dualTRAIN Project

Guidelines on how to find, analyse, and use the learning potentials of work places

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Content:

0. Introduction

Compared to formal learning arrangements in classrooms or workshops work-based learning (WBL) is characterised by a row of specifics; the most relevant are:

1 What can or should be learnt is not based only on decisions of a teacher or trainer but determined by work-processes;

2 the absence of pedagogically highly skilled persons;

3 and a high amount of mentors who contribute to the competence development of an apprentice resp. VET-student.

These specifics require elaborated preparation and guidance procedures to assure a smooth learning pathway both within each learning station and the whole apprenticeship scheme as well. For the purpose of dualTRAIN project do we recommend an iterative approach; adapting existing and approved methods; each step focussing on one of the specifics listed above; in detail:

1 Learning Station Analysis (LSA). This research based method was developed to figure out what can and should be learnt at a chosen work-place; taking into account not only technical aspects but also the surroundings like supply chains, the organisation of work or what an apprentice should already know to use the learning potential best. Chapter 1 sketches the milestones of LSA; supplemented by a template and comprehensive examples from dualTRAIN project.

2 The choice and preparation of skilled workers for their role as mentors/advisers is crucial for the success of WBL; they act not only as guides but are also responsible for the achievement of learning outcomes (LO) acquirable in the respective department. Chapter 2 proposes approaches of recruiting and preparing mentors.

3 In each department / at each learning station a different mentor is responsible for the apprentice/VET-student; proper communication between mentors on one side and teachers resp. trainers on the other side must be assured by easy to handle documents. Many German companies developed already templates that document the LO of the learner and the quality of the learning station; chapter 3 starts with some basic pedagogical thoughts and proposes templates (transcript of records, feedback sheet) to be used when piloting WBL.

1. Learning Station Analysis (O2-A1) - an instrument to explore possible Learning Outcomes (LO) of Work-Based-Learning (WBL)

1.1 Introduction

This manual *'Learning Station Analysis – an instrument to explore possible Learning Outcomes (LO) of Work-Based-Learning (WBL)'* is an adapted version of a collaborative product of the pilot projects 'Move Pro Europe' and 'AERONET' in the aeronautic sector implemented by Airbus and already approved in other European projects like 'APPRENTSOD'. In particular, the form of documentation of the analytical results was changed with respect to the specific aims of the project dualTRAIN. The methods proposed here should by applied to exemplary work places, where the 'activity fields' (AF) or units, proposed to be suited for the implementation of dual structures in the shoe sector in Portugal and Spain, are performed.

The procedure 'LSA' (Learning Station Analysis) was developed to help arrange the training at the learning places in an effective way in accordance with the business needs and operating processes. Essentially, it helps users to figure out the work places that are important both in terms of the significance of their operating processes *and* for the learning opportunities they provide. This approach emphasizes the value of training taking place at work stations where really relevant operations are being carried out: the relevance of training to prepare trainees or apprentices for the requirements of modern skilled work is multiplied if this training takes place where key operational processes are being carried out.

As well as the LSA being used to examine the quality of individual work stations, the tool can highlight the value of *these being attended in a certain order*. A simple example would be the comparison of an operational work place in a workshop and an operational work place in the final assembly line (FAL) that offers insight into and experience of a technology and a quality procedure that are characteristic for a certain industry. However, in order to be able to 'enter' such a workplace, young people already have to possess understanding of certain production procedures. Without such prior experience, for example if a trainee was to arrive quite early in their training at a challenging learning station and furthermore remain there for only fourteen days, one could not teach them to handle fully the actual functioning at that work station. In such a case good learning opportunities are missed as the flow through different learning stations has consequences in terms of the organisation of training. An additional important aspect of this method is that the skilled work is to be regarded from an angle of a beginner: that is, elements that are self-evident for experienced colleagues but might pose considerable, if not insuperable, problems for a trainee have to be pointed

out. A LSA can uncover the potential that learning at that work station can make to the whole apprenticeship programme as well as contributing to the analysis of other work stations so as to give information on the optimal sequencing of movement through the work stations which can be represented on a flow chart. LSA is appropriate also to examine the potential of work stations that have not yet been used for training purposes – not only the learning potential at work stations already used in training.

In general an outcome of a LSA should not only focus upon the *working process*, it should also encourage the *development process of the trainees*.

Accordingly first learning stations must be chosen by experts from the sector; as it was done with activity field "cutting" in dualTRAIN project, a collaborative decision from INESCOP (ES), CTCP (PT) and ISC (DE).

1.2 Procedure - milestones

The name 'Learning Station Analysis' itself clarifies the aim of the analysis. 'Learning stations' are places where learning to perform work central to the occupation takes place. LSA analyses workplaces, which cover activity fields (AF). These AFs describe skilled work tasks in terms of characteristic operations and work contexts that are needed in order to make sense of learning and development in an occupation. They are typical for the profession and together comprise a complete specification of the learning required in order to become fully skilled. With this definition vocational activity fields can be specified as follows:

No individual activities or performances are analysed, for example cutting or finishing according to reference documentation. Instead tasks, in the sense of complete actions, following a holistic process structure, are analysed. The aim is a general process structure of activity fields; containing specifications of concrete tasks, including their planning and accomplishment as well as the inspection and assessment of work outcomes. The LSA construct uses the following criteria:

- it has to reflect the super-ordinate coherence of the vocational working process and refer to a self-contained career profile;
- it always describes a work context and a complete work action, which highlights the context for planning, implementing and evaluating;
- the formulation of the documentation also emphasizes the content and shape of the skilled work;
- it reflects the sense, function and meaning in the context of the super-ordinate operational business processes;
- special regard is given to the development potential that is provided by skilled work.

The analysis of the work places for trainees assigned to activity fields is divided into the following three phases:

- preparation of the investigation,
- accomplishment of the investigation,
- evaluation and documentation of the investigation (for use of the results in constructing a schedule for progression through the learning stations).

1.3 Analysis of Learning Stations - the approach

1.3.1 Preparation of the analysis of a learning station

Although each work analysis corresponds to an identified activity field, the following practical advice is recommended. It is necessary to distinguish an activity field from sub-tasks. The project is to plan an internship of apprentices or VET-students in countries with school-based VET like ES and PT at a location in accordance with the whole development process of a VET programme. Planning a whole apprenticeship requires numerous individual analyses, which should be matched in the technical and production areas, in order that suitable development will be realised – but the method also fulfils the requirements of analysing a single learning station like “cutting” for a pilot implementation of dual structures in the shoe industry of Portugal and Spain.

Select workstations

It is necessary to select operational work places as (possible) learning stations in the enterprise and/or a department, at which qualified specialists master requirements, which are representative for the activity field. Operational representatives of the investigation team are responsible for the selection of the workstations, since they have detailed insight into the business and working processes and can assure the organizational conditions of the investigation.

Usually activity fields are not found in isolation from each other in practice. At many work places, and thereby also at learning stations or work fields, several closely linked activity fields are mastered together. *For the analysis it is advisable to select work places with the ‘core specification’ of an activity field. Although, in principle, only an individual activity field is analysed, of course also the interfaces with other activity fields have to be observed.* A simultaneous investigation of several fields can cloud the view of the substantive processes involved in different fields. When several AFs are involved in a work process due to organization of work, it might be necessary to perform several learning station analyses from different angles, for example, in the case of function checks, disassembling and malfunction analysis.

An influential factor not to be neglected in the selection of work places in departments and operations is the participation of specialists in an analysis of their work. Here it is important to make particularly clear that the analysis does not concern the preparation of rationalization measures or personnel restructuring. The location of specialists with substantive professional experience is crucial to devising vocational education and training programmes in practice. This central request should be clarified with the production manager who has given agreement for the planned analyses to take place.

Investigation team

The selection of the participants for the investigation also belongs to the preparation phase. For reasons of an efficient, purposeful execution of a LSA it is recommended to choose a group of two persons, containing an expert skilled worker and a researcher. The following four functions are to be performed in preparation for the group investigation:

- Discussion schedule (interview);
- Preparation of a record (references);
- Preparation of photos and sketches;
- Taking along / organization of working material (e.g. designs).

1.3.2 Manual for the Analysis

Both for the researchers as well as for those groups of people who are specially selected for an analysis, it is important to look to the manual as to how the analysis leads through the investigation before starting by focusing on the following questions:

- In which *business and working processes* is the activity field integrated?
- At which *workplace* is the task of the activity field executed?
- Which *items* are treated at the concrete task?
- Which *tools, methods and organization forms* are used?
- Which skilled work *requirements* have to be fulfilled thereby?
- Which *interfaces* to other activity fields exist?
- Which experiences exist as regards the *training* on this workplace?

After completion of these basic questions the analysis categories are developed, which can then be opened up in more detail by a leading question catalogue.

Analysis category: business process

The analysis of skilled work cannot refer to the workplace without considering the context. Without consideration of the integration in business and working processes, skilled work in its full complexity is not compiled appropriately. For this analysis category material and information flow charts as well as schematic diagrams of the order flow are helpful demonstrations, which facilitate the analysts'

work. These materials can often already be examined by the investigation team in the preparatory phase of the analysis, before the 'on-site-analysis' starts.

Analysis category: workplace

Besides the location (department, production area and section) it is of special interest, when describing the chosen work place, to identify the type of working conditions to which the specialists are exposed when managing their everyday work life. Site conditions such as lighting conditions, noise exposure, ambient temperatures but also aspects of ergonomics at the workplace (e.g. seating positions, work benches) are of relevance here.

Analysis category: components of skilled work

Describing the components of skilled work, the work context and the work process are considered here. Thus, for example, the technical realization of a machine tool is based on the idea that for its use there should be only a few skill and knowledge prerequisites necessary for the operation of the tool. According to this, the work process of the operator differs substantially from that of the maintenance worker, although both work processes include the same machine tool. The operator of the machine tool feeds parts to it, establishes the tool and accomplishes simple maintenance tasks. The work is geared to the trouble-free functioning of the system, and in general the operator does not know very much about the internal design and details of how the tool functions. In contrast, the maintenance worker has to determine the cause for a defect of the system and is therefore dependent on detailed knowledge of the correct function sequence, in order to determine hints for possible causes of malfunctioning.

Especially in methods of skilled work diverse design potentials are possible. Even if, for example, two maintenance workers can proceed completely differently during their search of a fault they aim at the same goal: the identification of the defect. To detect the fault underpins the methodical approach of skilled workers in performing such professional tasks. Differences appear not exclusively in the concrete execution of their work but also in how it is planned, whereby different strategies can be used.

Table 1: guiding questions for the Learning Station Analysis

Category of Analysis	Constituent questions
Business and working process	- The activity field belongs to which business processes? - Which products are produced? - Which services are furnished? - Where do preliminary products come from? - How are orders accepted?

	- Where are the products used in the further process? - How are processed orders handed over? - Who is the contracting authority/customer for the service?
Workplace	- Where is the analysed workplace located? - What conditions of light are present? - What climatic conditions affect the specialists (e.g. warmth, coldness, radiation, ventilation, gases, vapours, fog, types of dust)? - In what circumstances do the specialists master their tasks?
Subjects and methods of the skilled work	- What is worked on in the activity field (e.g. technical products and processes, services, documentations, control programs)? - What is the role of the object in the working process (e.g. system guide or system repair)? - What processes are used when working on the task (e.g. error tracing, quality assurance procedure, manufacture, assembly)?
Tools/media of the skilled work	- Which tools and media are used to perform this task (e.g. circuit analyser, torque wrench, PC with user software)? - How is the tool/medium handled?
Organization of the skilled work	- Organization of the skilled work (e.g. individual work or group work, division of labour)? - Which hierarchies affect the skilled work? - Which co-operation and borders to other occupational groups and departments exist? - Which aspects of colleagues' cooperation have a unifying effect?
Requirements of the skilled work	- Which operational requirements have to be fulfilled during the accomplishment of the task? - Which demands are posed by the customer? - Which social requirements play a role? - Which standards, laws and quality standards are considered? - Which rules and 'standards' does the community of practice require?
Interfaces	- Which relations exist towards other activity fields? - Which comparisons can be drawn to other analyses of this activity field that were already accomplished? - Which things in common/differences exist to other workplaces in the operation where the same tasks from the same activity field are mastered?

	- Which relationships are there to occupational theory (vocational school) and/or for 'vocational basics' and/or to 'core competencies'?
Experiences with the training	- Do training components take place at the analyzed workplace? - If not, why? - In which year of apprenticeship are the trainees at this station (or should they be)? - How long are (should be) they at the station and where were they before/afterwards (should have been)? Training pilot: - Which preliminary conditions should the trainees meet? - What should they learn in the view of the skilled workers at that place? - Which experiences with trainees/young skilled workers/new colleagues do the skilled workers have? - - In what way are the trainees supported? - Do the trainees work 'normally' or do they work under separate instruction (e. g. simulated work processes)? - What is the level of autonomy expected from a trainee at the end of his internship at this station? (support/under instruction/under surveillance/independently)

Analysis category: tools and supplies for the skilled work

Concerning the description of the tools and supplies used in the skilled work, the context of the work process is crucial. Beside the tools used, the workshop facilities that are used in the work process at the work place are also of interest.

Analysis category: organization of the skilled work

The form of the organization of work is a key feature for the arrangement of skilled work that cannot be neglected. Here aspects of the operational structure and sequence organisation are the centre of attention (e.g. group organisation, division of labour, hierarchy levels, co-operation with other occupational groups). Co-operation with other professional groups (e.g. in skilled maintenance work; decentralized versus central maintenance) is an important aspect of the investigation. Varying organizational forms lead to substantial differences for the occupational responsibility, the task connection and co-operation and communication requirements allied to the working process. Also work time models (e.g. shift work, work break times, part-time jobs) may affect the nature of skilled work considerably.

Analysis category: demands on skilled work and its components

Here the varying demands towards the work process and the work components which are made by different interest groups are identified. For example, the company sets specific quality standards, which relate to search for competitiveness, that have to be respected when performing skilled work. This may require, as an example, the adherence to time and cost targets. Legislative requirements and how these are enacted in regulations, e.g. in the form of technical standards and rules for the prevention of accidents, must be respected. The possibilities and the requirements of arranging technology and skilled work become clear only in the comparison of these varying, and partially contradictory, demands.

Analysis category: interfaces

Furthermore the investigation has to be set into a broader context, especially interfaces and overlaps with other activity fields deserve special attention. As previously mentioned activity fields are rarely found isolated in practice, they are often linked closely to others, which are managed by the specialists together with the one under consideration. Results of analyses concerning the chosen activity fields, which derive from other workplaces, can also be the subject of critical reflection here.

Analysis category: experience with training

The described analysis is focused on the development of recommendations as to the order, duration and shape training could have at the analyzed work stations. The experiences of skilled workers in their interactions with trainees and/or young skilled workers are accordingly of particular importance.

For the purposes of dualTRAIN are the entries “experiences with new colleagues”, “preliminary conditions” and “level of autonomy” of special relevance:

- Experience with new colleagues: The answers might reveal relevant weaknesses of the training system, which clearly won’t be solved by single internships but might be part of training schemes.
- Preliminary conditions: It strongly increases acceptance of internships if basic skills (i. e. work security, joining under workshop conditions) are trained in advance.
- Level of autonomy always indicates, what extend of learning outcomes are realistic. There might be a couple of reasons why the highest level is not reachable (legal preconditions, need of a lot of experience, etc.) – but this doesn’t lower the potential added value of WBL; just indicates the realistic outcome. Additionally is this scale very valuable to document the achievements of an individual trainee (cp. chapter 3): The

mentor responsible for the station might indicate on a personal learning sheet how well the trainee performed.

The presented classification scheme with guiding questions for the LSA is merged in table 1 and designed as a master to guide the investigation. The developed guiding questions offer suggestions for the investigation. It is not intended that they should be strictly followed question by question in each investigation, as if they comprised a checklist. The purpose of the guiding questions is rather to provide suggestions in order to be able to elaborate test results more purposefully.

1.3.3 Execution of the analysis and documentation

The specialists, who are working on the selected workplaces and whose work should be analysed, should be informed of the topic and aim of the analysis. It has to be made clear to them that they should follow as close as possible their everyday work: the analysis is not concerned with 'performance', but with the accomplishment of everyday requirements of the skilled worker. If on the day the analysis is carried out there are no 'highlights' in the work observed, but rather just unspectacular 'standard work', this is not problematic for the analysis. It just reflects normality. The workplaces are visited and tested following the list. On that the skilled workers are asked, in order to make the" invisible "visible. With the agreement the discussions should be noted, in order to handle the information abundance. The required time for the analysis depends on the complexity of the tasks on the concrete workplace. Experience shows that analysis usually takes between one hour and half of a day.

1.4 Evaluation

By using LSA tool we pursue two targets. Firstly, we try to compare the organisation of work in the learning stations with AF resp. units of the curriculum. Secondly, we make an effort to document the learning potential of these stations. Through using the manual described above, data will be available from the results of the interviews with skilled workers on their workplaces that means the learning potential of each workplace should be easily identified and presented with the necessary clarity. However, one should initially consider as well what can be expected of the 'learning potential' in relation to individual development in accordance with vocational training requirements.

For sure 'potential' is not a guarantee of 'learning', rather it highlights that a situation or context offers (good) possibilities for substantive learning. In qualification research and professional education 'learning potential' not only has connotations of positive influences at a personal level, it also highlights in this context the increase of competences in the special subject or task - in the sense that someone is enabled during the learning process to do something that he or she was not able to

do before. That is, someone who is not able to do something that he will need to do later in her or his career is not behaving wrongly, he or she is *not yet able* to perform the required tasks. That means that the individual should be expected to reach the required level of performance, in relation to actions and behaviours, not through threats or exhortation, but by learning to do something in the correct manner. For this purpose the individual is in need of appropriate learning opportunities and has to take advantage of those opportunities in order to build up their experience and expertise. Vocational training helps individuals achieve these goals, but in order to realise this supporting role, those planning vocational training have to know where all the relevant learning possibilities are located inside the working process. That is what we mean by 'learning potential'.

An emerging question is what is the relation between an AF (activity field) and the learning potential for the traineeship? This question is very simple to answer: if the definition of the AF and the selection of the learning stations belonging to the AF have been done in a sensible high quality manner, then each learning station will have learning potential associated with the AF. The knowledge and ability of the workers active at workplaces which are important and characteristic for the operation set the norm for the training and competence development apprentices. If firm-specific AFs are suitably described (first condition) and the learning stations are correctly selected (second condition), then the substantive information is available for an arrangement of the learning stations that is logical for the purpose of competence development.

Here a we touch a topic that frequently leads to a misunderstanding. If we say that a work process orientated training that involves a different organisation of training results in the possibility of trainees reaching the standard of skilled workers in chosen activity fields, then one could doubt the results of a LSA. One could object that a correctly described AF (first condition) and a learning station selected corresponding to this AF (second condition) only apparently gives, at first glance, a fitting picture of the learning potential. The reason why a picture could emerge that is only apparently correct would then be a fault of the investigation-method of the vocational requirements. One could suppress by the AF-definitions and the LSA oriented to these definitions the fact that the observed skilled work is actually based on experience and routine of many years in order to reach the level of an AF. Thus, in this sense one could not say that the best AF and the best suitable learning station are enough in order to reach the level of the skilled work actually exercised, at least in the context of a temporally limited training!

One cannot easily reject this argument. It is true that already from the educational view something is not correct: the advantage of routine and experience skilled workers have gained after 5 to 15 years of professional experience can never be caught up in an internship of one month – even if it is organised in the most effective way one can imagine. But this is exactly the pedagogic argument as to why beginners should get in contact with skilled workers, with 'masters of their profession', and

learn together with them from the beginning of their training. Thus, even if it is not possible to become almost as professional as the experts who are working at this working place following a stay of several weeks at the learning station, the contents that are important for the profession one can most effectively learn from the people who are adept in doing important things. A gap between the skills, knowledge and experience of the expert in what is to be learned and those of even the most capable beginner will still remain. It will shrink over time as the former trainee becomes more expert at performing skilled work. However, one can start the learning process of the trainee at the side of an 'expert'.

The actual argument is, therefore, that it is not the primary task of a process orientated training to change beginners as quickly as possible into 'experts'. LSA acts rather to identify the cores of competent skilled work that are present at the relevant learning stations according to the AF. Furthermore, it is the aim of the LSA to bring them into an appropriate order for learning purposes. For this purpose, going far beyond dualTRAIN project, it would be necessary to know the learning potential of all learning stations. For example, consider the core work associated with the pinning of plugs. It can be analysed how this competence or skill is learned in an effective way. Also it can be detected what kind of prior skills, knowledge and attitudes the trainee has to have in order to learn effectively in that workplace, for example having a cooperative manner may greatly aid the learning process, as would already having learned how prepared wiring harnesses are shortened and how one sets, and in some cases also connects, pins. If a trainee already has these skills he will be able to cooperate in a test stand where all the cables already laid are tested for function, insulation and dielectric. A trainee can learn all this from involvement in the work process. Afterwards the trainee could, for example, move on to maintenance work and learn about fault diagnosis. In order to be able to do that independently, although someone else may still be taking ultimate *responsibility*, the trainee must understand the holistic way systems of fault-finding, the ordering and order-processing of replacement parts operate as well as being able technically to complete the task. These systemic and holistic components, which are compiled for the purposes of individual learning during a LSA according to the AFs, concern the learning potential of all the working places that are present or can be developed for the traineeship.

In order to organize an effective progression (or flow) through the different learning stations, the evaluation of the LSA for this purpose must be led by two relevant questions:

- *What* spectrum of skills are acquirable at the particular learning station and *what* content of that spectrum is necessary for *which* upcoming stations?
- *What abilities must be* already possessed in order to increase the chances of effective cooperation here in order to achieve a substantive learning gain?

These two questions have to be answered for each case in a series of learning station analyses. The initial entry level condition of being able to cooperate at a learning station has to be known as well as the expected final level of the knowledge and skills that one should achieve after performing at a particular learning station. This exit level of skills and knowledge itself can then be the entry level, and a necessary condition, for working at the next learning station. As a result at each learning station one needs data on the initial conditions for learning as well as the learning outcomes that can contribute to the learning conditions for successful completion of subsequent learning stations.

A comprehensively accomplished LSA in a plant will result in a logical organisation of the necessary learning steps that can be achieved by a particular progression through different organisational work processes. The evaluation should therefore take account "of the internal linkage of all working processes". Thus it can be examined whether the actual organisation of the labour process guarantees an orientation close to the AF. Regarding the result of this evaluation step, it has to be tested if the requirements inherent in the single AFs are found to be present in the analysed learning stations and can be acquired in the process as a whole. This is because the requirements for the flow of development-steps of competencies have to align with how trainees can move through the organisational work processes. With regard to the result of this step of analysis one has to check then, if the single requirements that are inherent in the AFs and are present in the analysed learning stations can also be achieved in the process.

Usually the answer to these questions will also depend on the time trainees are able to stay at the operational workplaces. Clearly one who rushes through a process very quickly will learn little about the process itself. Later on he will only be able to tell about the things that he has heard and seen rather than an understanding based upon substantive experience, a rapid progression through work processes is likely to lead to only a superficial knowledge of ways of working that exist in the company. On the contrary, it is important for the control of the overall learning process to have learned in the single steps what is necessary for the upcoming missions in a technical sense and to gain a developing understanding of the work process as a whole.

The flow through learning stations is guided by a pedagogic rationale, since, for example, 'pinning' as ability is needed not just in simple operations but also in very complex work situations. Thus one will rarely find a learning station inside the company where 'pinning' can be learned at a glance. We should thus regard be aware that the core competences may require hierarchical structuring because of rising levels of difficulty and increasing amounts of time to learn. Therefore it makes sense if those less complex component elements of a major task are learned at an earlier stage. This means that it will make sense to order progression through the learning stations so that, for example, pinning is mastered before an apprentice arrives at a learning station involving pinning as part of more complex tasks.

1.5 Template

The documentation is orientated towards the table of analysis categories as shown in table 1 above. The template is half open, that means in contexts like tools some tools are identified while others can be added, while in other cases and subcategories entries are pre-structured. In any case, however, there is at any time the possibility to offer additional entries appropriate to the particular case under investigation.

description	**workstation**	**Cutting**
location	**profession**	
allocation	**to AF**	
process	type of product/service	
	Type of production / delivery of services: single/small series/ big series	
	order- / material acceptance	
	direct user of product/service	
	„end“ user of product/service	
	production steps already performed	
	production steps	
	specifics of work process related to the duration of execution, work process organisation, quality assurance etc.	
workplace	hall	
	illumination/ environment	
	posture	
	specifics	
objects & methods	objects / systems	

	methods / activities			
	specifics of the execution			
tools/ standard material (to tick): Material to be cut: leather. Cutting tool: knife, cutting dies, cutting table…				
building apparatus:				
organisation	employees on place per shift			
	employees at range			
	hierarchy			
	cycle			
	shifts			
	similar building places			
	Cooperation			
	specifics			
requirements	General			
	special			
interfaces	to AF?			
	to other places?			
	to workshop/ professional theory?			
	miscellaneous			
vocational training	vocational year / duration			
	premises / previous stations			
	What should they learn?			

	specifics of training (individualisation, duration, timing)			
	experience with trainees & young skilled workers			
	assistance / working tasks			
	Is the existing potential used?			
	improvement possibilities			
	number of the trainees per building place			
highest level of autonomy reachable	support	under instruction	under surveillance	independently

1.6 German example

	Learning Station **When**	**Cutting** **October 2015**
Location	**Occupational Profile**	Sulingen (Germany) / Industrial Shoe Maker and Finisher
Reference	**to the occupational profile position**	**8 Hand and machine cutting (see chapter 2 of the German report)**
Process environment	Products	Upper leather, lining leather, textile lining
	Type of products	Small batches and prototypes

	(Internal) supplier	Ordering upper and lining leather as well as textile materials from external suppliers (purchasing department) Internal supplier <u>Upper leather warehouse</u> This is where the material comes from (internally) <u>Work preparation</u> The work preparation department establishes the calculation for material consumption and the standard times, creates the production documents and plans the production batches. <u>Design</u> The design department creates the styles and either orders the cutting dies or transfers the style-related CAD/CAM data to the cutting table.
	Order / Material reception	Job tickets <u>Upper and lining leather:</u> At the leather warehouse, the operator receives the material quantity which has been calculated according to the production lot size. <u>Textile lining:</u> The textile lining is given out in stacks of layers. When a stack has been worked down to the penultimate layer, the operator will find a form to order new supplies.
	Direct client	Stitching department
	Final client	Delivery centre

	Process steps that have already been completed	(None, the material is directly supplied by the tannery / lining material producer). All upper and lining leathers are checked for damages, sorted according to different quality categories, and allocated to the respective production batches.
	Process interfaces	None
	Specific features	-
Process steps Detailed description	The job ticket lists style details and the number of parts to be cut, the upper and lining materials to be chosen, as well as the calculated material consumption (in square decimetres / dm^2). Depending on the number of parts to be cut [prototypes: manual cutting; small batches: cutting table (fig. 2), production batch: clicking press (fig. 3)] the respective working station receives the material to be cut (upper leather, lining leather, textile lining material, fig. 1). At the CAD cutting table, the geometry of the shoe upper parts to be cut is projected onto the material. Cutting by means of a clicking press requires cutting dies for each upper part in each size (this is done externally). The dies are placed by hand on the material to be cut. Independent from the cutting method, the optimum utilisation of the leather (and all other materials) while respecting the correct stretch direction and the pair rule is imperative; this is where the experience of the operator plays a decisive role. The clicking press is triggered manually; the cutting process at the CAD cutting table is initiated as soon as the optimum nesting / placement of the upper parts to be cut has been decided on. After the cutting process, the parts are stamped in order to give evidence of the cutter's intention which parts will make a pair. Once the work order is completed, all parts of the order are placed in a box (fig. 5) together with the job ticket, and the box is now ready to be transferred to the stitching department.	

Work station	Shoe factory	Main production hall
	Illumination, environment	Brightly illuminated. No use of corrosive chemicals etc.
	Posture	Sitting or standing
	Specific features	-
Organisation	Group work?	No
	Workers at the work station per shift	1-2
	Workers in the department	9
	Hierarchy	Master craftsmen, trainers, skilled workers
	Cycle times / work stations	2 different CAD cutting tables, 6 upper leather clicking machines, 6 work stations for trainees
	Shifts	1
	Similar departments	Not in Sulingen; large cutting department in Rumania
	Specific features	Great number of different styles and materials
Components & Methods	Parts, components, materials, systems	Upper and lining leather, various textile lining materials Cutting dies, clicking presses, CAD cutting tables, leather scissors
	Methods / operations	Place stencils / cutting dies / know how to handle a clicking knife / project part geometries onto the material Manual and machine clicking.
	Special features	-
Machines	2 CAD cutting tables	6 upper leather clicking presses
Specific requirements		Optimum utilisation of the raw material taking into consideration the quality, the stretch direction, and the pair rule
Interfaces	To other vocational fields	3 Occupational safety, 4 Environmental protection, 13 Quality assurance
	To other learning venues	Lloyd cutting department in Rumania
	To a training workshop /	Training of how to optimise the material utilisation

	theoretical instruction?	taking into regard the quality, the stretch direction and the pair rule using stencils could alternatively be taught in a training workshop. Materials science	
	Other	-	
Apprentice-ship	Year of the apprenticeship / duration	1st year: 12 weeks, 2nd and 3rd year: 2 to 4 weeks each, plus two weeks in Rumania.	
	Requirements / previous work stations	Basic knowledge in shoe production	
	What is the learning objective?	Using the specific machines, tools, techniques, and materials, efficient use of resources.	
	Special features	-	
	Experience with apprentices and / or young skilled workers	Most apprentices are highly motivated and are able to work independently. Excellent learning results.	
	Support / work tasks	The process in the cutting department is explained. During the 1st year, the apprentices train with stencils (fig. 4) and cut only textile or leather lining material (cheaper). In the 2nd and 3rd year they cut upper leather. Finally, they can be entrusted with all relevant tasks in the cutting department.	
	Number of trainers	1	
	Possible number of apprentices	Max. 5 apprentices, ideally 2	
	Other	-	
	Is the existing learning potential being exploited?	Yes.	
	Potential improvements	None	
Support	guided	supervised	independent
	1st year	2nd year	3rd year

Fig. 1: Local textile lining storage

Fig. 2: CAD cutting table with projection and oscillating knife

Fig. 3: Set-up of a clicking press

Fig. 4: Stencils to train the optimum utilisation of a leather side

Fig. 5: Completed work order

1.7 Portuguese example

Learning Station		Cutting
Date		01 June/2016
Location		S. João da Madeira/Portugal
Occupational profile		Footwear technician manufacturer
Reference	**To the occupational profile position**	Cutting of leather and other materials (see chap. 2 of Portuguese report)
Process environment	Products	Upper leather, lining leather, textile lining
	Type of products	Prototypes, samples and small orders
	Internal suppliers	<u>Development:</u> The Design and product development area creates the models and shapes them into CAD system. They are then transferred to the cutting machine to be cut there. This area elaborate also the stencils to perform the cutting dies for the clicking presses. <u>Work preparation:</u> In samples and prototypes phases the development area send the cutting order to the cutting machine and simultaneously sends the supply order of the materials needed to carry the samples to the raw materials warehouse. <u>Purchase:</u> Based on the received orders purchase area made the acquisition of materials according to the needs

		generated by the same orders and taking account of existing stocks. <u>Raw materials warehouse:</u> The warehouse receives raw materials, check, arrange and organize all raw materials purchased by the purchasing department in the places defined for each type of material inside the warehouse. Later, prepares and delivers the materials to the production according to the weekly production plan following the requirements defined in the "needs of the materials" of each order.
	Order / Material reception	All materials from suppliers are labelled after accounting and internal coding in raw materials warehouse. Every week, this sector receives the work plan and the manufacturing orders to produce. From this two documents supply the materials and in case of any deviation in the consumption against the established this is communicated to modelling and purchasing department to make the respective adjustments.
	Direct Client	Pre-stitching, stitching and external stitching suppliers
	Final Client	In the case of prototypes the development sector. In the case of samples the commercial sector. In the case of production, after inspection, the finished product warehouse that will refer to external customers
	Process steps that have already been completed	Raw materials inspection and materials prepared for cutting
	Process Interfaces	None
	Specific features	None
Process Steps Detailed	<u>Before cutting)</u> <u>Documents:</u>	

description	The cutting responsible receives the weekly work plan and in accordance with the priorities set out in that document he makes the distribution of work. The workers receive the manufacturing order where the following aspects are specified: • Type of cutting • Pieces to cut • Sizes to cut • Materials and quantities per material • Relevant technical specifications Based on this document the workers check if what they will cut matches the materials received and proceed to carry out the cutting operations. When the order is completed they sign and record the effective production. <u>Materials:</u> The raw materials warehouse prepares materials for cutting. The responsibility for the verification of the materials delivered to the cutting area is of the cutting responsible. After this analysis, he distributes the work. Before proceeding to cut the leather and other materials, each of the workers checks if they are with the quality desired. On leather the procedure followed is: • Stretch the leather in clicking press and / or the cutting table and analyses to detect changes in the colour of the leather compared to the standard sample. • Check the thickness, grain and pattern of the leather. • Notes defects with a white pen so that in the cutting process they are not inserted in the pieces. <u>Methods:</u> The company uses two cutting systems:

	• Mechanical cutting • Automatic cutting The former is used when quantities justify ordering the execution of cutting dies. The second system is used for cutting prototypes, samples, small orders. In any of the systems the characteristics of the materials and model technical specifications are taken into account during cutting process. <u>- Mechanical cutting</u> The company has two types of clicking presses - arm and bridge. For cutting leather it's used the arm clicking press and for synthetics cutting it's used the bridge clicking press. Before being cut synthetic materials are folded in layers which allows with one blow to cut several pieces simultaneously. Regardless of clicking press used the worker always check the status of the cutting surface, of the cutting dies and regulates the pressure and height of the clicking press head to make the pieces cutting. Apart from the above, checks if the cutting dies are in the right quantity and match the reference to cut and after this analysis starts cutting interspersing larger sizes with smaller sizes to make better use of the leather. The cutting dies are identified with a code size which enables to identify at the end the size of the piece cut. <u>- Automatic cutting</u> In this cutting process the manufacturing orders are entered into the system and the worker is able to view the pieces to cut by type of material. He selects the material to cut and places the pieces on the material. After he gives instruction to the machine for starts cutting. The machine performs cutting and markings in the pieces in terms of orientation and size. <u>After cutting</u> After the pieces are cutting they are placed in a box by size. When manufacturing orders are small each box can contain various sizes.

	In the boxes we can find all the pieces relating to the model (leather, lining, foam, synthetic lining, etc.). Each worker is responsible for inspection of their own work and only after verification the box is sent to the stitching preparation section.	
Work Station	Shoe factory	The total production of the product is concentrated in the same pavilion, where we can find the cutting, stitching, assembling and finishing areas.
	Illumination, environment	The section has natural light that is increased by the general lighting rail that is positioned above the clicking presses and autonomous lighting in the cutting machine.
	Posture	Standing
	Specific features	The worker has a clicking press and a lateral support table for placement of the cut pieces and cutting dies.
Organization	Group work?	No
	Workers at the work station per shift	1
	Workers in the department	5
	Hierarchy	Company responsible and workers
	Cycle times /equipment's	4 arm clicking presses 1 bridge clicking press 1 automatic cutting table
	Shifts	1
	Similar departments	No
	Specific features	The diversity of manufactured products origin the use of many types of materials.
Components	Parts, components,	For the production of the models can be used a wide range of materials: various leather types (Aniline, suede),

and methods	materials, systems	textile for lining and the outer vamp, rubber, elastics and others. For each of these types of materials the cutting process must be suited and optimized. For most materials the mechanical cutting is the most suitable and may be optimized by cutting in layers, applicable only in synthetics.
	Methods/operations	Mechanical cutting and automatic cutting
	Specific features	The samples and prototypes cutting are done only in the automatic cutting machine.
Equipment		4 arm clicking presses 1 bridge clicking press 1 automatic cutting table
Specific requirements		-
Interfaces	To other vocational profiles	Knowledge on materials and components Footwear production Pre-stitching Finishing
	To other learning venues	No
	To a training workshop/theoretical instruction?	Development of themes such as: - innovative materials - new technologies
	Other	None
Apprenticeship	No formal apprenticeship has been done at this firm. The most similar situation is when a young worker is hired.	
	Year of the apprenticeship /	2 years

	duration	
	Requirements / previous work stations	Basic training on different types of materials and equipment
	What is the learning objective?	Use appropriately the cutting equipment available, tools and techniques for cutting all types of materials and models
	Special features	None
	Experience with apprentices and/or young skilled workers	When young workers are motivated and are properly guided, they quickly learn to work independently and the desired results are achieved
	Support/work tasks	Cutting synthetic materials in clicking press in the first phase and leather after consolidation of the training
	Number of trainers	1
	Possible number of apprentices	1
	Other	___
	Is the existing learning potential being exploited?	Yes

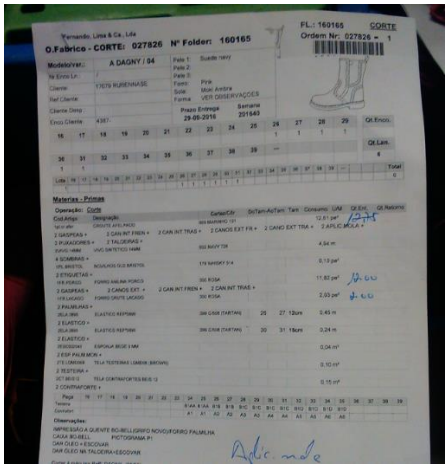
	Potential improvements	Yes
Support	Guided and supervised	Independent
	During 1st and 2nd years	3rd year

Images

1. ***Box with a complete and identified production order***

2. ***Box with stencils and cutting dies by reference***

3. ***Production order***



4. ***Mechanical cutting***

5. ***Automatic cutting***

6. ***Cutting section***

7. ***Raw materials warehouse (leather and synthetics)***

1.8 Spanish example

LEARNING STATION ANALYSIS FOR "CUTTING" IN PEDRO GARCIA

Learning Station		Cutting
When		January 2016
Location		Elda (Spain)
Occupational Profile		Technician in Footwear and Fashion Accessories
Reference	**to the occupational profile position**	**3 Cutting of materials (see chapter 2 of the Spanish report)**
Process environment	Products (fig. 1)	Upper leather, lining leather (only with certain models for which the upper leather is not thick enough), textile reinforced upper.
	Type of products	Prototypes, samples and small batches.

	(Internal) supplier	Design The design department creates the models and the fitting department produces the envelope with the shoe pieces/parts stencils (fig. 2). Work preparation The sample department receives the envelope from the design department, creates the job ticket (fig. 3) and gathers the materials needed for the production process. Purchasing department Ordering upper and lining leather as well as textile materials from external suppliers. Upper leather warehouse This is where the material comes from (internally)
	Order / Material reception	Job tickets and envelope with shoe pieces stencils Upper and lining leather: At the leather warehouse, the operator receives the material quantity which has been calculated initially based on the estimations from fair sales and later readjusted to effective sales.
	Direct client	Preparation for stitching department or stitching departments.
	Final client	If prototypes, the design department If samples, the sample department for distribution to fairs, sellers, etc. If production, after quality control at each single stage (cutting, stitching, etc.) and a final quality check, the logistics warehouse.
	Process steps that have already been completed	The purchasing department is the one in charge of providing the department with the leather. Staff checks their colour, calibre, etc. and hands them to the sample department which in turn hands them to the head of the cutting department.

	Process interfaces	None.
	Specific features	None.
Process steps Detailed description	Before cutting *Documents* The head of the cutting department receives the job ticket and the envelope with the pieces. He will check to make sure none are missing and will prepare the leather (calculating the amount to be handed to the cutter taking into consideration remnants). He distributes the work among the cutters by handing them these documents and materials. If it is the case he will also hand out the dies. The job ticket lists the model reference, type (prototype, sample, etc.), incoming time and day, production outcoming time and day, leather type, number of pairs (complete pair or "half a shoe"), last reference and size. It also includes the model drawing. Apart from the above most relevant characteristics, further specifications are given that affect not only the cutting department but all the production process. Suppliers of the various components are also included. *Materials* The cutter receives the job ticket, the envelope with the cardboard pieces from the design department and the leather. These pieces will have been graded in hard cardboard if the model has been accepted by management. First step: leather preparation. Before starting the cutting process, leather is checked. Imperfections and certain parts of the leather are marked to keep them in mind when placing the stencils or dies. Leather pieces are not identified except when they are new leathers, not used before in the company. Methods Depending on the model's characteristics (leather type, difficulty in manual cutting, number of shoes to be cut, etc.) it is cut manually	

	or by cutting presses. Independent from the cutting method, optimising utilisation of the leather while respecting the correct stretch direction and the pair rule are key. For this, the operator's experience is essential *Manual cutting (fig. 4 and 5)* The cutter takes out the pieces/stencils from the envelope and organizes them on the leather. When several sizes have to be cut, the graded cardboard stencils are done within the company and included in the envelope. *Machine cutting-cutting presses (fig. 6)* Cutting by means of a clicking press requires cutting dies for each upper part. For some orders, dies in each size. The dies are placed by hand on the material to be cut. When several sizes have to be cut, the graded cutting dies (according to the graded cardboard stencils) are done externally and included in the envelope. The clicking press is triggered manually. After cutting Once the work order is completed, all parts of the order are placed in a box together with the job ticket and envelope, and the box is now ready to be transferred to further departments: preparation for stitching or directly to the stitching department. Prior to the transfer to other departments, supervision of the result of the cutting department is done by its head taking into account that all pieces have been well cut and without imperfections. This is a visual inspection that takes a very short time (much less than 5 minutes). Factory operators work independently. The final quality check is carried out by the production head that hands it over to the design department.

	Specific features: Depending on the shoe piece a certain part of the leather will used. The two textile lines are cut manually. Models where leather changes tone or is engraved are the only ones which are stamped to give evidence of the cutter's intention on which parts will make a pair.	
Work station	Shoe factory	Production hall where three departments are located: cutting, preparation for stitching and stitching. On another floor they have the mechanics and the warehouse.
	Illumination, environment (fig. 7 and 8)	The cutting tables are set parallel to the clicking machines as the same worker who cuts manually may also have to cut with the machine. Brightly illuminated with direct and clear light (in order to see all the leather details). Lights are set both at the cutting table and clicking machine according to the height of the cutter who always uses the same working station. Height table is established according to worker's height. Leather is placed under the cutting table or on a trolley beside the cutting table.
	Posture	Standing.
	Specific features	The cutter has his own cutting table and besides his own clicking machine. Workers are not placed according to the hierarchy level.
Organisation	Group work?	No. Unless an unexperienced worker is hired.
	Workers at the work station per shift	1 The unexperienced worker will have his own work station placed beside the tutor.
	Workers in the department	3

	Hierarchy	Head of cutting department and 2 skilled workers (one with more experience than the other).
	Cycle times / work stations	3 upper clicking machines and 3 cutting tables.
	Shifts	1
	Similar departments	In Elda external cutting department with CAD cutting machines working for several firms.
	Specific features	Great number of different styles although mainly leather of great calibre.
Components & Methods	Parts, components, materials, systems	Upper and lining leather, upper textile materials Cutting dies, clicking presses Exchangeable manual cutting surface: rubber, glass and zinc (depending on the type of leather: cutting is done quicker on glass; with thicker leather, zinc is better used because the leather doesn't move and it helps cutting) Clicking knife (fig. 9)whose tip is done manually by each individual cutter to adapt it to his/her "cutting style" and the type of leather that is usually used (the thinner, the straighter the tip can be; the thicker, the more curved it should be although in balance with the difficulty in the pulling gesture which is greater the more curved it is). Each tip is done from a cutting material that is inserted on a sleeve. The shape is given thanks to a machine and manual process. Leather markers to point imperfections and certain parts of the leather.
	Methods / operations	Place stencils / cutting dies / know how to handle a clicking knife onto the material Manual and machine clicking.
	Special features	Prototypes are always cut manually for cost reasons as the firm does not know if it will be accepted or not as part of the collection so that they save producing dies. Samples are also generally done manually except when the firm wants to produce a great number of

		them or it is too difficult to cut manually. In any case the die is a single 37 size. The factory head is the one who decides which models are cut in one way or the other (based mainly on the number to be cut).
Machines		3 upper leather clicking presses
Specific requirements		Optimum utilisation of the raw material taking into consideration the quality, the stretch direction, and the pair rule
Interfaces	To other vocational profiles	None. Occupational safety, environmental protection and quality assurance are part of the cutting module.
	To other learning venues	External CAD cutting company.
	To a training workshop / theoretical instruction?	Training on stamping textiles, leather and other upper materials, part of the contents of machine preparation, piece cutting and occupational safety and environmental protection.
	Other	None.
Apprentice-ship	**No formal apprenticeship has been done at this firm. The most similar situation is when a young worker is hired.**	
	Year of the apprenticeship / duration	Depending on the young worker's talent he/she will take a certain time to reach a similar level to other colleagues: approximately 12 months.
	Requirements / previous work stations	Basic cutting expertise
	What is the learning objective?	Using the specific machines, tools, techniques, and materials, cutting up to standards all types of models.
	Special features	None.
	Experience with apprentices and / or young skilled workers	If the young worker is efficient he/she will help the master although it is true that because of productivity reasons less and less training is done.

	Support / work tasks	There doesn't seem to be an established protocol for learning. Young workers are taught as the trainers themselves learnt when they themselves were the apprentices. Traditionally a young cutter starts by learning how to make his clicking knife tip and practices cutting techniques on remnants. Afterwards they cut lining and easier leathers. Cutting with clicking presses is simultaneously trained.
	Number of trainers	1
	Possible number of apprentices	1 apprentice
	Other	None.
	Is the existing learning potential being exploited?	No.
	Potential improvements	All.
Support	Guided and supervised	Independent
	1st year	Following years

Images

Fig. 1: Completed work order

Fig. 2: Envelope with cutting stencils

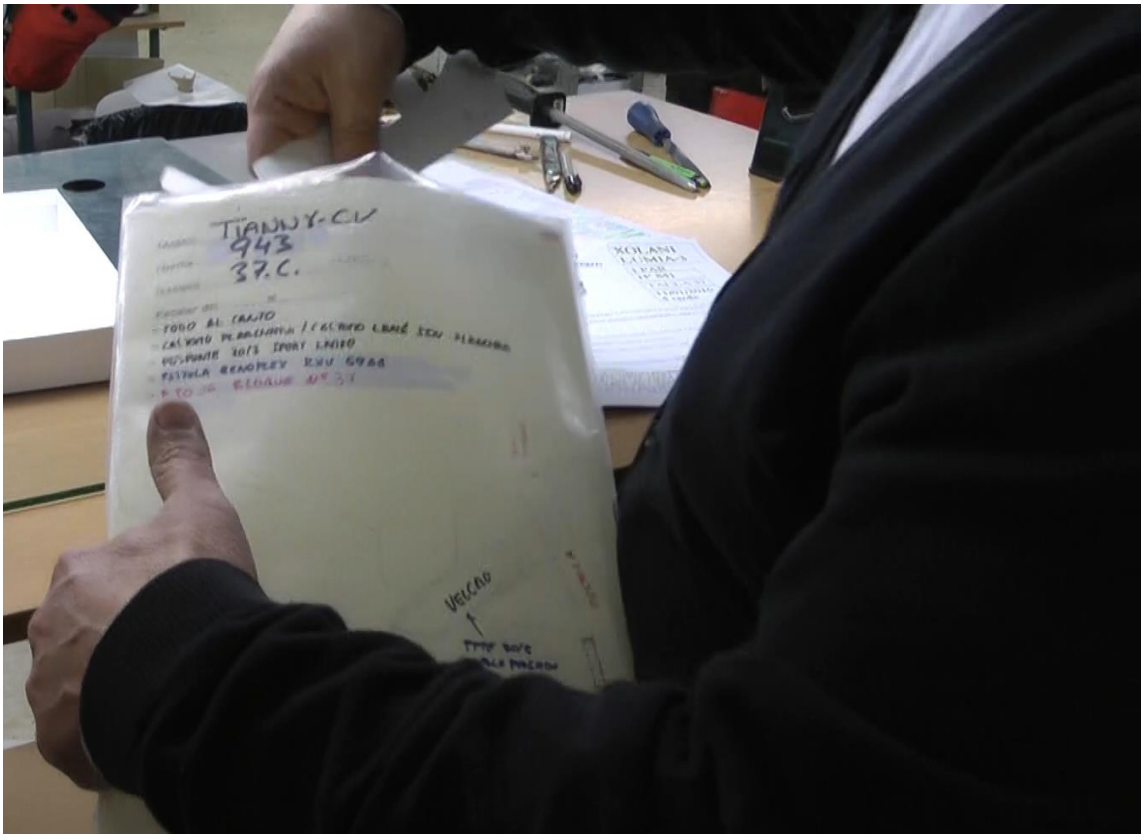


Fig. 3: Job ticket

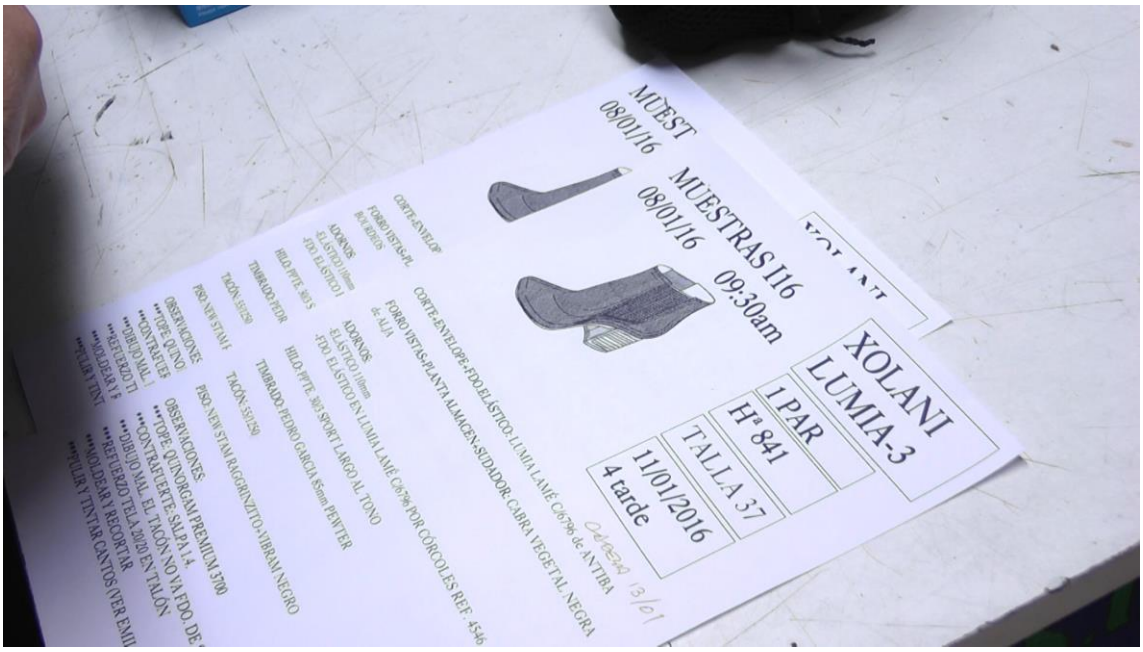


Fig. 4: Manual cutting

Fig. 5: Detail of manual cutting

Fig. 6: Cutting by clicking press

Fig. 7: Cutting department

Fig. 8: Cutting department

Fig. 9: Personalizing cutting tip

2. Preparation of the dualTRAIN Pilot Training / Compilation of Training Material

2. 1. Choosing a Production Department for the Pilot

Due to the lack of time in a pilot project an approach to embrace the complete production process would not be feasible. The proposal to choose the CUTTING department met with approval for the following reasons:

- In shoe manufacturing, the production process can be divided into four major departments: Cutting, stitching, assembly and finish (in this order). Assuming that the future pilot trainees would not have any shoe making knowledge and as the partners did not want to create admission barriers, only two out of those four departments were considered appropriate: cutting and stitching.
- The facts that 1) the duration of the pilot training has been set to four weeks and that 2) some of this time would be dedicated to the theoretical preparation of the trainees before they would start the work-based part of the pilot training were key arguments to choose the cutting department because the contents of cutting are more adaptable than the contents of stitching.
- Making progress in stitching takes time, and having actually only some weeks available for work-based learning in the company was judged too short for a successful pilot in the stitching department. In addition, cutting is at the beginning of the value creation process so all partners agreed on cutting as the most appropriate department for the pilot training.
- As already mentioned, the pilot was supposed to comprise a VET school part (theoretical instruction on shoe types, types of leather, materials, tools, machinery and processes), which the partners deemed more varied and interesting for newcomers in cutting than in stitching.

2. 2. Organizing the Pilot Training

Accordingly, a working curriculum version for the pilot training in cutting was drafted. This served as a base for discussing the further steps to organise the pilot training and the compilation of the training material.

The footwear competence centres CTCP, INESCOP and ISC unanimously confirmed cutting as the department of choice for the pilot training. They underlined the reasons why cutting deemed the most appropriate department for the pilot:

- No prior experience of the participants is required. Everybody can start from scratch.
- theoretical instruction (strong VET part focussing on theoretical basics) would be interesting and varied for the participants
- comprehensive contents could be fit into the four weeks (172 hours of training / 22 days) of the pilot training (which would be more difficult with a more complex department such as stitching),
- it is realistic to expect that the participants would attain a good level of theoretical know-how and practical skills during the pilot, and that they could even attain a certain level of “employability”.

2. 3. Developing the Curriculum

To facilitate the brainstorming to compile the training material for the pilot, a curriculum (excerpted from the German VET / WBL curricula for the training path “industrial shoe maker and finisher”) was drafted. This document was shared with all partners who were invited to make comments and changes, and to add ideas, which they did.

2. 4. Compilation of the Training Material

The footwear competence centres agreed to go through their existing course materials and upload appropriate documents onto Sharepoint (all file formats such as word documents, powerpoint, images, scans, pdfs, video footage, etc.) even if this material would supposedly not be in English but in Portuguese, Spanish, and German.

It was ISC’s task to prepare a cutting training manual comprising theoretical material as well as exercises and templates which the tutors could use for the practical training.

On the following pages, please find the Cutting Training Manual developed by ISC and consolidated by CTCP and INESCOP and supported by the other partners (32 pages; containing the VET school curriculum developed for this pilot).

Certificate

Partners also decided to prepare a certificate, which should be handed out to all pilot participants (trainees and trainers).

START OF DOCUMENT CUTTING TRAINNG MANUAL (31 pages)

2. 5. Pilot Training in the Company: Cutting

Contents

1. Preface: What This Document Is About

This document has been compiled in order to help companies to structure the on-the-job-training in their cutting department during the dualTRAIN pilot.
The cutting know-how will be imparted by skilled workers of the cutting department who will take on the role of in-house workplace instructors/trainers, also called TUTORS in this project. In order to prepare the tutors for their task, please also read the attached document “Training for Workplace Instructors”.
The tutors will be entrusted with

- planning of the training,
- demonstrating the operations which the students are expected to learn
- assessing and documenting the learning progress of each student

In the context of the dualTRAIN Pilot Training, it would be advisable to propose a one-day preparatory training for the future tutors provided by CTCP respectively INESCOP. They should also get the opportunity to make themselves familiar with all contents of the VET school training which precedes the work-based in-company training of the pilot.

The chapters of this document are not meant to replace a text book. They represent a rough guideline to help the trainers to plan the activities with the trainees. The tutors should feel free to supplement and reinforce the information given in this document.

Before you start the hands-on training in the cutting department, please give your trainees a tour of your company including all departments. Start with presenting the type of products your company manufactures and their intended use, the customers, the distribution channels etc. Then show the entire product creation and manufacturing process, i.e. product design, pattern making, production planning, and all production departments.
Explain some shoe models your company produces (as in Fig 0). Your trainees will better understand the complexity of the product “shoe” and the interdependencies (“what will go wrong if operation x is not done correctly”).
Take them to the leather warehouse of your company to make them familiar with all the different leathers your company uses as well as with all the other materials. Focus on the characteristics of each material which will be processed in the cutting department. Do not hesitate to give a lecture on the different leathers, synthetics, and textile materials which your company uses, explaining their specific properties, provenance, production process (leather production / tanning), quality

management procedures etc. When you first take the trainees to the cutting department, re-explain the work safety rules, the cutting methods, machines and tools.

This document does not focus on leather production as VET school will extensively cover this very important learning field. If you would like to go through the basics of leather production again, please feel free to download INESCOP's PowerPoint file on leather production (CURSO CORTADOR DE CALZADO ASISTIDO POR ORDENADOR) from project page: http://www.dualtrain.eu.

Fig. 0

2. Cutting of Shoe Materials

Cutting shoe parts from a leather hide does not simply mean to cut parts of the correct geometry from any part of the hide. The cutting department of a shoe factory needs highly specialised and experienced workforce. Leather cannot be cut in layers by machines. There are many factors to be respected in order to deliver quality work. Know-how and expertise of the workers in the cutting department are decisive for the quality of the shoes produced, and they have an influence on the number of reworks and rejects. Furthermore, leather is expensive. An experienced cutter can save lots of money: If the cutting waste can be reduced to a minimum, this means considerable savings for the company.

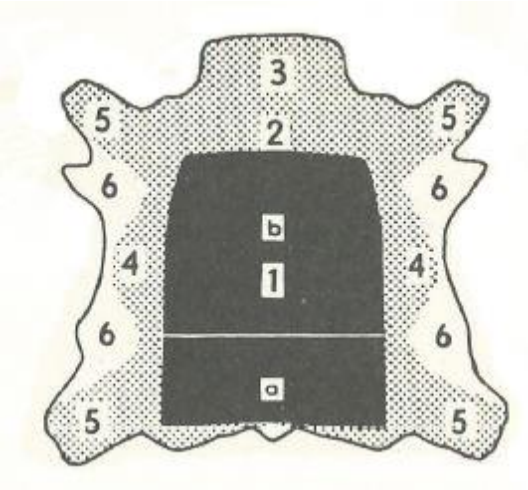
Leather is a natural product. Each hide respectively skin is different in terms of size, homogeneity of thickness or of the dye, quality zones, and in terms of defects. There are leather types which are considered to be somewhat easier to cut than others (such as patent leather or black bovine leather), and there are leather types which require lots of expertise (such as coloured glaze kid or reptile leathers).

2.1. Cutting Rules for Leather

Although there are basic cutting rules to be respected, there is no strict cutting scheme which can be applied and repeated for each hide. It is the key task of a cutter to understand the individual characteristics of each hide and utilise the material in the best possible way by finding the ideal placement and interlocking, the so-called “nesting” of the shoe parts. It is quite an art to arrange the cutting layout in a way to minimise waste and to “hide” small defects in shoe parts where they are less or not at all visible.

2.1.1. Quality Zones

Fig. 1



1= Butt
a = Bend
b = Back
2 = Shoulder
3 = Neck / Head
4 = Belly
5 = Legs
6 = Leg pits

Fig. 1 visualises the quality zones of a calf hide. The butt represents the best quality because this is the zone where the leather is firm, with a very dense fibre structure, followed by the shoulder etc. Other important quality factors are the homogeneity of grain and dye as well as the absence of defects such as holes, scars, cuts, loose grain etc.

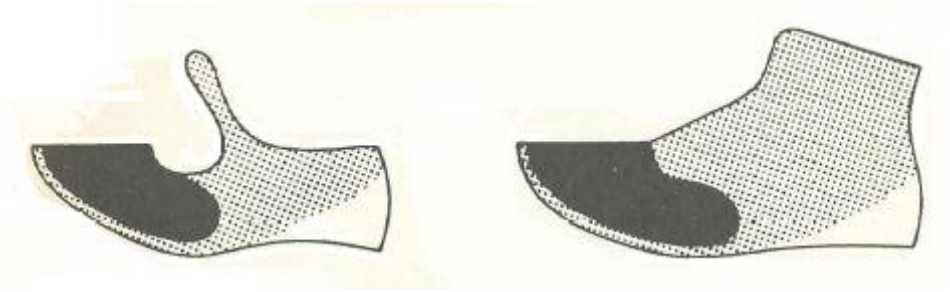


Fig. 2

Fig. 2 explains which parts of the shoe upper should be cut from the butt. The vamp represents the part of the shoe which is exposed to high mechanical stress (when wearing the shoe: impacts, walking creases; during production: elongation at lasting). At the same time, the vamp is the "face" of the shoe. Therefore it should be cut from the butt. The rear parts of the upper (such as quarters) are less exposed to stress. In addition, the quarters will be reinforced by the heel counter. Therefore, they can be cut from hide zones of inferior quality. When cutting quarters from a leather hide / skin, the front upper part of each quarter should always point towards the butt and the lasting allowance should point towards the edge of the hide / skin.

Fat creases of the neck should always be placed in the longitudinal direction of a quarter in order to be able to pull them out during lasting. Fig. 3 shoes how to place slight leather defects on upper and lining parts to reduce leather waste.

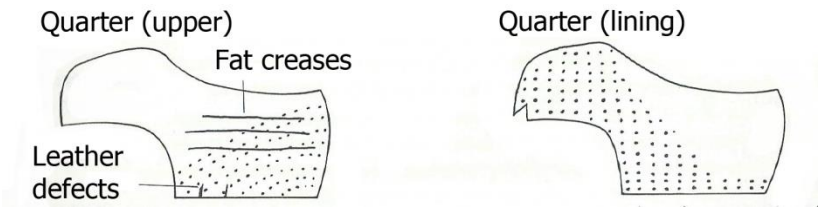


Fig. 3

Dotted areas: zones on the quarters which are less exposed to wear

2.1.2. Stretch Direction

One of the characteristics of leather is that it has a stretch direction. In order to ensure that shoe parts will "work" correctly on the final product, it is important to respect the stretch direction of the material to be cut.

- An upper must not stretch in longitudinal direction

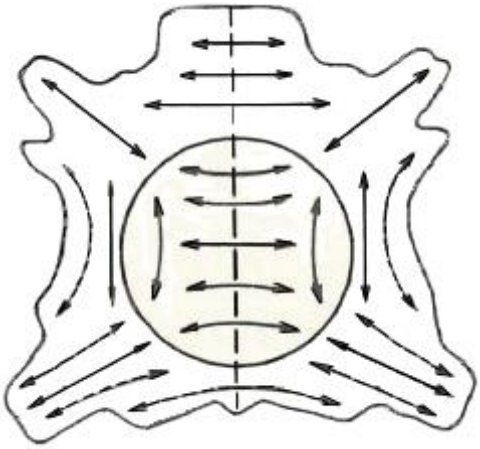
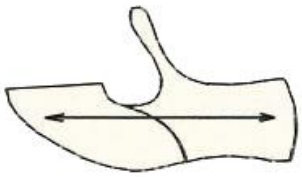


Fig. 4



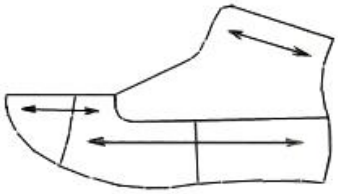


Fig. 5

Fig. 4 shows a calf hide. The arrows indicate the direction of the lowest stretch. The arrows on the shoe uppers (Fig. 5) indicate how to place the direction of lowest stretch in an upper.

- Stretch is necessary in the transverse direction of the vamp and in the waist area in order to be able to pull the upper tightly to the last.
- Heel covers must not stretch in transversal direction. Tongues and boot shafts must not stretch in longitudinal direction.

2.1.3. Nesting of Shoe Parts on Leather: Always Think in Pairs

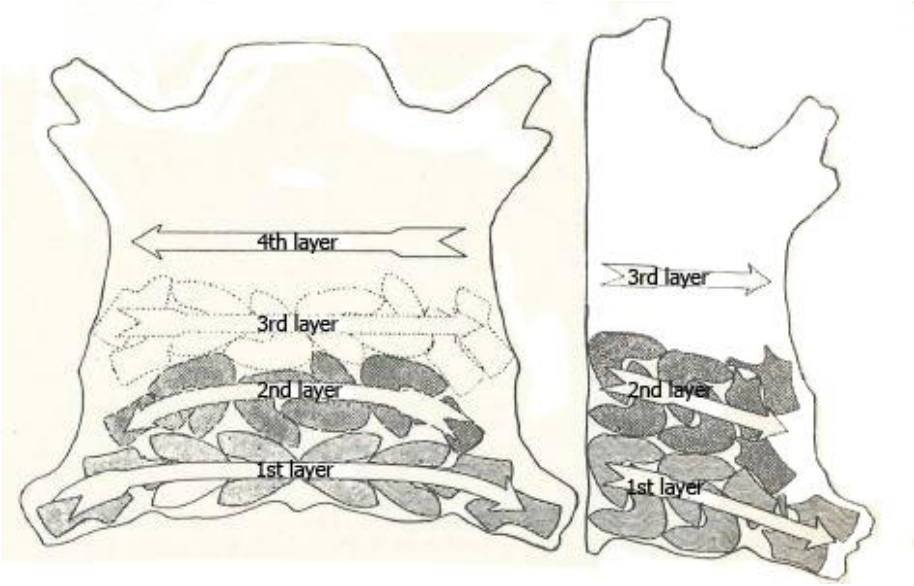


Fig. 6

Fig. 6 shows how the cutting layout is created respecting the stretch rule and the quality rule. The third important rule is that all parts of a pair must be of homogenous thickness, colour, and structure. In consequence, the two vamps of a shoe pair, for example, should be cut from the same area. The cutter always needs to think in pairs, as figures 6 to 9 show. The images also visualise that a cutter will always try to place waste in the less valuable zones of a hide. Experienced cutters are able to place leather defects in the lasting allowance or in the lap seam.

Fig. 7 gives an example of the cutting layout of a basic men's shoe model, Fig. 8 of a men's boot, and Fig. 9 of a mix of two different ladies' models.

Fig. 7

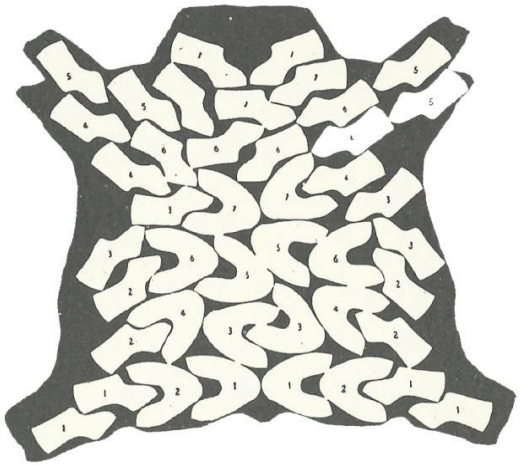


Fig. 8

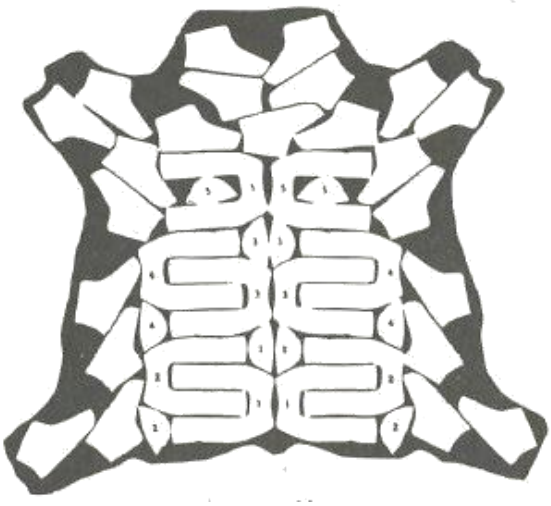
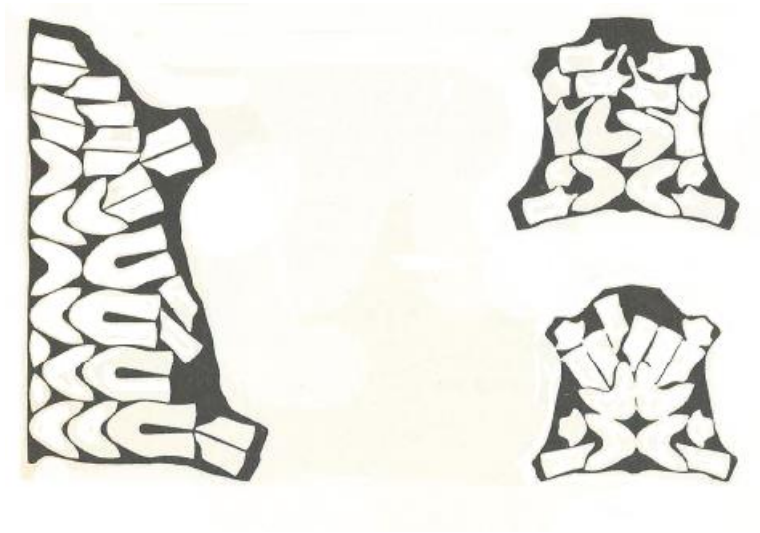


Fig. 9



Leather Lining

Cutting lining leather is different from cutting upper leather: The best leather has to go to the rear of the shoe because this is where it has to be the most wear resistant. When cutting lining quarters, the parts should always point with their rear to towards the butt. Vamp linings should not be cut from the butt.

2.2. Cutting of Textile Materials

For cutting textile the stretch direction is also important: Just as for upper leather, a textile shoe part must be cut in a way that there is the least possible longitudinal stretch (Fig. 10), i.e. in the direction of the warp thread. If this rule is not respected, the textile upper risks to break during the lasting operation.

Fig. 10

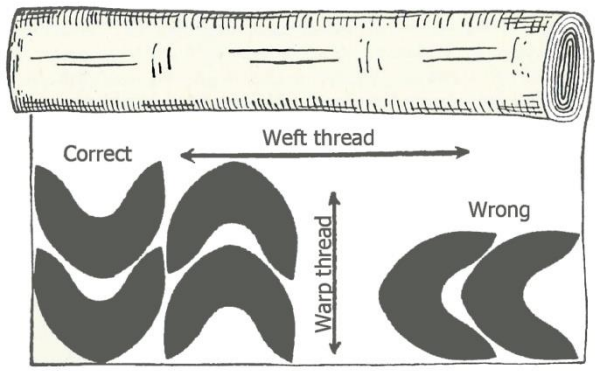


Fig. 11

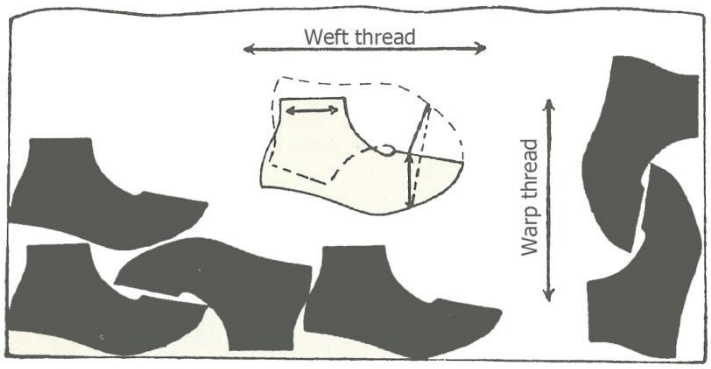
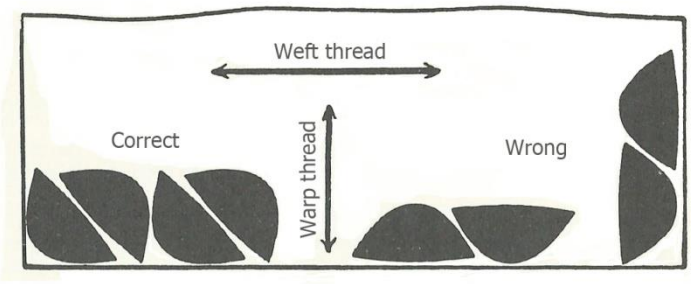


Fig. 11 shows a very common way of placing parts on a textile material: The four parts in the bottom left corner are cut in a double layer. When unfolding the lining part after cutting (see dotted line in fig. 11), you will see that the middle line of the lining part is not parallel to the weft thread direction but in an obtuse angle which is important enough to ensure that the part will not tear during lasting.

2.3. Cutting of Synthetic Leather

When it comes to cutting synthetic leather with a textile base, it is important to place them diagonally on the material (Fig. 12).

Fig. 12



2.4. Cutting of Leather Bottom Materials (Soles, Insoles, Heel Lifts, Counters etc)

Fig 13

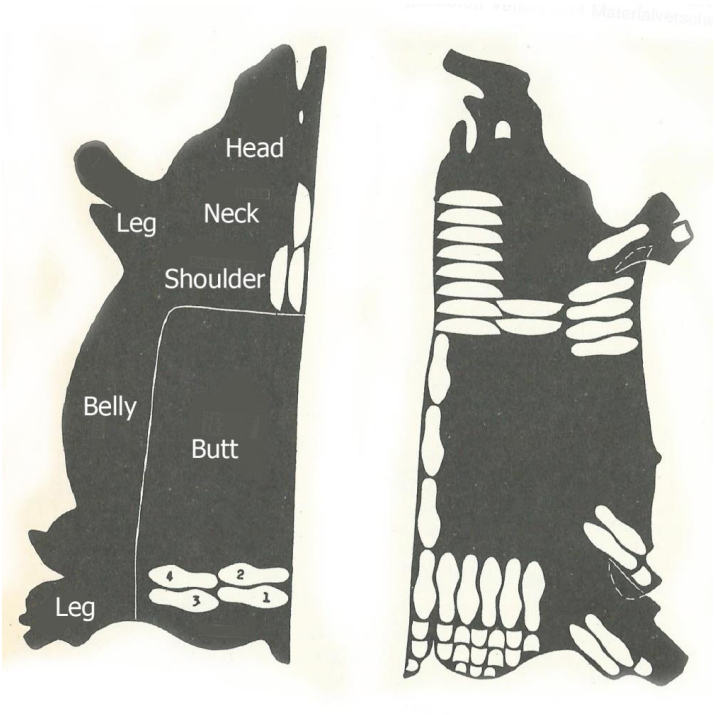


Fig 14

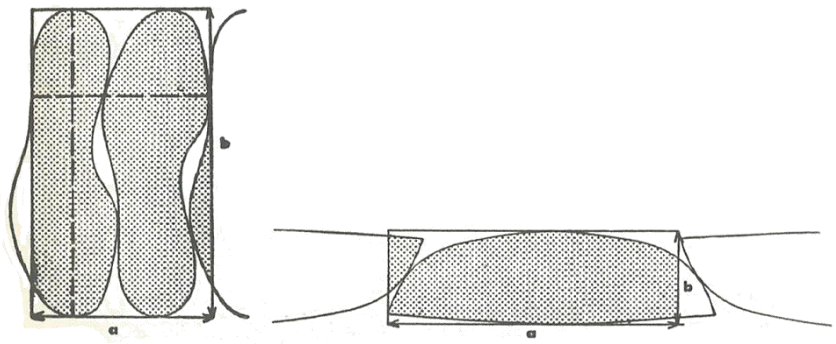


Fig. 13 and 14 visualise how to place bottom parts are on a hide.

3. Cutting Machines and Tools

3.1. Cutting Knifes

Specific knives are used for hand cutting of leather (fig. 15).

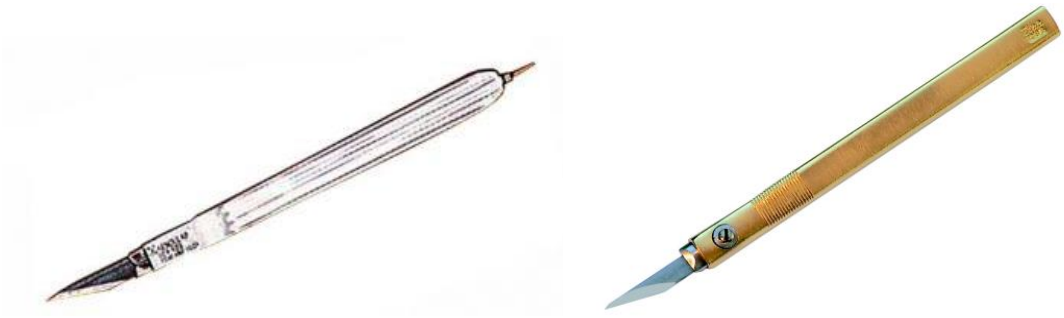


Fig 15

3.2. Cutting Machines with Clicking Dies

Several types of cutting / clicking machines require cutting dies. The first clicking presses were mechanical versions which used the force of a flywheel. These machines are not in use any more because it is not possible to guaranty the safety of the operating personnel.

Modern cutting presses are powered by a hydraulic pump. There are two basic builds: Beam presses, which are mainly used for cutting non-leather sheet materials, and swing arm types as they are commonly used for leathers. There are many variants of these two basic types.

Fig. 16: Swing arm clicking press

Fig. 17: Beam cutting press

3.2.1. Cutting Dies and Cutting Boards

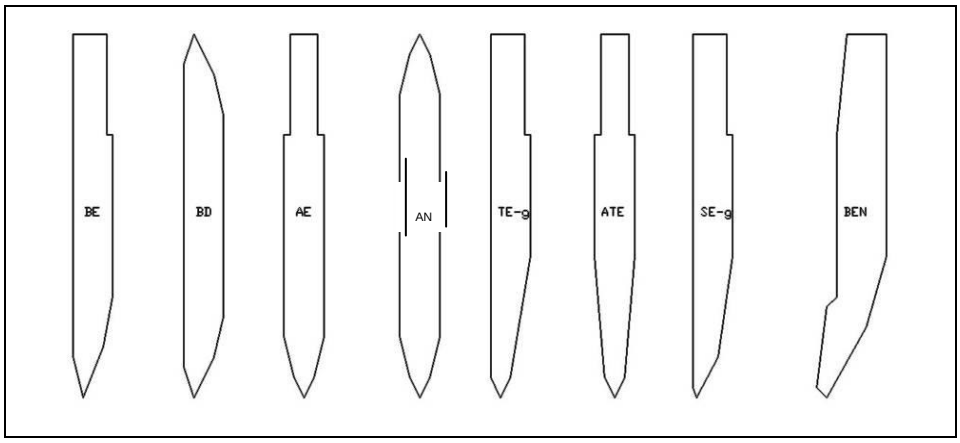
Cutting Dies

Cutting dies must have an appropriate profile and correct dimensions, which both primarily depend on the material to be cut. Also to be considered are: pattern size, degree of complexity, number of cutting cycles, expected cutting pressure, and whether the material will be cut in single or multiple layers. It is important to discuss the material to be cut and the intended cutting process with the die maker.

A large variety of different RDS profiles exists, from versatile types to very specific ones:

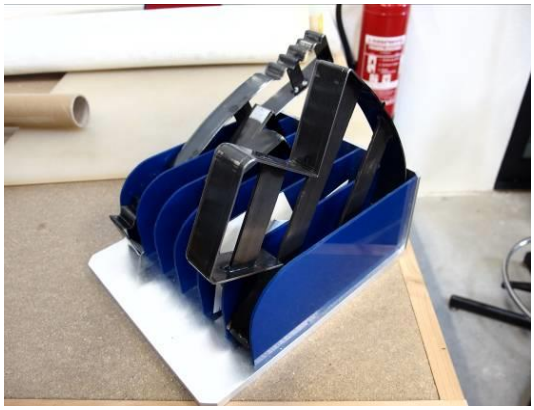
- BE = single layer cutting (leather)
- BD = single layer cutting, double edge for cutting left and right parts with one single die
- AE = symmetric profile for splitting knives
- AD = symmetric double edge steel
- TE-g = multi-layer cutting (textile, fleece, lining, leatherette)
- SE-g = rigid material cutting (insole)
- ATE = cutting heavy textile materials in several layers
- BEN = back clearing dies (outsole)

Fig. 18: Different blade shapes



Cutting dies must be thoroughly produced. Upper and bottom edge must be parallel even without minimum load. They must be properly stored. The blades must not touch other blades nor other metal or other hard material (see fig. 19).

Fig. 19: Correct storage of cutting dies is important



Cutting dies can carry punchers, prickers, or markers.

Fig. 20 and 21: Cutting dies can be equipped with punchers, prickers, or markers, which can make subsequent work steps redundant

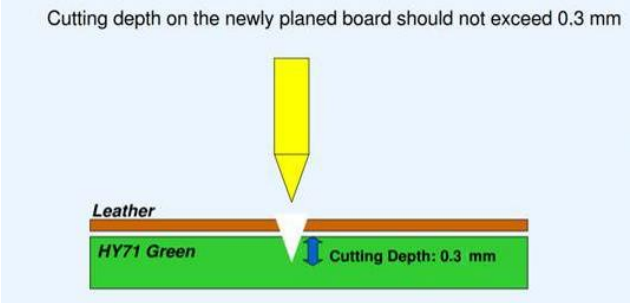
Cutting Boards

The prevalent plastic material for cutting boards is polyamide (PA) blended with other thermoplastics. The crucial properties of cutting boards are:

- hardness (expressed in Shore / °Sh)
- thickness
- size

The most important property of a cutting board is its hardness. Depending on the supplier, there are different approaches to choose the appropriate cutting board for each specific cutting press and each specific material to be cut.

Fig. 22: How to properly adjust an hydraulic cutting press, cutting rules, and appropriate cutting dies (copy right: Hydroma)



You can continue explaining the cutting depth principle, flipping and turning of the cutting boards, and the correct storage of cutting boards.

Fig. 23: How to flip and turn a cutting board

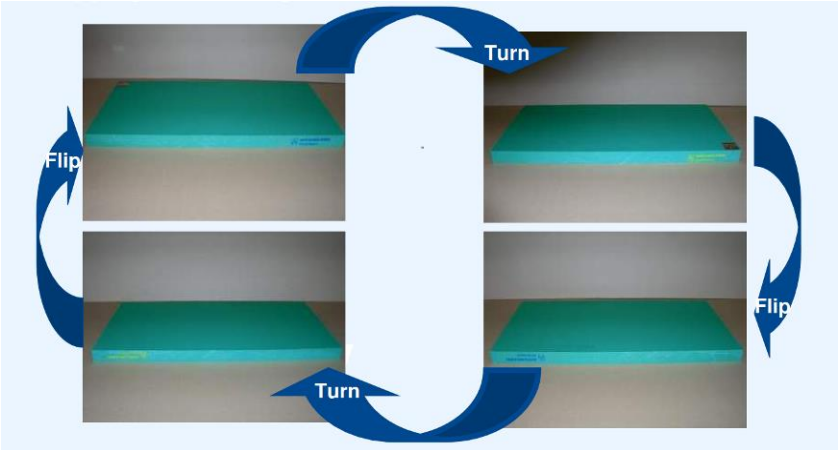


Fig. 24: Correct (horizontal) and wrong storage (vertical) of cutting boards

Fig 25: Some companies still use wooden cutting boards

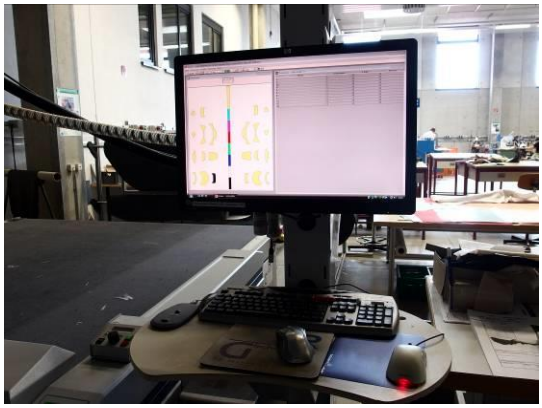
3.3. Dieless Cutting Tables - CAM

Today, dieless cutting is state-of-the-art even in cheap-labour countries. The ratio between investment cost, running cost, speed, and flexibility of the traditional way of cutting with cutting dies should be calculated. CAM machines are mainly used for sample making because of their great flexibility. They are also used in companies which are unable to find qualified skilled workers for the traditional cutting operation.

The important feature is that the positioning / nesting of the parts to be cut can be changed several times until the final cutting layout is found. Cutting itself does not start until the operator is satisfied with the cutting layout on the hide. This is not possible with traditional cutting.

Most CAM systems allow for simultaneous marking, numbering, and punching of the parts. When comparing the return on investment of a traditional cutting machine and a CAM machine, the possibility of grouping the above mentioned operations and the optimised utilisation of material to be cut must be taken into regard.

Fig. 25 and 26: Dieless cutting table (oscillating knife)



The CAD system communicates the geometrical data of the parts to be cut to the CAM cutting table. The material (leather hide) is placed on the working area of the cutting table and the parts are projected onto the material. The parts are placed using desktop and mouse. The number of finished parts and the number of parts left to be cut is automatically displayed.

4. How In-Company Training at VET School Go Together

Before trainees start their first day in the cutting department, they should already have undergone an initial theoretical training at VET school. The VET school curriculum touches on all the important learning fields related to cutting. We highlighted the topics which you should explain again to your trainees when they start the in-company part of the pilot.

VET School Curriculum for the Training Pilot (Theoretical Approach)

Learning Field	**Contents**
Health and Safety at Work	a) health and safety risks at work b) job-specific occupational safety and accident prevention regulations c) initial measures in the case of a work accident d) fire prevention measures; fire-fighting measures
Environmental Protection	Prevent damage to the environment (from the own workplace); explain in particular how to a) use energy and raw materials in an economically and environmentally friendly manner b) avoid waste; recycle or dispose substances and materials in an environmentally friendly manner

Shoe Types and Intended Use of Footwear	a) historical evolution of footwear b) shoe types (sports shoes, brown shoes, children's shoes, occupational footwear…) c) shoe parts d) different upper cuts e) requirements which footwear and upper materials must meet
Introduction to Product Engineering	a) characteristics of a last b) types of lasts / last production c) visualisation of a pattern making of a shoe model and pieces extraction d) examples e) understand the criteria of quality control based on the product engineering knowledge
Foot Anatomy and Impact of Footwear on Feet	a) anatomy of the foot b) from foot to last c) fit criteria d) influence of footwear on gait and posture e) systems for gait analysis
Sizing systems	a) English sizes, American Sizes, French stitch b) Mondopoint / millimetres c) measuring in centimetres d) width systems
Introduction to the Stages of Footwear Production	a) general organisation of a shoe factory b) leather storage c) cutting d) preparation for stitching e) stitching f) shoe assembly g) finishing department
Shoe Construction Methods	a) Cemented b) Goodyear Welt c) Blake / McKay d) Veldtschoen e) Moccasin f) Direct Injection etc.
Selection of Upper Materials	**Leather** a) Which leather from which animal?

	b) structure of the skin c) tanning methods and processes d) influence of tanning and finishing of hides on the characteristic properties of leather (tannery visit possible?) **Textile materials** a) raw materials and properties b) fabric construction types (woven fabrics, nonwovens, composite fibres) c) textile coatings and finishes d) textile lamination, roughing
Auxiliary Materials & Components	a) adhesives b) bottoming materials c) toe puffs and heel counters d) finishing products etc.
Cutting of Upper Materials (Knife Cutting / Cutting Dies / Cutting Table)	**Workplace design** **Occupational safety** **Cutting technologies / Construction and mode of functioning of machines, equipment, and tools** a) machines for cutting and clicking b) cutting dies and accessories **Cutting rules** a) quality rule b) pair matching rule c) stretch direction rule **Calculation of material consumption** **One-pair calculation** **Parallelogram method**

5. Work-Based Training in the Company

In order to start the work-based training, first there is a list of materials you should prepare:

- Knives for hand-cutting
- Work tables (standing)
- Card board
- Card board shoe parts
- Non-woven sheet material for first real-scale cutting exercises
- Print-outs of the cutting exercises on paper (provided as separate files in the attachment)

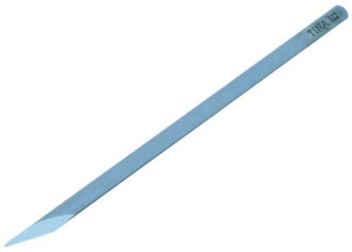


Fig. 27: Cutting knife for hand cutting

Fig. 28: Work-based learning / hand cutting

Fig. 29: Standing workplace with cutting mat

Fig. 30: Real-scale and miniature shoe parts for cutting exercises

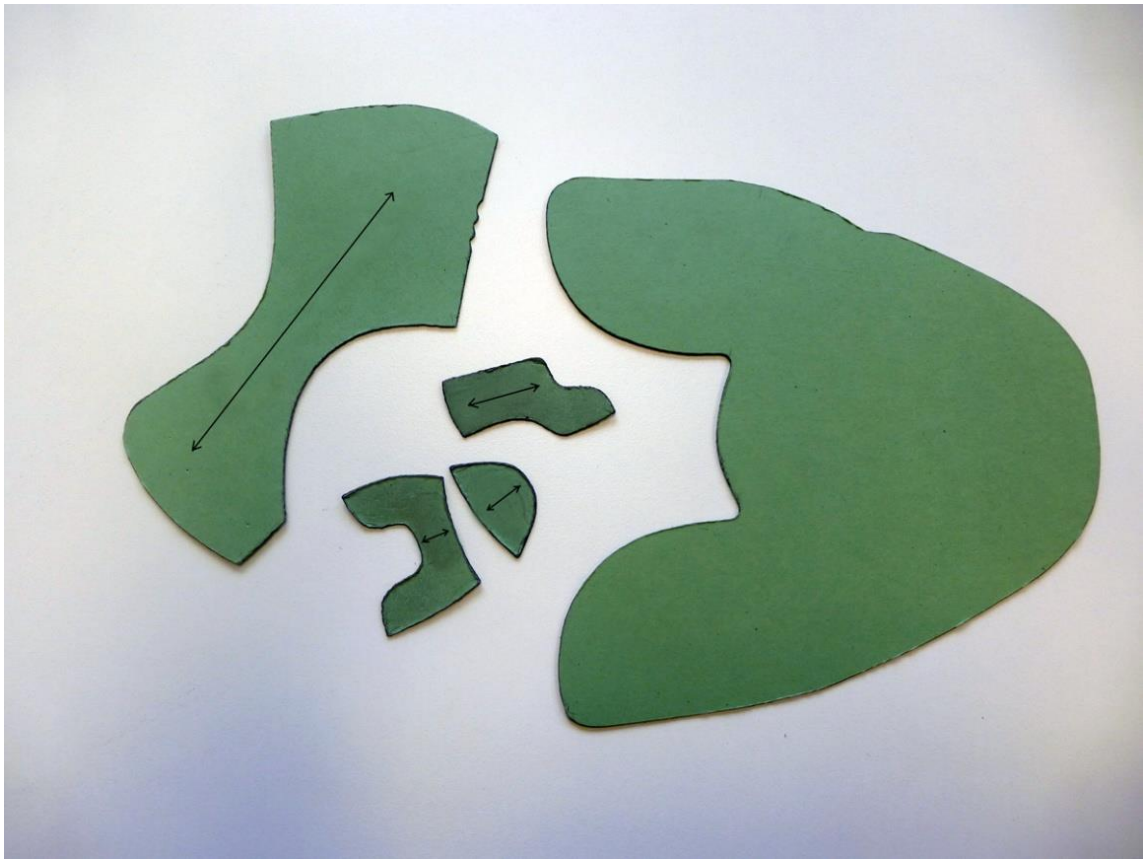


Fig. 31: 40x50 cm card board "leather hide" with cutting layout done by a trainee (miniature shoe parts)

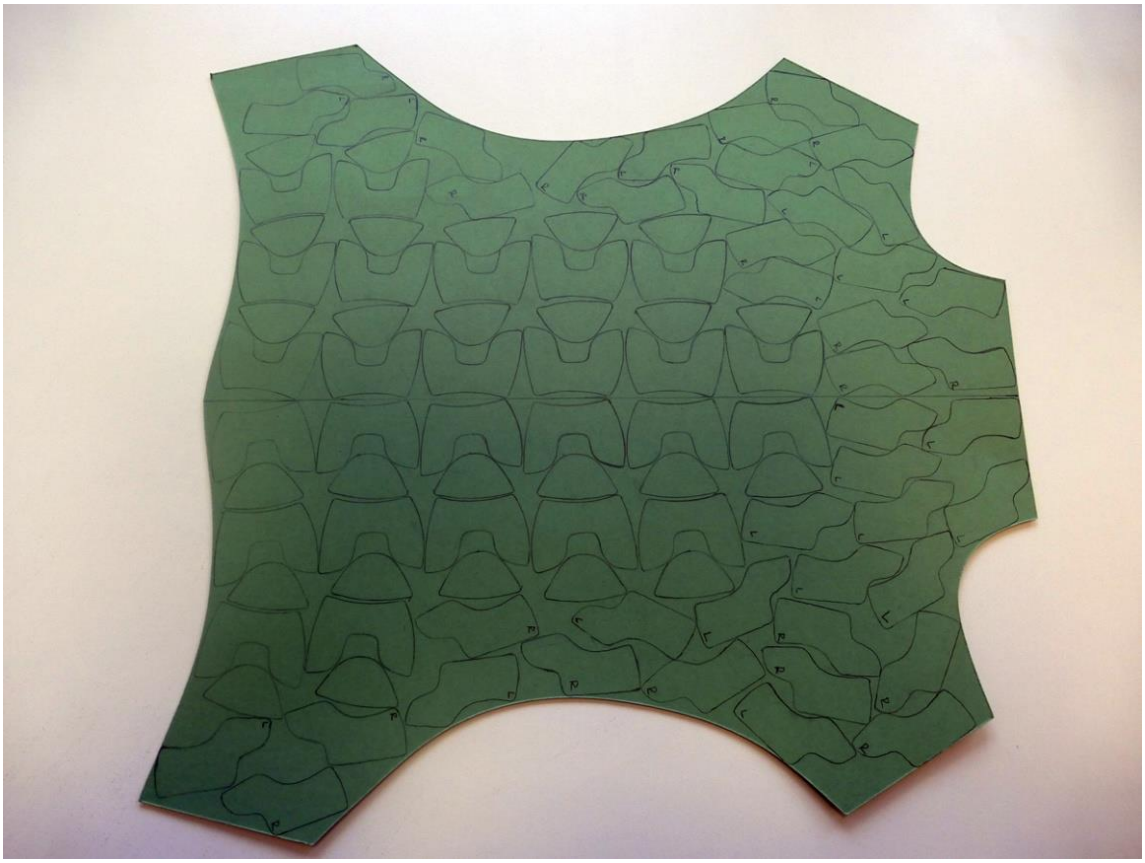


Fig. 32: Real-scale half hide (non-woven material) for first real-scale cutting exercises

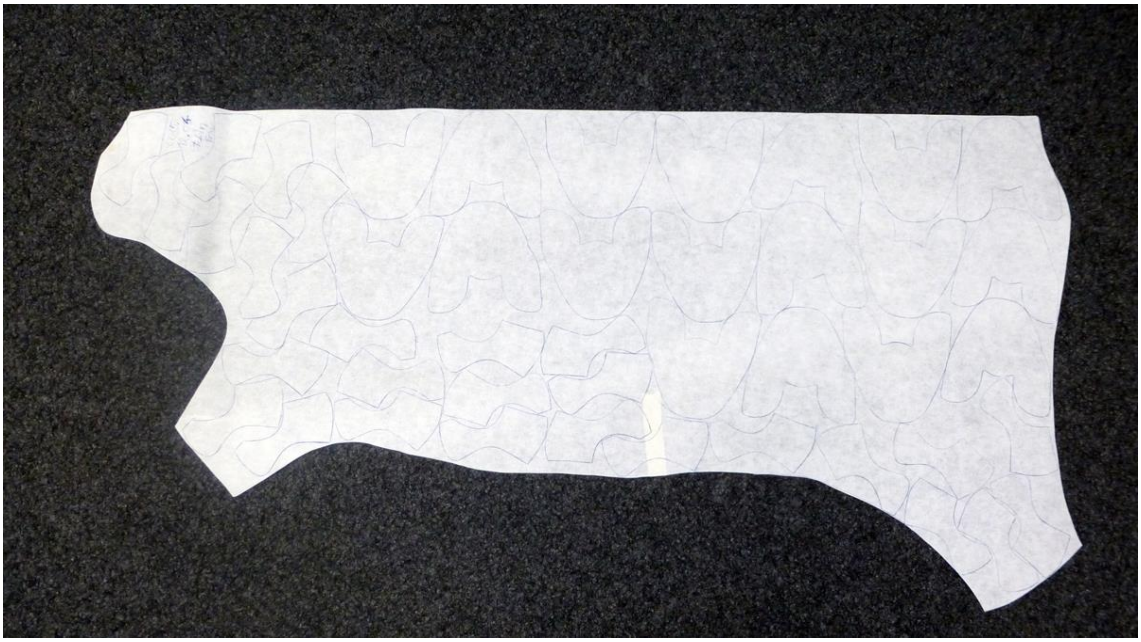


Fig. 33 to 42: Cutting exercises on paper (the files are provided as separate files for print-out)

Fig. 33

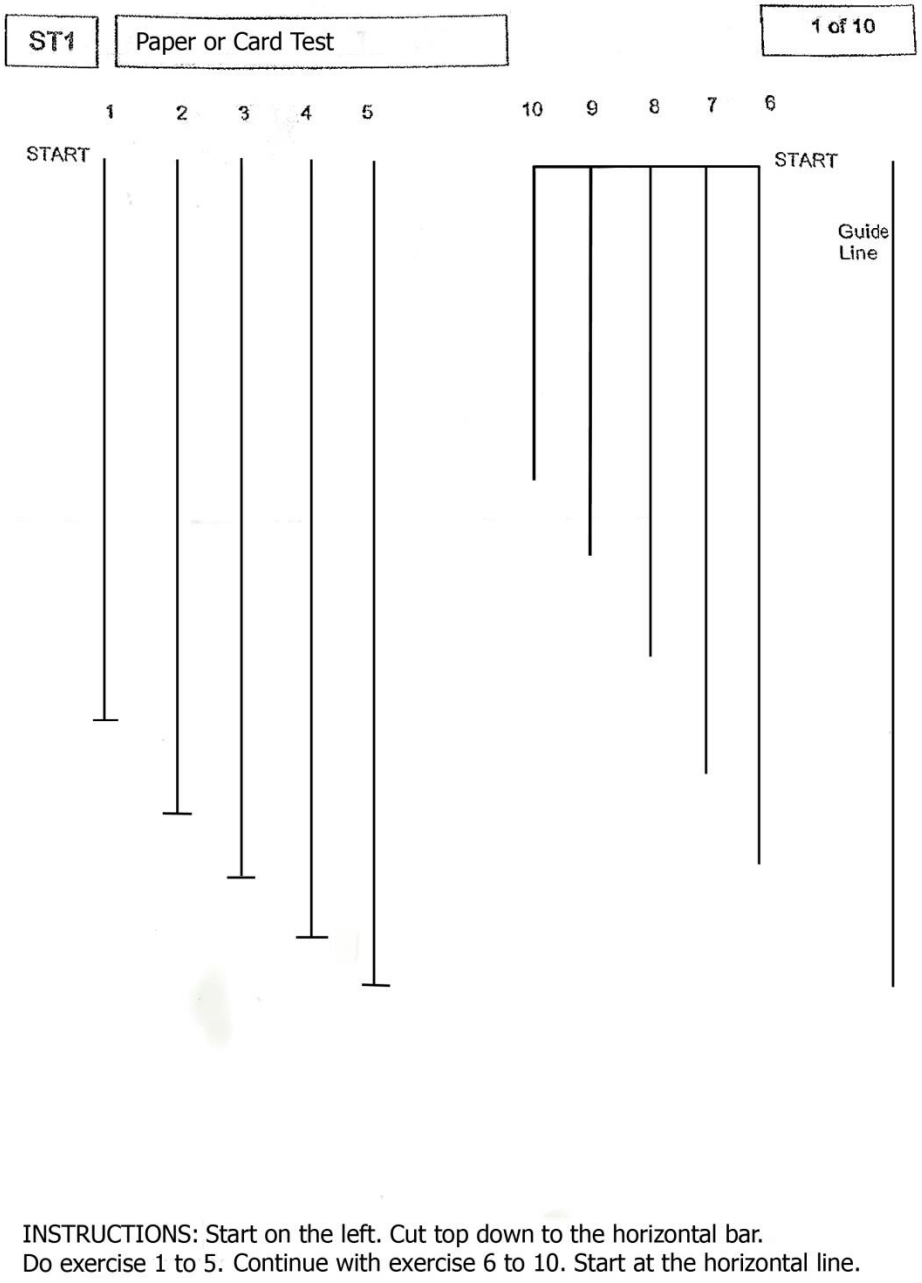
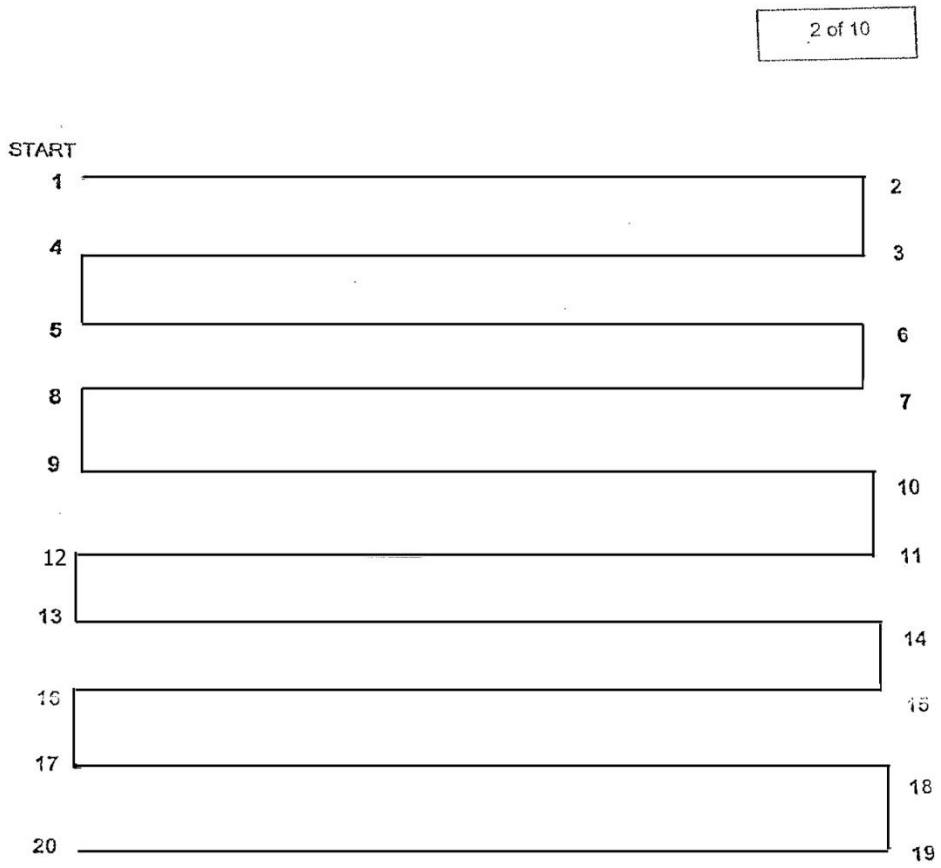


Fig. 34

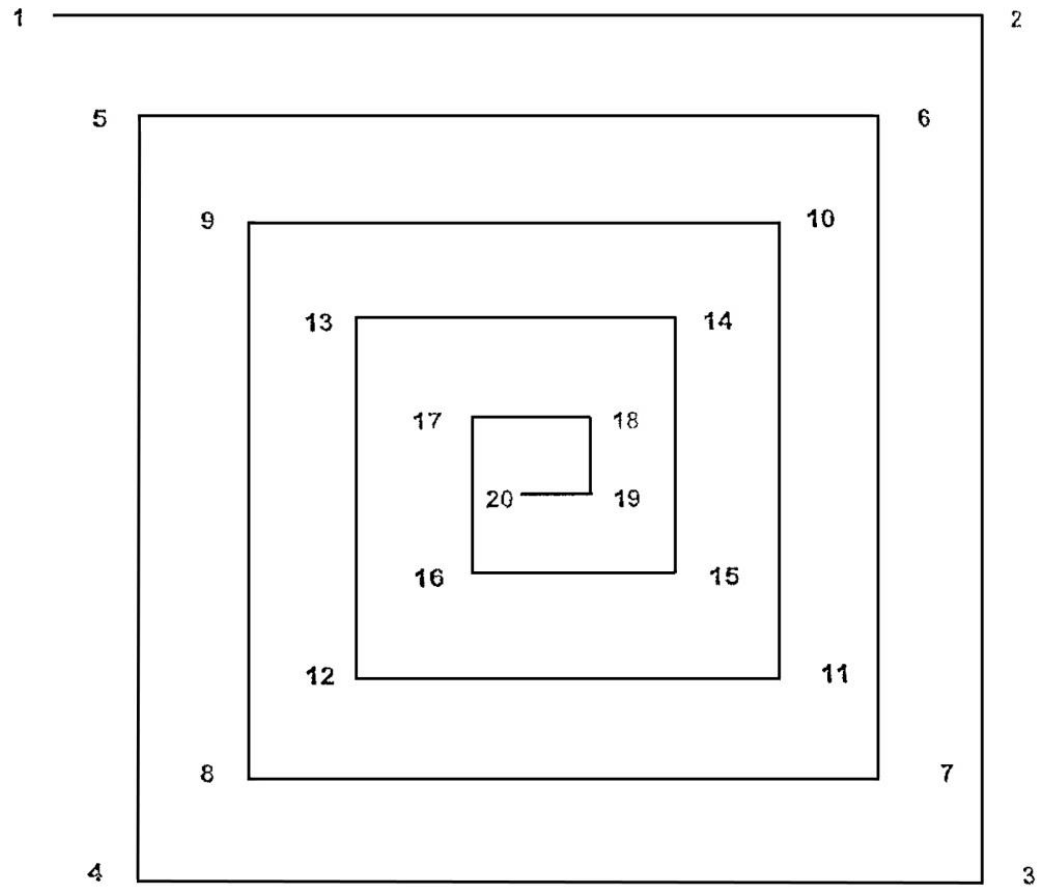


INSTRUCTIONS: Position blade on start point. Cut line from point 1 to 2.
Stop. Then cut from point 2 to 3. Stop. Repeat for points 4 to 20.
Never turn the page.

Note: Trainee should try to cut in a continuous movement. Instructor takes time.

Fig. 35

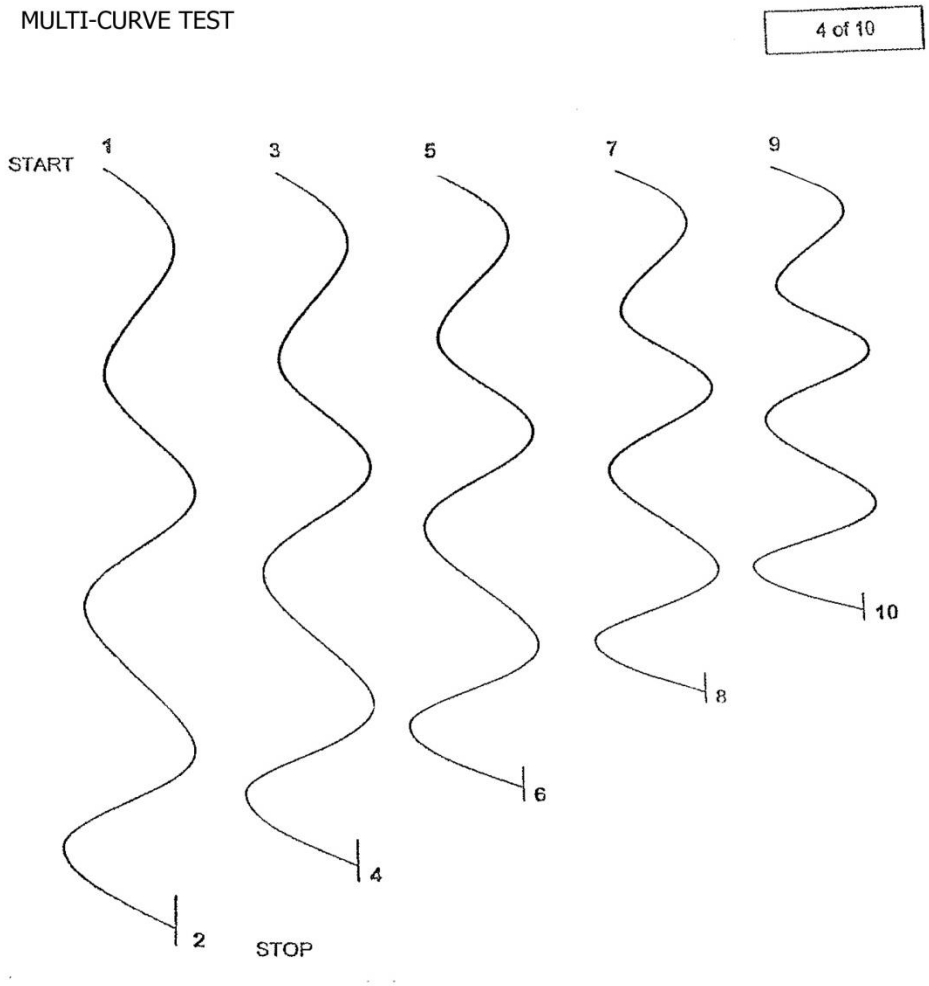
START



INSTRUTIONS: Position blade on START. Cut line from point 1 to 2. Stop. Cut from point 2 to point 3. Stop. Repeat from point 4 all the way to point 20.

NOTE: Trainee should try to cut in one continuous movement. Instructor takes time.

Fig. 36



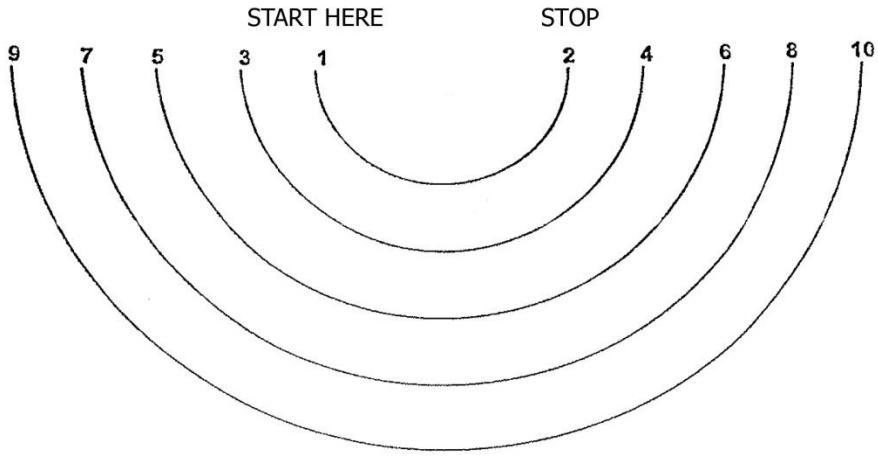
INSTRUCTIONS: Position blade on START. Cut line from point 1 to STOP at point 2.

Note: Trainee should try to cut in one continuous movement. Instuctor takes time.

Fig. 37

Cutting Semi-Circles

5 of 10



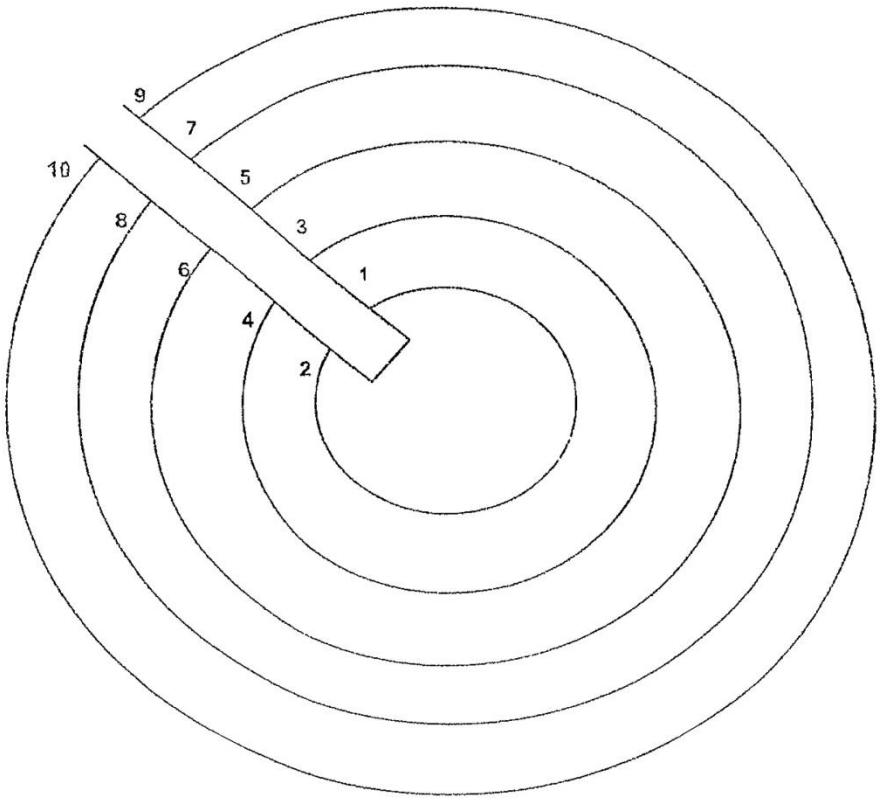
INSTRUTIONS: Position blade on point 1. Cut in one continuous movement to point 2. Continue the same exercise from 3 to 4 etc. Repeat 5 to 6 etc.

NOTE: The trainee should try to cut in one continuous movement. Trainer takes time.

Fig. 38

Circle Test

6 of 10

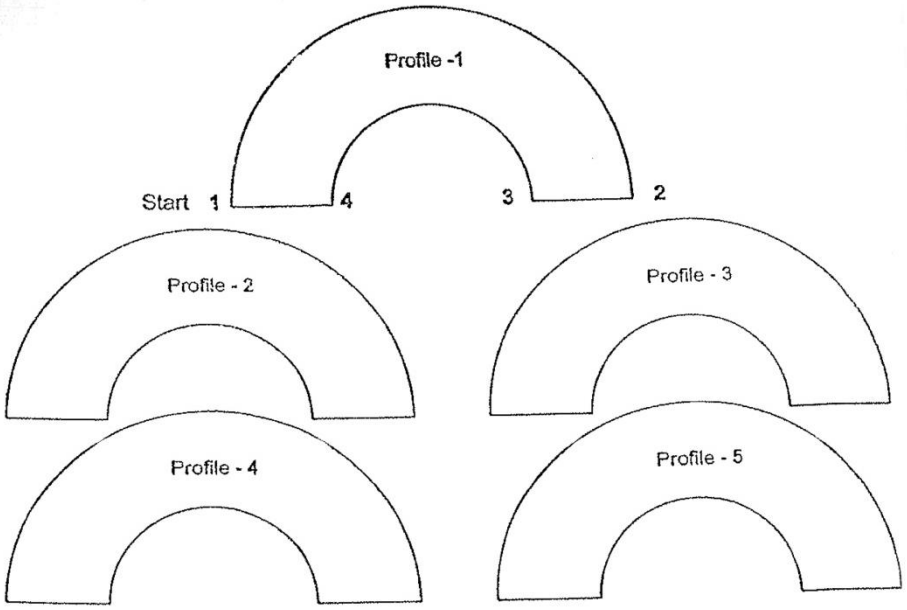


INSTRUCTIONS: Place the blade on point 1. Cut in a circle (continous movement!) towards point 2. Restart at point 3, cut to 4. Reposition blade at point 5. Cut to point 6 etc.

NOTE: The trainee should try to cut a circle in two movements (two demi-circles). Instructor logs time.

Fig. 39

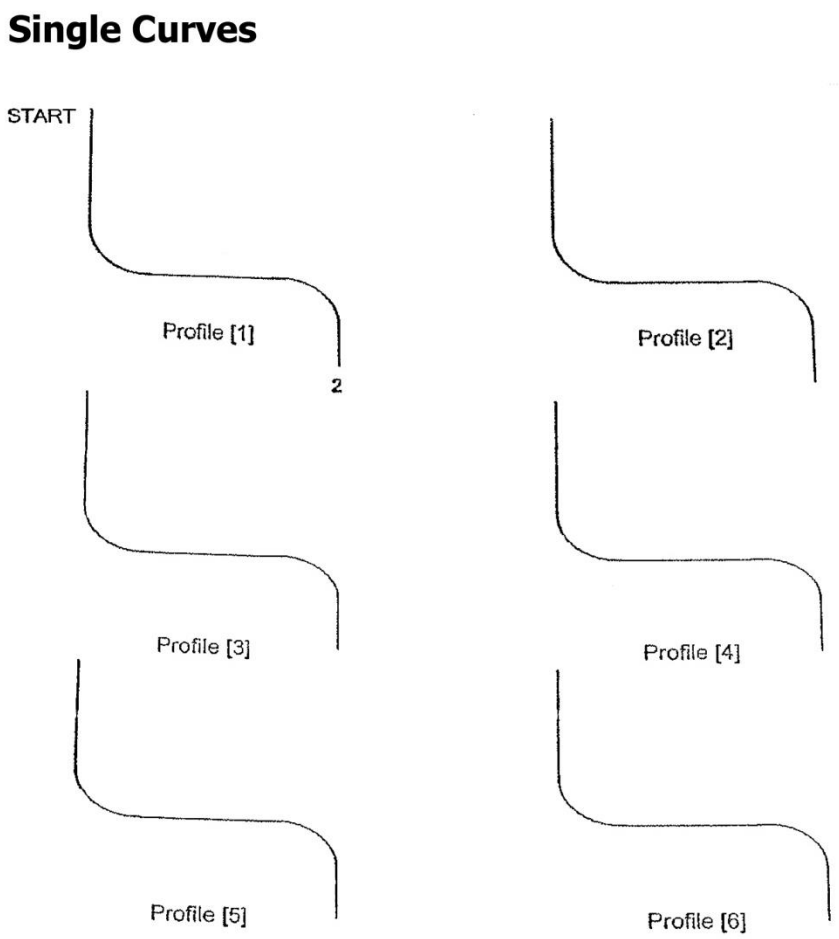
Semi-Circles



INSTRUCTIONS: Position the blade on point 1. Cut to point 2 in one continuous movement, then to point 3, then to point 4, and finally back to point 1 without turnig the page.

NOTE: This exercise has to be completed with acceptable quality before the trainee can proceed to the next exercise. The instructor should demonstrate how to execute the exercise and should explain the quality requirements.

Fig. 40

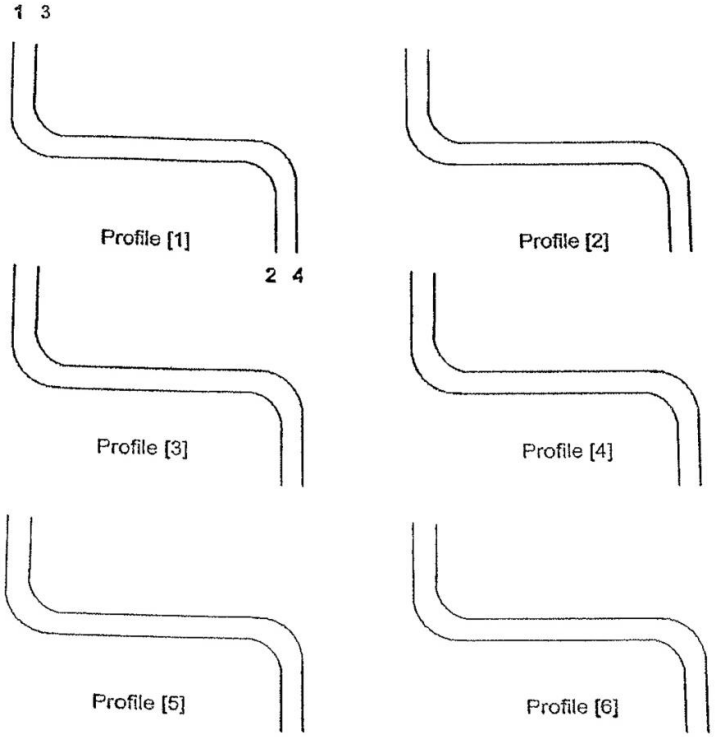


INSTRUCTIONS: Position blade on point 1. Cut in one continous movement to point 2. Repeat for all profiles.

NOTE: The exercise must be completed with an acceptable quality. The instructor should demonstrate the exercise and explain the quality requirements.

Fig. 41

Double Curves



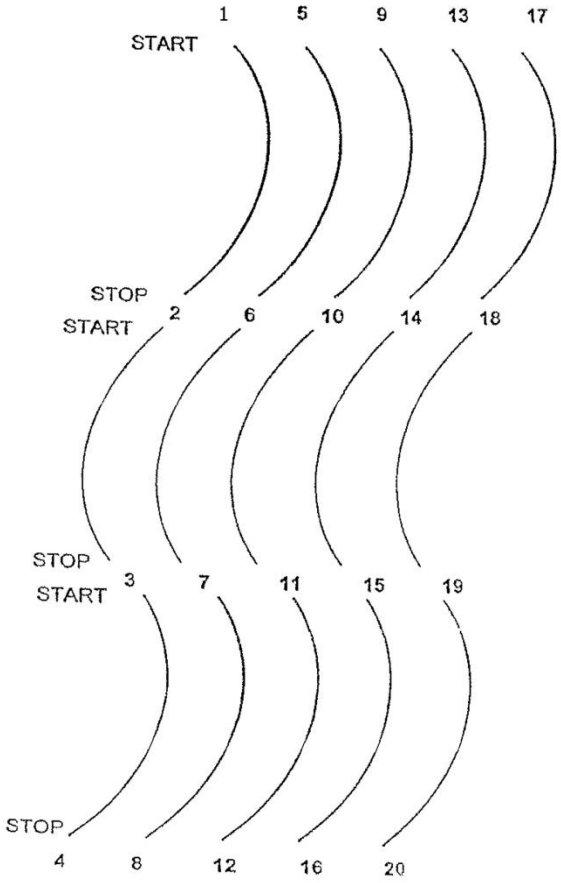
INSTRUCTIONS: Position the blade on point 1. Follow the curve in one continuous movement to point 2. Start again at point 3. Follow the line in one continuous movement to point 4.

Cut all 6 profiles this way.

NOTE: This exercise must be completed meeting a certain quality standard. The instructor should demonstrate how to execute the exercise and explain the quality requirements.

Fig. 42

Triple Curves



INSTRUCTIONS: Position blade on point 1. Cut to point 2 in one movement and stop. Restart after point 2 and cut to point 3. Restart after point 3 and cut to point 4.

Complete the exercise to point 20.

NOTE: This exercise has to be completed meeting an aceptable quality level. The instructor should demonstrate the exercise and explain the quality reuirements.

All this material serves as preparatory exercises. Once the trainees have reached an acceptable level in the preparatory exercises, they should switch to textile cutting, then lining, and finally upper leather of the real production (after a period of observation / watching the workplace trainer demonstrate the task).

Training progress and work results are assessed by the tutors.

At the end of the pilot training, a certificate is issued which states the (successful) completion of the training, the duration, and the acquired skills, as well as an appreciation of the VET school and the workplace trainer.

END OF DOCUMENT CUTTING TRAINNG MANUAL

2.6. Preparation of the Tutors

Analysing the German dual system, one of the key findings was how important the role of the in-company tutors is. This led to the decision to focus on the workers in the companies participating in the pilot, who were supposed to take over the role trainers. Hence partners underlined how important the thorough preparation of the tutors would be for the overall success of the pilot.

The tutors were supposed to be entrusted with:

- planning of the training,
- explain and demonstrate the correct execution of all operations which the students are expected to learn,
- assessing and documenting the learning progress of each student.

To ensure a smooth training run, the tutors needed to be made familiar with the goals of the dualTRAIN project as well as with the contents of the entire pilot curriculum (i.e. the VET part), and they needed to acquire some pedagogical basics.

CTCP had formerly worked on a project called BMW (“Be a mentor at work”) and proposed to put the project material at the availability of the dualTRAIN project. The BMW project scope had included a “train the trainer” methodology which seemed very useful for the dualTRAIN project.

START OF DOCUMENT AGENDA TUTOR TRAINING DAY (2 pages)

Agenda

2.7. Training Day for In-Company Tutors

9h15 Welcome Address

Welcome the participants and explain what they are up to during the day and why.

9h30 Introduction: dualTRAIN Project

Sketch the big picture: Explain that the dualTRAIN project is being financed by the EU in order to improve vocational education pathways and to combat youth unemployment. Explain the aims of the dualTRAIN project, how the project is set up and what the deliverables will be. Explain how a dual vocational education pathway is organised by using the German «Industrial Shoe Maker and Finisher» example. Explain the role of the tutors within this specific pathway and the role of the tutors in the training pilot.

10h15 Introduction: Who is Who

This could be organised as a participatory introduction round.

- let the participants explain who they are
- where they currently work
- what their job experience is and what their current job is
- what type of materials is cut in their respective companies
- how they got trained on the job
- whether they have tutoring experience
- what they think their role in the pilot is
- whether they already have a rough idea how to tackle this challenge
- …

10h45 Role of a Tutor / What Makes a Good Tutor

Theoretical approach on tutoring (take inspiration from BMW document / Scandinavian document (www.dualtrain.eu))

12h00 Lunch

13h30 Overview: What are the Trainees Being Taught at VET School?

If possible provide copies of the VET school textbooks / documentation VET school uses for the apprentices / trainees; go roughly through to make sure that the future tutors understand the level of theoretical knowledge the trainees will have when they arrive at the company: Ideally the future tutors can take the material home for in-depth lecture.

14h30 Planning of the Two Training Weeks at the Company

Involve the future tutors in structuring the two weeks the trainees will spend at the company.

Make a list of information which the trainees need to receive when they arrive at the company (see document “Pilot Training in the Company: Cutting”).

Make them familiar with the company, the products and how the different departments work together; explain how product creation and production planning are organised; show the warehouse and the cutting department (different cutting methods), impart safety instructions, explain materials to be cut (and for which shoe models those materials are intended), tools, working documents, work orders, work flow in the production.

Prepare workplaces, materials and tools for the trainees.

15h30 Demonstrate the Operations Which the Students Are Expected to Learn

Start with the paper cutting exercises. Demonstrate each exercise before the trainees start the exercises. Let them work on the paper cutting exercises until the results are satisfactory. Then continue with cutting non wovens or textile materials and finally lining and upper leather. If cutting upper leather is not feasible, include phases where the trainees can watch you cut an order while explaining what you do and why you are doing it that way.

16h30 Assessing and Documenting the Learning Progress of Each Student

Make the participants familiar which tools are available for assessment of the learning progress and how to give feedback. Decide on feedback intervals (only at the end does not leave room for improvement; feedback should be given at the end of each training day; maybe in both directions tutor-trainee but also trainee-tutor?).

END OF DOCUMENT AGENDA TUTOR TRAINING DAY

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3. Documenting of LO and Evaluation of WBL

Introduction

This approach of documenting Learning Outcomes (LO) from different learning stations (venues or countries) was developed for the purpose of mobility in the Leonardo-project AEROVET. It is preferable but not always realistic that a learner acquires the LO of a whole unit at once. So the contents of the units were subsumed to mobility units (MU) which are integrated parts of the respective unit.

- The MU must be seen as single steps within the context of the whole unit of LO; there should be no formal crediting of the isolated MU.
- It is not possible to list all potential MU, there should be space to add additional MU.
- Learning must be seen as a development of competence, single units (MU or LU) are not necessarily learnt from "0 to 100".
- To achieve a sustainable learning outcome single MU must be performed several times, especially central skills like "*creating a cutting layout on a leather hide/skin*", "*cutting by hand*", "*machine cutting*" need several periods of training before they can be performed according to the sectoral quality demands.
- The additional work load for teachers/trainers should be as small as possible.
- The matrices should be reduced as far as possible.
- Performing a MU independently is a necessary but not sufficient precondition for the awarding of a whole unit of learning outcomes.

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

- describing only the headline of the unit and the denomination of the MU in the passes and only attaching the holistic description of the learning station,
- reducing the amount of space per matrix to 2 pages, only 1 if possible,
- following the skills for the denomination of the single MU and clarifying by the attached unit and by listing the KSC (knowledge, skills and competencies) for chosen MU that the denomination is meant holistic,
- adding the row "remarks" to open spaces for additional aspects,

- opening the possibility to document the reached level of autonomy for each learner on a 4-level, performance-oriented frame,
- establishing the possibility to add additional MU to each unit,
- clarifying that the last row (performing the MU above in context) ***cannot*** be assessed in a qualitative-performance-oriented manner.

The recognition of LO with the proposed instruments follows a 2-step approach. The teachers or trainers who are responsible for each MU (independent of the place where the student is learning) assess the level of autonomy reached by the candidate on the 4 levels of our scheme. To inform other training responsible about the concrete environment, additional information like place and date is provided. If, for example, certain learning activities of a candidate related to a chosen MU date back several months, they may need refreshment. The MU in our approach represent some kind of transcript of learning outcomes: The matrices just trace the work stations an apprentice has run through; however, having all signatures collected on paper does not mean that the LO of the whole unit is acquired. Only if the responsible teachers or trainers (independent of the place where the student is learning) are convinced that a candidate has acquired most of the relevant MU, then they can decide to assess the whole unit as acquired. Just like the handling of the passes, the assessment, too, should not cause additional work for teachers respectively trainers. For the assessment, the candidate should work autonomously on a work order that is characteristic for the chosen unit. The processes as well as the product are part of the assessment. An example for the training pilot of the dualTRAIN project could be that the candidate proves to be able to create a cutting layout that optimizes the material utilization on a homogenous textile material. If the local trainers/teachers confirm that the LO are reached, then this is certified.

3.1. Matrix of Learning outcomes

Cutting of parts of a shoe model							
Unit/Skill	Assessment (choose the degree of autonomy achieved by the student)				Place	Date	Signature
	observed/ supported	Under instruction	Under surveillance	Independently			
To be able to interpret and prepare technical cutting documentation							
To be able to mark textiles, leather and other materials to be cut							
Knowing the behaviour of the different materials							
Knowing the classification of materials and their tolerances							
Knowing material spreading systems							
Knowing positioning marks							
Knowing the optimal layout							
To be able to prepare cutting machinery and equipment and keep them in good condition							
Knowing the sharpening processes and requirements							
Knowing the cutting parameters and technical information							
To be able to cut textiles, leather and other materials by hand							
To be able to cut textiles, leather and other materials using press dies							

To be able to o cut textiles, leather and other materials using cutting machines							
Knowing how to spread the materials							
Knowing the parameters to avoid deviations							
Knowing the cutting sequence							
Knowing the correspondence between the cut pieces and job tickets, and labelling cut pieces							

Unit/Skill	Assessment (choose the degree of autonomy achieved by the student)				Place	Date	Signature
	observed/ supported	Under instruction	Under surveillance	Independentl y			
To be able to comply with health & safety and environmental risk prevention instructions							
Knowing the associated risks and preventive measures							

To be able to meet quality standards and make the necessary adjustments							
Cutting of leather pieces of a standard shoe model of the company							

Remarks:

Although key competencies are integrated part of the units resp. mobility units, a separate evaluation might be of added value; especially with focus on potential difference in self-awareness and awareness of others; in our case the mentors at the work-place. We adopted an approach, developed and approved by Airbus Germany, to the projects' needs and suggest that both, the trainee and the mentor, fill in the radar chart (see below) and compare results afterwards. In case of serious deviations (> 2 units) a common discussion, including the responsible teacher resp. trainer, should be conducted – to figure out the reasons.

3.2. Support and Development Scheme (SDS)

Personal Data of the Trainee

Last name:		
First name:		
Employee number:		
Apprenticeship programme:		
Start date of apprenticeship:		
Supervisor:		**Phone:**

Learning Venue

Training unit / Learning venue:		
Duration of the training unit:	**From:**	**To:**
Trainee instructor:		**Phone:**

Certificate of Safety Training Attendance

The trainee has attended the relevant safety training for the departments he/she will work in (Occupational Safety & Hazardous Substances)	
Training date:	
Signature of the	
Signature of the	

Monitoring and Assessment of the Key Qualifications

(Instructor's view compared to trainee's view)

	Learning Capacity							
The trainee is • receptive, eager to learn and open-minded • aware of own weaknesses and seeks ways and support to make up for them • looking for information, seeks to acquire knowledge in an independent manner making use of different learning paths, and is	Carry-over from the self-evaluation sheet of the trainee:							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	Degree from the instructor's perspective:							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Short explanation of the instructor's view:								
	Communication Skills							

The trainee • communicates in a clear and comprehensible manner (oral & written) • actively gets enrolled in conversations, listens carefully, gives and accepts feedback	Carry-over from the self-evaluation sheet of the trainee: **1 2 3 4 5 6 7 8** Degree from the instructor's perspective: **1 2 3 4 5 6 7 8**
Short explanation of the instructor's view:	

The trainee • independently takes on tasks that fall under his/her own scope of competencies, tackles and solves them • is committed to his/her work and acts in a proactive manner • comes up with own ideas / proposals / solutions • is confident to make decisions that fall under his/her own scope of competencies	**Independence** Carry-over from the evaluation sheet of the trainee: **1 2 3 4 5 6 7 8** Degree from the instructor's perspective: **1 2 3 4 5 6 7 8**
Short explanation of the instructor's view:	

The trainee • assumes the responsibility for his/her own acts • takes on responsibility in the team • adheres to agreements and to operational provisions • utilises resources in a reasonable way	**Responsibility** Carry-over from the evaluation sheet of the trainee **1 2 3 4 5 6 7 8** Degree from the instructor's perspective: **1 2 3 4 5 6 7 8**
Short explanation of the instructor's view:	

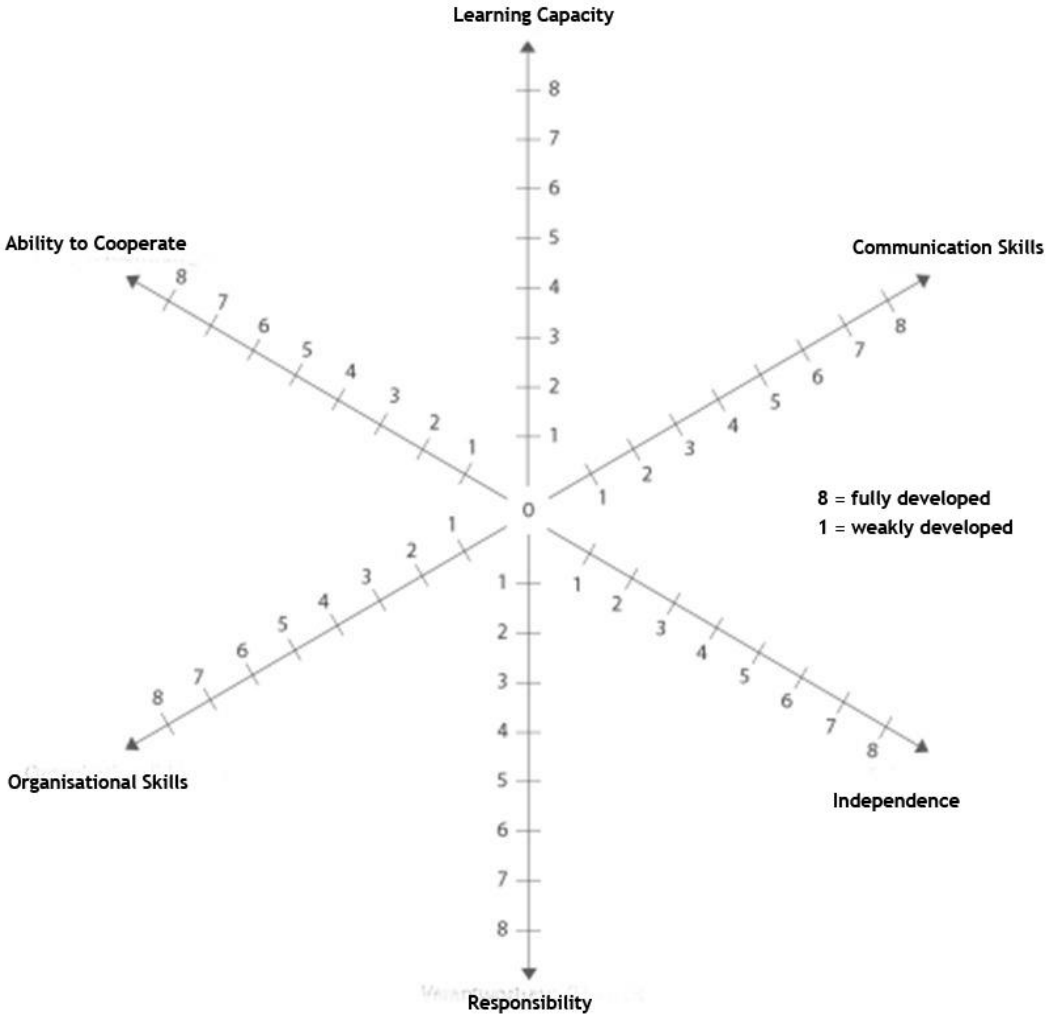
<table>
<tr><td>The trainee
• tackles tasks in a goal-orientated and systematic manner
• identifies and adresses problems and makes suggestions for improvements and solutions
• can visualise situations and circumstances and is able to present them; can moderate discussions</td><td colspan="8">Organisational Skills
Carry-over from the evaluation sheet of the trainee
1 2 3 4 5 6 7 8
Degree from the instructor’s perspective:
1 2 3 4 5 6 7 8</td></tr>
<tr><td colspan="9">Short explanation of the instructor’s view:</td></tr>
<tr><td>The trainee
• is fair and open in his exchanges with others and has a consensual approach
• passes on information and own knowledge and supports the team to reach common goals
• seeks support when solving problems
• contributes to a positive work atmosphere</td><td colspan="8">Ability for Cooperation
Carry-over from the evaluation sheet of the trainee
1 2 3 4 5 6 7 8
Degree from the instructor’s perspective:
1 2 3 4 5 6 7 8</td></tr>
<tr><td colspan="9">Short explanation of the instructor’s view:</td></tr>
</table>

Self-Assessment and External Assessment (Radar Chart)

Please transfer the value degrees of the Key Qualifications onto the radar chart (centre = 0).

Please use different colours for the self-evaluation of the trainee and of the instructor's assessment.

In case of significant deviations, please make this a subject of discussion in the concluding discussion with the trainee.



The concluding discussion at the learning venue took place on (date): _____

_____	_____
(signature of the trainee)	**(signature of the instructor)**

Monitoring and Assessment of the Sectorial Qualifications [%] from the Supervisor's Perspective and Carry-Over from the Trainee's Self-Evaluation

<table>
<tr><td colspan="2">No. 1 Occupational Health and Safety
The trainee is able to
• identify risks for health and satefy at the work place and take measures to avoid them
• keep the work place clean and tidy (no tripping hazards such as cables, hoses, or tubes, no food and drinks at the workplace) and respect the smoking ban in the production hall
• use safety devices such as covers, lids, and railings
• handle cleaning agents and sealing compounds
• use personal protective equipment such as hearing, eye, and skin protection
• correctly handle and maintain tools, measuring devices, machines and equipment in a perfectly functional condition
• report identified risks to his/her superior
• behave appropriately in the event of accidents, as well as which first measures to take, dial the emergency number, provide crucial information (what happened, where, how many people concerned etc.)
• inform superiors, get the first aid kit, document the injury
• identify emergency exits and take particular care not to block them
• work with pneumatic or hydraulic machines after instruction</td></tr>
<tr><td>Remarks:</td><td>Carry-over from the self-evaluation sheet of the trainee:
10 20 30 40 50 60 70 80 90 100
Instructor's assessment:
10 20 30 40 50 60 70 80 90 100</td></tr>
</table>

No. 2	**Environmental Protection**

The trainee is able to

- help avoid operational environmental impact within one's own professional sphere of influence, in particular
  a) apply the existing environmental protection regulations for the training company
  b) apply economic and environmetally friendly methods of using energy and materials
  c) avoid waste; properly dispose substances and materials (waste separation)

Remarks:	Carry-over from the self-evaluation sheet of the trainee:
	10 20 30 40 50 60 70 80 90 100
	Instructor's assessment:
	10 20 30 40 50 60 70 80 90 100

No. 3 **Applying Operational Information and Technical English**

The trainee is able to

- interpret job tickets and adopt his/her work accordingly
- interpret technical drawings (of styles, parts and components), explain bills of materials as well as assembly lists and adopt his/her work accordingly
- translate English technical terms and put them to use

Remarks:	Carry-over from the self-evaluation sheet of the trainee:
	10 20 30 40 50 60 70 80 90 100
	Instructor's assessment:
	10 20 30 40 50 60 70 80 90 100

No. 4 **Work Organisation**

The trainee is able to

- identify the sequence of operations he/she is supposed to carry out
- identify the materials, auxiliary materials, and the equipment (stencils, tools) for executing a work order, and to request, transport and pass on the material as well as the finished work order
- be an operational member of the production line

Remarks:	Carry-over from the self-evaluation sheet of the trainee: **10 20 30 40 50 60 70 80 90 100** Instructor's assessment: **10 20 30 40 50 60 70 80 90 100**

No. 5 **Quality Assurance**

The trainee is able to

- detect own quality deficiencies
- carry out a work order taking into regard all work specifications and meeting the quality requirements

Remarks:	Carry-over from the self-evaluation sheet of the trainee: **10 20 30 40 50 60 70 80 90 100** Instructor's assessment: **10 20 30 40 50 60 70 80 90 100**

No. 6 **Monitoring and Ensuring the Material Flow / Handling and Maintenance of Machines and Equipment**

The trainee is able to

- operate all the machines and equipment along the entire production line
- explain machines and equipment, chose them according to the requirements of a work order and make the necessary machine settings
- check machines and equipment on a daily basis and carry out basic maintenance work

Remarks:	Carry-over from the self-evaluation sheet of the trainee: **10 20 30 40 50 60 70 80 90 100** Instructor's assessment: **10 20 30 40 50 60 70 80 90 100**