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LKT-TGM international

Austrian Laboratory for Plastics Technology

21th UNIDO In-Plant Group Training Programme
in the Field of Plastics Technology

Organized by the United Nations Industrial Development
Organization (UNIDO) in co-operation with the Government
of Austria

to be held

from 1 October to 16 November 1990 in Vienna, Austria

F I N A L R E P O R T

by

H. HUBENY
Programme Director

Vienna, 16. November 1990/ZT190/Hu/Do

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TECHNOLOGISCHES GEWERBEMUSEUM

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of Foreign Affairs:

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

VIENNA INTERNATIONAL CENTRE

P.O. BOX 300, A 1400 VIENNA, AUSTRIA

TELEPHONE 26 310 TELEGRAPHIC ADDRESS UNIDO VIENNA TELEFAX 135612

Background and Objectives

1. The programme in the field of plastics technology is one of a series of the United Nations Industrial Development Organisation (UNIDO) activities on specific sectors of industry which is being organized for the developing countries through the Chemical Industries Branch. This "In-Plant Group Training Programme" has been implemented annually since 1970 through a special contribution of the Government of Austria to UNIDO. The implementation of the 1986 programme as well as the previous ones has been successfully conducted by the Laboratorium für Kunststofftechnik LKT-TGM (Laboratory for Plastics Technology).
2. The trend of training activities in the field of plastics technology is characterized by the increasing sophisticated nature of the programme requiring high level experts, consultants and specialized equipment for the workshop. There is also an increasing demand for visits to plants, companies and institutes which are advanced in their field of specialisation. Group discussion to deal with specific technological problems in manufacturing and application is also an important feature of current training activities.
3. Plastics are already one of the world's main groups of industrial materials. World plastic consumption is now greater than that of all non-ferrous metals in terms of weight and of steel in terms of volume. The numerous uses and applications of plastics which are still increasing, have caused this industry generally to grow at a faster rate than most branches of manufacturing industries and to contribute in growing proportion economy.
4. The demand for plastics materials is steadily growing at a very high rate and this situation is expected to continue in the future. Engineering plastics will find many new applications and replace traditional materials. Important factors in the research and development activities will be the drive to save energy and feedstocks. Plastics allow for a large potential of energy saving, partly by replacing traditional heavier materials and partly by reducing the use of energy in the various production processes.
5. Through the acquisition of technological know-how and skills in the field of mould design and mould making, the plastics industry could achieve further development. The lack of experienced personnel in this field in the developing countries and the need to acquire and exchange experience, are the main reasons for the organization of this programme. Its aim is also to bring together a group of selected persons whose work is expected to benefit from a concentrated training programme which otherwise could require a long period of training, research and development work. This assistance to the developing countries in the development of their plastic industry and the development of manpower is in accordance with items i, ii and k of Article 58 of Lima Declaration and Plan of Action as well as in line with the New

6. The programme is designed as a group training course covering the whole field of modern plastics technology at an industrial - not academic - level including

Introduction:

- Theory (Plenary Session)
- Practice (Small Group Work)

Seminar:

- Special Small Group Discussion
- Special Practical Experiments (Small Group Work)

Group Moderation:

- Selection of Priorities (Programme Design)
- Methods of Problem Solving (Case Study)

7. The programme has received the support of the Austrian Federal Ministry for Foreign Affairs, the Austrian Federal Ministry of Education and Fine Arts, the Austrian Federal Economic Chamber and Association and Industrialists. The Laboratorium für Kunststofftechnik LKT-TGM (Laboratory for Plastics Technology), a leading technological institute, will conduct, utilizing its facilities, the theoretical and practical training in plastics technology. The institute has a staff of highly qualified specialists.

Since 1970 LKT-TGM held 20 programmes with a total of 364 participants from 81 countries.

The regional distribution was the following:

Far East (FE)	118	32,4 %
Middle East/		
North Africa (ME)	79	21,7 %
Latin America (LA)	79	21,7 %
Africa (AF)	65	17,9 %
Europe (EU)	23	6,3 %

70 % of the participants came from privat and public companies, 30 % from institutes and non-profit government organizations.

Region	Programs	Total	Region	Programs	Total
	1.-20.				
Afghanistan	ME	2			2
Algeria	ME	3			3
Algeria	AF	1			1
Argentina	LA	9			9
Bangladesh	FE	9			9
Bhutan	AF	2			2
Bolivia	FE	3			3
Bolivia	LA	7			7
Brazil	EU	1			1
Brazil	LA	6			6
Brazil	FE	5			5
Brazil	LA	4			4
Brazil	FE	16	1	17	
Burkina Faso	LA	4	1	5	
Burkina Faso	LA	4		4	
Burkina Faso	LA	4		4	
Burkina Faso	EU	3		3	
Chad	LA	2		2	
Chad	LA	3		3	
Chad	ME	15		15	
Costa Rica	LA	2		2	
Cote d'Ivoire	AF	7		7	
Cote d'Ivoire	AF	6		6	
Cote d'Ivoire	LA	3	1	4	
Cote d'Ivoire	AF	1		1	
Cote d'Ivoire	LA	1		1	
Cote d'Ivoire	LA	1	1	2	
Cote d'Ivoire	FE	1		1	
Cote d'Ivoire	EU	3		3	
Cote d'Ivoire	FE	12		12	
Cote d'Ivoire	FE	11		11	
Cote d'Ivoire	ME	18		18	
Cote d'Ivoire	ME	10		10	
Cote d'Ivoire	ME	3		3	
Cote d'Ivoire	LA	4		4	
Cote d'Ivoire	ME	4		4	
Cote d'Ivoire	AF	1	1	2	
Cote d'Ivoire	FE	1		1	
Cote d'Ivoire	FE	5		5	
Cote d'Ivoire	ME	2		2	
Madagascar	AF	1		1	
Malawi	AF	3		3	
Malaysia	FE	4		4	
Malta	EU	2		2	
Mauritius	AF	4		4	
Mexico	LA	1		1	
Morocco	ME	1		1	
Mozambique	AF	1		1	
Nepal	FE	3		3	
Nicaragua	LA	1		1	
Nigeria	AF	4		4	
Pakistan	FE	8		8	
Panama	LA	1		1	
Paraguay	LA	2		2	
Peru	LA	6		6	
Philippines	FE	6		6	
Poland	EU	6		6	
Romania	EU	2		2	
Rwanda	AF	2	1	3	
Saudi Arabia	ME	5		5	
Senegal	AF	1		1	
Singapore	FE	7		7	
Somalia	AF	4		4	
Sri Lanka	FE	5		5	
Sudan	AF	7		7	
Syria	ME	6	1	7	
Taiwan	FE	2		2	
Tanzania	AF	8	1	9	
Thailand	FE	10		10	
Togo	AF	-	1	1	
Trinidad Tobago	LA	4		4	
Turkey	EU	5		5	
Uganda	AF	2	1	3	
Uruguay	LA	6		6	
Venezuela	LA	2		2	
Vietnam	FE	7	2	9	
Yemen PDR	ME	8		8	
Yugoslavia	EU	2		2	
Zambia	AF	3		3	
Zimbabwe	AF	1		1	



Fotos: J. Schermann

3. PARTICIPANTS

3.1. Participants financed from AUSTRIA

COUNTRY	NAME	CONTACT ADDRESS
China	XU CHUN	Jiang Xi Engineering Plastic Factory, Jiang Xi
Colombia	VARGAS Andrés	GRIVAL S.A. Av.13 No.7-85 Funza, Cund. Bogotá
Guatemala	CORDERO GONZALEZ Erwin	Fábrica Tubovinil, S.A. Ave.del Ferrocarril 16-17 Guatemala, C.A.
Honduras	MOYA Dimas Eduardo	PLASTICOS GAMOZ P.O.Box 1105 San Pedro Sula
Kenya	OBEL George Othieno	ESLON PLASTICS OF KENYA LTD P.O.Box 41761 Nairobi
Rwanda	KAGABA Callixte	MIRONKO PLASTIC INDUSTRIES B.P. 307 Kigali
Tanzania	MLAKI Rita Louise	TANGANYIKA TEGRY PLASTICS LTD P.O.Box 2219 Dar-es-Salaam
Togo	KOSSIVI Eklou	Industrie Togolaise des Plastiques B.P. 9157 Lomé Port
Uganda	KATUMBA KIZZA John	Ship Toothbrush Factory P.O.Box 5961 Kampala
Vietnam	HUYINH QUANG Viet	Union of Plastic Enterprises 274 Ben Ham Tu Q.5 Hoachiminh City

3.2. Participants self financed

Syria	EL MAHMOUD GHATTAS	General Organization for Engineering Industries P.O.Box 3100 Damascus
Vietnam	LE HUONG DUONG	Plastics Technology Centre 27 E. Tran Thai Giap, Quang Hochiminh City



4. STAFF

Principal of TGM: Hofrat Dir.Dipl.-Ing.Dr.F.Plöckinger
Director of LKT-TGM: Abteilungsvorstand Dipl.-Ing.Dr.H.Hubeny
Assistant Programme Director: Ing.W.Michel

Organization Committee:

AV Dipl.-Ing.Dr.H.Hubeny
Ing.W.Michel
B.Dörr
StR Ing.R.Hillisch
Th.Kasprzyk

Lectures:

Prof.Dipl.-Ing.Dr.H.Dragaun
Prof.Dipl.-Ing.H.Elmecker
Prof.Ing.Dkfm.H.Graf
StR Ing.R.Hillisch
AV Dipl.-Ing.Dr.H.Hubeny
Prof.Dipl.-Ing.Dr.W.-R.Jessenig
Dr.P.Liptak
Prof.Dipl.-Ing.W.Mähr
Prof.Dipl.-Ing.Dr.F.Mayer
Prof.Mag.R.Mayer-Maly
FL Ing.F.Mennerstorfer
Prof.Dipl.-Ing.Dr.H.Muschik
FOL Ing.G.Minarovich
FL Ing.S.Paschek
Ass.M.Pfaffl
Ing.A.Revesz
Ing.H.Richter
Ing.J.Schermann
Prof.Dipl.-Ing.A.Schmidt
FL Ing.E.Weiß
Univ.-Doz.Dipl.-Ing.Dr.E.Wogroly
Prof.Ing.Mag.H.Wolaneck

Assistance and Preparation:

FOL F.Beran
H.Braunsteiner
B.Dörr
FL G.Freyer
Dr.G.Grossmayer
Ass.E.Helfert
A.Knieschek
Dr.P.Liptak
Ass.St.Loblich
Ing.W.Michel
FL Ing.Chr.Neustifter
Ass.M.Pfaffl
Ing.A.Revesz
Prof.Dipl.-Ing.A.Schmidt
FL H.Seifert
FL Ing.E.Weiß

5. SUBJECT LIST

1. INTRODUCTION

1.1. THEORY (Plenary Session) Hours

Technology Transfer and Development	2	
Techno-Economic Aspects in Plastic Technology	2	
Trends in Polymer Engineering	10	
Trends in Polymer Physics	4	
Trends in Polymer Chemistry	2	
Principles of Mould Design	8	
Principles of Control Engineering	4	
Plastics Application Engineering	4	
Subtotal 1.1.		36

1.2. PRACTICE (Small Group Work)

Compounding	6	
Computation	4	
Controlling	8	
Extrusion	10	
Finishing	4	
Foaming	6	
Injection and Compression Moulding	10	
Machining and Forming	6	
Computer Aided Mould Design	4	
Polymer Chemical Analysis	4	
Polymer Physical Analysis	10	
Quality Control	6	
Reinforced Plastics	4	
Trouble Shooting and Repair	6	
Subtotal 1.2.		88

2. SEMINAR

2.1. SPECIAL SMALL GROUP DISCUSSION

Quality Control	4	
Polymer Science	4	
Injection Moulding	4	
Extrusion	4	
Subtotal 2.1.		16

2.2. SPECIAL PRACTICAL EXPERIMENTS (Small group work)

Quality Control	4	
Polymer Engineering	4	
Injection Moulding	4	
Extrusion	4	
Subtotal 2.2		16

3. GROUP MODERATION

Selection of Special Topics	4	
Case Study: Problem Identification	4	
Case Study: Methods of Problem Solving	4	
Workshop: Techno-economic Aspects of Plastics Processing Technology	4	
Subtotal 3.		16

Grand Total 172 hours

6. PLANT VISITS

In the special interest of the participants of plant visits during the seven-week course in Austria has been organized by ACTUAL.

The selection of the plants according to the interest of the participants gives a regional and technical survey of the Austrian plastic industry.



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**ACTUAL Anlagen-, Maschinen- und
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Ing. Walter Genzberger
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- A-4982 Würzburg, Kr.,
Tel (07507) 366-0, Tlx. 23300, Fax (07507) 91510
- A-4982 Würzburg, Kr., Auenweg 100
Tel (07507) 504, Telefax 006 3716283, Fax (07507) 410
- A-2822 Oberwaltersdorf, Straßmaderstraße 21
Tel (02253) 213-0, Tlx. 14380, Fax (02253) 648
- A-4889 Gries, Wauer Straße 204
Tel (0764) 62111, Tlx. 31200, Fax (0764) 62119 15
- A-4889 Isenbruck, Schusterbergweg 77
Tel (0913) 84400, Tlx. 532233, Fax (0913) 84400 14
- A-4889 Eisenfurt, SchulstraÙe 11
Tel (0463) 21501, Tlx. 42201, Fax (0463) 21500
- A-1088 Wien, Zur Spinnerei 79
Tel (0227) 62204-0, Tlx. 132030, Fax (0227) 62204 14

Germany / Deutschland

- D-7400 Heilbronn, Golgenbergstraße 9a
Tel (07143) 501-0, Tlx. 7287340, Telefax 17 7022301,
Fax (07143) 50111
- D-71331 Bietigheim, Pfl. Stuttgarter Straße 60 - 51
Tel (07146) 138, Tlx. 727300, Telefax 17 71644,
Fax (07146) 15273
- D-7000 Stuttgart-Gröden, Wappelerstraße 342
Tel (07143) 9462-0, Tlx. 001200, Fax (07143) 9462 22
- D-7041 Plochingen, Maybachstraße
Tel (07143) 501-0, Tlx. 7287300,
Fax (07143) 50114, 50100
- D-7281 Wangen, Robert Schöck-Strasse 15
Tel (07146) 25004, Fax (07146) 25009
- D-6810 Calburg, Parkstraße 01 - 01
Tel (09940) 104-00, Fax (09940) 200 10
- D-6170 Oberursel, Wallstraße 31
Tel (06071) 51170, Fax (06071) 50 300
- D-3001 Woburn, Ziemsen, Nordstraße 2
Tel. 05304-2000, Fax 05304-2000, 2001

Belgium / Belgien

● B-2040 Wuar Melle, Zeyssdijk 10
Tel (0312) 4991, Tlx. 34000

France / Frankreich

● F-69000 Prieure
6 Place Saurer Centre
Tel (4920) 7100, Fax (4920) 7401

Great Britain / England

● GB 200000 North
CAPE
Dunbury
Chimneywood, CA. H 3 995 G B
Tel (0123) 5400 33, Fax (0123) 5400 70

Hungary / Ungarn

● H-6000 Miskolcsmegyeri
Rudolfstr 7
Tel (033) 3000, Tlx. 24707, Fax (033) 600

Japan

● -Mitsubishi Q Building
6th floor, 7-9-3 Akasaka
Minato-ku
Tokyo
Tel (03) 3010073, Tlx. 0303070, Fax (03) 3010070

Netherlands / Niederlande

● NL, 2000 AG Alphen a/d Rijn, Postbus 280
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Norway / Norwegen

● N-1500 Holten
Bustadveien
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Spain / Spanien

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Camino con Marqués de la Vega, 8-10
Arganzuela 41
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● E-08020 San Pedro de Cervera
Plaça Melibria, 6 / 10
Arganzuela 1000
Tel (071) 120000

USA

● Georgia Village Road



KUNSTSTOFFWERK KREMSMÜNSTER

MÜNSTER





Plastics-Machinery Division Austria

A-4960 Lenzing, Austria, Tel. (07672) 2511-0
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Telex: 21131



Ludwig Praher
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Ludwig Praher
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A-4311 Schwertberg
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Telefon 0 72 62 / 61
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7. IN-DEPTH-EVALUATION OF THE PROGRAMME 1970 - 1988

Improvement of Cost Efficiency

- increase of cost efficiency of the programme with participants in the last five years
- increase of cost efficiency by continued reduction of government contribution by self-financed participants
- government support in basic help also for middle income countries, it stimulates private participation (help to self-help)

Regional Orientation to Africa and Far East

- changes in the regional distribution following to the Austria development policy
- highest increase in lowest and low income countries in AF and FE

Priority to Lowest and Low Income Countries

- successful technology transfer of participants in middle income countries up to 1978
- successful introduction of lowest and low income countries to the programme
- motivation for self-financed participants from middle income countries

Direct Structural Orientation to Industry

- government contribution oriented to public and private companies
- priorities of public companies in Far East and Middle East, priorities of private companies in Latin America, balanced in Africa
- participants of institutes are increasingly financed by UNIDO and other development organizations
- the government contribution stimulates direct industrial development in lowest and low income countries and activates industry in middle income countries to vocational training

Excellent Programme Design

- UNIDO's international know how and facilities
- LKT international is a leading European institute in training, testing, research
- excellent feed back of participants
- permanent improvement and adaptation to the collective and individual needs of the participants

International Follow Up

- direct continued co-operation with 18 countries
- vocational training in companies
- establishment of national training centres for programme participants
- regional seminars, inter-regional co-operation
- independent industrial activities
- trainer/cost relation

Technology Export of Austria

- Exports of injection moulding machines, extruders, moulds and other equipment 1978-1987 in the regions covered by the programme from visited companies
- exports of materials and additives 1978-1987 as above

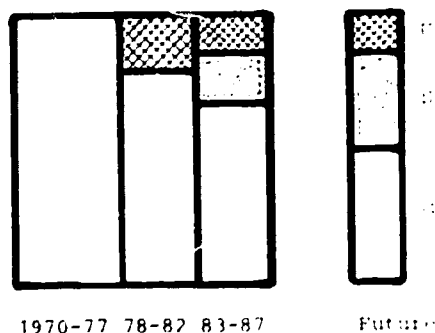


Fig 1: Structure of Contributions

U: UNIDO Projects, S: Selfsupport, G: Government

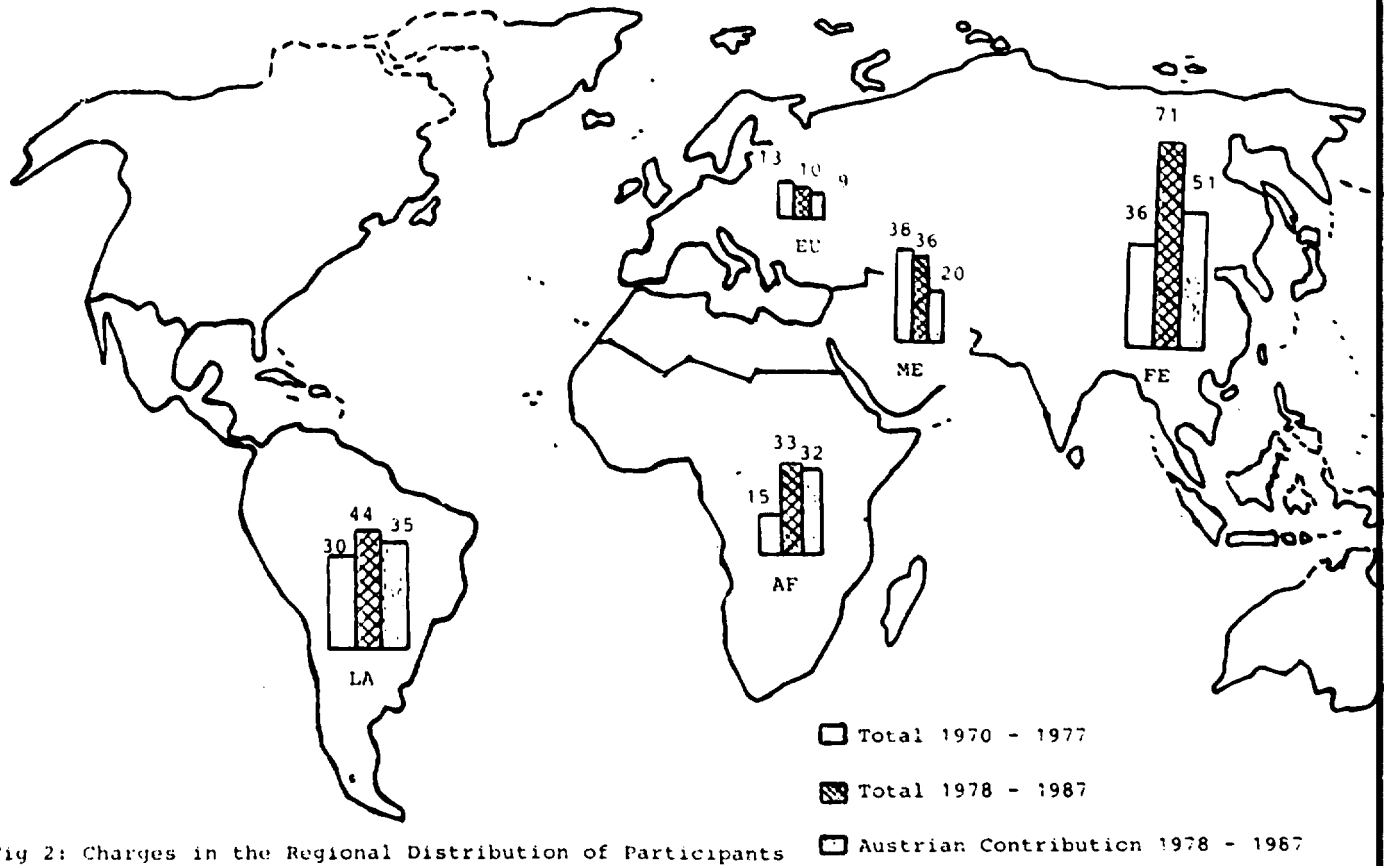


Fig 2: Changes in the Regional Distribution of Participants

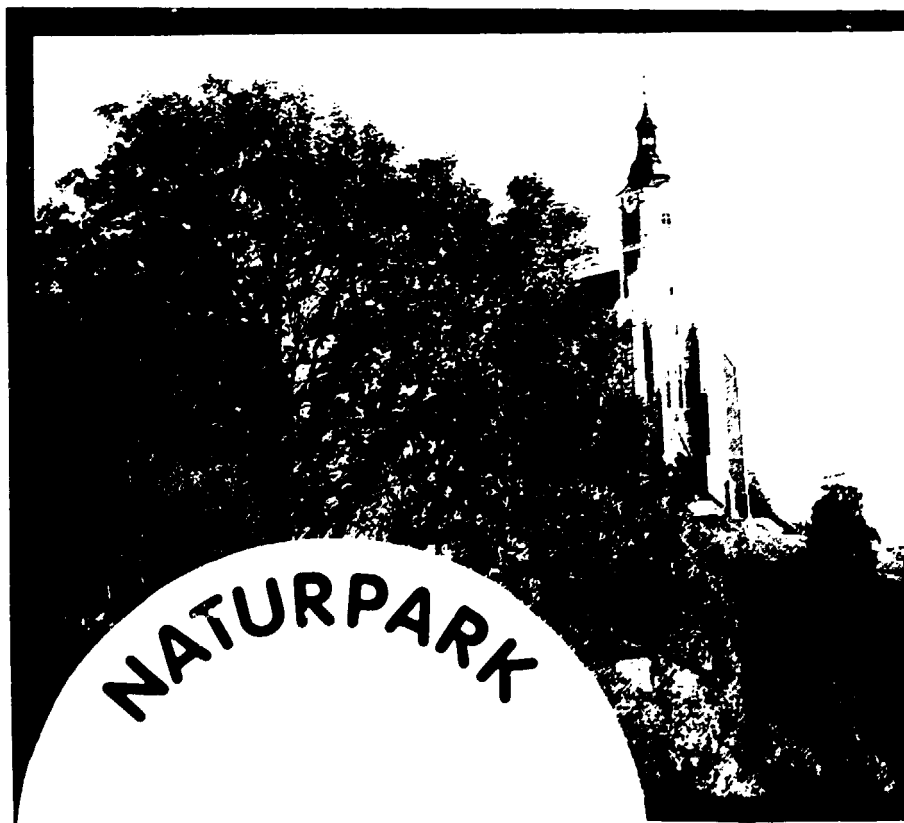
8. SPECIAL EQUIPMENT FOR THE TRAINING PROGRAMME

ALPINE, FRG: Extruders
AVI, Graz: Electronic Control Systems
BATTENFELD, FRG: Injection Moulding and Blow Moulding Machines
BATTENFELD FICHNER, FRG: Blow Moulding
BATTENFELD FICHNER, FRG: Extruders and Injection Moulding Machines
BAUER, Switzerland: Measuring Instruments
BECKMANN, USA: EDV-Equipment
BIEBER, Vienna: Silo-Installation
BOBENBERG, FRG: Testing Equipment
BRANDL, FRG: Highspeed Testing
BROSA, FRG: Control Instruments
BUNHEB-GUYER, Switzerland: Presses
DELL, USA: EDV-Equipment
DUNFIELD, FRG: Expert System for Molding
EAST, Italy: Testing Equipment
CHURCHILL, England: Water and Oil Circulating Controllers
CISCINATI MILACON, Vienna: Extruders, Injection Moulding Machines
COUDENHOVE UND HUNNER, Vienna: Spray-Up Machines
DEMES, FRG: Pre-Treatment Instruments
DIETACHMAIR, FRG: Mixing and Dispensing Machines
ENGEL, Schwertberg: Injection Moulding Machines
EPSON, Japan: EDV-Equipment
ERBA, Italy: Gaschromatography
FBV, Vienna: Process Control Systems
FRANK, FRG: Testing Equipment
FUCHS, Vienna: Mills
GOERZ Electro, Vienna: Instruments
GÖTTFERT, FRG: Rheological Equipment
HACK, Vienna: Laboratory Equipment
HAGEDORN & BAILLY, FRG: Water and Oil Circulating Controllers
HARTMANN & BRAUN, FRG: Control Systems
HASCO, Vienna: Moulds
HENSCHEL, FRG: Mixers
HOTTINGER, Vienna: Torque Measurement Equipment
JEGI, Japan: Electron Microscopic Equipment
JOENS, FRG: Control Systems and Recorders
JUNG, a.k.a. Juchheim, FRG: Control Instruments
ILLIG, FRG: Vacuum Forming Machines
KISSEL, FRG: Film-Extruder
KISTLER, Switzerland: Piezo-Quarz Sensors
KRAUSS-MAFFEL, FRG: Foaming, Extrusion, Recycling
KRAUTKRÄMER, FRG: Ultrasonic Equipments
K-TRON SODER, Switzerland: Dosage-Systems, Dosage-Computer
LINK, GB: X-Ray Analytical Equipment
LÖDIGE, FRG: Mixer
MEDEK & SCHÖPNER, Vienna: Signator (Marker)
METRAWATT, FRG: Control Systems
METTLER, Switzerland: Analytical Instruments, Balance
MIKRONIX, Pulkau: Electronic Equipment and Computer
MOLDFLOW, Australia: Expert System for Molding
NETSTAL, Switzerland: Injection Moulding Machines

OMYA, Fluid Ultrasonic Measurement Systems
PAAK, Analytical Ultrasonic Measurement Preparation
PARSONS ELECTRIC, Major Analytical Instruments
PETERSON, Vibration Control Systems and Recorder
POMERLEAU, Analytical Instruments, Measuring Equipment
PVA, High Precision (Analytical) Electronic Equipment
and Analytical Measuring Equipment
PULSAR ELECTRIC, Measuring and Control Equipment
RAYSON, Fluid Analytical Instruments
SCHNEIDER, Measuring Electronic Equipment
SILVER, High Precision and Analytical Control
SMAK, Analytical Instruments
SOLAR, Measuring Instruments
TAKASHI, Measuring and Measuring Equipment
THERMO, Measuring Equipment for Solids
VIBRATION, Measuring Instruments
WALSH, Measuring and Control
WILSON, Measuring Electronic Equipment
WILSON, Measuring and Control for Cables, Digital Processing
WILSON, Measuring Control Systems
WILSON, Measuring and Control
WILSON, Measuring and Control



Pöllauberg



NATURPARK

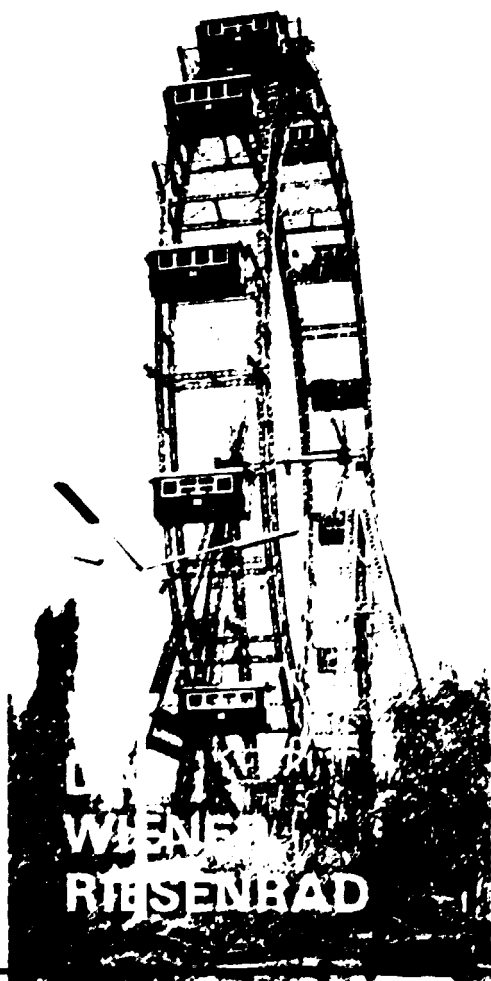
PÖLLAUER TAL





LKT-TGM international
Austrian Laboratory for Plastics Technology

The LKT-staff members
invite
all UNIDO-Seminar participants



for a
**PRATER-
BUMMEL**
and a
DINNER
on
Friday
5th of Oct. '90
at 5.30 p.m.

Meeting point:
Entrance to Riesenrad

Dinner: 7.30 p.m.
Wieselburger Bierinsel

All further information:
Robert Hillisch

LKT-Mitarbeiter:



ID-Programme

Stand 1987

Industrial Development Programme in Polymer Engineering and Plastics Technology

Description:

The ID programme is an individually arranged top level programme for experienced candidates to help them solve their specific problems in polymer engineering and plastics technology. It is designed as an individual tuition course through project work in a specific field of polymer processing, engineering, application and recycling, including theoretical introduction, practical work, educational training methods, computer aided skills, publications, and membership to the Austrian Society for Polymer Engineering (GFKF).

Content:

The project work is selected from the following fields of study:

Plastics processing and control engineering injection moulding, extrusion, blow moulding, foaming, compounding, machining, forming, welding, bonding, finishing, mould design, reinforced materials - **application engineering** mechanical engineering, electrical engineering, electronics technology, energy conversion, pipe and fitting systems, transport and packaging, composites - **quality control** polymer physics (X-ray diffraction, electron microscopy, thermal analysis), polymer chemistry (analysis, IR spectroscopy, chromatography), testing (mechanical, thermal, optical, electrical), behaviour, ageing, stability and flammability - **environmental technology** waste management (collection, transportation, disposal, composting, combustion, refuse derived fuel), reclamation, secondary usage and recycling of polymer materials, hazardous waste - **automation and computation** programming, microprocessors, robotics - control engineering - **quality assurance**

Services:

Permanent availability of by senior experts - individual lectures - planning, review and evaluation of project work - permanent assistance - operators services - preparation and use of equipment and materials - infrastructure, computer, literature and patent services - documentation - basic administrative facilities - computer aided skills

Organization:

Austrian Institute for Plastics Technology LKT-TGM international, Kärntnerstraße 10, A-1020 Vienna, Austria, Tel. 022 36 21 06 3 and 022 36 15 11 476, Telex 1176 24, fax operator with 12 lines, telegraph, central mail service, Branch offices in industrial operations, international information service, telephone, A 1020 Vienna, Tel. 022 36 21 06 41 3, telex 1176 24.

Qualifications:

Graduation and experience in the field.

Language:

English, German



VIENNA INTERNATIONAL CENTRE (UNO-CITY)