget krävs omfattande förbehandling i kombination med hälsovådliga kemikalier, vilket inte rekommenderas, är dyrt och osäkert. Ett annat problem är svårigheten att utvärdera vidhäftningen i produktionsflödet utan förstörande provning.

2-Component Adhesive Process (2-CAP) [2023-2025]

Purpose and goal

- For new innovative constructions, joining with adhesive is important. 2C applications are a strong trend in the electrification of vehicles where new concepts are now being developed that require new technical solutions. Adhesive joints give the possibility of new material combinations and with longer service life. 2C-based bonding with a short curing time and secure geometry fixation is essential. **The goal is a robust process for high-volume manufacturing with automated application of 2C adhesive and thus also reduced work environment risks.**

Expected effects and result

- A robust automated joining process for 2C adhesive has potential to rationalize and make production more efficient, but **deep knowledge of the interaction between materials, equipment, application situation** and process is required to give Swedish companies the competitive advantage it entails and also contribute to a resource-efficient use and thereby contribute to FFI´s impact target. The goal of the project is therefore an automatic handling of all parts of the process to obtain a stable robust process, optimized material consumption and minimized chemical risks for personnel.

SIMPL Avancerad och innovativ digitalisering 2024-2027
Simuleringsdriven plasmaoptimering för ökad vidhäftning med lack och lim

Mål för projektet

Contribute to the next-generation digital system to system solutions, through the development of a unique simulation and path planning tool for plasma activation, based on extensive and uniquely collected research.

Plasma treatments is considered to revolutionize surface treatment but is still not commonly used. Sweden is in a transition phase with growing interest in plasma from a time, quality, cost and sustainable perspective.The idea of the project is to develop a unique and automated platform for plasma activation before bonding and painting in a system to systems solution. The platform for high quality parts will include data driven development of a plasma simulation and robot path planning tool that will enable optimized support. **RISE highly automated testbeds with digital twins and open communication platform will be used.** Autonomous systems for interoperability need to be established for communication between positioning tool, robot and simulation and path planning tool.

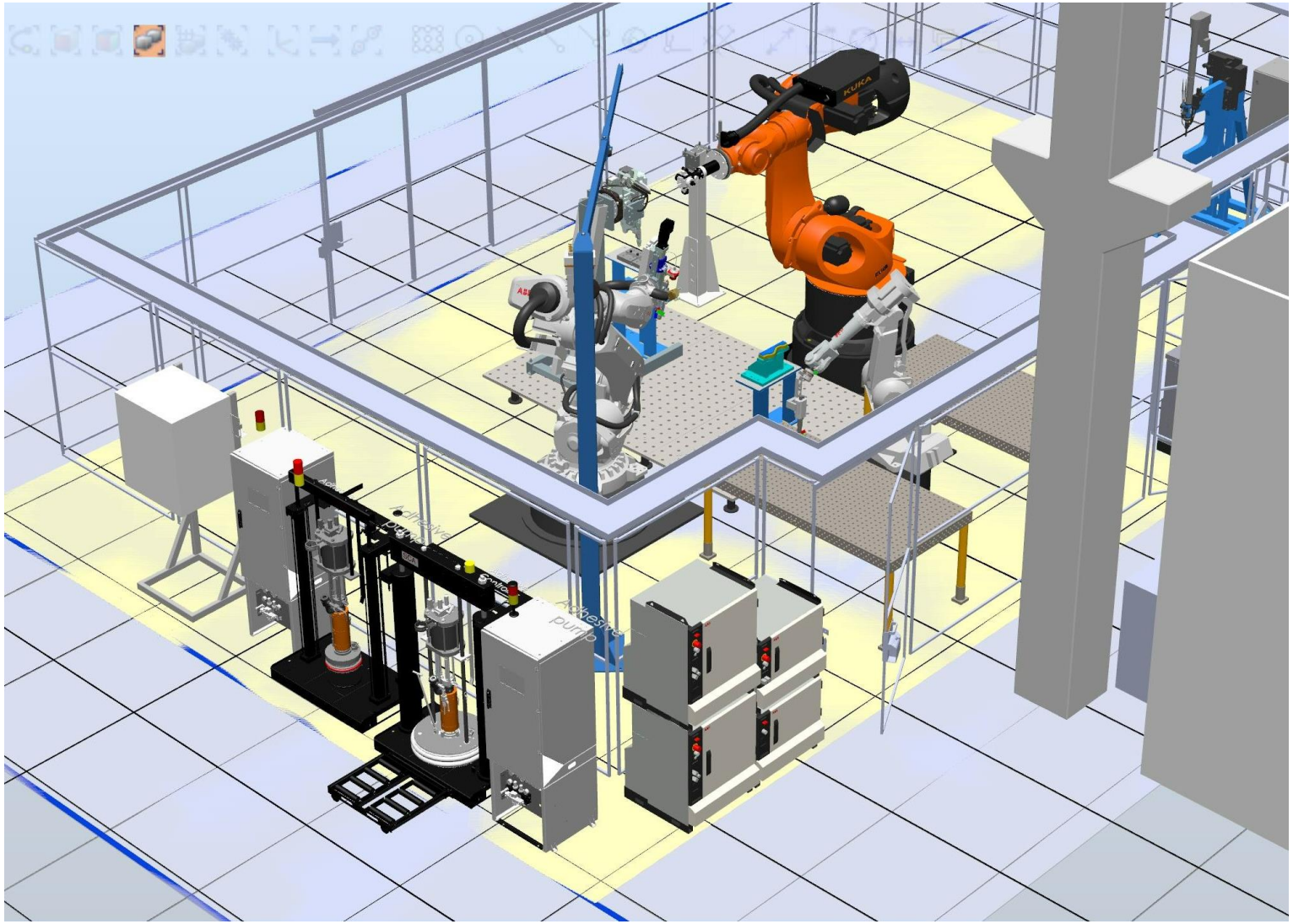
The project will include: **Benchmarking and technical evaluation of adaptive tools for positioning**. Development of a plasma activation simulation and path planning tool with a methodology to integrate learnings, optimization tools and algorithms. Extensive and uniquely collected plasma data. Model validation on challenging geometries. Learnings from real case plasma implementation. Decision bases on broadening of the IPS plasma module.

The aim of the project is a system for: **Shorter lead time to implementation**. Enable the choice of best suitable plasma system or system combination based on geometry, cycle time and cost. Replace much of the robot path planning with time- and quality-optimized programs

Research projects within Dry pretreatment at RISE in Mölndal

Hybrid Joining Testbed - HJT

The coming joining methods gathered in one testbed



RISE: HJT 2022 (matterport.com)

HJT offers hybrid joining of components of different materials.

HJT offers the opportunity to study advanced material and process simulation of the joining processes as well as co-programming of the entire joining process in a digital twin.

HJT is a platform for future information exchange and monitoring in an entire hybrid bonding process that includes adhesive application, assembly and mechanical joining.

Kommande områden

- Material Aluminium
- Produkter Megacast och Batteri (Modul/Pack/Låda)
- QA och QC [In-line och produkt]
- 2K
- Torra lokala förbehandlingar Laser Plasma (+ Beläggning)
- Hybridfogning
- Produktion . Kommunikation mellan utrustningar samt datainsamling

Vad ser ni för trender och behov från företagen rörande fogning?