Appendix 1 to Chapter 4
GUIDELINES FOR THE IMPLEMENTATION OF COMPETENCY-BASED TRAINING AND ASSESSMENT FOR AIRCRAFT MAINTENANCE PERSONNEL

1. Introduction

1.1 The introduction of competency-based training and assessment for aircraft maintenance personnel presents several safety and efficiency benefits, not only for the licence holders, who certify the aircraft or parts of the aircraft as airworthy, but also for all those non-licensed personnel undertaking work that will lead to airworthiness certification.

1.2 The Quality Management System of an AMO depends on the competency of its maintenance personnel. Competency standards therefore play a key role in harmonizing task performance, thereby upholding and potentially improving safety standards in aircraft maintenance. Whether the work is performed by licensed/authorized personnel or not, all personnel inspect their own work. Only in exceptional cases is a duplicated inspection (four-eye-inspection) deemed necessary. Since the risk associated with a poorly performed task rests to a large extent with the individual, it is essential to ensure that personnel authorized to sign for their own work performance be adequately trained and assessed against the corresponding competency standards.

1.3 Airworthiness regulations stipulate the licences and authorizations that personnel shall acquire and maintain valid in order to exercise the certification privileges for different aircraft maintenance tasks. These regulations vary substantially from one State to another in terms of the scope of the privileges, and the requirements for training, experience and examination or assessment. This lack of harmonization hampers the movement of competent personnel amongst Contracting States as well as the outsourcing of maintenance work from one State to another.

1.4 Competency-based training and assessment of aircraft maintenance personnel facilitates the use of a modular approach suited for the wide variety of maintenance tasks. Because generic knowledge-based training programmes are not outcome-driven, their effectiveness in terms of time and resources used can be limited. Competency-based training and assessment programmes can be tailored to specific sets of competencies required to perform defined maintenance operations, with each competency representing a “building block”.

1.5 This modular approach can deliver further efficiencies by taking into account the already acquired competencies that a particular trainee brings into a training programme. Typically, trainees entering a course do not have to meet predetermined entry requirements or undergo a pre-training assessment. For some students, this can result in the repetition of previously attended training and for others in unrealistically demanding course content. To increase the effectiveness and efficiency of the training programmes, the pre-training competencies of trainees should be measured against the competencies to be achieved. Consequently, individual training needs would be identified and training

focused on the identified competency gaps thereby potentially reducing training time and effort.

1.6 The constant introduction of new technology results in a permanent requirement for aircraft maintenance personnel to adopt new methods and processes. Consequently, personnel need to master new knowledge and skills to meet the competencies needed to cope with technological development. Because of its modular approach, a competency-based training programme can easily accommodate the introduction of training activities for new technological applications.

1.7 Finally, competency-based training programmes accommodate the introduction of new, more effective and efficient training methodologies, including but not limited to simulation, e-learning, multi-media-based and self-directed learning.

2. Guidelines for the Civil Aviation Authorities and maintenance organizations

2.1 Aircraft Maintenance Mechanic/Technician/Engineer (AMMTE) training and licensing path

Competency-based training requires continuous evaluation to ensure that it remains effective and relevant to maintenance operations. All relevant Standards related to approved training organization in Annex 1, Appendix 2 shall apply, including those dealing with approval of the curriculum and quality assurance system.

2.2 Competency-based training — Non-specialty-rated

2.2.1 At the end of fundamental training, students shall demonstrate the set of competencies associated with the “Standard Practices”, as described in “Standard Practices Manuals”, that they will eventually use on the job. In order to demonstrate these competencies, underlying knowledge and skills shall be acquired. These “Standard Practices” are applicable to all types of aeronautical equipment and all existing environments.

2.2.2 As all personnel involved in aircraft maintenance should undergo fundamental training, it is essential that Civil Aviation Authorities closely monitor these training programmes and oversee the final examinations and assessments to ensure that trainees meet the standards associated with the set of competencies that they will use on the job (“Standard Practices”). Civil Aviation Authorities shall therefore approve fundamental competency-based training programmes.

2.2.3 Conditional to trainees successfully passing the final fundamental training examinations and assessments, Licensing Authorities may issue aircraft maintenance licences without specialty-rated endorsement giving clear statements about which competencies the licence holder can demonstrate.

2.3 Competency-based training — Specialty-rated (aircraft systems and structures or components)

2.3.1 At the end of competency-based training for specialty-rating, students shall demonstrate the set of competencies they require to perform maintenance tasks on specific equipment and in specific environments. These specialty-rated maintenance tasks are described in maintenance instructions found in a variety of manuals such as the “Aircraft Maintenance

Manual (AMM)", "Component Maintenance Manual (CMM)", "Structural Repair Manual (SRM)", "Fault Isolation Manual (FIM)", and other authorized maintenance instructions which describe how these tasks are executed and to which standards.

2.3.2 In order to perform work in accordance with maintenance instructions, an AMMTE needs to apply the relevant "Standard Practices" learned in fundamental training to the specific equipment on which work is to be performed. To achieve this, additional training on the specific type of equipment is required.

2.3.3 Competency-based training for specialty-rating shall address the features that are unique to the aircraft type or component to be worked on and were not included in fundamental training. Competency-based training for specialty-rating may include but is not limited to the following features:

- location and identification of systems and components;
- operation and monitoring of systems and components;
- analysis of system or component functions;
- removal and installation of units;
- performance of adjustments and tests; and
- use of tools, equipment and materials.

2.3.4 Because of the wide variety in the scope of work undertaken by different maintenance organizations and their personnel, AMOs and/or AMTOs shall be responsible for the contents of training programmes for specialty-rating required for the various maintenance functions personnel carry out.

2.3.5 The Civil Aviation Authority shall closely monitor competency-based training programmes for specialty-rating and approve them. These programmes shall be described in the Maintenance Organizations Procedures Manual (MOPM). The evaluation of the effectiveness of the training programmes is the responsibility of the Maintenance Organization and shall be included in the auditing and monitoring activities performed by the Civil Aviation Authority on that organization.

2.3.6 Examiners designated by the Licensing Authority in AMTOs or appointed by the AMOs are responsible for the final competency-based examinations and assessments of the students in courses for specialty-rating. These examinations and assessments should not only examine the attained knowledge but also ensure that the students demonstrate competencies to perform maintenance tasks to defined standards as per the maintenance instructions. Based on the successful completion of these examinations and assessments, the AMO shall issue aircraft maintenance authorizations which clearly indicate the competencies that the holder of the authorization has demonstrated.

2.3.7 The procedures to conduct examinations and assessments, as well as the requirements to be met for the issuance of authorizations shall be described in the MOPM. The Civil Aviation Authority shall approve these procedures and exercise oversight.

2.4 Competency-based training flowcharts of existing licensing and training paths

2.4.1 The competency-based approach can be introduced in different ways in the existing licensing and training paths. The flowcharts in Figures 4-App 1-1 to 4-App 1-6 illustrate how this can be accommodated. All start with the student attending fundamentals/basic training.

2.4.1.1 Example 1.— Person attending fundamentals/basic training and receiving a Basic Licence after a successful examination/assessment by the Licensing Authority.

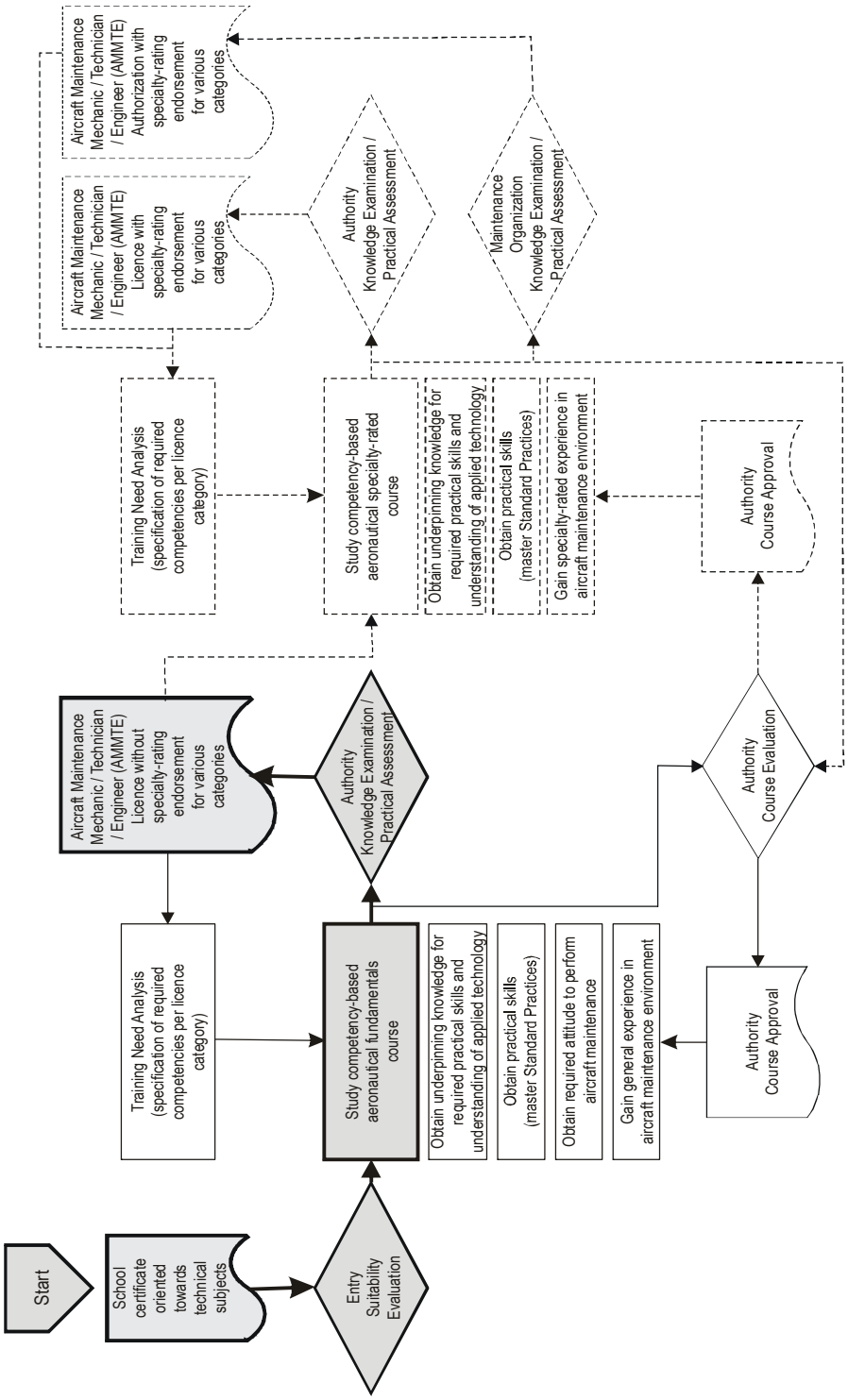

Figure 4-App 1-1. AMMTE training and licensing path (Example 1)

2.4.1.2 Example 2.— Person attending fundamentals/basic training and receiving a Basic Licence, then attending training for specialty-rating and receiving a specialty-rated endorsement on the licence after a successful examination/assessment by the Licensing Authority.

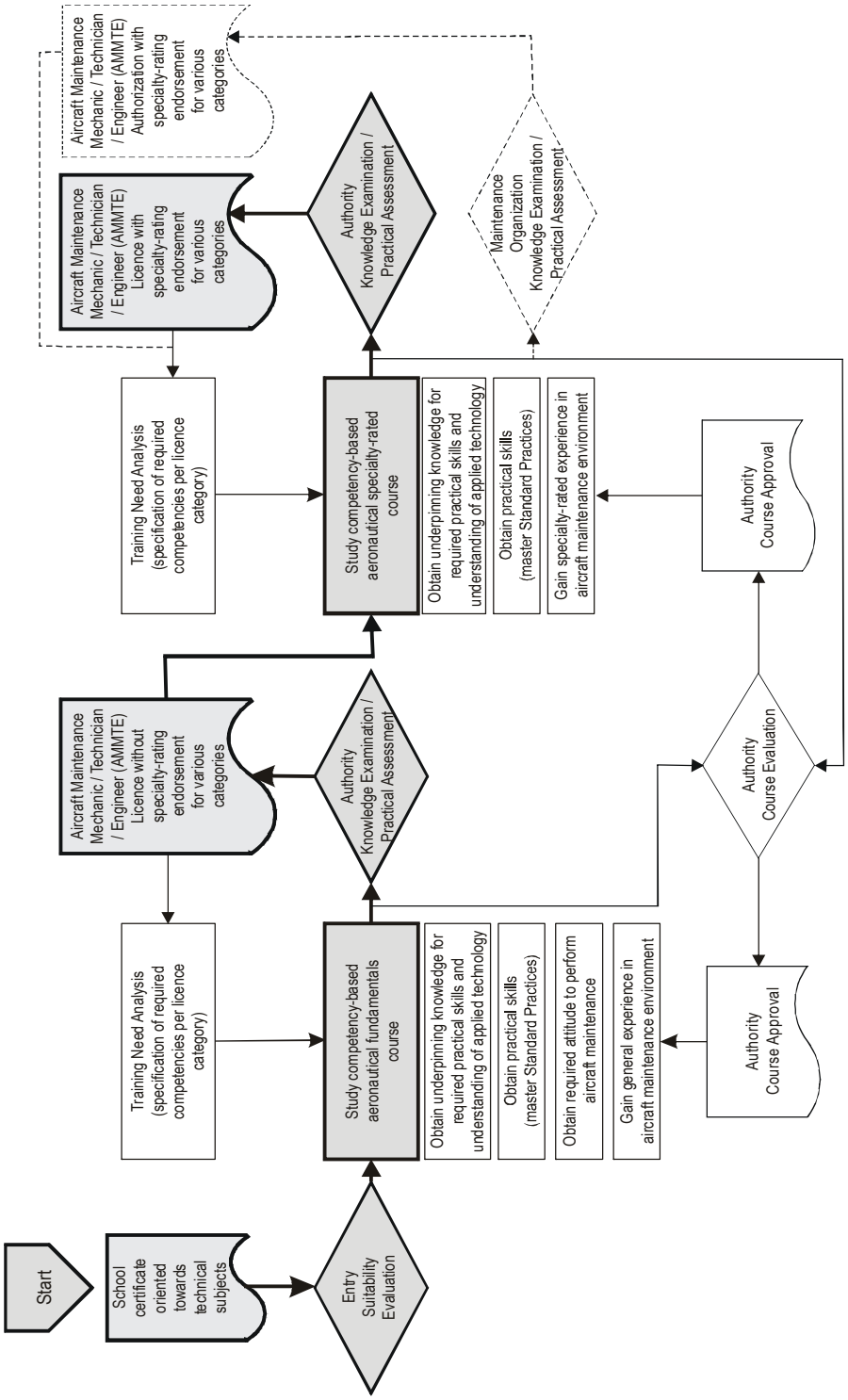

Figure 4-App 1-2. AMMTE training and licensing path (Example 2)

2.4.1.3 Example 3.— Person attending fundamentals/basic training and receiving a Basic Licence, then attending training for specialty-rating and receiving a specialty-rated AMO authorization after a successful AMO examination/assessment.

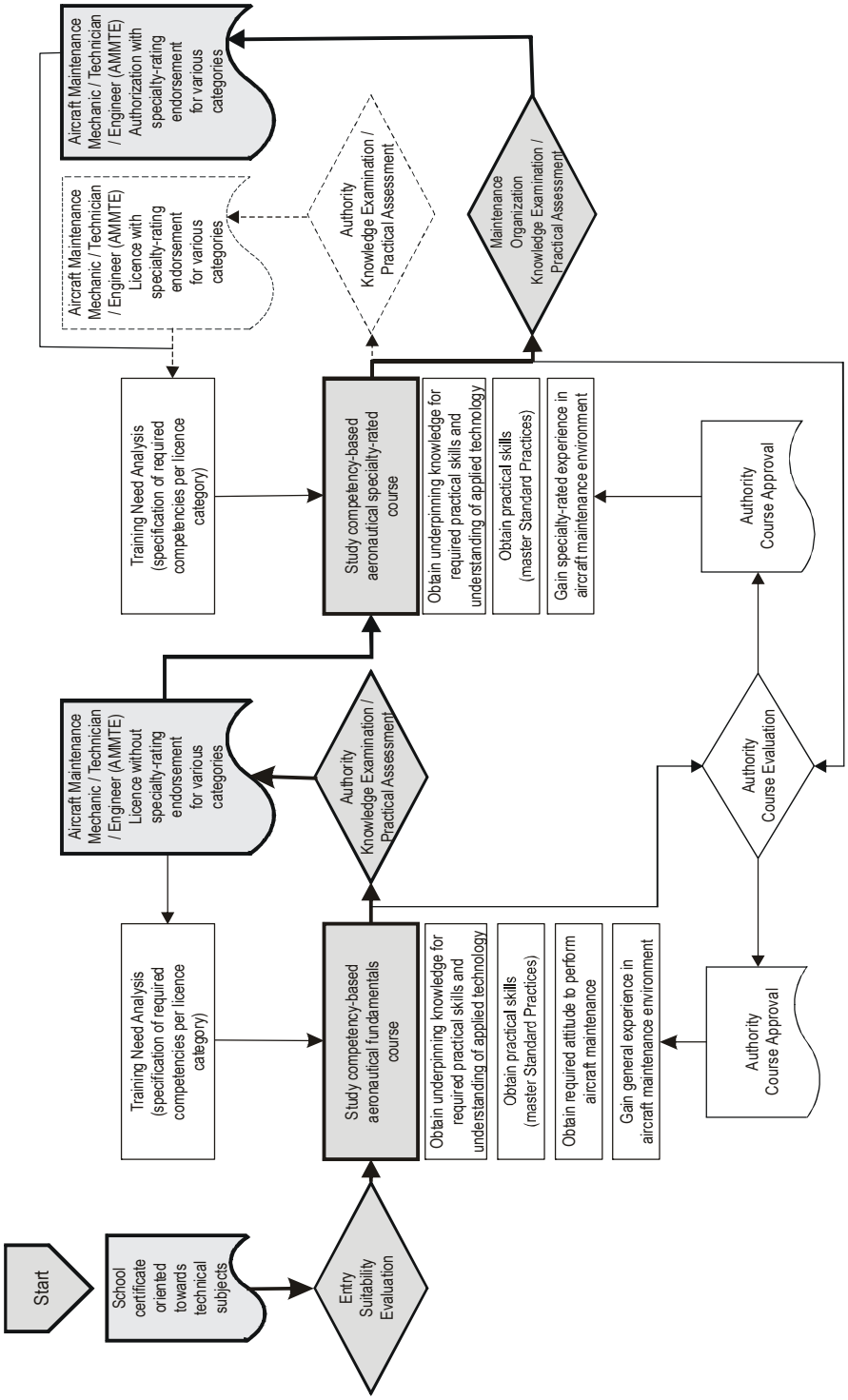

Figure 4-App 1-3. AMMTE training and licensing path (Example 3)

2.4.1.4 Example 4.— Person attending fundamentals/basic training and receiving a Basic Licence, then attending training for specialty-rating and receiving a specialty-rated endorsement on the licence after a successful examination/assessment by the Licensing Authority as a pre-requisite for an additional specialty-rated AMO authorization after a successful AMO examination/assessment.

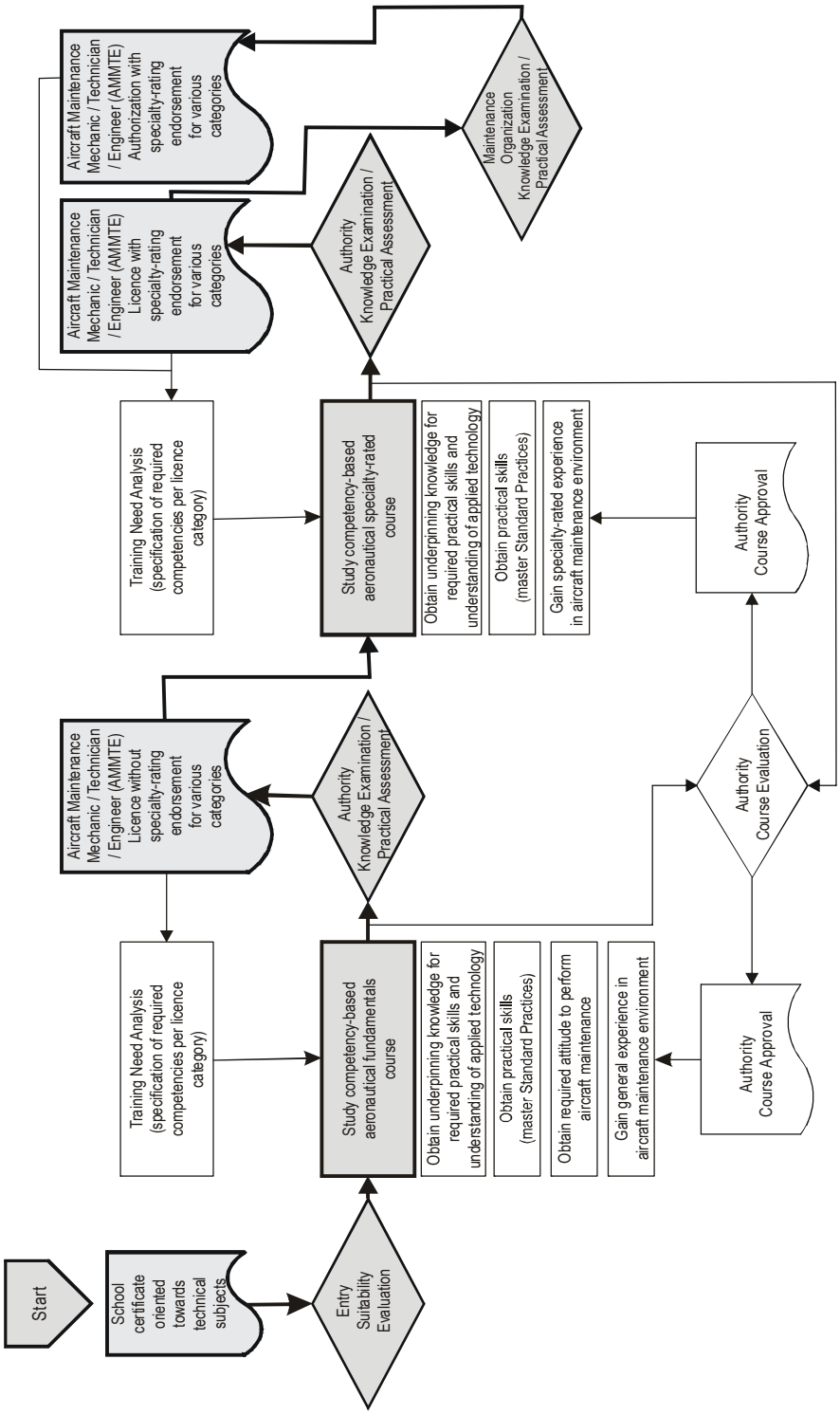

Figure 4-App 1-4. AMMTE training and licensing path (Example 4)

2.4.1.5 Example 5.— Person attending fundamentals/basic training, then attending training for specialty-rating and receiving a specialty-rated AMO authorization after a successful AMO examination/ assessment.

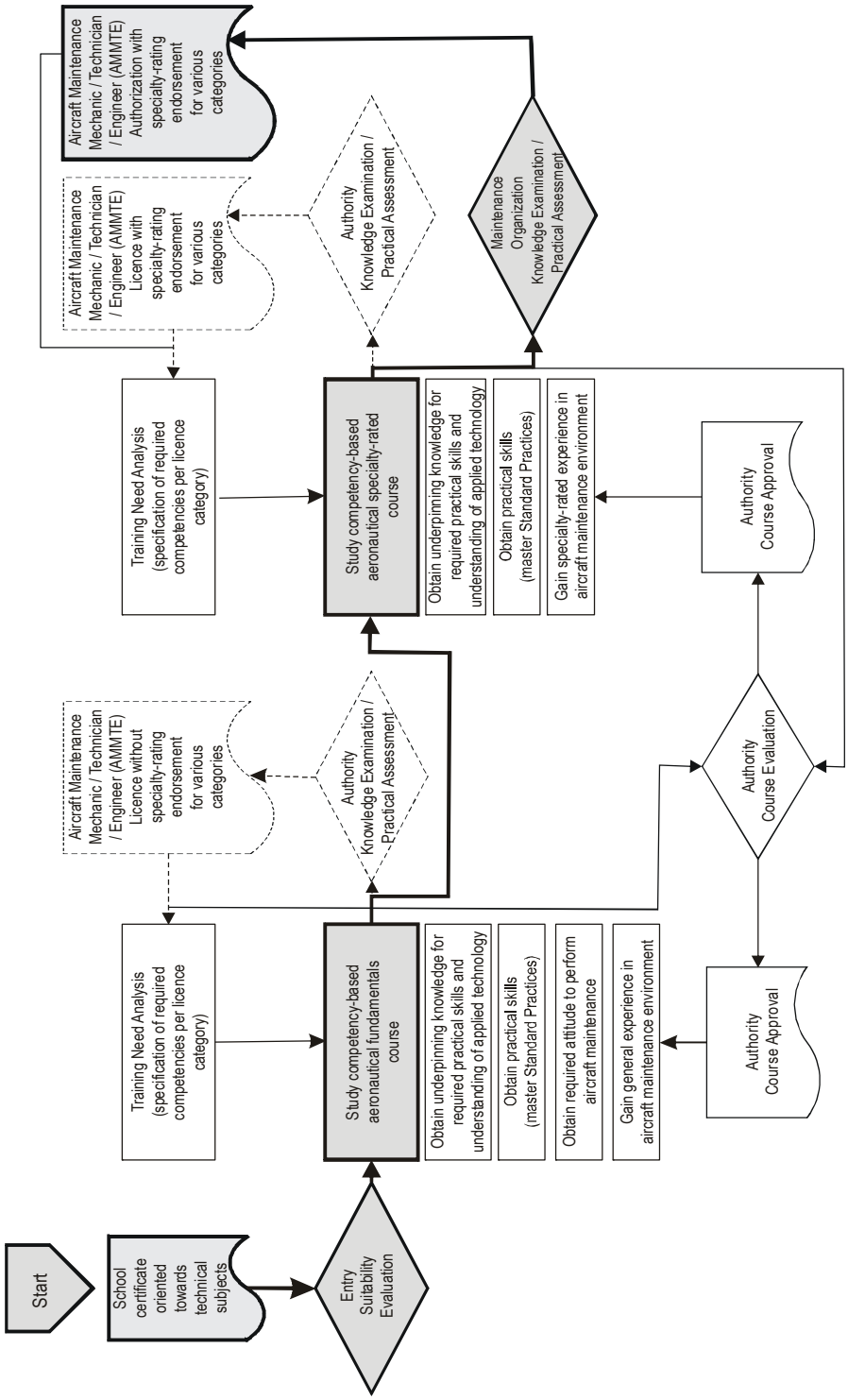

Figure 4-App 1-5. AMMTE training and licensing path (Example 5)

2.4.1.6 Example 6.— Person attending fundamentals/basic training, then attending an equipment technology group training and receiving an equipment technology group AMO authorization after a successful AMO examination/assessment.

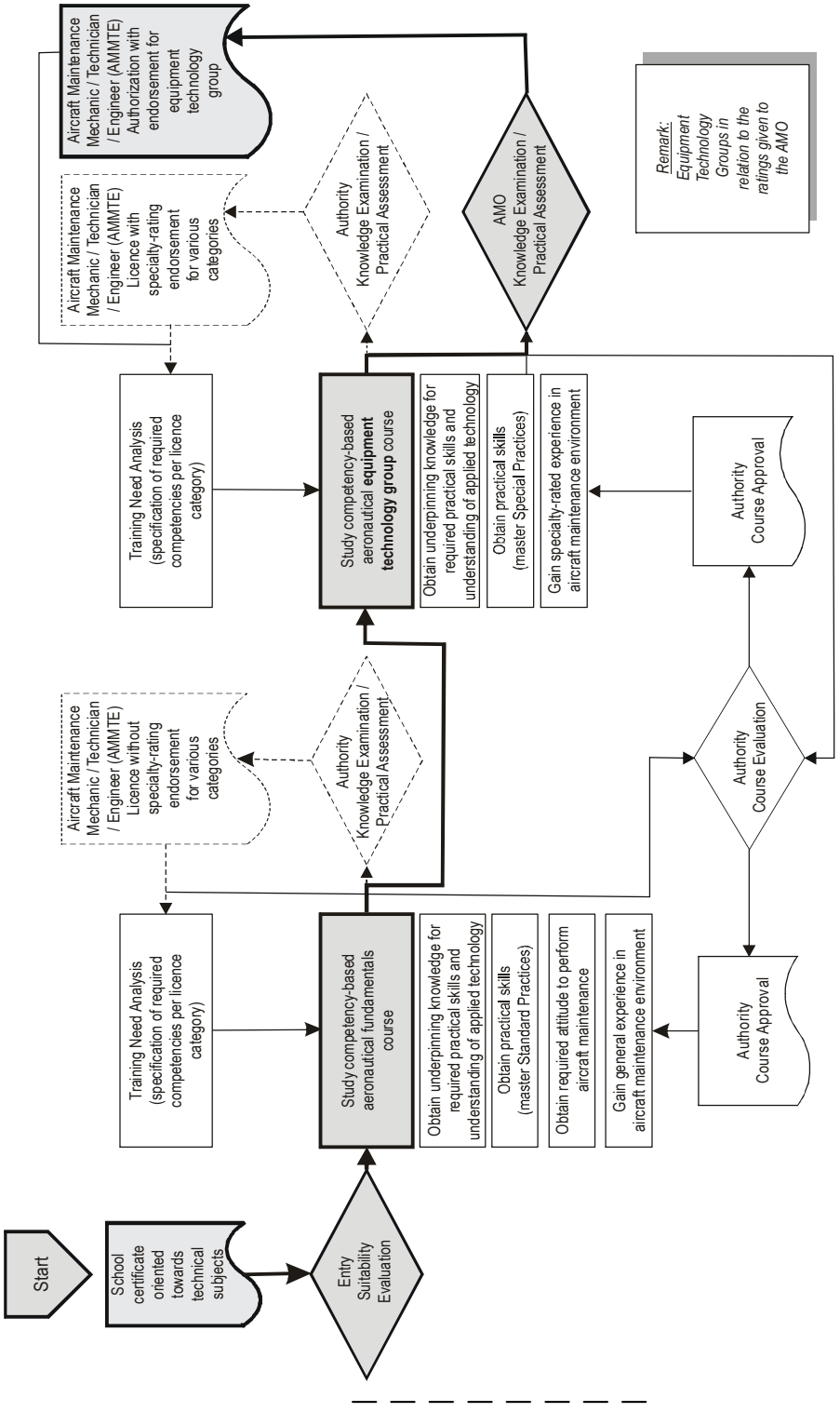

Figure 4-App 1-6. AMMTE training and licensing path (Example 6)

Appendix 2 to Chapter 4
AIRCRAFT MAINTENANCE COMPETENCY UNITS — COMPETENCY ELEMENTS AND PERFORMANCE CRITERIA

1. Introduction

1.1 Aircraft maintenance involves a wide range of tasks performed in maintenance organizations whose scope of work varies broadly. Some maintenance organizations perform the full range of aircraft and component maintenance while others are specialized. Depending on the type of maintenance organization, personnel will require different sets of competencies.

1.2 The following competency frameworks were developed to accommodate the different types of maintenance tasks and organizations. The frameworks list the competencies for three domains: aircraft systems maintenance, aircraft structures maintenance and aircraft components maintenance. The frameworks were developed by combining the existing generic information found in aircraft and engine maintenance manuals, structural repair manuals, component maintenance manuals and the actions described in standard practices documentation. Figure 4-App 2-1, aircraft maintenance domains, illustrates the basis on which the competency frameworks were developed.

1.3 It is not envisaged that one person should achieve all competencies listed in the frameworks. Students shall achieve the competencies selected by the Licensing Authority and/or approved maintenance organization for a specific function.

1.4 The competency frameworks were developed with the following assumptions:

- they are targeted to aircraft maintenance mechanics/technicians/engineers and/or aircraft component maintenance mechanics/technicians/engineers, working within the scope of aircraft and engine maintenance manuals, structural repair manuals and component maintenance manuals;
- they are applicable in aircraft line, base and workshop maintenance; and
- they apply to large aeroplanes (> 5 700 kg) powered by turbine engines and components thereof.