

**Annex 1 Revision 2 to
Acceptable Means of Compliance (AMC) and Guidance
Material (GM) to Part-147**

Annex 1 to AMC and GM to Part 147 is hereby introduced regarding the possibility of distance learning, to provide flexibility during this COVID-19 difficult period.

New training methods have been introduced by Annex 1 (See attached AMC). For the time being, this AMC will introduce for interested organization by mean of a concession and on a case by case basis.

As detailed in the AMC, three different training methods are allowing remote trainings:

- E-learning.
- Distance learning synchronous.
- Distance learning asynchronous.

The organization will have to justify the concession request and ensure, at the minimum, the following:

- Students attendance is recorded in an accurate way
- Individual progress of the students is monitored
- Possible questions raised by students are answered
- Examination and practical training are excluded from concession (examinations will be performed at the approved facility when the activity is resumed)
- Additional support is provided for level 3 topics
- Training duration is extended as necessary (at least for level 3 topics)
- Concession duration is limited to 31 March 2021

AMC 147.130(a) Training procedures and quality system

This guidance material provides some clarifications for the incorporation of new training methods and training technologies in the procedures for aircraft maintenance training.

The classic training method is a teacher lecturing the pupils in a classroom. Commonly the training tools are a blackboard and training manuals. New technologies make it possible to develop new training methods and use other training tools, e.g. multimedia-based training and virtual reality. A combination of several training methods/tools is recommended in order to increase the overall effectiveness of the training.

Simulation cannot be eligible as a sole training or assessment tool for basic hand skills such as wiring, welding, drilling, filing, wire locking, riveting, bonding or any other skill where competence may only be achievable by performing a hands-on activity.

Three tables are provided to illustrate the possibilities for the use of different training methods and tools:

Table 1: Training tools

Table 2: Training methods

Table 3: Combination of training methods and tools and their use

Table 1 lists existing training tools that may be selected for basic and or type training.

Table 1: Training tools

Training tools		Description
1	Slideshow presentation	A structured presentation of slides.
2	Manuals	Comprehensive and controlled publication of a particular topic
3	Computer (desktop PC, laptop, etc.)	An electronic processing device that can hold and display information in various media.
4	Mobile devices (such as, but not limited to, tablets, smart phones, etc.)	A mobile electronic processing device that can hold and display information in various media.

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5	Videos	Electronic media for broadcasting moving visual images.
6	MSTD — Maintenance simulation training device	A training device that is intended to be used in maintenance training, examination, and/or assessment for a component, system or entire aircraft. The MSTD may consist of hardware and software elements.
7	Mock-up	A scaled or full-size replica of a component, system or entire aircraft that preserves (i.e. is an exact replica of) the geometrical, operational or functional characteristics of the real component, system or entire aircraft for which maintenance training is delivered with the use of such a replica.
8	Virtual reality	A computer-generated three-dimensional (3D) environment which can be explored and possibly interacted with.
9	MTD — Maintenance training device	Maintenance training device is any training device other than an MSTD used for maintenance training and/or examination and/or assessment. It may include mock-ups.
10	Real aircraft	<p>A suitable aircraft whose condition allows teaching a selection of maintenance tasks that are representative of the particular aircraft or of the aircraft category.</p> <p>'Suitable' means an aircraft of the type or licence (sub)category (if the licence (sub)category aircraft is outfitted with the same equipment subject to the particular lesson module(s) and is sufficiently similar so that the lesson objective(s) can be satisfactorily accomplished) for type training, or an aircraft representative of the licence (sub)category for basic training, and excludes 'virtual aircraft'.</p> <p>'Condition' means that the aircraft is equipped with its main components and that the systems can be activated/operated when this is required by the learning objectives.</p>
11	Aircraft component	<p>A suitable aircraft component used to teach specific maintenance tasks off-the-wing. This may include but is not limited to tasks such as borescope inspections, minor repairs, testing, or the assembly/disassembly of sub-components.</p> <p>'Suitable' means that the condition of the component should fit the learning objectives of the tasks and, when appropriate, may feature existing defects or damages.</p>
12	Augmented reality	An enhancement (modification, enrichment, alternation or manipulation) of one's current perception of reality elements of a physical real-world environment following user's inputs picked up by sensors transferred to rapid streaming computer images. By contrast, virtual reality replaces the real world with a simulated one.

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13	Embedded training	A maintenance training function that is originally integrated into the aircraft component's design (i.e. a centralized fault display system).
14	Classroom	A physical, appropriate location where learning takes place.
15	Virtual classroom	A simulated, not physical, location where synchronous learning takes place.
16	Virtual aircraft	A simulated, not physical, aircraft that may be used in theoretical training, practical training, examination or assessment.

Note: Synthetic training devices (STDs) is a generic term used for systems using hardware and/or software, simulating the behavior of one or more aircraft systems or a complete aircraft, such as maintenance simulation training devices (MSTDs), maintenance training devices (MTDs) and flight simulation training devices (FSTDs).

Table 2 lists existing training methods that may be selected for basic/ type training.

Table 2: Training methods

Training Method	Description	Instructor centred(1)	Student-centred (2)	Blended training(3)
Assisted learning (mentoring)	Assisted learning or mentorship represents an ongoing, close relationship of dialogue and learning between an experienced / knowledgeable instructor and a less experienced/knowledgeable student in order to develop experience/knowledge of students.	x	x	x
Computer- based training (CBT)	CBT is any interactive means of structured training using a computer to deliver a content. (Note: Not to be confused with competency- based training that also uses the acronym 'CBT')	x	x	x
Demonstration	A method of teaching by example rather than explanation	x		x
Distance learning asynchronous	Distance learning reflects training situations in which instructors and students are physically separated. It is		x	x

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	asynchronous if the teacher and the students do not interact at the same time.			
Distance learning synchronous	Distance learning reflects training situations in which instructors and students are physically separated. It is synchronous if the teacher and the students interact at the same time (real time).	x		x
E-learning	Training via a network or electronic means, with or without the support of instructors (e- tutors).	x	x	x
Lecturing (instructor-led/face to face)	Practice of face-to-face delivery of training and learning material between an instructor and students, either individuals or groups.	x		x
Mobile learning (M-learning)	Any sort of learning that happens when the student is not at a fixed, predetermined location, using mobile technologies.	x	x	x
Multimedia-based training ⁽⁴⁾	Any combined use of different training media	x	x	x
Simulation	Any type of training that uses a simulator imitating a real-world process or system	x	x	x
Web-based training (WBT)	Generic term for training or instruction delivered over the internet or an intranet using a web browser	x	x	x

Note: The purpose of this table is to provide a short definition for each associated training method and to relate each method to the focus of the learning. It is not meant to comprehensively explore and identify the capabilities of each training method herein included.

1. 'Instructor-centered' means that the instructor is responsible for teaching the student.
2. 'Student-centered' means that the student is responsible for the learning progress.
3. 'Blended training' includes different instructional methods and tools, different delivery methods, different scheduling (synchronous/asynchronous) or different levels of guidance. Blended training allows the integration of a range of learning opportunities.
4. 'Multimedia-based training' by definition uses various media to achieve its objective, thus, none of the single media listed is per se a complete solution for training.

Table 3 presents the combination of training methods and tools that may be taken into account for



theoretical and practical training.

The table is intended to support potential delivery methods. Additional training methods and further use of those methods could be acceptable to CARC when demonstrated as supporting learning objectives.

Table 3 Combination of training methods and tools and their use

Training method	Training tools	Theoretical elements			Practical elements	OJT	Learning objectives		
		Level 1	Level 2	Level 3			Knowledge	Skills	Attitude
See Table 2	See Table 1	Level 1	Level 2	Level 3			Knowledge	Skills	Attitude
Lecturing (instructor-led/face to face)	1.2.3.5.6.7.8.9.10.11.12.13.14.16	X	X	X	X	X only type	X	X	X only type
Assisted learning (mentoring)	1,2,3,5,6,7,8,9,10,11,12,13,14,15,16	X	X	X	X	X only type	X	X	X only type
e-learning	1,2,3,4,5,8,12,14,15,16	X	X	X ⁽¹⁾	X ⁽¹⁾		X	X ⁽¹⁾	X ⁽¹⁾
Computer-based training	1,2,3,4,5,8,12,14,15,16	X	X	X	X ⁽¹⁾		X only type	X ⁽¹⁾	
Multimedia-based training	1,2,3,4,5,8,12,13,14,15,16	X	X	X	X ⁽¹⁾		X only type	X ⁽¹⁾	X ⁽¹⁾
Web-based training (WBT)	1,2,3,4,5,8,12,14,15,16	X	X	X ⁽¹⁾	X ⁽¹⁾		X only Type	X ⁽¹⁾ only Type	X ⁽¹⁾
M-learning	1,2,3,4,5,12,15,16	X	X	X ⁽¹⁾	X ⁽¹⁾		X ⁽¹⁾ Type unlimited	X ⁽¹⁾	
Distance learning	1,2,3,4,5,8,15,16	X	X	X ⁽¹⁾	X ⁽¹⁾		X ⁽¹⁾ Type	X ⁽¹⁾	X ⁽¹⁾ only

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synchronous							unlimited		Type
Distance learning asynchronous	1,2,3,4,5,8,16	X	X	X ⁽¹⁾			X ⁽¹⁾ Type unlimited	X ⁽¹⁾	X ⁽¹⁾ only Type
Demonstration	1,2,3,5,6,7,8,9,10,11,12,13,14,15,16	X	X	X ⁽¹⁾	X		X ⁽¹⁾ only Type	X	X ⁽¹⁾ only Type
Simulation	1,3,4,6,7,8,9,10,12,14,15 ⁽¹⁾ ,16	X	X	X ⁽¹⁾	X		X	X	X only type

This table relates a given training method to a list of acceptable training tools (code), oriented to deliver the theoretical elements, practical elements or on-the-job training associated with their specific learning objectives

(1) Limited suitability. It means that the respective training method may be used but with limited results, thus requiring the support of a complementary training method to fulfil the learning objectives.

Note: Instructor (human) involvement should be considered in Basic Knowledge Modules 9A/9B.