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CERTIFICATION OF ADHESIVE BONDED REPAIRS FOR PRIMARY AEROSPACE COMPOSITE STRUCTURES (PATCHBOND II)

The project deals with the certification strategy for bonded repairs. This type of repairs of composite structures offers many advantages compared to conventional bolted repairs, for instance, through bonded repairs, the original strength and stiffness of a structure can be restored. In addition, thin laminates of sandwich structures can be repaired instead of being replaced, something which is hardly possible using a bolted repair.
In a war or crisis situation, a fast bonded repair will be essential for the operability of the platform, however,the new bolt-free approach is also believed to be both relevant and cost-effective in peace time. Nevertheless, for an adhesively bonded repair of a critical/primary composite structure, certification is currently only possible on a case-by-case basis and not on a general basis. This is mainly due to the present adhesive bonding methods applied. Within the PATCHBOND II project, a new technology will be developed to create a damage tolerant repair method, also employing in-service structural health monitoring as part of a certified repair approach.

Objectives

» The target of the project, started in June 2020, is to set the guidelines and provide analyses of bonded repairs to confirm the damage tolerant design philosophy. This includes an initial assessment of the criticality of a damaged composite structure, along with a no growth/slow growth design approach in view of new certifiable large composite repairs, involving bigger bonded repair size limits compared to current certification policy.

» Technology for in-service health monitoring of the repair will also be developed.

Work Strands

» The scope of the project is to both develop the new technology and to support the design methodology needed to repair composite aerospace primary structures (rotorcraft and fixed wing), by adhesively bonding a composite patch onto/into the prepared damaged area.

» A certification approach using crack-stopping design features would in the end be the best solution, as this approach fits within the existing airworthiness requirements. The use of bonded repair travellers next to the patch and structural health monitoring methods will be investigated within the project as a supporting technology to the initial and in-service inspection of the repaired area. The effect of bond-line ageing, due to environmental exposure, will also be investigated.

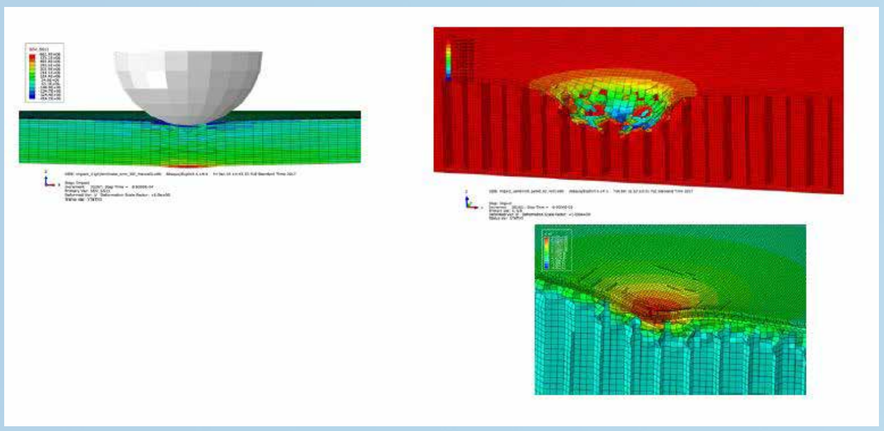
» The PATCHBOND II project is a follow-up activity of the PATCHBOND project and it is also using the "crack stopper" technology developed within the previous EU BOPACS project.

Way Ahead

The results of the PATCHBOND II project will be beneficial for the Maintenance, Repair and Operations (MRO) industry and the MOD's of the participating countries.

Link to TBBs, other CapTechs, and other links

- OSRA_TBB90 New manufacturing, joining and repair processes. (CapTech Materials TBB07).



Impact simulations on sandwich panel

Participating Members

Consortia/Organization

FINLAND:
Patria | VTT | Tampere University (TAU)

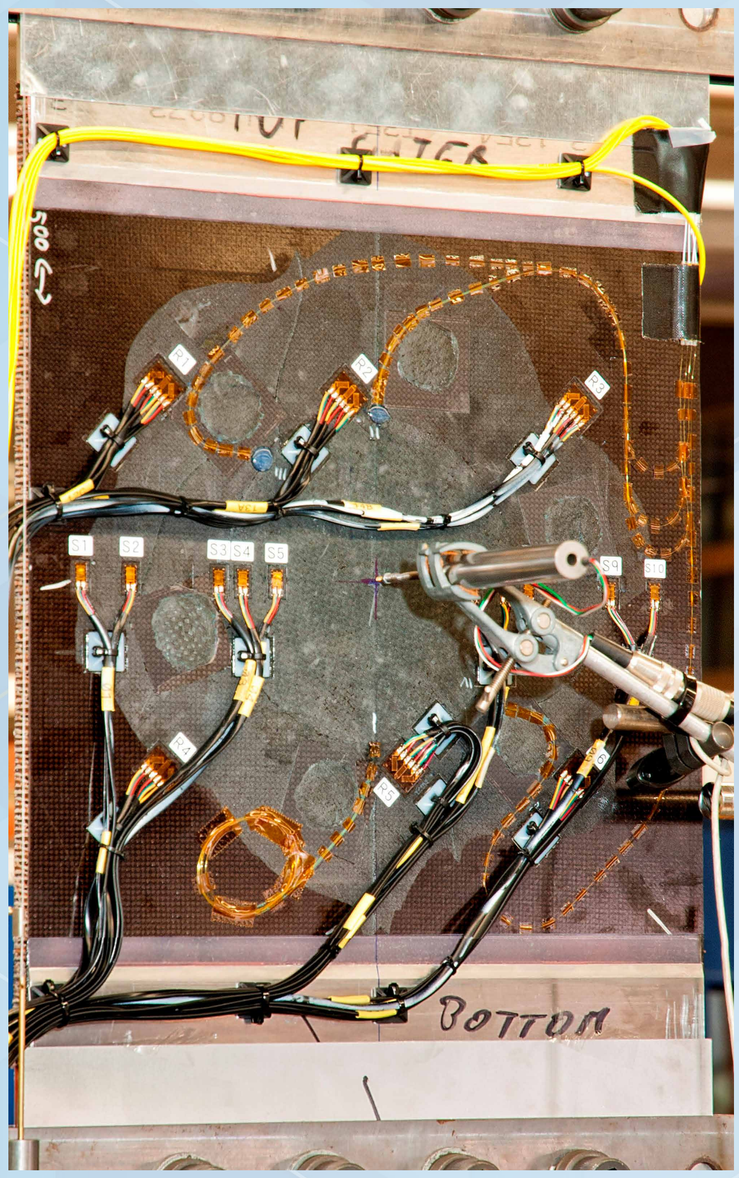
GERMANY:
Airbus DS | WIWeB | University of Stuttgart (USTUTT)

ITALY:
Politecnico di Milano (POLIMI)

NORWAY:
Norwegian Defence Research Establishment (FFI)
Norwegian Defence Material Agency (NDMA)
Light Structures | FiReCo

THE NETHERLANDS:
NLR | KVE | Fokker Services

CZECH REPUBLIC:
VZLU



Repair demonstrator fatigue test

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EDA Activities
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