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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (**UNIDO**)
Technical Information on Industrial Processes

PROFESSIONAL TRAINING
in the Leather-based Industry

by
Ferenc Schmél
Industrial Development Officer

for the 12th Session of the UNIDO Leather Industry Panel

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Background

Since the leather related industry has been gradually shifted to developing countries in South-America and South-East Asia, institutions, conducting training at various levels for the subject industry sector, had to close down. Some of the training schools (e.g. SOUTH FILED COLLEGE in UK, TNO in the Netherlands, EL-KE-DE in Greece, the INTERNATIONAL SCHOOL OF MODERN SHOEMAKING in the Czech Republic) turned entirely toward delivering short and medium term courses for students coming from various developing countries. *Analytical* (e.g. cutters skill development of TECHNORG, Hungary) and *computerized* (e.g. SATRA's VisionStitch) methods were implemented to train semi-skilled operators, whereby the training was made in the factories. Other new forms of professional training and education are the *Computer Aided Technology Training (CATT)* from the BLC LEATHER TECHNOLOGY CENTER (UK). *Distance training* courses under the name "Open-Tech Units" were offered by the ACCRINGTON AND ROSENDALE COLLEGE in UK; new methods and courses were developed later at the TESTING AND INVESTIGATING INSTITUTE FOR THE LEATHER INDUSTRY in Austria and at the LEATHER INDUSTRY RESEARCH INSTITUTE (LIRI TECHNOLOGIES) in South Africa.

A number of institutions were created or strengthened in developing countries through (technical) assistance programmes implemented by UNIDO and several national developmental agencies (e.g. AFPA/AFPIC in France, BRITISH COUNCIL in UK, GTZ and PROTRADE in Germany, PISIE in Italy). Some of the recipient institutes (e.g. CLRI and FDDI in India, SENAI in Brasil, TPSI in Kenya) now offer training courses not only for their own industries but have trainees from other developing countries in their respective regions. SENAI is developing a fairly comprehensive footwear training system using multimedia technology, which is planned to be implemented in Germany as well, i.e. the direction of transferring (training) technology is being reversed.

In most of the new tanneries, footwear, leather goods and garment factories started up in developing countries during the past three decades, training of local personnel was rather neglected. Direct labour receiving some kind of on-the-job training, a few middle-managers participated in study tours or short courses abroad. Latin-America is a unique region in this respect: whole networks of well organized and equipped leather and footwear training schools offer 1-4 year educational programmes for the young generation (e.g. SENAI in Brazil, CETEC in Colombia).

Developing countries having substantial raw hides and skins resources and giving high priority to the development of the local leather-related industries have realized the need for establishing a *local professional training system*. In many cases this objective is supposed to be achieved by setting up a training institution (if possible by using foreign aid and expertise), but no due consideration is paid to the integration of the technical training into a comprehensive and systematic scheme of the local education. At the same time, new initiatives are taken in introducing appropriate labour training methodology (e.g. the system of so-called self-paced training manuals developed at the FDDI - FOOTWEAR DESIGN AND DEVELOPMENT INSTITUTE in India).

UNIDO has always been assisting developing countries in *institution building* and transferring up-to-date training methodology. National training and/or development institutes dealing with leather related technology have been set up or strengthened through UNIDO projects in Brazil, China, Costa Rica, Ethiopia, India, Indonesia, Kenya, Nigeria, Pakistan, Philippines, Sudan, Tanzania, Tunisia, Vietnam and Zimbabwe. According to the latest information, new institutes are being set up in several developing countries (e.g. in Brazil, Egypt, India, Pakistan) - using local funds, bilateral and international assistance.

When specialized training institutions are closing down in industrialized countries, at the same time new institutes are emerging in various developing countries, no coordination of professional training education systems exist neither appropriate efforts are made to this effect. The result is a chaos in the structure of schooling systems at skill development, vocational training, technical education, and scientific degree levels. Such result is a jungle of certificates and diplomas issued by various institutions, whereby entrepreneurs are kept in the dark

as regards their real value. Accessibility of professional training facilities for women is another problematic area in the majority of developing countries.

So far no unique solution has been found to all the above problems. It seems, however, that introduction of new principles such as creation of *uniform (standard) syllabi* for particular industrial sub-sectors and/or introduction of *credit accumulation and transfer schemes (CATS)* would make much more transparent and flexible the professional education everywhere. The role of UNIDO in this respect cannot be overemphasized as this organization - together and/or alongside with ILO - implement training courses and systems in several developing countries. Such a key position offers excellent opportunity to elaborate, introduce, test and refine appropriate training programmes, whereas compatibility of certificates and diplomas can be ensured in accordance with the substance and complexity of know-how transferred to trainees. On the other hand international organizations are in the best position - provided funds are made available for this purpose - to collect and integrate the most efficient and advanced methods, handouts, illustrations etc. from all over the world. (One of the obvious possibilities is to study, adapt, fine-tune and disseminate the credit earning approach used in a wide range of universities in Europe and North-America.)

The Basic Concept

The leather related trade has become global, the number of tanners, footwear technologists, designers, production managers, quality controllers - just to name a few categories - involved in operations requiring collaboration with foreign companies and even practical work abroad is rapidly growing. The ever broadening international cooperation gradually eliminates technical differences among different countries and regions, the technology (including CAD/CAM/CIM) implemented in different parts of the word is very much the same today. Consequently, there is no reason for having different training programmes in industrialized and developing countries, so the creation of a uniform syllabus for the leather, footwear and other leather products is not only an opportunity but also a necessity - not to mention the financial rationale (economic scale of printing text books, producing illustration materials and training software). The term uniformity, however, should not be understood as a rigid standard which would not give room for adjustments to local conditions (e.g. public education) or would not be sufficiently elastic to absorb (quickly) new developments in the technology.

Before going deeper into the problematic area of industrial human resources development, a clear distinction has to be made between professional *training* and *education*. The former is applicable to courses or individual efforts when special - manual or mental - *skills* (e.g. operating sewing machines, sketching, negotiating contracts) are being *developed*. In contrast, professional education focuses on transferring a knowledge base (composed of data capturing, storing and retrieving, as well as inference capabilities) and empowering students for handling concepts.

The development process aiming at establishing or upgrading a professional education and training system is outlined by the flowchart attached as *Annex 1*. A possible structure of such a system is illustrated in *Annex 2*.

Uniformity should come together with complexity, systematic approach and integration of aspects related to training and education. In fact, there are three basic facets: professions (branch within the leather trade), modules (disciplines) and levels (roles or rather target ranks in a company hierarchy) which should be brought into relations when designing a comprehensive professional training *system*. *Table 1* offers a possible breakdown of each of these facets.

Table 1

Profession *(Branch)*	**Discipline** *(Module)*	**Level** *(Function)*	
Tanner **Shoemaker** **Leather goods** **Leather garment** **Leather gloves** **Harness/saddlery**	Product development Material knowledge Technology Quality Equipment Management Environment	Operator	Semi-skilled Skilled
		Craftsman, specialist	
		Foreman/lady Supervisor Manager	Designer - stylist (creator) - pattern cutter Technologist Production controller Quality specialist Marketing specialist Maintenance engineer

As it is seen in the above table, the relation between different interpretations or clarifications of functions which will eventually be undertaken by trainees and/or students of professional training courses needs further elaborations. *Table 2* demonstrates a scheme which puts these categories in their places, connects the specialization with levels of engagement (subsequently with levels of professional education).

Table 2

	Designer	**Technologist**	**Quality specialist**	**Maintenance**
Operator	grader	manual/machine operator		machine operator
Skilled worker	pattern cutter	key worker	inspector, tester	technician
Supervisor	chief designer	line supervisor, instructor	laboratory chief	maintenance chief
Manager	range builder	plant supervisor, prod. controller	quality manager	

These two tables together indicate that regardless of the level and specialty of function to be carried out be trained labour and/or staff, they all need certain subset(s) of the *special knowledge base* of leather and leather products technology. *Annex 3* shows an attempt to systematize the most important components of such a knowledge base.

To build up a specific syllabus two basic criteria should be defined: the profession or manufacturing *branch* (e.g. leather goods production) and the targeted *function* (e.g. product development ≈ design). The next step is to encounter the kind of *tasks* involved at the - expected or requested - *level* of employment (i.e. position to be held in the technical management), from which it is not difficult to derive manual and intellectual *skills*, as well as the volume and range of *information* required for coping with the given responsibility. These are the main factors influencing the **subset (scope) of the knowledge** base to be included in the training programme.

The time allocated for each selected unit again depends on two things: the function (i.e. perfection of skills, depth of knowledge, ability to deduct new information) and the basis on which the training can be built. The volume of training should be split into two parts: theoretical and practical (for higher levels of professional education a certain amount of time may be assigned for individual and/or project work).

To be able to absorb (understand, save and interpret) the information transferred through the training process, trainees or students should have certain abilities (they can be measured by aptitude tests) and should have some educational background (it may be assumed by judging the previous grades or degrees achieved). Therefore, each syllabus should have thoroughly prescribed entry level requirements.

In certain cases - especially when international courses are designed or syllabi are made for (sub)regional institutes - supplementary or refreshing training should be provided in subjects of general nature such as *mathematics* (e.g. advanced arithmetic, equations, statistics), *physics* (e.g. mechanics, thermodynamics, electro technics), *chemistry* (e. g. reactions, colloids, organic chemistry, analysis), art (e.g. perspective, projections, painting), *economics* (e.g. taxes and custom duties, borrowing and interests), *computing* (e.g. word processing, use of spreadsheets and databases, graphing).

Annex 4 gives an example of a syllabus outline and the description of one of the units (it is a copy of the training programme prepared by the TEXTILE INSTITUTE, London and implemented in two CENTRAL FOOTWEAR TRAINING CENTRES in India). *Annex 5* describes a possible education and training programme for an institutions providing such services fro the leather processing and leather products industries.

A uniform knowledge base introduced above serves also as a basis for setting up a **credit accumulation scheme**. When a person, after having successfully completed a particular course wants to acquire additional knowledge or skills within the leather based trade, there is a high probability that the knowledge bases of the two courses overlap. To save time, efforts and costs it is quite natural expectation that the units covered earlier should not be repeated by the incumbent. The equivalence, however, will depend on the level and duration of the completed training or education, therefore appropriate schemes should be established to assist in deciding on acknowledging previous results. The scheme should take into consideration the level of the comparable courses, time spent earlier and required in the new course, as well as the grade achieved by the candidate when completing the subject unit.

A well formulated syllabus should also prescribe the training *methodology*, specify the conditions and *equipment* (tools, software etc.) used in the training process and *assessment* criteria. Reference should be made on the technical literature, handouts, audio-visual aids used in training. It may be done even in case of skill development oriented training such as training of cutters which is implemented by TECHNORG for shop flow operators and training instructors (*Annex 6*).

Features of Modern Training Systems

Professional education and training ***systems*** should, first of all, be flexible, i.e. they should adapt not only to changes in the respective technology, but should follow the development of economy and cultural infrastructure with particular reference to changes in the general education system of the given country and/or region (e.g. EU, COMESA, MERCOSUL, NAFTA). More and more technical knowledge is transferred to pupil in elementary schools, subsequently part of the specific information and skills (e.g. polymer chemistry, computing) may be considered as known by students or trainees and they need not be involved in professional education. Furthermore half of the knowledge imparted at a given point of time becomes outdated (e.g. wooden nailed shoe construction) or irrelevant (e.g. manual fleshing) in 10-15 years. Therefore skilled workers and especially higher level staff should upgrade their knowledge several times during their life.

Beside flexibility and adaptability modern training system should have some distinguishing features - the following may be considered the most relevant today:

1. Modular structure

The knowledge base and skills may be broken into modules from which the required amount and range can be combined to suit certain needs of a particular job or duty. If these modules are properly linked together and organized in a coherent system then students or trainees may learn them separately and subsequently *accumulate* the required knowledge in a relatively freely spaced and programmed way. To achieve this goal the modules should provide ways of perfection and widening the knowledge. Moreover there should be ceratin stages (milestones) which offer qualifications - if possible in form of certificates - adequate for performing actual jobs. *Figure 1* illustrates the set of basic modules involved in education of mechanical engineers at the BUDAPEST TECHNICAL UNIVERSITY (BME): a similar scheme may be constructed for the leather related trade as well.

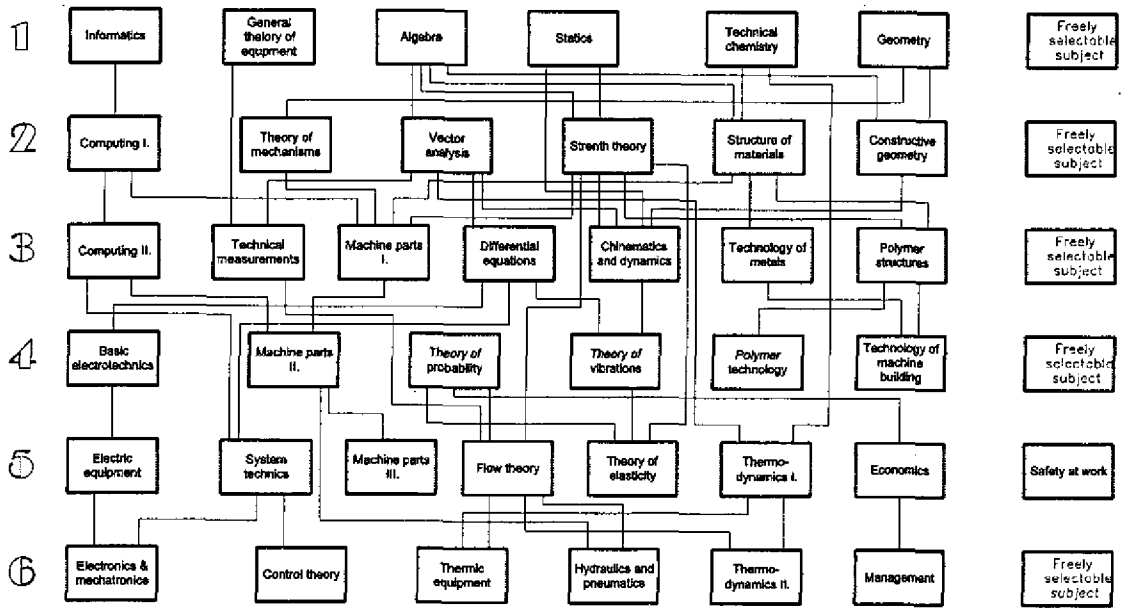


Figure 1

Analogical approach was followed by SENAI in Brazil in case of training basic skills required for undertaking series of jobs in footwear factories. The structure of system developed under GTZ technical assistance is two-dimensional and incorporates elements of credit accumulation and transfer (*Figure 2*). One of the most interesting feature of this system is that a trainee successfully completing any of the very basic modules can start working immediately and in the course of practical experience it can be decided - by the incumbent and his/her supervisor when and which module (of the next level) can be introduced. The horizontally arranged alternatives provide flexibility for transferring the worker from one department to others within the shoe factory.

Another example of modularity is implemented by the *skill analysis* training method. This originates from the system elaborated for training sewing machinists for assembling apparel. The concept was adapted and applied by CLARKS to footwear upper manufacturing in the fifties, then widely used by SATRA and a number of training institutes in UK. Further adaptation took place when the Hungarian research institute (BCK) modified the practical exercises and background knowledge according to the specific needs of the leather goods industry. Finally TECHNORG elaborated an analytical training methodology for (leather) cutters which is described in detail in *Annex 6*. These skill analysis training methods was implemented by UNIDO in several developing countries (e.g. Cuba, Hungary, India, Kenya, Philippines, Zimbabwe).

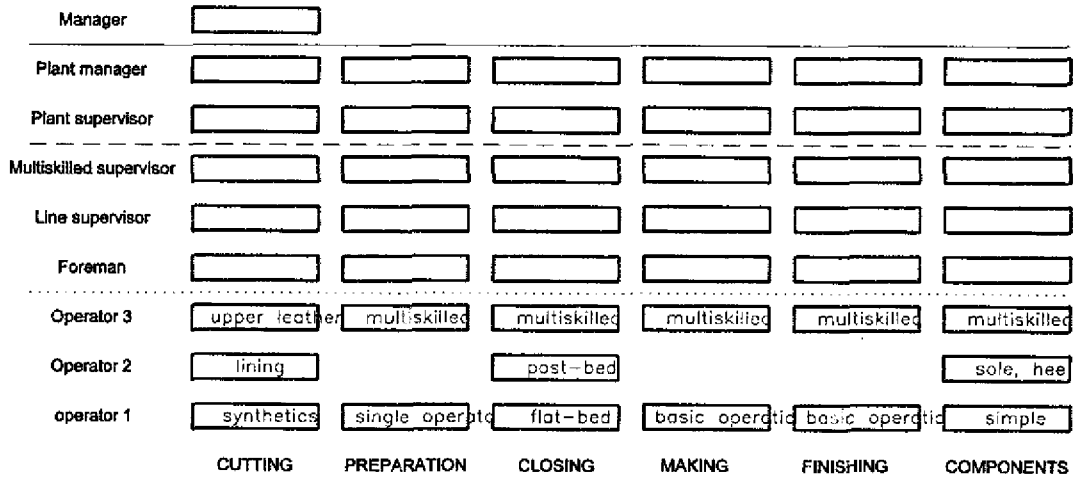


Figure 2

2. Credits

Credit accumulation and transfer schemes (CAT) may only be implemented if *modularity* of training is well defined and applied. The idea is to make training as quick and cheap as possible by eliminate overlapping or repetitions in conveying knowledge and developing skills. Another important condition for applying this principle is *certification*: the acquired knowledge should not only be tested and rated, but it should also be reliably documented so further training - which normally takes place later and may be made in a completely different institution - could build on it and would avoid spending efforts on what is known already by the trainee. However most of the existing certification systems failed to evaluate and rate experience of people acquired during their practical work or engagement.

Traditional education systems have a vertical structure in the sense that certain grades are associated with level and scope of knowledge (e.g. vocational training is supposed to produce skilled workers, colleges middle managerial staff, polytechnics engineers). With world-wide globalization of industrial production and economy the first thing which became questionable is the *real value* of certificates and diplomas. The fast geographic reallocation of production brought in the time element: how can the foreign partner find candidates for local (supervisory) jobs within the region and add only the necessary elements to his/her knowledge in the shortest possible time. (While earlier the foreign partner delegated some of its existing staff, today they need to employ people from the target region and in many cases these retrained technical managers are delegated to third countries when manufacturing capacities are reallocated again.)

Some kind of credit systems are implemented in universities - especially in Europe and North America. They normally use time to assign *quantitative* measures to grade the effort spent on learning given modules. An attempt was made in Hungary to rate the quality of students going through the education process whereby the composition of subjects and their scope is relatively freely selected by the students themselves. For this purpose credit points are assigned to each module (on the basis of time spent in classrooms and laboratories, as well as time estimated for project and home work) and a coefficient is generated by using the following formula:

$$K = \frac{\sum grade * credit\ point}{\sum credit\ points}$$

Apparently a coherent and flexible credit accumulation and transfer schemes should be built on modules, have reliable and transparent certification, indicators on substantive aspects of the knowledge and skills, a well defined chart of linkage among modules (including indicators on their replaceability), some kind of parameter informing about the quality of training and/or trainee (achievements).

3. Computer assisted training

Computers are widely used already in leather and footwear industry training. Good examples include BLC's tanning training software, INESCOP's CAD training CD, SATRA's VisionStitch, TECHNORG's range of programs assisting in developing skills for cutters etc. A very promising attempt was made by SENAI early this decade to integrate product and production quality related knowledge in a comprehensive software which could also be used as a practical aid in handling practical problems on the shop flow level. Using this experience SENAI is developing now a complete *multimedia* system which will cover the entire knowledge base required in footwear manufacture. Text formatting elaborated for the Internet lends itself as a very suitable tool for presenting technical information with a wide network of references. Based on this principle the Hungarian quality testing laboratory (BIMEO) has produced quality management guidelines which are distributed on CD-ROMS.

4. Distant learning

This method was widely used in East-Europe during the past four decades. The idea was that students receive a batch of (work)books and tasks together with the work programme and come to the training institution 3-5 times within a semester (4-6 months) for consultations, tests and laboratory works. Each semester was ended with series of examens. Using this approach practically the entire normal (daily or stationer) education system had its distant (correspondence) implementation. Although it was realized that the theoretical knowledge acquired by students through this distant learning was considerably lower that transferred during regular education, the diplomas were (legally and practically) are equivalent. On the other hand companies appreciated this system because incumbents had wide and strong practical experience and they were committed to their employers (sometimes even by legal bonds). There are attempts to bring back this system for international professional education in leather processing (e.g. Vienna Tanning School).

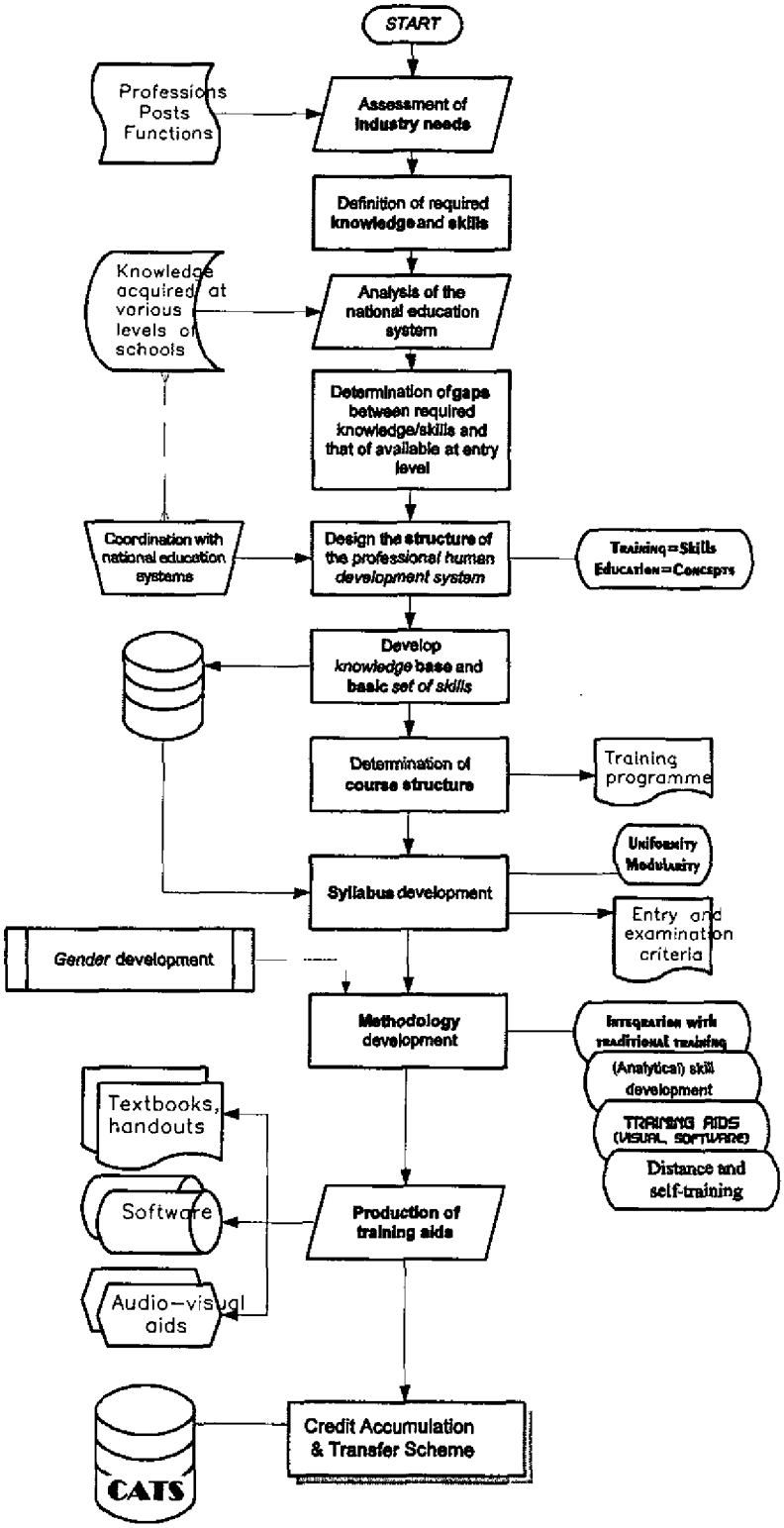
Modern communication technology offers new ways of imparting training without bringing trainees to institutes. One possibility is the use of *multimedia training packages which built in interactivity* as it was described above. Other and practically unlimited option is the use of Internet (reference materials are already available). Finally *video conferencing* can also be used for education purposes: SENAI in Brazil has made a trial in the paper and pulp industry and the organization is considering to launch a special satellite for this very purpose.

Recommendations

UNIDO as an impartial and neutral body may consider to build up a comprehensive programme dealing with professional education related to leather-based industries. The preparatory phase of such a programme may include one or more of following components:

a) survey on certificates and diplomas issued worldwide in relation with the scope and depth of knowledge covered and their place in the local (national) education system;
b) inventory of computer assisted (and other self-paced) training systems and software with analysis of their transportability to other countries;
c) preparation of a comprehensive scheme of modules and their linkage which may serve as a basis for credit accumulation and transfers, as well as for creating uniform (multimedia) training materials to be used for distant training;
d) proposal for (international) accreditation of training institutions and examination bodies for issuing certifications and diplomas with indication of their equivalence.

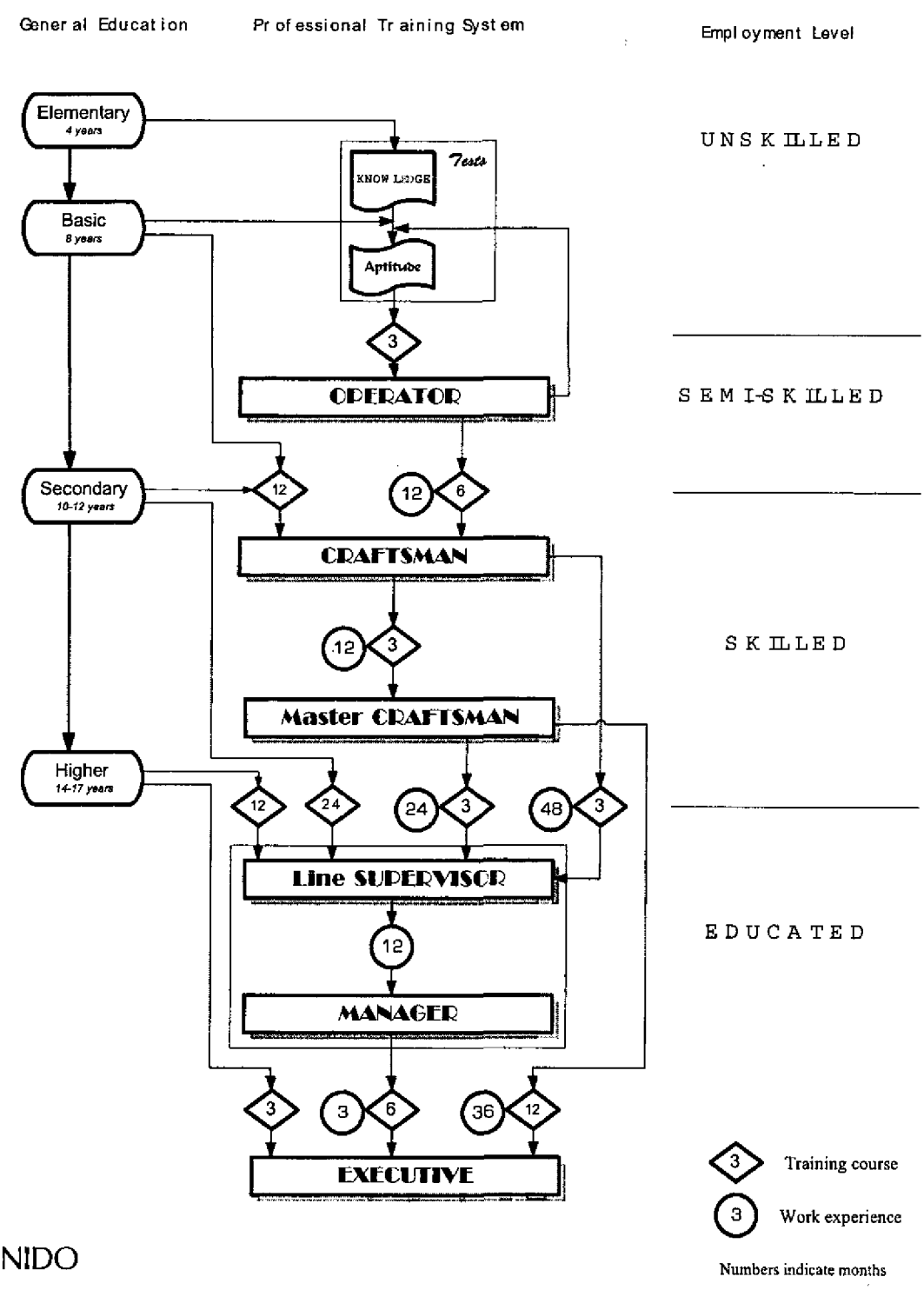
Professional Training and Education System Development Process



UNIDO

Training and Education System

for the Leather, Footwear and Leather Products Industries



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Annex 3

Knowledge Base of Training in Footwear Manufacture

Module	*Unit*	*Core knowledge*		*optional studies*	
		Subject	*Hours*	*Subject*	*Hours*
Design	Art and industrial design	Sketching, painting		Modelling	
		Colour theory		National art	
		Decorating			
	Fashion appreciation	Information sources		Clothing fashion	
		Trend contents		Fashion history	
	Styling and range building	Product groups		Inspirations	
		Range concepts			
		Model sketching			
	Foot and shoe lasts	Foot anatomy		Orthopaedics	
		Sizing systems		Clothing hygienic	
		Shoe lasts		Last design	
	Pattern engineering	Last moulds		Special products	
		Pattern standards		Pull-overs	
		Trims and furniture			
		Component patterns			
		Grading			
		Documentation			
	Tool design	Basic tools		Tool making	
		Moulds			
Materials	Genuine leather	Raw materials		Hides & skins improvem.	
		Histology		Special leather & tannage	
		Wet processing		Biology/bacteriology	
		Tanning			
		Finishing			
	Plastics and rubber	Simulated leather		Composite materials	
		Rubber (natural, synthetic)			
		PVC, TPR, EVA, PE, PS etc.			
	Other basic materials	Textile			
		Leather and cellulose board			
		Wood/paper/metal			
	Auxiliaries	Adhesives			
		Threads, laces			
		Finishing agents			
	Testing	Test methods		Certification	

Module	Unit	Core knowledge		optional studies	
		Subject	Hours	Subject	Hours
		Assessment			
Technology	Types of constructr.	Basic constructions		History of the sector	
	Cutting	Material properties		Jet cutting	
		Type of wastes			
		Layouts			
		Manual and die cutting			
		Cutting tools			
	Sewing and closing	Component preparation		Welding	
		Interlining, reinforcing		Transport systems	
		Seams and sewing			
		Closing/lining methods			
		Sewing automates			
	Components	Sheet material based			
		Moulding			
	Assembling	Lasting		Line production	
		Preparation for soling			
		Sole attaching			
	Finishing	Cleaning			
		Finishing			
		Packaging			
	Technological processes	Operation sequences		Traditional technologies	
		Flowcharts			
Equipment	Basic mechanisms	Mechanics		Numeric control	
		Pneumatics and hydraulics			
		Electronics, automation			
	Components/parts	Main component groups			
	Evaluation and selection	Specifications			
		Evaluation of bids			
	Utilities	Power, compr. air, steam		Energetic	
	Maintenance	Preventive maintenance		Spare-part stocks	
		Tooling			
Management	Industrial engineering	Time studies		Ergonomics	
		Work-place organization			
	Costing	Cost components		Overhead analysis	
		Job costing			
	Stock control	Inventory management		Just in time	
	Plant organization	Plant layouts		Sub-contracting	

Module	Unit	Core knowledge		optional studies	
		Subject	Hours	Subject	Hours
		Synchronization		Sourcing	
		Line production			
		Rink systems			
		Production control			
		Logistics			
	Financial control	Financial resources		Taxation	
		Accounting			
		Feasibility studies			
	Human resources	Wages and incentives		Career development	
		Staff training/development			
		Management structures			
	Quality control	Quality systems			
		Control methods			
	Marketing	Market research		Public Relations	
		Purchasing		Advertising	
		Pricing policy		Branding	
		Order control			
		Channelling			
		After sale service			
	Industrial law	Trade contracts		Entrepreneurship	
		Employment affairs			
		Licensing			
Environment	Work safety	Working conditions			
		Health and safety			
		Fire prevention			
	Pollution control	Clean technology		Ecology	
		Waste processing			
		Recycling			

Syllabus

Implemented in the
CENTRAL FOOTWEAR TRAINING INSTITUTES (CFTI)
in Agra and Chennai/Madras (India)

Year	No.	Module	Unit	Subject	Time allocated [hour]		
					Theory	Practical	Total
1	1	**Design and pattern cutting**	**1**	Art and design, fashion appreciation		20	20
			2	Pattern engineering	10	130	140
			3	Design and patter cutting	20	20	40
	2	**Clicking and materials**	**4**	Clicking and material technology 1	20	100	120
			5	Clicking and material technology 2	75	40	115
	3	**Upper making (closing)**	**6**	*Closing technology*	20	100	120
	4	**Making**	**7**	Lasting, making and finishing	20	100	120
	5	**Scientific management**	**8**	Purchasing and store control	20		20
			9	Costing and quality control	40	5	45
			10	Science, health and safety, mathematics	10		10
	6	**Management**	**11**	Applied management	30	10	40
			12	Production management	60	20	80
			13	Industry	20	20	40
			14	Market	30	20	50
				Total	**375**	**585**	**960**
				Proportion [%]	*39*	*61*	*100*
2	7	**Design**	**15**	Product sketching and design		20	20
			16	Practical design and pattern cutting		40	40
			17	Pattern engineering		40	40
			18	Range building	20		20
	8	**Technology**	**19**	Advanced technology	20		20
			20	Foot comfort	20		20
	9	**Management**	**21**	Production management and organization	40		40

Year	No.	Module	Unit	Subject	Time allocated [hour]		
					Theory	Practical	Total
			22	Production control	60		60
			23	Industrial accountancy and costing	20		20
			24	Factory survey and projects		80	80
			25	Marketing management	20		20
			26	Communication	20		20
			27	Personnel management	20		20
	10	**Practical work**	**28**	Clicking		80	80
			29	Materials and related sciences	54	26	80
			30	Closing		140	140
			31	Lasting, making and shoe room		120	120
	11	**Final projects**	**32**	Project preparation		120	120
				Total	**294**	**666**	**960**
				Proportion [%]	*31*	*69*	*100*
				GRAND TOTAL	**669**	**1,251**	**1,920**
				PROPORTION [%]	*35*	*65*	*100*

Annex 4.1

Institute:	Central Footwear Training Centre (CFTC)		
Course:	Certificate in Footwear Technology		
Module:	4 - Making Technology		
Unit:	7 - Lasting to Shoe room		
Duration *[hours]:*	Theory: 20	Practical: 100	TOTAL: 120
Objective(s):	1. To provide the knowledge and impart the skills required to understand the principles and practice of the lasting, making, finishing and shoe-rooming processes, their own place in the manufacturing chain and the use of hand and machine techniques and equipment. 2. To provide the student with the necessary skills and understanding of the essential elements and concepts fundamental in the principles and practice of footwear manufacture.		
Methodology:	Lectures/Demonstrations and Practical Workshops		
Assessment:	Project (3 pairs lasted to a time limit) 1 Theory Exam + 1 Practical Exam (12 pairs)		

Course Content

1. Lasting

1.1. Types and uses of toe-puffs and stiffeners.
1.2. Identification of methods of attachments.
1.3. Methods of conditioning uppers and components.
1.4. Lasting principles and methods of application
1.5. Lasting and bottoming systems for different types of construction in general use.
1.6. Heeling processes, including heel building and heel finishing, covering systems and methods of heel attachment.
1.7. Systems of work transportation and track management
1.8. Combined lasting systems.
1.9. The theory and practice of heat setting - *moist and dry heat effects on materials and* adhesives.
1.10. The use of hot-melt adhesive in lasting and bottoming.
1.11. Lasting faults and effects upon subsequent operations.

2. Bottoming

2.1. Correct techniques for sole attachment.
2.2. Composition, characteristics and uses of insole and soling materials for different constructions.
2.3. Machine cutting direct/caster and planet rounding operations.
2.4. Preparation of cut stock and bottom components including pre-finishing and assembly of pre-fabricated and Louis heel bottom units.

2.5. Assembly and storage of lasts and components.
2.6. Standardization of components.
2.7. Multiple thickness cutting of components.
2.8. Pre-moulded shanked insole assemblies.
2.9. Insole conforming equipment.
2.10. Departmental management.
2.11. Control of components and raw materials.
2.12. Fitting up to ticket requirements.

3. Finishing

3.1. Procedure and processes for various soling and heeling materials and units.
3.2. Top-piecing methods of attaching and types and characteristics of material available.
3.3. The objectives and methods of finishing - types and functions of machines and equipment used. Finishing processes for both leather and non-leather soles and heels. Effects of faults in preceding operations on the finishing processes. Selection of appropriate processes.
3.4. Comparisons between various finishing systems - pre-finishing vs finishing on the shoe. Cutters, irons, abrasives, inks, stains, waxes and finishes used. Decorative treatments and randing.
3.5. Statutory requirements concerning general, fire, mechanical and electrical safe working conditions will be emphasized.

4. Shoe rooming

4.1. The functions and processes of the shoe room; their importance to sales appeal. Shoe room operations and techniques - socking, cleaning, repairing, dressing, top spraying, trim attaching, quarter reforming, irons, inspection procedures, boxing etc., for leather and non-leather materials. Machine adjustments.
4.2. Fault identification, diagnoses of cause and defects in work. Application of decorative treatments, e.g. antique, shadow spray etc. Final examination and inspection procedures - quality control. Packaging and presentation techniques. Storage of boxed footwear to prevent ageing.
4.3. Statutory requirements: general, fire, mechanical and electrical safe working conditions in relation to the above.

Institute:	Central Footwear Training Centre (CFTC)		
Course:	Certificate in Footwear Technology		
Module:	7 - Design and Pattern Cutting		
Unit:	18 - Range Building		
	Theory:	Practical:	TOTAL:
Duration *[hours]:*	20		20
Objective(s):	1. To provide the participants with a knowledge of the basic concepts and principles of 'Range Building". 2. To provide the participants with the techniques and expertise required to plan a critical path network in the production unit for samples, styles and pathfinders.		
Methodology:	Lectures (workshop discussions) and practical projects		
Assessment:	1 examination 1 joint project with module 13 to create drawings for a range of footwear (or leather goods) and product development schedule		

Course Content

1. **Marketing strategy and guidelines**
   - 1.1. The fashion phenomenon.
   - 1.2. Fashion and style trends.
   - 1.3. New materials and colors.
   - 1.4. New lasts, bottoms and component materials.
   - 1.5. New equipment and tools.
   - 1.6. Purchase requirements for prototypes.
   - 1.7. Fashion sources.

2. **Critical Path Network process**
   - 2.1. Style specification.
   - 2.2. Techniques involved in processing.
   - 2.3. Costing sequence.
   - 2.4. Production sequence.

3. **Style creations**
   - -- sketches,
   - -- drawings,
   - -- pullovers,
   - -- photographs .

4. **Product development (first assessment)**
   - 4.1. Assessment of style trends (prototypes).
   - 4.2. Fitting tests.
   - 4.3. Estimate of product costs.
   - 4.4. Selection of styles for further development.

4.5. Purchase requirements for "collection".

5. **Sample processing (sales representatives)**

6. **Product development (second assessment)**
   6.1. Review of pathfinders.
   6.2. Shoe fitting tests.
   6.3. Final cost structure.
   6.4. Final specifications.
   6.5. Final approval of styles.
   6.6. Initial sales forecast.
   6.7. Initial purchase requirements for production.

7. **Product development (final review)**
   7.1. Review of complete collection.
   7.2. Final manufacturing specifications.
   7.3. Final quality standards.
   7.4. Final costs.
   7.5. Final sales forecasts.
   7.6. Purchase requirements (based on second sales forecast).

8. **Fast Response**: importance of fast response to customer need.

RANGE OF TRAINING
to be Offered by
Professional Training Institutions

Leather Technology

Entry requirement: High school diploma (matura), min. 18 years age
Entry test in chemistry and mathematics, aptitude test in color matching and manual skills.

Duration: Two academic years = 72 weeks - full time, 32 periods/week: 1 period = 50 min;
Remark: One year general studies or upgrading (languages, science, basic economics etc.) may be required prior the diploma course.

Alternative course: One academic year full time or two years part time (evening) education for diploma holders (B.Sc. or B.Tech.) from other branches/sciences.

Certificate: Diploma in Leather Technology.

Target jobs: Top executive, technical and marketing manager, plant supervisor.

Type of education: 65% theory, 10% project work, 25% practical leathermaking

Major elements:

Chemistry: proteins, complexes, polymers, basics of biochemistry.
Hides and skins: histology, topography, flaying, preservation, faults and their reasons, grading.
Leather processing: soaking, liming and deliming, physical operations in the beamhouse, pickling, (re)tanning, toggling, fat-liquoring, drying, finishing, measuring.
Engineering: introduction to hydraulics and mechanics, principles of mechanisms used in tannery equipment, basics of woodworking, energy generation and supply, process control and electronics, maintenance systems.
Quality assurance: metrology, standards, chemical and physical test methods, (total) quality control and management, certification (ISO 9000).
Management: work and time studies, wage and incentive systems, safety at work, costing, storing, process flow-charts, planning and scheduling, loading and production control, plant layouts, communication and logistics, marketing, computer technology.
Environmental protection: basics of ecology, cleaner technology, recycling, effluent treatment, legislation and standards, by-products manufacturing.

Leather Production

Entry requirement: Completed elementary/basic school (8th grade), min. 15 years age
Entry test in sciences, aptitude and medical tests (eyesight, manual skills)

Duration: Two academic years = 72 weeks - full time, 35 periods/week: 1 period = 50 min;
Remark: One year general studies or upgrading (languages, science, basic economics etc.) may be required prior the certificate course.

Alternative course: One academic year part time (evening) education for operators capable of operating at least six different machines and having five years practical experience.

Certificate: Certificate in Leather Production.

Target jobs: Plant and line supervisors, testing laboratory staff, quality inspectors, instructors, effluent treatment plant operator.

Type of education: 35% theory, 5% case studies, 60% practical leather making.

Major elements:

Science: basics of arithmetic, physics (including electricity) and chemistry.
Hides and skins: topography, flaying, preservation, faults, grading.

Leather processing: principles and processes of leathermaking; practical skill development in (down)loading vessels, dosing chemicals, working on key machines (flashing, splitting, shaving, toggling, staking, drying, spraying, measuring), sorting and grading, quality testing and control, by-products manufacturing.
Management: work and time standards, wages and incentives, safety at work, costing, quality control, production control and supervision, basics of marketing and labour training, principles of pollution control.

Tannery Operators

Entry requirement: Elementary education (5th grade), min. 16 years age.
Aptitude and medical tests (eyesight, manual skills, physical conditions).
Duration: 12-20 weeks - full time in tanneries, 40 hours/week.
Alternative course: One week full time or three week part time (evening) training in regulations and principles of technology for operators acquired their skills in practice and having worked on the selected group of machines at least three years.
Certificate: Machine Operator Certificate.
Target jobs: Key operators of leather processing plants.
Type of education: 10% theory, 90% practical work on machines.
Major elements:

Regulations: work discipline, payment system, fire prevention, safety at work and first aid.
Leather processing: adjacent processes of leathermaking, materials, quality requirements, workplace organization and layout.
Operations: practical skill development on selected group of equipment (e.g. wet processing, tanyard, vessels, finishing, transport), cleaning of machines and maintenance.

Short Term Training in Leather Processing

Entry requirement: Min. basic education (8th grade) or equivalent, min. 22 years age
Two years practical experience in leather technology or production.
Duration: 1-4 weeks full time or 2-10 weeks part time (evening or weekend), 30 hours/week or 15 hours/week respectively.
Certificate: Certificate of attendance (no exam) or successful completion of the course (with examination).
Target jobs: Specialized tasks in tanneries or management.
Type of education: 70% theory, 30% case studies and/or project work.
Course examples:

Leather finishing: types of finishes, chemicals, equipment, color matching, quality aspects.
Technology upgrade: new chemicals, processes, equipment, automation and production control methods in leather processing.
Special technology: specific and practical aspects of producing selected types of leather (e.g. water-resistance suede/nubuck for footwear, upholstery, garment nappa, vegetable tanned sole leather).
Production management: planning and scheduling, productivity assessment, costing, work-in-progress handling, energy and waste management, incentive systems, reporting, use of computers.
Quality assurance: standards, test methods, ISO 9000, total quality management, sorting and grading.
Marketing: market research and segmentation, product life cycle, product development, channeling, promotion, branding, costing, pricing policies and practices.
Maintenance: inspections, small and medium repairs, overhauling, troubleshooting, preventive maintenance systems, spare-part management.
Environmental protection: legislation, standards, principles of cleaner technology and recycling, effluent (end of pipe) treatment, sludge processing, waste disposal, related laboratory testing, tannery by-products.

Footwear Technology

Entry requirement: High school diploma (matura), min. 18 years age
Entry test in science and mathematics, aptitude test in sketching and shape appreciation.

Duration: Two academic years = 72 weeks - full time, 32 periods/week: 1 period = 50 min.
Remark: One year general studies or upgradation (languages, science, basic economics, sketching and drawing etc.) may be required prior the diploma course.

Alternative course: One academic year full time or two years part time (evening) education for diploma holders (B.Sc. or B.Tech.) from other branches/sciences.

Certificate: Diploma in Footwear Technology upon completion of the entire course;
Certificate in Footwear Technology after completion of the first year only.

Target jobs: Top executive, technical or marketing manager, pattern engineer, plant supervisor, quality manager, training officer.

Course structure: Basics of design, technology and management theory, as well as practical work in all key operations are covered during the first year. The second year is devoted to specialization (design, technology, management) through series of projects.

Type of education: 55% theory, 20% project work, 25% practical pattern- and shoemaking.

Major elements:

Science: statistics, mechanics, thermodynamics, optics, electricity, polymers, basics of economics and financing, computing.

Materials: leather histology and topography, basic leather processing, types of leather finishes, simulated leather (poromerics), leather boards, textiles, rubber and plastic components, adhesives and finishing agents, packaging.

Design and pattern engineering: basics of industrial design, fashion appreciation, style sketching and painting, foot anatomy and physiology, anthropometric, shoe size systems, shoe lasts, last moulds, shell construction of various types of footwear, component patterns, construction of internal components, design of unit soles and heels, construction of dies and moulds, standardization and component coordination, pattern (size) grading, CAD.

Technology: shoe constructions, cutting of genuine leather and substitutes, component preparation, sewing techniques, upper manufacturing, lasting, conditioning and heat-setting, soling methods (including direct vulcanization and injection moulding), finishing, packaging, operational sequences, principles of shoe machines and their maintenance.

Quality assurance: metrology, standards, material and product test methods, (total) quality control and management, certification (ISO 9000).

Management: work and time studies, industrial engineering, wage and incentive systems, safety at work, material and product costing, procurement and storing, planning and scheduling, loading and production control, plant and workbench layouts, communication, logistics, marketing.

Shoe Production

Entry requirement:	Completed basic education (8th grade), min. 15 years age Entry test in sciences, aptitude and medical tests (eyesight, manual skills).
Duration:	Two academic years = 72 weeks - full time, 35 periods/week: 1 period = 50 min; *Remark:* One year general studies or upgradation (language, arithmetics, science, sketching and drawing etc..) may be required prior the certificate course.
Alternative course:	One academic year part time (evening) education for skilled workers capable of operating a complete group of machines (cutting, sewing, assembling) and having at least five years practical experience.
Certificate:	Certificate in Shoe Production.
Target jobs:	Line supervisors, testing laboratory staff, quality inspectors, training instructors, highly skilled workers.
Course structure:	Trainees should acquire ability to perform all basic operations and working on key machines during the first year. The second year is devoted to specialization and developing skills in particular sections of the technological process (i.e. in cutting, upper manufacturing, lasting and making.
Type of education:	35% theory, 5% case studies, 60% practical shoemaking.

Major elements:

Science and art: arithmetic, physics (including electricity) and chemistry, computer operation.
Materials: genuine leather, simulated leather, rubber and plastics, textiles, threads, adhesives and chemicals, auxiliaries.
Pattern cutting: sketching and drawing, fashion appreciation, foot anatomy, measurements and shoe size systems, shoe last and moulds, construction of basic shoe types and components, size grading.
Technology: types of shoe construction, practical skill development in cutting, upper making and bottom assembling, working on key machines, operational sequences, quality inspection, tooling, machine (preventive) maintenance.
Management: work and time standards, wages and incentives, safety at work, material and labour costing, quality control, production control and supervision, basics of marketing and labour training.

Skilled Shoe Factory Operator

Entry requirement:	Elementary education (5th grade), min. 16 years age. Aptitude and medical tests (manual skills, physical conditions).
Duration:	12-15 weeks - full time in workshops, 40 hours/week.
Alternative course:	2-4 weeks - full time for semiskilled operators with well developed skills with min. two years practical experience in the given stage of technology.
Certificate:	Operator Certificate/Cutting or Closing.
Target jobs:	Genuine leather cutters and sewing machinists.
Type of education:	10% theory, 90% practical work (mainly on machines).

Major elements: see also *Annex 2* for description of the analytical training methodology.

Regulations: work discipline, payment system, fire prevention, safety at work and first aid.
Footwear technology: adjacent processes of footwear manufacturing, materials and tools, quality requirements, workplace organization and layout.
Operations: practical skill development in cutting or sewing respectively, cleaning of machines and maintenance.

Short Term Training in Footwear Technology

Entry requirement:	Minimum basic education (8th grade) or equivalent, min. 22 years age. Two years practical experience in footwear design, production or trade.
Duration:	1-4 weeks full time or 2-10 weeks part time (evening or weekend), 30 hours/week or 15 hours/week respectively.
Certificate:	Certificate of attendance (no exam) or successful completion of the course (with examination).
Target jobs:	Specialized tasks in product development, shoe manufacturing or management.
Type of education:	70% theory, 30% case studies and/or project work.

Course examples:

Actual fashion trends: clothing and apparel, colors, shoe lasts and shapes, materials, cuts, soles and heels, decorations, combinations with other leather accessories.

Computer-Aided Design (CAD): sketching and painting, preparation and digitizing of shells, component construction, allowances, grading, pattern cutting, 2D and 3D systems.

Technology upgrade: new materials, constructions, processes, equipment, automation, production control methods and computer software in footwear manufacture.

Production management: modern technology and its application, range building and marketing, time and motion studies, industrial engineering (ergonomics), planning and scheduling, controlling and reporting, motivation and incentives, communication.

Quality assurance: standards, test methods, in-plant and final inspection, quality requirements, certification and accreditation, ISO 9000, total quality management.

Marketing: consumer behavior, market research and segmentation, collection and interpretation of fashion information, product life cycle, range building and product development, channeling, promotion, branding, costing, pricing policies and practices, consumer services, export and import regulations.

Maintenance: inspections, small and medium repairs, overhauling, troubleshooting, preventive maintenance systems, spare-part management, special aspects of maintaining equipment groups (die cutting, sewing, component manufacturing, lasting, injection moulding), die making, tooling.

Instructor training: structure of human skills, why and how people learn, skill analysis, inductions, demonstration, feed-back, stamina building (see also *Annex 3* for details).

Entrepreneurship: opportunity and feasibility studies, business planning, legal aspects, financing, promotion and public relations, industrial cooperations.

TechnOrg CONSULTING

H-1041 Budapest, Hungary
Závodszky Z. u. 9.
Phone/Fax: (+36-1) 230-1355
Mobil: (+36-30) 9483-955
E-Mail: technorg@technorg.hu
INETRNET: http://www.technorg.hu

ANALYTICAL TRAINING OF SHOE UPPER CUTTERS

The **analytical (or skill analysis) training** is based on the thorough analysis of working methods used by the *experienced* operators. The shoe upper cutting training system and methodology, including accessories and auxiliary equipment, training aids and manual, was developed and being offered by **TECHNORG CONSULTING** in Hungary.

The Objective

The main objective of the analytical training is to *achieve the experienced workers standard* - in terms of quantity (productivity) and quality - within the shortest possible time. A great deal of the system is used for training of *instructors*, while its another modules are applicable for *retraining* operators not achieving the required targets or those transferred for production of entirely different products.

Target Audience

Green labour recruited for (new, extended, rehabilitated or relocated) footwear manufacturing plants are the target beneficiaries of the analytical training. They can be trained to the basics of genuine leather and (or) its substitutes cutting by instructors acquiring the necessary knowledge and applying the systematic approach of the analytical training method. Direct labour exposed to new tasks (e.g. production of higher quality footwear, introduction of new materials, transfer from lining to upper leather cutting) or having bad habits which prevents them increasing their output, could also be subjects of the analytical training.

The analytical training **does not intend** to replace the vocational or higher level training of specialists employed in shoe factories. It or its certain elements may, however, be utilized in the practical training of supervisors, plant managers, technologists as well.

The Problem

Cutting (especially genuine soft leather) needs a *combination of various mental and manual skills*. The job is too complex to be taught as the operator's attention is divided among a number of factors having direct impact on the material utilization, thus on production costs. The cutter should realize the quality of the leather (its substance, strength, shade, topography,

faults etc.), has to assess the suitability of its each portion for certain components, should be able to place the pattern or cutting die in position giving minimum waste but still assuring the right orientation of the component as to its stretch properties, has to take quick decisions in order to achieve the required productivity. Furthermore she/he has to possess all the manual skills needed for setting and operating the die clicking machine, using and maintaining the hand cutting knife. To learn all these skills normally needs years of experience. The best workers have certain "secrets" which they may not really be aware of or would not (be able to) transfer the hints to a trainee.

The Principle

The (leather) cutting operation, like any other job, can be broken into *knowledge elements* and into a *set of skills*. There are certain basic skills which may be developed separately helping the trainee to concentrate on that particular aspects of the operation. The combination of these basic skills may also be done on a step-by-step basis offering again an efficient way of enhancing the trainees' capabilities (the enclosed chart demonstrates the system of skills and the principle of their combination). All these are done through dozens of specially designed exercises which have to be done by each trainee at target times and quality requirements. The actual results are registered in score sheets. The progress made by individual trainees is thoroughly monitored (by the instructor) and introduction of new skill elements is the subject of achieved results. This approach makes it possible that the trainees proceed to more complex exercises only when they have acquired perfection in carrying out simpler tasks. Each exercise is measured, so appropriate feedback is provided for both the instructor and the trainee. Above all most of the skill development is done in **practice** without wasting *any* genuine leather or other valuable material.

In case of cutters and clickers the **personal abilities** are very important factors: the eyesight, the visual combination, pattern recognition, touch play key role in performing this complex operation. In order to assess these (partly inherited) skills a set of ***psychological and manual tests*** are supplied together with the analytical training system which help to appraise candidates for the job and provide valuable tools in selection of trainees.

The analytical training philosophy is based on the fact that *everybody has skills* which could be developed to the required level if appropriate procedures are used.

Exercises to Develop Skills

There are five basic and four combined skills to be developed through the analytic training process. Beside the set of respective exercises the trainees should learn how to organize their work-places and how to develop their stamina required for the continuous production work (see also the attached chart). The objective and contents of the **basic skill development** modules are as follows:

RECOGNITION: Combination of surface elements, putting together shapes from its parts, determine size and proportion of different shapes.

POSITIONING: Find shapes (shoe components) fitting into given area without and with combining different pieces, without and with repeating the same piece.

COSTING: Estimating and measuring net pattern area, building parallelograms, calculation of first and side wastes, determination of wastes because of material faults, computation of allowances.

MATERIALS: Appreciation of different kinds of materials used for shoe uppers and lining, recognition of hides and skins of different origin, appreciation of surface finishes, distinction between various faults, strengths and thicknesses, leather grading.

HANDLING: Use and sharpening of hand cutting knifes, setting clicking presses, types of clicking dies and blocks.

When manual and mental basic skills have been developed the trainees proceed to the **combination** if them adding one or two elements at a time:

SURFACE UTILIZATION: Placement one and later more, simple and complex shoe components of one and different sizes on a given area of.

MATERIAL UTILIZATION: Preparation of cutting layouts for leather substitutes (textile, simulated leather) and genuine leather using different techniques.

OPERATOR TRAINING: Manual and die cutting of paper having a shape of materials used for footwear uppers and lining.

WORK-PLACE ORGANIZATION: Placement of materials, cutting dies and cut components, cleaning the work area and waste management, lighting, recording work results.

STAMINA BUILDING: Gradual development of workers attitude, stamina for continuous work.

After the trainee has successfully gone through all related exercises and learned all theoretical lessons she/he is transferred for to **production** work.

The Knowledge Base

Beside the acquired manual skills cutters should know about *materials* (their nature, topography, physical properties, look, surface characteristics), *equipment* (cutting knifes and dies, principles of machine operation, blocks and their maintenance), *quality requirements* with special references to fault analysis, shoe component preparation *technology*. The background knowledge consists of two parts. The **technology related knowledge** includes shoe types, component denomination, tools and machines used in footwear manufacture, main phases of the process technology, the structure of a shoe factory etc. The **general knowledge** of a cutter or clicker should cover work safety, wage systems (including bonuses), work discipline measures, training opportunities etc.

Instructors are introduced to such skills and information as selection of trainees, job analysis and preparation of appropriate exercises, target times and quality requirements, progress control, scheduling of trainees activities and optimal utilization of resources (equipment), role of instructors, demonstration and illustration techniques, use of audio-visual aids, how to give theoretical lessons, transferring trainees to production, dealing with young trainees.

Special Features

The analytical training has a number of features which distinguishes it from the traditional methods and which makes it more efficient in case of green labour training as well as in retraining of experienced operators. These are

- a **systematic approach** which starts from the personal ability test, develops basic skills and then combines them into a comprehensive manual and mental potential;
- skills are developed through *exercises* with target times and quality requirements providing feedback and reliable data for progress control;
- the pace trainees advance in acquiring skills is individual and adjusted to personal abilities;
- theoretical lessons are limited to two times half an hour daily and concentrating on the relevant knowledge element, hence providing sufficient background information required for a cutter to become a member of the factory team;
- the training process is supported by a wide range of special exercises, auxiliary equipment, slides and *demonstration materials*;
- several exercises are done by using *computer programs* providing objectiveness and versatility;
- the training process consumes very little of valuable materials making the analytical training *cost effective*;
- instructors trained to the use of analytical training will be able not only to adapt the system to local conditions but also to develop special exercises serving particular purposes;
- the analytical training method can be used in shoe factories, as well as in training and development institutions, at the same time it is a useful component in educating middle managerial staff and technologists.

ACCESSORIES and AUXILIARY EQUIPMENT
for Skill Analysis Training
of Shoe Upper Cutters

Item No.	*Description*	*Unit*	Training of			
			INSTRUCTORS 10 trainees, 3-4 weeks		**OPERATORS 6 trainees, 12-16 weeks**	
			Minimum	*Optional*	*Minimum*	*Optional*
1.	**Equipment for the training room**					
1.1	Swing arm hydraulic clicking press (*min.* 12 to) with plastic cutting block	pc	2	4	4	2
1.2	Straight knife cloth cutting machine	pc		1		1
1.3	Disk knife cutting machine	pc		1	1	
1.4	Marking (numbering) machine	pc		1		1
1.5	Tables/benches/shelves set up beside cutting presses	pc	4	8	4	8
1.6	Hand cutting table with cutting block	pc	8	2	4	2
1.7	Large size table for leather sorting and marking (*min.* 2000*150 mm)	pc	1	1	1	1
1.8	*Cutting blocks and/or mats made of different materials (plastic, zinc, glass) used for hand cutting*	*set*	*1*	*2*	*1*	*2*
1.9	Horses for leather	pc	6	6	6	2
1.10	*Letter weight (balance) with 50 g measuring range and 0.1 g precision*	*pc*	*1*			*1*
1.11	Thickness gauge (max. 10 mm, 0.1 mm precision, 200 mm arm length)	pc	2	3	1	5
1.12	Personal computer with hard and floppy disks, serial and parallel ports, mouse, MS-DOS 5.0 and WINDOWS 3.1 (or later)	pc	1	1	1	
1.13	Printer connected to the above personal computer	pc	1	1	1	
1.14	Digitizer (*min.* 12") with 4 button cursor attached to the above personal computer	pc	1			1
1.15	Stop watches with stand	pc	10		6	
1.16	Wall watch	pc	1		1	
1.17	Minute counter with alarm	pc		1	1	
1.18	Overhead projector	pc	1		1	
1.19	Slide projector	pc	1		1	
1.20	Projection screen (with tripod or stand)	pc	1		1	

Item No.	Description	Unit	Training of			
			INSTRUCTORS 10 trainees, 3-4 weeks		**OPERATORS 6 trainees, 12-16 weeks**	
			Minimum	*Optional*	*Minimum*	*Optional*
1.21	Trolley	pc	1	1	1	1
1.22	Desk (for chief instructor)	pc	1		1	
1.23	Worker's chair (adjustable height)	pc	11		7	
1.24	Store for press knives (for *min.* 80 pcs.)	pc	1		1	
1.25	Boxes made specially for holding 12-20 press knives used in machine cutting	pc	4	6	4	4
1.26	Cabinet (for storing small equipment, material, tools etc.)	pc	1		1	1
1.27	Black or white board	pc	1			1
2.	**Hand tools**					
2.1	Press (cutting) die	set	3	3	4	4
2.2	Hand cutting knife with spare blades	pc	10	2	6	2
2.3	Cutting knife sharpening stone	pc	10	2	6	2
2.3	Cutting scissor (for textile etc.)	pc	4	2	3	3
2.4	Triangular liner (one side should be *min.* 300 mm and marked by mm)	pc	12	2	6	1
2.5	Plastic oiler	pc	6	6	6	1
3.	**Material**					
3.1	Squared paper (5 mm, *min.* A/2 size sheets or rolls of 400 mm width)	m^2	60	40	60	30
3.2	Plain paper (*min.* 800*1200 mm sheets or rolls of 800 mm width)	m^2	120	60	600	200
3.3	Textile used for (inter)lining, *min.* 800 mm wide	m^2	40	20	60	40
3.4	Simulated leather (coated fabric or poromerics)	m^2	60	60	120	15
3.5	Genuine leather of different color, thickness and finish	m^2	30	20	60	60
4.	**Stationery**					
4.1	*Score sheets made of light card board and printed on both sides*	*pc*	*380*	*130*	*640*	*190*
4.1.1	*Daily Programme (DP)*	*pc*	*30*	*20*	*80*	*20*
4.1.2	*Progress Control (PC2)*	*pc*	*20*	*10*	*10*	*10*
4.1.3	*Production Records (PC3)*	*pc*	*20*	*10*	*30*	*20*

Item No.	Description	Unit	Training of			
			INSTRUCTORS 10 trainees, 3-4 weeks		OPERATORS 6 trainees, 12-16 weeks	
			Minimum	Optional	Minimum	Optional
4.1.4	General purpose score sheet (SS1)	pc	120	30	250	50
4.1.5	Material knowledge (SS5)	pc	30	10	40	10
4.1.6	Material knowledge (SS6)	pc	30	10	40	10
4.1.7	Material knowledge (SS7)	pc	30	10	40	10
4.1.8	Surface utilization (SS12)	pc	40	10	50	20
4.1.9	Material allowances (SS10)	pc	30	10	50	20
4.1.10	Material utilization (SS11)	pc	30	10	50	20
4.2	Notebook	pc	10	4	6	6
4.3	Ball point pen	pc	10	5	6	6
4.4	Solvent based felt pen (for overhead transparencies and white board)	set	2	2	2	4
4.5	Ring folder (plastic)	pc	10	5	6	3
4.6	Writing paper (size A4 or similar)	pc	100	100	100	50
4.7	Drawing paper (size A1 or similar)	pc	30	20	10	10
4.8	Transparencies	roll	2	1	3	2
5.	**Auxiliary materials**					
5.1	Marking foil	roll		1		2
5.2	Cloth for machine cleaning		as required		as required	
6.	**Training aids**					
6.1	Slides demonstrating the exercises	pc	320		320	
6.2	Slides demonstrating footwear manufacturing technology and/or operations	pc		200		200
6.3	Computer programs for ability tests, area estimation and exact measurement (RECOGNITION exercises R4 and R5)	pc	4		4	
6.4	Computer program for computation of material requirement (COSTING exercises)					
6.5	Accessories for specific exercises	set				
6.5.1	Folders consisting 2*80 shapes and 80 sets of mosaic pieces for RECOGNITION (R1, R2) exercises	set	2		2	

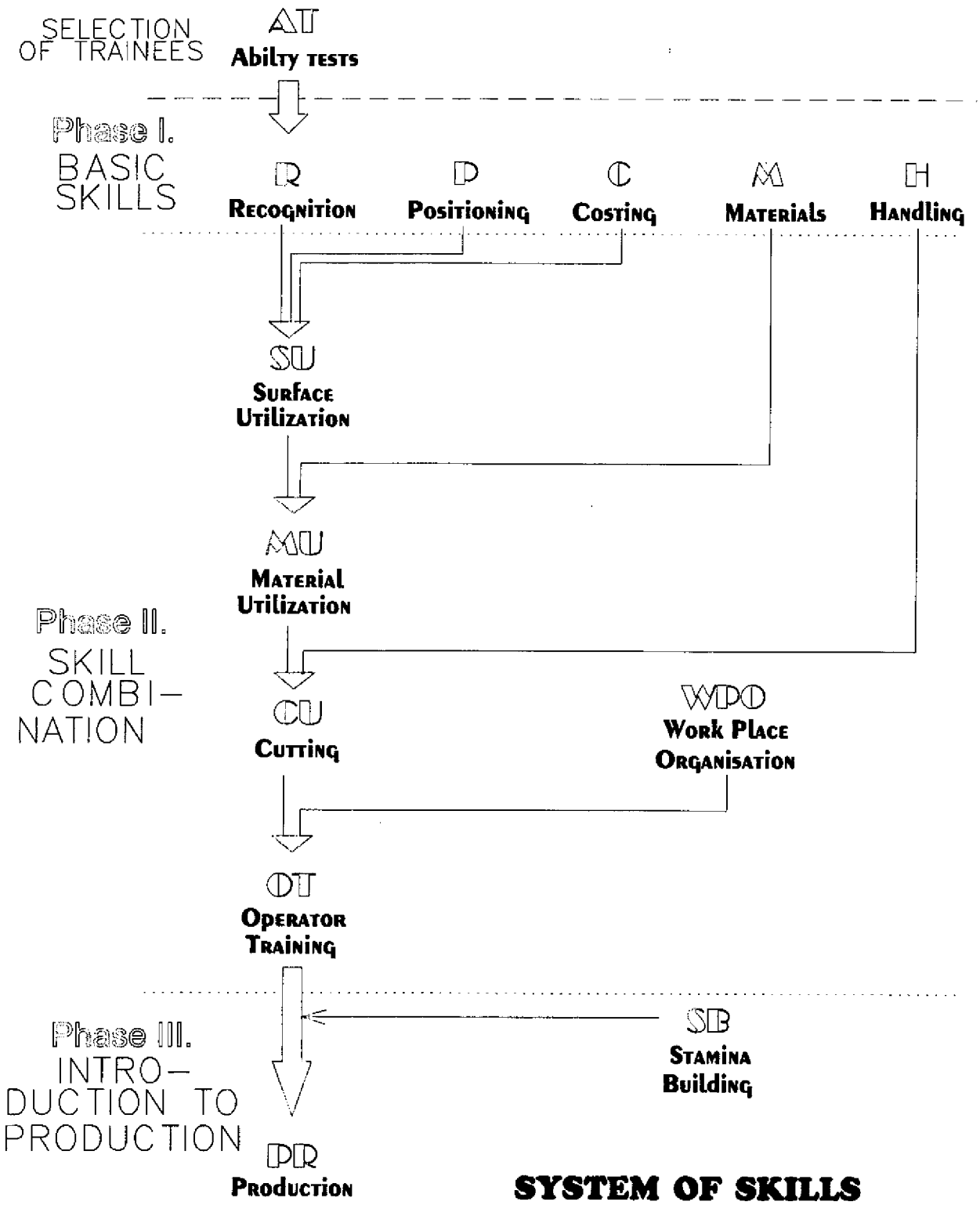
Item No.	Description	Unit	Training of			
			INSTRUCTORS 10 trainees, 3-4 weeks		OPERATORS 6 trainees, 12-16 weeks	
			Minimum	Optional	Minimum	Optional
6.5.2	Folder consisting 100 shapes and 7 mosaic pieces for RECOGNITION (R3) exercises	set	1		1	
6.5.3	Folders consisting shapes and shoe upper patterns for POSITIONING exercises P1-P3	set	3		3	
6.5.4	Test sheets with imitation of material for SURFACE UTILIZATION exercises SU1/SU2 and SU4	pc	20		20	
6.5.5	Standard rectangles for SURFACE UTILIZATION exercises SU3	pc	10		10	
6.5.6	Folders consisting 11-21 samples of 6-9 different material, finished leather, samples of leather faults, leather with different thickness used for MATERIAL (KNOWLEDGE) exercises M1-M5	set	5		5	
6.6	Patterns	pc	714		707	7
6.6.1	Cardboard patterns of 11 different styles with 2-5 upper and/or lining components - 20 pieces of each pattern, used for SURFACE UTILIZATION and Material Utilization exercises	pc	700		700	
6.6.2	Patterns made of metal sheet used for manual cutting (HANDLING) exercises H2/H3	pc	7			7
6.6.3	Bound cardboard patterns used for manual cutting (HANDLING) exercises H2/H3	pc	7		7	
6.7	Printed exercise sheets for manual cutting (HANDLING) exercise H1	pc	800	300	1,100	300
7	Instructor's Manual	pc	13	2	1	1

Remarks:

To be provided locally

To be supplied by TECHNORG

SKILL ANALYSIS TRAINING OF SHOE UPPER CUTTERS



SYSTEM OF SKILLS