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MARMARA UNIVERSITY
EUROPEAN COMMUNITY INSTITUTE

A STUDY ON THE USE OF ADVANCED
TECHNOLOGY IN THE TURKISH AND
EUROPEAN COMMUNITY TEXTILE
INDUSTRIES TODAY AND TOMORROW

Submitted for M.A. Thesis

NEVRA ÖLÇER

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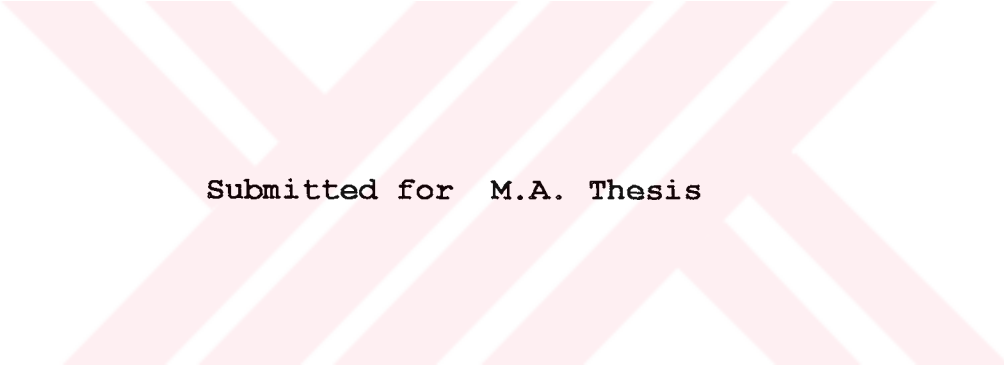
T.C. YÜKSEK ÖĞRETİM KURULU
DOKÜMANİSYON MERKEZİ

March 1997



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Adviser : Prof. Dr. SAMİ ERCAN

March 1997

A C K N O W L E D G E M E N T

I would like to cordially thank my adviser Prof. Dr.Sami Ercan for his initiation and constant support during all stages of this thesis.

Mañy friends and associates from all walks of life helped me invarious capacities for the brushing up of numerous chapters and my special thanks go to (in alphabetical order) Ergun Kađıtçıbaşı, Bilge Kolođlu, Orhan Kolođlu, Cüneyt Ölçer, Engin Ölçer, Biltin Toker, Emanuel Wenger and Nigar Zabcı.

All companies in the field of this study welcomed the idea and cooperated by providing the information I required.

Last but not least many thanks should go to Prof. Dr. Gündüz Ulusoy whose encouragement has been one of the crucial factors for the realisation of this study.

S U M M A R Y

In this thesis I have researched and investigated the use of technology in the textile industry in the European Community and Turkey on a comparative basis.

The side industries of the field too were closely studied, namely the weaving and ready-to-wear sectors. The research and development presently made by the EC, technology used, customer groups, personel employment policies, market research, credits, capacity problems are amongst the subjects dealt with in this study.

Use of computers in general and the future of the quotas are additional themes discussed especially with regard to companies and with a view at arriving to concrete conclusions.

The main body of the research consists of series of questions and answers and their evaluation which has been used in the final analysis.

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1- I N T R O D U C T I O N

The story of this thesis dates back to the four years I worked for the General Motors Austria Plant in Vienna as a systems planner in the Industrial Engineering Department. It was there that I first witnessed the most advanced technology in action. Since my hobby has been dressmaking and modelling for a long time, I was first intrigued and later extremely interested to observe the application of the technology in question and wondered whether or not the same advanced methods could be used by the textile industry in my motherland Turkey.

I soon started to visit textile factories throughout Europe and was amazed at the wonders of contemporary technology and what could be achieved. Back in Turkey, I had the chance, to see how the computer technology had influenced production. Since it was my firm belief that computer technology alone could place Turkey on a competitive plane, I began to investigate and compare conditions in Turkey with the EC countries, where Turkish export trade in textiles had reached a sizeable percentage of the total exports in the field.

Since almost all the major factories which produce textile products with an established brand name are involved in exports, I chose my interviewees from amongst these companies in the top bracket. Most of them used the most advanced technology available in Turkey. Their clean cut answers shed enough light to comprehend the complexities of the field and I hope, that this thesis will help these companies as well as others in their future production planning.

2- P R O B L E M D E F I N I T I O N

In the European Community great sums have been invested for research and development funds. The aim of one of these development projects is to improve the technology used in the textiles industry. If we look closely to the projects included in the BRITE program, we can see the importance given to the improvement of the textiles industry by the EC.

Turkey has made a big step forward in the textiles export. The decision taken in the recent years concerning the export trading has resulted in an increase of production. To investigate the increase of production and to compare Turkey's textile production with the EC, to establish from a futuristic point of view the state of production is the main goal of this paper. While doing so, the subject of imports of textile machinery to Turkey is also studied closer.

Turkey imports textile machines in great quantities from Europe, Asia, USA and even some African countries. This figure shows yearly an increasing trend. While the total of imports figure in 1990 was 63.4 million dollars, in 1995 is 99.5 million dollars. ^[1]

This study showed some insight for the decision making about the comparison between low wages with the advanced, so expensive technology.

This research has been done through the use of interviews (see section 8). To be able to come forward with a useful research, the subdivisions have been kept to the minimum by selecting only two: ready-to-wear and weaving industries.

^[1] Due to the figures of Istanbul Chamber of Commerce

3- WHAT IS THE EUROPEAN COMMUNITY ?

The European Community first got together and laid the foundation of the EC with the Treaty of Paris of 1951 uniting the Federal Republic of Germany, France, Italy, the Netherlands, Belgium and Luxembourg within the European Coal and Steel Community. Later, the European Economic Community and the European Coal and Steel Community were all joined together with the Treaty of Rome in March 1957.

Its aim was to integrate the member countries within this Treaty and achieve first economic and later political unity, thus to reestablish Europe's former strength through a vast market.

First enlargement of the EC took place in the year 1973. Great Britain, Ireland and Denmark got the full membership of the EC. In the year 1981 Greece followed them.

Third enlargement took place in 1986, where Spain and Portugal got full members.

The fourth and last enlargement was in the year 1995. That time Austria, Sweden and Finland got full members of the European Community.

The third article of the Treaty of Rome fully explains the aims of the community: ^[3]

Article 3:

For the purposes set out in Article 2, the activities of the Community shall include, as provided in this Treaty and in accordance with the timetable set out therein :

^[3] Treaty of Rome, 1957

- a) the elimination, as between Member States, of customs duties and of quantitative restrictions on the import and export of goods, and of all other measures having equivalent effect;
 - b) the establishment of a common customs tariff and of a common commercial policy towards third countries;
 - c) the abolition, as between Member States, of obstacles to freedom of movement of persons, services and capital;
 - d) the adoption of a common policy in the sphere of agriculture;
 - e) the adoption of a common policy in the sphere of transport;
 - f) the institution of a system ensuring that competition in the common market is not distorted;
 - g) the application of procedures by which the economic policies of Member States can be coordinated and disequilibria in their balances of payments remedied;
 - h) the approximation of the laws of Member States to the extent required for the proper functioning of the common market;
 - i) the creation of a European Social Fund in order to improve employment opportunities for workers and to contribute to the raising of their standard of living;
 - j) the establishment of an European Investment Bank to facilitate the economic expansion of the community by opening up fresh resources;
 - k) the association of the overseas countries and territories in order to increase trade and promote jointly economic and social development.
-

Article 237 of the Treaty of Rome deals with the membership, and 238 with partnership. ^[3]

Article 237 :

Any European State may apply to become a member of the Community. It shall address its application to the Council, which shall act unanimously after obtaining the opinion of the Commission.

The condition of admission and the adjustments to this Treaty necessitated thereby shall be the subject of an agreement between the Member States and the applicant State. This agreement shall be submitted for ratification by all the contracting States in accordance with their respective constitutional requirements.

Article 238 :

The Community may conclude with a third State, a union of States or an international organisation agreements establishing an association involving reciprocal rights and obligations, common action and special procedures.

These agreements shall be concluded by the Council, acting unanimously after consulting the Assembly.

Where such agreements call for amendments to this Treaty, these amendments shall first be adopted in accordance with the procedure laid down in Article 36. ^[3]

^[3] Treaty of Rome, 1957

In 1963 Turkey signed the Association Agreement for Partnership in accordance with article 238 and in 14th April 1987 applied for full membership in accordance with article 237.

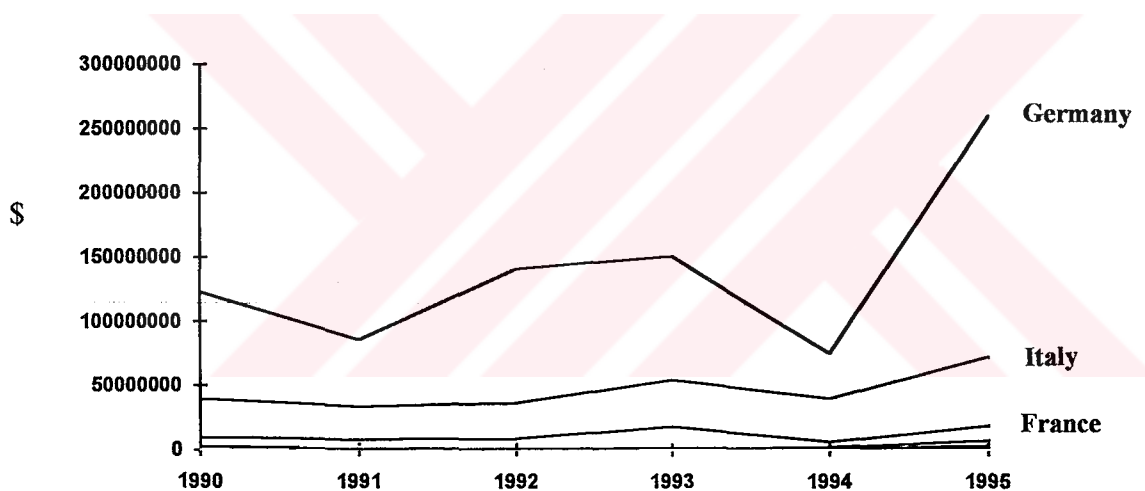
Turkey's application to the Community in accordance with the member countries of the EC has two basic aims : Economical and political. The economic aim is to raise the national standards of living and quicken the development pace through unity with the Community. The political aim is to continue the policy of Turkey's westernisation which started with Atatürk's reforms. In the aftermath of the 2nd World War, it was this policy on which Turkey's signing of many international treaties was based. Namely : Constitution of the United Nations, European Economic Cooperation Organisation Treaty, Council of Europe, the North Atlantic Treaty Organisation, Organisation for Economic Cooperation and Development.

4- IMPORTS OF MACHINERY IN THE TEXTILE SECTOR

The imported machinery for the textile sector from all the world to Turkey is listed in four groups, namely 8445, 8446, 8447 and 8448 at the Istanbul Chamber of Commerce. So the same grouping will be continued at this research. In the following each group will be analysed in form of European Community, Trade blocks, Most Exporting Countries and Total Figures of Import.

4.1- 8445 ^[1] ^[2]

4.1.1.- European Community : ^[1] ^[2]



Import figures : ^[1]

(in \$)	1990	1991	1992	1993	1994
Belgium	2759953	1875882	150778	2154912	763446
Germany	1230282225	85746889	140985451	150701785	75391994
Italy	39747993	33486109	36824572	54526321	40297706
Irland	3198742	464958	333776	0	0
Austria	500696	468559	155147	844794	0
France	10220842	7968973	8981231	18115922	6453333
Holland	331357	2319191	279592	52831	96825
Greece	0	157400	252251	37830	37830
Gr.Brit.	3119153	72554	288443	490607	2427417

^[1] Due to the figures of the Istanbul Chamber of Commerce
^[2] The list of the machines is included in the appendix

Spain	427773	212889	425419	555353	1018903
Finland	0	0	0	0	0
Sweden	14917	0	0	84643	962817
Denmark	0	0	0	22583	0
Sum	183349651	132631744	191428393	419230395	127450271

1995

Belgium	3264707
Germany	259405596
Italy	72248763
Ireland	0
Austria	1245201
France	18690442
Holland	459410
Greece	105473
Gr.Brit.	7586745
Spain	1236634
Finland	0
Sweden	0
Denmark	0
Sum	364242971

4.1.2.- Trade blocks:^{[1][2]}



(in \$)	1990	1991	1992	1993	1994
USA+C	3012212	1979557	948348	316710	2387091
EC	183349651	132631744	191428393	419230395	127450271
Swit.	66585824	66807034	73680773	112989600	52429387
Japan	4295206	14640181	16474852	57097340	12979073
As.Tig.	5515	0	2893	37936	61800

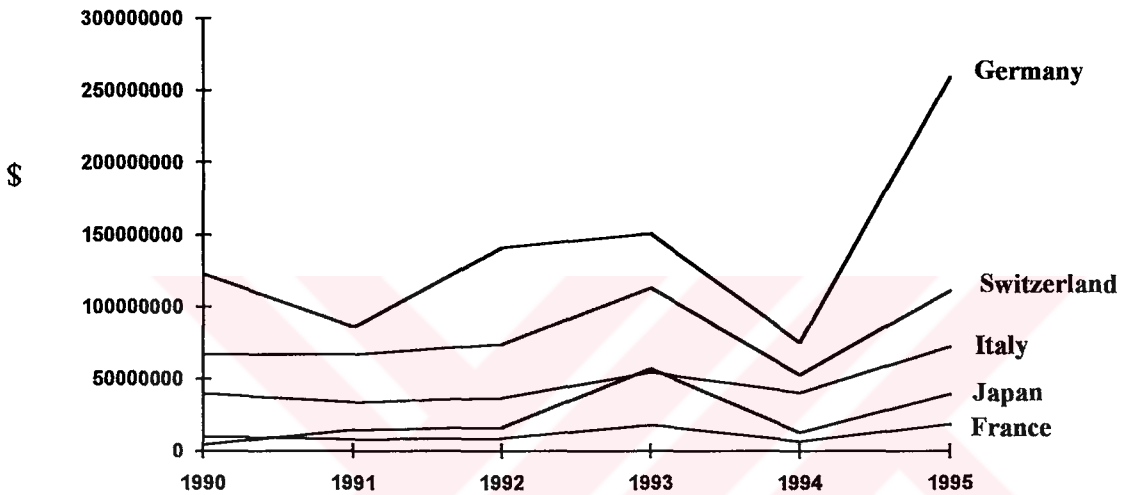
[1] Due to the figures of the Istanbul Chamber of Commerce

[2] The list of the machines is included in the appendix

1995

USA+C	4447985
EC	364242971
Swit.	111152837
Japan	39403483
As.Tig.	4654645

4.1.3.- The most exporting countries ^{[1][2]}



(in \$)	1990	1991	1992	1993	1994
France	10220842	7968973	8981231	18115922	6453333
Japan	4295206	14640181	16474852	57097340	12979073
Germany	123028225	85764889	140985451	150701785	75391994
Italy	39747993	33486109	36824572	54526321	40297706
Switz.	66585824	66807034	73680773	112989600	52429387

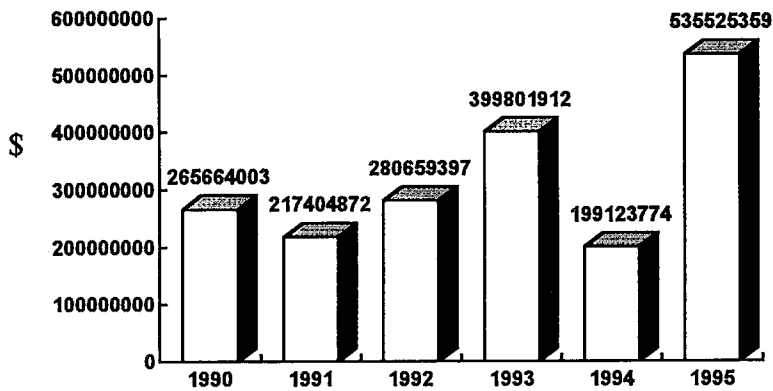
1995

France	18690442
Japan	39403483
Germany	259405596
Italy	72248763
Switz.	111152837

Hungary, Australia, Chekoslovakia, Bulgaria, Poland, Russia, China and South Korea have also exported some machinery to Turkey. ^{[1][2]}

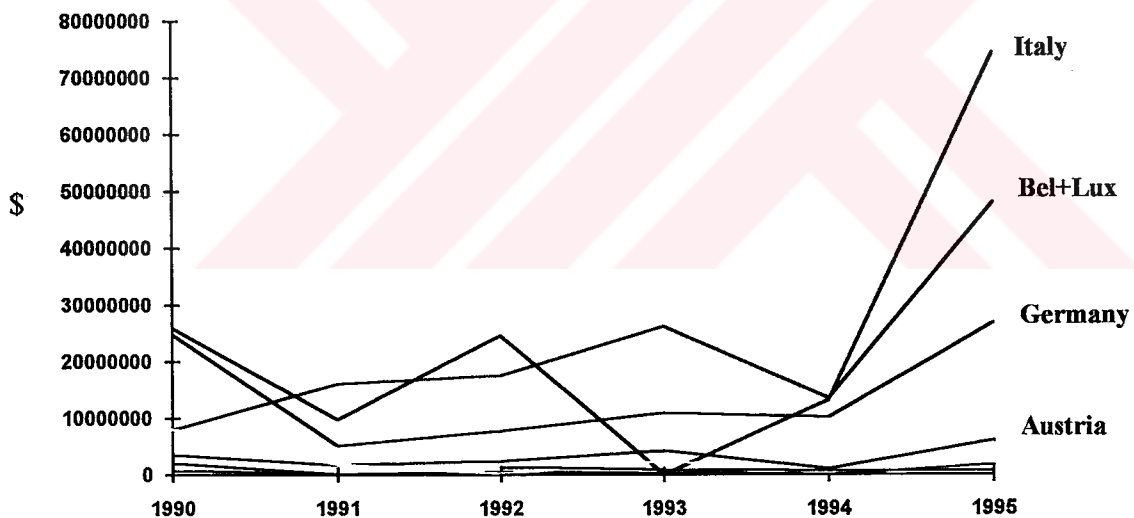
[1] Due to the figures of the Istanbul Chamber of Commerce
 [2] The list of the machines is included in the appendix

4.1.4.- Total figures of import (8445):^{[1][2]}



4.2.- 8446 ^{[1][2]}

4.2.1.- European Community : ^{[1][2]}



(in \$)	1990	1991	1992	1993	1994
Germany	24805936	5125245	7730794	10839532	10090687
Italy	25910724	9770565	24542592	37785	13101542
Austria	3530030	1742845	2373956	4223310	1095706
Bel-Lux	7907653	16056364	17488313	26122535	13469063
France	2065189	204185	648318	255927	5709
Holland	114273	97250	10903	383095	20872
Spain	8094136	1913899	289566	2464487	485173
Sweden	845889	164433	0	0	0

[1] Due to the figures of the Istanbul Chamber of Commerce

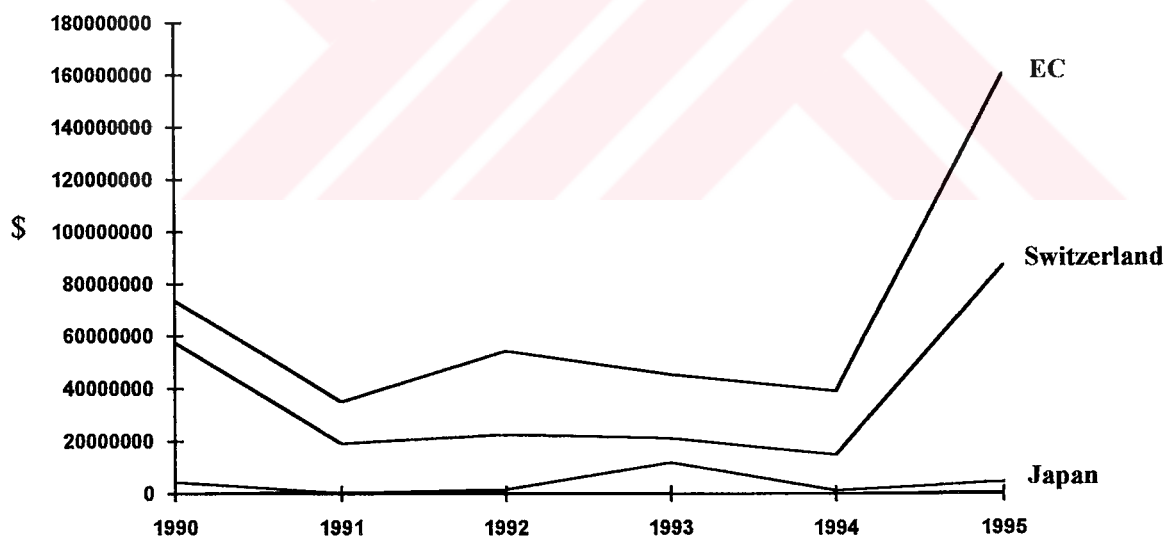
[2] The list of the machines is included in the appendix

Gr.Brit.	478352	0	1378798	958461	749307
Greece	19318	0	9469	81990	5506
Irland	0	0	0	0	0
Sum	73771500	35074786	54472709	45367122	39023565

1995

Germany	26706115
Italy	74263243
Austria	6029584
Bel-Lux	47961344
France	1885169
Holland	57411
Spain	2240929
Sweden	0
Gr.Brit.	728611
Greece	210602
Irland	79032
Sum	160083008

4.2.2.- Imports from trade blocks:



(in \$)	1990	1991	1992	1993	1994
EC	73771500	35074786	54472709	45367122	39023565
USA+Can	75526	700362	409778	0	0
As.Tigers	25183	63089	439115	256543	13687
Japan	4371425	320300	1603693	11841086	1196823
Switzerl.	57442133	19216020	22605828	21336783	14846730

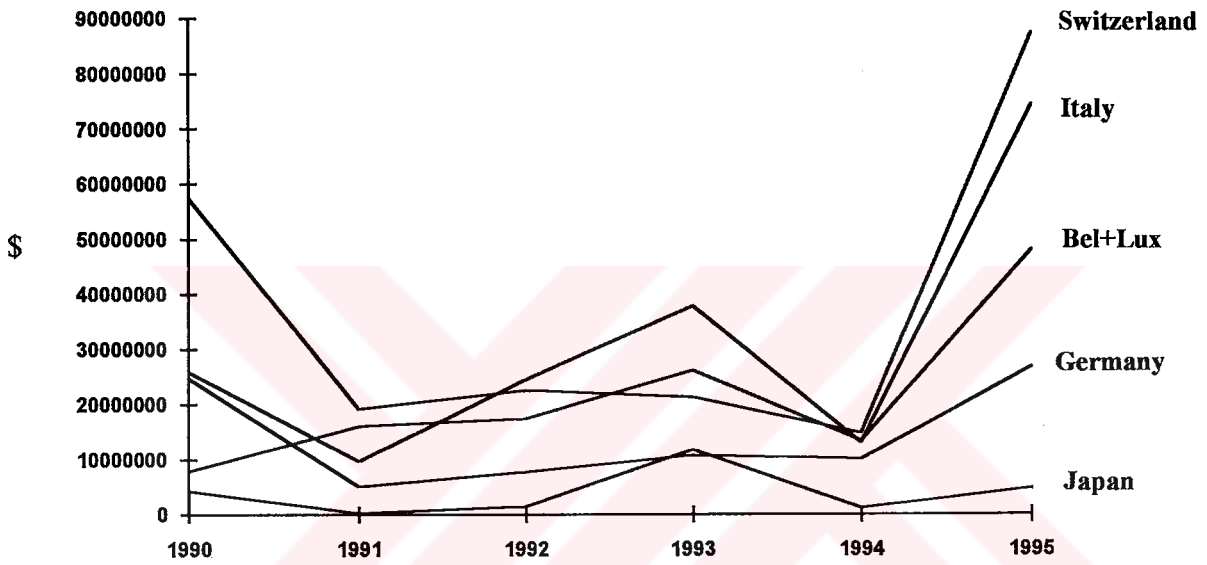
[1] Due to the figures of Istanbul Chamber of Commerce

[2] The list of the machines is included in the appendix

1995

EC 160162040
 USA+Can 348350
 As.Tigers 641760
 Japan 4719658
 Switzerl. 87261968

4.2.3.- Countries, which export the most ^{[1][2]}



(in \$)	1990	1991	1992	1993	1994
Germany	24805936	5125245	7730794	10839532	10090687
Switzerl.	57442133	19216020	22605828	21336783	14846730
Italy	25910724	9770565	24542592	37785070	13101542
Bel+Lux.	7907653	16056364	17488313	26122535	13469063
Japan	4371425	320300	1603693	11841086	1196823

1995

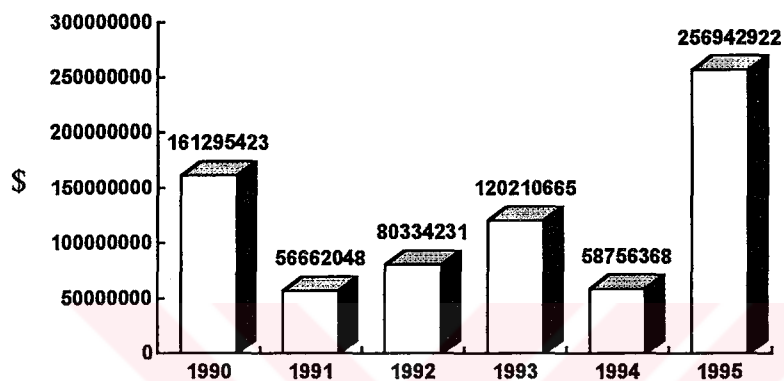
Germany 26706115
 Switzerl. 87261968
 Italy 74263243
 Bel+Lux. 47961344
 Japan 4719658

[1] Due to the figures of Istanbul Chamber of Commerce

[2] The list of the machines is included in the appendix

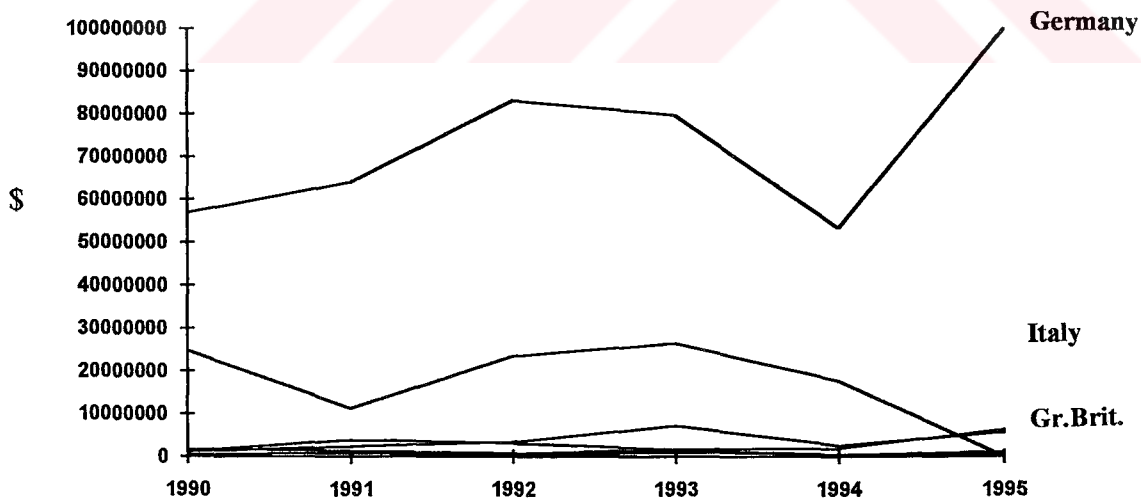
For the 8446-group Russia, DDR, Georgia, Polnia, India, Chekoslowakia, Bulgaria, Australia and Brazil have also exported some machinery to Turkey.^{[1][2]}

4.2.4.- Total imports (8446):^{[1][2]}



4.3.- 8447^{[1][2]}

4.3.1.- European Community :^{[1][2]}



(in \$)	1990	1991	1992	1993	1994
Italy	24801272	11275060	23392466	26403690	17592357
France	412806	839422	646159	1021950	477688

^[1] Due to the figures of Istanbul Chamber of Commerce

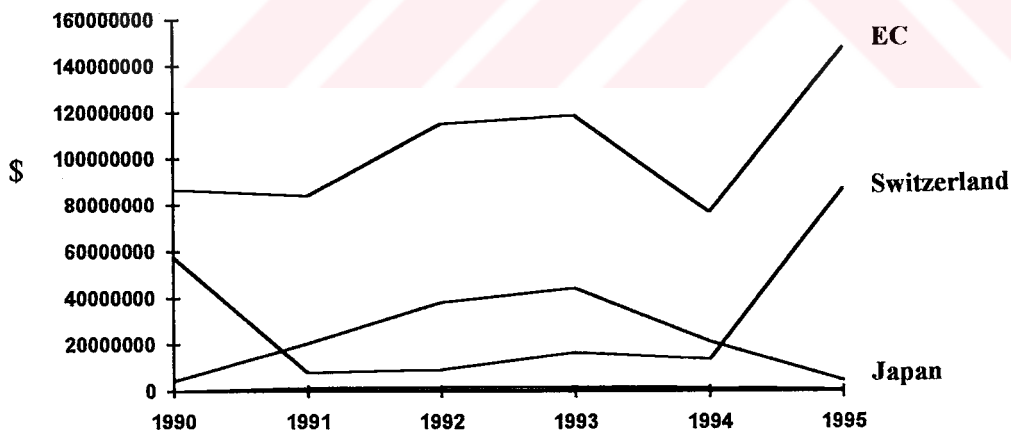
^[2] The list of the machines is included in the appendix

Germany	56866620	64035600	83152823	79676663	53242155
Gr.Brit.	1178285	2467664	3516507	7186216	2561881
Spain	1384532	3908244	3155638	1660606	1996417
Austria	1856690	1374425	798455	1657012	373112
Holland	111	92225	471	0	161020
Bel.+Lux.	52857	37414	147729	1151310	507835
Greece	10870	29533	23158	26728 0	0
Sweden	383	0	325636	0	0
Sum	86564426	84059587	115159042	118784175	76912465

1995

Italy	33837
France	797330
Germany	99931757
Gr.Brit.	5638379
Spain	6333132
Austria	1266557
Holland	48091
Bel.+Lux.	128843
Greece	74504
Sweden	24887
Sum	148080541

4.3.2.- Trade blocks :^{[1][2]}



(in \$) 1990 1991 1992 1993 1994

USA+Can	75526	210966	549275	810921	1050720
AsianTig.	25183	1528336	1797082	2086512	1630339
Japan	4371425	20480718	38221084	44384245	21320539
EC	86564426	84059587	115159042	118784175	76912465
Switzerl.	57442133	7837691	9243608	16866063	13612584

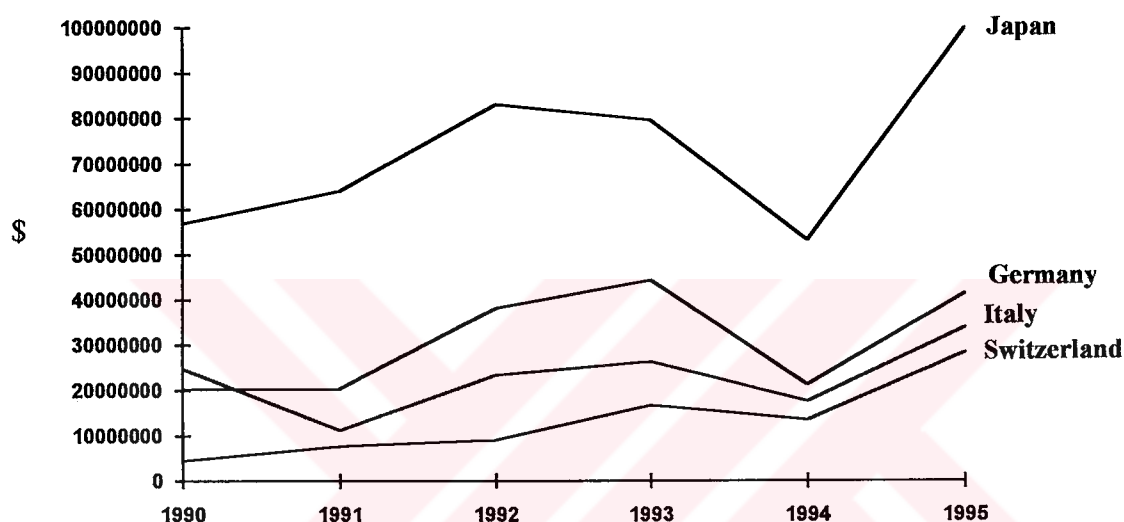
^[1] Due to the figures of Istanbul Chamber of Commerce

^[2] The list of the machines is included in the appendix

1995

USA+Can 348350
AsianTig. 641760
Japan 4719658
EC 148080541
Switzerl. 87261968

4.3.3.- Most exporting countries ^{[1][2]}



(in \$)	1990	1991	1992	1993	1994
Italy	24801272	11275060	23392466	26403690	17592357
Germany	56866620	64035600	83152823	79676663	53242155
Switzerl.	4520531	7837691	9243608	16866063	13612584
Japan	20357246	20480718	38221084	44384245	21320539

1995

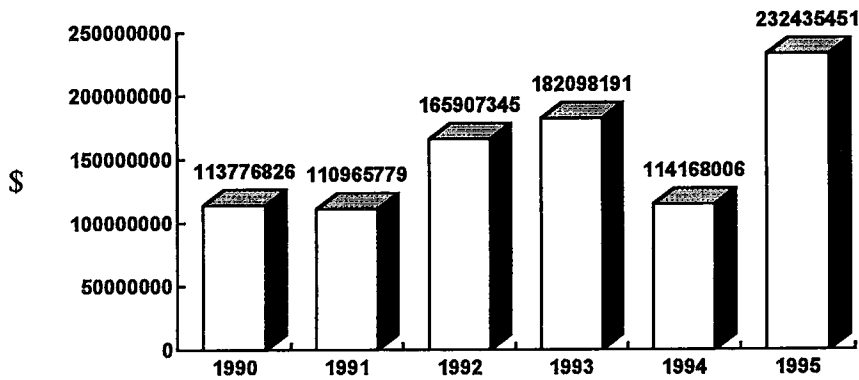
Italy 33837061
Germany 99931757
Switzerl. 28390300
Japan 41386531

China, South Afrika and Nambia, Iran, Georgia, Russia, Rumania, Chekoslowakia, Bulgaria and Israel have also exported some machinery to Turkey.^{[1][2]}

^[1] Due to the figures of Istanbul Chamber of Commerce

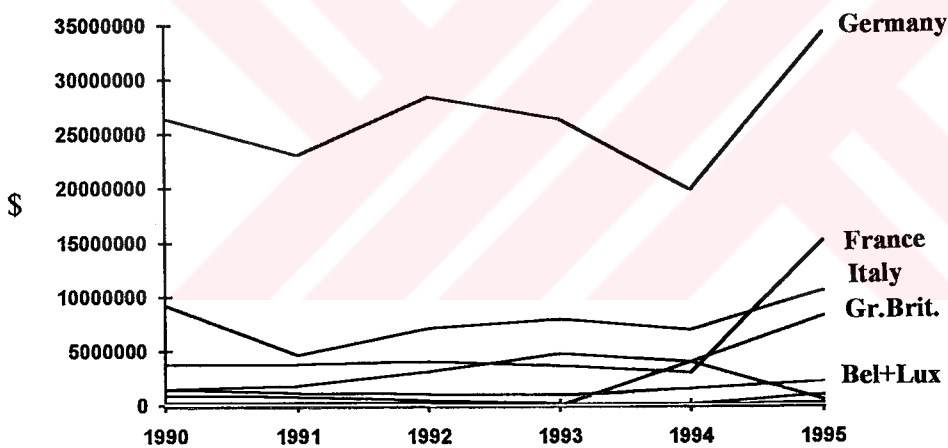
^[2] The list of the machines is included in the appendix

4.3.4.- Total imports:^{[1][2]}



4.4.- 8448^{[1][2]}

4.4.1.- European Community:^{[1][2]}



(in \$)	1990	1991	1992	1993	1994
Germany	26442147	23057375	28418428	26384892	19860896
France	3738743	3808474	4025002	3666094	3030322
Bel+Lux	1463644	1165978	1077337	940677	1541868
Italy	9228891	4630007	7102244	7904724	6950121
Holland	159479	144684	400497	9884	3987376
Gr. Brit.	1462531	1804093	3095795	4787921	3987376
Spain	317419	448234	538650	1004916	786643
Denmark	19176	7764	0	1119	3797
Sweden	918806	855075	470845	188073	36355
Austria	235705	309842	175615	145254	144741
Irland	127054	39899	67332	29142	0
Sum	44113595	55853133	75269284	74662652	57635275

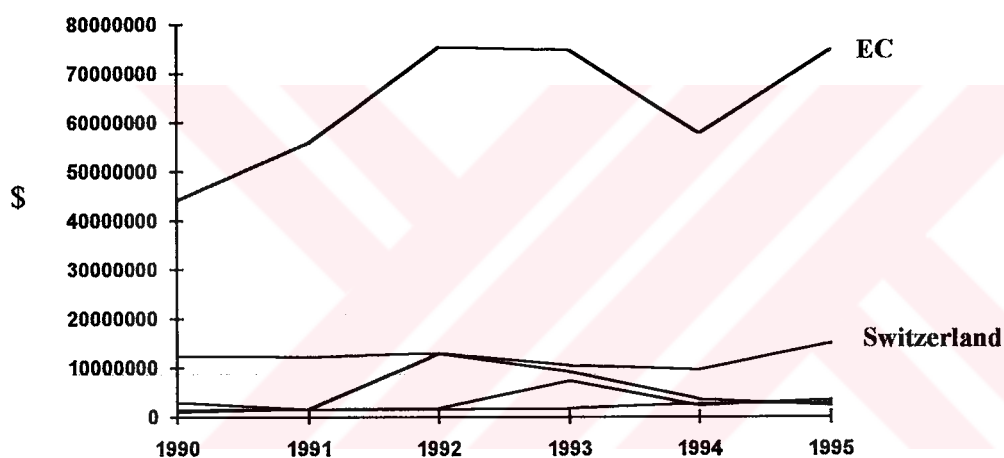
^[1] Due to the figures of Istanbul Chamber of Commerce

^[2] The list of the machines is included in the appendix

1995

Germany	34375606
France	15216700
Bel+Lux	2177468
Italy	10596167
Holland	542693
Gr.Brit.	8204256
Spain	1969798
Denmark	150890
Swèden	313669
Austria	1023506
Irland	2783
Sum	74577446

4.4.2.- Trade blocks:^{[1][2]}



(in \$)	1990	1991	1992	1993	1994
EC	44113595	55853133	75269284	74662652	57635275
As.Tig.	1007318	1632644	1520571	1769741	2693368
Japan	2957212	1599845	1778235	7327148	2306860
USA+Can.	1485967	1735439	12849923	9245246	3641985
Switzerl.	12426389	12183914	13029383	10551523	9648425

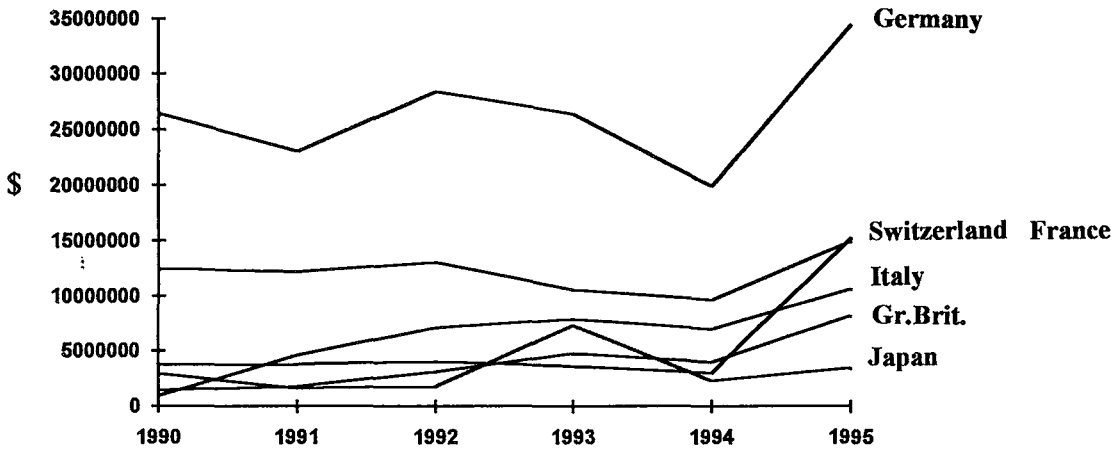
1995

EC	74577446
As.Tig.	2895640
Japan	3481147
USA+Can.	2375449
Switzerl.	14947266

[1] Due to the figures of Istanbul Chamber of Commerce

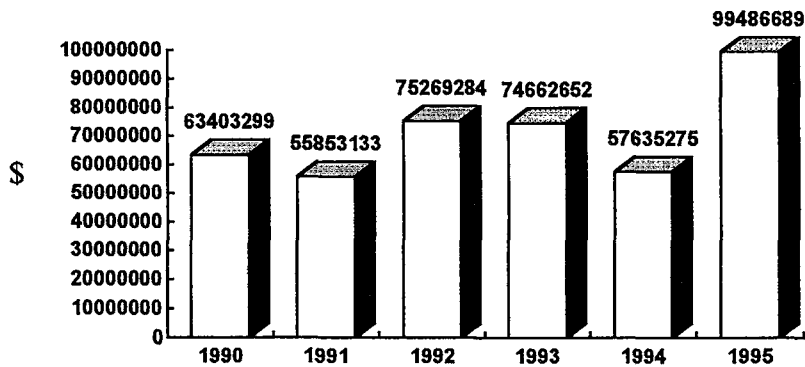
[2] The list of the machines is included in the appendix

4.4.3.- Most exporting countries:^{[1][2]}



(in \$)	1990	1991	1992	1993	1994	1995
Germany	26442147	23057375	28418428	26384892	19860896	34375606
France	3738743	3808474	4025002	3666094	3030322	15216700
Gr. Brit.	1462531	1804093	3095795	4787921	3987376	8204256
Italy	928891	4630007	7102244	7904724	6950121	10596167
Switzerl.	12426389	12183914	13029383	10551325	9648425	14947266
Japan	2957212	1599845	1778235	7327148	2306860	3481147

4.4.4.- Total imports :^{[1][2]}



[1] Due to the figures of Istanbul Chamber of Commerce

[2] The list of the machines is included in the appendix

4.5.- Total figures of import : ^[1]^[2]

The above mentioned figures show clearly, that some European Community countries are the main exporters of textile machinery to Turkey. Germany is on top of the list. Italy is in general on the second place. France and Belgium are among the important exporters. Great Britain's role is not very important. The remaining countries in the European Community also export some machinery to Turkey, but there is a great difference to the above mentioned leading countries.

Switzerland is not member of the EC, but is almost after Germany the main exporter of textile machinery to Turkey.

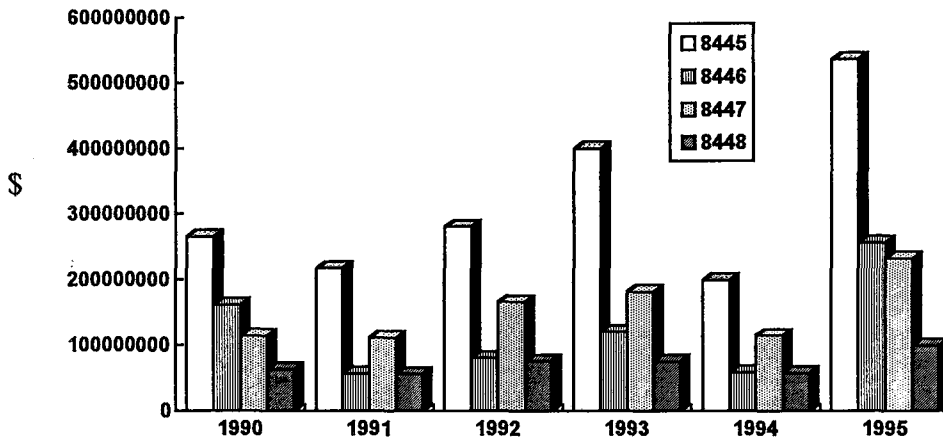
Japan exports important quantities to Turkey, but is not among the first two or three countries, which export textile machinery to Turkey.

Asian Tigers and USA export some textile machinery to Turkey, but the figures are not worth to be mentioned.

^[1] Due to the figures of Istanbul Chamber of Commerce

^[2] The list of the machines is included in the appendix

4.5.1.- The total import figures :^{[1][2]}



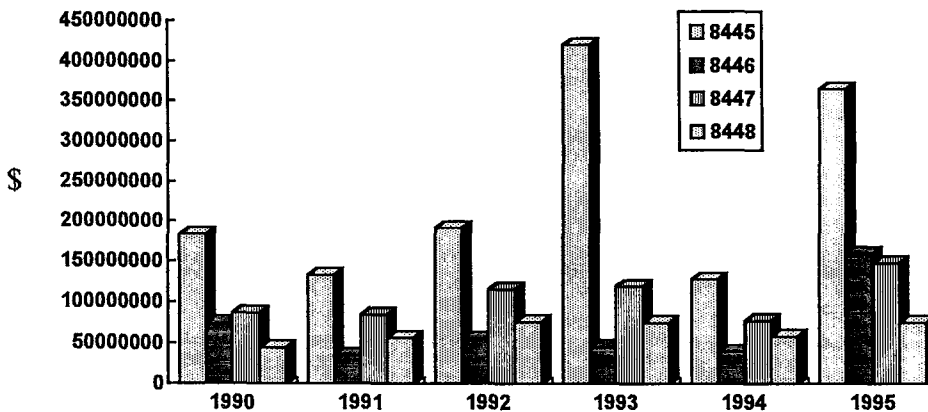
(in \$) 1990 1991 1992 1993 1994

8445	265664003	217404872	280659397	399801912	199123774
8446	161295423	56662048	80334231	120210665	58756368
8447	113776826	110965779	165907345	182098191	114168006
8448	63403299	55853133	75269284	74662652	57635275
Sum	604139551	440885832	602170257	776773420	429683423

1995

8445	535525359
8446	256942922
8447	232435451
8448	99486689
Sum	1124390421

4.5.2.- EC-Totals:^{[1][2]}



^[1] Due to the figures of Istanbul Chamber of Commerce

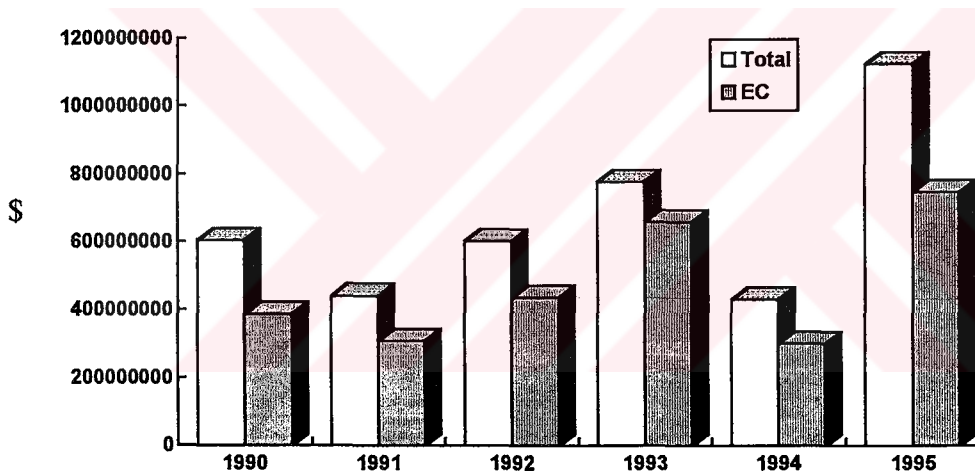
^[2] The list of the machines is included in the appendix

(in \$)	1990	1991	1992	1993	1994
8445	183349651	132631744	191428393	419230395	127450271
8446	73771500	35074786	54472709	45367122	39023565
8447	86564426	84059587	115159042	118784175	76912465
8448	44113595	55853133	75269284	74662652	57635275
Sum	387799172	307619250	436329428	658044344	30102176

1995

8445	364242971
8446	160083008
8447	148080541
8448	74577446
Sum	746983966

4.5.3.- Comparison Imports Total - EC :^{[1][2]}



(in \$)	1990	1991	1992	1993	1994
Total	604139551	440885832	602170257	776773420	429683423
EC	387799172	307619250	436329428	658044344	301021576

1995

Total	1124390421
EC	746983966

[1] Due to the figures of Istanbul Chamber of Commerce

[2] The list of the machines is included in the appendix

The above mentioned figures show clearly, that most of Turkey's imports is made from European Community countries concerning the machinery used in textile operations. In this context it is interesting to have a look at the research programmes of the EC, where the technical progress of this machines is supported highly in the framework programmes of the European Community.



5- BRITE PROJECTS ^[4]

1/ MULTIAXIAL TEXTILE PERFORMS FOR COMPLEX STRUCTURAL COMPOSITE PARTS

Starting Date: 4.1996 Ending Date: 3.1999

Duration: 36 months

Objectives: The ultimate technical objective of the MULTEXCOMP project is to be able to produce lightweight (50% lower than steel), low maintenance (50% of present) complex shaped composite structural parts at acceptable costs for transport equipment and sporting goods. To be able to use long fibre reinforcement economically- and to improve damage resistance, near-net shaped integral preforms are needed. These can be produced by the textile technologies which are to be developed in the project: brading, weft and warp knitting, weaving and two types of stitching.

2/ SKILLED MULTI-ARM ROBOT

Starting Date: 5.96 Ending Date: 4.99

Duration: 36 months

Objektives: The research and development taking place in order to automate the real example processes will lead to the creation of a guide containing guidelines and examples for the development and design of learning skilled multi-arm systems, capable of handling non-rigid materials. This guide will meet the industrial objectives of firstly establishing a better understanding and presenting a formal description of skilled manipulation tasks with non-rigid materials. Secondly, it will enable industries to automate

^[4] Brite projects

processes involving non-rigid materials by applying the knowledge gained through the project.

3/ SUSTAINABLE CLOSED LOOP SYSTEM FOR RECYCLING OF CARPET MATERIALS

Starting Date: 12.95 Ending Date: 11.98

Duration: 36 months

Objectives: The European carpet industry and the strategic suppliers of raw materials for the manufacturing of carpets have a strong need for a cost-effective and ecological justified waste management system for post-use carpet waste. Major targets of the proposed developments are to achieve substantial cost reductions (approx. 200-400 MECU=30%) and increased environmental benefits (approx. 125-300 MECU=60%) with the RECAM-system, compared with the results of waste-management by MSW-incineration. The proposed RECAM-system to be developed, includes all necessary steps of collection and logistics as well as of technologies for the identification, sorting, cleaning, size reduction, separation and purification of the material components, recycling of valuable materials and energy recovery from the residual waste streams.

4/ NEW TOOLS AND METHODOLOGIES FOR AN OPTIMUM DESIGN OF CLEAN AND EFFICIENT LAMINAR PREMIXED COMBUSTORS AND BOILERS

Starting Date: 1.96 Ending Date: 12.98

Duration: 36 months

The aim of this project is to develop new design tools and methodologies for the manufacturing industry using gas fuelled laminar premixed burners. The processes in concern are heating systems for domestic or tertiary use, and

industrial drying as used in food, paper or textile industries.

5/ RECYCLING OF RINSE WATERS FROM METAL FINISHING FACILITIES ELIMINATION OF ORGANICS BY CATALYTIC OXIDATION

Starting Date: 12.95 Ending Date: 11.98

Duration: 36 months

Objectives: The objective of the project is to develop a water recycling process adapted to this need, able to remove 95% of the chemical oxygen demand of the rinse water by combining proven membrane separation with an innovative chemical oxidation. Other industrial sectors such as the chemical, pulp and paper, mechanical, automotive and textile industries will also benefit from this water recycling technology for a sustainable development.

6/ BIOFINISHING OF COTTON FABRICS WITH CELLULASES

Starting Date: 12.95 Ending Date: 11.98

Duration: 36 months

Objectives: The finishing of cotton textiles using cellulolytic enzymes provides environmentally acceptable routes to achieving certain fashionable and desirable effects such as the stone-washed appearance of denims and the defuzzing and softening of other cotton fabrics. The cellulases that are currently used, however, are crude mixtures which tend to cause unacceptable levels of fabric strength loss. Furthermore the processing methods being applied are difficult to control. Advances in biotechnology have permitted isolation of the individual enzyme components and the development of recombinant DNA techniques has made it possible to manipulate the genes of cellulase secreting fungi. Using these techniques new

strains can be developed enabling industrial production of novel cellulase compositions. These may provide the opportunity for achieving radically new cellulase finishing effects, as well as improving the existing ones.

7/ ETUDE SUR LES BESOINS TECHNOLOGIQUES DANS LE SECTEUR
TEXTILE

Starting Date: 2.95 Ending Date: 2.88

Duration: 11 months (Completed)

8/ DEVELOPMENT OF A MANAGEMENT SYSTEM FOR HYDROXIDE
METALLIC SLUDGE PRODUCED BY THE SURFACE TREATMENT INDUSTRY

Starting Date: 6.94 Ending Date: 6.97

Duration: 37 months

Objectives: The proposed research concerns the development of a process for the elimination, the deactivation and/or the valorisation of the hydroxide metallic sludge produced during purification of the residual water from surface treatment. The process will be applicable to the whole of the surface processing industry, by chemical or electrolytic means. Hydroxide sludge, which contains more than 70% water, is currently left untreated in class 1 dumps. This situation requires rapid action as dumps are reaching saturation point, European regulation is evolving and there is an increasing awareness of the need to protect the environment.

9/ ECOTEX MOBILE DIAGNOSTIC SYSTEM FOR ENVIRONMENTAL
CONTROL OF TEXTILE INDUSTRIES

Starting Date: 6.94 Ending Date: 5.96

Duration: 24 months (Completed)

Objectives: The proposed research is directed at developing a mobile system of the industrial textile processing which will monitor a series of parameters influencing and determining the level of production, quality, environmental and maintenance conditions.

10/ QUICK RESPONSE PRODUCTION PLANNING SYSTEM WITHIN A COMPUTER INTEGRATED LOGISTIC CONCEPT FOR THE TEXTILE-APPAREL-RETAIL-PIPELINE

Starting Date: 9.94 Ending Date: 8.98

Duration: 48 months

Objectives: The application of "Quick Response Strategies" calls for the development of production planning concepts and instruments. It should thus be possible to improve significantly planning throughout the whole textile and clothing chain, both within each stage of production and between the various stages and/or partners, and also to integrate planning in a logistics concept. In order to do so, a consortium of partners will develop and implement planning methods and components based on the current state of the art of software technology and communication networks. A computer-controlled planning of production and logistics will be achieved, which will help to greatly reduce throughout times within each processing stage (e.g. spinning, dyeing, knitting, finishing, making-up) as well as lead times between these various stages. Moreover, this will contribute to a significant reduction of buffer stocks of intermediate and end products.

11/ SHARE PLANNING TECHNICAL QUALITATIVE CONTROL AND SHARE SYSTEMS FOR FABRIC FINISHING AND GARMENT MANUFACTURER

Starting Date: 1.94 Ending Date: 12.96

Duration: 36 months

Objectives: The project aims to develop an integrated system for the management of the production cycle of finishing in the Weaving Mill, and for the scheduling and management of the production cycle in the garment mill, with an eye to the full integration between the weaving and the clothing companies.

12/ DEVELOPMENT OF SPLIT-FILM CO-KNITTED THERMOPLASTIC COMPOSITES

Starting Date: 6.94 Ending Date: 5.97

Duration: 36 months

Objectives: The industrial objectives of this research programme is the development of a thermoplastic preimpregnated textile structure, based on the split-film technology and the knitting technique, and the development of adequate processing techniques for mass production application (cycle time less than 2 minutes) and for high-end applications.

13/ PREDICTION OF FABRIC PERFORMANCE

Starting Date: 5.94 Ending Date: 4.98

Duration: 48 months

Objectives: Overall objective of the proposed project is to develop a knowledge-based system for fabric engineering design, integrating a prediction component. Such a tool will provide fabric manufacturers with the required support to predict fabric performance and assess different options while designing a new product.

14/ AUTOMATED MANIPULATION OF FLEXIBLE MATERIALS FOR SEWING

Starting Date: 6.94 Ending Date: 5.97

Duration: 36 months

Objectives: It is proposed to develop an automated tracking and handling system for the sewing of two-dimensional flexible material-sheets into three-dimensional end-products. The techniques to be studied can be applied to the manufacture of a wide variety of sewn products made from porous and non-porous flexible materials. To focus the research the project will concentrate primarily on garment manufacture, with additional studies in the area of "soft-play" toys made from non-porous PVC coated fabrics.

The aim of the project is to make an important step towards the development of "intelligent" sewing-stations. The proposed research is a necessary step for computer integrated manufacturing in the making-up industry.

15/ PROPERTY TAILORING AND NET SHAPE PROCEEDING OF STRUCTURES FROM TEXTILE PREFORMS WITH THERMEPLASTIC MATRICES.

Starting Date: 1.94 Ending Date: 12.97

Duration: 48 months

Objectives: This project has the aim, to show the mechanical and economical potential of knit fabric reinforced thermeplastic materials compared to "standard" reinforcements, like woven fabrics.

16/EXPERT SYSTEM AS MANAGEMENT TOOL FOR BEST AVAILABLE TECHNIQUES IN TEXTILE WET PROCESSING

Starting Date: 9.94 Ending Date: 8.98

Duration: 48 months

Objektives: The objektive of the project is to develop an expert tool for assisting managers in decision making on

Best Available Techniques, taking into account the concept of integrated Pollution prevention and control.

17/NET CYCLENOW EUROPEAN TEXTILE CYCLE - INTEGRATED SUPPLIER - PRODUCER - CUSTOMER NETWORK IN HIGH QUALITY WORSTED SPINNING

Starting Date: 4.97 Ending Date: 3.97

Duration: 36 months

Objektives: The creation of a chain linking supplier-spinner and customer in a single integrated system is of interest to a vast sector of European economic operators and would result in the following benefits:

- Better use of raw materials
- Rationalisation and improvement of products and processes
- Reduction of the time which elapses between order and delivery

18/SURFACE ENGINEERING OF TITANIUM COMPONENTS

Starting Date: 11.86 Ending Date: 10.90

Duration: 48 months COMPLETED

Objektives: The objective of this proposal is to allow manufacturers to design high strength/weight ratio components in titanium for operations under conditions currently unacceptable. By enhancing the tribological and load bearing characteristics of titanium and its alloys a new generation of components will be available which will not only be of benefit in such traditional areas as the textile and automobile industries, but also for the pipeline and aerospace sectors. A variety of surface engineering techniques such as plasma and laser thermochemical processing offer considerable promise in this field.

19/DEVELOPMENT OF AN INTEGRATED SYSTEM ABLE TO OPTIMIZE THE FLEXIBILITY LEVEL IN THE TEXTILE-APPAREL PRODUCTION PROCESS

Starting Date: 7.91 Ending Date: 7.94

Duration: 36 months COMPLETED

Objektives: The development of an expert system allows production management through a short term production planning and constant adjustment in the light of the daily performances.

20/RESEARCH INTO THE CARDED YARN PROCESS IN THE COARSE YARN COUNT SECTOR USING MODERN NON CONVENTIONAL SPINNING TECHNOLOGY

Starting Date: 1.91 Ending Date: 1.95

Duration: 48 months COMPLETED

Objektives: This research project intends, to increase the productivity and efficiency of the carded wool spinning system, which is predestined to produce valuable and fashionable textiles from high quality fibres.

21/RESEARCH ON AND PERFECTION OF ON-LINE SENSORS AND CONTROLLING PROCESSES FOR CONTINUOUS TEXTILE FINISHING

Starting Date: 1.91 Ending Date: 1.94

Duration: 36 months COMPLETED

Objektives: Application of manufacturing technologies. Manufacturing processes for flexible materials

22/MATHEMATICAL MODELLING IN WORSTED SPINNING, ALLOWING THE OPTIMIZATION OF THE PROCESS AND THE DEVELOPMENT OF CIM

Starting Date: 5.91 Ending Date: 5.94

Duration: 36 months COMPLETED

Objektives: Application of manufacturing technologies.
Manufacturing processes for flexible materials.

23/DETECTION SYSTEM AND FAULT MARKER FOR TEXTILE DEFECTS IN
THE PATTERN, STRUCTURE AND COLOUR WITHOUT COMING INTO
CONTACT WITH THE MATERIAL ITSELF

Starting Date: 4.88 Ending Date: 7.91

Duration: 40 months COMPLETED

Objektives: The aim of the project is to develop a
completely integrated system to detect and to mark defects
in woven and knitted goods.

24/MAGNETIC BEARINGS FOR NEW FLEXIBLE SPINNING CONCEPT FOR
HIGH QUALITY YARN

Starting Date: 11.93 Ending Date: 10.97

Duration: 48 months

Objektives: The new machine concept will allow European
machine manufacturers as well as high-tech European
magnetic bearing producers to increase significantly their
market share. The reduction of the yarn price will bring
back to European yarn producers the leadership in high
quality yarns and increase their market share.

25/AUTOMATIC CELL WITH INTEGRATED ON LINE QUALITY CONTROL
FOR PANTYHOSE FINISHING

Starting Date: 10.93 Ending Date: 9.96

Duration: 36 months

Objektives: The main objective of this project is to built
up an integrated unit to automatically perform the
panty hose finishing by linking the already existing
seperated operation stations while providing an on line

quality control in order to fully automatize the whole process.

26/DESIGN METHODOLOGIES FOR ENGINEERING COMPONENT PROPERTIES

Starting Date: 1.90 Ending Date: 12.93

Duration: 48 months COMPLETED

Objektives: This project is intended to improve the quality of design and specification of mechanical components used typically in the aerospace automotive, electronic and textile engineering industries.

27/OPTISATION OF FLEXIBLE INDUSTRIAL AND AGRICULTURAL PRODUCT BASED ON FIBRES AND SYNTHETIC MATERIALS

Starting Date: 1.86 Ending Date: 12.86

Duration: 12 months COMPLETED

Objektives: The purpose of this initial study is to define which are the most important lines of research to be followed up.

28/ORIENTED POLYMERS OBTAINED BY RADIATION POLYMERIZATION OF ORIENTED LOW MOLECULAR WEIGHT SPECIES

Starting Date: 1.86 Ending Date: 12.88

Duration: 36 months COMPLETED

Objectives: The primary objective of the project is to develop new fibre spinning and dry - and - wet spinning methods without the usual disadvantages by using the better handling properties of a precursor with a lower molecular weight.

The secondary objective is to use the newly developed technique for the coating of optical glass fibre.

29/DEVELOPMENT AND APPLICATION OF MODULAR AND FLEXIBLE SYSTEMS FOR COMPUTER AIDED MANAGEMENT OF DISCONTINUOUS PRODUCTION PROCESSES IN SME

Starting Date: 4.86 Ending Date: 3.87

Duration: 11 months COMPLETED

Objectives: The aim of this initial study is to examine the possibilities for developing integrated commercial and technical management systems for industries producing relatively small batches in discontinuous manufacturing processes. The study will concern product development, product design, production planning and control, real time control of production equipment, material handling through to inventory control and sales.

30/FOLDING DEVICES AND SENSORS TO AUTOMATE SEWING MACHINES FOR MIXED PRODUCTION

Starting Date: 7.86 Ending Date: 6.90

Duration: 48 months COMPLETED

Objectives: New production technologies suitable for products made from flexible materials.

31/PLANNING, DEVELOPMENT AND DEMONSTRATION OF A PILOT FLEXIBLE CELL FOR DIVERSIFIED MANUFACTURING OF CLOTHING

Starting Date: 8.86 Ending Date: 7.90

Duration: 48 months COMPLETED

Objektives: The objective of this project is to develop new sewing technologies in which modules like needles, bobbins, loopers etc. will be interchangeable and can run without a central drive motor.

32/COMPUTER CONTROL IN CONTINUOUS DYEING

Starting Date: 9.86 Ending Date: 9.87

Duration: 12 months COMPLETED

Objectives: The decisive process variables will be determined by monitoring the production process for a continuous period and on the basis of a statistical analysis, four or five critical parameters will be selected.

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33/HIGHLY FLEXIBLE MODULAR SEWING CENTRE FOR A FULL RANGE OF OPERATIONS

Starting Date: 1.87 Ending Date: 12.87

Duration: 12 months COMPLETED

Objectives: The objective is to define a new way for the production of garments, especially for various styles, materials, colours etc.

34/PLANNING AND DEVELOPMENT OF AN INFORMATION AND COMMUNICATION SYSTEM FOR COMPUTER INTEGRATED MANUFACTURING IN THE APPAREL INDUSTRY

Starting Date: 9.86 Ending Date: 8.88

Duration: 24 months COMPLETED

Objectives: New production technologies suitable for products made from flexible materials.

35/OPTIMISATION AND CONTROL OF ACRYLIC FIBRE SURFACE AND CRIMP CHARACTER FOR MODERN YARN SPINNING PROCESSES

Starting Date: 1.89 Ending Date: 8.95

Duration: 53 months COMPLETED

Objectives: Larger scale trials will then be carried out to establish, with a greater degree of certainty, the dependence on certain identified critical properties. Concurrently, techniques based on image analysis using parallel processing will be developed to measure on-line

the crimp character and surface finishing level of fibre to the required degree of accuracy.

36/PLASMA TREATMENTS FOR TEXTILES: NEW PRODUCTS AND ENVIRONMENT PROTECTION

Starting Date: 2.93 Ending Date: 1.96

Duration: 36 months COMPLETED

Objectives: The above project will be carried out prospecting 3 ways of treatment using plasma or chemically-assisted plasma surface modifications of natural and synthetic textile materials to obtain high-quality products with permanent new properties, especially non-shrinkability, non-feltability and non-flammability.

37/SIMULATION OF THE RESIN TRANSFER MOULDING PROCESS FOR EFFICIENT DESIGN AND MANUFACTURE OF COMPOSITE COMPONENTS

Starting Date: 11.92 Ending Date: 10.95

Duration: 36 months COMPLETED

Objectives: The proposed research programme intends to address the current short-fall in expertise by developing techniques for the design of the RTM process for high performance components.

38/NON CONTACT REAL TIME DEFECTS DETECTION DURING THE MANUFACTURING OF A STRUCTURED FABRIC

Starting Date: 12.92 Ending Date: 12.95

Duration: 36 months COMPLETED

Objectives: The aim of this project is the study and development of an optoelectronic system able to detect defects during the weaving of a fabric.

39/HIGH QUALITY LASER MARKING OF POLYMERIC MATERIALS BY MEANS OF EXCIMER SOURCE

Starting Date: 11.92 Ending Date: 10.95

Duration: 36 months COMPLETED

Objectives: The aims of the project are to develop a prototype demonstrator excimer laser machine for marking high quality characters on computer keyboards.

40/NEW MANUFACTURING TECHNIQUES FOR ECONOMICAL AND QUALIFIED PRODUCTION OF NEW TYPE OF FLAX PRODUCTS "NEOFLAX"

Starting Date: 1.93 Ending Date: 1.96

Duration: 36 months COMPLETED

Objectives: Ultimate goal of the research project is the production of low cost of fine flax yarns from 100% flax or blends with high percentage of flax fibres, because in these areas yarn production was up to now very difficult.

41/QUALITY ASSESSMENT BY INTELLIGENT SURFACE INSPECTION SYSTEM

Starting Date: 1.93 Ending Date: 12.95

Duration: 36 months COMPLETED

Objectives: The goal of this project is the development of an intelligent system performing the following functions:

- on and off-line surface inspection
- on and off-line quality classification
- quality assessment of produced materials following classification rates.

42/CLEAN DESTRUCTION OF DYE BATH CONSTITUENTS BY ADVANCED CATALYTIC OXYDATION BEFORE DISPOSAL OR REUSE

Starting Date: 12.92 Ending Date: 11.95

Duration: 36 months COMPLETED

Objectives: The aim of the project is to develop and optimise an innovative method for treating waste waters.

43/DEVELOPMENT OF A SYSTEM TO DETECT AND TO REMOVE FOREIGN MATERIALS IN RAW COTTON AND SCOURED WOOL

Starting Date: 12.92 Ending Date: 5.96

Duration: 42 months COMPLETED

Objectives: The aim of the project is to develop an integrated system to detect and remove foreign material in raw cotton and scoured wool.

44/ADVANCED TECHNOLOGIES FOR AUTOMOTIVE SEAT EVALUATION AND DESIGN

Starting Date: 11.92 Ending Date: 10.95

Duration: 36 months COMPLETED

Objectives: SED has the objective of developing criteria, methodologies, data bases and numerical tools for evaluation and design of car seats.

45/APPLICATION OF MEMBRANE TO THE TEXTILE INDUSTRY: DEVELOPMENT OF SPECIFIC MEMBRANES AND PROCESSES

Starting Date: 4.86 Ending Date: 7.89

Duration: 40 months COMPLETED

Objectives: The membranes can be applied to reach one of more of the following objectives:

- to recover water and-or auxiliary chemicals
- to enhance traditional waste disposal methods
- to reduce the waste to be treated by concentrating it.

46/RESEARCH INTO THE FUNDAMENTAL PARAMETERS OF CONTINUOUS DYEING AND THEIR EFFECT ON SUBSTANTIVITY, MIGRATION AND YIELD OF DYESUFFS, IN ORDER TO DEVELOP ON-LINE SENSORS AND

REAL TIME CONTROL MECHANISMS THAT GIVE CONSISTENCY AND REPEATABILITY

Starting Date: 8.88 Ending Date: 1.92

Duration: 42 months COMPLETED

Objectives: Application of manufacturing technologies. Manufacturing processes for flexible materials.

;

47/STUDY OF A MODULAR DEVICE PERMITTING AUTOMATIC RECOGNITION OF FLEXIBLE MATERIAL DEFECTS

Starting Date: 11.88 Ending Date: 10.92

Duration: 48 months COMPLETED

Objectives: Based on the use of a camera the detection will first be applied to structural defects of singlecoloured fabrics with a recognition of the type of detected defect.

48/AUTOMATIC ON-LINE SYSTEM FOR DETECTION, EVALUATION AND MAPPING OF DEFECTS AND SHADE VARIATION MONITORING ON FINISHED FABRICS

Starting Date: 11.88 Ending Date: 6.92

Duration: 44 months COMPLETED

Objectives: Application of manufacturing technologies. Manufacturing processes for flexible materials.

49/ADVANCED TECHNOLOGY FOR THE MELT SPINNING OF CONTINUOUS SYNTHETIC YARN FILAMENT TO IMPROVE THE COMPETITIVENESS OF THE EUROPEAN TEXTILE INDUSTRY

Starting Date: 3.87 Ending Date: 5.90

Duration: 39 months COMPLETED

Objectives: This project envisages taking a major step forward in reducing manufacturing costs and improving productivity of the melt spinning of nylon and polyester continuous filament yarns by determining the process and

engineering requirements when yarn collection speeds are in excess of 6 km/min, and possibly as high as 10km/min.

50/MANUFACTURING COST REDUCTION THROUGH THE USE OF PREDICTIVE CONTROL TECHNIQUES FOR SMES IN DISCONTINUOUS MANUFACTURE OF POLYMER AND TEXTILE PRODUCTS

Starting Date: 4.88 Ending Date: 3.90

Duration: 24 months COMPLETED

Objectives: The aim of predictive control is to use real time information to continuously feed a model of the process in order to predict it's future state.

51/UNMANNED KNITTING PLANTS - DEVELOPING A PROTOTYPE AND PRESCRIBING OPERATIONAL REQUIREMENTS

Starting Date: 3.89 Ending Date: 2.91

Duration : 24 months COMPLETED

Objectives: Application of manufacturing technologies. Manufacturing processes for flexible materials

52/FLEXIBLE UNIT FOR REMOVING TEXTILE WORKPIECES FROM A PILE AND OVERLAYING THEM

Starting Date: 2.89 Ending Date: 10.92

Duration: 45 months COMPLETED

Objectives: The project is aimed at designing and constructing an automatic, highly flexible unit for taking textile workpieces from two piles of pre-cut textile parts and organising, recognising, separating, gripping, returning, transferring and positioning each of the two workpieces so as to overlay them with a view to making them into a single piece.

53/DEVELOPMENT OF STANDARDIZED MATERIAL TRANSPORT DEVICES
FOR THE SEQUENTIAL AUTOMATION OF THE PROCESSING OF FLEXIBLE
MATERIALS

Starting Date: 7.86 Ending Date: 12.91

Duration: 66 months COMPLETED

Objectives: This shall be achieved by the following
objectives of the project:

- Development of a new handling solution for flexible
material using the freezing principle.

- Development of standardized material transport devices
which in their combination realise varied sequential
automation solutions.

54/2-D AND 3-D GARMENT MODELLING

Starting Date: 7.86 Ending Date: 6.90

Duration: 48 months COMPLETED

Objectives: The objective of the project is to improve
current design and production techniques by means of CAD-
CAM.

55/A DIGITAL, ENVIRONMENTALLY FRIENDLY AND HIGH
PRODUCTIVITY JET PRINTING TECHNOLOGY, APPLICABLE IN THE
TEXTILE, GRAPHIC AND PHOTOGRAPHIC INDUSTRIES

Starting Date: 12.93 Ending Date: 11.96

Duration: 36 months

Objectives: It is proposed to develop a new,
environmentally friendly, digital, full colour jet printing
technology, applicable in the textile, graphic and
photographic industries.

56/ECONOMIC ELECTRICAL DRIVE HIGHLY DYNAMIC APPLICATIONS IN THE TEXTILE INDUSTRY, THE VALVE ACTUATOR INDUSTRY AND THE VACUUM PUMP INDUSTRY

Starting Date: 5.92 Ending Date: 4.95

Duration: 36 months COMPLETED

57/RESORBABLE CONTINUOUS-FIBER REINFORCED POLYMERS FOR THE OSTEOSYNTHESIS

Starting Date: 9.91 Ending Date: 3.95

Duration: 42 months COMPLETED

Objectives: The aim of the project is to develop a new form of processing for resorbable osteosynthesis devices, using continuous fibre-reinforced polymeric materials.

58/RESEARCH ON AUTOMATIC HANDLING TECHNIQUES FOR NON-RIGID MATERIALS BASED ON THEIR PROPERTIES

Starting Date: 9.91 Ending Date: 8.94

Duration: 36 months COMPLETED

Objectives: The principle objective of the research is to generate knowledge for use by systems engineers to develop machines for automated handling of a broad range of non-rigid materials.

59/DEVELOPMENT OF ENVIRONMENTAL FRIENDLY PROCESS FOR MANUFACTURING OF COATED FIBRES

Starting Date: 9.91 Ending Date: 8.94

Duration: 36 months COMPLETED

Objectives: Application of manufacturing technologies. Manufacturing processes for flexible materials.

60/DEVELOPMENT OF AN INTEGRATED SYSTEM ABLE TO OPTIMIZE THE FLEXIBILITY LEVEL IN TEXTILE-APPAREL PRODUCTION PROCESS

Starting Date: 8.91 Ending Date: 7.94

Duration: 36 months COMPLETED

Objectives: There are two lines of action in this project:

- By telematic linkage, garment collection data, as requested by the garment mill, are converted into suitable parameters to be transmitted to the production departments
- by the development of an expert system allowing production management through a short term production planning, as outlined in the former phase, and constant adjustment in the light of the daily production performances.

61/EXIMER LASER PROCESSING OF FLEXIBLE MATERIALS

Starting Date: 9.90 Ending Date: 8.93

Duration: 36 months COMPLETED

Objectives: In the proposal, scheme for the adaptation of excimer laser processing, technology for plastics and flexible material industries will be examined; in order to promote the introduction of high power excimer laser technology in industries dealing with flexible materials.

62/CHARACTERIZATION OF POLYMER-LIKE FILMS, FIBRES AND CERAMICS AND THEIR SURFACE TREATMENTS, BY HIGH RESOLUTION ELECTRON ENERGY LOSS SPECTROSCOPY

Starting Date: 11.90 Ending Date: 10.93

Duration: 36 months COMPLETED

63/QUICK QUALITY RESPONSE

Starting Date: 1.91 Ending Date: 8.95

Duration: 36 months COMPLETED

64/STUDY FOR THE DEFINITION OF PRIORITIES FOR EUROPEAN
INTEGRATED R&D PROJECT FOR TEXTILE AND CLOTHING INDUSTRIES

Starting Date: 11.90 Ending Date: 5.91

Duration: 6 months COMPLETED

65/DEVELOPMENT AND EVALUATION OF TECHNOLOGIES AS SUPPORT
FOR FLEXIBLE PRODUCTION GROUPS IN THE CLOTHING INDUSTRY

Starting Date: 1.91 Ending Date: 12.94

Duration: 48 months COMPLETED

Objectives: The objective of the project is therefore to
work with small flexible autonomous production groups and
to develop the necessary equipment.

66/INFLUENCE OF CARBONISING AND BLEACHING OF WOOL ON THE
FIBRE PROPERTIES UNDER SPECIAL CONSIDERATION OF THE
QUALITY OF WOOL FELTS

Starting Date: 10.90 Ending Date: 9.92

Duration: 24 months COMPLETED

67/PRINTING, WORLD WIDE INDUSTRY: PIGMENT SCREEN AND COLOUR
JET PRINTING OF TEXTILE MATERIALS UNDER UV AND EB CURING
SYSTEMS

Starting Date: 11.90 Ending Date: 10.93

Duration: 36 months COMPLETED

68/APPLICATION OF ULTRASONICS IN THE PHYSICO CHEMICAL
CLEANING OF TEXTILES IN DOMESTIC WASHING MACHINES

Starting Date: 7.90 Ending Date: 6.93

Duration: 36 months COMPLETED

69/MULTISENSOR VISUAL INSPECTION IN HIGH SPEED GARMENT
PRODUCTION

Starting Date: 7.90 Ending Date: 6.93

Duration: 36 months COMPLETED

Objectives: An automatic system for quality control in high speed garment production based on the current on the current state-of-the-art in computer vision techniques and involving advanced hardware architectures has been identified as a key device to increase the competitiveness of the European textile industry.



6- W E A V I N G INDUSTRY

Companies are inclined to continuously renew the technology they use. Most of those establishments set up their business after 1980 and use machines bought at the beginning of the decade. Yet, most companies prefer to renew their available technology by machines with shuttles with machines without shuttles.

A large number of new machines without shuttles have been ordered by the companies and may have already been imported. In spite of this many companies still own both, machines with and without shuttles. Some state owned undertakings use machines, which were bought in the 1940's, alongside high tech equipment.

Three quarters of the companies interviewed stated that they possess the latest technology available anywhere. There are companies, which have invested for the next two years, and there are others, who have ordered around 100 new machines without shuttles. The oldest machine in most companies is about 5 years old.

Companies have bought their equipment mostly from Switzerland. In the second place come machines from Germany. The rest comes from Italy, Japan and the U.S.

The question of "research made prior to importing machines" received diverse answers. For example

- We imported the most widespread and accepted technology in the world.

- We are members of the International Wool Secretary's Office. Our colleagues visit often fairs. We study various publications. We are in permanent touch with machine-producers.

- We imported the most inexpensive one.

- Our machines are modern, inexpensive, well known. They produce quality products.

To be widespread and accepted in the world was one of the reasons of their choice. There are many other reasons. A company, which is the member of the International Wool Secretary's Office stated that it acts according to the recommendations as put forward by its Secretariat. Most of the firms which I have interviewed said that they participate to machine-fairs. And one said, that it is in constant touch with the machine-producers. Financial considerations were brought up only by a minority of companies as their motivation.

A company said, that they market-researched the productivity of the technology they chose. Apparently their market research consists of reading international publications. Another company stated that "the technology they imported did not previously exist in Turkey, and that they wanted to fill a gap in the field."

Another company said, that they act on the recommendation of their clients, whose prerequisite to do business with them is that they purchase specific type of machines.

A company which aims to follow and use technology accepted by the EC companies, stated that they made a survey of the rival companies and decided accordingly.

The contribution of the technology to the cost per unit was not analysed by the companies. Nevertheless they expect to improve the quality of their output and as well as an increase in their profits. Speed is the main reason for the adaptation of high tech.

A saving of 15-20% in energy consumption was realised. A machine with shuttle produces about 15000 m/year while a machine without shuttle about 95000m/year.

Capacity increased due to these machines while there was a decrease in costs. The low fault-rate provided high-production. Breaking of the thread which resulted in a series of out-of-order machines was minimised. Operating these machines is relatively easy and one worker can handle 3 to 4 machines simultaneously.

Increase in speed resulted in the increase of material produced. A company stated, that production costs went down by 7% when this technology was put into use.

Quality improved and 10-15% return was obtained. On the contribution of technology to quality, the following statements were made :

Training the staff for the servicing of machines is easier, because automation requires almost no initiative. And more automation means less faults. Furthermore inbuilt control mechanisms result in better quality end-products. For the production of fancy cloth artificial silk and delicate materials are used. Such material must be weaven carefully, because they are very delicate and machines without shuttles are ideal for the purpose. The use of automated machines made it possible, to catch-up with world-standards (for example combed knitted material without seam represents the best quality and such technology makes that possible).

Also such machinery makes complicated designs possible. This enables companies to produce the best quality with a few exeptions. Also faults caused by warp and weft are minimized.

The stoppage of the machines due to the faults can be checked through a computer and this helps to eliminate weaving faults.

Mostly companies responded positively to the question, that high tech contributes to quality.

Automatical changing mechanism for machines is given as an example. The change of a machine from one category to another is possible simply by the use of a card. Quality due to the workers skill is thus eliminated.

Some companies claim, that there is no higher technology in existence than their own. Others claimed, that there are indeed more developed technologies but they contribute little to the endresult.

The consumer-bracket, to which the companies appeal, also differs. Women, youngsters, middle- and high-income-brackets can all be their target market.

They all agree that new technologies are expensive and even though high quality is achieved, they cannot appeal to masses due to high production costs. The number of companies, which are active in the wool-weaving industry are limited, which is the reason why the price of woolen materials cannot be reduced.

State-owned factories have a policy of producing for all income brackets. Uniforms for the army, police, postmen, foresters are produced in such state owned factories.

Factories set up primarily for exports appeal to the high income bracket consumers in Turkey. Yet in the countries where they are exported, they aim to appeal middle-classes.

The question if they would like to refine the quality in order to adress to higher-income clients, was answered by

most companies with the remark, that they already produce the highest quality which cannot be superated.

Some companies expressed the view, that they are satisfied with their clientele, and fear a drop in their market share if they adress to higher income-people. Other companies stated they always aim to produce the best quality, to catch up with the last set up standards which will enable them to have a voice in the world markets:.

One forth of the companies said, they don't intend to ameliorate their quality.

The energy used is mostly electrical energy. Fuel-oil is also used. The use of natural gas is also considered by most companies, they intend to use it in the future.

New technologies need less energy. That results in low costs. The share of the energy in the production cost gets continuously higher. This leads companies to invest in technologies which need less energy.

In companies the share of energy in the unit production cost is different from each other. It might be between 4%-33%. (One company even claimed : only 1%). Companies having three watches complained of high energy costs of the industrial electricity during certain hours of the day.

The main problems caused by the use of electrical energy is the result of the energy-cut-offs. Most companies have no generators, which leads to breaking of thread, faults in the weaving, colour differences in colour mixing machines a.s.o. That leads to the loss of millions of TL. in the factories.

Some companies found the cost of energy too high and applied to the Chamber of Commerce for Energy Promotion

Certificate. It is also stated, that electrical energy is much more expensive in Turkey than in European countries. Some companies use the energy which they produce themselves, as the-result of cost researches on energy.

All companies stated, that their administrative staff is well informed about the use of high technology. Some companies said, that they are in continuous contact with the ministry, and some with Europe.

International fairs and seminars are followed closely. Publications are steadily followed.

State owned factories expressed, that their administrative personnel continuously attend courses on high technology.

All the interviewed companies have among their staff technical personnel. 50% of these companies educate this personnel themselves. They prefer to engage graduates of technical schools, but they are not easily available. Every company has to offer the training facilities in a certain degree. And than they select the needed personnel among them.

Technology marketing companies steadily inform the textile companies about the new technologies and offer courses. Sometimes these courses are held in the company or abroad, at the training center of the technology-marketing companies.

One of the companies stated that the service provided by the technology marketing firm is sufficient. Personnel for maintenance exists in all companies.

Companies employ both skilled and unskilled personnel. In general 30% are skilled and 70% unskilled. The skilled personnel consists of graduates of art-schools. These are

charged more with administrative work, as supervision. Many companies train them from among the unskilled workers.

Some companies have training programs for workers like spinners and weavers. Mostly unskilled workers are graduates of elementary or junior high-schools. A low percentage of them have graduated at senior high-schools.

All the companies in great cities have spoken about low efficiency of the workers. They change often the working place and can't be motivated because of low wages.

In smaller cities the existent working-staff changes are relatively slow, and this affects the efficiency positively. Graduates of art schools are preferably engaged, but it is rather difficult to find such personnel.

The technology used by the company has an important part in marketing. 8% of the companies stated, that they could get the order after the clients see the then present technology. 8% is of the opinion, that technology has no effect on marketing. Some companies can only get the orders after they are equipped with the preferred technology of the clients. These companies in general sew the pieces together, which are cut in the ateliers of their European clients.

50% of the interwieved companies told, that there is no higher technology than their own in the world.

%42 said, that all companies use the same technology. 8% stated, that there are more developed technologies in Turkey than their own and that they can follow the developments with a two years delay, because of burocratic barriers.

The organised sector can use promotion credits to obtain new technologies. The unorganised sector has no such possibility. These companies buy used machines of the organised sector.

In Turkey there are companies, - out of the export aiming developed companies - who produce for the inner market. They print cloth by hand and use simple machines. There is a great quality difference between high and primitive technologies, but clients of the inner market aren't too meticulous concerning the quality.

Most companies agree, that high technology gives a great competition power to Turkey in the international markets. Companies participate two times a year in international textile-fairs. So they can follow the latest developments in this sector.

With the use of high technology the produced quantity increases, fault-rate decreases and so the price goes down. The most important facts in exports are quality and product-costs. Cheap labor is an advantage, but the most important point is the quality. There is no great raw-material difference, because the whole world uses the same raw materials (f.e. greasy Australian wool is used in the whole world).

The only difference is, that there are not enough new machines. Companies try to renew their technologies, but technological developments are quicker than the renewing-speed of the companies.

The most important factor for competition is the new technology. Companies stated, that without it they have no possibility of competition. Therefore they follow new technologies and adapt it to their structure.

With the imported technology companies produce high competitive wares. These have no marketing problems. 66% of the companies described their own technology as the best in Turkey. The remaining 34% said, that they use nearly the best: the second best.

The capacity use is over 60% in general. Capacity use is higher 90% by 80% of the companies. For 8% the percentage is 80 and the remaining 8% uses 60%-70% of its capacity.

If additional capacity is needed, most companies would choose the same technology. But companies prefer use small ateliers for sewing instead of adding capacity. As long as they don't feel secure of the continuity of the orders they avoid to making big investments.

8% of the companies expressed the will to produce more kinds of wares.

Some companies renew their technologies with a slow process. They stated, that they would import the newest technology if they could be sure that they would get continuous orders.

50% of the companies said, that they wouldn't change their technologies if they would adress a wider range of customers. %16 said, they would. Companies think, that labor would cost more, once Turkey will be a member of the EC, and they plan to increase the number of machines pro worker.

Other companies indicated, that they produce different kinds of wares, and they do own the sufficient technology for it. 25% of the companies see no barriers preventing the use of unknown new technologies.

Financial problems and the high cost of money causes anxiety. 40% of the companies have difficulties with credits and financing. 40% of the companies can't get qualified personnel. To get the know-how and the skills to operate the machinery is not easy and causes problems.

It takes a great deal of time and energy to train technical personnel in order to get the highest productivity out of the machines. The trained worker often changes his working place and there is a continuous need for new personnel.

New work requires a long preparation time and experience. To get education and to collect sufficient information to operate the machine need time. It is also very expensive to import new technology with all the details.

To use the present technology as productive as possible is not easy. People, especially workers have great difficulties, until they get used to high technology. Energy difficulties occur. Raw material can't be found in right quantity and quality.

Orders are not spread equally over the year. In winter orders and the production increase, while they decrease in summer. Some factories make annual contracts and this requires full production. 8% of the companies are able to get such orders.

40% of the companies are not satisfied with their workers. With each novelty difficulties occur and training of the personnel gets more difficult. A certain number of workers don't benefit from training.

Companies can easily get credits, but interest rates are high and so the number of companies who appeal for credit is relatively low. High interest rates increase the cost

of machines, and unless obliged, companies don't apply for it.

Short-term credits are more demanded. 5-year credits are too high for the producers. 25% of the companies find the promotion loans insufficient, but 75% are content with them.

Some companies made use of "export-encouragement-loan" and imported machines without paying customs. Others complained that there is no aid to decrease any of the costs.

Supporting export led many people to establish export-companies. But much of this support ended in summer 1989 and a great number of companies fell into difficulties.

There are companies which think that export companies should be able to exist without state-aids, but the inflation causes great problems since the stopping of parity changes. The production costs increased because of the inflation, but due to the contract he has already made, the producer can't increase the selling price. Thus the gain decreases continuously. Investment aids are found beneficial.

The producer is expecting a stable state-politicy. For example as the export of cotton was set free, the producer found itself in a difficult position. Companies were not against this decision, but they criticise that it was decided suddenly, without any warning. Producers said, that without inflation they wouldn't need any state aids, but that inflation makes it very difficult for them to continue their exports.

It is claimed, that the aid is distributed not to the real needy, but to those who are quite comfortable. A more equitable distribution is requested.

Concerning the proper sources of the company, 92% of the companies stated, that it was sufficient. 8% said that being old establishments, their own capital wouldn't suffice.

Banking authorities, with whom I've spoken expressed the view that this subject is one of the reasons of difficulties. The capital problem is a serious concern and that the loan rate for proper capital is very high.

40% of the companies said, that they can obtain the required raw material locally, while 8% stated, that they prefer to import it, although they can be provided at the local market.

24% said, that they can't get the required raw material locally. Other companies stated that they partly buy their raw material locally and partly import it. Greasy wool, different paints and the like can't be found in Turkey, therefore have to be imported.

17% of the companies are of the opinion, that considering cost and quality it is not logical to import raw material. Others find it logical.

Dye is imported by all the companies. The same raw materials (for example : viscose, greasy wool) can't be found in Turkey. The price of the cotton, which is an important raw material increased suddenly as its export was set free recently and importing of cotton for cheaper price became possible. 17% of the companies expressed, that they could start importing it.

It was said, that it is advantageous to import raw material from the Far East (not from Europe). Most of the companies import only a part of its needed raw material.

Potential in the exports is considered positively by companies. 92% of the interviewed companies think, that there is a potential for exports. 8% think that this potential is only at the ready-to-wear sector and not in the weaving industry.

92% of the companies think that, better quality and higher capacity would result in an increase of clients. 8% think that the number of clients has no connection with capacity and quality.

16% of the companies said, that their clients wanted them to produce more, but because of capacity problems (already full capacity) they can't afford it.

As a response to the question "if at production planning, production follow-up, material follow-up and cost-accounting computers are used", different answers were given, but it came out that computers are only partly used.

25% said, that they use computers in some fields and are satisfied with it. 8% stated that they are in a transitory stage, machines having arrived concluding their investment. 8% use computers only for cost-accounting and production follow-up. 8% intend to work with the computers. First stock and then accounting systems will be applied. Salaries are already being worked with computers.

8% stated, that cost-accounting is already applied by the computers, they will work on production planning and stock-control for applying it to the computer. 8% stated, they already use the computer for the above subjects but didn't

have satisfying results. Other companies are on the transitory stage.

If we compare Turkish textile industry with the European textile industry, we get interesting results :

The question, 'if the same kind of production is made in the EC with higher technology', was answered by 65% of the companies with a "no". 8% made a difference between the products and said for A-type-products "no", for B-type-products "yes".

The remaining companies stated that in EC the factories are totally in automation and that they don't use such a high technology as EC.

The question on the reasons for the differences in costs, productivity and quality, although the same technology is used in Europe was answered differently by the companies.

-In Europe cost of money is cheaper than in Turkey. Energy costs less in the EC.

-In Europe, people have a higher education level.

European workers (and working habits) are different than Turkish workers. In Turkey workers change their working place often, and that prevents them from becoming specialists in their work. In European countries workers remain for a long time at the same working place and every worker gets as skilled as a master (foreman). The age average of workers in European factories is higher than in Turkey.

The reason for some of the differences to the disadvantage of Turkey in quality is the above statement.

Concerning productivity there are two opinions. All the companies expressed the view that labor is cheaper in Turkey, and 7% find workers' productivity low in Turkey.

7% of the companies are of the opinion, that raw material prices are cheaper in Turkey, while another 7% stated that these prices are higher.

92% of the companies said the quality is the same as in Europe, 8% think that quality here is lower. This 8% said, that if the worker is skilled, then the quality is better, but workers aren't skilled in Turkey. Quality of yarn and dye in Turkey is not as good as in Europe, and so quality of the end-product is lower here.

Another 8% stated that raw material as well as the electricity are expensive here, and added that spare parts in Europe are also product of higher technology in Europe and all these are negative points for Turkey. As a solution to this problem it was said that rather than selling the company to foreigners, joint ventures with foreign partners should be aimed. Some other companies stated also, that it is not so easy to find new markets for Turkey as it is the case for Europe. If one would have his seat in one of the EC countries, it would be more effective.

A company said that quality is the same as in Europe, and so far having an advantage over them, labor-intensive yarns should be produced here (every yarn doesn't need the same treatment).

The fact that European workers are educated, conscious and attentive was expressed by all the companies, and it was said, that the lowness of salaries in Turkey doesn't

motivate the workers and they don't pay attention to their work.

The question, "if there appears in Europe a higher technology, would the companies like to import it" was answered by 25% of the companies that there exists no such technology. Other companies had different opinions :

The uncontinuity of orders, obligation to deliver the order in a short time and small orders prevent the companies from making big investments. The working system is set this way. All kinds of orders are accepted.

Companies, who want to increase the quality and decrease the costs intend to buy high technology. But there are companies, which don't want to reduce the number of workers. They are satisfied with their current technology.

The latest and best technology is desired for dye factories.

A computerised dying factory is longed for, because production follow-up, to get the quality of dye and get informed-about the status of the whole dying factory from one center are among the possibilities which can be organised by computers.

33% of the companies said, that if Europe uses high technology, the most important reason for that is to decrease the labor expenses. 25% state that better quality is the aim. Other companies stated, that to increase the production and to decrease the costs are important reasons to use high technology. New technologies are desired to sell more products easier, to be competitive and to create new demands.

Companies mentioned that dying factories were places, where computers are mostly needed. To measure and mix colour computers are needed. In addition finishing and preparing new designs are among the reasons, why companies wish to use computers.

As a result, production follow-up, costs, stock, accounting, production planning, quality control, return calculating, loom return indicator are among the subjects which are thought and desired to be done by the computers.

European Community is developing a program concerning automation in the textile industry. It is called "Brite program" (see chapter 5) and it deals with more automation in sewing machines. Millions of ECU's are invested in this program.

What is Turkey's point of view concerning automation in the textile industry? All companies agree that the future of the textile industry lies in full automation and production without faults.

Selling wares to the EC means getting into competition, then automated machines are needed. Europe aims to diminish labor as much as possible and this could reach 1% at the end.

Very high automation isn't ideal for Turkey, because labor is cheap, and because of high rate of unemployment it will remain cheap, even if Turkey gets full membership of the EC (like in Portugal now).

It was said, that it is too early for Turkey to get fully automated. In addition, companies stated, that they have come a very long way in a relatively short time, and they couldn't have made it better.

The question "Could Turkey have a competition-chance, if the same technology is used as the EC" was responded with a definite "no".

But Europe, and especially highly industrialised countries like France, Germany, England and Switzerland are beginning to give up the textile industry. Therefore Turkey is becoming more attractive to European countries. EC countries prefer to produce machines for the textile industry rather than to produce textiles. Investments for the textile industry decreased to a great extent.

It is more profitable to be a technology producing and marketing country, but we can use only the produced technology.

Companies export mostly to Great Britain, France, Germany, Italy, and Benelux countries. Export is made also to U.S.A., Canada, Greece, KKTC, Spain, Saudi Arabia, Albania, Iran, Iraq, Kuwait, Algeria, Singapur, Sweden and Denmark.

While most companies complained of the abolishment of the state aids, some others stated that if import and export-aids are be abolished they would get difficulties, but it wasn't essential for them to stand on their own feet. One company finds tax-return not necessary, it thinks that selling on base of real costs should play the main role in the trade.

Companies rate negatively the increase of raw-material and energy prices and high interest rates. Unsteady state policies, change of decisions, sudden new decisions (without warning) are among the themes, which trouble the companies.

The decrease of state aids is, regarding to some companies very negative. They state, that also in the EC there are hidden aids, Turkey must continue to give the necessary aids.



7- R E A D Y - T O - W E A R INDUSTRY

Companies working in the ready-to-wear industry which I investigated are of the opinion that the ready-to-wear sector is a labor-intensive industry, and therefore use traditional sewing-machines. They are all simple sewing machines. Some companies own special automated machines for pocket, side-seams and flap's. Most companies continue to use the traditional machines. Especially companies which produce garments for boutiques said that they use out-dated technology. Some companies use pattern drawing and cutting machines but due to the expenses involved with regard to new technologies, they finally decided in favour of more workers and less technology. Thus it is clear that they don't find it profitable to use modern technologies. Some machines have no maintenance facilities in Turkey and so any mechanical failure results in great difficulties. Furthermore such machines do not have a second-hand market.

Some companies stated, that they intend to buy pattern-drawing systems. These systems are cheaper than the cutting-systems and are widespread in the EC and Turkey. Small companies also use the pattern-drawing system.

Companies import machinery from abroad. They mostly import from countries like Japan, West Germany, U.S.A., Italy, Spain and Austria. The oldest machines are 30 years old, and the newest ones are imported this year.

In general machines belong to the time of the founding of the companies and have not been replaced since. If additional machines are needed, only then new machines are bought, and these are traditional sewing machines. In the

ready-to-wear industry high technology machines aren't used. In case new machines are needed, brand names that have been known to them are selected.

The firms gave different answers to the question "What kind of preliminary work they have done in selecting the technology to be used?"

To familiarize with the idea of using computers, to facilitate the production, market-research, and to invest for the future are some of the reasons, which led the companies to furnish with high technology.

Some companies thinking that labor in Turkey will get expensive in the future, tend to invest in low-cost-high-technology. Others which disagree with the above statement continue with the most economic solutions.

Highly industrialised countries give scholarships to foreign students to study textiles in order to invest for the future to export their machines to the countries of these students. These students after their return home, prefer the machines with which they are familiar, thus urge the companies to import them.

It is a negative fact, that the former school-industry cooperation couldn't be continued. The education centers knew the exact requirements of the industry and the industry knew the latest developments in the textile sector. Some firms bought the technology they use through the promotion campaign of the producer firm.

The maintenance possibilities of the imported technology and the provision of spare-parts are important factors concerning the selection of the technology.

The main factor influencing the selection of the technology are factors and the choice of the customer resulting from the relation between the producer and the company. Some firms thinking that labor is cheap in Turkey buy the cheapest simple machines while making short-term plans.

According to some companies the technology was not profitable concerning cost per unit. But the majority stated that through technology they economized on work power and the percentage of failures has decreased.

In pattern drawing, the fact, that the pattern remains in the memory of the computer and can be reached when needed for drawing and cutting of the same kind of order without any faults, is considered a great advantage by the companies.

Companies, saying that automated cutting systems diminish the fault-percentage highly, and in case of continuous orders, high technology would surely be a great advantage.

The decrease in workers number and a finer quality of product are among the reasons why companies decide in favour of high technology.

According to some companies, there are problems with the quality of the fabric (different width), and that causes problems in using new technology. Quality control is a very important subject, and more attention should be given to this problem.

Concerning the contribution of technology to the quality, 15% of the firms are of the opinion that there is no contribution. The remaining firms did have different thoughts on this subject. Despite some of them, who think

that only time is spared, there are firms who assure that quality got much better.

To the question of contribution of a higher technology to the quality, 50% of the companies answered, that they didn't expect any improvement in the quality through technology. They declared, that production for boutiques in garment industry is labor-intensive, and technology in this sector will not be very helpful.

Some firms are of the opinion that sewing time could be 10% quicker. The problem is with the workers, not with technology. To employ mobile workers bears difficulties. A high percentage of companies stated, that high technology is absolutely needed in the cloth-production sector.

Exporting firms generally appeal to high-income-brackets. In order to be able to export to European countries, firms produce high-quality goods, and in Turkey these goods are sold only to high-income-brackets. These companies do not produce anything for low-income-brackets. Most firms produce for boutiques and boutique-like stores abroad and this addresses to middle-class people.

67% of the companies are satisfied with the quality of their work and don't plan to refine the quality. One firm stated that brandname is important (name of the company already known) and no matter how the quality is, if the name is unknown, the result will not change. 33% of the companies claimed, that they aim at improving the quality continuously.

All the firms use electrical energy. Fuel oil and coal are also used widely.

Though electricity-cuts are not harmful to some companies, others are highly disturbed. Electricity cuts ruin electronical equipment, thus causing great problems. 20% of the companies own a generator, which is activated as soon as electrical energy is cut off. It is said, that Turkish electricity is 50% more expensive than in Europe.

As a response to the question, 'Does administrative personnel has knowledge about high technology ?' firms stated this is to be positive. Visits to factories, fairs and exhibitions abroad provide for this knowledge.

Usually companies employ technical personnel with administrative qualities. But as some companies stated, this kind of personnel is quite mobil and change their jobs very often. Mostly firms employ people with a basic education, and once they are employed, organize training programs to further educate them.

90% of the companies have skilled personnel for the maintenance of their machines in their own staff. Those companies, who don't have the necessary maintenance personnel, count upon the services of brand names of their machinery.

It is difficult for the administration to get skilled personnel. Companies prefer skilled personnel mostly, but this is not always possible. In general, companies prefer to train their own personnel. Most companies would like to continue the traditional school-industry cooperation to employ their personnel. That is the reason, why companies have skilled and unskilled personnel working together.

Another type of workers is, that even though they are experienced in another kind of job other than textiles,

companies still prefer this kind of workers to completely unskilled ones.

Some companies are of the opinion, that place and technology are very important factors for the clients. Some companies stated that their clients in order to work with them insisted on high technology as a must. Some companies indicated that they would import high technology if required by the clients. There are some companies, which believe in low prices as sufficient factor for marketing, and since this sector is a labor-intensive one, high technology isn't needed. Since there are not enough orders, companies are channeled to low-price-technology.

%40 of the firms are of the opinion that technology has nothing to do with marketing. They state, that their merchandise is of high quality, and that is what concerns their clients. "If prices are reasonable, and the quality good, then we are satisfied" some firms said. Others prepared special brochures to introduce themselves and their technology. Here, technology is used as a marketing factor.

To the question " What kinds of technologies exist in Turkey concerning the textile industry ?" companies responded knowingly and pointed out that they followed the novelties in the field closely. Some companies, even though they did not use new technologies themselves, were informed about the subject.

In the textile world, who uses high technology and who uses classical methods are all known. According to some companies, companies who claim that they have high technology wouldn't have the know-how to use it.

Some companies pretended, that their technology is the same level as in industrialised countries, and no better technology exists. It was also stated there are no workers, who could work with super-automated sewing machines. In Europe workers permanently in the same post acquire skill in their professions, while it is just the opposite in Turkey.

The contribution of high technology to the competitive power of the Turkish exports is high according to some companies, because clients attach a particular importance to place and technology. Clients prefer some firms because of their higher quality, and although the same merchandise can be bought cheaper somewhere else, they accept to pay higher prices. The companies concerned believe, that since they are able to export to the EEC market they are capable of producing garments up to the European standards.

Another view is, that the technology of industrialised countries is not developing any more. It is claimed for example that technologies used in U.S.A. are older than in Turkey. Indeed, investments in the textile sector in U.S.A. have decreased sensibly in recent years.

Firms with computer integration told, that the possibility of storing thousands of models in the memory of the computer and to use them whenever wanted, is a great help in order-repeats, also the computing of used cloth is made instantly. And these facts are of great importance for quick production.

Technology quickens the production, which causes an abundance of stocks, and as a result the ware gets cheaper thus supplying competing capacity.

Most of the exporting firms call their technology as the best in Turkey. Some of the interviewed firms own the most modern cutting and pattern-drawing systems. All of them called their technology as the most perfect. Firms, who don't own the stated systems point out that the kind of sewing machines they use are also used by other companies, and in general in Turkey technology could be classified as a middle- and upper class technology.

37% of the firms make use of their whole capacity. Capacity using percentage is 100. These in general are the firms, which make all-year-around contracts. This provides them work for summer months, unlike the other companies.

The question "if there were a chance of creating additional capacity which technology would you prefer ?" was answered differently by various companies. Some mentioned machines, which would complete the already existing technology. Most of them were of the opinion that they would choose again the already existing brand names. Some others point that they would prefer the most economic models. The latest technology was also considered by some of the companies.

Companies consider to change their technology only if they would serve a greater client-group. One of the most marked points is the situation, that export companies are not sure of their clients.

One of the immediate aims is to complete the already existing technology. Since new technologies consist of some interdependent machines (for pattern-drawing and cutting); companies need to buy these machines one by one to solve their immediate problems.

It was claimed, that it is not easy to change technology in Turkey. In addition high technology for grading, computer-

design and final ironing is known by the firms, but companies which cannot get big orders, do not find it worthwhile to acquire these new technologies. Companies, which reach an equilibrium in all-year-around orders, own already the mentioned technology or plan to buy it.

It is also claimed, that a fashion center like France consists of numerous small sewing-ateliers and that is a good example of the uselessness of considering a technology-change.

Some companies intend to change their technology. Others laid down as a prerequisite to get "big standard orders" for to consider a change in the technology. There are also firms, which are satisfied with their clients and don't consider any changes.

The greatest barrier in adopting new technologies is said to be the worker problem.

As some firms have not engaged additional personnel for the new technologies, existent staff was insufficient, thus could not reach the maximal output.

The workers being used to the old system, couldn't revert to the old system immediately and that created a problem. At least 3-4 months were needed to familiarize them with the new technology.

The training of the newly employed personnel took a long time. Old personnel thinking that they would loose their job was disturbed and this feeling showed itself with an instinctive "no". Some workers believed, that they could do it quicker than the machine.

Finance, business administration, place problems appeared as other barriers. The maintenance of the machines

appeared as another problem. It was necessary to train personnel for this purpose. Training and timing problems were added to the other problems.

The worker problem came again into the forefront when a productive use of the existent technology was considered. Trained worker has a tendency to change work immediately after the training program is completed. There exists the problem of finding a sufficient number of skilled personnel. Firms reduce each others personnel.

Some high technology producing firms don't mention the total number of machines required to get the best results, with the aim of presenting their products less expensive. With time companies find out what is lacking and additional expenses arise.

Companies use their credit possibilities in a positive manner. In general they have to work with credits, since they get paid after the products are sold. It is not difficult to obtain this credit, but the interest rates are high and that causes payment difficulties. Companies which had negative results with credit system try not to work with credits because of the excessive interest rate.

It was said that state-incentive is sufficient. However, import difficulties and long transaction formalities in Ankara were mentioned as additional negative points.

The cutting off of export-promotion means the cutting of tax-return which put the firms in a difficult position. Furthermore, the slow increase in the exchange rates, and at the same time the high level of inflation added to that difficulty. Investment-incontives are judged positively. Companies in general stated that their real-assets are sufficient, only 13% expressed the contrary.

Firms in general can obtain the required raw-material within the borders of Turkey, but the quality problem forces them to import raw-material from abroad. Since the firms have to achieve a certain quality for export, raw materials obtained from the inner market hardly meet the required criteria.

The continuous increase in the raw material prices force the companies, which until now constantly secured raw material from the local market, to import them from abroad.

Considering quality and production costs companies generally stated, that it is reasonable to import raw material after the last price-increases. The production cost is constantly increasing as a result of inflation, and dollar's exchange rate has also increased. This puts the companies in a difficult position, and some had to close.

Good quality raw-material is difficult to get in Turkey, therefore firms have to import them from abroad. Wares produced by imports are cheaper.

Even though the potential in the export is seen positively by the firms, they think that quotas create big problems. They are of the opinion, that if the quotas are eliminated, they can sell 2-3 shirts to one family in Europe. To keep up with the seasonal lines in the fashion sector also is not an easy problem. If this line is caught in time, potential wouldn't be a problem. Concerning finding new markets, firms have confidence in themselves. But they think that to find long term clients is not as easy as short-term clients. It is thought that increasing the capacity and bettering the quality will effect the number of buyers.

Use of computers in fields like production, production follow-up, material follow-up and production cost accounts is not yet perfect in Turkey. Some firms brought software-program-packages from abroad, others tried to let them be written locally. With the local programmer difficulties came up. It was also not easy to use imported software. Long time has elapsed and the result is not satisfactory. There is a lack of personnel in this field. To import software packages from abroad is a high-cost action, and firms can't do it, even if they like to do so.

Some firms planned, to use computers for the future in those subjects, and they made cost calculation, but they had to face very high costs. The result of their research is that the programming has not yet reached to perfection in Turkey.

Some companies would like to develop the existing systems. Often there is no connection between the company and the factory. Some companies told that they transported some information to the computer, but most subjects, like cloth, stock and accessoires are still handled by hand and with old methods. Only a little percentage of the companies declared themselves satisfied with the computer applications. According to companies, European countries use technologies suitable to their own styles.

Companies say that the only advantage of Turkey in entrance to the EC is cheap labor. The technology used in Europe is similar to that of Turkey. Some companies go further and state that their technology is higher than that of European countries. High technology is used in Europe only by a few companies. It was also stated that high technology isn't used in Europe. The reason is that in the fashion

industry, production is made only in small quantities, and therefore high technology is not needed.

Companies, which own cutting systems are of the opinion that they have the highest technology, but they add, that Europe uses more developed technologies in other fields.

The fact that European companies import textiles in great numbers, is conceived by Turkish producers as "high technologies are expensive everywhere, that is why Europe prefers to let sewing done in countries like Turkey". Another view is that European countries have to use high technology, because labor is expensive in Europe.

The question "if the same technology here is also used in Europe, what are the reasons for the difference in cost, quality and productivity between Turkey and the EC" was responded by most of the companies as "labour".

It was said, that in Europe there is division of labour, and pay is high, plus, there is an old-established accord-system. The European worker knows how much he has to produce per hour, the work follow-up by hour, and that the workers are skilled, are the causes of great differences in the production in Turkey and in EC. The difference is in the quality of workers, which is the reason for difference in productivity. There is no difference in the quality. It was even stated, that the quality in Turkey is better. Cost is cheap in Turkey, because labor is cheap.

It was added, that in Europe technology can be hired, and this possibility is a great help for the companies, while in Turkey there is no such possibility. (*)

Companies were asked the question of "Do they intend to use high technology in the future ?". Most of them, which don't use high technology, responded in the negative.

In Turkey the fact that ready-to-wear industry is a labour intensive sector led to the thought, that this kind of technology has to be worthwhile. Demand by European customers plus orders getting fixed are reasons for the import of these technologies. Some companies stated, that they would begin to use this kind of technology when labour gets expensive in Turkey. There are companies which plan the use high technology in the future, but they haven't started yet.

According to some companies, the reason Europe is using high technology is generally the high cost of labor. One of the firms, which has bought such a system told, that it economised on 17 workers. Europe intends to produce more machines and by marketing them to obtain higher profits. That means, textile-industry is becoming less attractive. To increase the production and diminish the cost, to heighten the quality, to produce more with less work, are among the reasons which lead Europe to use high technology.

(*) Concerning pattern-drawing there is such a possibility. The companies which market high technology on this sector, prepare for different companies, the drawing of their patterns. A company, which plans to work this way, may not be successful, because other companies fear that their models could get stolen while being drawn there.

The question "where could computers be used? " is answered nearly by all of the companies in "cutting". The most widespread computer applications are as understood by this answer, cutting machines. Design, colour, planning and analyzing activities are in the 2nd rank. To prepare a colour-card, to draw models are among the subjects which belong to actual computer use. In reality, most companies aren't using these systems now, but they plan to do it in the future. For financial analyses and stocking computers are also used. Iron press, and sewing (like buttonhole automates) are on the last rank. That is a realistic result, because these are the less used technologies.

In the EC currently a program is developed for the automation in the textile industry : Brite program. The goal of the program is to insert as much automation as possible in the textile industry.

Companies consider automation activities in textile with different views.

Some companies are of the opinion that automation brings no benefit to the fashion world, when it comes to sewing, it has to be labour-intensive work. For cutting, high technology could be useful, they state, but any further high technology is not needed. In addition they think, that investments by western companies in Far East countries are due to cheap labour.

Some companies point out that Turkey is leading towards high technology. They say that in order to adress the world market, some definite standards must be achieved. The difference between a skilled and an unskilled worker can be reduced to a minimum only with high technology, and the result is, equality in the production.

Due to another opinion, hand-work will get valuable, if production costs decrease. For example with woolen sweaters : "Europe has developed a high technology to knit wool-sweaters. High quality sweaters were produced and Turkey seemed to loose production possibilities. But now hand-knitted wool-sweaters are very fashionable and Turkey has a big share of that market."

Some companies interpreted it as an another proof of the fact, that high technology is not necessary in the textile industry. These systems could be very useful f.e. for army clothing. Some firms defend the opinion, that in the fashion sector there is no place for standardisation and therefore high technology isn't needed.

Some other companies stated, that in Japan robots are sewingmen's shirts, and if workers salaries continue to rise, automation will be a must.

The only advantage of the computers is to quicken the work, that is why computers are not much needed in our country, since the wages are so low.

Most of the exports are directed towards F.R.G. U.S.A. occupies the second place. Holland and Switzerland follow these countries. Poland, Japan, Canada, the Soviet Union, Hungary, South Africa, Brazil are amongst the countries where Turkish exports are made.

Some companies are of the opinion, that investments would increase, if Turkey gets to be a member of the EC, but it is feared at the same time the EC-countries may prefer East-Block countries in the textile sector because of cheapness of labour in these countries.

Firms aren't satisfied with state policies in the textile business. The state has abolished the state-aids on the textile-export and that caused dissatisfaction.

High inflation, changes in the exchange policies, change of the system of adjustment of foreign currency to Turkish money are on top of the list of worries.

The new cotton-policy increased the cotton prices in the inner market (double), therefore it became more profitable to import cotton from abroad.



8 - C O N C L U S I O N

8.1. - WEAVING INDUSTRY

In the weaving industry the most advanced technology is being used in Turkey. The new developments are being followed closely and applied within a very short time period. Weaving industry is able to compete with the EC and World Trade, and therefore they are convinced that the most advanced technology is a must. Today the weaving machines without shuttles are being used instead of the ones with the shuttles. These machines are fully automated so they need less manpower and while being very fast they increase the production. Administrative staff stated that the wages will increase by entering the EC, and this will result in the use of modern technologies which will require less manpower. These modern technologies use less energy. In Turkey the share of energy increases by cost per unit, therefore investments are channelled towards technologies using less energy.

Most of these textile products of high technology are exported. The potential of export trading is high.

The firms who cannot afford high technology equipments, are producing low quality textiles for the inner market.

8.2. - READY-TO-WEAR INDUSTRY

At present, modern technology is not in use in the ready-to-wear industry. This situation has various reasons : European market not being known sufficiently, and limitations of production because of the quota situation. There is a need for serious market research about the EC countries.

Day to day and small amounts of orders prevent the textile producing companies in making investments for the future.

The research about the modern textile technologies are not well known in Turkey. Unreliability of the order amounts and client consistency makes it reasonable to continue with old fashioned methods. The producing companies depend on the low wages. Some companies share the same opinion and bring their already designed and cut materials to Turkey for solely the final sewing stage.

The companies complain about the workers' productivity. Because the workers are unsatisfied with the low wages, they often change their working place. As soon as they get the proper training for the modern technologies, they change to rival firms with a better salary. The companies are not aware that they need new personnel administration methods so they can prevent losing their employees.

The ready-to-wear companies who don't know the European Market and european technology, stated that in the ready-to-wear sector there is no need for advanced technology today nor in the future, and also in the EC there will be no benefits gained from using advanced technology. The producing companies are not aware of the efforts for improving technology, and the research and development programmes (BRITE) of the EC, but they heard about the

existence of some special sewing machines. As they all state, if the continuity of orders could be realised, they would import the most modern systems.

The producing companies by saying that there is no need for advanced technologies they are in contradiction with their statements about their willingness to import machines according to the demand from the customers. With this it is clear that they are not sufficiently informed about the benefits that the technologies can bring. Another conclusion is, that these firms who already own some of these technologies haven't made the necessary feasibility reports; because of this they are faced with unused capacity. But the firms who follow the newly developed technologies in the textiles industry, and had already seen how they are used; first make a feasibility report about how these technologies can be adapted to the textiles industry in Turkey. Then, if it is found feasible, they import all of the necessary machinery.

The majority of these companies don't make the necessary market research needed for exports, because they don't realize the importance of it. These firms should employ the personnel who are specialized in business administration and international marketing within their administrative staff.

9 - QUESTIONS

- 1) What kind of technology are you using now ?
- 2) From which country did you import it ?
- 3) For how many years have you been using it ?
- 4) What kind of preliminary work was done for selecting your current technology ?
- 5) What is the effect of this technology in your final cost?
- 6) What role does technology play with regard quality ?
- 7) Do you think that higher technology will have an effect on quality ?
- 8) Presently which customer groups do you serve ?
- 9) Are you planning to address a higher income-bracket by upgrading your technology ?
- 10) What kind of energy does your present technology require ?

Do you have energy problems ?

What is the cost of this energy ?
- 11) Does your administrative personnel have the know-how of the higher technology in question ?
- 12) Do you employ technical personnel ?
- 13) Have you employed personnel for maintenance ?
- 14) Do you have skilled personnel, or do you train them yourself ?
- 15) Does technology help you in marketing ? (Do your customers come to you due to the technology you use ?)

- 16) In general, what kind of technology exists in your field ?
 - 17) What kind of competitive force does this provide for Turkey?
 - 18) How do you classify your technology vis-a-vis Turkey ?
 - 19) What is the percentage of capacity use ?
 - 20) If additional capacity were possible, what is the kind of technology you would choose ?
 - 21) If you were to cater for a broader range of clientele, would you consider changing your technology ?
 - 22) What are the difficulties in reverting to new technologies ?
 - 23) What are the difficulties involved in using the existent technology productively ?
 - 24) How do you view the credit sources available ?
 - 25) Are your means of promotion satisfactory ?
 - 26) Are your own sources satisfactory ?
 - 27) Do you obtain the necessary raw materials internally ?
 - 28) Are imports reasonable in terms of quality and cost ?
 - 29) How do you evaluate the problems involved with regard the potential in exports ?
- Would it effect the clientele quantitatively if capacity and quality were raised ?
- 30) Do you use computers in production planning, production follow-up, materials follow-up and cost-accounting?
 - 31) Does your type of production use higher technology ?

- 32) If your technology is also used in Europe, how do you evaluate the differences in cost, production and quality ?
- 33) If you know of such technology would you plan on adopting it in Turkey ?
- 34) Why do you think Europe is using advanced technology ?
- 35) Which fields do you think are suitable for using computers in textiles ?
- 36) There is a program being organised in textiles in EC (BRITE program). What is your opinion in automation in textiles ?
- 37) Which countries do you export to ?
- 38) What is the effect of State policies on your production ?

10 - STATISTICS

10.1.- WEAVING INDUSTRY

1) technology used at present %

high tech 75

traditional + high tech 25

2) country %

Switzerland 48

F.R.G. 21

Italy 21

Japan 5

U.S.A. 5

3) period %

up to 5 years 60

6 - 15 years 35

over 15 years 5

4) type of preliminary work %

fairs, publications 27

low-cost technology 28

most advanced technology 18

customer's choice 9

widespread in the world 9

experience 9

5) effect on unit cost %

medium 50

high 33

none 17

6) effect on quality %

a lot 55

little 45

none 0

7) role of advanced technology in quality %

a lot 75

little 0

none 25

8) customers %

low-income bracket 12

medium-income bracket 41

high-income bracket 47

9) refining the quality %

yes 27

no 73

10) type of energy %

electricity 67

fuel oil 28

steam 5

11) skilled administrative personnel %

yes 92

no 0

little 8

12) technical personnel % training technical personnel %

yes 92 yes 50

no 8 no 42

partially 8

13) maintenance personnel %

yes 100

no 0

14) skilled personnel %

yes 17

no 50

partly 33

15) role of advanced technology in marketing %
yes 91
no 9

16) technology used by rival companies %
the same 34
more advanced 8
less advanced 58

17) advantage in exports %
yes 92
no 8

18) generally in Turkey %
the best 100

19) use of capacity %
90 - 100 83
50 - 89 17
0 - 49 0

20) additional capacity %
same or the latest model 100
most economic (cheap) 0

none 0

21) change of technology %

yes 18

yes, conditionally 82

22) barriers %

none 21

knowledge+experience 14

qualified.personnel 28

financial 37

23) limitations to productivity %

none 30

workers 23

irregular orders 15

difficulties with new modernisation 8

lack of worker training 8

energy problems 8

raw materials 8

24) availability of credits %

good 60

no problems 10

high interest rates 20

do not use 10

25) state-aids %

yes 60

no 40

26) sources %

yes 83

no 17

27) provision of raw materials (internally) %

yes 42

no 50

partly 8

28) import of raw materials advantageous %

yes 83

no 17

29) potential in exports %

yes 100

no 0

30) computer applications on other subjects %

yes 33

partly	58
no	9

31) use of similar technology in Europe %

yes	17
no	67
partly yes	8
no response	8

32) reasons for differences %

energy cheaper in Europe	12
low productivity-rate of workers in Turkey	40
costs cheaper in Turkey	20
low wages in Turkey	7
raw materials cheap in Turkey	7
raw materials expensive in Turkey	7
ample spare parts in Europe	7

33) reasons %

to make cost per unit cheaper	11
no, because no order-guarantee	11
to increase production	11
to increase quality	22
no, no need to diminish number of workers	12

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no 33

34) <u>reasons</u>	%
quality	27
to increase production	18
high wages	37
advanced technology in Europe	18

35) <u>fields of usage of computers</u>	%
in all areas	16
dye department	16
design department	12
other	56

36) <u>effects of automation</u>	%
a must	33
can't be realised fully in Turkey	33
good, but expensive	8
should be used to increase productivity	8
Turkey should produce own technology	18

37) <u>countries</u>	%
Great Britain	33
F.R.G.	20
Italy	17
France	23
Canada	7

38) <u>state policies</u>	%
satisfactory	11
not satisfactory	67
no effect	22

10.2- READY-TO-WEAR INDUSTRY

1) <u>technology used at present</u>	<u>%</u>
traditional	50
special	20
traditional + high tech	30

2) <u>country</u>	<u>%</u>	<u>cutting systems</u>	<u>%</u>
U.S.A.	24	U.S.A.	80
F.R.G.	24	France	20
Japan	24		
Italy	15		
Spain	5		
Austria	5		

3) <u>period</u>	<u>%</u>
-up to 1 year	35
2 - 5 years	15
6 - 15 years	35
over 15 years	15

4) <u>type of preliminary work</u>	<u>%</u>
technic+ quality most advanced	30
low cost	20
fairs, advertisement	20

education abroad, product known. 10

expensive work power 10

spare parts 10

5) effect on unit cost %

medium 29

high 43

none 28

6) effect on quality %

much 50

little 25

none 25

7) role of advanced technology in quality %

much 37

little 13

none 50

8) customers %

low-income bracket 11

medium-income bracket 22

high-income bracket 67

9) refining the quality %

yes	33
no	67

10) type of energy %

electricity	63
fuel oil	19
steam	12
coal	6

11) skilled administrative personnel %

yes	75
no	0
little	25

12) technical personnel % training technical personnel %

yes	88	yes	38
no	12	no	25
		a part	37

13) maintenance personnel %

yes	88
no	12

14) skilled personnel %

yes	88
-----	----

no 12

15) role of advanced technology in marketing %

yes 40

no 40

little 20

16) technology used by rival companies %

the same 60

more advanced 40

less advanced 20

17) advantage in exports %

yes 80

no 20

18) generally in Turkey %

the best . 40

traditional+the best 10

low 20

medium 20

no comment 10

19) use of Capacity %

90 - 100 30

50 - 89	40
0 - 49	20
no comment	10

20) <u>additional capacity</u>	%
same or the latest model	77
low cost	22
none	11

21) <u>change of technology</u>	%
yes	25
yes, conditionally	50
no	25

22) <u>barriers</u>	%
none	22
training personnel	56
cost	11
maintenance	11

23) <u>limitations to productivity</u>	%
lack of orders	10
lack of personnel	20
other	10
no limitations	60

24)	<u>availability of credits</u>	%
	no problems	50
	high interest rates	38
	no usage	12
25)	<u>state-aids</u>	%
	yes	63
	no	25
	yes, but difficult	12
26)	<u>sources</u>	%
	yes	87
	no	13
27)	<u>provision of raw materials (internally)</u>	%
	yes	38
	no	50
	partly	12
28)	<u>import of raw materials (advantageous)</u>	%
	yes	100
	no	0
29)	<u>potential in exports</u>	%

yes, conditionally	50
yes	50
no	0

30) computer applications on other subjects %

yes	50
partly	38
not yet	12

31) use of similar technology in Europe %

yes	50
no	50

32) reasons for differences %

advanced technology not widely used in Europe	25
workers wages are high in Europe	38
productivity low in Turkey	25
same quality	12

33) reasons %

doesn't pay	20
no, wages low	20
I don't know	10
yes in the future	20

no response, 30

34) <u>reasons</u>	<u>%</u>
cost (workers)	70
social standard	10
no comment	20

35) <u>fields of usage of computers</u>	<u>%</u>
cutting	26
design	20
planning	20
colour	20
sewing	7
ironing press	7

36) <u>effects of automation</u>	<u>%</u>
no effect on sewing	30
specific standards required for world markets	20
time saving	20
handwork will be valuable Turkey advantageous	10
better quality	10
workers wages increase, therefore automation	10

37) <u>countries</u>	%
F.R.G.	38
U.S.A.	19
Netherlands	14
Poland	10
Switzerland	14
Canada	5

38) <u>state policies</u>	%
satisfactory	10
not satisfactory	90

11 - R E F E R E N C E S

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11.2.- I N T E R V I E W E D C O M P A N I E S

(in alphabetical order)

- Akın Tekstil,
Veliefendi Yolu, no 49, Bakırköy
- Alp Giyim,
Gümüřsuyu cad, Iřık San. Sitesi 21, A Blok, Topkapı,
Maltepe
- Altınyıldız,
Yeni Bosna Köyü, Köyaltı Mevki, Bakırköy
- Aycibin,
Fatih cad. 29/1, Güneřliköy
- Beymen,
Yeni Bosna Köyü, Köyaltı Mevkii, Bakırköy
- Biessecei Tekstil San. ve Tic.,.Organize Sanayi Bölgesi,
Yeřil cad.8, Bursa
- Enteks,
Tevfik Bey Mahallesi, Tahsin Tekođlu cad. 15, Sefaköy
- Gürteks,
Oto San. Sitesi, Bayman cad. 10/2, 4.Levent
- Istanbul Giyim Sanayi,
Londra Asfaltı, Avcılar
- İpeker Tekstil San. ve Tic. Organize Sanayi Bölgesi,
Mavi cad.7, Bursa
- Ipekiř Mensucat T.A.ř.,

Stadyum cad.7, Bursa

- Korteks Mensucat ve Tic. A.5.,

Organize Sanayi Bblgesi, Bursa

- Modam,

Ethem Efendi cad., Merve Safa Sitesi, Safa Blok, Erenköy

- Nergis Tekstil San. ve Tic. A.Ş.,

Organize Sanayi Bölgesi, Bursa

- Orta Anadolu,

Mimar Kemalettin sok., Konyali İş Hanı, Kat 1-2,
Sirkeci

- Saydam Tekstil San. ve Tic. A.Ş.,

Ahmet Hamdi cad., Saydam İş Merkezi 21, Bursa

- Sönmez ASF tplik-Dokuma ve Boya Endüstri A.Ş.,

Yeni Yalova Yolu, 9.km., Bursa

- Sümerbank Merinos Yünlü Sanayi Müessesesi,

Mudanya cad. 34, Bursa

- Tekstilbank,

Teşvikiye cad. no.144, Teşvikiye

- Tuncalılar,

Yeni Bosna Köyü. Köyaltı Mevki

- Vakko,

Londra Asfaltı, Çırpıcı Mevki, Topkapı

- Zeki Triko,

Gümüşsuyu cad., Oltulu İş Hanı 57, Topkapı, Maltepe

APPENDIX



.İ.P.	MADDE İSMİ	AT ve EFTA Ülkeleri İçin G.V.	Diğer Ülkeler İçin G.V.
13.90.10.90.00	Diğerleri	Muaf	2,5
13.90.90.10.00	Dokumaya elverişli maddeler üzerine baskı yapmaya mahsus makinalara ait olanlar	Muaf	2,5
13.90.90.90.00	Diğerleri	Muaf	2,5
14.00.10.00.00	Ekstrüzyona mahsus makina ve cihazlar	Muaf	3
14.00.90.00.00	Diğerleri	Muaf	3
15.11.00.00.00	Karde makinaları (tarak makinaları)	Muaf	3
15.12.00.00.00	Tarama makinaları (penyöz)	Muaf	3
15.13.00.00.00	Şerit halindeki pamuk, keten, kendir, vb. lifleri çekip uzatarak ve hafifçe bükerek iplik taslağı (fitil) haline getirmeye mahsus cihazlar	Muaf	3
15.19.00.11.00	Saw gin çırçır makinaları	Muaf	3
15.19.00.19.00	Diğerleri	Muaf	3
15.19.00.20.00	Ditme, dövme, temizleme ve hallaç makinaları	Muaf	3
15.19.00.90.11	Açma makinaları	Muaf	3
15.19.00.90.12	Ovalama makinaları (finisör)	Muaf	3
15.19.00.90.13	Kıvrıkcıklaştırma makinaları	Muaf	3
15.19.00.90.14	Karde makinalarından çıkan vatka ve şerit halindeki lifleri bir araya getirerek tekrar homojen bünyeli şeritler haline sokmaya mahsus makina ve cihazlar	Muaf	3
15.19.00.90.19	Diğerleri	Muaf	3
15.20.00.00.11	Open-end eğirme makinaları	Muaf	3
15.20.00.00.12	Ring eğirme makinaları	Muaf	3
15.20.00.00.19	Diğerleri	Muaf	3
15.30.10.00.00	Dokumaya elverişli lifleri katlamaya mahsus olanlar	Muaf	3
15.30.90.00.00	Dokumaya elverişli lifleri bükmeye mahsus olanlar	Muaf	3

.İ.P.	MADDE İSMİ	AT ve EFTA Ülkeleri İçin G.V.	Diğer Ülkeler İçin G.V.
5.40.00.00.11	Masura sıyırma makinaları	Muaf	3
5.40.00.00.12	Masura sarıcılar (atkı aktarma makinaları)	Muaf	3
5.40.00.00.19	Diğerleri	Muaf	3
5.90.00.00.11	Çözgü makinaları	Muaf	3
5.90.00.00.12	Çözgü ipliklerine mahsus haşıl makinaları	Muaf	3
5.90.00.00.13	Çözgü ipliklerini, dokuma tezgahlarının gücü tellerine ve taraklarına geçirmeye mahsus cihazlar (tahar makinaları)	Muaf	3
5.90.00.00.14	Dokuma tezgahlarındaki çözgü ipliklerinin nihayetlerini tezgaha yeni verebilecek olan çözgü ipliklerinin uçlarına bağlamayı sağlayan cihazlar	Muaf	3
5.90.00.00.19	Diğerleri	Muaf	3
6.10.00.00.00	Genişliği 30 cm.yi geçmeyen kumaşların dokunmasına mahsus olanlar	Muaf	2,8
6.21.00.00.00	Motorlu olanlar	Muaf	2,8
6.29.00.00.00	Diğerleri	Muaf	2,8
6.30.00.00.00	Genişliği 30 cm.yi geçen kumaşların dokunmasına mahsus olanlar (mekiksiz)	Muaf	2,8
17.11.10.00.11	Ev tipi yuvarlak (dairevi) örgü makinaları	Muaf	3,3
17.11.10.00.12	Sanayi tipi yuvarlak (dairevi) örgü makinaları	Muaf	3,3
17.11.90.00.11	Ev tipi yuvarlak (dairevi) örgü makinaları	Muaf	3,3
17.11.90.00.12	Sanayi tipi yuvarlak (dairevi) örgü makinaları	Muaf	3,3
17.12.10.00.11	Ev tipi yuvarlak (dairevi) örgü makinaları	Muaf	3,3
17.12.10.00.12	Sanayi tipi yuvarlak (dairevi) örgü makinaları	Muaf	3,3
17.12.90.00.11	Ev tipi yuvarlak (dairevi) örgü makinaları	Muaf	3,3
17.12.90.00.12	Sanayi tipi yuvarlak (dairevi) örgü makinaları	Muaf	3,3
17.20.10.00.11	Düz örgü makinaları	Muaf	3,3
17.20.10.00.12	Dikiş-trikotaj makinaları	Muaf	3,3

G.T.İ.P.	MADDE İSMİ	AT ve EFTA Ülkeleri İçin G.V.	Diğer Ülkeler İçin G.V.
8447.20.92.00.11	Ev tipi düz örgü makinaları	Muaf	3,3
8447.20.92.00.12	Sanayi tipi düz örgü makinaları	Muaf	3,3
8447.20.92.00.13	Ev tipi dikiş-trikotaj makinaları	Muaf	3,3
8447.20.92.00.14	Sanayi tipi dikiş-trikotaj makinaları	Muaf	3,3
8447.20.98.00.00	Diğerleri	Muaf	3,3
8447.90.00.00.11	İşleme makinaları	Muaf	2,6
8447.90.00.00.12	Şerit ve kaytan yapan makinalar	Muaf	2,6
8447.90.00.00.19	Diğerleri	Muaf	2,6
8448.11.00.00.11	Ratierler	Muaf	3
8448.11.00.00.12	Jakardlar	Muaf	3
8448.11.00.00.13	Jakard kardlarını azaltıcı makinalar	Muaf	3
8448.11.00.00.14	Jakard kardlarını delici makinalar	Muaf	3
8448.11.00.00.19	Diğerleri	Muaf	3
8448.19.00.10.00	Dokumaya elverişli iplikleri eğirmeye mahsus makinalar için yardımcı makinalar	Muaf	3
8448.19.00.90.11	Mekik masurası değiştirme makinaları	Muaf	3
8448.19.00.90.12	Çekim manşonları ve makinaları	Muaf	3
8448.19.00.90.13	İğneli cihazlar	Muaf	3
8448.19.00.90.14	Otomatik iplik düğümleyicisi	Muaf	3
8448.19.00.90.15	El düğüm aparatı	Muaf	3
8448.19.00.90.19	Diğerleri	Muaf	3
8448.20.10.00.11	Üretim memeleri	Muaf	3
8448.20.10.00.19	Diğerleri	Muaf	3
8448.20.90.00.11	Üretim memeleri	Muaf	3
8448.20.90.00.19	Diğerleri	Muaf	3
8448.31.00.00.00	Kard garnitürü	Muaf	3

G.T.İ.P.	MADDE İSMİ	AT ve EFTA Ülkeleri İçin G.V.	Diğer Ülkeler İçin G.V.
8448.32.00.00.00	Dokumaya elverişli liflerin hazırlanmasına mahsus makinalara ait olanlar (kard garnitürü hariç)	Muaf	3
8448.33.10.00.11	İğler	Muaf	3
8448.33.10.00.12	Kelebekler	Muaf	3
8448.33.90.00.00	Döner bilezikler ve açık ağızlı bilezikler	Muaf	3
8448.39.00.00.11	Naylon kopçalar	Muaf	3
8448.39.00.00.12	Metal kopçalar	Muaf	3
8448.39.00.00.19	Diğerleri	Muaf	3
8448.41.00.00.00	Mekikler	Muaf	3
8448.42.00.00.11	Tarak tellerinin genişliği 5 mm.ye kadar olan kalaylı taraklar	Muaf	3
8448.42.00.00.12	Ziftli ve sentetik taraklar	Muaf	3
8448.42.00.00.13	1 mm.den 2 mm.ye kadar gamet çelik taraklar	Muaf	3
8448.42.00.00.14	Geniş dokuma makinalarının çiftli taraklar	Muaf	3
8448.42.00.00.15	Diğer taraklar	Muaf	3
8448.42.00.00.16	Gücü telleri	Muaf	3
8448.42.00.00.19	Diğerleri	Muaf	3
8448.49.00.00.11	Tarak telleri	Muaf	3
8448.49.00.00.12	Lameller	Muaf	3
8448.49.00.00.13	Hamut ve takeler	Muaf	3
8448.49.00.00.19	Diğerleri	Muaf	3
8448.51.10.00.00	Platinler	Muaf	3
8448.51.90.00.11	Örgü makinalarına ait iğneler	Muaf	3
8448.51.90.00.19	Diğerleri	Muaf	3
8448.59.00.00.11	Örgü ve haşıl makinalarına ait taraklar	Muaf	3
8448.59.00.00.12	Konik örgü çapraz taraklar	Muaf	3
8448.59.00.00.19	Diğerleri	Muaf	3

T.C. YÜKSEKÖĞRETİM KURULU
DOKÜMANTASYON MERKEZİ