



European Design Technicians League

Project nr. 2020-1-ES01-KA202-082337



Co-funded by the
Erasmus+ Programme
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Defining the METAL AM DESIGN TECHNICIAN for AM Industry

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1. EMAM-DT Qualification standard

Entry Requirements (Access Conditions)

Entry requirements
Skills in using 3D CAD tools AND National compulsory school diploma in technical areas OR VET diploma in technical areas OR Comparable professional experience of at least 2 years

EMAM-DT qualification structure overview

The EMAM-DT Qualification standard is organized in a modular approach, comprised of two general Competence Units (CUs) and two specific CUs (one for DED and other for PBF process).

Its structure is as follows:

COMPETENCE UNITS / UNITS OF LOS		
	Recommended Contact Hours*	Expected Workload**
CU 00: Additive Manufacturing Processes Overview	3.5	7
CU: Designing Metal AM Parts	18	36
CU: Design for DED processes***	14	28
CU: Design for PBF processes***	7	14
TOTAL	42.5****	85**

* **Contact Hours** are the minimum recommended teaching hours for the Standard Routes. One contact hour shall contain at least 50 minutes of direct teaching time.

** **Workload** is calculated in hours, corresponds to an estimation of the time students typically need to complete all learning activities required to achieve the defined learning outcomes in formal learning environments plus the necessary time for individual study (outside classroom context).

***It is **mandatory** that at least one of the Design for Processes CU is selected.

****Total hours depending on the selection of one or the two Design for Processes CUs. If only CU Design for PBF processes is selected, total hours will be 28.5; If only CU Design for DED processes is selected, total hours will be 35.5.





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2. Competence Units: Contents

Competence Unit 00 Additive Manufacturing Processes Overview¹

CU/ULO CU 00: Additive Manufacturing Processes Overview	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
Directed energy deposition	0,5
Powder bed fusion	0,5
Vat photopolymerization	0,5
Material jetting	0,5
Binder jetting	0,5
Material extrusion	0,5
Sheet lamination	0,5
Total	3.5
WORKLOAD	7

LEARNING OUTCOMES – CU 00 Additive Manufacturing Processes Overview	
COMPETENCE UNIT/ULO	Additive Manufacturing Processes Overview
KNOWLEDGE	Basic factual knowledge of: <ul style="list-style-type: none"> – Directed energy deposition – Powder bed fusion – Vat photopolymerization – Material jetting – Binder jetting – Material extrusion – Sheet lamination
SKILLS	Distinguish parts produced by different AM processes List the advantages and limitations of AM processes from a manufacturing process chain point of view. Name the applicability of different AM processes, according to the characteristics of each process.

¹ **Cross-cutting Competence Unit** - A CU whose learning outcomes are not directly linked with one job function since the knowledge and skills achieved will be mobilized in several job functions and activities.





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CU Designing Metal AM Parts²

CU/ULO Designing Metal AM Parts	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
Metal AM materials overview	1
Think Additively	4
Design principles for AM	7
CAD files	1
Post processing Overview	2
Case study	3
Total	18
WORKLOAD	36

LEARNING OUTCOMES Designing Metal AM Parts	
COMPETENCE UNIT/ULO	Designing Metal AM Parts
KNOWLEDGE	Factual and broad knowledge of theory, principles and applicability of: <ul style="list-style-type: none"> - Metal AM Materials - AM design thinking - Design principles for AM - Post processing
SKILLS	Identify types of metal materials commonly used in AM Apply design principles when developing and modelling a CAD part Associate design considerations to design thinking Relate AM potentials and limitations to metal parts design

² **Cross-cutting Competence Unit** - A CU whose learning outcomes are not directly linked with one job function since the knowledge and skills achieved will be mobilized in several job functions and activities.





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CU Design for PBF Processes⁴

CU/ULO Design for PBF processes	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
Overview of Machines, Process Capabilities and Limitations	1
PBF process related materials	1
Specific PBF design considerations	4
Case study	1
Total	7
WORKLOAD	14

LEVEL	JOB FUNCTION	JOB REQUIRED ACTIVITIES	RECOMMENDED CONTACT HOURS	WORKLOAD
Independent	Execute the Design of parts for PBF metal process by:	Interpreting process requirements	7	14
		Creating new or redesigning existing models using CAD tools based on the instructions provided by a Metal AM Designer		
		Validating design with the Metal AM Designer		
		Deriving production drawings, the corresponding parts lists and their structure		

LEARNING OUTCOMES Design for PBF processes	
COMPETENCE UNIT/ULO	Design for PBF processes
KNOWLEDGE	Factual and broad knowledge of theory, principles and applicability of: <ul style="list-style-type: none"> – PBF machines: Features and performance data. – Capabilities and limitations of PBF metal processes influence in design – Design considerations required for PBF metal parts design – Specific materials for PBF: achievable properties and sustainability
SKILLS	Explore the degrees of freedom of a PBF machine to the possibilities in terms of design Relate the capabilities and limitations of PBF to design considerations Determine dimensional constraints and geometric tolerances required for PBF parts design

⁴ **Functional Competence Unit** - Competence Units which Learning Outcomes are directly linked with at least one job function and in which the knowledge and skills achieved will be mobilized in specific job functions and related activities





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CU Design for DED Processes⁵

CU/ULO Design for DED processes	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
Overview of Machines, Process Capabilities and Limitations	2
Process related materials	1
Specific Design considerations	8
Case study	3
Total	14
WORKLOAD	28

Note: To be fulfilled only for functional CU/ULO				
LEVEL	JOB FUNCTION	JOB REQUIRED ACTIVITIES	RECOMMENDED CONTACT HOURS	WORKLOAD
Independent	Execute the Design of parts for DED metal process by:	Interpreting process requirements	14	28
		Creating new or redesigning existing models using CAD tools based on the instructions provided by Metal AM Designer		
		Validating design with Metal AM Designer		
		Deriving production drawings, the corresponding parts lists and their structure		

LEARNING OUTCOMES Design for DED processes	
COMPETENCE UNIT/ULO	Design for DED processes
KNOWLEDGE	Factual and broad knowledge of theory, principles and applicability of: <ul style="list-style-type: none"> – DED machines: Features and performance data. – Capabilities and limitations of DED metal processes influence in design – Design considerations required for DED metal parts design – Specific materials for DED: achievable properties and sustainability
SKILLS	Explore the degrees of freedom of a DED machine to the possibilities in terms of design Relate the capabilities and limitations of DED to design considerations Determine dimensional constraints and geometric tolerances required for DED parts design

⁵ **Functional Competence Unit** - Competence Units which Learning Outcomes are directly linked with at least one job function and in which the knowledge and skills achieved will be mobilized in specific job functions and related activities

