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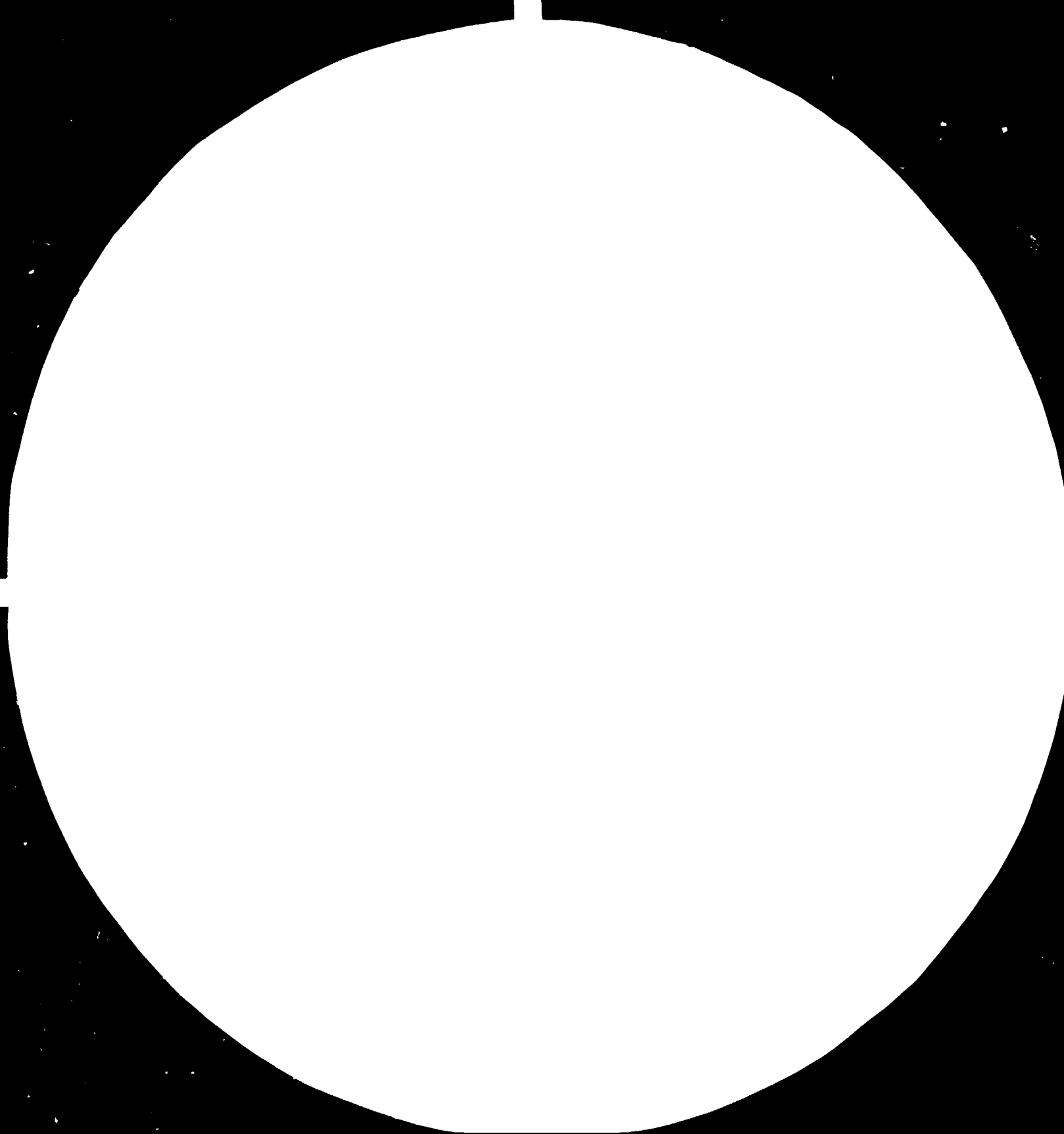
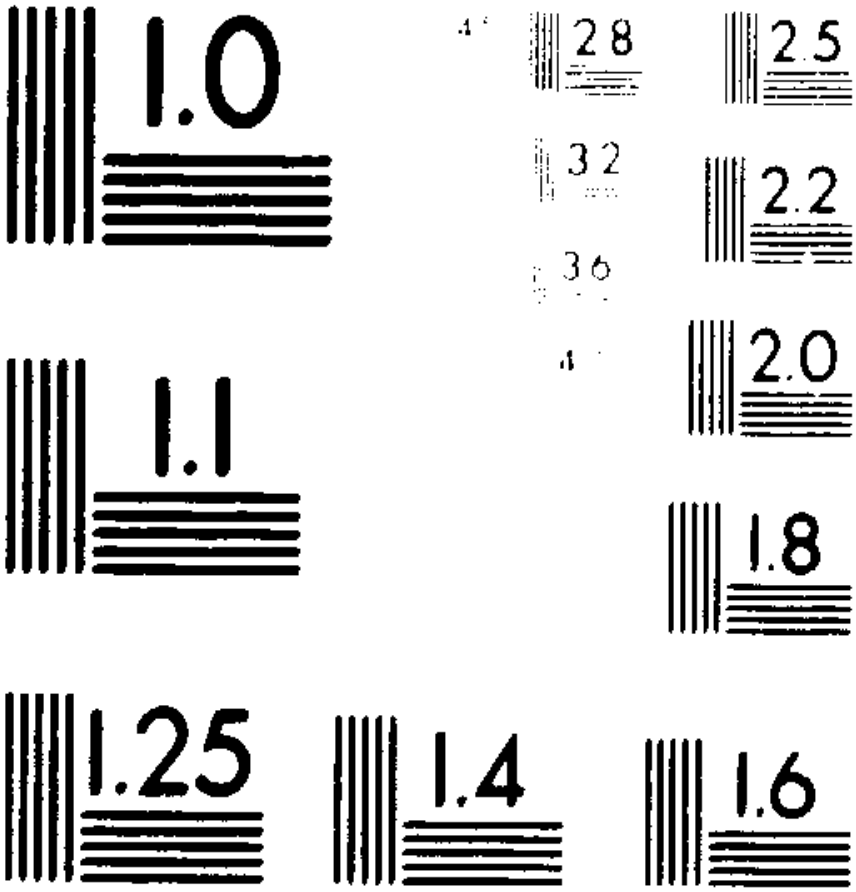
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org





14526 1985

# Report

on

the mission to

the People's Republic of China. (Textile industry)

February 6 - 19, 1985

by

W. C. ALBRECHT

3316

Contents

1. Purpose of mission
2. Lecture on non-wovens
3. Lecture on geotextiles
4. Help in organisation of an "International Conference on Synthetic Fibres"

1. Purpose of mission

(see job description)

Duties:

(a) Lecture on non-wovens (spunbonded and chemically bonded)
   (1) general introduction
   (2) products of non-wovens
   (3) production of non-wovens
   (4) development of non-wovens
   (5) problems

(b) Lecture on geo-textiles
   (1) general introduction
   (2) end products and end use
   (3) present state of development

(c) Help in organisation of an "International conference on Synthetic Fibres"
   (1) programme
   (2) subjects of papers
   (3) selection of candidates

2. Lecture on non-wovens (about 65 participants)

(a) General introduction

The subjects discussed included:

- the history of non-wovens; that they must not be regarded as general substitution textiles; they are only useful if they
  - o can be produced at an adequate cost/benefit ratio,
  - o have the desired, mostly light, weight and
  - o produce effects which at equal cost cannot be obtained by other textiles (mostly these are advantages resulting from the fact that non-wovens are composed of single fibres).

- Definition of non-wovens. It was pointed out that the word "non-wovens" was inadequate and it was recommended to introduce a more appropriate term into the Chinese language.

- Market situation of non-wovens in Western Europe and the U.S. It was mentioned that, in spite of the overall stagnation of the textile market, non-wovens showed annual growth rates of about 10 %, although these varied with fibre types and processing technologies.

- The influence of the selection of fibre type, processing technology and construction on fabric properties. These factors are more closely related than for other textiles and can hardly be influenced during the production process.

- Fibre selection. The properties which are of particular importance for non-wovens were discussed in detail:

  - o **Viscose**: titre, elongation, crimp, cross-section, water absorption, effect of finishes on processing performance, fibre separation as well as mechanical and chemical bonding

  - o Polyamide: transverse strength, abrasion resistance, flexural strength, bicomponent fibres, melting behaviour of PA 6 and PA 6.6

  - o Polyester: wide fibre range, stabilized/unstabilized types, dimensional stability, shrinking fibres, different cross-sections, pilling, hydrophobia, affinity to binders

  - o Polypropylene: creeping, UV stabilization, hydrophobia, finishing, spin-dyeing, specific gravity, melting point and melting behaviour

  - o Binder fibres: water-soluble, fusible, adhesive, bicomponent fibres

  - o Varieties of man-made fibres (summary)

  - o Glass fibres and aramids

  - o Natural fibres: cotton/problem of purity, wool/felting property, and crimp

  - o Fibre production from films: cutting and splitting

  All the problems related to "fibre properties and resulting fibre selection" for the various types

of non-wovens were discussed in an unexpectedly lively manner and in great detail. This demonstrated the keen interest of the Chinese, but also that they are not yet actively engaged in non-wovens to any significant extent.

(b) Web production

- Mechanical process
  Special attention was drawn to the difference between web production at spinning mills and the production of non-wovens fabrics and it was explained why the webs to be used for non-wovens must meet higher quality requirements.
  The general discription of the process was followed by a discussion of the relation between fibre titre, possible square weights of the non-wovens, productivity of the cards and the physical properties of the non-woven fabrics.

- Aerodynamic process
  The process was described in detail and the demands on the fibres, the differences in web quality from mechanically formed webs as well as the possible uses of the webs were discussed.

- Wet process
  The current situation was explained on the basis of the history of this process. Then the characteristic features of the process were described (short-staple fibres, development of machinery, bonding, drying process and its influence on fabric quality and uses of such non-wovens).

- Spun-bonded fabrics
  Starting from the well-known processes for man-made

fibre production, the differences between these and the production of spun-bonded fabrics were brought out (drawing, opening, depositing, flexibility, influence of the polymer used, square weights of non-wovens, bonding methods).Then it was made clear that the relatively expensive non-wovens must have properties which are not found in other textile products and that they must offer the user certain cost advantages.

- Tow spreading process
  The requirements for crimp, finishing and continuous operation in the production of cushions and quilts were explained and the handling of these novel products was discussed (washing, covers, sewing, welding, sizes).

- Melt blowing and casting processes
  The process was described and it was pointed out that steady progress is being expected in this field (use of pulp in the place of fibres).

This chapter was concluded by answering numerous questions (machine suppliers, production details, machines for specific end products and fibres, fibre properties and processing; repeated questions were asked about machines and fibres for universal use). - These questions again displayed great interest and understanding.

(c) Web bonding

After having dicussed the fundamentals of web bonding to form non-woven fabrics, the individual processes (needle-punching, bonding with binders and heat) were treated in detail.

- Needle-punching
  Needles (sizes, hooks, needling machines, influence of fibres, finish and web weight), including needles producing special effects

- Chemical bonding
  Process (impregnating, padding, spraying, foaming, printing, powdering). - Binder types and their characteristics and the influence of the latter on the final product. It was explained by the example of impregnation that the equipment to be selected (simple or more sophisticated) depends on the requirements to be met by the final product.

- Thermal bonding
  Calenders, calender roller engravings to obtain special effects. The use of spot bonding and free fibre lengths in producing elastic fabrics of a textile character was dealt with in detail.

- Drying of non-wovens/binder curing
  Stenter frame and rotary dryers were explained as was the effect of temperature and time on the non-woven fabric being obtained.

- Special bonding processes
  In this section, spin-lacing and needle-punching with effect needles were discussed. The limits to these processes and the performance of the final products in actual use were also described.

(d) After having answered numerous questions about web bonding, a number of samples representing different product categories were discussed: household articles, medical and sanitary products, floor coverings, filters, abrasive

discs and, in outlines, geotextiles. In this connection the influence of fibre selection, web forming technology as well as bonding - process type and details - were demonstrated, which again gave rise to numerous questions.

(e) Discussion of equipment and suppliers as well as test methods
This aspect was dealt with very briefly for lack of time. However, suitalbe information material was handed over after having given a brief summary of its contents.

The number of questions growing from day to day and from section to section as well as the increasing open-mindedness of nearly all participants seem to justify the assumption that this was a useful meeting. The possible tasks of the Academy in the field of non-wovens were dealt with in a final discussion and it was concluded that

- the Academy should not undertake any work of its own regarding the production of wet-laid non-wovens, but acquire the necessary know-how in connection with a possible purchase of equipment;

- in principle there were no unanswered questions left regarding the aerodynamic process;

- it would be convenient to buy a suitable card;

- end-use-related needle-punching and chemical bonding trials (also with binder fibres) were useful;

- activities in the field of spin-bonding would be recommendable;

- it was not advisable for the near future to work on melt-blowing and spin-lacing;

- development of chemical finishing processes was important.

## 3. Lecture on geotextiles

In view of my curtailed stay in the PR China and the fact that the audience of the lecture on geotextiles should be more end-use-oriented, it was agreed that this lecture should be held in November 1985 on three days before or after the First International Conference on Man-Made Fibres.

## 4. Help in organization of an "International Conference on Synthetic Fibres"

In view of the urgency of this matter, it was dealt with in the first two days in a detailed and final manner between the representatives of the ministries, the Academy and the author of this report. During their meetings they prepared a detailed proposal for a programme, visited the Congress Centre and the author gave some recommendations regarding the formal aspects of the programme and the registration procedure as well as the organization of the conference.

For conference programme see Annex 1.

Remarks on conference programme:

- Chairmen for discussions for half a day each
  - o 3 representatives of the PR of China including a personality of particular renown for the first morning
  - o 1 representative of UNIDO if fibre expert available
  - o 2 foreigners (proposal: Prof. Herlinger and Prof. Albrecht)

- The visist to the Academy will take place in two groups:
  - o first group: 3rd day starting at 10.30 hours
  - o second group: 3rd day starting at 14.00 hours

- At the meeting it was assumed that the PR of China would organize another conference in two or three year's time.

- Quite a number of lecturers could not be considered in

view of the limited time available.

- Conference languages: Chinese/English with simultaneous translation

- Lecture times: as a rule, 30 minutes plus 10 minutes for discussion. - Exceptions: the two opening lectures as well as the lectures of the developing countries (20 minutes) and the lectures of the Chinese experts (15 minutes plus 5 minutes for discussion). If further discussion should be requested, these will be held in smaller meeting rooms at times still to be agreed.

- An area of about 300 $m^2$ is available for the exhibition. A list of the exhibitors to be invited is attached (Annex 3).

- Dispositions should be made on the basis of about 300 participants, who could be accomodated at the Conference Centre and preferably only one further hotel (transport). In the meantime, another meeting place is under discussion where all participants could be accomodated (Friendship Hotel?). No separate accomodation for Chinese and foreign participants.

- Participation fee: 100.- US $ for free participants from abroad

- The author of this report forwarded the programme to Mr. Youssef/UNIDO-Vienna without delay and asked for OK or suggestions for alterations by telex 8.592.732 ehv d to him and to Mr. Zhu Xing/Ministry of Textile Industry, Department of Foreign Affairs, Beijing (telex 22661 mti).

- The Chinese participants in the meeting relied on UNIDO to name the lecturers from the developing countries. The author will submit some proposals as quickly as possible.

Annex 1

P r o g r a m m e

First International Conference on Synthetic Fibres

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First day

| | | |
|---|---|---|
| 09.00 - 10.00 | Registration | |
| 10.00 - 10.30 | Opening ceremony<br>- Representative of PR China<br>- Representative of UNIDO | |
| 10.30 - 11.15 | Opening speach H.F. Mark (./. disc.)<br>'Trends in the man-mades' | USA |
| 11.15 - 11.30 | Break | |
| 11.30 - 12.00 | Development of the fibre field in the PR China (./. disc.) | PR China |
| 12.00 - 14.00 | Break | |
| 14.00 - 14.40 | Geerdes<br>'Trends in world fibre production and forecast' | USA |
| 14.40 - 15.20 | USSR ?<br>'Production of cellulosic fibres - situation and future' | SU |
| 15.20 - 15.40 | Break | |
| 15.40 - 16.20 | Kawaguchi<br>'High-speed spinning of PES' | J |
| 16.20 - 17.00 | K. Bauer/Barmag<br>'Modern false-twist and air-texturing technology' | FRG |

Second day

| | | |
|---|---|---|
| 09.00 - 09.40 | McIntire<br>Use of PES staple and filament | UK |
| 09.40 - 10.00 | Chinese expert for PES | PR China |
| 10.00 - 10.20 | dito | |

| | | |
|---|---|---|
| 10.20 - 10.40 | Chinese expert for PES | PR China |
| 10.40 - 11.00 | Break | |
| 11.00 - 11.40 | Prof. Klare<br>'PA fibres - structure and properties' | GDR |
| 11.40 - 12.00 | Chinese expert for PA | PR China |
| 12.00 - 14.00 | Break | |
| 14.00 - 14.40 | Prof. Krässig<br>'PAC fibres - situation and future' | A |
| 14.40 - 15.00 | Chinese expert for PAC | PR China |
| 15.00 - 15.20 | Break | |
| 15.20 - 16.00 | Spruiell<br>'Structure and properties of PP fibres' | USA |
| 16.00 - 16.20 | Chinese expert for PP | PR China |
| 16.20 - 17.00 | Prof. Herlinger<br>'Modification of synthetic fibres' | FRG |

Third day

| | | |
|---|---|---|
| 09.00 - 09.40 | Matsuhashi<br>'Industrial fibres and their use' | J |
| 09.40 - 10.20 | Däfler<br>'Uses and new developments in fibre finishes' | FRG |
| 10.20 - 10.40 | Break | |
| 10.40 - 11.00 | Developing countries (without discussion) | |
| 11.00 - 11.20 | dito | |
| 11.20 - 11.40 | dito | |
| 11.40 - 12.00 | dito | |
| 12.00 - 14.00 | Break | |
| 14.00 - 14.20 | Developing countries (without discussion) | |
| 14.20 - 14.40 | dito | |
| 14.40 - 15.00 | dito | |
| 15.00 - 15.20 | Break | |

| | |
|---|---|
| 15.20 - 15.40 | Developing countries (without discussion) |
| 15.40 - 16.00 | dito |
| 16.00 - 16.20 | dito |
| 16.20 | Closing ceremony<br>- Representative of PR China |

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Annex 2

Programme details

- Reception / information: desk in the airport
- Ladies' programme: (in Beijing) to be paid for

  Forbidden Town
  Palace Museum
  Summer Palace
  Silk fabrics
  Temple of Heaven Park
  Hand-painting
  Arts, antiques

- Excursion: for all participants and ladies
  e.g. Great Wall, Ming Tombs
- Official dinner
- Unofficial evening programme: at own cost
  with artistic opening performance
- Reception desk in the conference hall with
  information, transportation, flights etc
  postcards (for sale)
  stamps (for sale)
- Coffee and tea: during the break
- Lunch in the conference building
- Projection: slides, sheets, light-stick
- Transportation: organization and information of the participants about transport facilities from the hotel to the conference hall and into town
- Papers: delivery deadline,
  instructions for preparation
  duplicating,
  two versions =
  Chinese for Chinese participants
  English for other participants
  short version
- Organisation and announcement of the visit to the Academy
- Questions to be prepared by scientists of the Academy
- Speakers from Barmag and Toray and Dr. Däfler will travel at their own cost, but without participation fee

Exhibition

| Companies | Pictures of plants or machines / fibres and end-uses (fabrics) / recommended items |
|---|---|
| Du Pont | hollow fibres (PA for carpets;PES)<br>differential dyeing PES<br>LYCRA (elastic fibres) |
| Celanese | POY ⟶ PES |
| Hercules | PP - fine deniers - but also heavy deniers |
| Chemtex | plant design |
| Courtaulds | viscose - hollow; modal<br>- ribbon |
| ICI | ? |
| Platt | pictures of friction yarn spinning, yarns and uses |
| Hoechst/Uhde | plant design |
| Lurgi | Docan - pictures |
| Zimmer | POY production |
| Enka | PES filament, spinnerets,<br>CV filament, membranes |
| Fourné | machine pictures |
| Barmag | texturising PES |
| Neumag | texturising PP and staple fibre cutter |
| Montedison | PP fibres, also spun-dyed |
| Sandoz | dyestuffs for spin-dyeing |
| Inventa | plant design |
| Lenzing | viscose: non-flammable<br>with high water absorbency<br>with X-ray absorbency<br>modal |

| | |
|---|---|
| ARCT | texturising<br>long-fibre yarn spinning |
| Murata | air jet spinning |
| PR China | products made of man-mades |
| Fleissner | ? |

Annex 4

Tentative Programme (in Chinese and English)

- idea of the conference (follow-up?)
- data
- participation fee
- application with deadline of registration
  - selection (is matter of politcs)
  - a nice letter to all persons who cannot be selected (e.g. Hotels, possibility to participate next time)
  - application after deadline has to be answered: sorry...
- names of the opener and the representative of UNIDO
- name of the opening speaker and title of his paper (H.F. Mark?)
- languages (simultaneous translation)
- organising of room reservations
- contact addresses for the responsible organiser of the congress - post, telex, telephone
- list of speakers and titles of their papers divided into groups (no timetable)
- remark on exhibition
- remark on ladies' programme (must be paid for separately)
  official dinner
  unofficial meeting (at own cost )
  excursion (must be paid for separately)
- special sign (logogram) of the congress

Annex 5

Programme (in Chinese and English)

- welcome address with purpose / theme of the conference thanks for the help of UNIDO — president

exact timetable

- names of the speakers with
  - co-authors
  - institutions/firms
  - countries
- titles of the papers
- chairmen
- breaks
- speaking time with/without discussion

remarks of the draft programme, in some cases more detailed