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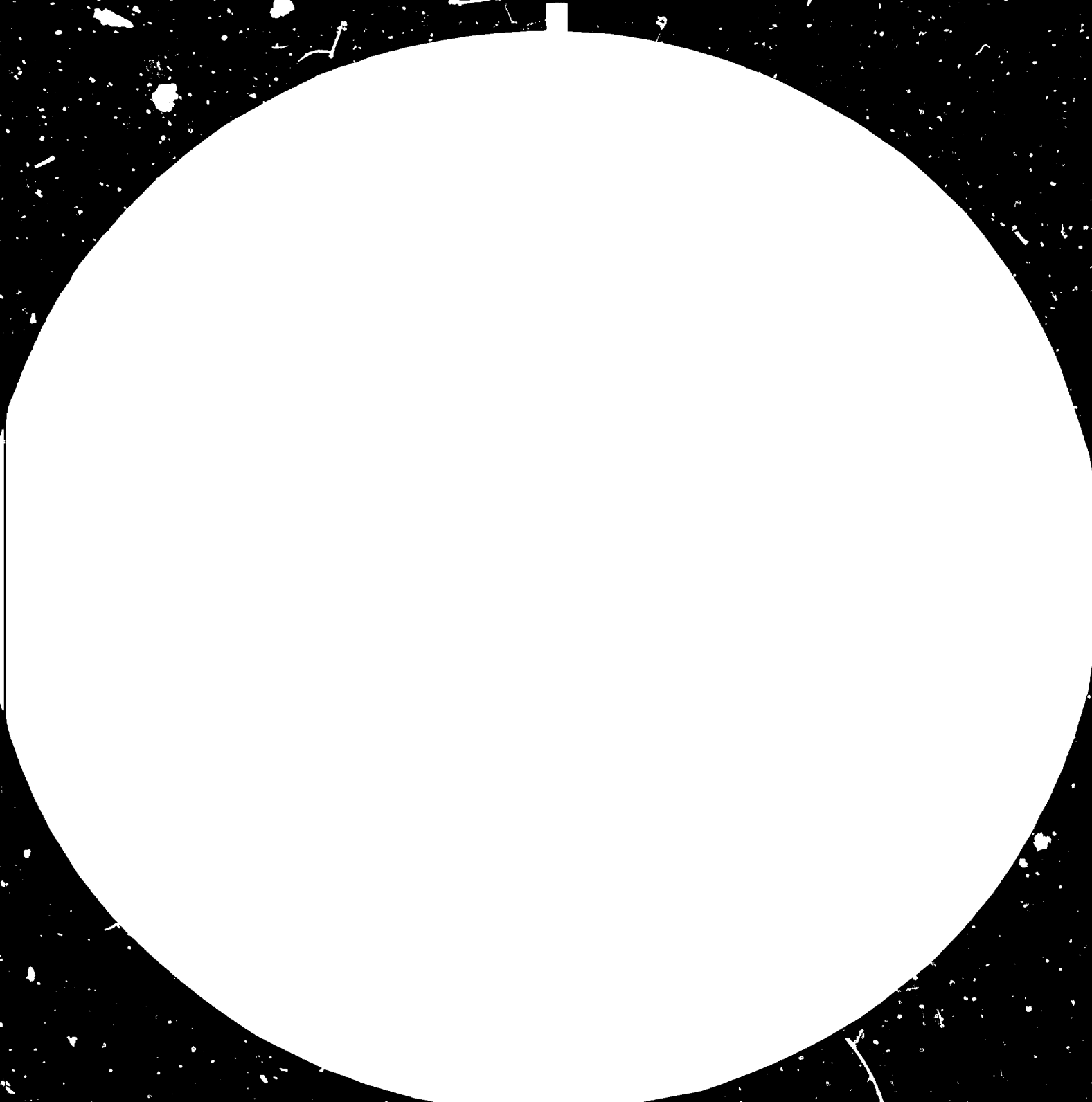

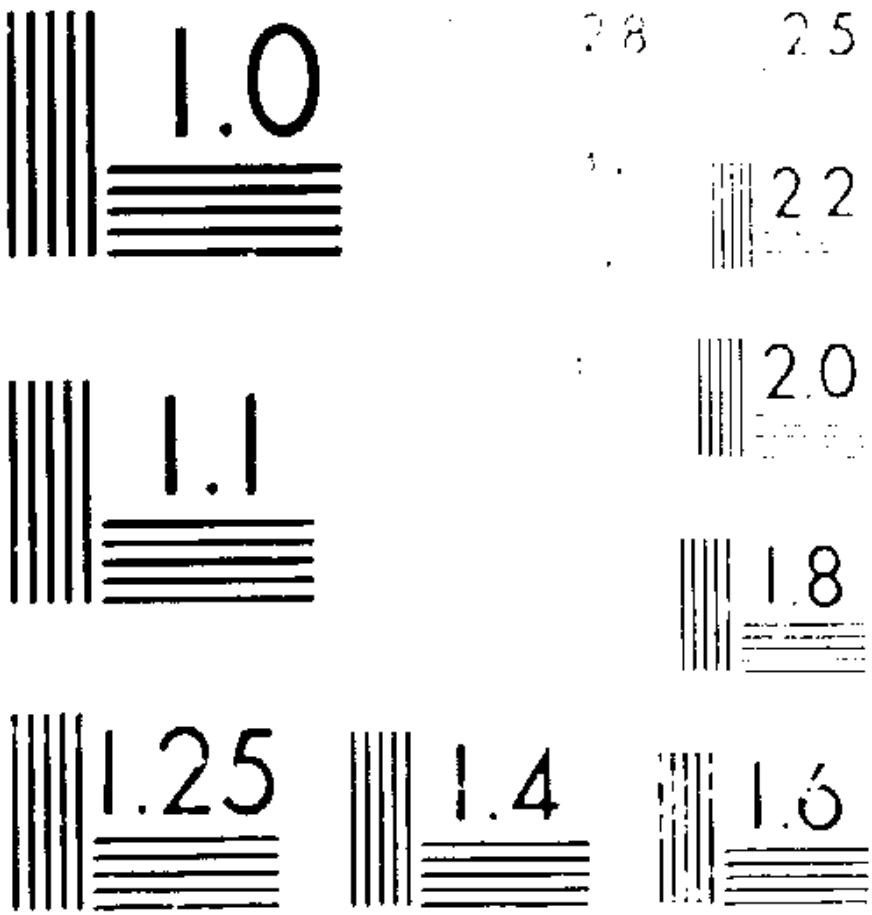
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FINAL REPORT

ON THE

NINTH

TRAINING PROGRAMME

ON THE

PRODUCTION AND APPLICATION

OF

SYNTHETIC FIBRES

Project No.US/INT/82/056

9th In-Plant Training Programme in the Field of Production and Applicstion of Synthetic Fibres, Vienna-Austria

Contr. No. 82/55

Höhere Bundes- Lehr- und Versuchsanstalt für
Textilindustrie Wien V.,
Spengergasse 20, A-1050 Vienna, Austria
Österreichisches Chemiefaserinstitut
Plößlgasse 9, A-1040 Vienna, Austria

Director: H. WIEHART
Managing Director: R. KATSCHINKA

Ninth Training Programme on the Production and Application of Synthetic Fibres.

Organized by the United Nations Industrial Development Organization (UNIDO) in co-opertaion with the Government of Austria,
Austrian Federal Chamber of Commerce,
Association of Austrian Industrialists,
Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie Wien V and
Österreichisches Chemiefaserinstitut, Vienna

Held in Vienna, Austria
from 5th October - 29th October 1982

Final Report

by
L. MACHHERNDL
Executive Manager

C O N T E N T

1. Acknowledgements

The Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie Wien V ant the Österreichisches Chemiefaserinstitut wish to express their appreciation to the UNIDO for organizing this training programme and for the excellent and successful co-operation.

Our thanks are specially directed to
Mr. D. A. Butaev (Director of Industrial Operation Divison, UNIDO)

Mr. H. May (Deputy Director, Division of Industrial Operations, UNIDO)
Mr. R. Gumen (Chemical Industrial Branch, UNIDO)
Mr.s I. Lorenzo (Head, Training Section, Industrial Operations Divisons, UNIDO)
Mr. P.F. Knotter (UNID Investment Promotion Service)
Mrs. B. Bristela

At the same time we give our thanks to the Austrian authorities and corporations, whose aid, prparatory work, valuable aid and understanding enable us to achieve a remarkable effect of the training programme.

Austrian Federal Chancellery
Mrs. B. Dekrout
Austrian Federal Ministry for Foreign Affaires:
Mr. E. M. Schmid
Austrian Federal Ministry for Educations and Art:
Mr. W. John
Mr. O. Tischler
Mr. L. Uyka

Austrian Federal Chamber of Commerce:

Mr. H. R. Seidl
Mr. F. Rieper
Mr. G. Tscherne

Association of Austrian Industrialists (VÖI):

Mr. P. Kapral
Mr. H. Krejci

We also are indebted to the Austrian Companies which we visited to complete our training programme.

2. Background and Objectives

The background and objectives of the training programme were stated in the Aide-Memoire from May 1982 circulated by UNIDO follows:

The programme, organized by the United Nations Industrial Development Organization (UNIDO) in co-operation with the Government of Austria, is one of a series of UNIDO Training Programmes on specific sectors of industry for engineers from developing countries. The programme will be carried out by the Höhere Bundes- Lehr- und Versuchsanstalt für Textil-industrie (HBLVA), a leading technological institute in the field of textile technology. The programme is the seventh in a series of programmes implemented annually since 1974.

The trend ot training activities in the field of production and application of synthetic fibres is characterized by the increasingly sopohisticated nature of the training programme requiring high level experts, consultants and modern specialized equipment. Consultation meetings at plants and companies to deal with specific technological problems are also an important feature of current training activities.

UNIDO implemented some technical assistance projects and neld meetings in the field of synthetic fibres and this experience can be available for the developing countries through the training programme.

During the last decade, research and development work in th the field of manmade fibres has been largely geared to rationalization and modification, and the fibre manufacturers have endeavoured to introduce new products on the market. The following types of synthetic fibres can be produced:

aromatic polyamide fibres, which include a number of variations suitable fo special fields of application, carbon fibres, produced by pyrolysis of cellulose, or polyadrylonitrile fibres under specific conditions. Carbon fibres are at present used solely as reinforcement for a wide range of matrix materials, polytetrafluoroethylene is one of the most stable polymers known. The properties of the major fibre types such as polyamide, polyester, cellulose and polyacrylonitrile have also been modified recently. Taking into account environmental pollution and energy problems, research centres throughout the world are also working on new technologies including new solvent systems, new processing during dyeing and finishing.

The developing countries as a result of the incresing demend from the internal and external markets for synthetic fibre products and the availability of comparatively cheap labour, have established synthetic fibre industries which are rapidly expanding. A number of these countries lack the required raw materials, financial resources and know how to start fibre synthesis, in order to meet to growing needs of the processing of synthetic fibres, for which the acquistion and introduction of new technical developments in the field are important.

The objective of this training programme is to broaden and upgrade the participants's professional knwoledge in a relatively short time and acquaint them with problems in the synthetic fibres industry and their solution, by concentradet training and exchange of information with specialists in the synthetic fibres,

The programme has received the support of the Austrian Federal Chancellery, the Austrian Federal Ministry of Foreign Affairs, the Austrian Federal Ministry of Education and Fine Arts, the Austrian Federal Chamber of Commerce and the Association of Austrian Industrialists (VÖI). The Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie (HBLVA) will conduct the

training on its premises, utilizing its laboratories and equipment for this purpose. The institute has a staff of highly qualified specialists.

3. Description of the Training Programme

The programme took place in Viena, Austria from 5th October to 29th October 1982 (see appendix I for the time table).
The programme received generous support from the Austrian Federal Ministry of Foreign Affaires, the Austrian Federal Ministry of Education and Fine Arts, the Austrian Federal Chamber of Commerce, the Association of Austrian Industrialists (VÖI) and the Österreichisches Chemiefaserinstitute. The Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie (HBLVA), a leading technological institute, gave full co-operation in running the teoretical and practical courses on its premises utilizing its laboratories and equipment for this purpose. (See appendix II for details of lectures and appendix III for equipment used in the practical classes.)

The institute's staff of hignly qualified specialists took full charge of the lectures, demonstrations, laboratory work, discussions, in-plant training programme and plant visits. (See appendix IV for list of staff members who participated in the training programme.)

In addition to the course conducted at the Institute plant visits in Austria were arranged to provied an opportunity for the participants to see some new developments in materials, processes and applications, to exchange technical information with experts as well as to study the possibilities of obtaining licenses and know-how on processes as well as equipment. (See appendix V for details of inplant training and plant visits.)

The training programme was attented by participants each from the following countries:

Afghanistan, Bangladesh (3), Brazil, Bulgaria. Egypt (2). Indonesia (2), Sudan, Yemen Arab Republic, Zambia

During the course of the training programme individual appointments were arranged for interested participants to discuss with UNIDO staff members problems affecting the development of the synthetic fibre industry in the participants home country.

A programme of social activities was organized by HBLVA and other sponsors for the benefit oft the participants. (See appendix VII for details of social activities)

Home countries of participants in the training programme on the production and application of Synthetic Fibres 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981 and 1982 (See appendix VIII).

Appendix I

Agenda and programme of work

Opening Ceremony: Tuesday, 5 October 1982, Conference Room III

09:30 - 11:30 Chairman pro tem: Mr. H. May, Deputy Director,
Division of Industrial Operations, UNIDO

Opening speech: Mr. D.G.A. Butaev, Director
Divisions of Industrial Operations, UNIDO

Speeches by: Mr. Erich M. Schmid
Envoy Extaordinary and Minister Plenipotent
Alternate Permanent Representative to UNIDO
Federal Ministry for Foreign Affairs
Government of Austria

Mr. G. Tscherne
Federal Economic Chamber of Commerce
of Austria

Mr. E. Schmitz, Director LKT-TGM
Laboratorium für Kunststofftechnik

Mr. R. Katschinka, Director Österreichisches
Chemiefaserinstitut

Mr. H. Mark
Polytechnic Institute of New York, USA

Mr. D.N. Shroff
SASMIRA, Bombay, India

14:00 - 16:30 - UNIDO's training programme by Ms. I. Lorenzo, Head
Training Branch, UNIDO/DIO

- Technical assistance by UNIDO by Mr. H. May. Deputy
Director, UNIDO/DIO

- Possible areas of co-operation with the plastics and synthetic fibres, industries in the participants' countries by Mr. R. Gonen, Industrial Development Officer, Chemical Industries Branch, UNIDO/DIO

Wednesday, 6th October -Thursday 29th October 1982

09:00 - 12:00 and 14:00 - 17:00	Lectures at Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie In-plant training and plant visits, laboratory work

Friday, 30th October 1982

09:00 - 12:00	Discussion with Chemical Industries Branch, Mr. R. Gumen

Appendix II

Details of Lectures

Subject	Hours
Man-made Fibres. Teir Development and Economic Significance H. Krässig, Doz. A.o.Univ.Prof. Dipl.Ing. Dr.Dr. habil, Director of the Research Department of Chemiefaser Lenzing AG., Lenzing	2
The Methods of Fibre Manufacturing H. Krässig, Doz. A.o. Univ.Prof.Dipl.Ing. Dr.Dr. habil, Director of the Reserch Department of Chemiefser Lenzing AG, Lenzing	2
Polymer Chemistry and Polymer Physics in the Relation to Synthetic Fibres W, Lebensaft, Dr., Member ot the staff of the Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie, Wien V	3
Chemistry and Technology of Cellulosic Staple Fibres and Filaments R. Färber, Dipl. Ing., Erste Österreichische Glanzstoff-Fabrik AG, St. Pölten	1
Polyacrylic Fibres K. Weinrother, Dr. Reserach Department Chemiefaser Lenzing AG, Lenzing	3
Processing of Synthetic Fibres and Blends A) Fiber-Blends and their Properties B) Spinning, Weaving J. Hördler, Dipl.Irg. Member of the staff of the Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie, Vienna	3
Production of Polyamide Filaments H. Steffens, Dr. Head Research Department Enka Glanzstoff, Wuppertal	3
Quality-Control of Man-made Fibres. Principle and Methods F. Puchegger, Dr., Chemiefaser Lenzing AG, Lenzing	2

Subject	Hours
The Economic ant Technical Future of Man-made Fibres H. Krässig, Doz. a.o. Univ Prof., Dipl.Ing., DDr. habil, Director of The Research Department of Chemiefaser Lenzing AG, Lenzing	2
Survey on Polyesteer Fibres, their Chemistry and Technology G. Peters, Dr, Managing Director of Austria Faserwerke, Lenzing	1 1/2
The TREVIRA^{R} Sortiment - its Properties and Fields of Application H. Zimmermann, DR., Farbwerke Hoechst AG, Frankfurt	1 1/2
Physical Methods of Fibre Modification W. Herzog, Dipl.Ing., Member of the staff of the Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie, Vienna, Head of Austrian Textile Research Institut, Vienna	3
Chemical Methods of Fibre Modification H. Lass, Dr., Member of the staff of the Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie, Vienna	3
Man-made Fibre Development - Raw Materials and the Environment W. Albrecht, Head of Textile technology Institute of Enka-Glanzstoff AG, Wuppertal	2
Polypropylene Fibres G.F. Hüttner, Chemie Linz AG, Linz	3
Problems of Textile Labelling in the Industrialized Countries	2
Problems and Tasks of Burning Behaviour in the Field of Man-made Fibres H.P. Bauer, Ing. , Austrian Textile Research Institute, Vienna	2

Subject	Hours
Pretreatment of Synthetic Fibres and Blends for Dyeing and Printing L. Machherndl, Dr., Head of the Department for Textile Chemistry at the Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie, Vienna	2
Dyeing of Synthetic Fibres and Blends W. Lebensaft, Dr., Membner of the staff of the Höhere Bundes- Lehr- und Versuchsanstalt für Textilindustrie, Vienna	2
Engineering Aspects to be Considered for the Construction of Plants, Producing Man-made Fibres in Developing Countries H. Meißner, Dr., Uhde GesmbH, FRG Bad Soden	3
The Austrian Textile Industry from an National and an International Point of View H. Huber, Dr., Hauptgeschäftsführer des Fachverbandes der Textilindustrie, Vienna	2
Man-made Fibres for Technical Purposes H. Hailwax, Ing., Managment Department of Erste Österreichische Glanzstoff-Fabrik AG, Vienna	3
Transfer of Chemical Technology in Developing Countries K. Czeya, Dozent, Dr., Dipl.Ing., Wien	2

Appendix III

Synthetic Fibre Testing Equipment used in the Training Programme

VIBROSKOP; Linear density of fibres

MICRONAIRE, linear density of fibres

AIR-FLOW, linear density of fibres

JOHANNSEN-ZWEIGLE, fibres length and lengths distribution by array method

USTER, fibre length and length distribution automatically working

INSTROM, breaking-strength and elongation fibres, yarns, fabrics

ZWICK-Textimat, breaking-strength and elongations yarns, automatically working

USTER-Dynamometer, breaking-strength and elongations yarns automatically working

ZWICK-Tearing-tester

TWIST-Tester

PRESSLEY-Tester, strength of fibres, bundle method

BURSTING-Tester, VEB Rauenstein

THICKNESS-gage

USTER-Testing equipment (Unevenessof textile strands)

ABRASION-Tester

AIR-PERMEABILITY-Tester

RANDON tumble pilling Tester

ACCELEROTOR

SCANNING ELECTRON MICROSKOP, PSEM 500, Philips

PRETEMA-Spectromat FS 3 A (Filterspectrophotometer) Colour measurement, Pretema, Switzerland

FIXOTEST
XANOTEST
LINITEST — Original Hanau Quarzlampengesellschaft, BRD
PRAXITEST

LABOR-STENTER, LABOUR-PADDING Machine, E. BENZ, Switzerland

EPPRECHT RHEOMAT 15, Contraves, Switzerland

FLAMETESTER; Ahiba, Basel, Switzerland
INFRARED-SPECTOPHOMETER 197; Perkin Elmer
GASCHROMATOGRAPH SIGMA 3; Perkin Elmer
SPECTORPHOMETER PM Q II; C. Zeiss, BRD
ELREPHO;C.Zeiss, BRD
HT- Dyeing apparatures, Scholl, Switzerland
HT-Dyeing apparatures, Ochsner, Austria
HT-Yet dyeing machine, Then , BRD

Appendix IV

Staff of the Training Programme

Director: Dipl. Ing. Mag. rer. nat. H. Wiehart
Managing Director: Dr. R. Katschinka
Executive Manager: Prof. Dr. techn. Dipl.Ing. L. Machherndl
Scientific Adviser: Director Doz. A. o. Univ-Prof. Dipl.Ing. DDr. habil. Hans Krässig
Public Relations and Social Engagements: Ing. R. Hetzer
Plant Visits: Dr. R. Katschinka

Lectures: Dr. W. Albrecht
Ing. H.P. Bauer
Doz. Dr. Dipl.Ing. K. Czeja
Dipl. Ing. R. Färbar
Prof. Dr. M. Hackauf
Ing. H. Hailwax
Prof. Dipl.Ing. Herzog
Prof. Dipl.Ing. J. Hördler
Dr. H. Huber
Dipl.Ing. G. Hüttner
Univ. Prof.Dipl.Ing. DDr.habil. H. Krässig
Prof. techn. Dr. techn. Dipl.Ing. H. Lass
Prof. Dr. techn. D.M.Sc. W. Lobensaft
Prof. Dr. techn. Dipl.Ing. L. Machherndl
Dipl.Ing. A. Meissner
Dr. G. Peters
Dr. F. Puchegger
Univ. Prof. Dr. Dipl.Ing. A. Schmidt
Dr. H. Steffens
Dipl.Ing. H. Weinrother

Dr. H. Zimmermann

Assistence and Preparation: Ass. Ing. F. Foukal
M. Fried H. Neufingerl H. Stütz
G. Gschmeidler R. Nothelfer
A. Luger J. Pichler

Appendix V

In-plant training and plant visits

To the special interest of the participants inplant training at fibre producing companies and plant visits to frbre-using companies during the four week cousse were organized.
The selection of the companies gave an regional and technical survey on the Austrian man-made fibre-producing and using industry:

1) Erste Österreichische Glanzstoff-Fabrik AG, Viscose fibres, Rayon	A-3100 St. Pölten, NÖ
2) Chemiefaser Lenzing AG Pulp, Viscose staple fibre, Acrylic staple fibres, Paper Sodiumsulfate, Sulphuric acid, Synthetic sheets and foil strips Machinery for processing Synthetic sheets, Laboratories	A-4860 Lenzing, OÖ
3) Austria Faserwerke GemsbH	A-4860 Lenzing, OÖ
4) Linz Textil AG Spinning and weaving mill	A-4020 Kleinmünchen (Linz)
5) Schiffswerft Linz AG Plastic Machinery	A-4020 Linz, OÖ
6) Baumann, Textile Printing Factory	A-3950 Gmünd, OÖ
7) Schiel Seide AG	A-3813 Dietmanns, NÖ
8) Triumph International AG	A-2700 Wr. Neustadt, NÖ
9) Chemie Linz AG Filaments, Spun Fibres, Sheets Non-wovens, Fertilizers, Pharmaceuticals, Laboratories	A-4021 Linz, OÖ St. Peterstr. 25

Appendix VI

P A R T I C I P A N T S

Country	Name	Address
AFGHANISTAN	Mr. Ahmad Shah Ah Ahmadi	UNDP Resident Rep. P.O. Box 5 Kabul
BANGLADESH	Mr.M.D.Azad Islam	UNDP Resident Rep. P.O.Box 224 Ramna, Dacca
	Mr. Kabir Ahmed	UNDP Resident Rep. P.O.Box 224 Ramna, Dacca
	Mr. M.D! Abdul Quasem Kahn	UNDP Resident Rep. P.O.Box 224 Ramna, Dacca
BRAZIL	Mr. Pedro Pita Aguiar NETO	Centro de Tecnologia da Industria Quimica e Textil Rua Dr. Manoel Cotrim, 195 Riachuelo, Rio de Janeiro
BULGARIA	Mr. Shivko T. Mishinev	Petrochemical Complex 25, Moscow Str., Bourgas
EGYPT	Mr. Gamal Abd-el-Azim el-Azab EL-MASRY	Misr Rayon Co. Kafr-el-Dawar
	Mrs. Fekira Mahmoud Ramadan	Misr Rayon Co. Kafr-el-Dawar
INDONESIA	Mr. Shahbudin	Direktorate General of Oil and Gas Jalan M.H., Thamrin 1 Jakarta
SUDAN	Mr. Ahmed Mohamed Ibrahim FADL	Industrial Research Institute P.O. Box 268, Khartoum
YEMEN ARAB REPUBLIC	Mr. Saleh Ahmed Al Sanabani	Yemen Weaving and Textile Corp., UNDP Resident Rep. P.O. Box 551 Sana'a
ZAMBIA	Mr. [illegible]by Mabvuto Moy	Kafue Textiles of Zambia P.O. Box 131, Kafue

Appendix VII

Social Activities

1. Trip to the Wachau, Visit to the Monastery of Melk. Dinner at the Restaurant Blondl.Dürnstein
2. Sight - Seeing Tour in Vienna
3. Visit to the National Opera (Tannhäuser)
4. Visit to the Empirial Chapel (Hofburgkapelle)
5. Visit to the City of Salzburg.
6. Visit tc the Fortress of Krauzenstein and the Monastery of Klosterneuburg.
7. Visit to the Spanish Horse Riding School.
8. Visit to the Monastery of St. Florian
9. Farewell Party at Sievering
10. Private Invitations
11. Visit to the "Schatzkammer"

Appendix VIII

Home countries of Participants

	74. 1.	75. 2.	76. 3.	77. 4.	78. 5.	79. 6.	80. 7.	81. 8.	82. 9.	Total
Afghanistan									1	1
Argentina	1				1					2
Bangladesh	1		1		1	1			3	7
Bolivia				1			1			2
Brazil	1				1		1	1	1	5
Bulgaria	1								1	2
China							1	1		2
Colombia				1		1				2
Costa Rica			1							1
Egypt	1	1	1	1	1	1	1		2	9
Ethiopia				1	1			1		3
Ghana			1	1		1	1			4
India		1			2					3
Indonesia		1	1	1					1	4
Iran	1									1
Iraq		1	2	2	2	1		1		9
Jamaica		1			1					2
Kenya						1				1
Korea		1								1
Lybia		1		1				1		3
Mexiko	1			1						2
Mozambique								1		1
Pakistan		1		1						2
Peru		1								1
Philippines	1	1		1			1			4
PLO							1			1
Poland						1	1			2
Romania	1		1		1					3
Singapore	1	1	1							3
Sri Lanka				1		1				2
Sudan									1	1
Syria			1			1	1			3
Tanzania								1		1
Thailand				1	1	1	1			4
Turkey	1		1			1		1		4
Uruguay			1							1
Yemen Arab Republic									1	1
Yugoslavia	1									1
Zambia									1	1
	12	11	12	14	12	11	10	8	12	102

The UNIDO in Vienna has to be congratulated in bringing about this Training Programme and we want to express our appreciation to all UNIDO-members who have contributed to the realization of this project.

We hope that we could fulfill theintentions of UNIDO by giving the participants as much as possible of insight, knowledge and experience.

We also want to give our thanks to the participants for their co-operation and wish them an effective evaluation in their native countries.