Structuring and preparation of a lesson: EAE module 6 (Testing and analysis)

time	Theme, core information, statements or questions	Learning objectives ¹	Methods (e.g. presentation/ discussion/group work)	Media/ training material
4 h	Property determination for adhesives, Adherend or Joints: Methods to measure the properties by preparing bulk specimens of the adhesive (e.g. static testing, dynamic testing,	-explain in detail adherend or substrate properties (1); -define methods for determining adherend or	Ppt content presentation Practical (group) exercise about adhesive and	Beamer / printed ppt presentation White board
	rheological characterization)	substrate properties (1); -select all the adequate	substrate properties measurement,	Text book
	using specially designed joint geometries to measure the failure strength and to analyse the fracture and failure behaviours	methods for measuring mechanical properties of the adhesive and substrate (2); - evaluate the adhesive or substrate property results(3); -monitor property determination for adhesive, adherend or joint;	Including results evaluation. <i>or</i> Hands on /group discussion about the selection of adequate methods for properties measurements; Visit to the laboratory for observation of	Practical exercise
Q h	Characterication of row material and sured	ovaloia in dotail row	some properties determination;	
δN	adhesive	materials and cured adhesives properties	presentation	Beamer / printed ppt presentation



	Determination of properties of Raw	(1).	Practical (group)	
	Naturial (a. r.) (in a site manufactor time for	(1),	Practical (group)	
	Material (e.g. Viscosity, reaction time for		exercise about raw	vvnite board
	adequate adhesive, DSC, Infrared	- define methods for	materials and	
	spectrometry, chemical determination of	determining the	cured adhesives	Text book
	the composition of the adhesive)	properties of raw	properties	
		materials and cured	measurement,	
		adhesives (1);	including results	Practical exercise
	Determination of properties of Cured		evaluation.	
	Adhesive (e.g. Mechanical characterization	- select all adequate		
	as other materials. DMA: Chemical	methods for determining	Hands on /group	
	Thermal Electrical and Optical properties)	the properties of raw	discussion about	
		materials and cured	the selection of	
		adhesives (2):	adequate methods	
			for proportios	
		avaluate the raw	monsurements:	
		-evaluate the law	measurements,	
		materials and cured		
		adhesives property results	Visit to the	
		(3);	laboratory for	
			observation of	
		- monitor property	some properties	
		determination for raw	determination;	
		materials and cured		
		adhesives.		
4 h	Destructive Testing (DT)	-explain the use of		
		standards and	Ppt content	Beamer / printed ppt
	National, EN or ISO Standards	specifications from the	presentation	presentation
	Industry Specifications and standards	industry for testing		
		materials (e.g:	Practical (group)	White board
	Destructive testing of the Assembly (e.a.	adhesively bonded test	exercise about	
	Failure strength measurements: fracture	pieces): (1)	inspection	Text book
	testing and failure analysis: Thermal		objectives and	



	properties and temperature effects; fatigue	-select the relevant	selection of proper	Practical exercise
	testing and failure analysis)	destructive methods	DT methods,	
		depending on the	including the	Video
	Tests for the durability of the Assembly	inspection objectives; (2)	evaluation of	
	(e.g. Thermal and Mechanical constraints,		results;	
	Moisture, Chemical environment, UV and	- discuss about	or	
	combined effects);	destructive test objectives	Hands on/group	
		and limitations of the	brainstorming	
		data generated;(2)	about DT field of	
			application and	
		-evaluate the data	limitations;	
		generated from the		
		destructive testing (3);	Video presentation	
			/demonstration	
		- monitor destructive	(e.g: destructive	
		testing methods applied	testing)	
		to test pieces.		
			Visit to the	
		- decide autonomously	laboratory (e.g: to	
		about DT methods	observe some	
		according to specific	examples of DT	
		inspection objectives.	methods);	
10 h	Non Destructive testing (NDT)	-explain standards and		
		specifications from the	_	
	National, EN or ISO Standards	industry for testing	Ppt content	
	Industry Specifications and standards	materials(1);	presentation	
				Beamer / printed ppt
	Fundamental of NDT methods (e.g. Visual	- explain all types of non-	Practical (group)	presentation
	inspection; liquid penetrant, Sonic vibration	destructive testing	exercise about	
	techniques; X-ray; thermal inspection	methods and industrial	Inspection	White board
	methods, holography and Transmission	techniques (1);	objectives and	



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and pulse-echo ultrasonics) Fields of application and limitations Design in respect to NDT	-select the relevant NDT methods depending on the inspection objectives (2);	selection of proper NDT methods, including the evaluation of results;	Text book Demonstration objects (e.g: adhesively bonded pieces)
Calibration	 (2); -discuss about the field of application of each type non -destructive test and the limitations of the data generated;(2) - evaluate the adhesive pieces design attending to the subsequent tasks and work order, to guarantee the accessibility for NDT(3); - identify calibration references to be used in NDT methods and techniques (e.g: UTprobcalibration); (1) - monitor non-destructive testing methods applied to adhesive fabrications; 	results; Hands on /group brainstorming about NDT field of application and limitations; Practical demonstration (e.g. of correct adhesive pieces design) Video presentation /demonstration (e.g: non destructive testing) Visit to the laboratory (e.g: to observe some examples of NDT methods)	Practical exercise Video
	- decide autonomously about NDT methods		



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		according to specific inspection objectives.		
4 h	Examination of Joint Fracture Surfaces and	-explain in detail the		Beamer / printed ppt
	<u>Adhesive Layer</u>	mechanisms and		presentation
		properties of the different	Ppt content	
	Failure analysis	kinds of fractures	presentation	White board
		affecting adhesives layer		
	Test Methods used in failure analysis	(1);	Practical (group) exercise about the	Text book
		-evaluate failures and	selection of proper	Demonstration objects
		fractures in adhesives	failure analyses	(e.g: adhesively
		joints (3)	methods	bonded pieces)
		-select the relevant test	Practical	Practical exercise
		methods for detecting	demonstration	
		failure analysis (2)	(e.g. analyses of adhesive pieces	Video
		-Monitor testing methods	design)	
		for failure analyses	5,	
		applied to adhesives	Video presentation	
		joints.	/demonstration	
			(e.g: failure	
		- Decide autonomously	analyses methods	
		about test methods for		
		detecting failure analyses	Visit to the	
			laboratory (e.g: to	
			observe some	
			examples of failure	
			analyses methods)	

¹ (1) Know and understand, (2) transfer and practically apply, (3) analyze and assess; (0) no learning objective; additional information



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