

<b>Taught block title</b>	PRODUCT DESIGN B	
<b>Unit title</b>	Damage Tolerance	
<b>Level (Credit points)</b>		
<b>Unit director</b>	Martyn Jones/ Prof Richard Day	
<b>Unit description</b>		
This unit forms part of the Masters level Composites Curriculum. Students who study this module will understand the key points of damage tolerance and how the design of a composite can ensure safety critical structures can survive after failure.		
<b>Core subjects to be covered</b>		
<ol style="list-style-type: none"> <li>1. Damage resistance and damage tolerance</li> <li>2. Types/Sources of damage</li> <li>3. Design processes to ensure durability</li> <li>4. Structural categorisation</li> <li>5. Sandwich impact damage</li> <li>6. Influence of manufacturing defects</li> <li>7. Fatigue in composites</li> </ol>	<ol style="list-style-type: none"> <li>8. Visual inspection guidelines and methods</li> <li>9. Non-destructive testing</li> <li>10. Mechanical testing processes</li> <li>11. Structural reliability, A Basis and B Basis</li> <li>12. Standards and procedures</li> <li>13. Repair methods after damage</li> <li>14. Use of Finite Element Analysis (FEA) to predict damaged and fracture.</li> </ol>	
<b>Statement of unit aims</b>		
The aims of this unit are to:		
<ol style="list-style-type: none"> <li>1. Develop a systematic understanding of damage tolerance and its implication in structural design with composites</li> <li>2. Develop a critical understanding of impact damage and environmental effects on a composite structure.</li> <li>3. Assess the implications of component design, material section, transition zones and ply stacking sequences.</li> <li>4. Allow learners to select appropriate inspection and testing methods for damage</li> </ol>		
<b>Statement of learning outcomes</b>		
Learners will be able to:		
<ol style="list-style-type: none"> <li>1. Have a systematic understanding of the effect of impact and environmental effects on composite components and its strength</li> <li>2. Develop a practical knowledge of standards related to damage tolerance and reliability, and how inspection, testing a repair can be undertaken safely</li> <li>3. Critically analyse designs for damage tolerance to include, matrix and fibre materials, fibre architecture, monolithic/sandwich structures, and ply drop off zones</li> </ol>		
<b>Methods of teaching</b>	4 lectures, 2 lab sessions and demonstrations, 2 computer sessions	
<b>Assessment details if required</b>	100% assignment (2 assessments worth 50/50)	
<b>Timetable information</b>	(4 days)	