

## Structuring and preparation of a lesson: **EAS module 7 (Health and safety)**

time	Theme, core information, statements or questions	Learning objectives <sup>1</sup>	Methods (e.g. presentation/ discussion/group work)	Media/ training material
0,5 h	<p>Selection Tables and Performance Specifications</p> <p><u>Selection of an appropriate adhesive:</u></p> <p>Technical performance specifications.</p> <p>Adjust adhesive/adherent cross scheme considering adhesive type health risks.</p> <p>Suitability of adhesives for a work environment or external environment.</p> <p>Consideration of necessary technical performance for a particular bond.</p> <p>Redesign the joint when the performance specifications are unnecessarily high demanding on adhesives due to the joint design.</p> <p><u>Selection between several adhesives:</u></p> <p>Specific requirements regarding the necessary performance and design of the</p>	<p>Interpret technical performance specifications (1)</p> <p>Infer the suitability of adhesives for a work environment or external environment (1)</p> <p>Compare several types of adhesives in terms of their technical performance possibilities against the joint performance requirements (1)</p> <p>Relate different types of adhesives to its associated health risks (1)</p> <p>Select appropriate adhesive for a specific application with the lowest risk possible by</p>	<p>Question about previous knowledge regarding adhesives and discussion of their application and specifications.</p> <p>Practical example for adjustment of adhesive cross scheme. Require the students to explain why it has to be adjusted and in which way.</p> <p>Repeat exercise for the redesign of joints.</p> <p>Handout tables of adhesives to clarify</p>	<p>Handouts</p> <p>White board</p> <p>Tables of adhesives</p>

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	<p>joint.</p> <p>Representation of the least risk possible.</p> <p>Consideration of adhesives constituents and its hazardous due to its risks.</p> <p>Simple selection guide of an appropriate adhesive should be given in a table of adhesives.</p>	<p>the use of selection tables and performance specifications; (2)</p> <p>Know how to redesign a joint in order to guarantee the satisfaction of the adhesive demands and reduce its performance specifications; (3)</p>	<p>which information is presented and in which way it can be accessed and useful for the student.</p>	
2 h	<p>Checklist with comments</p> <p>Importance of a checklist regarding work environments and technical aspects of adhesive selection.</p> <p>Checklist which includes all the different steps in the adhesive process with regards to the health effects:</p> <ul style="list-style-type: none"> <li>- General</li> <li>- Design</li> <li>- Surface treatment</li> <li>- Adhesive dispensing/application</li> <li>- Curing/solidification</li> <li>- Repair</li> <li>-</li> </ul>	<p>Explain the main topics about adhesives' risk assessment; (1)</p> <p>Relate each step of a specific adhesive process to its health effects; (1)</p> <p>Create a checklist which includes all the steps of the adhesive process with regards to the health effects accompanied by comments; (2)</p> <p>Monitor the use of the checklist created for a</p>	<p>Question about the importance of a checklist and which sections should be included in one.</p> <p>Discussion of the different sections integrated in the checklist, their need and content included.</p> <p>Identify adhesives that require pre or</p>	<p>Handouts (checklist examples)</p> <p>White board</p> <p>Demonstration objects (different joint types with adhesives to illustrate different contexts for the group work)</p>

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	<p>Comments which describe the various problems and indicate alternative methods for each item in the checklist.</p> <p>Specify additional requirements for some adhesives which require pre-treatment and/or post-treatment of the joints.</p> <p>When foreseen work environment problems, aspects of the entire process must be considered and added to the list.</p>	<p>specific adhesive process; (3)</p>	<p>post-treatment of the joint. For each one give an example of which kind of treatment is necessary and how it should be applied.</p> <p>Group work in which each group has to pick a specific adhesive and create a checklist. The context in which it is applied can be given by the teacher or be applied in an experience that the student has encountered.</p>	
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<p>1 h</p>	<p>Countermeasures</p> <p>Countermeasures list with description of risks associated with the use of various types and forms of adhesives, and how they can be reduced. Also discusses the advantages and drawbacks of various measures.</p> <p><u>Common “workstations” with required countermeasures:</u></p> <p>Adhesive bonding with epoxy:</p> <ul style="list-style-type: none"> <li>- Fluid state</li> <li>- Solid state</li> </ul> <p>Adhesive bonding with polyurethane:</p> <ul style="list-style-type: none"> <li>- Polyurethane – one and two component</li> <li>- Polyurethane/hot melt</li> </ul> <p>Adhesive bonding with acrylate</p> <ul style="list-style-type: none"> <li>- Cyanoacrylate</li> <li>- Anaerobic</li> </ul>	<p>Relate various types and forms of adhesives with the risks they bring to a workstation; (1)</p> <p>Exemplify measures for risk reduction in specific workstations; (1)</p> <p>Explain how identified countermeasures help reduce risk; (1)</p> <p>Create a countermeasures list describing the associated risks in the use of various types and forms of adhesives and how they can be reduced; (2)</p> <p>Monitor the use of countermeasures to apply in the use of specific types and forms of adhesives; (3)</p>	<p>Create a countermeasures list describing the associated risks in the use of various types and forms of adhesives and how they can be reduced.</p> <p>Debate on how to apply the list when planning or checking work positions.</p> <p>Discussion of a case study where a countermeasures list is necessary for one of the workstations referred in this learning unit.</p>	<p>Handout</p> <p>White board</p> <p>Case study</p>
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	<ul style="list-style-type: none"> <li>- SGA</li> <li>- UV curing</li> </ul> <p>Primer, accelerator</p> <p>Finishing treatment</p> <p>Use of the list to plan new positions for bonding work, and also to check the existing workplaces.</p>			
2,5 h	<p>Data section</p> <p>Health hazards for different types and forms of adhesives</p> <p>Synonymous chemical name list</p> <p>Design aspects</p> <p><u>Surface treatment aspects</u></p> <ul style="list-style-type: none"> <li>- Surface treatment methods for different adherents and applications</li> <li>- Alternative surface treatment/cleaning methods</li> </ul> <p>Aids for preparation, measuring and mixing adhesives</p> <p>Equipment for dispensing/application of</p>	<p>Identify and understand the gathered information regarding the design of bonded joints, pre-treatment, preparation and application of adhesives, summaries of health risks associated with constituents of adhesives and equipment; (1)</p>	<p>Presentation of videos to explain concepts and equipment used during the use of adhesives.</p> <p>Initiate a debate regarding hazardous situations that can happen, how to avoid or minimise them.</p>	<p>Handout</p> <p>White board</p> <p>Videos</p>

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	<p>different adhesive forms</p> <p><u>Equipment for various automation levels of dispensing application of:</u></p> <ul style="list-style-type: none"> <li>- Adhesives in fluid state</li> <li>- Adhesives in solid state</li> </ul> <p>Health hazards for different ways of curing/solidification</p>			
2,5 h	<p>Health hazards for equipment used for curing/solidification</p> <p><u>Information on various stages of the bonding process:</u></p> <ul style="list-style-type: none"> <li>- Inherent risks associated with particular adhesives</li> <li>- How the adhesives can be applied</li> </ul> <p><u>Factors that influence the health hazards associated with adhesives:</u></p> <ul style="list-style-type: none"> <li>- Form in which the adhesive is encountered or applied</li> <li>- Method of handling</li> </ul> <p>Adhesives form of supply: thick liquids, viscous pastes, powders, films, tape, granulates, blocks melted prior application.</p> <p>Adhesives single-component or two-components.</p>		<p>Presentation of videos to explain concepts and equipment used during the use of adhesives.</p> <p>Initiate a debate regarding hazardous situations that can happen, how to avoid or minimise them.</p>	<p>Handout</p> <p>White board</p> <p>Videos</p>

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	<p><u>Hazards of adhesives in liquid form:</u></p> <ul style="list-style-type: none"> <li>- Most common adhesives are in the liquid form and two component adhesives have to be prepared before application. The measuring and mixing can result in risks of skin contact and inhalation of fumes.</li> </ul>			
2,5 h	<p><u>Hazards of adhesives in liquid form (cont.):</u></p> <ul style="list-style-type: none"> <li>- Single component adhesives are usually preferred since they require less preparation unless, for a particular application, they become very health-hazardous.</li> </ul> <p><u>Hazards of adhesives in solid form:</u></p> <ul style="list-style-type: none"> <li>- Usually used for single-component type, which means that there is no measuring or mixing.</li> <li>- Adhesives in film form, which have a defined thickness, are easy to apply in the correct quantity.</li> <li>- Adhesives in solid form are heated at some point in the bonding process in order to melt them which can release fumes.</li> </ul> <p>Equipment choice for measuring, mixing and application, together with proper ventilation to reduce work environment</p>		<p>Presentation of videos to explain concepts and equipment used during the use of adhesives.</p> <p>Initiate a debate regarding hazardous situations that can happen, how to avoid or minimise them.</p> <p>If possible, bring some demonstration equipment and explain how to use</p>	<p>Handout</p> <p>White board</p> <p>Videos</p> <p>Demonstration objects (equipment for measuring, mixing and applying adhesives)</p>

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	risks associated.  Different independent elements for the application of adhesives: adhesive itself, measuring/mixing equipment, application equipment and curing/solidification stage.		it and the prevention measurements required.	
1 h	<p>National rules and regulations</p> <p><u>General rules for people and aspects to consider:</u></p> <ul style="list-style-type: none"> <li>- Importers/manufacturers</li> <li>- Employers</li> <li>- Marking for packaging</li> <li>- Hazard symbols for packaging</li> <li>- Data sheets</li> <li>- Details of hazard substances</li> <li>- Applications</li> <li>- Exceptions</li> <li>- Lists of types</li> <li>- Written hazard and protection information</li> <li>- Product inspection at the place of use</li> <li>- Measuring equipment for different substances</li> <li>- Protection equipment (clothes, gloves, etc.).</li> </ul> <p>Knowledge regarding hazard substances</p>	<p>Explain general rules to handle substances safely; (1)</p> <p>Relate adhesives' associated risks and general characteristics that can influence risk situations; (1)</p> <p>Identify national requirements regarding handling hazard substances; (1)</p> <p>Compare general rules that apply in different countries; (1)</p> <p>Define protective measures to ensure the material is handled</p>	<p>Development of content with the participants.</p> <p>Discuss the aspects and rules presented and correlate each point with national rules and regulations.</p>	<p>Handout</p> <p>White board</p>

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	associated risks and general characteristics that can influence risk situations.  Protective measures to ensure that the material is handled correctly (can vary from country to country)	correctly; (2)  Discuss the risks associated to hazard substances and the general characteristics that can influence risk situations; (3)		
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