

Composites Curriculum – Unit information

Taught block title	Performance B	
Unit title	In-service Damage and Repair	
Level (Credit points)		
Unit director	Dr. Hamed Yazdani Nezhad	
Unit description		
The unit provides an intense teaching of common academic and industrial practices for in-service damage and repair along with the existing aviation certification and repair regulations. The unit also complements and continues Unit: Joining & Assembly		
Core subjects to be covered		
<ol style="list-style-type: none"> 1. Introduction to damage in composites and composite assemblies 2. BVID 3. Damage in bolted and bonded assemblies 4. Effect of glass transition temperature 5. Serviceability of composite structures 6. Limitations of production NDT 7. Limitations of service NDT 8. Composite bonded repair 9. Bonded repair model 10. Repair failure modes 11. Selection guidance for fastening options 12. Load attraction and stresses in repair 13. Stresses in fasteners and bonds 14. Strength variation along degrading interface 	<ol style="list-style-type: none"> 15. Real bond defects 16. How to measure degrading joint strength 17. Repair of BVID 18. Bond failure forensics 19. Sandwich panel service defects 20. Core-to-spar bond in aircraft structures 21. Effect of operational thermal stresses 22. Total load at end of repair vs. design limit load 23. Stress under repair 24. Repair failure due to hot bonding and poor heating 25. Certification of composite joints 26. Aerospace composite repair regulations 	
Statement of unit aims		
The aims of this unit are to: <ol style="list-style-type: none"> 1. Provide categories of damage occurring in service in high performance composite materials and structures 2. Provide industrial repair procedures for in-service damage 		
Statement of learning outcomes		
Learners will be able to: <ol style="list-style-type: none"> 1. Appreciate a variety of integration, repair and joining procedures in composite structures from fastening, thermoset adhesive bonding to thermoplastic welding 2. Learn about adhesive bond damage tolerance and failure assessment procedures 3. Learn about composite repair certifications 		
Methods of teaching	8 lectures, 1 lab demonstration, 1 Boeing 737 visit (Cranfield only)	
Assessment details if required	Written assignment (85%), 20 minute assessed presentation (15%)	
Timetable information	2 days of teaching in a block	