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REHABILITATION AND ADEQUATION ASSISTANCE TO THE KNITTING  
INDUSTRY OF THE STATE OF SANTA CATARINA

UC/BRA/83/241

BRAZIL

Technical report: Findings and recommendations \*

Prepared for the Government of Brazil  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme

Based on the work of Gary W. Smith, knitting technologist

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United Nations Industrial Development Organization  
Vienna

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1. SUMMARY OF RECOMMENDATIONS

- (i) A well organized, complete and highly responsible information distribution center needs to be established in Blumenau that would have the facilities and financial resources to provide currently available technical material to all interested yarn, knitting, finishing and apparel companies on a regular basis. Such information would be supplied by SENAI-CETIQT in Rio de Janeiro. At the moment SENAI in Blumenau has some technical material but for various reasons, it is not being forwarded to the companies. One suggestion is that such a center could be administered by the textile associations in Blumenau, Joinville and Brusque in conjunction with SENAI-CETIQT in Rio de Janeiro.
- (ii) Communication techniques between the textile associations in Blumenau, Joinville, Brusque and SENAI-CETIQT need to be improved in order for these organizations to work together more effectively in order to share the vast amount of technical material that is available. In this respect, SENAI-CETIQT could play a key role because of the resources it has available.
- (iii) The short and long range need for training new and existing knitting supervisors and mechanics needs to be considered now more than ever because it is probable that a number of these people (and many experienced operators) who have been laid off in the past six months because of the present crisis will not return to their previous jobs. When demand for knitted products improves, many knitting companies will have the desire and the capital equipment to supply the need but they may not have the trained personnel available to produce the product quality that will be required.
- (iv) The textile associations in Blumenau, Joinville and Brusque, as a group, need to request a series of seminars from SENAI-CETIQT that would be based upon

mutually agreed topics. In addition, there should also be more requests for courses that are more tailored to individual company requirements. Included in such a program would be topics such as: machine maintenance, problem solving, problem prevention, machinery utilization and fabric analysis et cetera. Such a concept could also eventually be expanded to include the many knitting companies that are located in Sao Paulo State.

- (v) There still needs to be much closer co-operation between the knitting companies in Santa Catarina and SENAI-CETIQT in Rio de Janeiro in terms of research and development. It is suggested that SENAI-CETIQT take the lead in this respect by requesting a meeting with the leaders of the textile associations in Blumenau, Joinville and Brusque to discuss the topic.
- (vi) Technical assistance which is sponsored by U.N.I.D.O. should definitely be continued but in a slightly different way. Co-ordination of the program should still remain under the control of Mr. Rudolfo Herdes and Professor Alexandre Rodrigues (both very dedicated and capable people) but there needs to be more direct input from the textile associations referred to earlier. In this way not only would there be the participation of groups of people who hold regular meetings but the "quality circles" approach that could be used in planning meetings could actually get the companies talking to each other about the solutions to common problems and not just the problems themselves. Obviously, ultimate control of such a program would lie with U.N.I.D.O..
- (vii) The technical assistance program referred to above could take several forms such as:
  - a) If the leaders of the textile associations agree, the first format could be:
    - Weeks 1 - 3 Plant observations and discussions in Santa Catarina
    - 4 - 5 Series of seminar lectures (at night) in Blumenau
    - 6 - 9 Write up and translation of seminar material in Rio de Janeiro at SENAI-CETIQT

b) If the leaders of the textile associations agree, the second format could be:

- Weeks 1 - 4 Write up and translation of seminar material in Rio de Janeiro at SENAI-CETIQT
- 5 - 7 Plant observations and discussions in Santa Catarina
- 8 - 9 Series of seminar lectures (at night) in Bluminau.

A third possible approach could involve the production of a series of video taped lectures that could be borrowed and used by knitting plants in Santa Catarina at their discretion; such tapes would not only be permanently available at any time but they would be sub-tracked in Portuguese. A typical format using this approach should be:

- Weeks 1 - 4 Production of video tapes on technical material at SENAI-CETIQT in Rio de Janeiro
- 5 - 7 Plant observations and discussions in Santa Catarina
- 8 Seminar and discussions on new technology with knitting professors at SENAI-CETIQT in Rio de Janeiro.

Note: An allowance for all anticipated expenses not directly related to the personal expenses of the U.N.I.D.O. sponsored knitting technologist should be built into the proposal.

## 2. INTRODUCTION

In the original contract description, the project assignment was stated as follows: "improve the processing technology of the knitting industry, in particular, with a view of adequate utilization of raw material and machinery, mill efficiency, styling and fabric quality; demonstrate methods to improve dimensional stability of fabric; train factory staff in advanced knitting and wet processing technology; prepare a technical report setting out the findings of the mission and recommendations to the Government on further action which might be taken".

During initial discussions with Professor Alexandre Rodrigues of SENAI-CETIQT and Mr. Rodolfo Herdes of CEBRAE (Centro Brasileiro De Apoio A Pequena E Media Empresa), the objectives of the present program were outlined. These plans included an initial period of time in Rio de Janeiro at SENAI-CETIQT to plan and write two technical papers that would be given at the "IV CONFERENCIA NACIONAL DE TECNOLOGIA TEXTIL" in addition to a follow up volume of the quality control booklet that was written during my 1986 U.N.I.D.O. assignment. After two weeks it was decided then that I would spend three weeks in Santa Catarina visiting companies and giving on-site technical advice; a generalized report with all observations would subsequently be sent to all companies (but no individual company names would be mentioned in that report). The last week of the assignment was to be spent in Rio de Janeiro preparing my report, getting all of the plant observations translated into Portuguese and preparing my two technical papers that would be given at the conference.

In reality it was not possible to spend a full three weeks in Santa Catarina because many knitters were operating at less than 50 % capacity and many knitters et cetera had already been laid off. Because of the associated embarrassment, Mr. Danilo Moritz of SENAI in Blumenau (who was in charge of all plant arrangements) suggested that I return to Rio on July 14. In a confirmation telephone call made to the administration of SENAI-CETIQT, they also suggested that I return to Rio because the new time that had been made available could be used productively on the quality control book that was being

written but had not been completed yet. Some of the additional time was also spent discussing matters of mutual interest with knitting professors at SENAI-CETIQT.

### 3. FINDINGS

Common observations and problems relating to many of the small to medium size knitting companies visited in Santa Catarina are listed below in more or less the order of importance.

- (i) With the unprecedented unleashing of inflation beginning in January of 1987, there has been a tremendous decrease in consumer purchasing power and an associated lack of orders for knitters. Fortunately many spinners have found some relief from the situation in that export orders have absorbed some of their production capacity. However, this situation could prove disastrous for knitters if demand were to increase suddenly because many of the export orders are long term and yarns could become unavailable within Brazil. As such, knitters would then have quality problems in that they would be forced to use yarns that would not be ideal for the knitting machines and/or products. The situation is complicated further in that many knitters who have the desire and capacity to export are frustrated because of either a low export quota set by Brazilian authorities or the complete absence of a quota. In this case Brazil is its own worst enemy because it must export to survive.
- (ii) With the economic recession, plant layoffs and closings are common and instead of using the time wisely to institute well thought out training and quality control programs (including maintenance), owners are often more interested in investing in the stock market than they are in losing good people and instituting such programs. What the owners do not realize is that with the loss of such good people, costs in the future will accelerate because of inflation, training costs, poor quality goods turned out by untrained people and perhaps even their unavailability. In addition, the work week is to be shortened.



- (iii) With the end of the Brazilian economic boom of 1986, the present inflationary period has brought additional problems to knitting mill owners in terms of how they are to pay for the machinery which was purchased last year (at a very high rate of import tax). In addition to these financial difficulties, there is still a big problem with existing machines which are outdated.
- (iv) Even though customers are demanding ever higher quality, Brazilian knitters are still plagued with problems of poor quality yarns, needle lines, barre, holes and waste et cetera. In fairness though, not only have many of the knitting companies that were visited last year improved but a number of them are using material from the quality control book that was written last year. In this aspect, it is the companies that have not been visited yet who would benefit from the advice of a U.N.I.D.O. sponsored knitting technologist.
- (v) Poor and unreliable raw stock and yarn manufacturing problems continue to be major concerns for knitters. Even though some of these problems can be overcome rather easily (see ANNEX IV) the preoccupation with the economic situation makes knitting mill owners somewhat reluctant to be bothered with other matters at this time; of course this attitude will change once the results of the Cruzado III plan are known.
- (vi) There is still not any truly effective information distribution center located in Santa Catarina that is supported and used efficiently by knitters in the Blumenau area. As such, some knitters probably do not really know what their real problems are let alone their solutions. Furthermore, many times many knitters do not even know where to look for information. In addition, the lack of co-ordination between various textile organizations in Blumenau, Joinville and Brusque prevents the effective sharing of information and problem solutions.
- (vii) Because it is expected that the Brazilian textile industry needs to double by the year 2000 to meet demand, it is difficult to visualize how this can happen given the problems with inflation, high import tariffs, antiquated

equipment, a lack of technical expertise, a lack of investment capital and the underutilization of yarn, machine and manpower capabilities.

- (viii) Too many knitters are still buying yarn by price and not quality.
- (ix) Although the technical sophistication of a number of the knitters that were visited last year has improved, much work must still be done in both these plants and others not yet visited.
- (x) There is still insufficient attention being given to product development.
- (xi) Product labelling and product standardization are still problems that must be solved.

#### 4. BACKGROUND TO RECOMMENDATIONS

Although essentially all of the small to medium size knitting companies in Santa Catarina buy their yarn externally, most of them try to be vertical from knitting to garment manufacture. Because they do not know yarn manufacturing and do not often have sufficient technical training and access to necessary information in Portuguese, English and/or German, many unnecessary problems are created and not effectively resolved between and within departments - let alone between the spinner and the knitter.

To further complicate this issue, there is often the problem of trying to receive proper training even when there is the desire. The coordination of such training is also often hindered somewhat by a lack of support from upper management and government inaction.

ANNEX I

Diary of Events

June 13, 1987 Left U. S. A.  
June 14, Arrived Rio de Janeiro, discussed theme of technical papers with Professor De Souza of SENAI-CETIQT  
June 15, Brazilian holiday, organized material  
June 16 - 19 Organized, wrote and discussed papers to be given at IV CONFERENCIA NACIONAL DE TECNOLOGIA TEXTIL, confirmed project plans  
June 22 - 26 Organized and wrote material for CONTROLE DE QUALIDADE NA INDUSTRIA DE MALHAS - Volume 2  
June 28, Arrived Blumenau, Santa Catarina  
June 29, Visited Malharia Hering (Blumenau)  
June 30, Visited Malharia Maju (Blumenau)  
July 1, Visited Malharia Brandili (Apiuna)  
July 2, Visited Malharia Lancaster (Blumenau)  
July 3, Visited Malharia Hering (Blumenau)  
July 6, Visited Cia Comfio (Joinville)  
Visited Dohler S. A. (Joinville)  
Visited Malharia Iracema (Joinville)  
Visited Malharia Nerisi (Joinville)  
July 7, Visited Cia Comfio (Joinville)  
July 8, Visited Malharia Campea (Joinville)  
Visited Malharia Iracema (Joinville)  
Visited Malharia Princesa (Joinville)  
Visited Malharia Aracy (Joinville)  
July 9, Visited Malharia Arp (Joinville)  
Visited SENAI (Joinville)  
(Centro de Treinamento Textil de Joinville)  
July 10, Visited CATEX (Blumenau)  
(Catarinense Textil de Exportacao Ltda.)  
July 13, Summarized plant visit observations  
July 14, Left Blumenau, arrived Rio de Janeiro  
July 15 - 17 Worked on material for quality control booklet  
July 20 - 22 Worked on proofing technical papers, quality control material, U.N.I.D.O. report

July 23 - 24 Presented two technical papers, completed  
U.N.I.D.O. report, discussed matters of mutual  
interest with CETIQT professors  
July 25, Left Rio de Janeiro

ANNEX II

List of Companies Visited

June 29, 1987	Malharia Hering
June 30,	Malharia Maju
July 1,	Malharia Brandili
July 2,	Malharia Lancaster
July 3,	Malharia Hering
July 6,	Cia Comfio
	Dohler S. A.
	Malharia Iracema
	Malharia Nerisi
July 7,	Cia Comfio
July 8,	Malharia Campea
	Malharia Iracema
	Malharia Princesa
	Malharia Aracy
July 9,	Malharia Arp

ANNEX III

Note on CETIQT - Centro de Tecnologia da Industria Quimica e Textil

A previous extract from a Technical Report by Mr. J. Carbonell is quoted because it describes the present capabilities of CETIQT.

"CETIQT is part of SENAI (Servicio Nacional de Aprendizagem Industrial), the national institute for technical education. Originally CETIQT functioned as a technical school training textile technicians but, in recent years, applied research has been added to the activities of the Center to support the training programs and to provide technical assistance to the industry.

CETIQT is the only institution in Brazil for training textile technicians.

For its research and development activities CETIQT is well equipped with laboratory and pilot plant facilities which permit bulk scale trials in spinning, weaving, knitting, dyeing/finishing and garment manufacture to support both the institute's own educational program as well as serve the industry. Of the various sections the dyeing/finishing section appears to be the weakest. It lacks a pragmatic approach to R + D, striking a balance between sophisticated research and standard, handbook know-how, readily available from the suppliers of dyestuffs and equipment. The staff of this section is, however, receptive to new ideas and approaches and CETIQT as a whole has the potential for developing its activities further, both in technical education and services to the industry".

ANNEX IV

Summary of Company Problem Areas

The problem areas noted during the visits made during this assignment were noted on an on-going basis and discussed with company personnel. Because many of the problems were similar to or the same as last year, it is important that a generalized summary of these problems be sent to each of the companies visited (with no specific companies identified in the list itself) in order for them to compare their relative standing and for them to improve. It should also be noted here that many of the findings formed the basis of the quality control booklet "CONTROLE DE QUALIDADE NA INDUSTRIA DE MALHAS - VOLUME 2". that was written in conjunction with this U.N.I.D.O. sponsored assignment. When this booklet has been translated into Portuguese, copies will be forwarded.

Yarn Mill Related Problem Areas

Opening Room

poorly scraped bales  
inadequate bale identification procedures  
poor blending practices  
poor stock reworking practices  
contamination  
poor lap storage practices  
tilted bales and stock mixing problems  
inconsistent bale density problems  
inadequate experimentation with machine related variables

Carding Room

inadequate use of can coding techniques for stock control  
inadequate checking of machine speeds, settings  
inadequate machine maintenance cycles  
inadequate stripping of lickerins, flats and doffers  
bent wire on flats is a problem  
poorly maintained tensions on can springs  
sliver contamination problems

Drawing

poor can alignment practices  
inadequate checking of machine variables  
poor sliver splicing techniques  
inadequate mixing of sliver from cards  
tangling and/or dragging of sliver  
poor sliver tail placement for later reserve creeling  
inadequate use of "black lights" for controlling blend yarns  
sliver contamination  
poorly maintained tensions on can springs  
poor lap-up removal policies

Roving

incorrect placement of sliver cans in creel  
poor sliver piecing up techniques  
stock contamination  
poorly maintained tensions on can springs  
clearing aprons are not properly maintained or cleaned  
vacuum tubes are not properly placed  
paddles on the flyers are not being wrapped consistently  
inadequate checking of machine speeds  
small roll lap ups are not being removed  
some flyer arms are choked with stock and are not being cleaned  
some sliver cans have rough tops, these should be sanded  
inadequate full bobbin storage practices  
poor package builds and stock placement on bobbins

Spinning

inadequately maintained clearer rolls  
roll laps are not being removed  
vacuum tube placement is not often optimized  
machine speeds are not checked enough with strobe lights  
creel contamination is a big problem  
choked roving bobbin sockets are causing incidental drafting  
roving should not be removed with a knife  
yarn piecing up techniques are not consistent and optimized  
roll buffing practices and maintenance policies are inadequate  
condensers should always be traversing to minimize wear  
apron wear is somewhat of a problem in some cases



### Winding

inadequate tails and poor tail placement practices  
variable package densities  
yarn identification techniques need to be optimized  
package banding and contamination is a problem at times  
crossed ends (overthrows) are sometimes a problem  
during rewinding paraffin application techniques are too variable  
damaged cone tips are creating many problems for knitters  
winding heads that bounce need to be stabilized  
yarn scuffing due to poor stop motion settings is a problem

### Yarn Warehouse Related Problem Areas

package identification techniques are inadequate  
all packages should arrived wrapped in polyethylene bags  
poor transportation techniques need to be corrected  
yarns should be used on a "first in - first out" basis  
yarn boxes need to be properly sealed and identified  
aisle spacings and lighting techniques are not optimized  
boxes should not be stacked more than two meters high  
all boxes in one pile should be of the same dimensions  
torn, split and crushed boxes are a big problem  
yarn lots need to be grouped especially colored yarns  
repacked yarn packages need to be neatly stacked and boxes resealed  
boxes should not be stacked on their sides  
all yarns layers within a box should be separated  
part boxes should be cut down, folded and resealed  
warehouse personnel need to be trained more

### Knitting Plant Related Problem Areas

#### Yarn Creel

cones often have no tails or poorly placed tails  
cones often have insufficiently long tails  
yarn tails should be kept wrapped around the cone  
yarn tails should not be allowed to untwist  
single creeling capability needs to have double creeling capacity  
lint on cone tops is still a big problem

vertically mounted cones need to be inclined to minimize lint  
knot quality is adequate and tails are not being clipped to 5 mm  
some lint propellers are not operating or operating improperly  
package alignments need to be improved  
balloon height distances need to be optimized  
plastic bags need to be used under the base of textured yarn packages  
missing, worn or scored guides need to be replaced  
tension discs and springs need to be cleaned more regularly  
yarns should be threaded in the proper sized eyelets  
top stop motion settings are not optimized, false stops are frequent  
packages need to be stabilized  
pins should not extend beyond to top of the yarn packages  
too many cones with damaged tips are being used  
the tops of rough plastic cones need to be sanded  
yarn identification techniques are inadequate and not consistent  
yarn threading paths need to be standardized  
input tensions to the positive feed belt are inconsistent and high  
packages of yarn should not be run from the floor  
boxes of yarn need to be kept closed at all times  
boxes containing different types of yarn should not be allowed  
rewound yarns should not be used with non-rewound yarns  
cones should not be "double-stacked" too early  
plastic feeding tubes need to be checked frequently for wear  
lively yarns need to be adequately pre-tensioned

#### Fabric Formation Zone

specification and construction sheets need to be used religiously  
tape speeds and tensions need to be checked once per day  
tapes need to be cleaned and tightened more often  
tape splicing techniques need to be improved  
idler wheels need to be cleaned and aligned more often  
latch detectors are not present in many cases, they should be used  
stop motion settings are often incorrect  
relative cylinder and dial knock-over depths are too variable  
yarn tensions are often too high and erratic  
more centrally located threading sticks are needed  
worn tapes need to be turned or replaced more often  
feeder plates and needle tricks need to be cleaned more often

needle timing needs to be monitored more carefully  
yarns are sometimes left out from under the positive feed tapes  
dial heights need to be set more consistently  
yarn carrier threadings need to be more consistent  
needles need to be cleaned and inspected more often  
machines need to be strip cleaned more often

Fabric Take-Down Zone

fabric patrol cycles need to be more carefully defined  
operators need to patrol more often  
machine speeds need to be checked more often  
non existing lights should not be allowed, fabric lights must be used  
revolution counters should be used to control roll lengths  
machines need to be cleaned at the end of every fabric roll  
cutting of roll lengths must be only at the lint bar line  
rolls must not be doffed onto the floor but onto a doffing skid  
rolls should not be arrowheaded at roll start ups  
spline rolls should be used to minimize edge creasing problems  
cloth rolls should always be stored in plastic bags or under plastic  
rolls of cloth should not be enveloped, masking tape is better  
fabric take down tensions need to be optimized and more consistent  
roll coding techniques need to be more complete and consistent  
roll coding needs to minimize cloth waste  
the area around and under the machines needs to be kept cleaner  
roll stacking practices need to be less random and more rational  
rolls of similar styles but different styles should not be mixed  
rolls should not be stored on end or dragged across the floor