European Aviation Safety Agency

Notice of Proposed Amendment 2014-22

New training methods and new teaching technologies

RMT.0281 (MDM.082) — 9.9.2014

EXECUTIVE SUMMARY

During the recent years, the evolution of aircraft technologies has been accompanied by the development of new training methods and teaching technologies. However, Annex III (Part-66) and Annex IV (Part-147) to Regulation (EC) No 2042/2003 do not sufficiently reflect these developments. This has been brought to the Agency's attention by industry associations and the Agency's Advisory Bodies. The Agency finds it, indeed, appropriate to introduce new training methods and teaching technologies into Annexes III and IV to Regulation EC (No) 2042/2003 for the benefit of all stakeholders.

As described in the Terms of Reference for this task, the specific objective of this proposal is to:

— evaluate the advantages and disadvantages of these new training methods and teaching technologies; and

— amend Regulation (EC) No 2042/2003 accordingly.

This Notice of Proposed Amendment (NPA) takes into account safety, economic and social issues related to the introduction of the new training methods and teaching technologies into the basic knowledge and aircraft type training of maintenance certifying staff.

This NPA proposes a regulatory framework to ensure the legitimacy of the new training methods and teaching technologies in terms of location, facilities, training records and documentation/course notes, the use of Maintenance Simulation Training Devices (MSTD) for practical training and assessment, duration of training courses, examinations and qualification and training of the instructors.

The proposed changes are expected to fulfil Industry's needs for efficient and cost-effective training of maintenance certifying staff, while maintaining or increasing the level of safety.

Applicability		Process map	
Affected regulations and decisions:	Annex III (Part-66) and Annex IV (Part-147) to Regulation (EC) No 2042/2003 Decision No 2003/19/RM	Concept Paper:	No
		Terms of Reference:	19.11.2012
		Rulemaking group:	Yes
Affected stakeholders:	Maintenance organisations, training organisations, air operators, personnel/licence and certificate holders, NAAs and EASA	RIA type:	Light
		Technical consultation during NPA drafting:	Yes
		Duration of NPA consultation:	3 months
Driver/origin:	Level playing field	Review group:	Yes
Reference:	N/A	Focussed consultation:	Yes (Workshop)
		Publication date of the Opinion/Decision:	2016/Q1

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1. Procedural information

1.1. The rule development procedure

The European Aviation Safety Agency (hereinafter referred to as the 'Agency') developed this Notice of Proposed Amendment (NPA) in line with Regulation (EC) No 216/2008[1] (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure[2].

This rulemaking activity is included in the Agency's 4-year Rulemaking Programme under RMT.0281 (MDM.082) 'New training methods and new teaching technologies'.

The scope and timescale of the task are defined in the related Terms of Reference RMT.0281 (MDM.082) Issue 1.

The text of this NPA has been developed by the Agency based on the input of the Rulemaking Group RMT.0281 (MDM.082). It is hereby submitted for consultation of all interested parties[3].

The process map on the title page contains the major milestones of this rulemaking activity to date and provides an outlook of the timescale of the next steps.

1.2. The structure of this NPA and related documents

Chapter 1 of this NPA contains the procedural information related to this task. Chapter 2 (Explanatory Note) explains the core technical content. Chapter 3 contains the proposed text for the new requirements. Chapter 4 contains the Regulatory Impact Assessment showing which options were considered and what impacts were identified, thereby providing the detailed justification for this NPA.

1.3. How to comment on this NPA

Please submit your comments using the automated **Comment-Response Tool (CRT)** available at **http://hub.easa.europa.eu/crt/**[4].

The deadline for submission of comments is **9 December 2014.**

1.4. The next steps in the procedure

Following the closing of the NPA public consultation period, the Agency will review all comments and will establish a Review Group and perform a focussed consultation which will consist of a workshop.

The outcome of the NPA public consultation, as well as the outcome of the Review Group work and that of the focussed consultation, will be reflected in the respective Comment-Response Document (CRD).

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1 Regulation (EC) No 216/2008 of the European Parliament and the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1), as last amended by Commission Regulation (EU) No 6/2013 of 8 January 2013 (OJ L 4, 9.1.2013, p. 34).

2 The Agency is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as the 'Rulemaking Procedure'. See Management Board Decision concerning the procedure to be applied by the Agency for the issuing of Opinions, Certification Specifications and Guidance Material (Rulemaking Procedure), EASA MB Decision No 01-2012 of 13 March 2012.

3 In accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure.

4 In case of technical problems, please contact the CRT webmaster (crt@easa.europa.eu).

The Agency will publish the CRD with the Opinion.

The Opinion contains proposed changes to EU regulations and it is addressed to the European Commission, which uses it as a technical basis to prepare a legislative proposal.

The Decision containing Acceptable Means of Compliance (AMC) and Guidance Material (GM) will be published by the Agency when the related Implementing Rule(s) are adopted by the Commission.

2. Explanatory Note

Rulemaking task RMT.0281 (MDM.082) has been proposed to the Agency by SSCC — the Agency's consultative body representing Industry. The Agency has recognised the need of the task and found it indeed adequate to introduce the new training methods and teaching technologies into Annexes III and IV (Part-66 and Part-147 respectively) to Regulation (EC) No 2042/2003 for the benefit of all stakeholders. The rulemaking task has been included in the Agency's 4-year Rulemaking Programme.

In November 2012, the Agency established a rulemaking group (GC RMT.281 (MDM.082)) with the participation of experienced members from Industry and civil aviation authorities whose task was the development of this NPA. The rulemaking group commenced its work in January 2013. After 12 months and 6 scheduled meetings dedicated to the drafting of the regulatory material including AMCs/GMs, the rulemaking group successfully completed its work. Based on the result of this work, the Agency has issued the present NPA.

2.1. Overview of the issues to be addressed

For a more detailed analysis of the issues addressed by this NPA, please refer to the RIA Section 4.1. 'Issues to be addressed'.

The main issues being addressed are the following:

— Current 147.A.145(b) excludes the possibility for any distance learning for the purpose of basic knowledge and aircraft type training in Part-147 'Approved Maintenance Training Organisations' (AMTOs), as it states that the training may only be carried out at the locations identified in the approval certificate and/or in the Maintenance Training Organisation Exposition (MTOE).

— Current 147.A.115(a) and (d) allow the use of 'Synthetic Training Devices' when they are considered beneficial for the training, but there is a lack of definition of such devices and a lack of guidance on their integration and usage in approved maintenance training.

— Current Appendix III to Part-66, point 3.(f) states that 'Multimedia-Based Training (MBT) methods may be used to satisfy the theoretical training element either in the classroom or in a virtual controlled environment', without further guidance and definition of the MBT and of the 'virtual controlled environment'.

— The training tools as described in the current rules suffer a lack of interactivity and do not sufficiently address the efficiency of the training course.

— There is a need to emphasise the importance of blending the different training methods with the objective of improving the effectiveness and the efficiency of the course.

— The current rules do not provide any option to adapt the duration of the training based either on the use of the new training methods and technologies or the blending of training methods.

— There is a lack of guidance for competent authorities on how to evaluate, validate and/or approve courses based on 'Multimedia-Based Training' methods.

2.2. Objectives

The overall objectives of the EASA system are defined in Article 2 of the Basic Regulation. This proposal contributes to the achievement of the overall objectives by addressing the issues outlined in Chapter 2.1 of this NPA.

As described in the Terms of Reference for this task, the specific objective of this proposal is to:

— evaluate the advantages and disadvantages of these new training methods and teaching technologies, and

— amend Regulation (EC) No 2042/2003 accordingly.

In particular, Part-66 and Part-147 should be reviewed with regard to, but not limited to, the following issues:

— Introduce, in addition to the traditional training methods, new training methods such as e-learning (or any digitalised tutor devices at the training facilities), Distance Learning or Web-Based Training (WBT) (at home or remote from the training organisations), Multimedia-Based Training (MBT), Computer-Based Training (CBT), practical training on virtual training devices.

  Some aspects of this task would be to:

  - provide a definition of these new methods; and
  - evaluate their advantages and disadvantages and then propose mitigation of any drawbacks or restrictions.

— Provide guidance to competent authorities regarding the qualification of a computerised training programme. One aspect would be the understanding of the simulation capabilities and its limits and then providing criteria to determine which parts of the practical elements of the training could be covered by simulation devices (bearing in mind that today all experience and practical training cannot be replaced by computers and virtual devices);

— Provide recommendations for the use and content of blended teaching methods;

— Better reflect criteria addressing the course efficiency based on these methods;

— Consider the potential impacts of these new teaching methods on the training in terms of content, level, duration, learning objectives, competence to be gained, documentation, assessment, examination and examiners, benefits and limits for the practical tasks.

2.3. Summary of the Regulatory Impact Assessment (RIA)

Chapter 4 contains the Regulatory Impact Assessment showing which options were considered and what impacts were identified, with the following conclusion:

Selected policy options

Option No	**Description**
0	Baseline option. No changes in rules.
1	Providing guidance by modifying/adding AMC/GM provisions only. No changes in implementing rules (IR).
2	**Amendment of the implementing rules (Part-66 & 147) to introduce new training methods and teaching technologies and providing guidance (AMC/GM).**
3	Option 2 plus amending Part-145 adding provisions for typical non-Part-66/Part-147 training courses based on distance learning (including HF, FTS, EWIS, etc.)

The preferred option is Option 2: To amend the IR to introduce new training methods and teaching technologies into the requirements and to provide AMC/GMs to provide guidance to the stakeholders on how to implement the new requirements.

2.4. Overview of the proposed amendments

2.4.1. Overview of the proposed amendments in Part-66

The proposed changes to Part-66 are summarised below:

(1) Introduction of a new requirement in Section B, Subpart B, to require competent authorities to produce a procedure for the approval of Multimedia-Based Training (MBT) courses based on the new training methods and teaching technologies, conducted either in a physical or a virtual controlled environment.

(2) In order to provide guidance on how to perform the assessment and the approval of such courses, a new Appendix VII to Part-66 'Assessment Method for Multimedia-Based Training Systems' is proposed providing the principles, instructions and the 'Assessment table of the quality of digital learning resource'.

The table serves as a tool for a simple, clear and standardised means of assessing any new digital training method intended to be used as a MBT method, student-centred or blended training method.

Although it is mainly intended for the competent authorities, the assessment table may also be used by training devices manufacturers and software developers in order to produce training devices and course software at a standardised quality level to ensure they will be approved by the competent authorities. Part-147 organisations may also benefit from this guidance when deciding which training devices or course software to procure.

(3) Introduction of a new paragraph 3 into Appendix I proposing different but appropriate training methods to be determined for each course or part thereof with regard to the scope and

objectives of each training phase, taking into consideration the benefits and the limits of the available training methods.

The previous Appendix III point (f) on the usage of MBT methods has been deleted and the same text inserted in paragraphs 3 of both Appendices I and III in order to increase clarity in defining the training standards and to align the training standards for basic knowledge training and aircraft type training.

(4) Introduction of a new AMC to paragraphs 3 of Appendices I and III providing the means of compliance that should be used when selecting the appropriate training method.

(5) Introduction of a new GM to paragraphs 3 of Appendices I and III on the selection of several training methods and tools recommending their combination and identifying their limitations in theoretical and practical elements of basic knowledge and aircraft type training.

For that purpose, the GM contains three tables:

— Table 1 ('Training methods and tools reference table') provides eligible training methods for basic knowledge or aircraft type training and relates them to the list of appropriate training tools defining the suitability of the chosen method and the tools for different levels of theoretical training elements, practical training elements and learning objectives in terms of competence elements to be gained. This table should be used in conjunction with:

— Table 2 which proposes a selection of eligible training methods, their definition and the categorisation of each training method, and

— Table 3 which provides eligible training tools and their definition and assigns a code to each training tool which is used in the second column of Table 1.

In Table 1, 'limited functionality' of a given training method for theoretical element, practical element and/or learning objective is marked with $^{(1)}$ (number one in parenthesis, superscripted). This means that the respective training method may be used but with limited results in achieving the learning objectives, thus requiring the support of a complementary method to fulfil the learning objectives.

Two examples below are given to illustrate the proper use of Tables 1, 2 and 3.

Example 1: The maintenance training organisation considers introducing 'Distance Training Asynchronous' in their basic knowledge training course.

As indicated in Table 1, this training method is eligible for basic knowledge training theoretical elements only, but with 'limited functionality' for Level 3 training. Thus, a complementary training method should be used, i.e. 'lecturing' (instructor led). 'Distance Training Asynchronous' is described in Table 2 where it is categorised as a student-centred training method. By combining Table 1 and Table 2, it appears that any of the following training tools, or any combination of them, may be used:

— slide show presentation,

— manuals,

— computer (PC),

— mobile devices,

— videos, and

— virtual reality.

Using 'Distance Training Asynchronous' the only competence element that can be gained is 'knowledge'. Hence, by blending it with 'lecturing', the full learning objectives can be achieved.

Example 2: The maintenance training organisation considers introducing 'e-learning' in their aircraft type training course.

As indicated in Table 1, this training method is eligible for aircraft type training for both theoretical and practical elements, but with 'limited functionality' for Level 3 theoretical training and practical training, thus a complementary training method should be used, i.e. 'assisted learning' (mentoring). The 'e-learning' method is described in Table 2 where it is categorised as an instructor-centred, student-centred and blended training method. By combining Table 1 and Table 2, it appears that any of the following training tools, or any combination of them, may be used:

— slide show presentation;

— manuals;

— computer (PC);

— mobile devices;

— videos;

— virtual reality;

— augmented reality; and

— classroom; and

— virtual classroom.

Using 'e-learning', the competence elements that can be gained are 'knowledge' and 'skills' up to a limited extent. Hence, blending this method with 'assisted learning' (mentoring), the full learning objectives can be achieved and the practical elements can be fully covered.

(6) Amendment of paragraph 1. (b)(iv) of Appendix III by replacing 'other training devices' with 'Maintenance simulation training devices (MSTD)' and 'Maintenance training devices (MTD)'. The definitions for MSTD and MTD respectively are given in Table 3.

(7) Amendment of paragraph 3.1.(d) of Appendix III by replacing 'attendance' by 'physical and/or virtual classroom attendance' and 'hours of training' by 'hours of physical and/or virtual classroom training' in order to reflect the new training methods and tools.

(8) Amendment of the content of the syllabus elements of the table in paragraph 3.1.(e) of Appendix III, as follows:

— Correction of the mistakes in '21A Air Supply' and '31A Instrument Systems' (wrong knowledge levels in helicopters turbine and helicopters piston); and

— Introduction of the new ATA chapter '47 Nitrogen Generation System' and associating knowledge levels to aeroplanes turbine and avionics.

(9) Amendment of the content of the table for practical training in paragraph 3.2.(b) of Appendix III, by:

— Addition of crossed items to chapter '49 Auxiliary Power Units (APUs)' and '71 Power Plant'; and

— Introduction of the new ATA chapter '47 Nitrogen Generation System' and associating crossed items.

(10) Amendment of the AMC to Section 1 point 6. by replacing 'synthetic training devices (STD)' and 'computer based training devices (CBT)' with 'Maintenance simulation training devices' (MSTD) and 'Maintenance training devices' (MTD).

(11) Introduction of a new point 7 in AMC to Section 1 to explain how MSTD and MTD should be integrated and used in the theoretical and practical elements of aircraft type training.

It defines MSTD as maintenance training, examination and assessment tool for components, systems or an entire aircraft and gives a detailed description of different types of MSTD depending on the level of accuracy and their capability of simulation, which could be limited or accommodate interactive simulation including some troubleshooting scenarios.

Flight simulation training devices (FSTD) may also be used as MSTD whenever their characteristics and capabilities are considered appropriate and supportive for the purpose of the delivery of the respective maintenance training element.

An MTD is defined as any training device other than an MSTD used for maintenance training, examination or assessment. Mock-ups or the aircraft may be considered as MTD.

(12) Amendment of the AMC to paragraph 3.1(d) point 4 by introducing an additional option in aircraft type training to reduce the minimum duration of the course depending on the selected training methods and tools proposed in the Training Needs Analysis (TNA). This is supported by two examples given. Point 5.g) and h) of the same paragraph have been slightly reworded to adapt these provisions to the new training methods. In point 5.(j), dealing with the minimum participation time for the trainee (90 % of the tuition hours), an additional requirement of 95 % of the content in case of the student-centred methods has been introduced to adapt the participation time to the specificity of the new training methods such as MBT, CBT, e-learning, m-learning, distance learning asynchronous, etc. In student-centred methods, completing the content is considered the key issue rather than the time the student spends on learning.

2.4.2. Overview of the proposed amendments in Part-147

The proposed changes to Part-147 are summarised below:

(1) Introduction of a new point (j) in 147.A.100 'Facilities requirements'. The purpose of this provision is to exempt the training organisation from complying with the requirements (a), (b), (c) and (d) of the same paragraph in case of distance learning, as these requirements are intended for the instructions performed at the training facilities and do not apply to distance learning where the training organisation has no control over the environment in which the student is located during the training. The exemptions provided are only applicable to the

training and shall not be applied to the examination and the assessment. Prior to initiating any distance learning course, the training organisation is required to brief the student and raise his/her awareness about the suitability of his/her learning location.

(2) Amendment to AMC 147.A.105 'Personnel requirements' by redefining 'larger' and 'smaller' maintenance training organisation for the purpose of appointing a training manager and a quality manager. The proposal now defines as 'larger' any maintenance training organisation with the capacity to examine or assess (instead of providing training) 50 students or more within a 12-month period. The working group decided to propose this change based on several comments from the industry indicating that the current definition is not clear enough (i.e. 50 students at the same time, 50 students per year, etc.). In terms of safety significance, examination and assessment are considered more relevant than the training activity itself.

Note: This proposal for amendment to AMC 147.A.105 'Personnel requirements' differs from the one already introduced within the task MDM.055, cf. NPA 2013-19.

(3) Introduction in AMC 147.A.105(f) 'Personnel requirements' of a provision for the instructors to be trained in the subject matter they are authorised to deliver, including the appropriate training methods and tools, in order to emphasise the importance of instructors (e-tutors/tele-trainers) being trained on the new training methods and technologies they are using.

(4) Introduction of a new GM 147.A.105(f) 'Personnel requirements' to clarify the training requirements for the instructors acting as e-learning instructors (e-tutors/tele-tutors/tele-trainer). Further guidance is given by providing the basic training structure for the instructors when involved in coaching, guiding and assisting of e-learning students.

(5) Introduction in 147.A.115 'Instructional equipment' of a new point (a) with new requirements for the design of the training content in a virtual training environment, in addition to the existing provision for classroom presentation equipment. Moreover, 'synthetic training devices' is replaced by 'maintenance training devices'.

(6) Introduction of a new AMC 147.A.115(a) 'Instructional equipment' to further explain the new provision in 147.A.115(a) including the computer system requirements in a virtual controlled environment, the traceability and recording of the student's activities and the policy regarding the use of 'third party providers' computer systems.

(7) Replacement of the complete text of current GM to 147.A.115(a) and addition of a new point (d) to make reference to GM to paragraph 3. of Appendix III to Part-66 and to point 7 of the AMC to section I of Appendix III to Part-66 for the description and definition of the MSTD. In addition, it takes into account the situation where an MSTD or an MTD requires a separate infrastructure due to the size and complexity, in which case the availability and access to the MSTD/MTD should be granted to the student in an appropriate manner.

(8) Introduction of a new point (c) in 147.A.120 'Maintenance training material' in order to allow Part-147 organisations to provide the training material to the students in any media. In the case of electronic media, the Part-147 organisation is responsible to ensure that the student has the appropriate means of accessing such material during the course duration at any given time.

(9) Introduction of a new point (d) in 147.A.135 'Examinations' in order to determine the examination to be performed in a controlled environment by the Part-147 organisation. Point (d)

provides the definition of 'controlled environment' and stipulates the examination to be described in the MTOE.

(10) Enhancement of point (b) in 147.A.145 'Privileges of the maintenance training organisation' by adding a new provision giving an option to the Part-147 organisation to provide training, including knowledge examination, from locations which may be URL (Universal Resource Locator) addresses, provided the virtual environment is clearly described in the MTOE and approved by the competent authority. In practice, this means that the training course and/or the knowledge examination may be conducted by logging on the organisation's server via a secured connection with an individual password from any place where the controlled environment, as defined in 147.A.135 (d), can be ensured.

(11) Replacement of text in point (g) in 147.A.200 'The approved basic training course' with a provision that provides an exemption from point (f). In practice, this means that the number of hours as established in Appendix I to Part-147 (Basic Training Course Duration) may be amended by the Part-147 organisation provided it can give proper justification of the proposed change. This change applies only to the theoretical element of the basic training course in order to take benefit from the changes in training methods and teaching technologies.

The existing point (g) is re-identified as point (h), without further changes.

(12) Enhancement of AMC 147.B.10 (b) 'Competent authority', point 1.7, by adding 'including training methods and technologies' at the end of the current text. This addition is proposed to emphasise the importance of the responsible staff from competent authorities to be trained on new training methods and technologies, in order to be able to properly oversee the implementation of the new requirements.

3. Proposed amendments

The text of the amendment is arranged to show deleted text, new or amended text as shown below:

(a) deleted text is marked with ~~strike through~~;

(b) new or amended text is highlighted in grey;

(c) an ellipsis (…) indicates that the remaining text is unchanged in front of or following the reflected amendment.

3.1. Draft Regulation (Draft EASA Opinion) — Part-66

Annex III (Part-66) to Regulation (EC) 2042/2003 is amended as follows:

New point 66.B.135 has been added to Section B, Subpart B as follows:

66.B.135 Procedure for the approval of Multimedia-Based Training (MBT) courses

The competent authority shall ensure the aircraft basic training and aircraft type training comply with Appendix I and Appendix III whenever approving courses based on MBT methods, student-centred or blended training methods, either in a physical or a virtual environment. Such procedure shall take into account the principles and criteria described in Appendix VII to this Annex (Part-66) 'Assessment method for Multimedia-Based Training (MBT) systems'.

Appendix I is amended as follows:

Appendix I

Basic knowledge requirements

1. Knowledge levels for Category A, B1, B2, B3 and C Aircraft Maintenance Licence

…

2. Modularisation

…

3. Basic knowledge training standard

An appropriate training method shall be determined for the entire course or for each module or sub-module thereof, with regard to the scope and objectives of each training phase and in consideration of the benefits and limits of the available training methods.

Multimedia-based Training (MBT) methods may be used in order to achieve the training objectives either in a physical or in a virtual controlled environment and is subject to the acceptance of the competent authority approving the training course.

Appendix III is amended as follows:

Appendix III

Aircraft Type Training and Examination Standard -

On-the-Job Training

1. General

Aircraft type training shall consist of theoretical training and examination, and, except for the category C ratings, practical training and assessment.

(a) Theoretical training and examination shall comply with the following requirements:

(i) …

(ii) …

(iii) …

(iv) …

(b) Practical training and assessment shall comply with the following requirements:

(i) …

(ii) …

(iii) …

(iv) Shall include demonstrations using equipment, components, ~~other training devices~~ Maintenance Simulation Training Devices, other Maintenance Training Devices or aircraft.

(v) …

…

3. Aircraft type training standard

Although aircraft type training includes both theoretical and practical elements, courses can be approved for the theoretical element, the practical element or for a combination of both.

An appropriate training method shall be determined for the entire course or for each part thereof, with regard to the scope and objectives of each training phase and in consideration of the benefits and limits of the available training methods.

Multimedia-based Training (MBT) methods may be used in order to achieve the training objectives either in a physical or in a virtual controlled environment and is subject to the acceptance of the competent authority approving the training course.

3.1. Theoretical element

(a) Objective:

…

(b) Level of training

…

(c) Duration:

…

(d) Justification of course duration:

…

In addition, the course must describe and justify the following:

— The minimum physical and/or virtual classroom attendance required ~~to~~ of the trainee, in order to meet the objectives of the course.

— The maximum number of hours of physical and/or virtual classroom training per day, taking into account pedagogical and human factors principles.

If the minimum attendance required is not met, the certificate of recognition shall not be issued. Additional training may be provided by the training organisation in order to meet the minimum attendance time.

(e) Content:

As a minimum, the elements in the Syllabus below that are specific to the aircraft type shall be covered. Additional elements introduced due to type variations, technological changes, etc. shall also be included.

The training syllabus shall be focused on mechanical and electrical aspects for B1 personnel, and electrical and avionic aspects for B2.

Chapters	Levels	**Aeroplanes turbine**		**Aeroplanes piston**		**Helicopters turbine**		**Helicopters piston**		**Avionics**
Licence Category		**B1**	**C**	**B1**	**C**	**B1**	**C**	**B1**	**C**	**B2**
Airframe Systems:										
21A Air Supply		**3**	**1**	**3**	**1**	**~~1~~3**	**~~3~~1**	**3**	**1**	**2**
31A Instrument Systems		**3**	**1**	**3**	**1**	**3**	**1**	**~~1~~3**	**~~3~~1**	**3**
47 Nitrogen Generation System		**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

~~(f) Multimedia Based Training (MBT) methods may be used to satisfy the theoretical training element either in the classroom or in a virtual controlled environment subject to the acceptance of the competent authority approving the training course.~~

Note: *(f) has been deleted and inserted in paragraph 3.*

3.2. Practical element

(a) Objective:

…

(b) Content:

…

Glossary of the table: LOC: Location; FOT: Functional / Operational Test; SGH: Service and Ground Handling; R/I: Removal / Installation; MEL: Minimum Equipment List; TS: Troubleshooting.

Chapters		B1/B2	B1					B2				
		LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
47	Nitrogen Generation System	X/X	X	X	X	X	X	X	X	X	X	X
49	Auxiliary Power Units (APUs)	X/X	X	X	-	X	X	X	X	-	-	-
71	Power Plant	X/X	X	X	-	-	-	-	X	-	-	-

A new Appendix VII has been added as follows:

Appendix VII

Assessment method for Multimedia-Based Training (MBT) systems

The assessment criteria shall comprise the evaluation, teaching, monitoring and students' support, as well as exercises and tests.

The general structure for the various sections shall be the following:

(a) Product identification

This section shall identify and present a digital educational resource. It shall indicate the name, title and those who are responsible for production, as well as the version number of the product.

(b) Category 'academic quality'

This section shall evaluate the quality of the information presented in the digital learning resource. Two essential criteria shall be assessed:

Information reliability — Is the information reliable, in compliance with current regulation, accurate and error free? Is information security guaranteed and is the information sustainable over time?

Information relevance — Is the information workable and usable? Does the information support the student in gaining learning objectives?

(c) Category 'pedagogical quality'

Does the system support the student in order to construct the required knowledge and is there an emphasis in active and student-centred activities which promote the development of knowledge and skills?

The main criteria for each product are related to three aspects:

Pedagogical formulation — it is characterised by the quality of simplification, the presence of summaries as well as the use of diagrams, figures, animations and illustrations.

Pedagogical construction — it evaluates whether the structure of the digital learning resource promotes its use in a pedagogical context. This means the ease of orientation (summary, lesson plan), presence of appropriate interactions, usability (back, forward, scroll boxes, etc.) and communication resources (questions and answers, FAQs, forum, etc.)

Pedagogical strategies — teaching and learning styles should be based on active teaching approaches (constructivism) to build meaningful situations related to learning objectives and learner motivation.

Assessment methods, such as exercises and tests, shall be implemented.

(d) Category 'didactic quality'

Does the content refer to real problems that could possibly the student face in the 'real' world? Is the content in adequacy with the objective and the target audience?

(e) Category 'technical quality'

This section assesses the design, browsing and technological aspects of the learning resource:

Design — The content and organisation of the learning resource shall promote appropriate use of colours, interactivity, graphic quality for selected images, animations and illustrations.

Browsing — While manipulating, the student should be able to find a plan, an index or detailed table of content. The suggested choices or guidelines shall be clear and the groupings within the menus shall be consistent.

Technological aspects — Multimedia techniques aim to combine and exploit the capacities of any new technologies in education to enhance the knowledge transfer. Therefore, the system shall favour the use of animations, simulations or any other interactive elements.

For the assessment process, each of above-mentioned aspects shall be dealt with separately.

The competent person performing the assessment shall put himself/herself in the position of the student or the end-user and rate each question in the attached form on a rating scale from 0 to 5. The final grade shall be calculated according to the sum of scores.

The following principle shall be observed: If only a single item within the categories is rated equal or below 3, an alternative learning process shall be considered in order to enhance the quality level or a product update, which fulfils the required quality level, shall be requested.

Assessment table of the quality of a digital learning resource			
Identification of the product:			
Name:	Author:	Version:	
			SCORE (0-5)
Category 'academic quality'			
Information reliability	1. Is the information presented reliable?		
Information relevance	2. Is the information presented relevant?		
Category 'pedagogical quality'			
Pedagogical formulation	3. Is the quality of the resource simplification good?		
	4. Does the educational resource present overviews and summaries?		
Pedagogical construction	5. Is the resource clearly structured? (summaries, plans)		
	6. Does the structure promote its use in the pedagogical context?		
Pedagogical strategies	7. Are the objectives stated?		
	8. Does the resource include stimuli to promote learning?		
	9. Does the resource present activities creating interactions between student and instructor?		
	10. Is active mental engagement of the student favoured?		
	11. Is learning based on student-centredness?		
	12. Are there any problem-solving tasks fostering conductive learning?		
	13. Does the resource present activities creating interactions between students?		
	14. Is the student able to see his/her learning progress?		
Assessment method	15. Does the resource provide a self-assessment procedure?		
Category 'didactic quality'			
Learning activities	16. Do activities refer to real problems which the student will possibly face outside of the classroom?		
Learning content	17. Is there a match between audience, content and the objectives?		
Category 'technical quality'			
Design	18. Is browsing between different elements of the product easy?		
Browsing	19. Are multimedia techniques effectively supporting information and pedagogy?		
Technological aspects	20. Do multimedia techniques promote information and pedagogy?		
		Final Score:	

The following rating intervals show the Quality level for each assessed learning resource:

100 – 81:	Excellent educational resource. It offers different functionalities and meets the required quality criteria.
80 – 61:	The learning resource meets the required quality criteria despite some weaknesses.
60 – 41:	The learning resource does not allow a sufficiently worthy educational use. It can be used for 'informal' training only.
40 – 0:	The learning resource is below the average. It does not meet several required quality criteria.

Although the overall rating level may fulfil the required criteria, it shall be checked if there is no single rating within the categories that is equal or below 3.

In this case an alternative learning process shall be considered or a product update which fulfils the required quality level(s) shall be requested.

3.2. Draft Acceptable Means of Compliance and Guidance Material — Part-66 (Draft EASA Decision)

AMC to Paragraph 3. of Appendix I to Part-66 'Basic knowledge requirements'

Basic knowledge training standard

Training methods are categorised as 'instructor-centred', 'student-centred' and 'blended training'.

The actual training method and the training tools should be adapted to the complexity or the criticality of the learning subject, and be chosen in consideration of their intrinsic characteristics such as, but not limited to, their efficiency and the pedagogical benefits of the method/tool.

A complex or critical subject should normally not be taught through a student-centred method unless provisions are in place to verify the actual and progressive acquisition of knowledge, skills and attitude by the student.

GM to Paragraph 3. of Appendix I to Part-66 'Basic knowledge requirements'

Basic knowledge training standard

A combination of several training methods/tools is recommended in order to benefit from the advantages of each of the methods and to consequently increase the overall efficiency of the training.

Simulation is not an eligible training tool for teaching basic hand skills such as wiring, welding, drilling, filing, wire locking, riveting, bonding or any other skill where competence can only be achieved by performing a hands-on physical activity.

The following table presents the combination of training methods and tools in reference to training elements and learning objectives and indicates their benefits and limits to be taken in to account when selecting the actual training method(s) for basic knowledge training.

Table 1

Training methods and tools reference table — Basic knowledge training								
Training method	Training tool (Code)	Theoretical elements			Practical elements	Learning objectives		
		Level 1	Level 2	Level 3		Know-ledge	Skills	Attitude
Theoretical training	1,2,3,4,5,6,7,8,9,10, 11,12,13,14,15	x	x	x		x		
Lecturing (instructor-led /face to face)	1,2,3,5,6,7,8,9,10, 11,12,13,14	x	x	x	x	x	x	x
Assisted learning (mentoring)	1,2,3,5,6,7,8,9,10, 11,12,13,14,15	x	x	x	x	x	x	x
e-learning	1,2,3,4,5,8,12,14,15	x	x	x(1)	x(1)	x	x(1)	
Computer-based Training	1,2,3,4,5,8,12,14,15	x	x	x	x	x	x	
Multimedia-based Training	1,2,3,4,5,8,12,13,14,15	x	x	x	x(1)	x	x(1)	
M-learning	1,2,3,4,5,12,15	x	x	x(1)	x(1)	x	x(1)	
Distance learning synchronous	1,2,3,4,5,8,15	x	x	x(1)	x(1)	x	x(1)	
Distance learning asynchronous	1,2,3,4,5,8	x	x	x(1)		x		
Practical training	1,2,3,4,6,7,8,9,10, 11,12,13,14,15(1)				x		x	x
Demonstration	1,2,3,5,6,7,8,9,10, 11,12,13,14,15	x	x	x(1)	x	x	x	x(1)
Simulation	1,3,4,6,7,8,9,10,12,14, 15(1)	x	x	x(1)	x	x	x	x
This table relates a given training method to a list of acceptable training tools (code), oriented to deliver the theoretical elements or practical elements associated to their specific learning objectives. (1) Limited functionality. It means that the respective training method can be used but with limited results, thus requiring the support of a complementary training method to fulfil the learning objectives.								

The table below proposes a selection of existing training methods to be taken into account when selecting the actual training method(s).

Table 2

Training method	Description	Instructor-centred	Student-centred	Blended training[(1)]
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
Computer-based training (CBT)	CBT is any interactive means of structured training using a computer to deliver a content.	X	X	X
Demonstration	A method of teaching by example rather than simple explanation.	X		
Distance learning asynchronous	Distance learning reflects training situations in which instructors and students are physically separated. It is asynchronous if the teacher and his/her students do not interact at the same time.		X	
Distance learning synchronous	Distance learning reflects training situations in which instructors and students are physically separated. It is synchronous if the teacher and his/her students interact at the same time.	X		
e-learning	Training organised around learning events, which may be led by instructors (e-tutors), via a network or electronic means.	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		
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[(2)]	Any combined use of different training media.	X	X	X
On-the-job training (OJT)	OJT refers to gaining competence and experience. It may or may not use structured learning process and is usually peer to peer. It takes place on aircraft, on component, or at the	X		X

	workplace (environment) and involves actual work performance.			
Practical training	Practical training refers to gaining competence, using structured learning process, instructor-led, in a classroom, simulation, on aircraft or in shops environment. It does not necessarily result in physical maintenance actions on real aircraft (removal/installation).	X		X
Simulation	Any type of training that uses a simulator imitating a real-world process or system.	X	X	X
Theoretical training	Teaching the knowledge element of the aircraft/system.	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) 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. (2) 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 a training.				

The following table proposes a selection of existing training tools and indicates their benefits and limits to be taken into account when selecting the actual training tool(s).

Table 3

Training tools	**Description**	**Code**
Slideshow presentation	A structured presentation of slides.	1
Manuals	Comprehensive and controlled publication of a particular topic.	2
Computer (Desktop PC)	An electronic processing device that can hold and display information in various media.	3
Mobile devices (such as, but not limited to, tablets, mobile phones, laptops, etc.)	A mobile electronic processing device that can hold and display information in various media.	4
Videos	Electronic media for broadcasting moving visual images.	5
MSTD — Maintenance simulation training device	Device that is intended to be used in the maintenance training, examination, assessment for a system or an entire aircraft. The MSTD may consist of hardware and software elements.	6

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.	7
Virtual reality	A computer-generated three-dimensional (3D) environment which can be explored and interacted with a person.	8
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.	9
Real aircraft	A suitable aircraft whose condition allows teaching a selection of maintenance tasks that are representative of the particular aircraft or of the aircraft category. 'Suitable' means an aircraft of the type for type training, or an aircraft representative of the licence category for basic training, and excludes 'virtual aircraft'. '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.	10
Aircraft component	A suitable aircraft component used to teach specific maintenance tasks off-the-wing. This may include but not limited to tasks such as boroscope inspections, minor repairs, testing, or the assembly/disassembly of sub-components. '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.	11
Augmented reality	An enhancement (modification, enrichment, alteration or manipulation) of one's current perception of reality elements of a physical, real-world environment following users inputs picked up by sensors transferred to rapid streaming computer images (By contrast, virtual reality replaces the real world with a simulated one).	12
Embedded training	A maintenance training function that is originally integrated into the aircraft component's design.	13
Classroom	A physical, appropriate location where learning takes place.	14
Virtual classroom	A virtual, appropriate location where synchronous learning takes place.	15
Note: The purpose of this table is to provide a short definition and codification for each associated training tool. It is not meant to comprehensively explore and identify the capabilities of each training tool included.		

...

AMC to Section 1 of Appendix III to Part-66 'Aircraft Type Training and Examination Standard. On-the-Job Training'

Aircraft Type Training

1. …
2. …
3. …
4. …
5. …
6. The theoretical and practical training should be complementary and may be:
   - Integrated or split
   - Supported by the use of training tools, such as trainers, virtual aircraft, aircraft components, ~~synthetic training devices (STD), computer based training devices (CBT), etc.~~ maintenance simulation training devices (MSTD) and maintenance training devices (MTD).
7. Maintenance simulation training devices (MSTD) and maintenance training devices (MTD) integration and usage in maintenance type training (theoretical and/or practical) should consider the following:
   - The use of actual aircraft components should be allowed for any MSTD or MTD (even if the components are in a non-airworthy condition, provided that this condition has no impact on the related geometrical, operational or functional characteristics for which they are used in the maintenance training, examination or assessment).
   - A maintenance simulation training device (MSTD) is a training device that is intended to be used in the maintenance training, examination, assessment for a component, system or an entire aircraft. The MSTD may consist of hardware and software elements. The complexity and degree of simulation may vary and support type training elements that address a component, a system or the whole aircraft. Based on their characteristics and capabilities, the MSTD may be:
     - a training device capable of providing for the respective component or system the representation of aircraft location, access, layout and servicing with an acceptable level of accuracy and limited simulation; or
     - a training device capable of providing for the respective component or system the representation of aircraft location, access, layout with sufficient accuracy and with interactive simulation for: servicing and the applicable maintenance data for operational (O) and functional (F) test elements including Built-in test (BIT) initiation and monitoring from outside the cockpit. Such a representation should have the capability to accommodate some trouble-shooting scenarios; or
     - a training device capable of providing for the respective component or system the representation of on board — flight deck/cockpit or cabin — indication and controls with an acceptable level of accuracy and limited interactive simulation; or

- a training device capable of providing for the respective component or system the representation of on board —flight deck/cockpit or cabin — indication and controls with sufficient accuracy and with interactive simulation for: servicing and the applicable maintenance data for operational (O) and functional (F) test elements including built-in test (BIT) initiation and monitoring. Such a representation should have the capability to accommodate some troubleshooting scenarios; or
- any combination of the above.

— Flight simulation training devices (FSTD) may be used as MSTD whenever their characteristics and capabilities are considered appropriate for, and supportive of, the delivery of the respective maintenance training element(s).

— A maintenance training device (MTD) is any training device other than an MSTD used for maintenance training and/or examination and/or assessment. Mock-ups or the aircraft may be considered as examples of an MTD.

AMC to Paragraph 3. of Appendix III to Part-66 'Aircraft Type Training and Examination Standard. On-the-Job Training'

Aircraft type training standard

Training methods are categorised as 'instructor-centred', 'student-centred' and 'blended training'.

The actual training method and the training tools should be adapted to the complexity or the criticality of the learning subject, and be chosen in consideration of their intrinsic characteristics such as, but not limited to, their efficiency and the pedagogical benefits of the method/tool.

A complex or critical subject should normally not be taught through a student-centred method unless provisions are in place to verify the actual and progressive acquisition of knowledge by the student.

GM to Paragraph 3. of Appendix III to Part-66 'Aircraft Type Training and Examination Standard. On-the-Job Training'

Aircraft type training standard

A combination of several training methods/tools is recommended in order to benefit from the advantages of each of the methods and to consequently increase the overall efficiency of the training.

The following table identifies the combination of training methods and tools in reference to training elements and learning objectives and indicates their limitations to be taken into account when selecting the actual training method(s) in aircraft type training.

Table 1

Training Methods and Tools Reference Table – Aircraft Type Training									
Training method	Training tool (Code)	Theoretical elements			Practical elements	On-the-job-training	Learning objectives		
		Level 1	Level 2	Level 3			Know-ledge	Skills	Attitude
Theoretical training	1,2,3,4,5,6,7,8,9,10, 11,12,13,14,15	x	x	x			x		
Lecturing (instructor-led /face to face)	1,2,3,5,6,7,8,9,10,11, 12,13,14	x	x	x	x	x	x	x	x
Assisted learning (mentoring)	1,2,3,5,6,7,8,9,10,11, 12,13,14,15	x	x	x	x	x	x	x	x
e-learning	1,2,3,4,5,8,12,14,15	x	x	x(1)	x(1)		x	x(1)	
Computer-based training	1,2,3,4,5,8,12,14, 15	x	x	x	x		x	x	
Multimedia-based training	1,2,3,4,5,8,12,13, 14,15	x	x	x	x(1)		x	x(1)	
M-learning	1,2,3,4,5,12,15	x	x	x(1)	x(1)		x	x(1)	
Distance learning synchronous	1,2,3,4,5,8,15	x	x	x(1)	x(1)		x	x(1)	
Distance learning asynchronous	1,2,3,4,5,8	x	x	x(1)			x		
Practical training	1,2,3,4,5,6,7,8,9,10, 11,12,13,14,15(1)				x	x		x	x
Demonstration	1,2,3,5,6,7,8,9,10,11, 12,13,14,15	x	x	x(1)	x		x	x	x(1)
Simulation	1,3,4,6,7,8,9,10,12, 14,15(1)	x	x	x(1)	x		x	x	x
On-the-job training	2,3,4,10,11,12,13				x	x		x	x

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 to their specific learning objectives.

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

The table below proposes a selection of existing training methods and indicates their benefits and limits to be taken into account when selecting the actual training method(s).

Table 2

Training method	Description	Instructor-centred	Student-centred	Blended training (1)
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
Computer-based training (CBT)	CBT is any interactive means of structured training using a computer to deliver content.	X	X	X
Demonstration	A method of teaching by example rather than simple explanation.	X		
Distance learning asynchronous	Distance learning reflects training situations in which instructors and students are physically separated. It is asynchronous if the teacher and his students do not interact at the same time.		X	
Distance learning synchronous	Distance learning reflects training situations in which instructors and students are physically separated. It is synchronous if the teacher and his students interact at the same time.	X		
E-learning	Training organised around learning events, which may be led by instructors (e-tutors), via a network or electronic means.	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		
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(2)	Any combined use of different training media.	X	X	X
On-the-job training (OJT)	OJT refers to gaining competence and experience. It may or may not use structured learning process and is usually peer to peer. It takes place on aircraft, on component, or at the workplace (environment) and involves actual	X		X

	work performance.			
Practical training	Practical training refers to gaining competence, using structured learning process, instructor-led, in a classroom, simulation, on aircraft or in shops environment. It does not necessarily result in physical maintenance actions on real aircraft (removal/installation).	X		X
Simulation	Any type of training that uses a simulator imitating a real world process or system.	X	X	X
Theoretical training	Teaching the knowledge element of the aircraft/system.	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 included. (1) 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. (2) 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 a training.				

The following table proposes a selection of existing training tools to be taken into account when selecting the actual training tool(s).

Table 3

Training tools	**Description**	**Code**
Slideshow presentation	A structured presentation of slides.	1
Manuals	Comprehensive and controlled publication of a particular topic.	2
Computer (Desktop PC)	An electronic processing device that can hold and display information in various media.	3
Mobile devices (such as, but not limited to, tablets, mobile phones, laptops, etc.)	A mobile electronic processing device that can hold and display information in various media.	4
Videos	Electronic media for broadcasting moving visual images.	5
MSTD — Maintenance simulation training device	Device that is intended to be used in the maintenance training, examination, assessment for a system or an entire aircraft. The MSTD may consist of hardware and software elements.	6

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.	7
Virtual reality	A computer generated three-dimensional (3D) environment which can be explored and with which a person can interact.	8
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.	9
Real aircraft	A suitable aircraft whose condition allows teaching a selection of maintenance tasks that are representative of the particular aircraft or of the aircraft category. 'Suitable' means an aircraft of the type for type training, or an aircraft representative of the licence category for basic training, and excludes 'virtual aircraft'. '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.	10
Aircraft component	A suitable aircraft component used to teach specific maintenance tasks off-the-wing. This may include, but not limited to, tasks such as boroscope inspections, minor repairs, testing, or the assembly/disassembly of sub-components. '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.	11
Augmented reality	An enhancement (modification, enrichment, alteration or manipulation) of one's current perception of reality elements of a physical, real-world environment following users' inputs picked up by sensors transferred to rapid streaming computer images (By contrast, virtual reality replaces the real world with a simulated one).	12
Embedded training	A maintenance training function that is originally integrated into the aircraft component's design.	13
Classroom	A physical, appropriate location where learning takes place.	14
Virtual classroom	A virtual, appropriate location where synchronous learning takes place.	15
Note: The purpose of this table is to provide a short definition for each associated training tool. It is not meant to comprehensively explore and identify the capabilities of each training tool included.		

…

AMC to Paragraph 3.1(d) of Appendix III to Part-66 'Aircraft Type Training and Examination Standard. On-the-Job Training'

Training Needs Analysis for the Theoretical Element of the Aircraft Type Training

1. …
2. …
3. …
4. In order to approve a reduction of such minimum duration, the evaluation done by the competent authority should be performed on a case-by-case basis appropriate to the aircraft type and to the training methods and tools proposed.

   For example:

   a) while it would be exceptional for a theoretical course for a large transport category aircraft such as an A330 or ~~B757~~ B777 to be below the minimum duration shown, it would not necessarily be exceptional in the case of a General Aviation (GA) business aircraft such as a Learjet 45 or similar.

   b) TNA for a GA aircraft course could demonstrate that a course of a shorter duration satisfies the requirements.

   c) The use of an MSTD (i.e. flat panel trainer) comprising actual aircraft software may result in the duration of the training being reduced due to a more effective transfer of knowledge, using the multimedia-based training (or blending the training methods) may improve the efficiency of training and, consequently, contribute to a reduction of the overall time needed to achieve the learning objectives.

5. When developing the TNA, the following should be considered:

   a) …

   b) …

   c) …

   d) …

   e) …

   f) …

   g) The TNA should:

      …

      - Describe the following:

        - The instructional methods and ~~equipment~~ tools, as well as their blended application, ~~teaching methods and blending of the teaching methods~~ in order

to ensure the effectiveness of the training;

- The maintenance training documentation/material to be delivered to the student;
- Facilitated discussions, questioning session, additional practiced-oriented training, etc.;
- The homework, if developed, i.e. to support the achievement of learning objectives while using asynchronous distance learning or self-learning methods;
- The training provider's resources available to the learner.

h) It is acceptable to differentiate between ~~issues~~ subjects which have to be led by an instructor and ~~issues~~ subjects which may be delivered through interactive simulation training devices and/or covered ~~web-based~~ by self-paced elements. Overall time of the course will be allocated accordingly.

i) …

j) The minimum participation time for the trainee in order to meet the objectives of the course should not be less than 90 % of the tuition hours or 95 % of the content in case of the student-centred methods in theoretical training course. Additional training may be provided by the training organisation in order to meet the minimum participation time. If the minimum participation defined for the course is not met, a certificate of recognition should not be issued.

k) …

AMC to Paragraph 4.1 of Appendix III to Part-66 'Aircraft Type Training and Examination Standard. On-the-Job Training'

Type training examination and assessment standard

Written examinations may be computer-based or hard copy-based, or a combination of both as approved by the competent authority. Refer to AMC 147.A.135.

AMC to Section 6 of Appendix III to Part-66 'Aircraft Type Training and Examination Standard. On-the-Job Training'

On-the-Job Training (OJT)

1. …

2. …

3. The use of ~~simulators~~ MSTD and MTD for OJT should not be allowed.

4. …

5. …

3.3. Draft Regulation (Draft EASA Opinion) — Part-147

Annex IV (Part-147) to Regulation (EC) No 2042/2003 is amended as follows:

SUBPART B

ORGANISATIONAL REQUIREMENTS

147.A.100 Facility requirements

(a) …

(b) Fully enclosed appropriate accommodation separate from other facilities shall be provided for the ~~instruction~~ delivery of training ~~of theory~~ and the conduct of knowledge examinations.

(c) …

(d) …

(e) …

(f) The maximum number of students undergoing practical training during any training course shall not exceed 15 per ~~supervisor~~ instructor or assessor.

(g) …

(h) Secure storage facilities shall be provided for examination ~~papers~~ and training records. The storage environment shall be such that documents remain in good condition for the retention period as specified in 147.A.125. The storage facilities and office accommodation may be combined, subject to adequate security.

(i) …

(j) By derogation to paragraphs (a) through (d), in the case of distance learning performed at a location where the Part-147 organisation has no control over the environment where the student is located, the Part-147 organisation shall brief the student and raise his/her awareness regarding the suitability of his/her learning location. This derogation applies only to distance learning and not to the corresponding examination and/or assessment.

147.A.105 Personnel requirements

(a) …

(b) …

(c) The maintenance training organisation shall contract sufficient staff to plan/perform ~~knowledge~~ theoretical and practical training, conduct knowledge examinations and practical assessments in accordance with the approval.

(d) …

(e) …

(f) …

(g) …

(h) …

147.A.115 Instructional equipment

(a) Each classroom shall have appropriate presentation equipment of a standard that ensures students can easily read presentation text/drawings/diagrams and figures from any position in the classroom.

In case of a virtual training environment, the training content shall be designed to assist students in their understanding of the particular subject matter, ensuring students can easily read presentation text/drawings/diagrams and figures.

Presentation equipment ~~shall~~ may include representative ~~synthetic training devices~~ maintenance simulation training devices (MSTDs) to assist students in their understanding of the particular subject matter where such devices are considered beneficial for such purposes.

(b) …

(c) …

(d) The aircraft type training organisation as specified in 147.A.100(e) must have access to the appropriate aircraft type. ~~Synthetic training devices~~ MSTDs may be used when such ~~synthetic~~ training devices ensure adequate training standards.

147.A.120 Maintenance training material

(a) …

(b) …

(c) Access to the maintenance training material relevant to basic or type training courses can be provided in any media (hard copy or electronic) provided the student has the appropriate means of accessing such material at any given time during the entire course duration.

147.A.135 Examinations

(a) …

(b) …

(c) …

(d) The examination shall be performed in a controlled environment by a Part-147 organisation and described in the MTOE.

For examination purposes, a controlled environment is one in which the identity of the students, the conduct of the examination process, the integrity of the examination and the security of the examination material shall be established, verified and guaranteed.

147.A.145 Privileges of the maintenance training organisation

(a) ...

(b) Training, knowledge examinations and practical assessments may only be carried out at the locations identified in the approval certificate and/or at any location specified in the maintenance training organisation exposition.

Training and knowledge examination location may include URL (Universal Resource Locator) addresses, provided the virtual environment is clearly described in the MTOE.

(c) …

(d) …

(e) …

(f) …

SUBPART C

APPROVED BASIC TRAINING COURSE

147.A.200 The approved basic training course

(a) …

(b) …

(c) …

(d) …

(e) …

(f) The duration of basic training courses shall be in accordance with Appendix I.

(g) Notwithstanding point (f), in order to benefit from changes in training technology and methods (theoretical training), the number of hours as established in Appendix I (Basic training course duration) may be amended provided that the syllabus content and schedule describe and justify the proposed change. A procedure shall be included in the MTOE to justify these changes.

(h) The duration of conversion courses between (sub)categories shall be determined through an assessment of the basic training syllabus and the related practical training needs.

3.4. Draft Acceptable Means of Compliance and Guidance Material — Part-147 (Draft EASA Decision)

AMC 147.A.100(i) Facility requirements

For approved basic maintenance training courses:

1. ~~For approved basic maintenance training courses~~ this means holding and ensuring reasonable access to copies of all relevant ~~Parts~~ EU Regulations and national aviation legislation, examples of typical aircraft maintenance manuals and service bulletins, Airworthiness Directives, aircraft and component records, release documentation, procedures manuals and aircraft maintenance programmes.

2. Except for the relevant ~~Parts~~ EU Regulations and national aviation regulations, the remainder of the documentation should represent typical examples for both large and small aircraft and cover both

aeroplanes and helicopters as appropriate. Avionic documentation should cover a representative range of available equipment. All documentation should be reviewed and updated on a regular basis.

GM to 147.A.100(i) Facility requirements

Where the organisation has an existing library of regulations, manuals and documentation required by another EU Regulation ~~Part~~, it is not necessary to duplicate such a facility subject to student access being under controlled supervision.

AMC 147.A.105 Personnel requirements

1. ~~The larger~~ Any maintenance training organisation ~~(an organisation~~ with the capacity to examine or assess ~~provide training for~~ 50 students or more within a 12-month period should appoint a training manager with the responsibility of managing the training organisation on a day-to-day basis. Such person could also be the accountable manager. In addition, the organisation should appoint a quality manager with the responsibility of managing the quality system as specified in paragraph 147.A.130(b) and an examination manager with the responsibility of managing the relevant Part-147 Subpart C or Subpart D examination system. Such person(s) may also be an instructor and/or examiner.

2. ~~The smaller~~ Any maintenance training organisation ~~(an organisation~~ with the capacity ~~to provide training for~~ to examine or assess less than 50 students~~)~~ may combine any or all of the sub-paragraph (1) positions subject to the competent authority verifying and being satisfied that all functions can be properly carried out in combination.

…

AMC 147.A.105(f) Personnel requirements

Any person currently accepted by the competent authority in accordance with the national aviation regulations in force prior to Part-147 coming into force may continue to be accepted in accordance with 147.A.105 (f).

Paragraph 3 of Appendix III to AMC to Part-66 provides criteria to establish the qualification of assessors.

The instructors should be trained in the subject matter they are delivering, including the appropriate training methods and tools, as applicable.

GM 147.A.105(f) Personnel requirements

The instructor (e-tutor/tele-tutor/tele-trainer) should be trained in coaching, guiding and assisting of e-learning students. It is important that the instructor understands the electronically-based distance learning process, has the competence to evaluate learning behaviour over the distance and is able to support the learning process of e-students proactively.

The following structure provides an overview of such an instructor training:

— Changes and tendencies of today's training;

— Fundamentals in methodology and didactics;

— Basics and theory of e-learning and tele-tutoring;

— Virtual communication;

— The changed role of students and instructors;

— Competence profile of a tele-tutor;

— Practical guide to support learning processes;

— Assessment of students' performance;

— The learning management system

AMC1 147.A.115(a) Instructional equipment

If the Part-147 organisation transfers theoretical knowledge by a virtual controlled environment (e.g. computer-based training (CBT) or multimedia-based training (MBT)), the organisation should ensure that appropriate computer system requirements are available to the end user.

The organisation should ensure that the student's activities are traceable, documented and recorded.

If the organisation uses computer systems of third party providers, a written agreement between both parties should be established covering the terms of delivery including the data security and data integrity.

GM to 147.A.115(a), (d) Instructional equipment

1. Refer to GM to Paragraph 3. of Appendix III to Part 66 for a description and to point 7. of AMC to Section 1 of Appendix III to Part 66 for definitions.

2. It is acknowledged that situations could exist where the size and complexity of such MSTD and/or MTD may require a dedicated infrastructure. Such instances shall be acceptable provided that student access to and usage of the respective MSTD/MTD are appropriately ensured.

~~1. Synthetic training devices STDs are working models of a particular system or component and include computer simulations.~~

~~2. A synthetic training device STD is considered beneficial for complex systems and fault diagnostic purposes.~~

AMC 147.B.10(b) Competent authority

1. …

1.7. knowledge of maintenance training standards including training methods and technologies.

4. Regulatory Impact Assessment (RIA)

This NPA has been developed by the RMT.0281 working group, formed by industry and competent authorities' representatives. The NPA is published for consultation in order to allow all affected stakeholders to make comments and propose amendments. The document mainly addresses the Part-66 and Part-147 rules for the training of the maintenance certifying staff, but it could address the training of any maintenance staff.

4.1. Issues to be addressed

So far the current 147.A.145(b) states that training may only be carried out at the locations identified in the approval certificate and/or in the maintenance training organisation exposition. Therefore, it currently excludes any distance learning.

Regarding synthetic training devices, 147.A.115(a) and (d) allow the use of such devices when they are considered beneficial for the training. GM to 147.A.115(a) states that:

— STDs are working models of a particular system or component and include computer simulations; and

— an STD is considered beneficial for complex systems and fault diagnostic purposes.

Results of standardisation inspections performed by the Agency in the Member States show that blended training and simulators are used with an intention to partially replace the requirement for practical training, notably for some type rating trainings.

Appendix III to Part-66, point 3.(f) states that multimedia-based training (MBT) methods may be used to satisfy the theoretical training element either in the classroom or in the virtual controlled environment, but further guidance and definition of the MBT and 'virtual controlled environment' should be given.

Lastly, maintenance training course material shall be provided to the trainee (147.A.120).

Currently the pedagogic tools as described in the rules:

— suffer a lack of interactivity; and

— do not sufficiently address the efficiency of the course.

The development of electronic engineering, computers and the Internet has considerably changed the way of:

— understanding the design of new aircraft types, interacting with these new aircraft types, its components and tools and finally maintaining these elements (these new aircraft types and these new technologies may even generate additional training requirements for existing and new maintenance personnel);

— learning (tutorial and self-learning).

The aeronautical industry, being a leading sector in new technological developments, requires contribution from maintenance and training organisations, requesting the personnel involved in aircraft maintenance organisations to:

— adapt themselves to these new technologies, methods and processes; and

— build up the competencies (knowledge, skills and attitude) needed to cope with the technological development.

In addition, it is recognised that the new generation of more computer-minded maintenance staff finds new teaching methods based on digital technology more appealing.

Direct interaction between the aircraft and the student is part of the learning processes and should enable the student to reach the required level of competence.

New training methods have to be adjusted to the training programmes as they bring interactivity and efficiency. In addition, the blending of teaching methods is recommended as pedagogic studies show that by doing so, the efficiency of the training is also improved.

Many pedagogic studies also confirm that there is a relation between the level of variety and interactivity of the training and the quality of these courses.

For all these reasons, the recourse to computers, Internet and electronic publishing is more frequently observed.

This task will consider the introduction, the impact and the extent of use of the new training methods and teaching technologies. After having given a definition and following evaluation of their pros and cons, the scope of application for the following new training methods will be defined:

— e-learning or computer-based training (CBT) or web-based training (WBT) at the training facilities (tutor-aided);

— e-distance learning (not tutor-aided or e-tutor available on line) away from the training facilities;

— maintenance simulation training devices (MSTD) and maintenance training devices (MTD) integration and usage in maintenance training (theoretical and practical); and

— any other training methods and tools deemed necessary to be evaluated in the course of this rulemaking task.

The effectiveness and efficiency of every training method will be analysed and appropriate use and limits of these new training methods will be recommended.

Emphasis will be put on the use and the blending of these training methods, so that the training is more engaging and efficient. As confirmed by experience, the more interactive and different teaching methods are used, the higher the student's attention and vigilance resulting in a more effective and efficient training course.

The regulatory framework will be need to evolve, so that it ensures the legitimacy of the new training methods in terms of location, facilities, training records and documentation/course notes, the use of MSTDs for practical training and assessment, duration of training courses, examinations and qualification and training of the instructors (e-tutors).

Finally, support will be given to competent authorities on how to evaluate/validate and approve the use of these training methods by developing requirements in section B and the related Appendix covering the evaluation method.

4.1.1. Safety risk assessment

The current rules exclude any distance learning. Reducing the duration of the Part-147 training course is possible with Regulation (EU) No 1149/2011 (Appendix III to Part-66), only when properly justified by the Training Needs Analysis (TNA).

Even though no safety-related findings were recorded, it is already known that some training organisations have introduced CBT and distance learning for the mere preparation for the examination. Sometimes these organisations are not Part-147 approved. Some already advertise the use of these new training methods in their training programmes in order to attract more trainees. The tendency to introduce these methods to approved Part-147 courses is high in order to reduce the duration and the costs of the training and better compete against organisations using them already.

It is recognised that a new generation of maintenance staff is now on the market: young people are more attracted by learning with a computer rather than attending the traditional academic course. Direct interaction between the aircraft and the student becomes more and more part of the learning processes and should lead to different and more attractive training methods. It has been observed that some training organisations hand to each trainee a portable computer or tablet at the beginning of the course.

Documentation on digital media is also part of the debate: nowadays, the access to documentation through DVDs, CDs, external memory devices, videos and web-based addresses or websites or hyperlinks on computers, cloud technology and mobile applications, replaces the traditional handset of supporting paper documentation given to the trainee when starting the training.

Moreover, despite the minimum duration of the course acting as safeguard in the current rules, some approved Part-147 training organisations may be tempted to reduce the duration of the course at the facilities up to a point where the approved Part-147 training environment would not have any added value. It will become a mere preparation for the examination. Practical experience cannot be completely replaced by using new training methods and teaching technologies.

On the other hand, more and more Part-147 organisations blend training and partially use simulation in order to replace the practical training for type rating training courses.

The tendency to introduce these methods into approved Part-147 courses is, therefore, high in order to:

— improve the efficiency of the course;

— be competitive with organisations that are not Part-147 organisations and offer these attractive learning tools;

— reduce the duration and the costs of the training; and

— partially substitute the availability of airworthy aircraft at the hangar by simulation devices.

Therefore, even if it may be claimed that the current rules are robust enough and that there is no direct safety issue in relation to them, there is a need to review and to adapt them more to today's technologies and to the learners' profiles, making them more efficient. In addition, giving legitimacy and a framework to these new methods will avoid any misuse as there are no criteria introduced in the current system (it is already clear that some non-approved training organisations advertise the use of distance learning, which confuses Part-147 approved organisations and may tempt them to give credits when using distance learning). Introducing the new methods and technologies will lead to a level playing field, raise the efficiency, quality and safety of maintenance training and bring it to the similar level amongst the

approved maintenance training organisations. Moreover, it may result in an increased number of young people choosing to engage in maintenance career which may help to tackle the expected shortage of maintenance staff in the near future.

Table 1: Safety risk matrix

Probability of occurrence		**Severity of occurrence**				
		Negligible	**Minor**	**Major**	**Hazardous**	**Catastrophic**
		1	2	3	5	8
Extremely improbable	1		**2**			
Improbable	2					
Remote	3					
Occasional	4					
Frequent	5					

4.1.2. Who is affected?

Sectors concerned are: maintenance training organisations and providers for basic and/or aircraft type training, maintenance organisations, airlines and operators, aircraft maintenance engineers, national aviation authorities.

4.1.3. How could the issue/problem evolve?

In the case of option 'do nothing', we may continue facing the risks described in paragraph 4.1.1 above. The issues identified in the ToR and this RIA would remain unchanged. There would be no improvement in the current rules regarding the new methods and technologies in maintenance training. The gap between the rules and industry needs and the technological developments in maintenance training would continue to widen. Opportunities for the overall improvements in this area would be missed. The possibilities to improve the efficiency and the effectiveness of the maintenance certifying staff training would remain limited. More and more approved maintenance training organisations would be tempted to keep up with the evolution of the new training methods and technologies seeking ways to introduce them into their training courses, thus formally not complying with the rules.

4.2. Objectives

The overall objectives of the Agency are defined in Article 2 of Regulation (EC) No 216/2008 (the Basic Regulation). This proposal will contribute to the overall objectives by addressing the issues outlined in Section 2.1.

The specific objective of this proposal is to adapt Regulation (EC) No 2042/2003 and corresponding AMCs GMs in the areas of Part-66 and Part-147. There may be also a need for giving guidance about training in Part-145 and Part-M.

4.3. Policy options

In order to address the issue and to achieve the objectives, a range of options has been identified and properly considered by the working group, as follows:

Table 1: Selected policy options

Option No	**Description**
0	Baseline option. No changes in rules.
1	Providing guidance by modifying/adding AMC/GM provisions only. No changes in implementing rules (IR).
2	**Amendment of the implementing rules (Part-66 & 147) to introduce new training methods and teaching technologies and providing guidance (AMC/GM).**
3	Option 2 plus amending Part-145 adding provisions for typical non-Part-66/Part-147 training courses based on distance learning (including HF, FTS, EWIS, etc.)

The preferred option is Option 2: To amend both the IR to introduce new training methods and teaching technologies to the requirements and to provide AMC/GM to provide guidance to the stakeholders on how to implement the new requirements.

4.4. Analysis of impacts

4.4.1. Safety impact

The introduction of the new training methods and new teaching technologies into the implementing rules (Part-66 & Part-147) is expected to have positive effects on safety. The usage of the modern training methods and technologies brings additional values into the maintenance training, including the interactivity, effectiveness and quality of training, variety of training possibilities that could be blended, higher motivation and engagement of the students attending the course, level playing field and higher level of standardisation and harmonisation.

In addition, giving legitimacy and a framework to these new methods and technologies may avoid any misuse as the tendency to introduce these methods to approved Part-147 courses is already very high.

Lastly, the usage of the new methods and technologies in maintenance training may ensure the appropriate conformity with the technological development of the aircraft, components, tools and equipment. The usage of simulators, virtual devices, augmented reality, etc. may improve safety and reduce hazards connected with aircraft visits, as a significant part of the practical element of the training could be performed off the aircraft.

4.4.2. Environmental impact

Less CO_2 emission due to reduction in travel.
Reduction of the environmental footprint of training by promoting a paperless approach.

4.4.3. Social impact

A positive social impact is expected. New generation of maintenance staff is now on the market: young people are more attracted by learning with a computer rather than attending the traditional lecture. Direct interaction between the aircraft and the student becomes more and more part of the learning processes and should lead to different and more attractive teaching methods. Some training organisations hand to each trainee a portable computer or tablet at the beginning of the course.

As confirmed by some pedagogic studies, the blending of teaching methods improves the efficiency of the training, therefore, there should be a positive social impact as the courses would become more attractive to the students, raising their motivation, engagement and learning abilities.

The new training methods and new teaching technologies are not intended to replace the instructors. However, the instructors will have to adapt to them. They will have to take additional responsibilities and acquire some new competencies, including:

— didactic competence;

— technical media competence;

— facilitation competences;

— communicative media competence;

— subject matter competence; and

— organisational abilities and learning techniques.

Additional competences are also expected from competent authority staff approving courses and organisations seeking benefit from the new training methods and teaching technologies. For them, additional training may be required. Approving those courses and organisations may pose an additional workload for the competent authorities and their staff.

Increased employment in all sectors concerned might be induced.

4.4.4. Economic impact

Introducing the new training methods and new teaching technologies into the implementing rules may result in a significant positive economic impact for the industry in most of the sectors concerned.

The Part-147 organisations may benefit by possible cutting of the hours spent for teaching in the classroom environment blending the classical teaching methods with distance learning, e-learning or web-based training. The time needed for aircraft visits as part of practical training may also be reduced resulting in additional cost savings. Consequently, there will be more time and resources available for the AMTOs for increasing the number of courses offered to customers, potentially increasing their revenue. However, transitional implementation costs may be incurred by some organisations for the procurement of the training devices and the course software, training the instructional staff for the new competences needed and creation and approval of the new procedures. For those training organisations wishing to conduct their courses ‘as before’ (mainly because of the availability of the real aircraft and parts for training and possible high investments for training devices and course software not in proportion to the size of the organisation), the implementation costs do not apply. The business area of the AMTOs may spread over the world.

The approved maintenance organisations (AMOs) may also benefit from the reduction of the duration and the costs of training. This leads to the higher availability of their maintenance staff for the regular job tasks and lower expenses for travel, accommodation and daily allowances, when the training is performed away from the organisation's facilities.

Individual maintenance technicians/engineers, especially the independent staff, may also benefit from the reduction of training expenses and the duration of the training, giving them the opportunity for faster return of their training investment and increasing their earning potential. The convenience and suitability of the new training methods and technologies may also lead to the reduction of the time spent for learning.

The training equipment manufacturers and training software developers will equally benefit from this proposal, increasing their revenues. It is expected that the number of manufactured training devices and training software will significantly increase based on the growing market demand. This may have a positive impact on the market prices of these devices and software in the medium run, as the competition on the market may intensify and the development of the training technologies may accelerate.

The national aviation authorities may face additional costs when implementing this proposal, caused by the required adaptation. They would need to adapt their procedures, train the existing staff on new competences required for the approval of the training courses, equipment and software. Some competent authorities would have to consider the employment of additional staff or make use of qualified entities, mainly subject matter experts. The proposed provisions should alleviate the potential issue.

4.4.5. General aviation and proportionality issues

There are no proportionality issues identified. The small and medium-sized enterprises (SMEs) and General Aviation may only benefit from this proposal in most of the areas already described. Negative impacts could not be identified by the working group.

4.4.6. Impact on 'better regulation' and harmonisation

With a view to implementing 'better regulation' principles, the rulemaking group determined the right balance between Implementing Rules and AMCs and opted for including detailed provisions on new training and teaching tools, methods and techniques at the level of AMCs, complemented with GM where necessary to support implementation.

This aims in particular at ensuring 'resilience' of the new rules in times where progress in digital communications, computer science, and other disciplines open the way to a wide range of technical alternatives, which may be considered in the form of alternative means of compliance. This flexibility provided to training organisations to meet or exceed the safety objectives defined at Implementing Rule level, depending on their particular organisation, business model, infrastructures, and type of training provided, supports the objectives of 'better regulation'.

Specific safeguards, determined in line with performance-based principles, have been defined to ensure that the adoption of new training methods and teaching technologies will not lower the training standards as required by Part-147.

4.5. Comparison and conclusion

4.5.1. Comparison of options

Option 0: *Baseline option. No changes in rules.*		
Impact Type	**Pros**	**Cons**
Safety	None	The safety risks remain the same, as described in point 4.1.1. of this document.
Economic	None	Possible cost savings for the industry would be neglected. The opportunity for improvement would be missed.
Social	None	The social benefits would be omitted. The opportunity for improvements would be lost.
Conclusion: The issues identified in the ToR and this RIA would remain unchanged. There would be no improvement in the current rules regarding the new methods and technologies in maintenance training. The gap between the rules and the industry needs and the technological developments in training would continue to widen. The chance for the overall improvements in this area would be missed.		

Option 1: *Provide guidance by modifying/adding AMC/GM provisions only. No changes in implementing rules (IR).*		
Impact Type	**Pros**	**Cons**
Safety	Minor improvements. Clarification and guidance on the implementation of the current rules.	No changes in implementing rules. Guidance material does not oblige the stakeholders.
Economic	Moderate improvements. Clarification and guidance on the implementation of the current rules.	No changes in implementing rules. Guidance material does not oblige the stakeholders.
Social	Minor improvements. Clarification and guidance on the implementation of the current rules.	No changes in implementing rules. Guidance material does not oblige the stakeholders.
Conclusion: This option only partially addresses the issue. It does not cover all the objectives set by the ToR. Giving more guidance on existing paragraphs in the rules has limited value, but could clarify the most of the ambiguities related to the relevant paragraphs in the rules. Positive impacts would be limited only to those persons and organisations implementing the proposed guidance.		

Option 2: *Amend the implementing rules (Part-66 & 147) to introduce new training methods and teaching technologies and providing guidance (AMC/GM).*		
Impact Type	**Pros**	**Cons**
Safety	Positive impact on safety based on interactivity, effectiveness and quality of training, higher motivation and engagement of the students in the learning process. Level playing field and higher level of standardisation and harmonisation. Legitimacy and framework of new methods and technologies will avoid any misuse of them. Conformity with the technological development of the aircraft, parts, tools and equipment. Reduced hazards connected with aircraft visits during practical training, as it could be performed in a more safe environment.	Not identified.
Economic	<u>For AMTOs</u>: Possible cutting of the hours spent for teaching in the classroom environment blending the classical teaching methods with distance learning, e-learning or web-based training. Cost savings resulting from reduced aircraft visits and aircraft availability; liability and insurance issues reduced. Potential increase in revenue due to more time and resources remaining for additional courses. <u>For AMOs</u>: Benefit in the reduction of the duration and the costs of training. Higher availability of the employees for the regular job tasks. Lower expenses for travel, accommodation and daily allowances. <u>For individuals</u>: Reduction of training expenses and the duration of the training.	<u>For AMTOs</u>: Transitional implementation costs may apply in some organisations due to the procurement of the training devices and the course software, training of the instructional staff for the new competences needed and creation and approval of the new procedures. <u>For NAAs</u>: Increased administrative burden Additional implementation costs expected due to: procedures adaptation, training of the personnel to new competences required, possible employment of additional staff.

	Faster return of their training investment and increase of their earning potential. Reduction of the time spent for learning For training equipment providers: Increase of revenue by selling more products based on increased market demand. Positive impact on market prices of the devices and software due to expected growth of the industry and increased competition. Increased rate of training technology development. For NAAs: No direct positive economic impact identified.	
Social	Attractiveness of the new methods and technologies leads to higher motivation and engagement of the students for learning. Convenience to learn from home, or any place and any time. Instructors and NAAs staff will acquire new competences. The training could become more affordable for maintenance staff.	Not identified.
Conclusion: Option 2 is to be preferred. Rulemaking in this area is probably the best option as it will be beneficial for the vast majority of stakeholders. It reflects fully the intention and the objectives of this rulemaking task. This option will have an overall positive safety, economic and social impact on all organisations and on maintenance staff & students undergoing the approved training.		

Option 3: *Option 2 plus amending Part-145 adding provisions for typical non-66/147 training courses based on distance learning (including HF, FTS, EWIS, etc.).*

Impact Type	**Pros**	**Cons**
Safety	Same as Option 2.	Same as Option 2.
Economic	Same as Option 2.	Same as Option 2.
Social	Same as Option 2.	Same as Option 2.
Conclusion: This option would have an overall positive safety, economic and social impact on all organisations and on maintenance staff undergoing the approved training. It reflects fully the intention and the objectives of this rulemaking task. In addition, it considers the training courses typical for Part-		

145 organisation (including HF, FTS, EWIS, etc.).

Based on the inputs received from the organisations and individuals, these training courses should be better regulated through rules and further guidance should be given, as an increasing number of them is offered on the internet by some unapproved organisations and individuals in a non-controlled environment and certificates printed online. For many organisations, those certificates are questionable, as well as the quality and reliability of the training, seeking clarifications from the Agency.

The rulemaking working group took those strives in due consideration and decided not to commit to extend the work on the task in order to propose amendments to Part-145 linked to the approval/acceptance of distance learning HF, FTS and EWIS courses. However, the working group left the door open to make some proposals/recommendations for Part-145 amendments (or AMC/GM), based on the outcomes of the working group on distance learning principles within the objectives of RMT.0281.

Conclusion and preferred option

After due consideration of all the identified options, the Agency believes that Option 2 is to be preferred. Rulemaking in this area is probably the best option as it will be beneficial for the vast majority of stakeholders. It reflects fully the intention and the objectives of this rulemaking task. This option will have overall positive safety, economic and social impacts on all organisations and on maintenance staff as well as students undergoing the approved training.

5. References

5.1. Affected regulations

Annex III (Part-66) and Annex IV (Part-147) to Commission Regulation (EC) No 2042/2003 of 20 November 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks (OJ L 315, 28.11.2003, p. 1).

5.2. Affected CS, AMC and GM

EASA Decision No 2003/19/RM (Acceptable Means of Compliance and Guidance Material – AMC/GM.

Annex IV (AMC to Part-66), Annex V (GM to Part-66), Annex VI (AMC to Part-147) and Annex VII (GM to Part-147) to Decision No 2003/19/RM of the Executive Director of the Agency of 28 November 2003 on acceptable means of compliance and guidance material to Commission Regulation (EC) No 2042/2003 of 20 November 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks.

5.3. Reference documents

— European Aviation Maintenance Training Committee: ‘Guidelines and Recommendations on E-Learning – GR 1003’

— European Aviation Maintenance Training Committee: ‘Guidelines and Recommendations on Synthetic Training Devices levels – GR 1004’

— European Aviation Maintenance Training Committee: ‘Guidelines and Recommendations on Practical Maintenance Training Devices - GR 1005’

— I Park, MJ Hannafin: ‘Empirically based guidelines for the design of interactive media’

— DL Scapin, JMC Bastien: ‘Ergonomic criteria for evaluating the ergonomic quality of interactive systems’

— AL Brown, JC Campione: ‘Psychological theory and the design of innovative learning environments: On procedures, principles and systems’

— Kearns, Suzanne K.: ‘e-Learning in Aviation’