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**TRAINING LOCATION:**

PATTS COLLEGE OF AERONAUTICS  
Lombos St., Paranaque, Metro Manila  
Philippines

**SCHEDULED COURSE (S) DATES:**

Composite Repair I	-	October 9-13,2017
Composite Repair II	-	October 16-20, 2017

Thank you for the opportunity to discuss your requirements for the composites training. HEATCON® specializes in hands-on training for companies that require expert level training in the practical aspects of composites repair for both commercial and military aircraft at our facility in PATTS, Philippines.

**STATEMENT FOR TRAINING STANDARDS**

AIR 5719 is the basis for the AC 65-33, the course developed for all FAA FSDO (inspectors) and was based on AIR 5719, and AC 65-33 was then written based on the FSDO course.

HEATCON has revised its course material (CRI and CRII) and is based on AIR 5719.

Both of the above are considered 'Type II' awareness training, as indicated in AIR 5719. In order to satisfy the requirement that technicians understand the need for approved data and have the ability to follow approved procedures, we include a generic Structural Repair Manual in our training, which has been published for public domain by the FAA through their technical center.

HEATCON training courses satisfy the requirements of AIR 5719 and AC 65-33 for composite maintenance and repair Level II (awareness) training.

## **COURSE DESCRIPTIONS**

### **COMPOSITE REPAIR I**

#### *WEEK ONE – (5 working days)*

This five-day course is designed for aircraft repair technicians who desire to learn more about the fundamentals of advanced composite materials manufacturing and repair techniques and have, for example, a background in sheet metal with some exposure to composites technology.

The hands-on exercises are extensive, practical, and allow students to work with advanced composite materials including fiberglass, carbon fiber, and aramid fibers in their individual projects. Students will have the opportunity to work with core materials (Nomex®) honeycomb. Students will fabricate composite panels using these materials to learn manufacturing techniques and elevated temperature curing processes using the “hot bond” method is also part of the course curriculum offered in Composite Repair I. HEATCON® hot bond equipment is used in over 85% of the world’s airlines and Maintenance/ Repair and Overhaul (MRO) facilities, thus making it an essential part of the training. Discussions and practical exercises will include proper use of the HEATCON® Composite Systems Hot Bonders and accessories used throughout the world. The composite panels will be damaged and afterwards repaired, using basic repair techniques and various lay-up repair materials and processes. The final repaired parts will be inspected to determine the quality of the repair.

#### **Advantages and disadvantages of composite structures.**

- Fundamentals of composites / composite structures.
- Hazards and Safety precautions with chemicals & tools.
- Fabrication Methods: wet lay-up and prepreg lay-up.
- Resin Matrix Systems properties: thermosets vs. thermoplastics, temperature ranges, cold storage requirements/shelf life limits, adhesives.
- Fabrication: prepreg cloth handling and ply orientation, lay-up procedures, vacuum bagging.
- Curing Methods: oven/autoclave/hot bonder and cure alternatives such as hot air and heat lamps.
- Inspection Criteria: non-destructive inspection methods, defect detection, galvanic corrosion, documentation, acceptable vs. unacceptable defects, defect prevention.
- Health and Safety Issues: proper handling, personal protection, allergic reactions, waste disposal. Principles of Tooling: types of tools, thermal characteristics.
- Repair Methods: permanent vs. temporary repairs, scarf vs. stepped vs. mechanical patch repair scenarios, demonstration of “hot-bonder” field repair units.
- Damage assessment and classification.
- Introduction to determining unknown lay-ups.
- Drying moisture-contaminated honeycomb cores.
- Bagging techniques for on and off-aircraft repairs.
- Introduction to programming and use of composite repair kits.
- Heat management issues: Heat blanket and thermocouple problems.
- Teamwork and disposition defining roles within the MRO / Composites shop.
- Nondestructive testing / NDI methods
- Materials & material control

***Hands-on training exercises:***

- Component lay-up using prepreg materials, including: sandwich panels in carbon fiber, fiberglass and aramid fiber cloth panels, ply orientation, warp direction, stacking vs. nesting, material cutting and handling honeycomb installation.
- Component lay-up using fiberglass dry cloth and liquid epoxy resin materials, including: fiber orientation, lay-up, resin mixing procedures, health/safety concerns, controlling fiber-resin ratios, vacuum bagging
- Vacuum bagging: materials and processes, bleeder/breather schedules, bridging, debulking, leak checking, potential problems, use of caul plates, use of thermocouples, use of an ultrasonic leak detector.
- Curing processes: ramp rates, vacuum schedule, oven cures, and potential problems.
- Repairs: damage removal, scarf preparation, skin repair fabrication, use of wet resins and cloth for repairs, core plug repairs.
- Proper grinding and drilling practice on composite parts to obtain proficiency in tool usage.
- Introduction to the use of manufacturers' repair instructions.
- Introduction to vacuum bagging (without crushing fragile structures).
- Introduction to the inspection of repaired area.

Upon completion of this course, and for those who desire further training in more advanced repair scenarios, we recommend the Composite Repair II Course. This course immediately follows Composite Repair I.

**COMPOSITE REPAIR II**

***WEEK TWO- (5 working days)***

This course is designed to follow the Composite Repair I course and it is therefore assumed the student has mastered the learning objectives necessary to be successful in Composite Repair II. This course offers more challenging repair situations than an aircraft mechanic may encounter.

Emphasis is on practical repair practice, with less time being spent in the classroom. Students will be given a variety of projects to expand their knowledge of composite components and structures. These projects will allow the students to determine the manufacturing methods, extent of damage, ply orientation and lay-up of an unknown structure, as well as preparing the component for the repair process which includes, for example, removing liquid contamination. Vacuum bagging of complex shapes is another challenge presented to students.

Students will continue to be exposed to the HEATCON® hot bond equipment which is an essential part of the training in composite repair. Determining the best repair method and carrying out the complete repair will help prepare the student by providing them with a better understanding of repair solutions in practice. Programming HEATCON® Composite Systems (HCS) "hot-bonders" to carry out these repairs is an integral part of this course. Students will become familiar with the operation and advantages of each HCS bonders.

**Course Topics:**

- Determining unknown lay-ups.
- Drying moisture-contaminated honeycomb cores.
- Bagging techniques for on and off-aircraft repairs.
- Programming and use of composite repair sets.
- Dealing with contaminated structures.
- Handling heat blanket and thermocouple problems.
- Repair design considerations.

**Hands-on training exercises:**

- Damage identification and assessment.
- Core removal.
- Unknown lay-up determination; repair procedure determination.
- Use of manufacturers' repair instructions.
- Repair scarfing: including curved surfaces.
- Vacuum bagging (without crushing fragile structures)
- Thermocouple welding and repair.
- Cure programming and monitoring using portable composite repair sets.
- Introduction to metal bonding technique.
- Through and through structure damage with core replacement
- Exposure to radome repair issues.

**TERMS AND CONDITIONS**

- The price of the course(s) includes all notes, curriculums, workbooks, and instructor costs (including airfare and lodging) required for presenting the course.
- In on-site training courses, facilities, equipment, materials, and other necessary items as indicative by the type of training, are to be provided by the customer and must be available at the cost of the customer.
- HEATCON Composite Training reserves the right to modify the course name and content, but the training must be equivalent.
- One instructor is to be provided on-site by HEATCON® Composite Training.
- Repair I course is a prerequisite for Composite Repair II. Both courses must be taken by the same student and are designed to be taken concurrently. There is no discount or refund for students that do not complete the second week.
- Product prices and schedules, configurations, availability, and terms and conditions are subject to change at any time. HEATCON® Composite Training has the right to refuse or cancel any order, submission or delivery of any item for any reason including, without limitation, the event of a pricing error.
- Airfare and land travel to and from the (origin) to the (destination), and accommodation (hotels And meals) are the responsibility of the students. Assistance with travel arrangements is available through HEATCON Composite Training by request only and at an additional cost.
- Quote is valid for sixty days from the date of the quote.
- When participating in the courses a one and a half hour (1.5) lunch break will be scheduled. Prompt return after any break is mandatory and no refunds will be issued if any portion of the

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course(s) is/are missed due to tardiness or absenteeism. It is the responsibility of the student to ensure they arrive and return at the scheduled time.

- All courses are to be undertaken within the prescribed agreed upon time.

	ORIGINAL PRICE	PROMO PRICE
Firm Fixed Pricing for CRI Course (per student):	<del>\$ 1,875.00 USD</del>	<b>\$ 1,500.00 USD</b>
Firm Fixed Pricing for CRII Course (per student):	<del>\$ 1,875.00 USD</del>	<b>\$ 1,500.00 USD</b>
Discounted Pricing for CRI & CRII COMBINED (per student):	<del>\$ 3,250.00 USD</del>	<b>\$ 2,500.00 USD</b>

**Note \* for those taking the combined course and introduction to metal bond is included**