OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

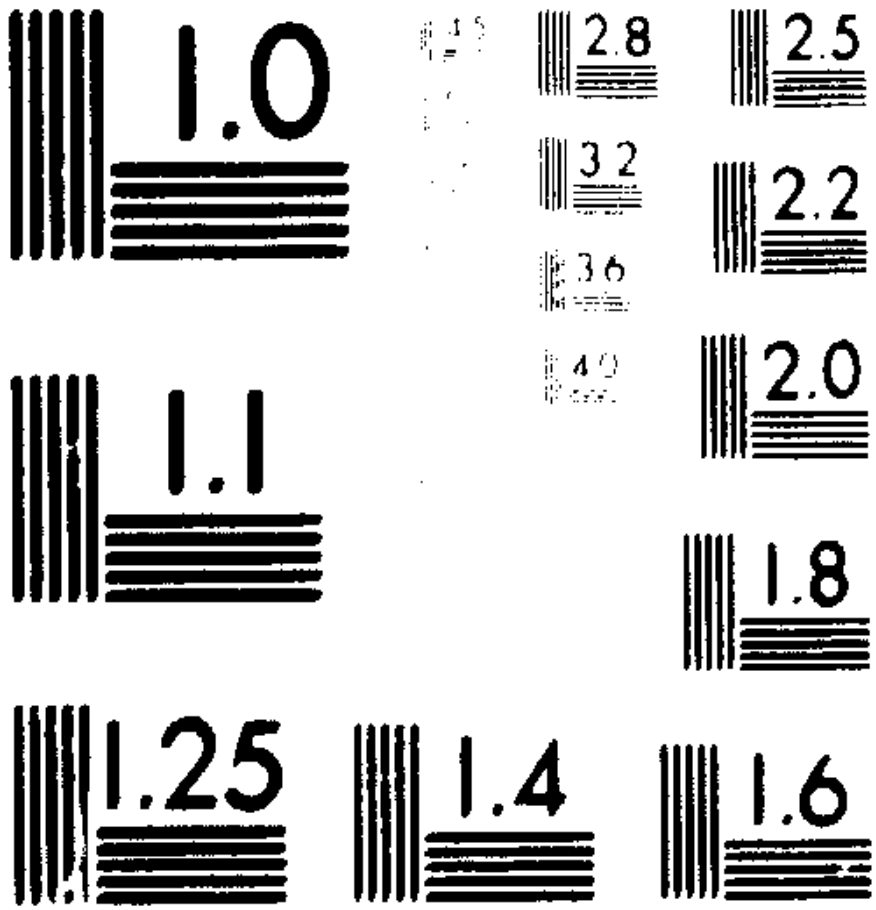
FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

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



09561

RESTRICTED

DP/ID/SER.A/238
9 January 1980
English

BAST FIBRES PROCESSING
SI/ROM/75/818
ROMANIA

(R) Technical report: Chemical processing and finishing of bast fibres. Romanian

Prepared for the Government of Romania
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of Osamu Yamamoto, consulting engineer

United Nations Industrial Development Organization
Vienna

30-30433

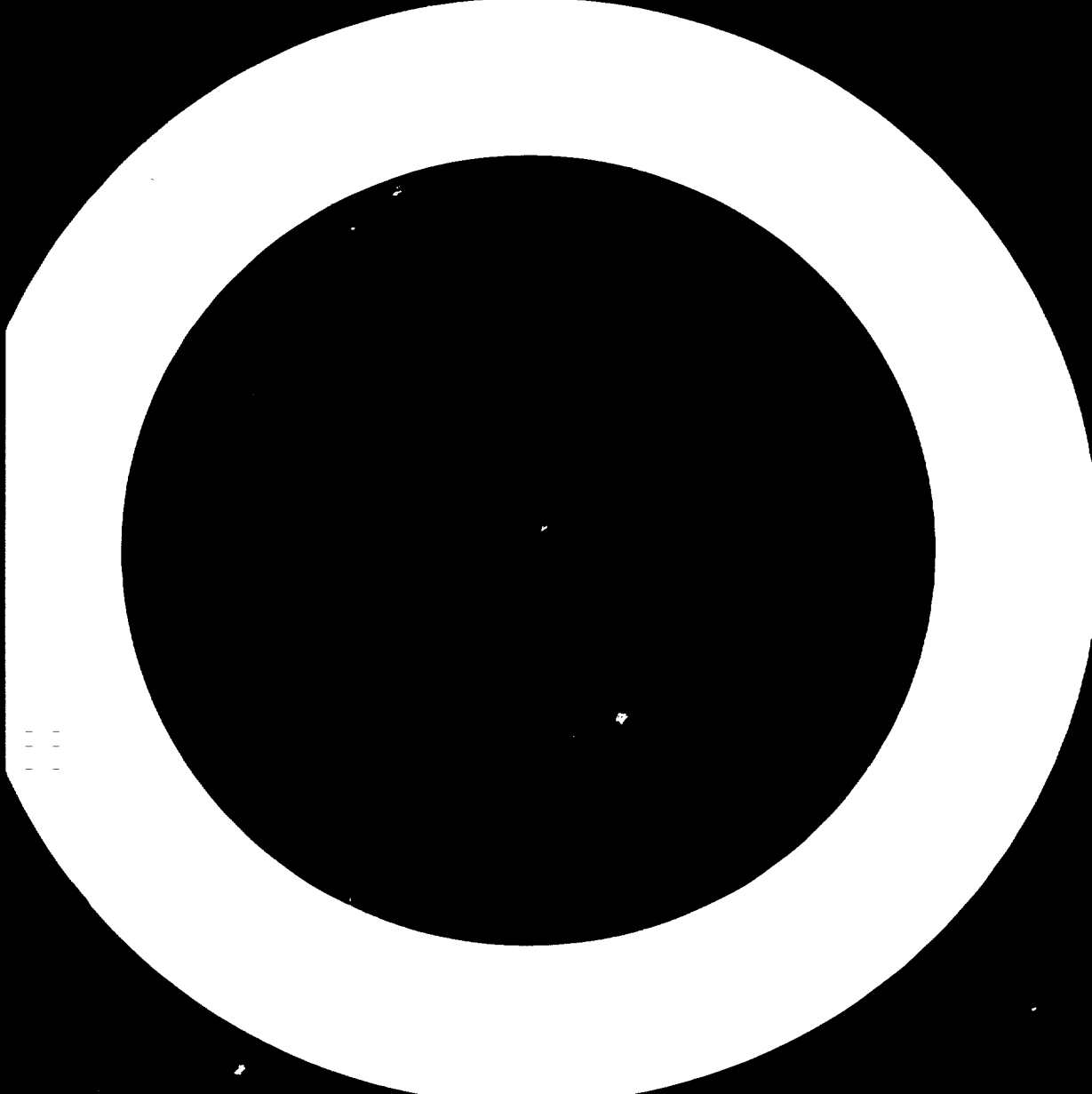
Explanatory notes

The designatiors employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Mention of firm names and commercial products does not imply the endorsement of the United Nations Industrial Development Organization (UNIDO).

ABSTRACT

The project entitled "Bast Fibres Processing" (SI/ROM/75/813/D) arose from a request made by the Government of Romania in May 1975, and approved by United Nations Development Programme (UNDP) in June 1975, for assistance in introducing new blends of linen and hemp with synthetic fibres. The four-month mission covered by this report began in May 1979. One of its main findings was that facilities currently used in the bast processing factories in Romania were not sufficient for the manufacture of commercial textile goods, especially the processing and finishing of polyester and linen blends. Major unresolved processing and finishing problems were also identified and possible solutions suggested.



CONTENTS

Chapter		Page
	INTRODUCTION	6
I.	PROJECT ACTIVITIES	8
II.	GENERAL OBSERVATIONS, CONCLUSIONS AND RECOMMENDATIONS	11

INTRODUCTION

In 1977 Romania had 12 factories processing bast fibres (linen and hemp) with a total annual production of 80 million m^2 of fabrics and a raw material consumption of some 40,000 t. By 1980 the Government hoped to increase the share of synthetic fibres, notably polyester fibres, as raw materials for this production.

To achieve this end, assistance was required in solving technological problems connected with raw material selection, sorting, blending and mechanical and chemical processing into finished fabrics. A request for assistance was therefore made by the Government of Romania to the United Nations Development Programme (UNDP) in May 1975 and approved in June 1975, thus giving rise to the project entitled "Bast Fibres Processing" (SI/ROM/75/813/D).

The part of the project covered by this report took place from May to August 1979. Its principal aim was to help solve technical problems relating to chemical processing. The main problems to be solved are described in this report.

In the course of his mission the expert visited five factories, namely Intex, Balotesti, Prodin, Pascani and Botosani (the last two under construction). These factories have machinery for pretreatment (singeing, desizing, scouring, bleaching, mercerizing), dyeing (jigger, winch), printing (flat, rotary, continuous steamer, open-width washer) and finishing (tenter, curing machine for resin finishing, calender, sanforizing machine).

The main products produced at present are fairly thick cotton and linen fabrics for curtains, drapes, coverlets, table cloths, napkins and tents, and polyester and linen blends (50/50) for suits, shirts and tents.

It seems that the Government plans to produce pure linen fabrics and more polyester and linen blends.

The processing methods and equipment used are standard. However, for the processing and finishing of polyester blends, existing facilities are not sufficient.

Textile industries throughout the world are striving to achieve better marketing. This has led to increased product differentiation and more competitive pricing. There is also a need for the introduction and demonstration of higher-level technology after checking and improving current processing methods and facilites at the factories. Owing to the difficulty of obtaining the necessary chemicals and attachments, such as resins, special printing agents, pins and tenter over-feed devices, the planned demonstrations could not be carried out. A follow-up project would therefore be useful, especially for pretreatment, including the heat-setting of polyester blends, and for resist-printing of reactive dyestuffs.

The textile industry throughout the world is currently beset with difficulties. It faces such serious trade problems as the increasing number of exporting countries, the international division of textile production, and import controls with the application of quota systems by many countries. As a first step towards a solution of those problems, it is very important for producers to determine whether their textile goods are competitive in terms of both prices and other factors in international markets. The core of marketing strategy is product differentiation and adaptability of price to demand.

For some products there may be no problems of price competitiveness.

In those cases, non-price competitiveness would include such factors as product quality, after-sale service, brand image, sales networks, terms of payment and the capability of responding to new demand.

I. PROJECT ACTIVITIES

The official data provided shows the production of each factory to be as follows:

Factory	Production (millions of meters per year)
Intex (weaving and finishing)	11
Balotesti (spinning, weaving and finishing)	10
Prodin (weaving and finishing)	19
Pascani (under construction)	
Botosani (under construction)	

Some production is exported, and the Government plans to produce pure linen fabrics and to increase polyester and linen blends especially for export. The Government seems to be trying to ensure the production of goods that are competitive in terms of both price and quality. This is reflected in the promotion of products undergoing special types of treatment, such as anti-crease, water-repellent, anti-flame, anti-microbe, soil-release, anti-pilling, anti-slipping and chemical treatment of the fibres before spinning. However, administrative difficulties hampered the acquisition of the chemicals, resins and dyestuffs required for the planned demonstrations. It also proved difficult for the expert to meet with members of the staff of the chemical or dyestuffs companies. Problems relating to the processes applied and the equipment used are listed below:

(a) Pad-roll systems have been used for continuous pad-dyeing;

(b) The fabrics stretched and deformed by pad-roll systems or jigger processing were dryed on cylinder dryers. The fabrics were liable to crease during drying, padding and printing;

(c) Equipment maintenance and cleaning were insufficient, especially the singeing machines and pre-dryer for thermosoling at Balotesti, and apparatus at all the laboratories;

(d) There were no pin-tenters with over-feed devices for processing polyester blends or drying finishes especially resin finishes;

(e) There were no suitable resin-finishing machines, especially padding apparatus and dryers;

(f) An excessive amount of resin has been used for finishing linen;

(g) The chemical treatment of linen fibre before spinning was done only in roves;

(h) Package-dyeing (on cheeses) was done inefficiently;

(i) One-phase printing by means of vat dyestuffs has been adopted.

The following problems need to be dealt with at Intex:

(a) Preparation of fabrics made of cellulosic fibres (cotton and linen) for dyeing and printing (Ronalda, Albina, Any, Preda);

(b) Preparation of linen and polyester fabrics (Carmen, Genua, Tismana, Bena) and dyeing in shades ranging from dark to light (dark red, brown, navy blue);

(c) Printing on cotton and linen grey background (Ronalda) with vat dyes, maintaining the colour contrast between cotton and linen, and also maintaining fastness in both dry and wet rubbing;

(d) Printing on thin compact cotton and linen fabrics with vat dyes, obtaining a uniform colouring and fastness in dry and wet rubbing;

(e) Flat white printing on grey linen fabrics (cotton and linen, and linen and polyester;

(f) White and coloured corrosions on a cotton and linen or linen and polyester background;

(g) Treatment of superior finishing (non-crease, pre-shrunk) for fabrics made of cellulosic fibres (cotton and linen) intended for clothing articles and for linen and polyester fabrics (anti-sliding, anti-pilling, non-crease etc.).

The following problems require attention at Balotesti;

(a) Preparation of linen and polyester fabrics for dyeing and printing;

(b) Dyeing of linen and polyester fabrics using different types of dyestuffs and systems of dyeing with a view to obtaining even shades;

(c) Printing of linen and polyester fabrics (in different ratios) with disperse and reactive dyestuffs by thermosoling and steaming at high temperatures;

(d) White and coloured discharges on linen and polyester fabrics;

(e) Acquiring printed yarns (linen and blends of linen);

(f) Printing with indigo dyestuffs (complete technology);

(g) Treatment of superior finishing of linen and polyester fabrics (non-creasing, anti-pilling, anti-sliding, waterproofing, permanent-pressing, soil-release,), obtaining the necessary equipment and complete technology;

(h) Fireproofing treatment applied to cotton and linen fabrics used for tarpaulins (camping articles) and protective clothing;

(i) Preliminary chemical treatment (before spinning) of hemp fibre and blends of hemp with chemical fibres in mass, in sliver, or in roves;

(j) Chemical treatment of roves simultaneously with dyeing, with a view to spinning on spinning machines with controlled rolling train;

(k) Dyeing of linen yarn and linen in blends with polyester and rayon in different ratios.

II. GENERAL OBSERVATIONS. CONCLUSIONS AND RECOMMENDATIONS

1. Continuous open-width desizing, scouring and bleaching machines should be adopted, especially for continuous pad-dyeing (thermosoling). Several types of continuous machine are in use throughout the world. Information on possible suppliers may be obtained on request from the relevant substantive division of UNIDO.

2. Pin-tenters with over-feed devices are essential for processing polyester blends and for textile finishing.

3. For purposes of resin finishing, 2 dip-2 nip padders and a tensionless dryer, such as a short loop dryer, a pin-tenter, or a suction drum dryer, are essential.

4. The fibre-strength of linen and its blended fabrics are weakened by resins. If reactive resins are used, the amount should not exceed 70 g/l when baked at 150°C for 3 min.

5. Bast fibres can be treated by chemicals, such as alkalis, bleaching agents, dyestuffs and lubricants, for spinning in the form of free fibres, sliver and rove.

6. Anti-creasing, anti-sliding, anti-pilling and anti-shrinking methods were introduced and discussed.

7. Water-repellent methods were introduced and water-repellent and oil-repellent finishes for linen/polyester and linen/cotton were introduced.

8. Fireproof finishes for linen or linen/cotton and polyester/cotton fibres were introduced.

9. Preparations of linen/cotton fabrics for dyeing and printing, especially the maintaining of the contrast of Ronalda fabrics, were discussed, experiments made and the following conclusions drawn at Intex:

(a) The number of weft yarns (picks) shall be reduced as follows:

	Present number of picks per 1.5 cm	Recommended number of picks per 1.5 cm
Before printing	21	18-19
Final	22-23	20-21

(b) Use should be made slightly more twisted yarn, of bigger count yarn, and of one twisted cotton yarn, without parallel warp;

(c) Scouring should be done with alkali detergent only.

(d) There must be sufficient singeing, repeated if possible after printing, soaping and drying (before sanforizing).

(e) The following sequence of operations should be adopted: scouring, bleaching and (mercerizing) for cotton yarn; scouring with detergent only for linen yarn; and then, weaving light washing, drying, singeing, printing, singeing and sanforizing.

10. To improve the rubbing fastness of dyed and printed linen fabrics, it was found that pretreatment, soaping after printing and treatment by chemicals such as acrylic emulsion binders, polyurethane resin, melamin resin and lubricant (e.g. silicon softener) are very important.

11. Yarn dyeings, pump efficiency curves and crape fabric production methods were introduced. The use of chemicals to produce crepon fabrics for linen and cotton fabrics was demonstrated.

12. The mercerizing of linen fibre and yarn to increase elongation was introduced, and Malimo and Raschel were applied for making new linen fabrics.

13. Resist-printings with Resistol HWS (Meisei Chemicals Ltd., Kyoto, Japan) were introduced and demonstrated. This is an up-to-date printing method, the application of which helps textile producers to ensure increased product differentiation. One demonstration was done on an industrial scale, and a follow-up project would probably be necessary if the Government decided to promote mass production.

14. Bulk and cubic printing by means of bronze binder FM-2 (Meisei Chemicals) was introduced and demonstrated. This is a new method for making fancy textile goods.

15. A bonding strength improver, SV-125 Z (Meisei Chemicals), was introduced. It can be used to improve the rubbing strength of printed materials.

16. Non-twisted fabrics with soluble polyvinyl acetate filament yarn were introduced.

17. A two-phase printing method using vat dyestuffs was recommended to achieve even and stable printings. For this method, a flash ager (steamer) is essential.