EARTH & FLIGHT COMPOSITES
TRAINING AND CONSULTANCY

Courses for Technicians

2017

Aviation

Aerospace

Energy industry

Marine / Boating

Automotive

Military

AEROSPACE AND ADVANCED COMPOSITES

TRAINING – CONSULTANCY – RESEARCH

EARTH & FLIGHT COMPOSITES
TRAINING AND CONSULTANCY

EFC mission statement

EFC' s mission is to provide the highest level of understanding and expertise in the aerospace and advanced composites community. By fulfilling this mission EFC will improve the life of those trusting it with their technical training, engineering support and research development.

Course compliance

EFC trains mechanics and engineers in the aviation, marine, aerospace, automotive, military and wind energy industries. Manufacturing techniques, repair methods, currency and recurrent training are compliant with the **CACRC** (Commercial Aircraft Composite Repair Committee) and **EASA** (European Aviation Safety Agency) Part 66 directives, that will become mandatory in the near future.

From all of us at Earth and Flight Composites ….. Welcome !

Today's engineers, managers, and technicians live in a world of increasing deadlines with an ever growing need for deep and immediate technical knowledge. We understand those needs and have therefore created these short course programs with you in mind.

Our courses provide the participants thorough understanding of the topic presented, allowing them to explore the subject further on their own while knowing that they were provided a solid foundation of knowledge for the subject at hand.

Each participant will leave the course with knowledge and skills that can immediately be translated in their work environment.

Each course will be taught by seasoned professionals that are experts in their fields and recognized as top trainers in the industry. When applicable, each course will combine classroom lectures and hands-on experience, so that learning is maximized by involving the participants every step of the way.

EFC facility in Hoofddorp, The Netherlands (more photos on the last pages)

European contact

Website: **www.efcomposites.com**
E-mail: **info@efcomposites.com**

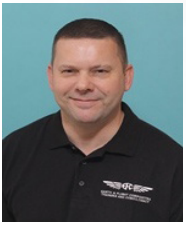
Introduction of the EFC team

Bert Groenewoud - Founder & CEO / Instructor

Bert Groenewoud

Bert has 3 decades of experience in the composite industry, working for KLM Royal Dutch Airlines as an instructor in Advanced Composites & Metal-bonded Repairs. Worked for Airborne Composites International NL as an instructor and Material Process Engineer also in their facility in Girona, Spain. Performs Radome Repair for Specto Aerospace NL. Worked for Vestas in Asia in Wind blade Repair, leading two Rope Teams and many other companies. Bert started his own **Earth and Flight Composites** Training & Consultancy company in January 2013 that is based in the Netherlands. In 1991 he was one of the founders of the SAE, IATA, ATA, C.A.C.R.C. (Commercial Aircraft Composite Repair Committee) task groups to standardize repair and taining. He is still active in the training task group.

Robert Otterspoor - EFC Composite Repair Specialist / Instructor



Robert Otterspoor

Robert is an experienced composites specialist who was involved in structural repairs, planning, managing, auditing, quality control and source inspection in parts manufacturing and maintenance environments. He has a profound knowledge of composites and metal bonding and has the ability to pass on knowledge and skills to composite repair technicians. Repair of all types of composite parts (radome, elevator, fuselage, rudder etc). Employers include Fokker Aero-structures, KLM / Air France, etc. Robert is officially registered at the EASA as Independent External Expert in several aviation disciplines.

Rolf Alexander Hovener - Business Development & Purchasing Manager

Rolf Hovener

Rolf is a Business Development & Purchasing Manager. He promotes EFC training, manages forecasts, prepares quotes and closes deals. He is responsible for business relationships and acquisition. Rolf started his career at KLM Roal Dutch Airlines as a Sheet metal structure specialist. In 1988 he was asked to join the KLM Engineering & Maintenance Training Department where he developed courses. Rolf has 2 decades of experience in purchase and selling of training. In this role he created an extensive network in the aviation maintenance world. Do not hesitate to contact Rolf, if you have any questions concerning EFC training, planning or consultancy. Rolf's e-mail address is: r.a.hovener@efcomposites.com

Composites specialists – Engineers, managers and academic level teachers

EFC has an extensive network of FEM (Finite Element Method) engineers, Radome- and Windblade Repair and Automotive specialists, Project Assistance employees and management. Also Aging Aircraft and Airframe Design trainers on an academic level. In addition EFC also assists companies requiring R&D capabilities.
Visit http://efcomposites.com - for more information.

Various specialists

Composites Courses for Technicians (TECH)

Basics of Composite Fabrication and Damage Repair (Level 1,2)
TECH-001 5 day Can also be conducted On Site

Skill Assessment for composite technicians
TECH-002 1 day Can also be conducted On Site

Basic Composite short courses
TECH-008 5 days Bicester UK

Intermediate of Composite Fabrication and Repair (Level 2)
TECH-010 5 day Can also be conducted On Site

Advanced Composite Repair (Level 2, 3)
TECH-020 5 day Can also be conducted On Site

Currency Practical Assessment Training (Level 2, 3)
TECH-021 5 day Can also be conducted On Site

Recurrent Training, Proficiency check (Level 1, 2 and 3)
TECH-022 3 day Can also be conducted On Site

Recurrent Repair Training for Composite Personnel (Proficiency Check)
TECH-023 5 day Can also be conducted On Site

Aircraft Cabin Interior Repair
TECH-030 5 day Can also be conducted On Site

Structural Repair Manual SRM

TECH-040 3 day Can also be conducted On Site

Structural Metal Bonding (Level 2,3)

TECH-100 5 day Hoofddorp

Advanced Radome Repair (Level 2, 3)

TECH-120 5 day Hoofddorp

Basic Resin Infusion (Level 2, 3)

TECH-150 5 day Can also be conducted On Site

Composite Tooling Fabrication Stage I

TECH-170 5 day Hoofddorp

Quick Repair Tooling Fabrication

TECH-171 5 day Hoofddorp

Wind blade Structural Repair (Level 2, 3)

TECH-260 5 day Hoofddorp

Check our website for full description, schedules and pricing about the EFC Technician courses.

For 'On Site' course information, please contact: Bert Groenewoud via e-mail info@efcomposites.com

On Site Global Consultancy

EFC offers expertise in On site in :

- Composite part assessment
- Assessment On the Job Training (OJT)
- Auditing
- Source and Quality inspection
- Quality Control
- Composite shop auditing & Repair auditing
- Composite Repair Training on Technician & Engineering level
- Global On-site composite component assessment

Locations of EFC training facilities

Earth and Flight Composites, B.V. Europe Correspondence
P.O. Box 3154, 2130 KD Hoofddorp, The Netherlands
Phone: **+31(0)-23-888-1815**

Earth and Flight Composites, B.V. Europe Training Facility
ROCvA building (Regional Community College of Amsterdam)
Opaallaan 25, 2132 XV Hoofddorp, The Netherlands

Bicester and Banbury College
Bicester campus - Telford House
Telford Road, Bicester, OX26 4LA, United Kingdom

Composite Repair Committee (CACRC) and regulatory documents

CACRC Course rules and Regulations

As a "Global" Composite Repair Training Provider, EFC trainees are trained to the latest current rules and skills and our training documents are directly derived from the documents developed by the SAE-CACRC task groups that were founded in 1991.

EFC follows and complies to the SAE-CACRC, FAA, CAA and EASA standards:

SAE-CACRC Aerospace Information Report (AIR) **AIR-4938 rev B**
SAE- Aerospace Recommend Practice (ARP) **ARP 6262** Composite Repair Technician Certification
FAA- Federal Aviation Administration Advisory Circular (AC) **AC-65-33** Development of Training/ Qualification programs for Composite Repair Technicians. EASA- Foreign **Part 145 Approval**.

Quote from the SEA-CACRC (2015) in their ARP6262 standard doucument:
"Currently, there is not a standard that requires a skill assessment to obtain a composite repair certificate" that can be found on: http://standards.sae.org/arp6262/

The SAE standard provides a method for EFC to comply with title 14 CFR Part 65 and AC 65-33 for basic aircraft composite repairs.

SCOPE

It is recognized that the structural integrity of repaired composite structures depends upon the capabilities of the individuals who are responsible for performing the repairs. EFC documents are assembled with great care and knowledge gained over three decades of working with composites.

They are intended to address repairs of composite structure regardless of the type of structure such as marine, wind turbine, automotive, aircraft, or other applications.

The SAE **ARP6262** certification standard establishes the minimum requirements for training, examining, and certifying composite structure repair personnel. It establishes criteria for the certification of personnel requiring appropriate knowledge of the technical principles underlying the composite structural repairs they perform. Persons certified under this document may be eligible for licensing or certification / qualification by an appropriate authority, in addition to this industry accepted basic composite repair technician certification.

Persons who successfully complete the requirements of this certification standard are considered to be able to perform basic composite repairs to composite structures in compliance with the manufacturers' repair documentation or other acceptable repair methods.

All curricula developed by EFC are derived from the CACRC standards are composed to identify the required knowledge and skills of a Composite and Metal bond Repair Technician / Specialist and are all-inclusive curricula written and published in modular sets.

Teaching levels 1 to 3 have been assigned to each curriculum and EFC Course Content Document (CCD) to define the knowledge, skills and abilities graduates will need to perform composite repairs. All subject matter will adequately be covered in lectures and laboratory sessions. The minimum number of prescribed hours may be exceeded, and may include an increase in the total number of training hours and / or increase in the teaching levels if required by the customer to meet their specific requirements. Each curriculum is a subpart of the CACRC **AIR-4938B** document.
http://standards.sae.org/wip/air4938b/

Part 1 is the basic curriculum independent of product and is the companion to **ARP6262**
Part 2 is the aircraft specific curriculum
Part 3 is the metal bond specific curriculum
Part 4 is bolted repairs of composite structure curriculum

These documents contain ATA-104 level IV curricula.

SEA - CACRC TEACHING LEVELS

The following definitions of minimum teaching levels are derived from **Title 14** Code of Federal Regulations, **Part 147** and may be exceeded. EFC provides their training according to those levels which are incorporated and noted in all our Course Content Documents (C.C.D.) and training material. http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title14/14cfr147_main_02.tpl

Level 1

Level 1 requires knowledge of general principles, but no practical application; no development of manipulative skill. Instruction by lecture, demonstration, and discussion. This teaching level generally refers to classroom discussion and does not require practical application. Teaching aids or instructional equipment may include charts, books, diagrams, or other visual teaching aids. If a training organization chooses to teach Level 1 courses incorporating actual components, the components do not have to be operational.

Level 2

Level 2 requires knowledge of general principles and limited practical application; development of sufficient manipulative skill to perform basic operations; and instruction by lecture, demonstration, discussion, and limited practical application. This teaching level requires some hands-on manipulative skills and their accompanying actual or simulated components / equipment, but still may be taught primarily in the classroom environment.

Level 3

Level 3 requires knowledge of general principles, performance of a high degree of practical application, development of sufficient manipulative skill to accomplish return to service (normal operation). Instruction by lecture, demonstration, discussion, and a high degree of practical application. This teaching level requires hands-on skill, as well as sufficient and appropriate instructional directions to train the students to develop manipulative skills sufficient to simulate return to service mechanical skill. At this level, the teaching aids must be similar to or be the actual items of equipment on which the student is expected to develop required skill levels. A Level 3 subject cannot be taught solely by lecture in the classroom; the appropriate training aids and hands-on experience must be used.

Level 4

Level 4 requires In-depth classroom discussion at the engineering level; high degree of detail and knowledge required, including applications of engineering analysis techniques.

EXAMINATIONS

EFC will follow the examination rule-set by the CACRC in all of our courses;

1. Written Examination:

The written examination shall contain a minimum of 50 multiple choice questions. The examination shall contain a minimum of three questions from each of the teaching Level 2 and above subjects. Successful completion of the written exam is 75% correct answers. The examination will be closed book.

2. Practical Assessment

By the end of the training program the trainee must demonstrate to the approved training provider that they can perform the basic tasks required to perform a composite repair

3. Re-examination:

If the trainee fails the written examination, they may request to retake a written examination. The written examination must not contain more than 20% of the questions that were on the failed examinations

CURRENCY AND RECURRENT TRAINING RECOMMENDATIONS

a. Currency:

Composite repair personnel should demonstrate continued competence every 3 years by performing a repair or by performing a practical assessment under the direct supervision of an examiner authorized and designated by the organization or by having participated in or performed at least six composite repairs in the 3-year period. EFC can provide individual or group practical assessment to prove competence of your technicians on request.

b. Recurrent Training:

A training program should include provisions for recurrent training to continually update persons on technology, materials, and other changes regarding composite maintenance and repair. Records of recurrent training should be maintained by the organization and the individual. EFC can provide individual or group recurrent training for your technicians on request.

c. Loss of Certification:

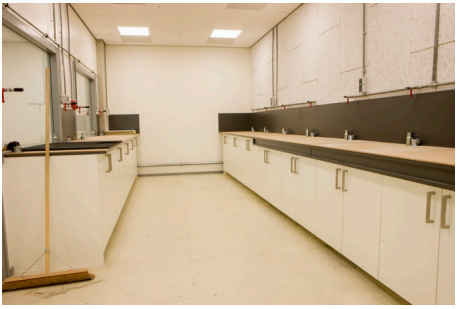
If the individual is shown to perform unsatisfactorily, certification shall be withdrawn.

d. Recertification:

Remedial training and / or testing may be required to become re-certified. EFC can provide individual or group remedial training and / or testing for your technicians to be come re-certified on request.

EFC facility visual impressions

Machine room



Trim room - 16 positions

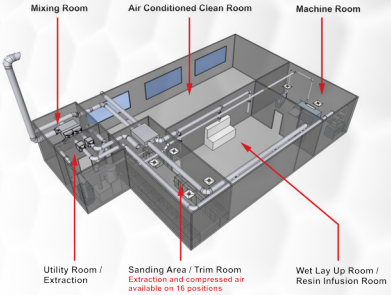
Cleanroom - North view

Cleanroom - South view

Wet Lay-Up room

Wet Lay-Up room - Fume extraction ducts

Utility room - Extraction system



Facility overview

Website

E-mail

SMS

Notes