



EDU-VET

E-Learning, Digitisation and Units for Learning at VET schools –
Creating online Learning Environments in Technical Education for
European metal industry

Learning Outcome Matrix – Summary

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Learning Outcome Matrices – Summary

This document shows the merged LOMs of each project partner. Please notice that VET in each European country shows differences. For example, regarding the Spanish VET curricula the outcomes are the same for the three levels due to drilling/ reaming/ counterboring/ threadcutting belonging to basic, intermediate and advanced level.

For this reason it should be mentioned that the results of the LOMs have been generalized to have a fundamental basis for the EDU-VET Curriculum. Therefore, in the case of using the Curriculum and LOMs, it is important that the each education system of the several European countries have to be taken into account.

The LOMs can be differentiated according to the level of difficulty:

Level 1: Introductory level (Knowledge tasks)

- ➔ At this level the knowledge of learners should be trained. Therefore, the tasks only intend to test the knowledge. This can be, for example, the querying of definitions, formulas, etc.

Level 2: Intermediate level (Extended tasks)

- ➔ At this level the learners should apply the knowledge that they have learned at level 1. This could be, for example, the calculation of formulas.

Level 3: Advanced level (Problem-oriented tasks)

- ➔ Within this level problem-oriented tasks will be focused. Existing knowledge must be used to activate new knowledge and transfer it to new contexts. For example, this can be trained by case studies or discussion groups.

Learning Outcome Matrix: Module 1 (Drilling/ Reaming/ Counterboring/ Threadcutting) - Online scenario (LOM1)

	Outcomes	Teaching and Learning activities	Assessment
	Having taken this induction/ course, learners will be able to:	The learners will be taught to achieve this specific outcome through the following learning-activities:	The learners will be assessed on their achievement of this specific outcome through the following assessment-tasks:
Introductory level (12-14 years)	Understand the main aspects, processes and definition of Drilling.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of Drilling.	An online task via H5P and a short evaluation questionnaire are main basis of assessing the right understanding of Drilling.
	Understand the main aspects, processes and definition of Reaming.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of Reaming.	An online task via H5P and a short evaluation questionnaire are main basis of assessing the right understanding of Reaming.
	Understand the main aspects, processes and definition of Counterboring.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of Counterboring.	An online task via H5P and a short evaluation questionnaire are main basis of assessing the right understanding of Counterboring.
	Organise the work in the execution of drilling/reaming/counterboring/threadcutting by interpreting the information contained in the product specifications.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about drilling/reaming/counterboring/threadcutting.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Prepare the drill and its tools, recognising its main features and applications.	Learners will be informed through a ppt presentation and pdf documentation and will have to carry out several online activities via H5PA related to calculations needed, selection of tools, etc.; concerning to drilling/reaming/counterboring/threadcutting.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Understand how to use the drill and the equipment involved in drilling processes, taking into account the relationship between its operation, the process	Learners will be mainly informed through videos and will have to carry out several online activities	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.

	conditions and the characteristics of the final product.	via H5PA concerning to practical activities of drilling/reaming/counterboring/threadcutting.	
	Recognise labour risk prevention standards by identifying the risks associated with drilling operations.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about labour risk prevention focused on drilling/reaming/counterboring/threadcutting.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Understand the health and safety requirements for the safe operation of drilling processes.	The learners will get informed by a ppt presentation which provides an overview of key Health and safety instructions that must be followed.	An online task via H5P and a short evaluation questionnaire is main basis of assessing their understanding on safety.
	Understand the different types of drills of drills that are readily used in the industry.	The learners will get informed by a ppt presentation which provides an insight into drill selection and process.	An online task via H5P and a short evaluation questionnaire on drill selection.
	Understand the main aspects and processes and definitions of Drilling/ Reaming/ Counterboring/ Threadcutting.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of Drilling.	An online task via H5P and a short evaluation questionnaire is main basis of assessing the right understanding of Drilling.
	Understand the drilling / reaming / countersinking / threading operations and be able to apply them where required in practice.	The students are informed by means of teaching material and demonstration videos that provide an overview on the topic of drilling. All this on a digital platform within Office 365.	An online task via Teams where a questionnaire (test) is available and must be completed is the most important basis for assessing the correct understanding of drilling.
	Familiar with the technical terms and concepts listed in the attached table, Cutting force during drilling, formulae, tables, diagrams, technical-physical quantities and sources of information/aids listed in the attached table.	The relevant technical terms, concepts etc. are presented to the learners via "interactive H5P course presentations" using multimedia (in particular texts, images, audios, videos and specifically structured interaction tasks) in such a way that they can use these technical terms, concepts and etc. in a self-directed manner Learn "playful" procedures.	The learners are given the opportunity to check their learning progress using the appropriate elements in the "interactive H5P course presentations.

	Determine main productive time when drilling. Learners are familiar with the technical terms and concepts listed in the attached table, main productive time of use when drilling, formulae, tables, diagrams, technical-physical quantities and sources of information/aids listed in the attached table.	The relevant technical terms, concepts etc. are presented to the learners via "interactive H5P course presentations" using multimedia (in particular texts, images, audios, videos and specifically structured interaction tasks) in such a way that they can use these technical terms, concepts and etc. in a self-directed manner Learn "playful" procedures.	The learners are given the opportunity to check their learning progress using the appropriate elements in the "interactive H5P course presentations".
Intermediate level (14-16 years)	Understand the drilling process.	The learners will get informed by a screencast-session, created by the teacher, which explains the several steps of the drilling process.	An online task via H5P (e. g. assignment of correct terms of drilling process) is main basis of assessing the right understanding of drilling processes.
	Understand the cutting parameters of drilling processes.	The learners will get informed by a screencast-session, created by the teacher, which explains the cutting parameters.	An online task via H5P (e. g. calculation of different cutting parameters) is main basis of assessing the right understanding of cutting parameters.
	Understand the different twist drill types.	The learners will get informed by a ppt presentation which provides an explanation concerning the different twist drill types.	An online task via H5P (e. g. Multiple Choice) and a short evaluation questionnaire are main basis of assessing the right understanding of the different twist drill types.
	Document the parts and components that make up a pillar drill.	Learners will be asked to split into pairs, research a pillar drill and document their findings.	Learners will be asked to present their findings in pairs to the rest of the cohort. Produce a drawing of the pillar drill with the main components highlighted.
	Understand the importance of cutting fluid in the drilling process.	The learners will be involved in a group discussion on cutting fluids and their uses. Their own individual points will be discussed.	A short presentation followed by a Q&A session.

	Reading and understanding engineering drawings.	The learners will research engineering drawings and the specific abbreviations that accompany them.	The learners will need to produce a drawing of a base plate with holes at equal measurements.
	Understand the drilling / reaming / countersinking / threading operations and being able to describe how and where to apply them in practice. Both conventional and CNC.	Describing the creation of partial products that contain the aforementioned operations. This can be manual or with machine tools.	The end product will be assessed on the basis of checklists that are completed and compared by the practical teacher and the participant.
	Apply these terms, concepts, etc. in a task- and situation-based way.	The relevant technical terms, concepts etc. are presented to the learners via "interactive H5P course presentations" using multimedia (in particular texts, images, audios, videos and specifically structured interaction tasks) in such a way that they can use these technical terms, concepts and etc. in a self-directed manner Learn "playful" procedures.	The learners are given the opportunity to reflect on their learning progress by creating standardised solution path documentation. This is achieved by using adapted forms and a comparison with experts. This comparison serves as reference solution documentation for the learners.
Advanced level (16-18 years)	Understand the tool selection procedure.	The learners will get informed by a video with a practical example which provides an explanation concerning the tool selection procedure.	On the EDU-VET online learning platform moodle the learners will find the video and an online H5P task (e. g. allocation tasks) which are the main basis of assessing the right understanding of tool selection procedure.
	Getting to know measures for different types of drilling problems.	The learners will get informed by a ppt presentation and a checklist which provides an overview and explanation concerning the different types of drilling problems.	On the EDU-VET online learning platform moodle learners will find a video which shows different drilling problems. Learners will asked to identify these problems and find a solution. The correct answers can be determined by means of an H5P task (e. g. Multiple Choice).
	Recognise and command the deep-hole drilling and deep drilling.	The learners will get informed by a video with a practical example which provides an explanation concerning the process of deep-hole drilling and deep drilling.	The assessment will be carried out in the moodle platform of EDU-VET (online forum). There will be an easy and time-independent place to discuss,

			share impressions and get feedback of other learners and teachers.
	Calculate formulas when looking at cutting speeds and drill times.	The learners can achieve theoretical knowledge via self directed learning with the support of the online platform.	The assessment will be carried out on the EDU-VET online platform. The learners must have completed Interactive H5P tasks to acquire theoretical knowledge about how to calculate drill speeds.
	Demonstrate an understanding of materials that can be drilled and their advantages/disadvantages.	The learners can achieve theoretical knowledge via self-directed learning with the support of the online platform.	The assessment will be carried out on the EDU-VET online platform. The learners must have completed Interactive H5P tasks to acquire theoretical knowledge about materials used in drilling.
	Demonstrate knowledge with respects to the quality and compliance of drilling processes.	The learners can achieve knowledge of quality and compliance processes via self-directed learning with the support of the teachers and their systematic coaching.	The assessment will be carried out on the EDU-VET online platform. The learners have to done interactive H5P tasks to acquire theoretical knowledge about quality and compliance of drilling.
	Retrieve the correct tools and cutting data for the machining process. And translating this into CNC programs and testing them.	Creating machining sequence and CNC programs containing all machining as taught.	The participants are questioned during their assessment conversation about the knowledge they have acquired.
	Optimize the production process with this data.	The machining sequence, the CNC program are assessed on the basis of established criteria.	
	Determine cutting force drilling and document their approach to the task as well as the partial, intermediate and final results achieved in a clearly legible and easily comprehensible structured way.	The relevant technical terms, concepts etc. are presented to the learners via "interactive H5P course presentations" using multimedia (in particular texts, images, audios, videos and specifically structured interaction tasks) in such a way that they can use these technical terms, concepts and etc. in a self-directed manner Learn "playful" procedures.	Learners are given the opportunity to carry out such comparative reflections with fellow students and/or experienced practitioners/teachers. This can be done in synchronous and/or asynchronous contact situations with oral and/or written forms of communication.

Learning Outcome Matrix: Module 1 (Drilling/ Reaming/ Counterboring/ Threadcutting) - Classroom scenario (LOM2)

	Outcomes	Teaching and Learning activities	Assessment
	Having taken this induction/ course, learners will be able to:	The learners will be taught to achieve this specific outcome through the following learning-activities:	The learners will be assessed on their achievement of this specific outcome through the following assessment-tasks:
Introductory level (12-14 years)	Understand the main aspects, processes and definition of Drilling.	The teacher who provides an overview (Texts in textbook, worksheets) concerning the topic of Drilling will inform the learners.	The Drilling fundamental processes will be shown in the metal workshop by the teachers to assess the right understanding of Drilling.
	Understand the main aspects, processes and definition of Reaming.	The teacher who provides an overview (Texts in textbook, worksheets) concerning the topic of Reaming will inform the learners.	The Drilling fundamental processes will be shown in the metal workshop by the teachers to assess the right understanding of Reaming.
	Understand the main aspects, processes and definition of Counterboring.	The teacher who provides an overview (Texts in textbook, worksheets) concerning the topic of Counterboring will inform the learners.	The Drilling fundamental processes will be shown in the metal workshop by the teachers to assess the right understanding of Counterboring.
	Organise the work in the execution of drilling/reaming/counterboring/threadcutting by interpreting the information contained in the product specifications.	The teacher who provide a review the main topics related to drilling/reaming/counterboring/threadcutting processes using face-to-face lessons in classroom and workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Prepare the drill and its tools, recognising its main features and applications.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Carry out basic drilling/reaming/counterboring/threadcutting operations.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.

	Comply with labour risk prevention and environmental protection standards, identifying the risks associated with drilling/reaming/counterboring/threadcutting operations.	The teacher who provide a review the main topics related to labour risk prevention and environmental protection standards belonging to counterboring/threadcutting processes using face-to-face lessons in classroom and workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Understand the health and safety requirements for the safe operation of drilling processes.	The teacher who provides an overview concerning the topic of Drilling will inform the learners.	The learners will be introduced into the workshop. They must provide knowledge of the mandatory PPE requirements.
	Understand the different types of drills of drills that are readily used in the industry.	Demonstration by the tutor on a range of drilling processes.	The learner will demonstrate their ability to select the correct drill and consumables for a specific work piece.
	Understand the main aspects and processes and definitions of Drilling/ Reaming/ Counterboring/ Threadcutting..	The teacher who provides an overview concerning the topic of Drilling will inform the learners.	The Drilling fundamental processes will be shown in the metal workshop by the teachers to assess the right understanding of Drilling. The learner must demonstrate a good understanding of the health and safety required in a workshop environment.
	Understand the drilling / reaming / countersinking / threading operations and be able to apply them where required in practice.	In the classroom, the theoretical teaching material will be treated by means of textbooks, videos and practical examples.	In theory, the student's knowledge is tested on paper.
Intermediate level (14-16 years)	Understand the drilling process.	The learners can achieve these knowledge aspects via self directed learning with the support of the trainers.	The assessment will take place in the direct communication situation and can be carried out in discussion forums as well to get direct feedback by the teacher.
	Understand the cutting parameters of drilling processes.	The learners can achieve these knowledge aspects via self directed learning with the support of the trainers. Learners can also work on tasks to calculate parameters of drilling processes.	The assessment will take place in the direct communication situation and can be carried out in discussion forums as well to get direct feedback by the teacher.

Understand the different twist drill types.	The participants discuss a presentation about different twist drill types. They create an own working team and set roles to design a flipchart presentation themselves to highlight the key aspects.	The assessment will be via creating an own team to achieve an aim is the basis for understanding the different twist drill types.
Prepare and tune drill, equipment, tools up involved in the drilling/reaming/counterboring/threadcutting process, applying the techniques and procedures required.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
Use the drill and the equipment involved in drilling/reaming/counterboring/threadcutting processes, taking into account the relationship between its operation, the process conditions and the characteristics of the final product.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
Comply with labour risk prevention and environmental protection standards, identifying the risks associated with drilling/reaming/counterboring/threadcutting operations.	Learners will have to put into practice this knowledge when they are carrying out the practical tasks proposed in the workshop.	Learners will be assessed according to the implementation of these standards when they are carrying out the practical tasks proposed in the workshop.
Understand the parts and components that make up a pedestal drill.	Locate the pillar drill in the workshop and draw a sketch of the parts of the drill – take health and safety into consideration.	After naming the parts of the drill, safely demonstrate how to complete pre start checks and ensure specific safety measures are in place.
Understand the importance of cutting fluid in the drilling process.	Split into pairs. Locate the COSHH data sheets for the cutting fluids and discuss.	Produce a report on the cutting fluids and the safety information required. Demonstrate workshop awareness.
Reading and understanding engineering drawings.	Learner will locate engineering drawings that are already existing in the workshop. Choose a specific drawing.	Using own engineering drawing of the base plate demonstrate the ability to produce the base plate.

	Understand the drilling / reaming / countersinking / threading operations and being able to describe how and where to apply them in practice. Both conventional and CNC.	In the classroom, the theoretical teaching material will be treated by means of textbooks, videos and practical examples. The students will apply this when making practical assignments under the supervision of a teacher	The theory is tested on paper. In practice, the assignments are assessed on the basis of measurement lists that are completed by both the student and the teacher.
Advanced level (16-18 years)	Understand the tool selection procedure.	The learners think about the tool selection procedure and take part in a discussion.	The assessment of getting to know the tool selection procedure can be carried out best in an oral way in a discussion process.
	Adopt measures for different types of drilling problems.	The adoption process will be learned in short case studies which will be analysed and combined with practical experiences. These experiences will be integrated in creating own learning contents.	The assessment of the adopting process will be done in two way, creating an own short learning content by the learners and a group discussion with feedback on these created contents.
	Recognise and command the deep-hole drilling and deep drilling.	The learners will go through a life demonstration. Therefore, they are forced to see and reflect the actions and also to do all actions themselves.	The assessment will take place in the direct communication situation and can be carried out in discussion forums as well to get direct feedback by teachers and other learners.
	Calculate formulas when looking at cutting speeds and drill times.	The learners can achieve theoretical knowledge via self directed learning with the support of the online platform.	Find out if the machine's capability to set a Speed Rate make a note of how this is achieved. Demonstrate ability to change the speed of the drill.
	Demonstrate an understanding of materials that can be drilled and their advantages/disadvantages.	The learners can achieve theoretical knowledge via self directed learning with the support of the online platform.	Produce a table with the recommended speeds of drilling dependent on material selection. Demonstrate drilling on a variety of materials
	Demonstrate knowledge with respects to the quality and compliance of drilling processes.	Research the types of measuring tools that are used in an engineering workshop. Highlight those specific to the drilling process and document their advantages and limitations.	The learner must demonstrate the correct use of specific measuring tools when carrying out quality checks on drilled holes – base plate can be used.

	<p>Retrieve the correct tools and cutting data for the machining process. And to apply this in practice and on an internship by means of programming and editing on a CNC machine.</p>	<p>In the classroom, the theoretical material will be treated by means of textbooks, videos and practical examples. Further additional information is obtained by the student at the internship company. The theoretical knowledge will be applied at this internship company by making real pieces of work.</p>	<p>The theory is tested on paper. In practice, the assignments are assessed on the basis of measurement lists that are completed by both the student and the teacher. The student makes a portfolio of his work. This is discussed at the end of the training during the assessment interview.</p>
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Learning Outcome Matrix: Module 2 (Turning) - Online scenario (LOM3)

	Outcomes	Teaching and Learning activities	Assessment
	Having taken this induction/ course, learners will be able to:	The learners will be taught to achieve this specific outcome through the following learning-activities:	The learners will be assessed on their achievement of this specific outcome through the following assessment-tasks:
Introductory level (12-14 years)	Understand the main aspects and definition of Turning.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of Turning.	An online task via H5P and a short evaluation questionnaire are main basis of assessing the right understanding of Turning.
	Know about the differentiation between three chip types (rupture chips, shearing chips, continuous chips).	The learners will get informed pdf work sheets/ online materials (e. g. texts from Online textbook) which provides an overview concerning the topic of chip types.	An online task via H5P (e. g. allocation tasks) and a short evaluation questionnaire are main basis of assessing the right understanding of different chip types.
	Know about the differentiation between chip forms.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of chip forms.	An online task via H5P (e. g. drawings – allocation of terms) and a short evaluation questionnaire (e. g. Multiple Choice) are main basis of assessing the right understanding of chip forms.
	Organise the work in the execution of basic turning processes by interpreting the information contained in the product specifications.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about basic turning processes.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Do a basic preparation of the lathe and its tools, recognising its features and applications.	Learners will be informed through a ppt presentation and pdf documentation and will have to carry out several online activities via H5PA related to calculations needed, selection of tools, etc.; concerning to turning.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.

	Understand how to carry out basic turning operations.	Learners will be mainly informed through videos and will have to carry out several online activities via H5PA concerning to practical activities of turning.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Recognise labour risk prevention standards by identifying the risks associated with turning operations.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about labour risk prevention focused on turning.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Understand the health and safety requirements for the safe operation of turning processes.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of turning.	An online task via H5P and a short evaluation questionnaire is main basis of assessing the learners understanding of Health and safety in turning.
	Understand the different types of lathes that are readily used in the industry.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of turning.	An online task via H5P and a short evaluation questionnaire is main basis of ensuring lathe selection is correct.
	Understand the main aspects and processes and definitions of turning.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of turning.	An online task via H5P and a short evaluation questionnaire is main basis of assessing the right understanding of turning.
	Understand the drilling / reaming / countersinking / threading operations and be able to apply them where required in practice.	The students are informed by means of teaching material and demonstration videos that provide an overview on the topic of drilling. All this on a digital platform within Office 365.	An online task via Teams where a questionnaire (test) is available and must be completed is the most important basis for assessing the correct understanding of drilling.
Intermediate level (14-16 years)	Understand the different types and its characteristics of a turning process.	The learners will go through a life demonstration. The learners will get informed by a video with practical examples which provides explanations concerning the different types and its characteristics of a turning process.	The assessment will be carried out on the EDU-VET online platform. The learners have to done interactive H5P tasks to acquire theoretical knowledge about the characteristics of the different types of a turning process.

	Know about characteristics and applications of different cutting-edge designs.	The learners can achieve theoretical knowledge via self directed learning with the support of the online platform.	The assessment will be carried out on the EDU-VET online platform. The learners have to done interactive H5P tasks to acquire theoretical knowledge about characteristics and applications of different cutting-edge designs.
	Recognise cutting-edge angles for various machining types.	The learners will go through a life demonstration. Therefore, the are forced to see and reflect the cutting-edge angles for various machining types the actions and also to use it themselves.	The assessment will be carried out on the EDU-VET online platform. The learners have to watch online learning videos to have insights in practical examples and also acquire theoretical knowledge about cutting-edge angles for various machining types.
	Organise the work in the execution of turning processes, analysing the process sheet and the product specifications, preparing the documentation required.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about turning processes.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Prepare the lathe, choosing the tools and applying the required techniques and procedures.	Learners will be informed through a ppt presentation and pdf documentation and will have to carry out several online activities via H5PA related to calculations needed, selection of tools, etc.; concerning to turning.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Understand how to use the lathe and the equipment involved in turning processes, taking into account the relationship between its operation, process conditions and features of the final product.	Learners will be mainly informed through videos and will have to carry out several online activities via H5PA concerning to practical activities of turning.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Document the parts and components that make up a conventional lathe.	Learners will be asked to split into pairs, research a lathe and document their findings.	Learners will be asked to present their findings in pairs to the rest of the cohort. Produce a drawing of the pillar drill with the main components highlighted.

	Understand the importance of cutting fluid in the turning process.	The learners will be involved in a group discussion on cutting fluids and their uses. Their own individual points will be discussed.	A short presentation followed by a Q&A session.
	Reading and understanding engineering drawings.	The learners will research engineering drawings and the specific abbreviations that accompany them – related to turning operations.	The learners will need to produce a drawing of a base plate with holes at equal measurements.
	Understand the drilling / reaming / countersinking / threading operations and being able to describe how and where to apply them in practice. Both conventional and CNC.	Describing the creation of partial products that contain the aforementioned operations. This can be manual or with machine tools.	The end product will be assessed on the basis of checklists that are completed and compared by the practical teacher and the participant.
Advanced level (16-18 years)	Know about the theory and facilitating of the preparation process of a machine (including testing of NC-programme).	The learners can achieve theoretical knowledge via self directed learning with the support of the online platform.	The assessment will be carried out on the EDU-VET online platform. The learners have to done interactive H5P tasks to acquire theoretical knowledge about the preparation of a machine.
	Calculate the theoretical surface roughness.	The learners have to do online work sheets and have to do different tasks to apply the formula of the theoretical surface roughness.	Online tasks via H5P (e. g. application of formulas) and a short evaluation questionnaire (e. g. Multiple Choice) are main basis of assessing the right understanding and calculating the theoretical surface roughness.
	Discuss about possibilities which are available for producing short broken chips.	The learners discuss in an online session the possibilities which are available for producing short broken chips.	The assessment can be carried out best in an oral way in a discussion process via online discussion forums on the EDU-VET online learning platform. Learners will asked to identify these possibilities and find a solution. The correct answers can be determined by means of an H5P task (e. g. Multiple Choice).

Organise the work in the execution of CNC turning processes, analysing the process sheet and preparing the documentation required.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about CNC turning processes.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
Prepare the CNC lathe, choosing the tools and applying the required techniques and procedures.	Learners will be informed through a ppt presentation and pdf documentation and will have to carry out several online activities via H5PA related to calculations needed, selection of tools, etc.; concerning to turning. They will also program the CNC lathe and use simulators to check the results with regard to the specifications.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
Understand how to use the CNC lathe and the equipment involved in CNC turning processes, taking into account the relationship between its operation, process conditions and features of the final product.	Learners will be mainly informed through videos and will have to carry out several online activities via H5PA concerning to practical activities of turning.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
Know about the theory and facilitating of the preparation process of a machine (including testing of NC-programme).	The learners can achieve theoretical knowledge via self directed learning with the support of the online platform.	The assessment will be carried out on the EDU-VET online platform. The learners have to done interactive H5P tasks to acquire theoretical knowledge about the preparation of a machine.
Calculate formulas when looking at cutting speeds and feeds times.	The learners can achieve theoretical knowledge via self directed learning with the support of the online platform.	The assessment will be carried out on the EDU-VET online platform. The learners have to done interactive H5P tasks to acquire theoretical knowledge about the preparation of a machine.
Demonstrate knowledge with respects to the quality and compliance of turning processes.	The learners can achieve theoretical knowledge via self directed learning with the support of the online platform.	The assessment will be carried out on the EDU-VET online platform. The learners have to done interactive H5P tasks to acquire theoretical knowledge about the preparation of a machine.

	Retrieve the correct tools and cutting data for the machining process. And translating this into CNC programs and testing them.	Creating machining sequence and CNC programs containing all machining as taught.	The participants are questioned during their assessment conversation about the knowledge they have acquired.
	Optimize the production process with this data.	The machining sequence, the CNC program are assessed on the basis of established criteria.	

Learning Outcome Matrix: Module 2 (Turning) - Classroom scenario (LOM4)

	Outcomes	Teaching and Learning activities	Assessment
	Having taken this induction/ course, learners will be able to:	The learners will be taught to achieve this specific outcome through the following learning-activities:	The learners will be assessed on their achievement of this specific outcome through the following assessment-tasks:
Introductory level (12-14 years)	Understand the main aspects and definition of Turning.	The teacher who provides an overview (Texts in textbook, worksheets, figures) concerning the topic of Turning will inform the learners.	The Turning fundamental processes will be shown in the metal workshop by the teachers to assess the right understanding of Turning. In the classroom the teacher shows work pieces to explain the Turning.
	Know about the differentiation between three chip types (rupture chips, shearing chips, continuous chips).	The teacher who provides an overview (Texts in textbook, worksheets, figures) concerning the topic of the differentiation between three chip types will inform the learners.	The assessment will take place in the direct communication situation in the classroom. There will be feedback sessions and oral support by the teacher.
	Know about the differentiation between chip forms.	The teacher who provides an overview (Texts in textbook, worksheets, figures) concerning the topic of differentiation between chip forms will inform the learners.	The assessment will take place in the direct communication situation in the classroom. There will be feedback sessions and oral support by the teacher.
	Organise the work in the execution of basic turning processes by interpreting the information contained in the product specifications.	The teacher who provide a review the main topics related to turning processes using face-to-face lessons in classroom and workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Do a basic preparation of the lathe and its tools, recognising its features and applications.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Carry out basic turning operations.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.

	Comply labour risk prevention standards by identifying the risks associated with turning operations.	The teacher who provide a review the main topics related to labour risk prevention and environmental protection standards belonging to turning processes using face-to-face lessons in classroom and workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Understand the health and safety requirements for the safe operation of turning processes.	The teacher provides a demonstration on safe operations concerning the topic of turning and will inform the learners.	The learners will be introduced into the workshop. They must provide knowledge of the mandatory PPE requirements.
	Understand the different types of lathes that are readily used in the industry.	Demonstration by the tutor on a range of drilling processes.	The learner will demonstrate their ability to select the correct lathe and consumables for a specific work piece.
	Understand the main aspects and processes and definitions of turning.	The teacher who provides an overview concerning the topic of turning will inform the learners.	The turning fundamental processes will be shown in the metal workshop by the teachers to assess the right understanding of lathes. The learner must demonstrate a good understanding of the health and safety required in a workshop environment.
	Understand the operations and be able to apply them where required in practice.	In the classroom, the theoretical material will be treated by means of textbooks, videos and practical examples.	In theory, the student's knowledge is tested on paper.
Intermediate level (14-16 years)	Understand the different types and its characteristics of a turning process.	The learners discuss a presentation about different types and its characteristics of a turning process and its characteristics. They create an own working team and set roles to design a flipchart presentation themselves to highlight the key characteristics of a turning process.	The assessment will be via creating working groups to achieve an understanding of the different types and its characteristics of a turning process with the aim to present and discuss their results in the whole class.
	Know about characteristics and applications of different cutting-edge designs.	The learners go through different characteristics and applications of different cutting-edge designs and create own poster overviews.	Direct communicative feedback by teacher/ other learners and short overview descriptions allow to

			assess the characteristics and applications of different cutting-edge designs.
	Recognise cutting-edge angles for various machining types.	The learners discuss these points in a discussion group.	Direct communicative feedback processes allow to recognize cutting-edge angles for various machining types.
	Prepare and tune lathe, equipment, tools up involved in the turning process, applying the techniques and procedures required.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Use the lathe and the equipment involved in turning processes, taking into account the relationship between its operation, process conditions and features of the final product.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Comply with labour risk prevention and environmental protection standards, identifying the risks associated with turning processes.	Learners will have to put into practice this knowledge when they are carrying out the practical tasks proposed in the workshop.	Learners will be assessed according to the implementation of these standards when they are carrying out the practical tasks proposed in the workshop.
	Document the parts and components that make up a conventional lathe.	Locate the pillar drill in the workshop and draw a sketch of the parts of the drill – take health and safety into consideration.	After naming the parts of the lathe, safely demonstrate how to complete pre start checks and ensure specific safety measures are in place.
	Understand the importance of cutting fluid in the turning process.	Split into pairs. Locate the COSHH data sheets for the cutting fluids and discuss.	Produce a report on the cutting fluids and the safety information required. Demonstrate workshop awareness.
	Reading and understanding engineering drawings.	Learner will locate engineering drawings that are already existing in the workshop. Choose a specific drawing	Using own engineering drawing of the base plate demonstrate the ability to produce the base plate

	Understand the operations and describe how and where to apply them in practice. Both conventional and CNC.	In the classroom, the theoretical material will be treated by means of textbooks, videos and practical examples. The students will apply this when making practical assignments under the supervision of a teacher.	The theory is tested on paper. In practice, the assignments are assessed on the basis of measurement lists that are completed by both the student and the teacher.
Advanced level (16-18 years)	Know about the theory and facilitating of the preparation process of a machine (including testing of NC-programme).	The learners can achieve this knowledge via self directed learning with the support of the teachers and their systematic coaching.	The assessment will take place in the direct communication situation and directly on the machine.
	Calculate the theoretical surface roughness.	The learners go through different tasks and practice to calculate the theoretical surface roughness.	The assessment will take place in the classroom. The learners work on the assignments on their own and can ask the teacher if they have any questions.
	Discuss about possibilities which are available for producing short broken chips.	The learners discuss these points in a discussion group.	The assessment will take place in the direct communication situation. Direct communicative feedback processes allow to assess possibilities which are available for producing short broken chips.
	Prepare the CNC lathe, choosing the tools and applying the required techniques and procedures.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Use the CNC lathe and the equipment involved in CNC turning processes, taking into account the relationship between its operation, process conditions and features of the final product.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Comply with labour risk prevention and environmental protection standards, identifying the risks associated with turning processes.	Learners will have to put into practice this knowledge when they are carrying out the practical tasks proposed in the workshop.	Learners will be assessed according to the implementation of these standards when they are carrying out the practical tasks proposed in the workshop.

	Preparing the machine (including testing of NC-programme).	The learners can achieve these knowledge via self directed learning with the support of the teachers and their systematic coaching.	The assessment will take place in the direct communication situation and directly on the machine.
	Calculate formulas when looking at cutting speeds and feeds times.	The learners can achieve these knowledge via self directed learning with the support of the teachers and their systematic coaching.	The assessment will take place in the direct communication situation and directly on the machine.
	Demonstrate knowledge with respects to the quality and compliance of turning processes.	The learners can achieve these knowledge via self directed learning with the support of the teachers and their systematic coaching.	The assessment will take place in the direct communication situation and directly on the machine.
	Retrieve the correct tools and cutting data for the machining process. And to apply this in practice and on an internship by means of programming and editing on a CNC machine.	In the classroom, the theoretical material will be treated by means of textbooks, videos and practical examples. Further additional information is obtained by the student at the internship company. The theoretical knowledge will be applied at this internship company by making real pieces of work.	The theory is tested on paper. In practice, the assignments are assessed on the basis of measurement lists that are completed by both the student and the teacher. The student makes a portfolio of his work. This is discussed at the end of the training during the assessment interview.

Learning Outcome Matrix: Module 3 (Milling) - Online scenario (LOM5)

	Outcomes	Teaching and Learning activities	Assessment
	Having taken this induction/ course, learners will be able to:	The learners will be taught to achieve this specific outcome through the following learning-activities:	The learners will be assessed on their achievement of this specific outcome through the following assessment-tasks:
Introductory level (12-14 years)	Know about the safety when grinding.	The learners will get informed by a ppt presentation and by online guidelines which provides an overview concerning the safety when grinding.	An online task via H5P (e. g. Multiple Choice) and a short evaluation questionnaire are main basis of assessing the right understanding of safety when grinding.
	Know about the advantages of grinding.	The learners will get informed by an online video which will be provided on the EDU-VET online learning platform to get an overview about the advantages of grinding.	An online video and a short evaluation questionnaire are main basis of assessing the right understanding of the advantages of grinding.
	Know about different types of abrasive tools.	The learners will get informed by a ppt presentation and by online work sheets which provides an overview concerning the different types of abrasive tools.	An online task via H5P (e. g. Multiple Choice, allocation tasks) and a short evaluation questionnaire are main basis of assessing the right understanding of different types of abrasive tools.
	Organise the work in the execution of basic milling processes by interpreting the information contained in the product specifications.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about basic milling processes.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Do a basic preparation of the milling machine and its tools, recognising its features and applications.	Learners will be informed through a ppt presentation and pdf documentation and will have to carry out several online activities via H5PA related to calculations needed, selection of tools, etc.; concerning to milling.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.

	Understand how to carry out basic milling operations.	Learners will be mainly informed through videos and will have to carry out several online activities via H5PA concerning to practical activities of milling.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Recognise labour risk prevention standards by identifying the risks associated with milling operations.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about labour risk prevention focused on milling.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Understand the health and safety requirements for the safe operation of milling processes.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of Drilling.	An online task via H5P and a short evaluation questionnaire is main basis of assessing the right understanding health and safety in respect of milling.
	Understand the different types of milling machines that are readily used in the industry.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of Drilling.	An online task via H5P and a short evaluation questionnaire is main basis of assessing the right understanding of milling.
	Understand the main aspects and processes and definitions of milling.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of Drilling.	An online task via H5P and a short evaluation questionnaire is main basis of assessing the right understanding of milling.
	Understand the milling operations and be able to apply them where required in practice.	The students are informed by means of teaching material and demonstration videos that provide an overview on the topic of drilling. All this on a digital platform within Office 365.	An online task via Teams where a questionnaire (test) is available and must be completed is the most important basis for assessing the correct understanding of drilling.
Intermediate level (14-16 years)	Know about the characteristics and differentiations of universal milling machines.	The learners go through the EDU-VET online observatory and watch life demonstration of Best-Practices. Therefore, they are forced to see and reflect the characteristics of universal milling machines.	Based on life demonstrations of Best-Practices the learners compare the characteristics and differentiations of universal milling machines provided by the EDU-VET Online Observatory with own experiences and rate the situations.

	Use measures concerning the safety when grinding.	The learners discuss these points in the Online discussion forum of the EDU-VET learning platform and create poster in online break-out sessions in working groups.	Direct communicative feedback and presentation of posters allow to assess the measures concerning the safety when grinding.
	Know and use the safety rules when grinding.	The learners create explanations videos in working groups and upload them on EDU-VET online learning platform.	Creation of explanation videos allow to understand and use the safety rules when grinding. The learners work on the assignments in a working group and allow to reflect the results.
	Organise the work in the execution of milling processes, analysing the process sheet and the product specifications, preparing the documentation required.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about milling processes.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Prepare the milling machine, choosing the tools and applying the required techniques and procedures.	Learners will be informed through a ppt presentation and pdf documentation and will have to carry out several online activities via H5PA related to calculations needed, selection of tools, etc.; concerning to milling.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Understand how to use the milling machine and the equipment involved in milling processes, taking into account the relationship between its operation, process conditions and features of the final product.	Learners will be mainly informed through videos and will have to carry out several online activities via H5PA concerning to practical activities of milling.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Document the parts and components that make up a conventional lathe.	Learners will be asked to split into pairs, research a milling machine and document their findings.	Learners will be asked to present their findings in pairs to the rest of the cohort. Produce a drawing of the milling machine with the main components highlighted.
	Understand the importance of cutting fluid in the turning process.	The learners will be involved in a group discussion on cutting fluids and their uses. Their own individual points will be discussed.	short presentation followed by a Q&A session.

	Reading and understanding engineering drawings.	The learners will research engineering drawings and the specific abbreviations that accompany them – related to milling operations.	The learners will need to produce a drawing of a base plate with holes at equal measurements.
	Understand the machining operations and describe how and where to apply them in practice. Both conventional and CNC.	Describing the creation of partial products that contain the aforementioned operations. This can be manual or with machine tools.	The end product will be assessed on the basis of checklists that are completed and compared by the practical teacher and the participant.
Advanced level (16-18 years)	Understand the fundamental and theoretical basis of NC programming.	The learners go through the EDU-VET online platform and edit online tasks.	The assessment will take place on the EDU-VET online platform to do H5P self-testing online tasks.
	Recognize the effect of high grinding heat on a workpiece.	The effect of high grinding heat on a workpiece will be learned in short online case studies. Best-practices on the EDU-VET Online Observatory will be the basis for analysing and combining the effect and also creating the online case study.	The assessment will be done in two ways, creating an own short learning content and the reflection of the Best-Practices which will be provided on the EDU-VET Online Observatory.
	Create a work plan for cylindrical grinding.	The procedure concerning the cylindrical grinding will be learned by creating a MOOC in working groups.	The assessment will take place in the direct online communication situation and can be carried out in online discussion forums (break-out sessions) as well to get direct feedback.
	Organise the work in the execution of CNC milling processes, analysing the process sheet and preparing the documentation required.	Learners will be informed through a ppt presentation and pdf documentation that provides an overview about CNC milling processes.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
	Prepare the CNC milling machine, choosing the tools and applying the required techniques and procedures.	Learners will be informed through a ppt presentation and pdf documentation and will have to carry out several online activities via H5PA related to calculations needed, selection of tools, etc.; concerning to turning. They will also program the CNC milling machine and use simulators to check the results with regard to the specifications.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.

Understand how to use the CNC milling machine and the equipment involved in CNC milling processes, taking into account the relationship between its operation, process conditions and features of the final product.	Learners will be mainly informed through videos and will have to carry out several online activities via H5PA concerning to practical activities of milling.	Online tasks via H5P and an evaluation questionnaire will be used to assess their understanding about these issues.
Understand the fundamental and theoretical basis of NC programming.	The learners go through the EDU-VET online platform and edit online tasks.	The assessment will take place on the EDU-VET online platform to do H5P self-testing online tasks.
Calculate formulas when looking at cutting speeds and feeds times.	The learners go through the EDU-VET online platform and edit online tasks.	The assessment will take place on the EDU-VET online platform to do H5P self-testing online tasks.
Demonstrate knowledge with respects to the quality and compliance of turning processes.	The learners go through the EDU-VET online platform and edit online tasks.	The assessment will take place on the EDU-VET online platform to do H5P self-testing online tasks.
Retrieve the correct tools and cutting data for the machining process. And translating this into CNC programs and testing them.	Creating machining sequence and CNC programs containing all machining as taught.	The participants are questioned during their assessment conversation about the knowledge they have acquired.
Optimize the production process with this data.	The machining sequence, the CNC program are assessed on the basis of established criteria.	

Learning Outcome Matrix: Module 3 (Milling) - Classroom scenario (LOM6)

	Outcomes	Teaching and Learning activities	Assessment
	Having taken this induction/ course, learners will be able to:	The learners will be taught to achieve this specific outcome through the following learning-activities:	The learners will be assessed on their achievement of this specific outcome through the following assessment-tasks:
Introductory level (12-14 years)	Know about the safety when grinding.	The participants discuss a presentation about safety aspects when grinding. They create an own working groups and set roles to design a flipchart presentation themselves to highlight the key aspects of safety guidelines.	The assessment will be via creating a flipchart in an own group to discuss the main aspects of safety when grinding.
	Know the advantages of grinding.	The learners are discuss different points of view and take part in a pro-contra discussion.	The assessment of getting to know the advantages of grinding can be carried out best in an oral way in a discussion process.
	Know about different types of abrasive tools.	The teacher who provides an overview (Texts in textbook, worksheets, figures) concerning the topic of the different types of abrasive tools will inform the learners.	The assessment will take place in the direct communication situation in the classroom. There will be feedback sessions and oral support by the teacher.
	Organise the work in the execution of basic milling processes by interpreting the information contained in the product specifications.	The teacher who provide a review the main topics related to milling processes using face-to-face lessons in classroom and workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Do a basic preparation of the milling machine and its tools, recognising its features and applications.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Carry out basic milling operations.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.

	Comply labour risk prevention standards by identifying the risks associated with milling operations.	The teacher who provide a review the main topics related to labour risk prevention and environmental protection standards belonging to milling processes using face-to-face lessons in classroom and workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Understand the health and safety requirements for the safe operation of milling processes.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of milling.	An online task via H5P and a short evaluation questionnaire is main basis of assessing the right understanding of milling.
	Understand the different types of milling machines that are readily used in the industry.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of milling.	An online task via H5P and a short evaluation questionnaire is main basis of assessing the right understanding of milling.
	Understand the main aspects and processes and definitions of milling.	The learners will get informed by a ppt presentation which provides an overview concerning the topic of milling.	An online task via H5P and a short evaluation questionnaire is main basis of assessing the right understanding of milling.
	Understand the milling operations and be able to apply them where required in practice.	In the classroom, the theoretical material will be treated by means of textbooks, videos and practical examples.	In theory, the student's knowledge is tested on paper.
Intermediate level (14-16 years)	Documenting and presenting the manufacturing process.	The learners discuss different points of view and take part in a pro-contra discussion.	The assessment of getting to know their own ways of presenting and documenting manufacturing processes can be carried out in an oral way in a discussion process.
	Use measures concerning the safety when grinding.	The learners discuss these points in a discussion group and create posters in working groups.	Direct communicative feedback and short overview descriptions via posters allow to assess measures concerning the safety when grinding.
	Know and use the safety rules when grinding.	The learners will create a handbook with safety guidelines when grinding via self directed learning with the support of the teacher.	The assessment will take place in the direct communication situation and can be carried out in

			the classroom as well to get direct feedback by the teacher and other learners.
	Prepare and tune milling machine, equipment, tools up involved in the milling process, applying the techniques and procedures required.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Use the milling machine and the equipment involved in milling processes, taking into account the relationship between its operation, process conditions and features of the final product.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Comply with labour risk prevention and environmental protection standards, identifying the risks associated with milling processes.	Learners will have to put into practice this knowledge when they are carrying out the practical tasks proposed in the workshop.	Learners will be assessed according to the implementation of these standards when they are carrying out the practical tasks proposed in the workshop.
	Documenting and presenting the manufacturing process.	The learners discuss different points of view and take part in a pro-contra discussion.	The assessment of getting to know their own ways of presenting and documenting manufacturing processes can be carried out in an oral way in a discussion process.
	Understand the importance of cutting fluid in the turning process.	Split into pairs. Locate the COSHH data sheets for the cutting fluids and discuss .	Produce a report on the cutting fluids and the safety information required. Demonstrate workshop awareness.
	Reading and understanding engineering drawings.	Learner will locate engineering drawings that are already existing in the workshop. Choose a specific drawing.	The learners will need to produce a drawing of a base plate with holes at equal measurements.
	Understand the machining operations and describe how and where to apply them in practice. Both conventional and CNC.	In the classroom, the theoretical material will be treated by means of textbooks, videos and practical examples. The students will apply this when making	The theory is tested on paper. In practice, the assignments are assessed on the basis of measurement lists that are completed by both the student and the teacher.

		practical assignments under the supervision of a teacher.	
Advanced level (16-18 years)	Understand the fundamental and theoretical basis of NC programming.	The teacher who provides an overview (videos, texts in textbook, worksheets, figures) concerning the theoretical basis of NC programming will inform the learners. Additionally the teacher shows NC programming directly on the machine to train the practical knowledge of NC programming.	The assessment will be trained in two ways. The fundamental and theoretical basis of NC programming will be shown in the classroom via didactical learning materials (video, work sheets). The practical basis of NC programming will be shown in the metal workshop by the teachers to assess the right understanding of it.
	Recognize and adopt the effect of high grinding heat on a workpiece.	The adoption process will be learned in short case studies which will be analysed and combined with practical experiences. These experiences will be integrated in practical adoption.	The assessment of the adopting process will be done in two ways, creating a short case study and the integration and combination, based on practical experiences, of practical adoption. Moreover the assessment can be carried out in a group discussion as well to get direct feedback.
	Create a work plan for cylindrical grinding.	The participants go through different approaches and create own work plans.	Direct communicative feedback and creation of work plans allow to assess preparation process for cylindrical grinding.
	Prepare the CNC milling machine, choosing the tools and applying the required techniques and procedures.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Use the CNC milling machine and the equipment involved in CNC milling processes, taking into account the relationship between its operation, process conditions and features of the final product.	Several practical tasks will be proposed to learners to be carried out in the workshop.	A task and an evaluation questionnaire will be used to assess their understanding about these issues.
	Comply with labour risk prevention and environmental protection standards, identifying the risks associated with milling processes.	Learners will have to put into practice this knowledge when they are carrying out the practical tasks proposed in the workshop.	Learners will be assessed according to the implementation of these standards when they are

			carrying out the practical tasks proposed in the workshop.
	Understand the fundamental and theoretical basis of NC programming.	The learners can achieve these knowledge via self directed learning with the support of the teachers and their systematic coaching.	The assessment will take place in the direct communication situation and directly on the machine.
	Calculate formulas when looking at cutting speeds and feeds times.	The learners can achieve these knowledge via self directed learning with the support of the teachers and their systematic coaching.	The assessment will take place in the direct communication situation and directly on the machine.
	Demonstrate knowledge with respects to the quality and compliance of turning processes.	The learners can achieve these knowledge via self directed learning with the support of the teachers and their systematic coaching.	The assessment will take place in the direct communication situation and directly on the machine.
	Retrieve the correct tools and cutting data for the machining process. And to apply this in practice and on an internship by means of programming and editing on a CNC machine.	In the classroom, the theoretical teaching material will be treated by means of textbooks, videos and practical examples. Further additional information is obtained by the student at the internship company. The theoretical knowledge will be applied to this internship company by making real pieces of work.	The theory is tested on paper. In practice, the assignments are assessed on the basis of measurement lists that are completed by both the student and the teacher. The student makes a portfolio of his work. This is discussed at the end of the training during the assessment interview.