

Defence VET Platform – Requirements and functionalities of a “one-stop-shop” for Defence Training

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1 Introduction

According to the *Vision report on defence-related skills* produced under the European Defence Skills Partnership in 2019,¹ the defence industry recommended the creation of a Vocational and Educational Training (VET) Platform to help meeting the industry's upskilling and reskilling needs. This platform was recommended to help boosting employability, mobility, and transferability of skills, which is one of the objectives of the European Defence Skills Strategy 2020-2024.²

This report presents the case for the creation of a one-stop-shop training/education platform for young talents and professionals interested in working in the defence sector, which will serve at the same time the needs for skills sets of relevant companies.

In order to achieve this objective, feedback received from representatives of companies, VET providers and universities, regarding the development of a European Defence Training platform was analyzed. This feedback was obtained through several interviews and is presented, throughout this document, in key points regarding the needed functionalities and properties of the platform.

Adding to this, desk research was also carried out to have a better understanding of other existing platforms. The analysis showed that most of these platforms act as repositories for training courses. However, as it will be explained throughout this report, when it comes to have a platform that addresses the defence sector's skills requirements, a repository is not the needed solution. Instead, what the sector really needs is a fully-fledged structure that will support such important tool.

The report will first address the notion of the platform and how it fits into the sector's upskilling and reskilling efforts. It will explain why quality assurance is an indispensable part of such tool, and will set the scene of the education and training offer in Europe. Following, it will describe a viable organisational structure. The report will conclude with guidelines and recommendations regarding the expected "role" of a European Defence Sector Training platform serving the needs of the industry and users.

More information on the used methodology can be found in ANNEX 1 – Methodology used.

¹ *Vision on defence-related skills for Europe today and tomorrow*, Rand Europe, January 2019. See https://eudsp.eu/event_images/Downloads/1%20Main%20report_1.pdf

² Strategy outline https://eudsp.eu/event_images/Downloads/European%20Defence%20Skills%20Strategy_2020-2024.pdf

2 Defence Sector Platform

This section describes the objectives and functions of a European Defence Sector Training Platform. It is important to point out that one of the most important outcomes of our analysis is that the Platform should not be only focused on VET but it should cover all ranges and levels of training that are required by the defence sector. This means that the Platform should be a Training/Education Platform instead of a VET Platform.

Also, the term “Platform” needs to be explained. As it will be further described throughout this report, the upskilling and reskilling needs of the defence sector cannot be solved by a mere “online platform”. The creation of an EU Defence Sector Skills Platform encompasses an organizational structure, a Quality Assurance System, a training organization network, and an online platform to ensure a wider reach.

A “one-stop-shop”

The term “one-stop-shop” was present in most of the discussions and received feedback during interviews, being from the perspective of the “Companies” or of the “Training Providers”. This term led to different recommendations regarding the objective and functionalities of the platform. It was used to cover different users of the platform but also different levels of training/education and different type of training delivery.

A “one-stop-shop” for industry/companies, students/professionals and training providers

The platform should address the needs of the following users:

- Students, job seekers and current professionals
- Defence sector companies
- Training providers

In order to have a platform that is used by the sector, its employees and potential employees, and aligned with the sector’s requirements, it is important that the needs of the companies are also reflected in the platform. Also, this link between the three main stakeholders (Professionals/students – Training providers – Companies) is critical to ensure that the skills needs are addressed. This is the main reason why it is recommended that the platform addresses these three types of users.

The following table presents the advantages and requirements for each type of users that the platform should present and address.

Students, job seekers and current professionals	Defence sector companies	Training providers
Identification of Upskilling and Reskilling paths or Qualification/training to allow changing the career	Access to relevant training/educational offers for the defence sector across the EU	Advertise their training/educational offer for the defence sector
Guidance for the definition of a Qualification/Training path aligned with a Career path	Collaboration between different European defence companies on Skills development	Allow identification of the defence sector needs
Awareness of the skills needs of the defence sector	Easier access to training/education offers across the EU	Compare and develop their training offer to be aligned with the benchmark of the sector
Access to Training/Education offers relevant and aligned to the defence sector requirements and needs	Development of an EU Workforce	
Identification of training/education routes to access the defence sector as a career	Access to an EU Workforce, talent pool, to support the defence sector	

A “one-stop-shop” for VET and Higher education (HE)

This, “one-stop-shop” for VET and HE, was the feedback received from the Training Providers but also from the defence companies. This change, from what was previously identified in the 2019 EDSP report³, will allow to have one single platform dedicated to Training/Education for the Defence Sector. This would also allow different types of organizations, like VET and HE, to work together in the delivery of the necessary skills. This is already something identified in other sectors as an added value since the progression and the upskilling of a professional will rely on both Education Systems, VET normally more associated with an “industrial route” and HE, academic route.

To best explain the advantages, the following diagram provides an example of a Qualification/Career route for a Welding Professional, a concept that applies to other technologies and processes, as well:

³ See the report in ref. 1.

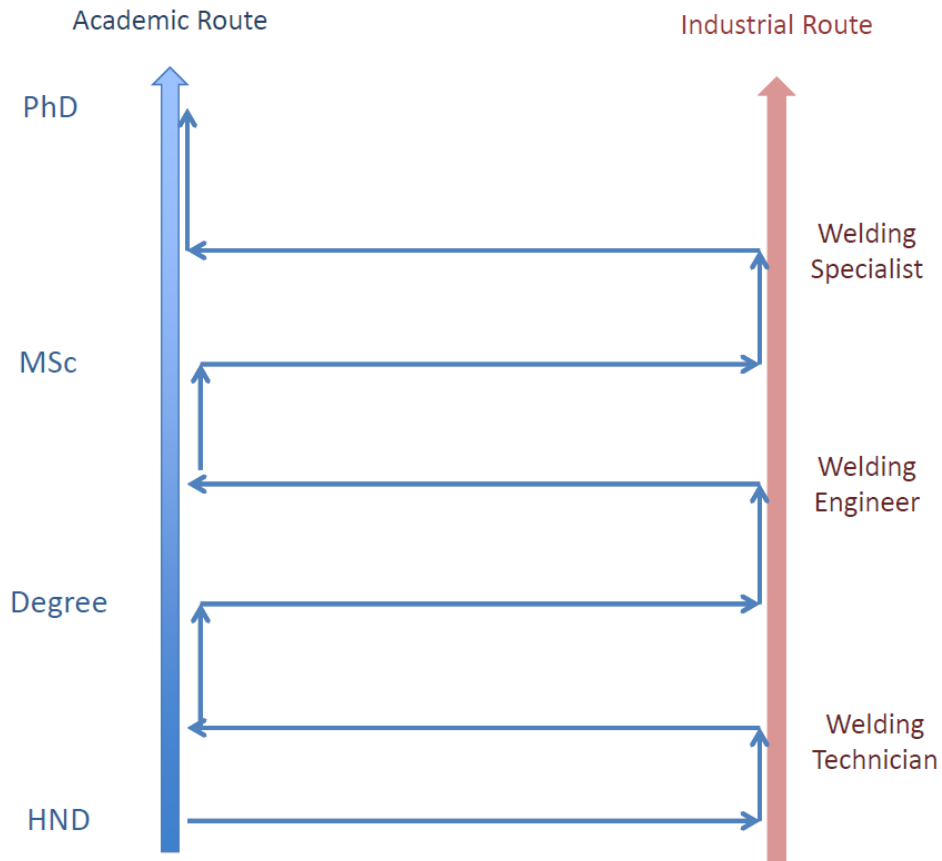


Figure 1 - Qualification/Career route for a Welding Professional starting from a Higher National Diploma (HND)

This integration of VET and HE would allow the following advantages:

- Collaboration between VET and HE organizations to allow better addressing companies' and students/professionals' needs.
- Progression based on different Educational Systems, VET and HE.
- All levels of training in the same platform.
- Easier training/qualification progression supported by VET and HE.
- Integrated training/education routes.
- Enable students, job seekers and current professionals to re-skill or up-skill themselves in the "right" Education System.
- Allow students, job seekers and current professionals to move seamlessly between the different training programmes.

A “one-stop-shop” for different types of training delivery

There is some misconception that the term “Platform” only encompasses online training. However, we recommend the **development of a “Platform” that does not only deliver online training**, but that also gathers different types of training offers. This includes different types of delivery of training.



Figure 2 - Different types of training delivery that the Platform should encompass

To address the skills needs of the defence sector, the Platform should not be limited to online courses. There are different types of training contents, some more practical while others are more theoretical, that cannot be taught online. The need to have more practical, on the job training and work-based learning, has also been confirmed by the sector and it is important that the Platform addresses this need.

Recommendations/Guidelines:

- The Platform should not just be focused on VET but it should cover both VET and HE alike
- The Platform should present/cover different types of training delivery
- The Platform should be developed having in mind three main users:
 - Students, job seekers and current professionals

- Defence sector companies
- Training providers, that should include VET and HE organizations

3 Quality Assurance

In order to have a working platform that is used by the different types of users (previously identified), it became clear that having an online platform would not be enough. The importance of having quality training/education aligned with the requirements of the defence sector is key. The recommendation would be to create and implement a Quality Assurance System to ensure the quality of the delivered training.

This Quality Assurance System would be developed with the support of the industry, to ensure that its needs are reflected in the requirements of the Quality Assurance System. The System would be based on a set of rules and requirements, defined by the industry, that would assess, evaluate, and authorise Training organizations in delivering “defence approved” training programmes/qualifications. This would create trust in the Qualifications and Training Programmes present in the Platform, from the companies and students/job seekers/professionals’ perspective.

However, the Quality Assurance System would also present benefits to the Training providers since it would allow them to compare their training or develop new training in compliance with rules and requirements defined by the defence sector. To develop and implement such a Quality Assurance System, an organizational structure would need to be established, like the one shown in Figure 3 below.

Such structure would need to have a Management Team to support the implementation of the Quality Assurance System, which could be done by using existing know-how of organizations that have similar activities, like the EWF⁴.

However, the rules and requirements need to be defined by the sector’s companies, while the implementation/delivery of the training/education is done at the regional/national/European level by the Training providers.

⁴ The European Welding Federation. See www.ewf.be.



Figure 3 - Possible Quality Assurance System structure

It is important to point out that the initial development of such a Quality Assurance System for the defence sector is being developed in the ASSETs+ project⁵ and its development is being led, due to its long-term experience, by the EWF. The Quality Assurance System developed in ASSETs+ can be the base for a more comprehensive Quality Assurance System that would also integrate the Platform into the System itself.

However, after the end of the ASSETs+ project, some developments in the Quality Assurance System will be required to ensure that the Platform will be able to address all the skills needs related to the defence sector, and not only those within the scope of the project related to new and emerging technologies.

⁵ Alliance for Strategic Skills Addressing Emerging Technologies in Defence – ASSETs+. Project launched under the Commission’s Blueprint for Sectoral Cooperation for Skills Initiative for the defence sector with €4 million EU contribution from Erasmus+. See <https://assets-plus.eu/>

4 Addressing the Qualification/Training offer at the European level

One of the biggest challenges identified in this work, is in having a European Platform with different types of training/education offers. It is crucial that the way the training/education is presented in the platform does not create any sort of confusion to companies or to students/job seekers/professionals. It is important to ensure that the different users of the platform (being it a company or a professional) can compare/analyse/decide on different training offers in a clear way.

To address these challenges, the following requirements/recommendations are proposed:

1. All the training offers should present not only the training content, but also the skills and job activities that the professionals will be able to carry out.

Even though this is considered the most challenging recommendation under this topic, this would be of extremely significant added value for all type of users. It would allow companies to identify, very clearly, the functions/activities that a specific professional will be able to do after attending a specific training/education programme. From the professionals/student perspective, they will be able to identify what are the expected activities that he/she will have to do after going through a specific training. Also, non-defence professionals will be able to compare their current activities with the expected activities if they become defence professionals.

This type of “mapping” has been developed and implemented in other sectors, with the support of the European Commission (DG EAC and DG EMPL) and the Learning Outcomes approach. Some work will need to be done to achieve this ambitious recommendation, but it would be of extreme added value.

As a starting point, and based on desk research, the template for definition of a Qualification/Training Programme showed in ANNEX 4 – Example template for definition of a Qualification/Training Programmewas prepared to be used as a starting point. ANNEX 5 – Example of a Qualification/Training Programme shows how the template can be used for describing the requirements and the content of a specific Qualification. But this will also be addressed further down.

2. The training offer should be catalogued by area and by technological process/solution

Finding the right area of activity (air, naval, land, space, cyber, C4ISTAR etc.) or the right technological process/solution (AI, Cyber Security, Welding, Robotics, Additive Manufacturing, etc.) is key from the perspective of all the three platform users. All training programmes/qualifications that are placed in the platform should identify the area and the technological process or processes.

3. The training should be organized by complexity level while the use of EQF levels should be assessed during the development phase

The importance of awarding levels to the different Training Programmes/Qualifications needs to be addressed. This will bring several advantages and will facilitate harmonization when comparing Training

Programmes/Qualifications related to the same topic. Also, this will allow understanding the possible progression in terms of training but also in terms of career. Assigning levels will also allow professionals that want to “reskill” themselves for working in the defence sector to assess at which level they currently are, and at which level they would like/need to be to work for defence.

An example of the importance of awarding levels is explained below in Figure 4 using the example of a career in Metal Additive Manufacturing. It shows the levels of Training/Qualification that a professional will have to go through to reach a higher-level Qualification or if he/she wants to move from a “Blue collar worker” to a “White collar worker”.

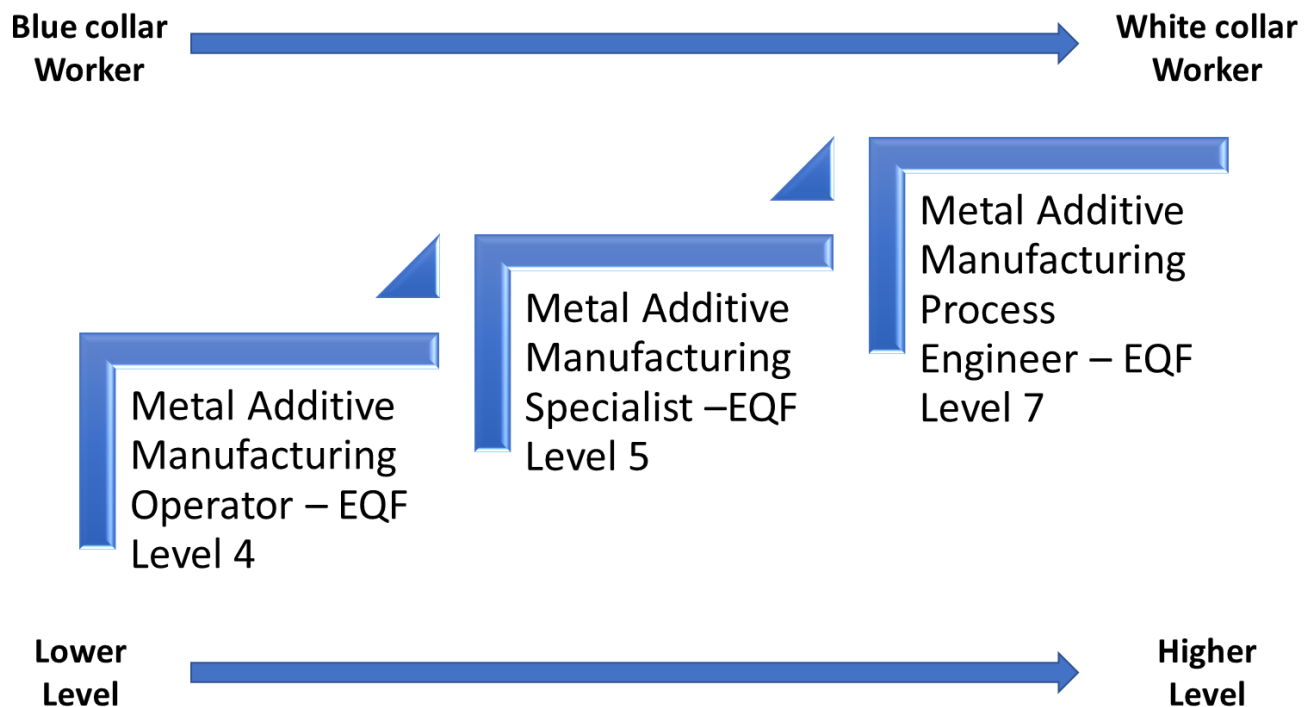


Figure 4 - Different levels of Qualification for a Professional in the Additive Manufacturing field

4. All information provided by training providers on each training offer should be harmonized

This will facilitate assessing the objective and the delivery of the training allowing an informed selection of the Training Programme/Qualification. By harmonizing the information presented in the Platform, professionals and companies can better compare different training offers and make an informed decision. Often, extensive offering of training (not necessarily defence specific) makes it complicated to decide on which training to choose. By harmonizing the information on the training offers, the comparison will be clearer.

The following topics should always be indicated in all the training offers in the Platform:

- Type of training offer (online, blended learning, virtual/augmented reality training, in classroom training, apprenticeships, on the job training, etc.).

- Duration.
- Level, including level of complexity – a harmonized way of applying this needs to be developed.
- Access conditions.
- Evaluation process.
- Location.
- Equipment used.

This information should be part of the Training Programme/Qualification description. An example on the information needed and how to present it is given in ANNEX 5 – Example of a Qualification/Training Programme.

5. Additional necessary functions and facilities of a fully-fledged platform

To meet all the needs of the users and the industry, the platform should also include the following functions and facilities:

- Regular feedback on the delivered training needs to be embedded in the platform: the option of using the existing feedback System that some companies already have in place may be a way to go. The use and adaptation of existing feedback systems should be considered when developing the platform.
- There should be a connection between the platform and the HR departments of large companies. However, this connection will be able to be assessed only during the platform's development.
- Companies should be able to advertise their needs – this highlights the need to have a Management Team that could search the market but also support the development of qualifications/training programmes when those programmes do not yet exist, ensuring that the platform constantly meets the defence industry's needs.
- The platform should collect statistical data on the available training to ensure constant monitoring and improvement of the delivered training.

5 Organizational structure of the Platform

It is clear that, to address the skills needs of the defence sector it is not “just” a question of creating an online VET platform. There is the need to develop and put in place an organizational structure, where the platform is one of the main tools. Figure 5 describes this structure and shows how the Quality Assurance System and the Platform fit in when addressing the sector’s skills needs.

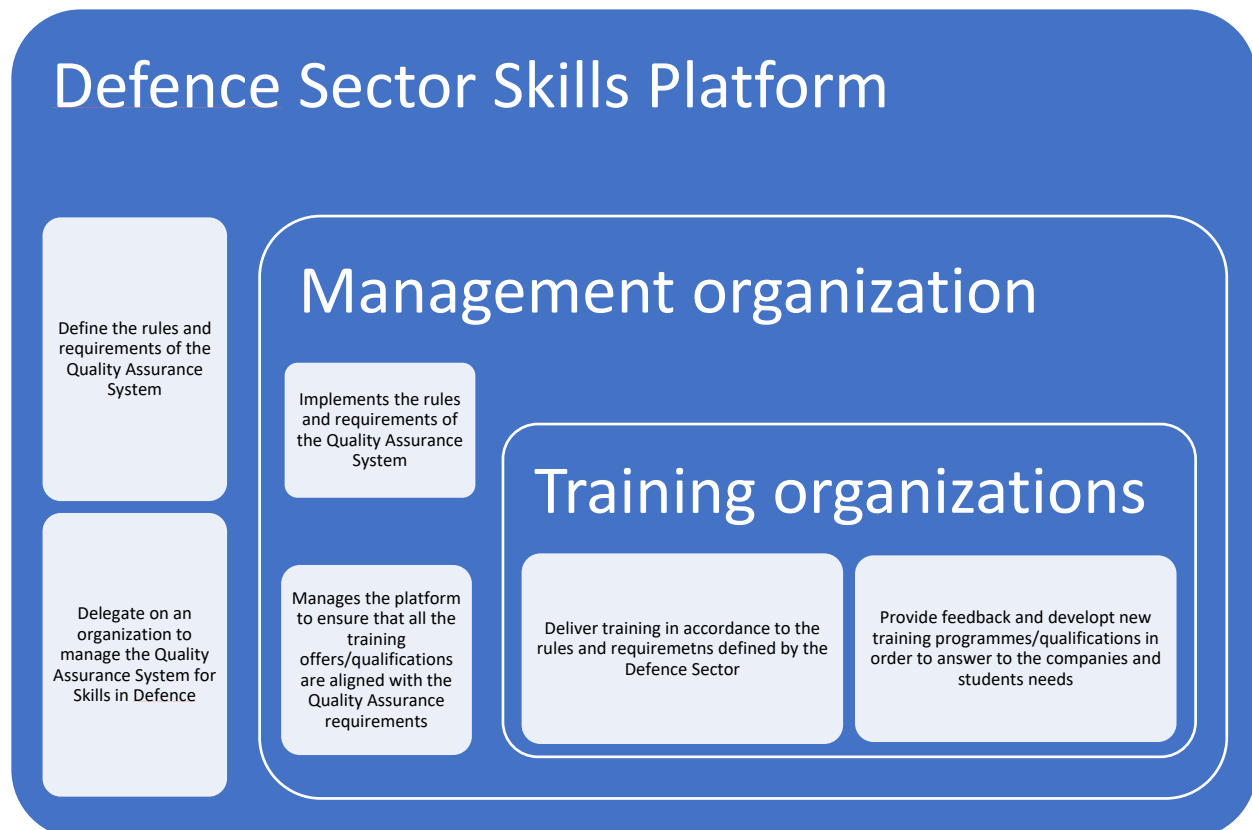


Figure 5 - Schematics on an organizational structure of the Defence Sector Skills Platform

Adding to this, the online Platform would also address the following functionalities (adding to those described above in Chapter 5):

- Provide access for students/professionals and companies to a range of defence-related training offers, qualifications and careers paths.
- Allow training organizations to place their training offers, so that professionals and companies can access them. The training organizations would need to go through a Quality Assurance check before “uploading” their training offer to the online platform.

Taking into consideration the analysis done so far, the below conclusions are taken into consideration in developing the next chapter:

- A “stand alone” platform is not enough and will not answer to the needs from the sector – this was a message that was obtained in several of the carried-out interviews that highlighted the importance of having a Quality Assurance System supporting the platform and for that a Management Team would be required. The objective would be to keep the platform operating but also ensuring the implementation of the Quality Assurance System.
- It needs to be a “System”, meaning that the platform is just part of it. A Quality Assurance System for the Training providers and for the provided training is necessary and critical – this would require the development of a Quality Assurance System, like the one that EWF manages and implements for Welding and Joining but also in alignment with the requirements from the defence sector companies.
- This “System” needs to be under the supervision of industry and developed and maintained in collaboration with industry. A structure, like the Observatory structure being assembled in ASSETs+ needs to be established and maintained to ensure that industry leads and supports the System and the Platform.
- It can not be an open platform since Training Providers should go through a Quality assurance check and constant evaluation (based on the feedback) before being part of the platform – this could be a complicated topic, however, to ensure that the industry trusts the training/qualifications provided by the platform, this is a mandatory requirement.

6 Viable way to develop such a European platform including recommendations on financing

One of the main discussion points during the interviews was how to fund the development of such System/Platform, but also how to make it sustainable for at least 2-3 years after its launch.

To sustain the Platform and the Quality Assurance System, a Management organization would have to be appointed. It should be an organization with already considerable experience in developing and implementing Quality Assurance Systems for Skills development and implementation at the EU level. It needs to be an organization similar to EWF.

However, in order to ensure the sustainability of the platform and the Quality Assurance System, the organization responsible for the management would need resources. These resources would be used to maintain the day-to-day management activities but also to support the defence sector in the identification, implementation, and development of training programmes/qualifications. Possible sources of resources to ensure the sustainability have been evaluated, as presented below.

For the sustainability of the Platform and of the, required, Quality Assurance System, the following scenarios are proposed:

- Fees paid by the defence companies to the management organization – in this scenario the defence companies would be responsible for contributing, through the payment of a fixed and/or variable fee, to the maintenance of the platform. While the fixed fee would be a defined annually fee that companies would have to pay, the variable fee would be based on the associated to the number of trained professionals throughout the year.
- Fees paid by the Training providers instead to the management organization, as part of the Quality Assurance check part of the platform. The quality assurance check would have to be repeated every two/three years based on current best practices (for example the EWF Qualification System). This check would be done based on an audit process that would have to be repeated in a specific timeframe or when the received feedback regarding a Training provider is negative. As part of the audit fee, there would be a sustainability fee to support the System/Platform.
- Mixed system – in this scenario both the defence companies and the Training providers would pay a fee to ensure the sustainability of the Platform and of the Quality Assurance System.
- Pay per use, meaning:
 - A fee to be evaluated based on the Quality Assurance System check done to the Training Providers,
 - Plus, a fee per training sold to the different defence companies.

Moving forward, the possible scenarios would have to be further developed and discussed to define the best solution for the defence sector. The industry has shown great interest in ensuring the sustainability of the Platform/System, while its creation requires pan-European effort and the involvement of a large number of stakeholders.

As an example, the EWF System for Welding and Joining, which has a very similar structure to what was presented in this report, is based on a fixed and variable fee that is paid by the users of the Platform and Qualification System. This allows some stability that supports the maintenance but also development of the necessary Qualifications/Training Programmes, due to the fact there is a fixed fee involved. However, the fixed fee is supported by a variable fee that is associated to the amount of training carried out, very similar to a “pay-per-use” approach which supports the System as it grows, ensuring that there are enough human resources when there are a lot of training activities.

For the development and initial roll-out of this Platform/System, EU support would provide the initial incentive to kick start the necessary development at the pan-European level. Based on this, an analysis of the different EU programmes that could support it was carried out.

The EU Programme that was identified as the most suitable is the Erasmus+, mainly the topic related to Alliance for Innovation Lot 2 that focuses on establishing alliances under the Blueprint for Sectoral Cooperation on Skills. The development of the Platform and System described in this report would allow tackling the following objectives/aims of Lot 2:

- **Must cover lower and higher VET levels: EQF 3-5 as well as 6-8** – the Platform/System described in this report can and should be applied to all the required, by industry, levels going from EQF 3 to EQF 8. This should be supported by the correct identification of the skills and job activities that the Professionals will have to obtain in order to carry out a specific professional activity (this was explained in Chapter 4)
- **Sectors/areas determined by 14 industrial ecosystems of the March 2020 Industrial Strategy** – the defence sector, along with the aerospace sector, was identified as one of the 14 industrial ecosystems
- **Synergies with sectoral partnerships under the Pact for Skills** – the defence sector together with aerospace is one of the first sectors joining the Pact for Skills already in November 2020.⁶
- **Drawing on evidence regarding skills needs with regard to occupational profiles, Blueprint Alliances support the design and delivery of transnational education & training content for quick take-up at regional and local level and for new occupations that are emerging.** Such a Platform/System would allow the design and delivery of transnational education at the regional and local level for the defence sector by creating a network of training centers that are all connected by the Platform/System and that deliver Qualifications/Training developed in collaboration and with the approval of the defence industry.
- **Long-term plans for mainstreaming project results at regional/national level, in clusters or with the EIT** – by ensuring the sustainability of the Platform/System it will be possible to develop a

⁶ See https://eudsp.eu/practical.asp?event_id=4370&page_id=11443

long-term plan for mainstreaming qualifications and training programmes at the regional and national level. This would also open the possibility of collaborating with EIT Knowledge & Innovation Communities that are addressing areas of interest to the defence sector:

- EIT Digital
- EIT Raw Materials
- EIT Manufacturing

Adding to the Erasmus+ Programme, another strong tool would be through the European Institute of Innovation and Technology (EIT). EIT main objective is to drive innovation in Europe by supporting entrepreneurs, innovators and students across Europe. For many years the defence sector (in combination with the aerospace sector) took the lead on the development of new technologies. However, in more recent years the defence sector lost that leading role. This is emphasized by the fact that the investment in R&D by the defence sector has been largely flat in recent years⁷.

Therefore, combining innovation and training/education, which is one of the objectives of EIT, could be a way of addressing this issue, where the Platform/System described in this report would be one of the tools developed to place the defence sector in the “leading role” when it comes to new technologies and processes. Another important point that should be taken into consideration is the fact that the defence sector and the aerospace sector are interlinked. This means that, when looking at the Erasmus+ Programme or at EIT, the approach taken might need to address the combined needs of defence and aerospace sectors, since they are part of the same Eco-System.

The Aerospace and Defence Pact for Skills is another option to develop the Platform/System. It involves most of the large companies – same as in the ASSETs+ – and many universities and training providers. Their adhering to the Pact for Skills made it possible to reach out to EU funding from the Recovery & Resilience Funds and the Structural Funds (i.e. the European Regional Development Fund and the European Social Fund), which is worth considering, as well.

⁷ <https://www.pwc.com/gx/en/ceo-survey/2020/trends/defence-trends-2020.pdf>

7 Conclusions and final important points

Based on the desk research and on the interviews, the following conclusions and important points were identified:

- There is a need to develop a Skills/Training Platform for the defence sector, supported by a Quality Assurance System, similar to the one run by EWF but specific to the defence sector, with a Management Team in the back office.
- The Quality Assurance System need to be under supervision of the Defence Sector Industry
- The first step should focus on the Quality Assurance System, the Management organization, and the defence sector supervision structure.
- The roll-out of defence focused Qualifications/training programmes, through the Platform/System, should be done in phases since it would be impossible to address all Defence Sector Qualifications/Training needs at the same time.
- Once the defence sector specific Qualifications and Training Programmes are in place and lessons are learnt, the System would be ready to embed also the Aerospace Sector Qualifications and Training Programmes due to the close connection between these two sectors.
- The possibility of developing the Defence Skills Platform, supported by a Quality Assurance System and an online platform, for a “combined” aerospace/defence sector should be further evaluated.
- When addressing the “Air” domain it will be difficult to separate civil aerospace from defence aerospace. One of the main reasons is related to the fact that the requirements, like the ones defined in standards and in accreditation systems like NADCAP⁸, are the same. We can conclude that developing a Platform/System that addresses the defence and aerospace sector together would be beneficial for both sectors.
- The project ASSETs+ will provide the first steps in developing the following, which can support the Platform and Quality Assurance System implementation:
 - Initial Rules and Operating Procedures for a Quality Assurance System for the Defence Sector, which are being developed based on EWF Rules and Operating Procedures.
 - Initial Structure/Information to allow harmonization of the different Qualifications/Training programmes.
 - Observatory Structure that will put in place a structure to allow receiving inputs and recommendations from the defence industry.

⁸ <https://p-r-i.org/nadcap/>

As a final note, it is important to highlighting the sustainability of such an approach. Such a System already exists in the Welding Sector for more than 25 years now and with almost 500.000 Diplomas Awarded and completely funded by industry. However, the variety of domains, technologies, processes, and requirements from the defence sector require the development of a Platform to support the correct functioning of the Quality Assurance System. But also, to ensure that there is a “connection” between students, professionals, training centers and companies which is critical for the success of such solution.

ANNEX 1 – Methodology used

This report was created based on a desk research of existing defence training platforms and based on interviews and feedback collected from defence companies and from training providers that work with the defence sector. The desk research main objective was to identify existing platforms but also, and most important, support the development of the questions that would be used in the interviews.

The interviews were carried out with 10 organizations:

- Airbus (two interviews were carried out)
- Leonardo
- Hensoldt
- Nexeya
- Aalborg University
- SAAB
- Aerocampus Aquitaine
- EWF
- European Commission
- ISQ (Portuguese Training Center)

The representatives interviewed were very much aligned with each other. The interviews lasted, on average, between 1 and 2 hours.

The questions were divided in accordance with the type of organization. The questions for Industrial Organizations are presented in ANNEX 2 – Questions for Industrial Organizations, and the questions for Education/Training providers are presented in ANNEX 3 – Questions for Training/Education providers.

ANNEX 2 – Questions for Industrial Organizations

Number	Question
1	What is your expectation towards a European VET/Professional Training platform? Should it be a repository of online courses? Or a "one-stop-shop" for VET/Professional Training for the Defense Sector?
2	What is more important, the training content or the skills and job activities that the Professionals will be able to do after the training?
3	Would it be an open platform, where any VET/Professional Training provider can advertise their training offer? Or should there be a Quality Assurance procedure put in place to carry out an initial assessment and filter some of the training offers?
4	Should the training offers be organized by area (e.g. air, naval, land, space, cyber, C4ISTAR etc.) ? Or by technological process/solution? Or both?
5	What type of connection would it be necessary to have between the VET Platform and the HR departments of companies? Is this connection relevant?
6	Should the Platform focus on answering the companies needs or should it focus on being a solution for the existing and future Defense sector professionals (for example by providing upskilling routes in a specific area)? Or both?
7	Would you prefer to see the training offered organized by level of complexity (using for example the EQF levels to ensure harmonization between the different training offers) or the level and complexity of the training is not relevant?
8	Would it be important to have some level of harmonization on the training offers or should VET/Professional training providers have the possibility of adding information in a non-harmonized way?
9	How important would it be to have statistical data coming out from the platform to identify trends and gaps?
10	Should it also be possible for companies to advertise training needs in case they do not find what they are looking for?
11	Should the platform be free to use by all users? Or should it be free for companies and a fee should be charged to the VET/Professional Training providers? Or free for VET providers and companies should pay a fee?
12	Should all training providers be allowed to advertise in the VET Platform or should they be authorized, based on an assessment to prove their capability of delivering training to the defense sector?
13	Should the platform be limited in terms of the type of offer (e.g., online, blended learning, virtual/augmented reality training, in classroom training, apprenticeships, on the job training), or all option should be allowed?
14	What type of information would you like to see for a specific training offer? (e.g., duration, level, access conditions, evaluation process, price, location, equipment used, etc)
15	How important would it be to have the training offered presented in a harmonized way by having pre-defined fields of information that need to be completed?

ANNEX 3 – Questions for Training/Education providers

Number	Question
1	What is your expectation towards a European VET/Professional Training platform? Should it be a repository of online courses? Or a "one-stop-shop" for VET/Professional Training for the Defense Sector?
2	Should the training offers be organized by area (e.g. air, naval, land, space, cyber, C4ISTAR etc.) ? Or by technological process/solution? Or both?
3	Should the platform be free to use by all users? Or should it be free for companies and a fee should be charged to the VET/Professional Training providers? Or free for VET providers and companies should pay a fee?
4	Should all training providers be allowed to advertise in the VET Platform or should they be authorized, based on an assessment to prove their capability of delivering training to the defense sector?
5	Should the platform be limited in terms of the type of offer (e.g., online, blended learning, virtual/augmented reality training, in classroom training, apprenticeships, on the job training), or all option should be allowed?
6	What type of information would you like to add for a specific training offer? (e.g., job activities, skills developed, knowledge/competences obtained, duration, level, access conditions, evaluation process, price, location, equipment used, etc)
7	How important would it be to have the training offered presented in a harmonized way by having pre-defined fields of information that need to be completed?
8	Should the platform be more focused on training offers to companies or to individuals? Or to both?
9	What benefits and uses do you see in a common EU VET provider platform targeting the defence industry, enabling individuals and companies across the EU to find your education and training courses?
10	Should the training offers be organized by area (e.g. air, naval, land, space, cyber, C4ISTAR etc.) ? Or by technological process/solution? Or both?

ANNEX 4 – Example template for definition of a Qualification/Training Programme

COMPETENCE UNIT/TRAINING PROGRAMME/QUALIFICATION XXX- XXXXXXXX

CU X - XXXXXXXX	MINIMUM CONTACT HOURS			
SUBJECT TITLE		LEVEL Z	LEVEL Y	LEVEL X
X.X – TITLE IS THE SAME AS IN THE DETAILED KNOWLEDGE TABLE				
XXXX - TITLE IS THE SAME AS IN THE DETAILED KNOWLEDGE TABLE				
XXXX - TITLE IS THE SAME AS IN THE DETAILED KNOWLEDGE TABLE				
XXXXX - TITLE IS THE SAME AS IN THE DETAILED KNOWLEDGE TABLE				
Subtotal Per Level				
Cumulated Subtotal				
WORKLOAD				
PER LEVEL				
CUMULATED				

EQF/ EWF LEVEL	JOB FUNCTIONS– XXXXXX (high levels can perform lower level functions)	JOB REQUIRED ACTIVITIES	MINIMUM CONTACT HOURS	WORKLOAD
7 / EXPERT	1.			XX
6 /ADVANCED	1.			XX
5/SPECIALIZED	1.			XX
4/INDEPENDENT	1.			XX

LEARNING OUTCOMES – XXXXXX				
LEVEL	XXX	XXX	XXX	XXX
KNOWLEDGE				
SKILLS				

DETAILED KNOWLEDGE				
<i>Qualification</i>	XXX	XXXX	XXXX	XXXX
<i>DEPTH*</i>	E	A	S	I
Advised Cumulated Hours	(XX)	(XX)	(XX)	(XX)
	ADVISED CONTACT HOURS			
DETAILED SUBJECT Title (Same as in the First Table with Global Contact Hours) XXXXXX XXXXX XXXXX XXXXX XXXXXXXXX XXXXXXXXX XXXXXXXXX				X
XXXXXXXXX XXXXXXXXX			X	
XXXXXXXXX XXXXXXXXX		X		
DETAILED SUBJECT Title (Same as in the First Table with Global Contact Hours) XXXXXX XXXXXX XXXXXX				X
XXXXXX XXXXXX XXXXXX			X	
DETAILED SUBJECT Title (Same as in the First Table with Global Contact Hours) XXXXXX XXXXXX XXXXXX XXXXXX XXXXXX XXXXXX XXXXXX				X
DETAILED SUBJECT Title (Same as in the First Table with Global Contact Hours) XXXXXX XXXXXX XXXXXX XXXXXX XXXXXX		X		

ANNEX 5 – Example of a Qualification/Training Programme

MINIMUM REQUIREMENTS FOR THE EDUCATION, TRAINING, EXAMINATION AND QUALIFICATION OF PERSONNEL – FOR A METAL AM PBF-LB OPERATOR FOR THE AEROSPACE/DEFENCE SECTOR

Introduction

This guideline covers the minimum requirements for education and training, which have been agreed upon by all EWF AM ANBs, in terms of Learning Outcomes (Knowledge and Skills) and the recommended contact (teaching) hours to be devoted to achieving them. It will be revised periodically by EWF AM Qualification Council to take into account changes that reflect the "state of the art".

Students successfully completing examinations will be expected to be capable of applying the achieved learning outcomes at a level consistent with the qualification diploma level. The modular course contents are given in the following structure (overview):

COMPETENCE UNITS	E/IO PBF-LB	
	Recommended Contact Hours*	Expected Workload**
CU 00: Additive manufacturing Process Overview	7	14
CU 15: PBF-LB Process	14	28
CU 16: Quality Assurance (QA) in PBF-LB	7	14
CU 17: Health, Safety and Environment (HSE) in PBF-LB	3,5	7
CU 18: Hardware, software and build file set-up for PBF-LB	14	28
CU 19: Monitoring and managing the manufacturing of PBF-LB parts	3,5	7
CU 20: Post-processing of PBF-LB parts	7	14
CU 21: Maintenance of PBF-LB systems	7	14
Subtotal (without optional CUs)	63	126
CU 48: Powder Handling	14	28
CU 49: Laser Beam Characterisation	7	14
Total	84	168

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

** Expected Workload is calculated in hours, corresponding 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.

Although the hours indicated in the above table are merely recommended, it is mandatory that in total the qualification has a minimum of 40 contact hours.

Within EWF's qualifications, there are two types of Competence Units:

Cross-cutting Competence Unit - A competence unit 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.

Functional Competence Unit - A competence unit whose 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.

The expected learning outcomes are described in two ways: generic outcome descriptors organized in knowledge, skills, autonomy and responsibility; and in detail for each competence unit, organized in job functions and related activities, knowledge and skills corresponding to a specific proficiency level within EWF's Systems Framework levels (see Appendix I). On each Competence Unit, objectives and scope are defined for a specific depth of knowledge and skills. Recommended contact hours are distributed between theoretical (A), assigned projects/exercises (B), practical workshop training (C), etc., as shown in the following example:

Qualification: Example 1	
RECOMMENDED CONTACT HOURS	X = SUM (A:C)
Subject Contents	A + B + C

Professional Profile

E/IO PBF-LB is the professional with the specific knowledge, skills, autonomy and responsibility to operate metal AM machines using PBF-LB Process. His/her main tasks are to:

- Operate powder bed-based laser beam machines for AM, including fitting and setting up, maintenance and repair.

He/She will be able to:

- Remove parts and prepare them for post-processing steps.
- Verify Laser beam measurement and positioning in laser powder-bed machines for AM.
- Self-manage the handling of powder (approval, storage, contamination, traceability).
- Develop solutions on basic and specific problems related with laser powder-bed fusion machines.

2. Routes to Qualification

Two distinct routes to gain the qualification described in this document have been agreed.

1. The Standard Route
2. Blended Learning Route

a. The Standard Route

The Standard Route requires successful completion of EWF approved course which is designed to meet all the requirements in this Guideline. This is the route recommended by EWF as offering the fastest, most comprehensive way the detailed knowledge may be covered.

b. Blended Learning Route

The Cross-Cutting Competence Units (theoretical knowledge and skills) may be taught using Distance Learning Programmes under the control of the EWF AM ANB and all the Functional Competence Units (practical knowledge and skills) must be taught at the EWF Additive Manufacturing Authorized Training Bodies (EWF AM ATB) facilities.

3. General Access Conditions

The defined access conditions approved by EWF Technical Working Groups Area of competence “Implementation and Authorisation” of the EWF are given in detail for all countries participating in the EWF system.

The access conditions to European PBF-LB Operator Qualification admission are the following:

- National compulsory school diploma

4. Special Requirements

a. Standard Route

Applicants shall satisfy the access conditions, to be accepted for the attendance of a training course conducted by an EWF AM ATB.

There will be written, oral and practical examinations (where applicable) for the award of the applicable EWF Diploma.

It is not obligatory to follow exactly the order of the Competence Units given in this guideline and choice in the arrangement of the detailed knowledge is permitted, with the exception that **the first Competence Unit to be provided must be CU 00: Additive manufacturing Process Overview.**

The rules to conduct the examinations by the EWF AM ANB are prescribed under Examination and Qualification in each Competence Unit guideline listed below in this guideline.

Complementary to the Competence Units that are required for the purpose of the E/IO PBF-LB Diploma issuing, a set of optional Competence Units can be added. These can be of added value for the student and can be implemented by the EWF AM ATB as a supporting training and education offer.

For these optional Competence Units, separate Records of Achievement will be issued after examination approval. Whenever these optional Competence Units are considered mandatory for a certain EWF Qualification, they can be recognized for the purpose of such Qualification Diploma.

To be awarded with the E/IO-PBF-LB Diploma, the trainee must successfully complete all the theoretical examinations described in each of the CUs referenced in the present document by achieving a minimum pass mark of 60% in each competency unit examination.

The trainee must successfully complete all the practical examinations described in each of the CUs referenced in the present document by achieving a minimum pass mark of 80% in each competency unit examination and a minimum mark of 60% for each of the assessment criteria included in the Practical Assessment Matrix.

The examination of any Competence Unit for the purpose of being validated individually, not included in a Qualification course, shall be completed within a period of 1 year from the starting day of the Competence Unit.

If the Competence Unit “A” is done as a part of a qualification course, the examination shall be completed within a period of 4 years from the date of the completion of the first Competence Unit from the qualification where Competence Unit “A” is integrated in. Failure in the examination shall require re-examination.

Each Competence Unit has a period of validity of 4 years. When applying for a Qualification course, the

period of validity of the completed CUs are at discretion of the AM ANB.

Note: For qualifying operators of equipment used in aerospace applications at least 80 % of the theoretical questions shall be answered correctly.

Section I: Theoretical and Practical Education – Qualification Descriptors and Learning Outcomes

I.1. Qualification Outcome Descriptors

QUALIFICATION	EFW LEVEL	KNOWLEDGE	SKILLS	AUTONOMY AND RESPONSIBILITY
European PBF-LB Operator	INDEPENDENT	Factual and broad concepts in the field of PBF-LB metal additive manufacturing process.	Fundamental cognitive and practical skills required to develop proper solutions and application of procedures and tools on simple and specific of PBF-LB manufacturing problems	Self-manage of professional activities and simple standard applications of PBF-LB manufacturing in predictable contexts but subject to change.

I.2. Mandatory Competence Units Learning Outcomes

Each of the following Competence Units has its Guideline with the Minimum Requirements for the Competence Unit and Examination, containing all the detailed knowledge to be covered and implementation and examination rules and procedures.

Competence Unit 00: Additive Manufacturing Processes Overview

CU 00: Additive Manufacturing Processes Overview	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
Directed energy deposition	1
Powder bed fusion	1
Vat photopolymerization	1
Material jetting	1
Binder jetting	1
Material extrusion	1
Sheet lamination	1
Total	7
WORKLOAD	14

Learning Outcomes – CU 00: Additive Manufacturing Processes Overview	
KNOWLEDGE	Factual and broad knowledge of theory, principles and applicability of: – Directed energy deposition – Powder bed fusion – Vat photopolymerization – Material jetting – Binder jetting – Material extrusion – Sheet lamination
SKILLS	Distinguish parts produced by different AM processes Recognise the advantages and limitations of AM processes from a manufacturing process chain point of view Identify the applicability of different AM processes, according to the characteristics of each process

Competence Unit 15: PBF-LB Process

CU 15: PBF-LB Process	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
PBF-LB Process Principles	2
PBF-LB System – Hardware and Software	4
PBF-LB Parameters	3
PBF-LB Feedstock	2
PBF-LB Consumables	2
Post Processing	1
Total	14
WORKLOAD	28

Learning Outcomes – CU15: PBF-LB Process	
KNOWLEDGE	Factual and broad knowledge of: – PBF-LB systems – Laser characteristics – Build platform – Powder – Gases – Processable materials with PBF-LB
SKILLS	Describe the PBF-LB systems, including the components and their functions Recognise the characteristics of the PBF-LB build platform, feedstock and other consumables Recognise the PBF-LB parameters and the influence of their adjustment on the as built part Recognise the interaction of the process heat source with the feedstock Identify the problems associated with inadequate preparation and setup of the build platform, handling and storage of feedstock and application of the gases used in PBF-LB

Competence Unit 16: Quality Assurance (QA) in PBF-LB

CU 16: Quality Assurance (QA) in PBF-LB	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
General QA principles	2,5
AM Machine QA	1,5
AM Parts QA	1
Visual Inspection Overview	2
Total	7
WORKLOAD	14

Learning Outcomes – Quality Assurance (QA) in PBF-LB	
KNOWLEDGE	Factual and broad knowledge of: – Quality Assurance in PBF-LB – Visual Inspection
SKILLS	Recognise the broader use of QA within engineering Recognise the scope of the PBF-LB operator qualification within the AM industry Support the qualification and requalification procedures of PBF-LB equipment Identify the main procedures, equipment and their role Prepare test reports based on the requirements specified by the manufacturer Read a manufacturing plan Compare geometry and dimensions specified in the technical drawings with the as built parts Use simple measurement devices and techniques to carry out a basic visual inspection of the as built part Identify problems in the as built parts distinguishing between imperfections and defects Report defects suggesting either their removal with post processing operations, further inspection or part disposal

Competence Unit 17: Health, Safety and Environment (HSE) in PBF-LB

CU17: Health, Safety and Environment (HSE) in PBF-LB	RECOMMENDED CONTACT HOURS
SUBJECT TITLE	
Health, Safety and Environment	3,5
Total	3,5
WORKLOAD	7

Learning Outcomes – CU17: Health, Safety and Environment (HSE) in PBF-LB	
KNOWLEDGE	Factual and broad of: – Health, Safety and Environment related to PBF-LB
SKILLS	Identify the main hazards and safety measures associated with PBF-LB systems

Competence Unit 18: Hardware, software and build file set-up for PBF-LB

CU 18: Hardware, software and build file set-up for PBF-LB	RECOMENDED CONTACT HOURS
SUBJECT TITLE	
PBF-LB machine set-up requirements	4
Pre-build check list	3
Consumables, feedstock & substrate	3
Build files	1
Work documentation	2
Practical implementation of HSE procedures (while fit and set up the machine)	1
Total	14
WORKLOAD	28

CU	EQF/ EWF LEVEL	JOB FUNCTIONS	JOB REQUIRED ACTIVITIES	CONTACT HOURS	WORKLOAD
Hardware, software and build file set-up for PBF-LB	4 Independent	Fit and set-up hardware, software and build file for PBF-LB	Verifying the PBF-LB system set-up according to the procedure determined by the machine manufacturer and required operational conditions	14	28
			Preparing and verifying the build substrate and feedstock conditions		
			Performing: build file loading, process preparation, process starts, in process observation and mal function detection and mitigation		
			Build observation		
			Following HSE procedures during machine and build file set-up		

Learning Outcomes – CU 18: Hardware, software and build file set-up for PBF-LB	
KNOWLEDGE	Factual and broad knowledge of: – Variables of PBF-LB and related operational conditions parameters – PBF-LB equipment requirements – Materials used for PBF-LB – Type of files and work documentation – HSE procedures under PBF-LB
SKILLS	Prepare the machine for operation, according to the AM procedure specification Prepare the feedstock, build platform and the machine in accordance to the material being used Verify if the PBF-LB machine complies with the machine manufacturer and/or internal specifications Load files to PBF-LB machines Verify if the PBF-LB machines are working in accordance with the job specification, in terms of process parameters Comply with HSE procedures associated to PBF-LB machines Interpret technical information related to the PBF-LB process and machines

Competence Unit 19: Monitoring and managing the manufacturing of PBF-LB parts

CU 19: Monitoring and managing the manufacturing of the PBF-LB parts	RECOMENDED CONTACT HOURS
SUBJECT TITLE	
Machine functionalities and monitoring systems	2
HSE Procedures	0,5
Documentation	1
Total	3,5
WORKLOAD	7

CU	EQF/ EWF LEVEL	JOB FUNCTIONS	JOB REQUIRED ACTIVITIES	CONTACT HOURS	WORKLOAD
Monitoring and managing the manufacturing of PBF-LB parts	4 Independent	Monitoring and managing the manufacturing of PBF-LB parts	Following HSE procedures when printing AM parts	3,5	7
			Following and completing work documentation according to quality/parts requirements		
			Reporting issues and implementing corrective or preventive actions based on parts' requirements feedback from the Engineer		

Learning Outcomes – CU 19: Monitoring and managing the manufacturing of the PBF-LB parts	
KNOWLEDGE	Factual and broad of: – Manufacturing of PBF-LB parts – Machine functionalities and monitoring systems
SKILLS	Load powder following mandatory safety procedures Apply HSE procedures when manufacturing parts Interpret technical documentation related to the requirements of the as built parts Identify the main reasons for failure during the manufacturing process Prepare reports on the manufacturing process, including identified issues

Competence Unit 20: Post processing of PBF-LB parts

CU 20: Post processing of PBF-LB parts	RECOMENDED CONTACT HOURS
SUBJECT TITLE	
Post-build cycle operations	3
Manual tools and methods for post-processing operations	4
Total	7
WORKLOAD	14

CU	EQF/ EWF LEVEL	JOB FUNCTIONS	JOB REQUIRED ACTIVITIES	CONTACT HOURS	WORKLOAD
Post processing of PBF-LB parts	4 Independent	Prepare PBF-LB parts for post processing	Providing information from monitoring data about critical areas for extended testing	7	14
			Applying simple manual operations to parts (cleaning, subtractive & post processing)		
			Handling parts for post processing operations		
			Following applicable HSE procedures		

Learning Outcomes – CU 20: Post processing of PBF-LB parts	
KNOWLEDGE	Factual and broad of: – Powder removal processes – Manual Tools and Methods for subtractive operations – Procedures for different post-processing methods and materials
SKILLS	Remove the as build parts and base plates from the machine applying the necessary HSE procedures Carry out simple manual preparation of the as built part for different post-processing methods Remove powder from the powder bed and parts following mandatory safety procedures Separate the as built parts from base plates distinguishing the base plate from the part based on the technical drawing and specifications using simple manual processes

Competence Unit 21: Maintenance of PBF-LB systems

CU 21: Maintenance of PBF-LB systems	RECOMENDED CONTACT HOURS
SUBJECT TITLE	
General maintenance aspects	2
Optical elements	0,5
Parts maintenance	1,5
Gas supply system	0,5
Auxiliary elements maintenance	1,5
Application driven material change	1
Total	7
WORKLOAD	14

CU	EQF/ EWF LEVEL	JOB FUNCTIONS	JOB REQUIRED ACTIVITIES	CONTACT HOURS	WORKLOAD
Maintenance of PBF-LB systems	4 Independent	Maintain and repair the PBF-LB system	Implementing equipment manufacturer's maintenance routines	7	14
			Cleaning and replacing materials components (e.g. powder bed, cleaning agent, filters, cover glass)		
			Reporting problems to the Engineer		
			Following applicable HSE procedures		

Learning Outcomes – CU21: Maintenance of PBF-LB systems	
KNOWLEDGE	Factual and broad of: – Maintenance aspects associated with PBF-LB systems
SKILLS	Change protective lens and clean the nozzle Assess the need to perform maintenance operations in PBF-LB system Perform maintenance operations in PBF-LB system Identify the consumables for the different machine parts Report the need to execute specific maintenance Support other technicians during system maintenance Verify the cleanliness of the optic system Verify if the optical system is working correctly Monitoring and calibration status Verify the level of wear of a mechanical component Verify the system gas flow Adequate maintenance routines to the material type Verify the condition and make use of the personal protective equipment

Competence Unit 48: Powder Handling

CU 48: Powder Handling	RECOMENDED CONTACT HOURS
SUBJECT TITLE	
Overview of Powder Manufacturing Processes	3
Chemical Composition and Physical Properties	4
Particle Size Distribution	2
Powder storage, handling, ageing and documentation	3
Powder reusability	1
HSE procedures	1
Total	14
WORKLOAD	28

CU	EQF/ EWF LEVEL	JOB FUNCTIONS	JOB REQUIRED ACTIVITIES	CONTACT HOURS	WORKLOAD
Power Handling	4 Independent	Manage powders for Metal AM	Implementing procedures for powder delivery and storage	14	28
			Preparing and analysing powder according to technical documentation		
			Performing powder reconditioning (e.g. sieving) after build cycle		
			Following HSE procedures		

Learning Outcomes – CU 48: Powder Handling	
KNOWLEDGE	Factual and broad of: – Powder handling, storage and reconditioning
SKILLS	Complete technical documentation related to powders for metal AM Characterise powders according to instructions from the engineer Ensure powder conditioning according to the AM Procedure Specification Control the reusability of powders Handle powders according to HSE procedures

Competence Unit 49: Laser Beam Characterisation

CU 49: Laser Beam and Characterisation	RECOMENDED CONTACT HOURS
SUBJECT TITLE	
Laser Beam parameters and conditions	2
Measurement Equipment	5
Total	7
WORKLOAD	1

CU	EQF/ EWF LEVEL	JOB FUNCTIONS	JOB REQUIRED ACTIVITIES	CONTACT HOURS	WORKLOAD
Laser Beam Characterisation	4 Independent	Verify Laser Beam	Checking of the Laser beam characteristics and properties	7	14

Learning Outcomes – CU 48: Laser Beam Characterisation	
KNOWLEDGE	Factual and broad of: – Laser Beam characteristics and properties – Measurement equipment
SKILLS	Safely carry out power measurements including power stability Safely carry out beam profiling in different areas of the build platform Use other measurement equipment to determine other Laser beam properties Carry out measurement in accordance with existing standards and/or internal specifications