



Republic of the Philippines  
**PHILIPPINE STATE COLLEGE OF AERONAUTICS**  
Piccio Garden Villamor Pasay City



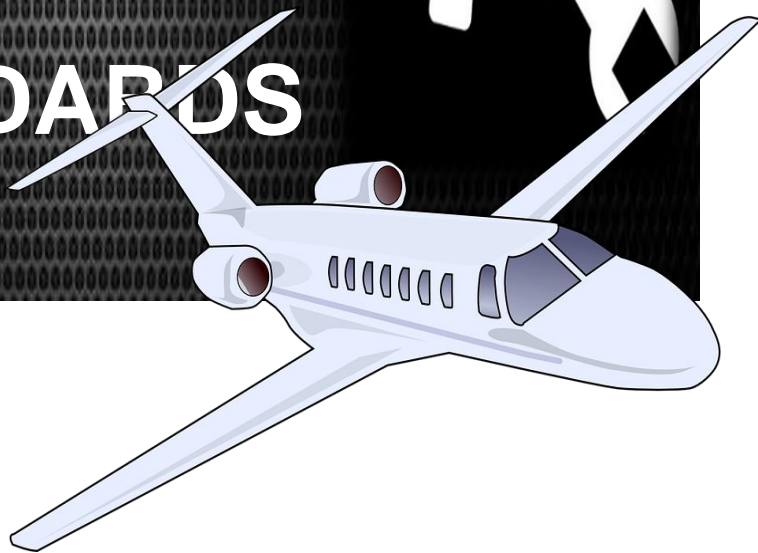
**AMT 2106 –AIRCRAFT MATERIALS CONSTRUCTION AND REPAIR II**  
(Composite)

# **PRELIM PERIOD**

**LABORATORY MODULE V**

## **EVALUATION OF COMPOSITE SAFETY REQUIREMENTS VS THE STANDARDS**

**SHEILA MAY D. MOTOS, MEAM**  
AMT Instructor



**AIRCRAFT MAINTENANCE TECHNOLOGY DEPARTMENT**  
**1ST SEMESTER - S.Y. 2021-2022**



## TABLE OF CONTENTS

TOPIC	Ref no.	Page no.
<b>MODULE V: COMPOSITE SAFETY</b>		
a. Laboratory Safety Rules and Regulations	2	4
b. Working Environment	2	4
c. Solvent: Usage and Safety	2	5
d. Used and Storage of Matrix Materials	2	6
e. Fire Hazard Minimization	2	7
f. Personal Safety while Machining	2	7
g. Tool Safety	2	8
h. Safety Precautions Base on EASA requirements	1;3	9

## TABLE OF REFERENCES

REFERENCES	Ref no.
EUROPEAN AVIATION SAFETY AGENCY (2015) Citation. Foreign Part-145 approvals Composite repair workshop	1
Airframe and Powerplant Handbook – Jeppesen	2
FEDERAL AVIATION ADMINISTRATION (2013) citation. REPAIRS AND ALTERATION TO COMPOSITE REPAIR AND BONDED STRUCTURES . AC 43-214	3







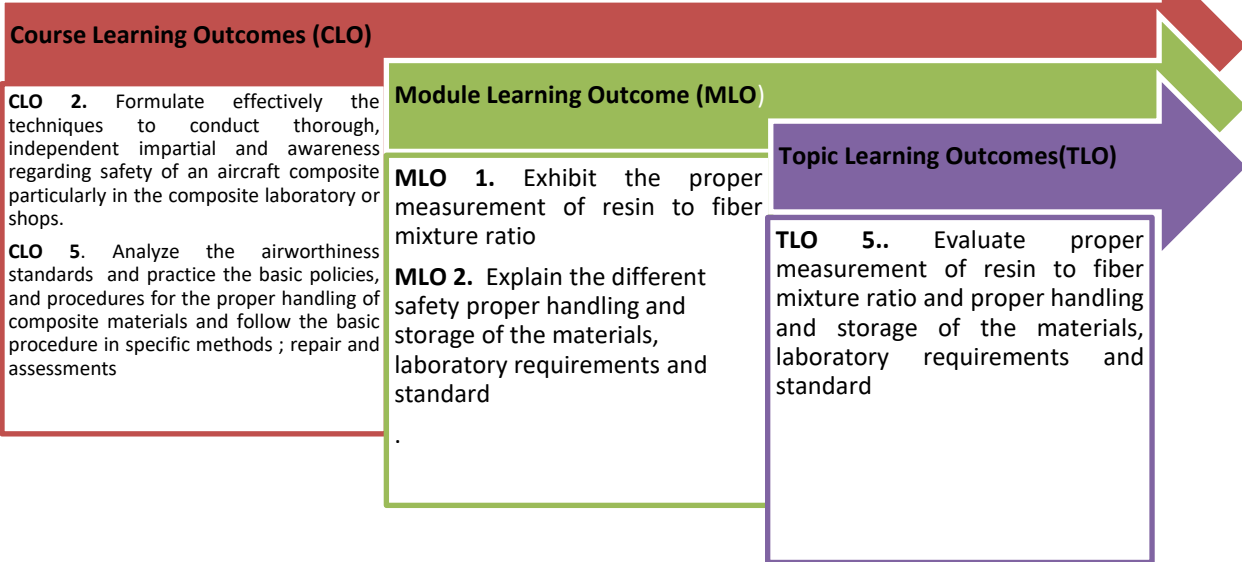
This module concentrate more on the discussion relative to safety requirements needed to address particular with this subject such as the safety rules and regulation inside the laboratory, specific safety handling requirements with composite materials. The module also discusses the safety parameters in mixing resin with fibers and also the safety considerations and standard requirements in composite.



**TIMEFRAME**

You should be able to complete this module including all the self-assessments, research works, assignments, and other performance tasks within **3** hours.

**LEARNING OUTCOMES**





## **LABORATORY MODULE V : COMPOSITE SAFETY**

### **LABORATORY SAFETY RULES AND REGULATIONS**

1. Always ensure the tools or equipment that you are going to use is in a safe and good working conditions.
2. Use the right tool or equipment for the right job.
3. Never operate any machine tools or equipment when you do not know how to use it.
4. Ask your instructor for the proper use of any machine tools and equipment and the correct manner of doing the job.
5. Always wear approved personal protective and safety gear when performing hazardous materials.
6. Keep your working area clean at all times.
7. Promptly report to your instructors any untoward accidents and incidents within the shop/laboratory premises.
8. Horse playing is strictly prohibited.
9. Students are responsible for his/her safety inside the laboratory.
10. All emergency equipment such as fire extinguisher and exit doors must be kept clear of obstacles.
11. Smoking is not permitted in the laboratory area.
12. Before leaving the shop/laboratory make sure that proper housekeeping was observed.

### **WORKING ENVIRONMENT**

Good housekeeping is an important aspect of the profession. It directly impacts an individual's safety and general work. Due to the materials used in composite repair, good housekeeping is a must. Here are few tips on good housekeeping in our working area:

1. Do not block access to any safety equipment.





2. Keep storage areas neat and orderly.
3. Properly disposed of mixing containers
4. Keep fabric remnants swept up.
5. Wipes up any spills and keep tools clean
6. Make sure containers labeling is legible and that the lids are intact.
7. Empty trace receptacle
8. Keep bagging materials on rolls with covered storage
9. Keep sanding away from lay-up area
10. Down draft or dust collectors should be used while sanding
11. Ensure there is a proper ventilation available while using with resin

### **SOLVENT: USAGE AND SAFETY**

Many types of solvent are used when working with or repairing composites. Some of the most common solvents with the composites includes:

- ✚ **METHYL-ETHYL KEYTONE (MEK)** – used for cleaning dust, grease, and mold grease agents from composite components
- ✚ **ACETONE** – Used for general Cleanup of tools and equipment and used as a prebond prep to clean the composite parts after sanding.

**These safety guidelines should be followed with all the solvents and matrices:**

- ✚ All solvents are flammable so there is strictly no smoking policy in effect when solvents are in use.
- ✚ Use solvents neatly. Do not pour any solvents directly on the part. A soft cloth moisten with the solvent is usually adequate.
- ✚ Used solvents in a well-ventilated area and avoid pro-longed breathing of the vapor
- ✚ Wear gloves when applying solvents to protect the skin from drying out.







- ✚ Never use solvents to clean skin. These are more suitable epoxy cleaners that are less dangerous to your health.
- ✚ Wear goggles when pouring solvents.
- ✚ Solvents should be kept in the original containers

### **USED & STORAGE OF MATRIX MATERIALS**

For safety, read and follow the manufacturer's instructions closely when handling the storing composite materials. Read the labels on containers for all information's on handling, storage, and safety precautions. Improperly storage adhesives, resins or pre-preg may result in structurally unsafe aircraft component.

- ✚ Follow the manufacturer's instructions for mixing components.
- ✚ Always store the matrix material properly
- ✚ Keep records on refrigerated storage to ensure materials that are placed first-in and the first out for use.
- ✚ Keep refrigerated materials sealed to prevent entry of moisture
- ✚ Record accumulated time –out of the refrigerated storage
- ✚ Allow components to warm to room temperature before weighing and mixing.
- ✚ Discard all materials that exceed their storage life.
- ✚ Handle materials with gloves to maintain cleanliness
- ✚ Never used brushes contaminated with another type of resin
- ✚ Store dry fabric ad bagging materials in a clean, drea area.
- ✚ Do not allow protective hand creams to come in contact with the resins and bond lines.
- ✚ Do not remove the backing on pre-preg material until the material is used
- ✚ Store honeycomb and foams in their original packing boxes
- ✚ Clean rooms are not required for making composite repairs, however m it is nice if you have a separate area for sanding and one for laying up the patches.





## **FIRE HAZARD MINIMIZATION**

Many of the solvent and resin materials used are flammable so you must keep them away from heat and open flame. To minimize or eliminate the danger of fire, the following requirements should be met:

1. Eliminates all flame, smoking, sparks and other sources of ignition from where solvents are used.
2. Use non-spark producing tools.
3. Ensure that all electrical equipment meets the acceptable building and fire codes.
4. Keep flammable solvents in closed containers
5. Provide adequate ventilation to prevent buildup of vapors
6. Statically ground the aircraft and any repair cart. (if any).
7. Never unroll bagging films and peel ply around solvents. They may produce static electricity
8. Never have solvent in the area when sanding. The possibility of sparks during sanding operation is a fire hazard when solvent fumes are present.

## **PERSONAL SAFETY WHILE MACHINING**

While sanding, drilling or trimming composite structure, very fine dust particles contaminate the air. To help alleviate health risks, respirator must be worn. A dust collector or downdraft table also is very desirable to use while sanding because they pull the fine particles out of the air.

To minimize the possibility of particles entering the pores of the skin, wear protective clothing that doesn't have loose fitting sleeves. After working with the composite, take a shower at the end of the day to flush particles from the skin and hair.





**TOOL SAFETY**

1. Tools should be disconnected from any air supply before changing cutters.
2. Never hold small parts in your hands while drilling
3. Always use a backup on the opposite side of the component to help prevent injury or damage
4. Because carbon chips maybe corrosive to aluminum parts and hazardous to electrical components, carbon composites may be removed from the area prior to being worked on.
5. Always point the exhaust from pneumatic power tool away from other people. And remember, safety goggles are a must when sanding, drilling, routing or grinding.
6. Never use compressed air to blow dust from a part that has been sanded. The excessive air pressure could cause an area to the laminated materials to disband, causing further damage. To remove the dust used vacuum followed by solvent wash.



**Self-Assessment:** Before we proceed with our next module, let’s check how well you have understood the discussion so far. Please answer with honesty the following questions below. **KINDLY DEFINE THE FOLLOWING IN YOUR OWN WORDS : Time frame: 3-5mins**

TERMS	
<b>SAFETY</b>	
<b>REGULATION</b>	
<b>GUIDELINES</b>	
<b>HAZARD</b>	







## **SAFETY PRECAUTIONS**

Aircraft maintenance chemicals (e.g., abrasives, cleaners, corrosion preventatives, paint stripes, surface treatments, sealants, paints, solvents, etc.) may be hazardous. The maintenance organisation is responsible for the evaluation of the hazards in the workplace, awareness of personnel and to address safety precautions.

### **The following elements should be taken into account:**

- Understand the warnings for using specific chemicals as published by the chemical manufacturer. Refer to the Material Safety Data Sheet which accompany the material. This is the primary source of information when determining the risk associated with any substance used in the workplace;
- observe the aircraft/component manufacturer`s warning and cautions in the applicable maintenance data;
- Use personal protective equipment (e.g., gloves, respirators, glasses, boots, etc.) to prevent skin, eyes, respiratory and digestive tracts from being exposed to chemicals;
- Make sure that sufficient ventilation exist;
- Many combination of chemicals are incompatible and may produce toxic fumes and violent reactions. Extreme caution is required to ensure that maintenance chemicals are only mixed in accordance with the specific mixing procedure;
- Set up first-aid measures in the workplace (e.g., eye washers, etc.).

### **Incoming inspection of raw material.**

145. A.42 (a) and AMC M.A.501 (d) requires the Maintenance organisation to ensure that purchased raw and consumable materials meet the required specification and has appropriate traceability (to the manufacturing and supplier source).

In the case of materials used for composite repairs (e.g., Prepreg, resins, etc.) Supplier laboratory test reports should also accompany each batch of material received. In addition the maintenance organisation may perform sample verification testing (by itself or using an independent laboratory) in order to establish confidence in the quality of materials received from the suppliers.





### **Material handling and storage.**

Materials used for bonded repairs are subject to specific handling and storage conditions, which requires adequate facilities and equipment (see also chapter 4.5 "NDT to support the composite") to be available.

The conditions of storage and shelf life limitation shall be in accordance with the manufacturer's instructions to prevent deterioration and damage to the stored items. In particular, the maintenance organisation shall refer to the Material Safety Data Sheet which accompany the material plus any other instructions which may be published in the relevant maintenance data.

In particular the maintenance organisation needs to establish procedures to cover the following aspects.

### **Shelf life and temperature considerations.**

Materials specifications normally specify shelf life when the material is stored at the specified temperatures. Prepreg and adhesives need to be stored in sealed containers often near -18° C in order to retard the "aging" or partial curing and extend the shelf life. The period of time the material is outside the freezer shall be recorded (ex. "out time" record log) in order to demonstrate that the total allowable out of freezer time is not exceeded.

### **Storage and handling recommendations.**

Particular care should be taken to prevent contamination of Prepreg materials and film adhesives during handling (e.g., skin oil), by the use of appropriate gloves, protective container/moisture-tight bags; Freezer storage conditions shall be strictly controlled (regularly monitored temperature, highest allowed temperature, location/orientation of the stored roll to prevent fiber breaking or resin migration).

If the maintenance organisation cuts the roll into "kits" before refreezing, procedures should be in place to ensure the materials are not contaminated during handling and kitting process (i.e. the out time is recorded and the material is correctly bagged before refreezing).

### **Unserviceable aircraft components incoming area.**

An incoming area for unserviceable components is expected at least in the case of maintenance organisation working under the Cx rating (components maintenance). In





this area an inspection process should be carried out to ensure as a minimum the availability of a "clear work order", approved data for the required repair, all required information from the customer/operator necessary for the issue of the CRS (e.g., identification, hours, cycles, origin, AD/SB, etc.).

Mastery Check

### **Individual Activity:**

For us to understand how to mix proper the matrix and catalyst and safety considerations in a workshop , everyone is encourage to watch this video. This video shows the important reminders before conducting the actual in the composite. Here's the link provided:

<https://www.youtube.com/watch?v=MifJ4WPMvqE>

<https://www.youtube.com/watch?v=UuDJWUxmtUk>

After watching , the last video has a self-assessment provides please , answer with honesty . time frame 10-15 mins .





**PRELIM LABORATORY**  
**ACTIVITY 5**

<b>Name</b>			<b>Instructor</b>		
<b>Section</b>		<b>GROUP NO.</b>		<b>Date:</b>	
				<b>Rating:</b>	

**MODULE V. COMPOSITE SAFETY**

**LABORATORY OBJECTIVE:**

- To students should be able to familiarized and aware the safety considerations, do and don'ts inside the laboratory

**TOOLS NEEDED:**

- Activity sheet
- Pen

**Time Limit:** 10 - 20 minutes

According to Anne Marie Helmenstine, Ph.D.,( sept 2019), the laboratory is an essentially dangerous place, with fire hazards, dangerous chemicals, and risky procedures. No one wants to have an accident in the laboratory, so it's imperative and strictly necessary to follow laboratory safety rules.

Good housekeeping is an important aspect of the profession. It directly impacts an individual's safety and general work. Due to the materials used in composite repair, good housekeeping is a must.





### Instructions:

Read carefully the statement below , and base on the orientation earlier about the rules and regulation with corresponding working environment . Put a check (/) if the corresponding statement if, the statement is one of the laboratory rules and regulations inside the laboratory and cross (x) if the statement shows not .

### **LABORATORY SAFETY RULES AND REGULATIONS & WORKING ENVIRONMENT**

- \_\_\_\_ 1. Make sure you wear protective gear, as needed. Basics include a lab coat and safety goggles. You may also need gloves, mask, earplugs, and other items, **but** depending on the nature of the experiment.
- \_\_\_\_ 2. Operate any machine tools or equipment when you do not know to use it.
- \_\_\_\_ 3. The laboratory is the place for horseplay.
- \_\_\_\_ 4. You could break glassware, annoy others, and potentially cause an accident.
- \_\_\_\_ 5. Always ensure the tools or equipment that you are going to use is in a safe and good working conditions.
- \_\_\_\_ 6. All emergency equipment such as fire extinguisher and exit doors must be kept clean of obstacles
- \_\_\_\_ 7. Make sure containers labeling is illegible and that the lids are intact.
- \_\_\_\_ 8. Do not used downdraft or dust collectors while sanding it may cause explosions.
- \_\_\_\_ 9. Keep your working area clean at all times
- \_\_\_\_ 10. Smoking is permitted in the laboratory area as long as you in the proper areas with right signage.
- \_\_\_\_ 11. Before leaving the shop/laboratory make sure that proper housekeeping was observed.
- \_\_\_\_ 12. Promptly report to your instructors any untoward accidents and indecent with in the shop/laboratory premises.
- \_\_\_\_ 13. Ensure there is a proper ventilation available while using with resin its better to work in an open area specifically while working with resin.
- \_\_\_\_ 14. Sanding procedure is allowed from lay-up area in composite laboratory
- \_\_\_\_ 15. Not only should you not bring in food or drinks, but you shouldn't taste but you smell chemicals already in the lab.





## HONESTY CLAUSE

My signature below constitutes my pledge that all of my writing is my own work, with the exceptions of those portions which are properly documented

**SHEILA MAY D. MOTOS, MEAM**  
Subject Instructor

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Parent Signature

