This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

4

possible units of a mobility pass

Introduction

As remarked in the report on WP3, is it preferable but not really realistic that a learner acquires the LO of a whole unit in the host institution due to the short time of standard mobility periods. So the contents of the units (cp. WP2) were subsumed to mobility units (MU) which are integrated parts of the respective unit.
The meetings with the stakeholders related to this work package were focusing on 2 functions:

1.) The structure of the mobility passes
2.) A meaningful denomination of the MU

In summary led the remarks and additions to the following conclusions:

- The MU must be seen as single steps within the context of the whole unit of LO; there should be no formal crediting of the isolated MU.
- It is especially but not only in the field of maintenance not possible to list all potential MU, there should be space to add additional MU.
- Learning must be seen as a development of competence, single units (MU or LU) are not necessarily learnt from “0 to 100”.
- To achieve a sustainable learning outcome single MU must be performed several times, especially central skills like “drilling” or “rivetting” need several periods of training before they can be performed according to the sectoral quality demands.
- The relative relevance as well as the concrete LO are depending on the type of aircraft.
- The additional work load for teachers/trainers should be as small as possible.
- The matrices should be reduced as far as possible.
- Performing a MU independently is a necessary but not sufficient precondition for the awarding of a whole unit of learning outcomes.

These results were considered in the development of the mobility passes by

- describing only the headline of the unit and the denomination of the MU in the passes and only attaching the holistic description of the unit,

- reducing the amount of space per matrix to 2 pages, only 1 if possible,
- following the skills (cp. WP2) for the denomination of the single MU and clarifying by the attached unit and by listing the KSC for chosen MU that the denomination is meant holistic,
- adding the row "remarks" to open spaces for additional aspects, f. e. the type of airplane or the operated automated system,
- opening the possibility to document the reached level of autonomy for each learner on a 4-level, performance-oriented frame,
- establishing the possibility to add additional MU to each unit,
- clarifying that the last row (performing the MU above in context) **cannot** be assessed in a qualitative-performance-oriented manner.

The recognition of LO with the proposed instruments follows a 2-step approach. The teachers or trainers who are responsible for the single MU (independent of the place where the student is learning) are assessing the level of autonomy reached by the candidate on the 4 levels of our scheme. To inform other responsibilities about the concrete environment additional information like the place and the date is provided. So it might become obvious, that the only learning activities of a candidate related to a chosen MU were month ago and need refreshment. Functional represent the MU in our approach a kind of transcript of learning outcomes, but there is no simple additive handling foreseen: The use of the matrices as a kind of route card (in the meaning of: all signatures collected => LO of the whole unit acquired) is not possible. When the respective responsible teachers or trainers (independent of the place where the student is learning) judge that a candidate has acquired most of the relevant MU in a sufficient manner, than is it possible to acquire the whole unit. As the handling of the passes the assessment too should not lead to a lot of additional work for the teachers respective trainers. The assessment follows the guidelines developed by SEMTA for the English units: The candidate should work autonomously on a work order that is characteristic for the chosen unit. The processes as well as the product are part of the assessment. An example for unit 14 is the passing of bunched circuits by the candidate by combing the MU. Do the local trainers/teachers confirm that the LO were reached than this is certified. This certification – with respect to national regulations – can be used in fragmented systems like the British one as approval of the LO – f. e. units 12 & 13 correspond to SEMTA-Unit 87 „Producing Aircraft Electrical

Sub-Assemblies, Cableforms and Looms“. In systems, which do not refer to the assessment of units, modules or something similar two actual added values are foreseen: Firstly, the certificate documents that additional teaching on this issue is not needed and secondly as equivalent to parts of formative assessment like interim demonstrations. Another possibly even more important case is the one when the LO of an unit are part of the (national) work tasks in the respective sector but not of the national curricula: The added value for the candidate in case of job application in his home country would be the confirmation of LO, that are wanted, but usually not acquirable in the home system.

Unit 1:							
Production of metallic components for aircraft or ground support equipment							
Remarks							
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Preparing wrought material							
Handling presses							
Using different moulds							
Knowledge of different characteristics of the presses							
Rigging and shutting down the presses							
Assessing the need for one or two work cycles for the respective workpiece							
Cooperating with the colleagues, asking for advice when needed							
Preparing workpiece for transport to the next workplace							
Demoulding work pieces							
Checking for damages, Rectifi-cation works (f. e. deburring)							
Production of metallic compo-nents for aircraft or ground sup-port equipment							

Unit 2:								
Production of components of plastics or composite materials for aircraft or ground support equipment								
Remarks								
Mobility unit	Assessment				Place	Date	Signature	
	observed/ supported	under instruction	under surveillance	independently				
Preparing wrought material, vacuum equipment								
Run autoclave								
Knowledge of the appropriate pressure and heat								
Choosing the parameters for the process								
Knowledge of the characteristics of the different fibre composites								
Controlling the process								
Cooperating with the colleagues, asking for advice when needed								
Respecting safety regulations								
Demoulding work pieces								
Checking for damages, Rectification works (f. e. deburring)								
Production of components of plastics or composite materials								

Unit 3:							
Operating and monitoring of automated systems in the aircraft production							
Remarks							
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Equipping the respective auto-mated system							
Setting and start-ing the respective automated system							
Running the re-spective auto-mated system and controlling the production							
Recognising dam-ages, assessing the quality of the products							
Knowledge of the quality standards							
Checking the results of the processes							
Cooperating with the colleagues from the quality department							
Performing additional tests							
Analysing the protocols of the production proc-ess							
Communicating results and/or possible im-provements							
Maintaining the respective auto-mated system							
Operating and monitoring of automated sys-tems in the air-craft production							

Unit 4: Joining and dissolving of structural components and aircraft airframes							
Remarks							
Mobility unit	Assessment				Place	Date	Signature
	observed/ supported	under instruction	under surveillance	independently			
Preparing structural components for joining							
Choosing driller with respect to the material and drilling with the appropriate rotational speed							
Knowledge about the properties of drillers and drilling machines							
Ability to work accurate							
In case of drilling fibre glasses: Respect the especial health hazards							
(Even blind) communication and cooperation with the colleagues							
Self-critical control of the results							
Documentation of concessions							
Delivering the airframe to the next cycle							
Joining and locking parts or assemblies by riveting, screwing or bonding							
Mounting assemblies							
Orienting and calibrating assemblies or structural components by reference points, lines or levels							
Checking concessions, visual inspections							

Joining of structural components and aircraft airframes					

Unit 5:								
Assembly and disassembly of equipment and systems in/at the aircraft airframe								
Remarks								
Mobility unit	Assessment				Place	Date	Signature	
	observed/ supported	under instruction	under surveillance	independently				
Assembling passenger and emergency doors								
Assembling air-condition unit								
Assembling Belly Fairing								
Assembling floors								
Clarify fitting with the quality department								
Checking work order and drawings								
Checking parts for defilements								
Knowledge about the tools								
Cooperating at assembly of the frames								
Inserting and screwing floor tiles								
Self-critical control of the results								
Documentation of concessions								
Assembling hydraulic equipment, preparing and performing hydraulic test								
Mounting cesspit and fresh water tank								
Assembling rotation shaft system for the flaps								
Mounting cargo-loading system								

Assembling fuel lines							
Connecting hoses							
Setting ground connections con-forming to stan-dards							
Assembling bleed air tubes							
Assembling plastic tubes							
Assembly and disassembly of equipment and systems in/at the aircraft airframe							

Unit 6: Functional checks and tuning at the aircraft								
Remarks								
Mobility unit	Assessment				Place	Date	Signature	
	observed/ supported	under instruction	under surveillance	independently				
Testing Aircraft Hydraulic Systems								
Setting and Testing Aircraft Pneumatic Systems								
Testing and/or replacing Aircraft Electric and Elektro-Pneumatic Systems								
Obtaining and using the correct issue of aircraft manuals and maintenance documentation								
Checking work order and drawings								
Respecting safety regulation, f. e. ensuring that the system is safely isolated								
Knowledge about the tools, expected values and possible error sources								
Performing the test by cooperating with the colleagues from safety department								
Analyzing and self-critical control of the results								
Documentation of the results and possible modifications								
Carrying Out Maintenance of safety systems esp. of Oxygen Masks								
Running and handling of auxiliary power units								
Performing “Weight and Balance”								

Maintaining ground equipment, tools and inspection equipment							
Testing and controlling components of aircraft systems							
Orienting and calibrating assemblies or structural components by reference points, lines or levels							
Functional checks and tuning at the aircraft							

Unit 7: Maintenance and inspection of the aircraft							
Remarks							
Mobility unit	Assessment				Place	Date	Signature
	observed/ supported	under instruction	under surveillance	independently			
Removing engines, ailerons, flaps, speed brakes and different head covers							
Washing and depainting the aircraft							
Determining compliance status of the structure, the body etc.							
Removing landing gear and cylinders							
Obtaining and using the correct issue of aircraft manuals and maintenance documentation							
Checking work order and drawings							
Respecting safety regulation							
Knowledge about the tools, possible technical difficulties and standard settings							
Cooperating and communicating with the colleagues							
Using approved removal and fitting techniques and procedures							
Marking parts and documentation of the work process							
Detecting flaws by magnetic or eddy-current tests							
Repairing simple malfunctions							
Adjusting repaired components							

Performing functional checks							
Performing tightness checks, replacing seals when necessary							
Maintenance and inspection of the aircraft							

Unit 8: Analysis and recondition of malfunctions at system components								
Remarks								
Mobility unit	Assessment				Place	Date	Signature	
	observed/ supported	under instruction	under surveillance	independently				
Analysing malfunctions at pneumatic or hydraulic parts, components or systems								
Exchanging or reconditioning pneumatic parts, components or systems by using special tools								
Exchanging or reconditioning hydraulic parts, components or systems by using special tools								
Connecting and disconnecting bunched circuits								
Reading & understanding work order								
Work resource-saving								
Knowledge of different characteristics of the connectors								
Providing & preparing the material								
Checking the circuits for corrosion and distortion								
Crimping, connecting								
Cooperating with the colleagues, asking for advice when needed								
Approving work order								
Detecting flaws by magnetic or eddy-current tests								
Setting control systems								
Testing repaired components and documenting concessions								

Analysis and recondition of malfunctions at system compo-nents							

Unit 9: Analysis and recondition of malfunctions at system components								
Remarks								
Mobility unit	Assessment				Place	Date	Signature	
	observed/ supported	under instruction	under surveillance	independently				
Analysing by visual inspection and reconditioning damages of body, steering gear or wings								
Carrying out maintenance of landing gear								
Detecting flaws by magnetic or eddy-current tests								
Riveting aluminium-Patches								
Knowledge about the properties of drillers and rivets and the manuals								
Removing damaged part with respect to structural integrity								
In case of drilling fibre glasses: Respect the especial health hazards								
(Even blind) communication and cooperation with the colleagues								
Working conforming to standards								
Cooperating with the quality department when confirming								
Documentation of concessions								
Sealing repaired damages								
Recognising delaminations								

Running ultra-sonic systems							
Laminating fibre-composite-patches							
Repairing sand-wich components							
Documentation of concessions							
Analysis and reconditioning of damage on structure com-ponents							

Unit 10: Reconditioning of accessory equipment							
Remarks							
Mobility unit	Assessment				Place	Date	Signature
	observed/ supported	under instruction	under surveillance	independently			
Differentiating and using connectors for engines							
Maintaining mechanical accessory equipment							
Production or reconditioning of hydraulic, pneumatic or electrical accessory equipment							
Assembling and disassembling components, boxes, turbines and electrical engine systems							
Clarify fitting with the quality department							
Checking work order and drawings							
Checking parts for defilements							
Knowledge about the tools							
Cooperating at assembly of the components							
Respecting the health hazards when working with high-voltage current							
Self-critical control of the results							
Documentation of the work and possible modifications							
Equipping and removing engine systems, documentation of concessions							
Mounting brackets and seals							

Reconditioning of accessory equipment							

Unit 11: Independent quality inspections							
Remarks							
Mobility unit	Assessment				Place	Date	Signature
	observed/ supported	under instruction	under surveillance	independently			
Choosing and preparing of test control units and test control circuits to measure the function of assemblies, subassemblies and devices							
Measuring the function of assemblies, subassemblies and devices							
Documenting and interpreting the results of the measurement							
Orienting and calibrating assemblies or structural components by reference points, lines or levels							
Performing quality assurance measurements on assemblies, subassemblies and devices with respect to the manual							
Knowledge about the relevant chapters of the quality control manual							
Choosing the right control units							
Respecting the health hazards when working with high-voltage current							
Communicating and cooperating with the colleagues from the safety department							
Working conforming to standards							
Documentation of measurements and results							

Performing visual and non-destructive material testing of new and repaired components							
Performing and recording of the final quality control							
Performing independent quality inspections							

Unit 11: Independent quality inspections Remarks							
Mobility unit	Assessment				Place	Date	Signature
	observed/ supported	under instruction	under surveillance	independently			
Choosing and preparing of test control units and test control circuits to measure the function of assemblies, subassemblies and devices							
Measuring the function of assemblies, subassemblies and devices							
Documenting and interpreting the results of the measurement							
Orienting and calibrating assemblies or structural components by reference points, lines or levels							
Performing quality assurance measurements on assemblies, subassemblies and devices with respect to the manual							
Knowledge about the relevant chapters of the quality control manual							
Choosing the right control units							
Respecting the health hazards when working with high-voltage current							

Communicating and cooperating with the colleagues from the safety department								
Working conforming to standards								
Documentation of measurements and results								
Performing visual and non-destructive mate-rial testing of new and repaired components								
Performing and recording of the final quality con-trol								
Performing in-dependent qual-ity inspections								

Unit 12: Production of bunched circuits Remarks							
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Production of copper bunched circuits							
Production of fibre glass bunched circuits							
Reading & understand-ing work order							
Work resource-saving							
Providing & preparing the material							
Knowledge about material property							
Cutting cables, crimp-ing							
Cooperating with the colleagues, asking for advice when needed							
Testing and preparing the circuit for transport to the next workplace							
Production of aluminum bunched circuits							
Production of bunched circuits							

Unit 13:							
Production or modification of electric devices							
Remarks							
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Producing or modifying bunched circuits following the manuals							
Producing electric devices of differ-ent elements fol-lowing the manu-als							
Modifying and/or upgrading electric devices following the manuals and/or the work-orders							
Working in modi-fied or updated technical dia-grams on assem-blies or devices							
Clarifying work order with the engineering							
Checking drawings							
Checking assemblies for modification							
Knowledge about the technical drawings							
Working following the diagrams							
Respecting the health hazards when working with high-voltage current							
Self-critical control of the results							
Documentation of the modifications							
Testing and ad-justing assemblies and devices to put them into opera-							

tion							
Production or modification of electric devices							

Unit 14:							
Passing bunched circuits in aircraft systems							
Remarks							
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Mounting brackets and splitters							
Setting ground points							
Mounting race-ways							
Passing bunched circuits							
Setting of connec-tors							
Reading & understand-ing work order							
Work resource-saving							
Knowledge of different characteristics of the connectors							
Providing & preparing the material							
Crimping, connecting							
Cooperating with the colleagues, asking for advice when needed							
Approving work order							

Appling test equipment and voltage							
Testing of connec-tivity & grounding							
Passing bunched circuits by performing the MU above in context							

Unit 15:							
Assembly and disassembly of subsystems and devices at aircraft systems							
Remarks							
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Checking the devices or sub-systems to be disassembled for zero-potential							
Disassembling electrical devices or subsystems							
Assembling de-vices or subsys-tems following the manuals							
Installing and adjusting electrical devices or sub-systems							
Checking drawings & work order							
Checking devices or subsystems							
Knowledge about the right setting							
Adjusting following the diagrams							
Respecting the health hazards when working with high-voltage current							
Cooperating with the colleagues							
Self-critical control of the results							
Documentation of the settings							
Assembling and connecting elec-trical drives and hydraulic or							

pneumatic connections							
Testing the assembled devices or subsystems following the documentations, repairing malfunctions and documenting modifications							
Assembly and disassembly of subsystems and devices at aircraft systems							

Unit 16:							
Modification of aircraft systems							
Remarks							
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Connecting and assembling sub-systems of digital technologies for sending and re-ceiving							
Connecting, as-sembling and adjusting subsys-tems of digital technologies for drive and control							
Testing assembly and installation following the documentations, repairing malfunc-tions and docu-menting modifica-tions							
Clarifying settings with the engineer-ing/colleagues							
Checking drawings and documentations							
Testing assemblies for modification							
Knowledge about the nominal values							
Repairing malfunctions							
Respecting the health hazards when working with high-voltage current							
Control of the results in cooperation with the safety department							
Documentation of the modifications							
Updating software							

Documenting modified and updated diagrams, settings and versions							
Modification of aircraft systems							

Unit 17:								
Functional checks and system audit of supply units and control systems								
Remarks								
Mobility unit	Assessment				Place	Date	Signa-ture	
	observed/ supported	under instruction	under surveil-lance	independ-ently				
Installing, testing and operating power-supply units								
Installing and adjusting electrical devices or sub-systems								
Installing, testing and operating warning, hydrau-lic, pneumatic, fuel, engine and cabin air systems								
Selecting and configuring meas-urement equip-ment and test circuits for check-ing functions of assemblies and devices								
Clarifying work order with engineer-ing/colleagues								
Selecting equipment and test circuits								
Configuring test cir-cuits								
Knowledge about the nominal values								
Performing pre-tests								
Respecting the health hazards when working with high-voltage current								
Critical control of the results								
Documentation of the work steps								
Checking func-								

tions of digital and analog assemblies and devices							
Checking and configuring electromechanical assemblies							
Checking and configuring drive and control devices							
Performing functional checks and system audit of supply units and control systems							

Unit 18:								
Functional checks and system audit of information and communication systems								
Remarks								
Mobility unit	Assessment				Place	Date	Signa-ture	
	observed/ supported	under instruction	under surveil-lance	independ-ently				
Checking and measuring electri-cal values in aerial systems								
Measuring and configuring sen-sors and trans-formers for non-electric values								
Checking informa-tion devices								
Checking and configuring warn-ing systems								
Checking the functional rela-tions and techni-cal solutions of communication and information systems on ground and at the aircraft referring the manuals								
Clarifying work order with engineer-ing/colleagues								
Reading and referring to the manual								
Checking functional relations and technical solutions								
Knowledge about the nominal values								
Working following the								

diagrams							
Respecting the health hazards when working with high-voltage current							
Critical control of the results							
Documentation of the test-results							
Modifying and operating sub-assemblies for information- and communication technology							
Checking, meas-uring and setting of analogue and digital signals							
Updating software							
Functional checks and sys-tem audit of in-formation and communication systems							

Unit 19:								
Analysis and repair of malfunctions at bunched circuits in aircraft systems								
Remarks								
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Repairing power-supply units by analysing and operating							
Repairing sub-assemblies and devices							
Operating with automated diag-nostic systems							
Selecting and configuring meas-urement equip-ment and test circuits for check-ing functions of circuits and de-vices							
Checking, meas-uring and setting of analogue and digital signals							
Clarifying work order with engineer-ing/colleagues							
Choosing the right instruments (digi-tal/analogue)							
Checking settings							
Knowledge about the nominal values							
Working following the diagrams							
Respecting the health hazards when working							

with high-voltage current							
Critical control of the results							
Documentation of the measured values							
Checking and setting of electro-mechanical sub-assemblies							
Modifying drawings							
Documenting and analyzing measured values							
Analysis and repair of malfunctions at bunched circuits in aircraft systems							

Unit 20:								
Analysis and repair of malfunctions at supply units and control systems								
Remarks								
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Repairing warn-ing, hydraulic, pneumatic, fuel, engine and cabin air systems							
Analysing and repairing units for measurement and control en							
Checking and configuring elec-tromechanical assemblies							
Clarifying work order with the engineering							
Checking drawings							
Checking assemblies for modification							
Knowledge about the technical drawings							
Working following the diagrams							
Respecting the health hazards when working with high-voltage current							
Self-critical control of the results							
Documentation of the modifications							
Measuring and configuring sen-sors and trans-formers for non-electric values							
Measuring, testing and adjusting analogue and digital input and							

output signals							
Documenting and analysing results of measurement, modifying technical drawings							
Analysis and repair of malfunctions at supply units and control systems							

Unit 21:								
Analysis and repair of malfunctions at information and communication systems								
Remarks								
Mobility unit	Assessment				Place	Date	Signa-ture	
	observed/ supported	under instruction	under surveil-lance	independ-ently				
Checking func-tions of analogue and digital devices and assemblies								
Measuring, testing and adjusting analogue and digital input and output signals								
Checking and measuring electri-cal values in aerial systems								
Testing and ad-justing functional units for meas-urement and con-trol								
Modifying techni-cal drawings								
Clarifying work order with the engineering								
Checking drawings								
Knowledge about the technical drawings								
Working following the diagrams								
Self-critical control of the results								
Documentation of the modifications								
Verifying modifications with engineering								

Documenting and analysing the results of tests and measure-ments							
Modifying and starting radio and IT- assemblies and devices							
Checking func-tional relations and technical solutions on ground and at the aircraft of IT- and communication systems following the technical documents							
Updating software							
Checking and starting alert sys-tems							
Analysis and repair of mal-functions at in-formation and communication systems							

Unit 22:							
Maintenance and inspection of aircraft systems							
Remarks							
Mobility unit	Assessment				Place	Date	Signa-ture
	observed/ supported	under instruction	under surveil-lance	independ-ently			
Checking func-tions of analogue and digital devices and assemblies							
Measuring, testing and adjusting analogue and digital input and output signals							
Checking and adjusting electro-mechanical as-semblies							
Checking and measuring electri-cal values in aerial systems							
Testing, measur-ing and adjusting sensors and con-verters of non-electrical quanti-ties							
Testing and ad-justing functional units for meas-urement and con-trol							
Clarifying work order with the engineering							
Checking drawings							
Checking functional units							
Knowledge about the technical drawings							

Working following the diagrams							
Respecting the health hazards when working with high-voltage current							
Self-critical control of the results							
Documentation of the results							
Checking and adjusting functional units of power electronics following the technical documentations							
Documenting and interpreting the results of the measurement							
Maintenance and inspection of aircraft systems							