

# VETwin-win

## MODULE 1

Fundamentals and design variants for interlinking further education and training modules in the building and construction industry and the commercial technical sectors.

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### General indications for the modules

An indispensable principle of this further education, which applies to all modules, concerns the particular methodical orientation that should relate throughout to what is taught, namely modern, action oriented learning methods in which the teachers do not "instruct" but see themselves rather as "learning colleagues of the learners". None of the modules address the pure determination of knowledge but should rather aim for the formation of a new practical knowledge for the arrangement of the interlinking processes of vocational training and further education from the company. The participants then connect learning in presence seminars with online learning, independent learning and learning from practical tasks carried out in their own field of work. These they can evaluate, absorb and theoretically process together with the other participants and the instructors in regular group meetings.

### I. Preliminary notes to Module 1

#### The aims of this module and the factors on which it depends

In Module 1 the participants learn the fundamentals and design variants of interlinking in vocational and further operational training in the building and construction industry and commercial technical sectors. These design variants of "interlinking" enable the consideration of concrete aims in the acquisition of professional competence and take into account in the best possible way the current conditions within the individual enterprises.

For the small enterprises there are good reasons to use the work process it contains and the possibilities of interlinking vocational and further operational training to ensure the use of personal competitiveness, as the specifics of the workplace and the resulting necessary competence are generally given insufficient consideration by external further education schemes. The different approaches of the learning contents and training modules should be underlined out here.

The interlinking of initial and further training simultaneously with the work process can be regarded as an optimum strategy for staff development in small enterprises.

#### Learning objectives and contents of the module

- The *general aims* of the interlinking of vocational training and operational further education
- The *concrete aims* of the interlinking
- Design variants of the interlinking of vocational training and operational further education
- Interlinking of the vocational training with elements of the operational further education
- Interlinking of the operational further education with elements of the vocational training
- Simultaneous interlinking of initial and further training
- Separate training modules to link initial and further training
- Additional qualifications on the basis of the interlinking of vocational training with operational further education
- Methods suitable for the support of work process integrated learning by interlinking the training with elements of further education
- Recognition of the different qualification modules constituents and practical examples of additional qualifications
- Subsequent modular qualifications.

#### What the participants/learners should know in conclusion

##### Knowledge

- The participants have knowledge of the different design variants of the interlinking
- The participants have the available knowledge of additional qualifications and other qualification models

- The participants know of the advantages and disadvantages in the training and the work process and can implement the different contents appropriately

### **Skills**

- The participants take in the possibilities of the different interlinked design variants
- They are able to develop independent learning units and operational tasks and convey them to the trainees
- They can motivate the trainees to acquire additional qualifications
- They can transfer their acquired knowledge and skills to other learning units.

### **Personal competence (social and self competence)**

- The participants understand the effort in modern, action and company process-oriented learning methods and can make a contribution to them
- The participants can stimulate the trainees to optimum performance learning methods and correctly evaluate their performance
- The participants can assess performance with other partners in training and cooperate and communicate well within the enterprise.

### **Requirements of the self learning process**

The participants independently work out from their own vocational environment the conception and organisation of an additional qualification in this module and present this suggestion before the learning group.

### **General methodical notes for the instructors**

- The further education culminates in the exchange of presence seminars, practice and the provision of study material through the online learning platform
- Teamwork should be primarily organised in the presence seminars
- The learning and work assignments of the participants are presented.

## **II. Contents and practical assignments**

### **Contents**

- 1.1 Explanation of terms
- 1.2 Fundamental aspects
- 1.3 Design variants for interlinking of vocational and operational further education
  - 1.3.1 Interlinking of vocational training with elements of operational further education
  - 1.3.2 Interlinking of operational further education with elements of vocational training
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  - 1.3.4 Separate training modules connecting initial and further training
- 1.4 Fields of action - additional qualifications
- 1.5 Practical examples of additional qualifications
  - 1.5.1 Examples of supplementary learning and additional qualifications in the building sector
  - 1.5.2 Additional qualifications in the commercial-technical sector
- 1.6 Fields of action - modular supplementary qualifications
  - 1.6.1 Promotion of supplementary qualifications in Germany

### **Practical tasks**

In this module the participants work out independently for an additional qualification the conception and organisation with a practical relationship and present this suggestion before the learning group.

## 1.1 Explanation of the terminology for the interlinking of vocational training and operational further education

For the development of a design concept for the interlinking of initial and further training, the terms training, further education and interlinking should first be defined:

- 1) *Vocational training* is understood as the acquisition of basic competences which enable one to carry out vocational actions or activities.  
These basic competences are the foundation of knowledge as well as of abilities and skills. They are generally imparted in a systematic form and are recognised by national regulations. The basic competences promote the professional career, individual mobility and flexibility.
- 2) *Operational further education* is understood as the acquisition of special competences which enable one to adapt to technical/technological changes and make a contribution to operational innovation processes. These special competences are mainly work process integrated, acquired to a great extent through organised learning. They also contain methodical and socio-cultural competences. The special competences promote company loyalty, effectiveness in the professional work and customer orientation. They also serve for individual profiling.
- 3) *Interlinking* is understood as the targeted process and integrated combination of elements (aims, content, methods, forms of organisation and assessments of results) in vocational training, with operational further education for a uniform process of studying and continued learning in the vocation and for the workplace. This interlinking goes beyond just an additive combination of individual qualifications and is characterised by the competences acquired through training, vocation and experiences in life as well as informal learning processes.

## 1.2 Fundamental aspects

The *general aims* of the interlinking of vocational training and operational further education result from:

- Company objectives and concrete work assignments
- The effort made to acquire active vocational competence for future work assignments. The learning therefore serves in the acquisition of a special, methodical competence.
- The aptitude for lifelong learning in other skills. The collective learning promotes therefore the acquisition of general learning competence.
- The necessity to form a working group and a motivated, multi-disciplined team. The collective learning then supports group development processes.
- The necessity to initiate cooperation networks with other partners. This collective learning serves in the development of social competence.

The *concrete aims* of interlinking are formulated as follows.

- Interlinking is the work process related acquisition of vocational competences, directed at the same time at the behavioural changes of the workers and the learners.
- The interlinking of vocational training and operational further education realises a leap in quality in the didactic-methodical organisation of learning processes based on the removal of contradictions between learning process and working process as well as between training and further education.
- The interlinking of vocational training and operational further education takes into account the existing legal and regulated education policies and ensures the independence of these forms of education, especially with regard to the recognition of learning results.

The "interlinking" is not therefore confined solely to the acquisition of additional qualifications but also forges close links between individual elements in the acquisition of competences in the context of process integrated learning.

The interlinking of process integrated vocational training and operational further education is a dynamic process which depends in particular on:

- concrete or predictable work assignments,
- the existing vocational competences of the learners,
- the respective current learning progress,
- the company culture,
- the learning culture in the company and the region,
- the pedagogic competences of the company,
- the competences of the training facilities, including consultants and instructors,
- the availability of new knowledge of the latest equipment and technology,
- the education policies and economic situation and
- the changes in prevailing regional conditions.

The use of interlinking for the development of competence calls for a suitable *didactic projection* for the organisation of the learning process.

The didactic projection is directed not only at:

- the aims,
- the learning content,
- the learning method,
- the organisational form within the company for learning in the working process and
- the evaluation of the learning results,

but also at the individual requirements of the employee as "learners" and "teachers" who are available as supervisors, mentors, advisors or instructors.

The learning content, learning methods and organisational forms cannot be fully defined due to the highly individual nature of the smaller firms. These must always adapt to the aims and conditions of a collective learning process.

The working process related acquisition of vocational competences in smaller firms follows through learning from and with each other in a collective working process.

This learning therefore includes

- formal learning,
- informal learning and
- implicit learning.

Typical of the learning found in smaller firms is the absence of homogeneity in the working and learning group regarding the vocational and life experience between age groups and the motivation and activity structure. Particular situations then arise if, for instance, learners are teachers for other group members and/or if project managers also act as technical managers.

The working process related acquisition of vocational competences is not only directed at the fulfillment of current, direct work assignments. It also embraces currently needed information, knowledge and abilities.

The successful interlinking of vocational training and operational further education depends heavily on how favourable the conditions for learning in the working process can be made, i.e. structures conducive to learning in the workplace.

A prerequisite for the introduction of self organised learning process is also the recognition of a favourable learning situation in the working process, the awareness therefore, that the currently available competences are insufficient to address the processes of change

### **1.3 Design variants of interlinking of vocational training and operational further education and their methodical implementation in SMEs**

The interlinking of vocational training and operational further education in the working process can be done by four different design variants:

- interlinking of vocational training with elements of operational further education
- interlinking of operational further education with elements of vocational training
- simultaneous interlinking of vocational training and operational further education
- separate training modules incorporated as links to vocational training and operational further education

#### **1.3.1 Interlinking of vocational training with elements of operational further education**

The training involves imparting practical skills and knowledge to a trainee or student through a training facility. The pedagogic aim lies less in collective and personal development and more in the standardised establishment of applicable abilities which best serve the industrial vocational exercise.

Training providers and schools mainly fill these roles in vocational training. For a recognised training requirement e.g. in Germany, training can only be offered in compliance with the national training regulations.

The interlinking of vocational training with elements of operational further education should enable the trainees to:

- more effectively meet the special requirements of the company that may arise from company specific technological processes, company specific performance profile, particular customer requirements (culture, language, region, safety requirements) and legal regulations (authorisation, permits)  
*and/or*
- acquire a faster familiarisation with company work assignments.

The interlinking of training with elements of further education allows the trainees to learn special skills within the company (additional qualifications, accreditation) which enable them to adapt to economic and technical/technological changes and make an active contribution to the operational processes of change. These special competences are in the main acquired through the working process integrated tasks. They also contain methodical and sociocultural competences and in addition, they also serve for an individual profile formation.

Teachers in further education are:

- experienced skilled tradesmen and mentors from the company and/or
- teachers from training facilities, vocational schools, universities or suppliers

The interlinking of training with elements of further education includes in particular the suitable project method for working process integrated learning. Methods relating to situations such as the following can therefore be included:

- Group work,
- Familiarisation tasks,
- Excursion tasks,
- Learning and working tasks,
- Key text methods, work instructions,
- Training methods,
- Case study methods,
- Role playing.

The use of experienced, skilled tradesmen for guidance (mentors) and imparting operational special competences to trainees has proved of value. The mentor is a confidant and contact with an "open ear". These experienced advisors lend support for an agreed period to trainees and others beginning a career and guide them in their personal and vocational development.

A special form of guidance by experienced advisors is the integration of new employees from a migrant background into a breaking in and training phase. This guidance can include various qualification modules, company placements and flanking guidance in all technical and personal questions.

### **1.3.2 Interlinking of further education with elements of vocational training**

Further education includes all activities which contribute to the broadening or recapitulation of knowledge, skills and abilities of people who have completed an *initial training phase* and are generally in employment.

Further education differentiates various forms of learning such as:

- formal, organised further education (e.g. seminars, courses and E-Learning, CBT, WBT) and
- informal further education (e.g. informal, self paced learning).

The aim of interlinking operational further education with elements of vocational training is:

- the updating and further development of operational competences, in particular after a vocational hiatus (new start after a period of unemployment, unfamiliar work, family commitments),
- the acquisition or updating of authorisation permits and
- the acquisition of basic vocational competences arising from new scientific and technical/technological knowledge.

The interlinking of further education with elements of vocational training leads to the acquisition of basic vocational competences from skilled tradesmen which enable and authorise the skills for special vocational work.

The content is generally imparted and acquired in a systematic form and recognised by the various national regulations.

The interlinking of further education with elements of vocational training applies a variety of methods in which the project methods often play a central role.

### **1.3.3 Simultaneous interlinking of vocational training and operational further education**

The simultaneous interlinking of initial and further training allows trainees and skilled workers to acquire simultaneously and collectively the vocational operational competences (basic vocational competences and company specific competences) that enable and authorise the vocational work. Target groups are therefore trainees together with skilled workers.

The acquisition of these competences should enable adaptation to the scientific and technical/technological changes and make an active contribution to processes of change within a company.

The simultaneous interlinking of initial and further training is arguably the most important form of interlinking for smaller firms.

Typical of this kind of learning is the absence of homogeneity in the group regarding the vocational and life experience between age groups and the motivation and activity structure.

The collective learning of younger and older employees in the working processes offers the possibility of combining the knowledge of older employees through operational processes and unconventional, proven solutions with the innovative potential of younger employees.

The following forms of learning could therefore also be used (see Module 4):

- Junior-senior learning pair
- Learning partnership
- Creative team
- Customer conference
- Learning with media support instruments

The following are possible approaches for using teachers:

- The trainees and experienced skilled workers in the firm take turns as teacher and learner.
- For contents which neither group can teach, instructors from training facilities, vocational schools, universities or suppliers could be called in.

### **1.3.4 Separate learning modules to connect vocational training with operational further education**

The term "interlinking" is often used if the time between vocational training and operational further education should be "bridged" through targeted teaching modules, without a process of integrated connection of elements (aims, content, methods, forms of organisation and evaluation of results), to vocational training with operational further education as a uniform process of learning and continued assimilation in the vocation and the workplace. The "interlinking" is in this case often merely an additive summary of individual qualifications.

## **Conclusion**

The different design variants of interlinking of process integrated vocational training and operational further education make it possible to address the concrete aims most effectively in the acquisition of vocational competences and the current conditions in individual concerns.

For the smaller firms, the working process itself and the possibility of interlinking vocational training and operational further education as the most effective form of ensuring competitive ability should in essence be used for the following reasons:

- Smaller firms cannot afford to break an employment agreement through further training of staff. The temporal, pressured performance requirement and lack of manpower call for another form of qualification in contrast to the larger firms.
- For the smaller firms external further training measures are as a rule not effective, as the specifics of the workplace and the necessary attendant competences are not given sufficient consideration.
- The further training measures offered in the education market are too expensive for the smaller firms. There is in addition the problem of finding a suitable training provider with the requisite competences. Moreover, the multimedia support for further education offered by the training provider is often, in the main, not an acceptable form of organisation to smaller firms.

In deductive summary, the interlinking of initial and further training together and simultaneously, together with the working process could be considered as an optimum strategy for personnel development in smaller firms.

The *additional qualifications* in the context of interlinking vocational training with operational further education will be addressed in detail in the following section.

#### **1.4 Field of activity - additional qualifications**

##### **What are additional qualifications?**

Additional qualifications are an instrument for more pronounced individual differentiation and practice compatible flexibility in vocational training. They occur during vocational training or in direct relationship and impart additional knowledge, cognisance and skills.

Additional qualifications are used by companies primarily to ensure the requisite, company specific, specialised knowledge and future new blood. The salient content of additional qualifications offers pointers on the need for qualifications in the firm.

The aims of additional qualifications are the broadening and consolidation of specialised and vocationally comprehensive competences, enhanced key competences and the acquisition of special skills and accreditation. Trainees can for instance gain extra computer certificates or consolidate their foreign language proficiency in vocational school courses or during trips abroad. Trainees in the vocational trades can for example gain additional business management knowledge.

The relevant certification body should be informed as early as possible to ensure that such additional qualifications can also be certified and recognised. If this is not feasible, the certification can also be arranged internally by a training facility or the firm itself.

##### **The advantages of additional qualifications**

The most important advantages are:

###### **Early specialisation**

- Specialised knowledge opens up new interesting fields of work even during training.

###### **Time saving**

- Additional qualifications can often be fully or partially taken into consideration in later further training.

### **Better opportunities**

- Those gaining an additional qualification enjoy much better career prospects.

The most important offers of additional qualifications come from the training providers. They differ in the nature and scope of training for learners. Additional qualifications can of course also be offered by external training providers.

### **Definition of needs**

The following questions help to define whether your concern has a need for additional qualifications and if so, what kind. If you answer only one of these questions with "Yes", the introduction of additional qualifications should be earnestly considered.

- Does your training lack certain contents i.e. do your trainees need knowledge from other related trades that is necessary in a productive application?
- Should individual special skills and abilities be targeted and consolidated for trainees?
- Do you require intensive promotion of key qualifications for your trainees?
- Are your trainees insufficiently challenged, i.e. could they be promoted to contribute more to the company?
- Do you see the possibility of interlinking initial and further training in order to achieve cost conscious qualifications for future applications within the company?
- Do you wish to use the promotion of new blood to improve your competitiveness by the promotion of your own trainees?
- Do you wish to keep trainees long term in your company after training?

### **Conception**

The content of additional qualifications should be as precisely defined as possible and clearly documented.

- Which learning content and which salient points are needed?
- Is there a projected time frame i.e. how many hours in total are needed?
- Should there be additional qualifications as a single event or is a modular progression more fitting?
- Which teaching method can be applied (E-Learning, CBT, or other)?
- Which teaching material will be needed?
- Can a certificate be obtained? Is there an examination?
- Is there a participation certificate?
- Is there the possibility of a credit against further training examinations (e.g. for the master craftsman examination)?

## Organisation

In contrast to the content design, the organisation can be enhanced by external influences (e.g. cooperation partners). Here however, the short and medium term changes are much more likely than those in the content.

- Can the additional qualification be arranged in the company or must another accommodation be found?
- Is the suitable equipment available?
- Who can implement the qualification (own staff or external teachers)?
- How can the measures be integrated into the operational schedule in terms of time and organisation?
- Which cooperation partner would be suitable? (manufacturer/supplier, vocational training providers, vocational schools)?
- Which trainees will be eligible for additional qualifications?
- What form of feedback is in place?
- How does the cost effectiveness projection look?

## Examinations and certification of competences

An examination is the essential requisite for the confirmation of competences. It is important that the certificate be filled out in detail, stating which competences, skills and knowledge have been acquired and how they were tested. It should be traceable and transparent for the benefit of third parties.

### 1.5 Practical examples for additional qualifications

#### 1.5.1 Examples of supplementary training and additional qualifications in the construction industry

*Supplementary training and additional qualifications for skilled construction workers/bricklayers*

Supplementary training/Modules	Training time in days
- Module: Concrete renovation/materials testing	5
- Module: Wood, timber jointing	5
- Module: Specific field, rendering/stucco	5
- Module: Specific field /vaulting	5
- Module: Unit construction drywalling	5
- Module: Woodwork and structural preservation	10
- Module: Concrete/ferroconcrete	15
- Module: Concrete/ ferroconcrete work, stone structures	15
- Module: Stone structures / rendering /screed	20
- Module: Certification, multi layer insulation systems	5

- Module: Avoiding structural damage	4
- Module: Building foreman, construction	15
- Module: Training for the instructor (ADA)	5

<b>Additional qualifications</b> for skilled construction workers/bricklayers	Training time in days
Training for small excavators	5
Certified rotary tower crane driver	15
Masonry construction	15
Framework renovation	15
Interior construction	15
Sealing work	15
Facade construction	15
Rendering equipment	10
Tiling	15
Paving	15
Clay construction	15
Mechanised rendering	15
Vaulting	15
Panel structure renovation techniques	15
Trained electrician	10
Word processing	5
Table calculation	5
Fundamentals of PC equipment	1
Introduction to the Internet	2
Digital graphics processing	2
Presentation with MS-PowerPoint	5
Foreign languages commercial-technical	5
Health and safety	3
Quality management	5
Fundamentals of entrepreneurial self employment	5
Teamwork skills and communication	2
Further training for training supervisors	2
Energy efficient building in construction	1
Basic course: Personal safety equipment to prevent falls	1
Waste and environmental management in the building industry	1
Documentation for BAU	1
Preparing und managing building processes	1

*Supplementary training and additional qualifications for skilled extension builder / carpenter*

<b>Supplementary training/Modules for skilled extension builder / carpenter</b>	<b>Training time in days</b>
Module: Interior construction	5
Module: Wood, timber jointing	5
Module: Screed manufacture	5
Module: Tiling and tile laying	5
Module: Building elements interior construction	5
Module: Rendering manufacture	10
Module: Concrete/ferroconcrete	15
Module: Stone building elements	15
Module: Wood, timber elements	25
Module: Foreman carpenter	15
Module: Calculations for beams, bearers	10

<b>Supplementary qualification for skilled extension builder / carpenter</b>	<b>Training time in days</b>
Driving license for stacker truck	5
Driving lessons for wheel loader	5
Certified rotary tower crane driver	15
Framework renovation	15
Interior construction	15
Half timbered construction	15
Interior surveying	5
Operation and maintenance of smaller plant in construction projects	5
Wood restoration	10
Trained electrician	10
Proficiency certificate, fastening equipment	5
Word processing	5
Table calculation	5
Fundamentals of PC equipment	1
Introduction to the Internet	2
Digital graphics processing	2
Presentation with MS-PowerPoint	5
Presentation equipment	2
Foreign languages, commercial-technical	5
Health and safety	3
Quality management	5
Fundamentals of entrepreneurial self employment	5
Teamwork skills and communication	2

Each additional qualification ends in a test and can be confirmed by a certificate from a company, a training provider or a chamber of commerce.

### **Example of the additional qualification "Design in skilled crafts" for painters, varnishers & joiners Part A (80 hours)**

The additional qualification "Design in skilled crafts" goes beyond the knowledge imparted in everyday vocational school life. Its aim is to create a basis through optional additional lessons for the appraisal of object layouts and promote the ability to bring design competences into a business.

The training is of two years duration. It begins in the second semester of the first apprentice year and ends with the first semester of the third apprentice year.

The training is subdivided into part A with general and experimental subjects. Part B relates more to the professional and project-oriented application. At the end of training an independent project is presented. The successful participant receives a certificate "Additional qualification in design".

The contents of the curriculum are as follows:

#### **Part A (80 hours)**

1. Perception
2. Communication, form, colour
3. Freehand drawing
4. Flächiges, räumliches Gestalten
5. Closing project

#### **Part B (120 hours)**

1. Project related display techniques
2. Design experiments
3. Closing project

Project related work is important for this course. Workshops, learning islands and if necessary, computer rooms are also called for.

### **Example of additional qualifications in the building sector in the abc Bau GmbH /Deutschland qualification programme**

#### **Vocation related qualification**

- Orbital welding course
- Restoration of historic walls
- Regenerative energy, in particular photovoltaic, geothermal
- Specialities of prefabricated constructions
- EDP on site (Word, Excel, AutoCAD or Allplan)
- Chimney construction
- Stucco / corner sills / mould construction
- Renewable energy in roof spaces

#### **Multi discipline qualification**

- Power saw operator licence course
- Building plant training course
- Stud gun operator course
- Trailer driving licence course
- Stores logistics on site, organisation of small and large element storage
- Training for guidance of trainees as mentor
- Recycling / waste reclamation (using scrap wood as firewood, rubble, sales of steel etc.)

- Disposition of night shift building projects
- From idea to planning to permits
- The route to building permission

**Individual qualification**

- First aid qualification
- “Etiquette” for tradesman trainees
- Social networking / Web 2.0
- Foreign languages on site, placement by exchange programme
- Enhancing the teamwork abilities

**1.5.2 Additional qualifications in the commercial technical sector**

For the toolmaker, electromechanic and process engineer trades the examples below of enhanced competence and its commercial uses by gaining additional qualifications should be made clear.

**Additional qualification: Injection moulding**

1. Procedure, operation and use of the machine controls

<b>Trades:</b>	<b>Toolmaker, electromechanic</b>
<b>Objectives:</b>	<ul style="list-style-type: none"> <li>- To learn and understand the functioning and procedures of the injection moulding machine (IMM)</li> <li>- Ability to follow a systematic procedure for commissioning and decommissioning</li> <li>- Ability to transfer operating elements to other machines</li> </ul>
<b>Content:</b>	<ul style="list-style-type: none"> <li>- Construction and functioning of the IMM</li> <li>- Injection moulding procedure</li> <li>- Fundamentals of the IMM and its controls</li> <li>- Starting and ending the injection process</li> <li>- Trouble shooting during commissioning and decommissioning</li> </ul>
<b>Why? Example</b>	<ul style="list-style-type: none"> <li>- Recognising and taking in the complexity and close relationship of one’s own vocational group with other technical fields</li> <li>- Acquisition of independence and security</li> </ul> <p><u>Example:</u> If a malfunction occurs in the IMM and the production line, both vocational groups can more promptly allocate the cause according to its nature to the commercial technical sector</p>

2. Tool changes

<b>Trades:</b>	<b>Toolmaker, electromechanic</b>
<b>Objectives:</b>	<ul style="list-style-type: none"> <li>- Acquisition of fundamental knowledge of tool changes</li> <li>- Correct procedure for dismantling and fitting tools</li> </ul>

Content:	<ul style="list-style-type: none"> <li>- Selection criteria IM tools and IMM</li> <li>- Practical training: <ul style="list-style-type: none"> <li>a) Tool changing</li> <li>b) Connection of peripheral equipment (e.g. tempering device, conveyor, etc.)</li> </ul> </li> </ul>
Why? Example	<ul style="list-style-type: none"> <li>- Development of a systematic procedure for tool changing</li> <li>- Acquisition of independence and security</li> </ul> <p><u>Example:</u> During a production run a serious tool breakdown occurs and the process engineer is busy with other tasks. The toolmaker can in this event react independently and undertake repairs.</p>

### 3. Recognition and elimination of injection moulding faults

<b>Trades:</b>	<b>Toolmaker, electromechanic</b>
Objectives::	<ul style="list-style-type: none"> <li>- Early recognition of injection moulding faults and their elimination</li> <li>- Improved moulding quality</li> </ul>
Content:	<ul style="list-style-type: none"> <li>- Recognition, causes and correction of moulding defects</li> <li>- Systematic analysis of injection faults</li> <li>- Working with training software</li> <li>- Practical training: carrying out and evaluating trial series</li> </ul>
Why? Example	<ul style="list-style-type: none"> <li>- To isolate possible causes of defects</li> <li>- Construction defects should be recognised in the earliest possible phase of tool manufacture.</li> </ul> <p><u>Example:</u> Tooling defects</p>

### 4. Injection moulding machine programming and setting

<b>Trades:</b>	<b>Toolmaker, electromechanic</b>
Objectives:	<ul style="list-style-type: none"> <li>- Knowledge of technological parameters and their meaning</li> <li>- Independent adjustment of travel and processing conditions</li> </ul>
Content:	<ul style="list-style-type: none"> <li>- Practical training: <ul style="list-style-type: none"> <li>a) Programming and setting of the clamping unit</li> <li>b) Programming and setting of the injection unit</li> <li>c) Influence of technological parameters on the quality of the mouldings</li> </ul> </li> </ul>
Why? Example	<ul style="list-style-type: none"> <li>- Independent and prompt elimination of faults when assembling a new tool</li> <li>- Communication breakdowns are obviated</li> <li>- With the adequate skilled competences, one can detect whether the cause of defects is due to the parameters or constructive defects in the moulding.</li> </ul> <p><u>Example:</u> Some SME's already have an IMM in their workshop and carry out the initial commissioning themselves</p>

**Additional qualification: Plastic production and processes**

<b>Trades:</b>	<b>Toolmaker, electromechanic</b>
<b>Objectives:</b>	- Fundamental knowledge of plastic production and testing
<b>Contents:</b>	<ul style="list-style-type: none"> <li>- Importance, classification, symbolism and properties of plastic</li> <li>- Possible applications for selected plastics</li> <li>- Importance and types of plastic test procedures</li> <li>- Practical training:               <ul style="list-style-type: none"> <li>a) Carrying out selected tests</li> <li>b) Evaluation of test results</li> </ul> </li> </ul>
<b>Why? Example</b>	<p>- The ejection of the moulding must be suited to the mechanical properties of the plastic</p> <p><u>Example:</u>            Tool dimensions must suit the shrinkage behaviour of the plastic.            Electromechanic: Thermal behaviour of the plastic</p>

**Additional qualification: Maintenance of electrical and mechanical assemblies**

<b>Trades:</b>	<b>Toolmaker, electromechanic</b>
<b>Objectives:</b>	- Participants should be assigned to specific work, similar and repeated tasks in the commissioning and maintenance of electrical assemblies
<b>Contents:</b>	<ul style="list-style-type: none"> <li>- Protective measures</li> <li>- Electronics (plant equipment)</li> <li>- Control equipment</li> <li>- Fundamentals of sensor systems in control equipment</li> <li>- Practical training:               <ul style="list-style-type: none"> <li>a) Assembly and wiring of safety switchgear</li> <li>b) Proficient assembly and soldering of circuit boards from instructions</li> </ul> </li> <li>- Operational practice:               <ul style="list-style-type: none"> <li>a) Connection and operation of plant related peripheral devices</li> </ul> </li> </ul>
<b>Why? Example</b>	<p><u>Examples:</u></p> <ol style="list-style-type: none"> <li>1. Hot runner moulds - cleaning and maintenance</li> <li>2. Sensors for core pulling tools - testing and readjustment</li> </ol>

**Comprehensive description of a learning unit relevant to an additional qualification in the commercial-technical sectors**

<b>Learning unit</b>	Fundamentals of injection moulding, operation and use of the machine controls
<b>Sector</b>	Commercial-technical branches of the plastics sector
<b>Training vocations</b>	Industrial mechanics, toolmakers, electromechanics who work directly in the production process of a firm in the plastics sector and also process engineers for plastics and rubber equipment
<b>Description of anticipated learning results</b>	<p><b>Knowledge</b></p> <p>Participants learn in intensive, practical training the fundamentals of injection moulding equipment.</p> <p>They learn the individual procedural steps of injection moulding.</p> <p>They acquire a comprehensive knowledge of the assembly and functions of the injection moulding machine.</p> <p>They learn the meaning of the symbols used for the machine controls and the assembly and the terms used in the display screens.</p> <p>They acquire a comprehensive knowledge of fault detection and breakdowns during commissioning and decommissioning of the injection moulding machine.</p> <hr/> <p><b>Skills</b></p> <p>Participants are able to describe the procedural steps for injection moulding from flow diagrams.</p> <p>They can start and end the injection moulding process in chronological order while observing health, safety and fire drill in the workplace</p> <p>They can apply the acquired knowledge and skills to other operational machine controls.</p> <p>With machine documentation and other documents they are able to interpret and use information on symbols, terms and explanations of the most important display screens.</p> <p>They can recognise, analyse and rectify malfunctions when running or shutting down the injection moulding machine.</p>

	<p><b>Personal competences</b></p> <p>Participants are able to recognise and take in the complexity and close relationship of one's own vocational group with other technical fields</p> <p>They are aware of the high responsibility they bear when commissioning and decommissioning machines and installations.</p> <p>Participants acquire independence and safety awareness when handling new machines and installations.</p> <p>They are able to present their independently learned abilities, knowledge and skills from topics and targeted results.</p>
<p><b>Learning objectives</b></p>	<p><b>Cognitive</b></p> <ul style="list-style-type: none"> <li>• Acquisition of fundamental knowledge of injection moulding equipment.</li> <li>• Understanding of the functioning and process flow of the injection moulding machine and the ability to follow a systematic, chronological order for commissioning and decommissioning.</li> <li>• The ability to detect analyse and rectify possible faults alone using the machine documentation.</li> <li>• The ability to apply the acquired knowledge and skills to other operating elements and controls of other machines and installations.</li> </ul> <p><b>Affective</b></p> <ul style="list-style-type: none"> <li>• Security with machine documentation and other documents.</li> <li>• Prompt and correct reaction to eventual faults and breakdowns.</li> <li>• The allocation of the causes of faults to commercial-technical demarcations according to their nature.</li> <li>• The readiness for cooperative, multi disciplined elimination of faults.</li> </ul> <p><b>Psychomotoric</b></p> <ul style="list-style-type: none"> <li>• Instilling of the technical, health and safety regulations in the plastics factory (injection moulding).</li> <li>• By continual practice on injection moulding machines, simulated faults / breakdowns are more quickly recognised and precisely identified.</li> <li>• Instilling of a routine and systematic procedure when operating the injection moulding machine.</li> </ul> <p>Specifications and scope of the drill:  A specification of the learning objectives results in the concrete preparation of individual training units.  The scope of the coordination of acquired knowledge, skills und competences is stated in the framework of operational tasks appropriate for training.</p>

<b>Learning content</b>	<p><b>Fundamentals of injection moulding equipment</b></p> <ul style="list-style-type: none"> <li>- Briefing on health and safety at work</li> <li>- Construction and mode of operation of the injection moulding machine</li> <li>- Process flow of injection moulding</li> <li>- Technological parameters and their meaning</li> </ul> <p><b>Fundamentals of the injection moulding machine and its controls</b></p> <ul style="list-style-type: none"> <li>- Explanation of the input unit</li> <li>- Display screen for the clamping injection unit</li> <li>- Starting and ending the injection process</li> <li>- Comparison of technological parameters in so called production reports (actual and target analyses)</li> <li>- Handling breakdowns/clearing faults during commissioning and decommissioning</li> <li>- Processing of on and off algorithms for injection moulding machines</li> </ul>
<b>Time frame under supervision of the learning location</b>	<p>2 weeks (80 hours) Learning location: plastics factory (injection moulding)</p>
<b>Forms of learning, methods, media</b>	<ul style="list-style-type: none"> <li>- Introductory instructions</li> <li>- Lesson discussion</li> <li>- Self learning units, fixed topics and practical exercises</li> <li>- Use of all course study material, machine documentation, sample protocols and work sheets</li> <li>- Self assessment and evaluation discussion</li> </ul> <p>Training on real injection moulding machines from manufacturers:</p> <ul style="list-style-type: none"> <li>- Arburg Allrounder 270 S</li> <li>- Klöckner Ferromatik Desma FX 50</li> <li>- Ferromatik Milacron E 50 S</li> <li>- Ferromatik Milacron E evolution 75</li> <li>- Engel ES 200H/80V/50HL 2F</li> <li>- Demag ERGOtech compact 80</li> </ul>
<b>Organisation of the learning content</b>	<p>The learning unit targets future commercial-technical skilled labour from the industry and other trades.</p> <p>The participants from the vocations of toolmaker, electromechanic and process engineer for plastics and rubber machinery will be receiving multi discipline company related training.</p> <p>The group should not exceed 10 participants in number.</p> <p>Given the requisite conditions, the entire learning unit can be carried out in-house.</p>
<b>Assessing the results / report on performance</b>	<p><b>Report on performance during the learning unit</b></p> <ul style="list-style-type: none"> <li>- Evaluation of the self learning unit</li> <li>- Evaluation of abilities and skills in commissioning and decommissioning injection moulding machines</li> <li>- Internal training course test</li> </ul>

	<p><b>Report on performance at conclusion of the learning unit</b></p> <ul style="list-style-type: none"> <li>- Self assessment</li> <li>- Evaluation by the instructor from the training centre</li> </ul> <p>The participant receives confirmation of the required results in the form of a certificate.</p>
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## 1.6 Action field - modular subsequent training

People without recognised vocational qualifications have difficulties in the labour market. Most employers require proof of the ability to plan and work independently, process information and communicate. All these qualifications are acquired mostly during initial training. However, not everyone has the usual background of training; some leave it until the end so that perhaps only the examination for a valid vocational qualification is lacking. As so called semi-skilled or unskilled labour they seldom find qualified, secure employment.

In view of the chronic deficit of qualified skilled labour, the question to enterprises of new intake of qualified staff from their own sources is continually posed because this demand often cannot be met through initial training. Many of their employees have acquired long standing, primarily company specific workflows and product knowledge. As a rule, semi-skilled and unskilled adults can offer the following advantages:

- Experience of vocation and life
- Practical skills
- Motivation, because every occupation increases their chance of long term integration into the labour market

The training of employed and unemployed, semi-skilled and unskilled people with and without migrant background represents therefore a potential which, with the initial and further training by suitable training and the interlinking of elements, can serve to offset the deficit of qualified employees.

Subsequent training opens up opportunities for unskilled or semi-skilled people and those who have broken off their training or studies, to gain a professional qualification later and improve their employment prospects. Enterprises can then see ways to induct potential trainees and develop unskilled employees to meet their requirements for qualified employees. Training and occupation are combined. The modular construction enables differential and individual forms of training.

The following aspects determine the subsequent training:

- Division of the training contents into so-called modules with well defined, vocationally oriented knowledge, skills and abilities,
- Orientation on the operational needs when implementing subsequent training offers,
- Close connections between learning and work. The subsequent training is carried out mainly within the business and is completed by study units in a vocational training facility.

Modular subsequent training enables one to gain a professional qualification without loss of time in the working life. Either on the job or as a comprehensive training measure, everybody can gain a professional qualification under consideration of his previous vocational knowledge and abilities. Building on one's own the professional experiences, the modular subsequent training offers an option which opens up new horizons.

## **Learning and working**

Learning and working go hand in hand in modular subsequent training. Subsequent training which targets a professional qualification can therefore take place only in close cooperation between the business and a vocational training facility. This virtual practice together with the suitable promotion of learning or guidance helps the participants to develop their professional competences.

Apart from orientation on the operational training needs it is primarily the separation of the training contents into individual, compatible modules which enables successful subsequent training. The modules are learning units, each with comprehensive, vocationally orientated knowledge, skills and abilities which are tested one by one.

## **Information and offers of advice**

To develop this qualification reserve, information and advice offers are required for enterprises. The resulting opportunities arising from the subsequent training of semi-skilled and unskilled labour should therefore be extant to enterprises. The enterprises should be informed of the possibilities as to how subsequent training can be planned, carried out and organised so that new training approaches can be applied to the flow of operational staff development. The information and offers of advice could refer to the following aspects:

### *Performance spectrum for young adults*

- Competent information and initial advice
- Determination of competence and analyses of strengths/ weaknesses
- Individual determination of the training requirements
- Organisational indications for the training in cooperation with enterprises
- Advice on possible promotional programmes
- Advice and guidance up to the final examination

### *Performance spectrum for the enterprise*

- Advice for enterprises on the subsequent training of the less qualified employees
- Determination of the training potential of unskilled employees
- Support in the optimum design of the subsequent training
- Advice on possible promotional programmes
- Guidance up to the final examination

## **1.6.1 Support for subsequent training in Germany**

### **The external examination for non-trainees**

The so-called external examination is an officially recognised final examination of non-trainees which is identical to the initial vocational training in its requirements. There are several possibilities of being approved for the external examination:

1. Those who require admission as external applicants for the skilled worker final examination must show proof that they have worked for at least 1.5 times the required training period in the vocation relating to the examination. This means, for example, four and a half years in an occupation that requires three years training. As a rule, proof of activity in the respective vocation is through references

from the employer and contracts of employment stating that experience in the vocation was acquired. Proof of training time spent in another vocation that requires training is also taken into account.

2. If proof of this minimum period is only partial or unavailable, admission is also possible if the applicant proves by testimonials or other means that he has acquired the vocational ability to justify admission to the examination. Suitable testimonials and proof of the ability to work in a vocation are for example necessary for supplementary training courses. Testimonials of foreign qualifications and time spent working in a vocation abroad are also taken into account.

If an applicant meets the admission requirements mentioned above, he can apply for admission to the external examination to the responsible body. If there are further learning contents open, they are covered in learning and studying modules. The number of still open learning modules then constitute the total duration of the subsequent training. The examination, the last step towards vocational qualification is set after the end of the last module.

During the marking of results, existing foreign vocational experience is recognised and does not have to be acquired again in the context of the subsequent training. The application for admission is made to the responsible chambers of industry and commerce or the trade chambers. This examination is also set before these chambers.

### **Finance possibilities**

A subsequent qualification programme can, apart from personal financing by the participant or the company, also be financially sponsored by various programmes for employers and participants.

### **Training allowances**

For workers from firms with less than 250 employees the labour office offers among other options sponsorship through training vouchers and an advance payment from the wage. A prerequisite for this is that the employee has little or no qualification and has worked for more than four years as semi skilled or unskilled. The employee receives the training voucher and can use these for the approved further training offers.

The unemployed and job seekers can, depending on the prospects for success, also be supported with a training voucher in gaining a further training qualification. This also applies to people registered with the responsible authority and with vocational training but without a formal qualification or with more than four years of work experience. A direct consultation with the responsible office is necessary for this allowance.