



TOGETHER
for a sustainable future

OCCASION

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



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations 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 Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

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

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

RESTRICTED

DP/ID/SER.A/848
12 June 1987
ENGLISH

PRODUCTIVITY AND QUALITY IMPROVEMENT IN
THE GARMENT INDUSTRY

SI/MEX/86/860/11-51

MEXICO

Technical report: Improvement of garment quality and manufacturing activity*
(Second mission)

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

Based on the work of Roger A. Harkness
Garment Technologist

Backstopping officer: A. Eräneva, Agro-based Industries Branch

United Nations Industrial Development Organization
Vienna

* This document has been reproduced without formal editing.

TABLE OF CONTENTS

	<u>PAGE</u>
TERMS OF REFERENCE	1.
REVIEW OF CURRENT SITUATION	2.
SUMMARY OF RESULTS	4.
RESULTS ON CURRENT STYLES	6.
RECOMMENDATIONS	8.
ACKNOWLEDGEMENTS	9.

ANNEXES

I ASSIGNMENT WORK PLAN, PHASE II	10.
II EQUIPMENT	12.
III WORK AIDS	13.
IV MEMORANDUM	16.

TERMS OF REFERENCE

IN CO-OPERATION WITH THE COUNTERPART STAFF, ASSIGNED TO THE EXPERT BY THE
COMPANIA MANUFACTURER DE ROPA ARISTOS TO:-

RE-ORGANISE THREE PRODUCTION LINES FOR PRODUCTION OF JEANS, SLACKS
AND SHIRTS.

TRAIN TWO PRODUCTION SUPERVISORS IN GARMENT FACTORY ORGANISATION AND
OVERALL MANAGEMENT.

ORGANISE A TRAINING COURSE FOR TWO JEANS/SLACKS AND TWO SHIRT
SUPERVISORS.

1. REVIEW OF CURRENT SITUATION

The observations set out below are based on information gathered from the two manufacturing departments in Compania Manufacturera De Ropa Aristos.

FINDINGS

1.1 Products and Material Used

There are three garment types manufactured: Jeans, Slacks and Shirts. The styles offered within these three types are very selective.

Shirting fabrics mainly light weight polyester/cotton blends all manufactured and purchased locally.

Buttons, Cottons, Zips Elastic and other accessories are manufactured and purchased locally.

All fabric and accessories are checked in plant to ensure that high quality standards are maintained.

1.2 Manufacturing Area of Shirts

All machines are industrial type, treadle controlled and electrically driven, power derived from overhead source.

Limited use of folders and attachments.

No formal selection procedures for recruitment and training of sewing personnel.

No work place design.

Many single needle lock stitch machines with automatic thread trimmers are " awaiting repair".

Some single needle lockstitch machines with automatic thread trimmers are used to sew work in a chain which is then separated by manual cutting.

Thread wipers are missing or are not being used. When fitted and operated correctly the top side of the sewn garment does not require any cleaning of threads.

Pace of work of machinists on piece work is high due to assembly line type construction.

Approximately 85% of the machines are under 3 years of age.

1.3 Manufacturing Area of Jeans/Slacks

All machines are industrial type, treadle controlled and electrically driven, power derived from overhead source.

Limited use of folders and attachments.

No formal selection procedures for recruitment and training of sewing personnel.

No sign of consistent methods of working.

Three Pfaff Single Needle Lock Stitch Machines have automatic thread trimmers disconnected. These machines are most suitable for light-weight fabrics ie. shirting fabrics.

Thread wipers are missing on bar tack machines. When fitted and operated correctly the garment does not require any cleaning of threads.

Unnecessary examination/thread cleaning in preparation section, will be achieved more effectively at the same operation in Join/Assembly Section.

Work sewn in a chain and separated by manual cutting, in most instances by a second operator.

Floor lay-out does not reflect sequence of garment construction.

High quantity of work and bottlenecks indicates incorrect line balancing.

Pace of work of machinists is high due to incentive and assembly line type construction, but is restricted because of poor floor lay-out and constant changing of styles.

Approximately 80% of the machines are between 12 and 25 + years of age.

Much fabric returned to manufacturer due to poor quality and this restricts programming of production and output.

2. SUMMARY OF RESULTS

Many organisations conscious of the need to offer a wide product range and yet minimise the production costs carry out a "standardisation" process. They analyse each different product and attempt to use as many 'common' parts as possible.

Work measurement is used to establish times for jobs which enables costs to be estimated and pay rates established.

However, it is not just a question of timing a job and assuming that this is the standard time, other factors such as operator skill, work conditions, physical or mental effort used, rest periods taken and the method being used have to be considered.

A standard definition of work measurement is that:

"Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out a specific job at a defined level of performance".

Before any work measurement is performed it is essential that the methods being used to complete the work are correct; if not, then a method study should be done first.

At the process and work-place levels, the best known technique for seeking productivity and quality improvements is method study. It is a very effective problem-solving technique and, consequently, application is extensive. A standard definition of method study is that:

"Method study is the systematic recording and critical examination of existing and proposed ways of doing work, as a means of developing and applying easier and more effective methods and reducing costs."

There may be several objectives when conducting a method study but it is generally used when:

- a) A new product, system or process is to be introduced to determine the best method of production.
- b) The work flow through a factory needs improvement, for instance there is a bottleneck.
- c) It is necessary to define the best method for operator training programmes.
- d) New machinery is acquired, resulting in the need for work place design.

This analytical approach provides a greater understanding of human motion and thus results in improved methods, improved work flow by eliminating bottle necks, improved work place lay-out and an increase in productivity.

A 20% increase in productivity and improved quality standards is observed in the shirt department.

Observations indicate a 13% increase in productivity in the jeans/slacks department but this is expected to increase as operators become efficient in the new methods set and quality standards are notably higher.

3. RESULTS ON CURRENT STYLES

The results of the project are summarised as follows:-

	STYLE	PRODUCTION PER WEEK		% ADJUSTMENT
		PREVIOUS	PRESENT	
1	SHIRTS	7500	9000	+ 20
2	JEANS/ SLACKS	7500	8500	+ 13

3.1 Productivity is increased due to the points listed:-

Repairing all machines with automatic thread trimmers and/or thread wipers and maintaining in working condition.

Using machines with automatic thread trimmers to eliminate sewing of parts in a chain and separating by manual cutting using a second operator. Redundant operators then re-trained on sewing operations.

Sewing visible seams using machines with automatic thread trimmers and thread wipers.

Sewing inside or hidden seams using machines with automatic thread trimmers only.

Work aids for small parts fitted to collar and cuff making machines. This greatly improves the method referred to Annex III of this report.

New Section Lay-Out to Improve Work Flow

Due to the increase in ratio of direct to indirect operators a higher production is expected during the manufacture of short sleeve shirts.

The production increase is without addition of personnel and quality standards are notably higher.

Management and supervisors did not understand fully all the functions available on the new single needle lock stitch machines purchased so therefore these machines were very under-utilized.

- 3.2 The present manufacturing capacity of jeans is sufficient to meet with sales expectations. However, as the sale of slacks is increasing so further output in the jeans/slacks department is directed towards the manufacture of slacks.

Productivity is increased due to the points listed:

"Wyco Cutters" fitted to some single needle lock stitch machines eliminating the need for a second operator to manually separate work sewn in a chain and re-training redundant personnel on sewing operations.

Eliminating thread cleaning and examination in the preparation section and combining it with same in the Join/Assembly section.

Fitting thread wipers to all bar tack machines.

Training supervisors in line balancing and numerically calculating manning levels for the operations.

New section lay-out placing all operations in a logical sequence of garment construction. This improves work flow and greatly reduces work in progress.

The Major Problems Experienced in this Department are:

- a) Management hours directly involved in department are very low because of other work related factors.
- b) Problems experienced in employing four extra sewing personnel to assist during re-training of existing personnel in new methods.
- c) High proportion of poor quality fabric returned to the manufacturer resulting in fabric shortage.
- d) Because of c) programming of work/styles is not practical.
- e) The sewing machines are very old and machine breakdown is high especially during change from light to heavy weight fabrics.

It should be noted that improvements are not always immediately apparent and that the results of the activities should be noted over a long term.

For information on equipment purchased refer to Annex II of this report.

For assignment work plan, phase II refer to Annex III of this report.

4. RECOMMENDATIONS

To further the objective of this report the following points should be considered in detail.

- a) The appointment of a Manager or Manageress to take overall responsibility for the Daily Management of the Jeans/Slacks Department, reporting to the General Manager.
- b) The appointment of a garment or textile engineer to provide continual assessment of methods and work values.
- c) A compliment of three full time mechanics to carry out daily repairs of machines and a programme of preventative maintenance commenced.
- d) New sewing machines be purchased, particularly for the jeans/slacks department to better quality standards and increase productivity. Refer to Annex IV of this report.
- e) Programming the cutting and manufacture of jeans and slacks to improve quality and productivity.
- f) All machines with automatic thread trimmers and thread wipers be repaired and maintained in full working order.
- g) The different characteristics of any new equipment should be examined in detail, evaluated, and after purchase explained to Managers, Supervisors and Operators.

Purchases should be part of a long term plan and not only immediate requirements.

- h) Equipment should only be purchased if a satisfactory after sales service is available.

5. ACKNOWLEDGEMENTS

I would like to thank all those with whom I have come in contact for the kindness, understanding and hospitality shown to me during the mission.

I would give special mention to:

Mr Gabriel Carrasco G	-	Director General
Mr Maurice Carrasco	-	Interpreter
Mr Olivo Del Angel	-	Production Manager
Mr Poly Hernandez	-	General Manager

and to Miss Inga Nalbach and all staff at the U.N.D.P. Office, Mexico City.

ANNEX I (CONTINUED)

ASSIGNMENT WORK PLAN

PHASE II

1. a) Survey of operations and methods in use, introduction of work aids, folders and attachments: Four Weeks.
- b) Re-Organisation of Lay-Out: One Week.

2. a) Re-Organisation of Lay-Out: One Week.
- b) Survey of operations and methods in use, introduction of work aids, folders and attachments: Four Weeks.

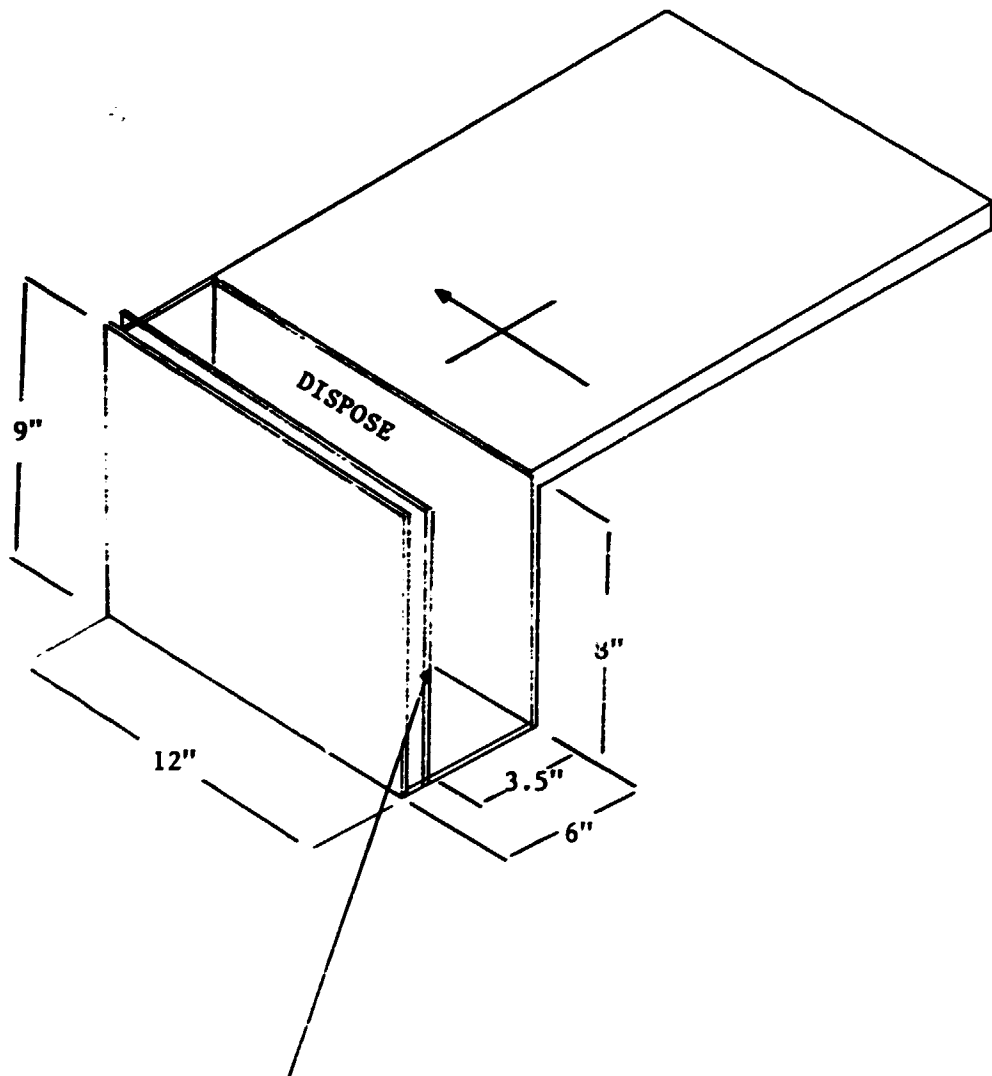
3. Messers. Del Angel And Hernandez to be present throughout the mission. They will train two jeans/slacks and two shirt supervisors in new developments and floor supervision.

EQUIPMENT

NON-EXPENDABLE EQUIPMENT

	US \$
2 Electronic Stop Watches	Paid By Company
4 Singer Sewing Machines	9832.50
Work Aids	168.50
Attachments	Paid By Company
	<hr/>
TOTAL =	<u>10,000.00</u>

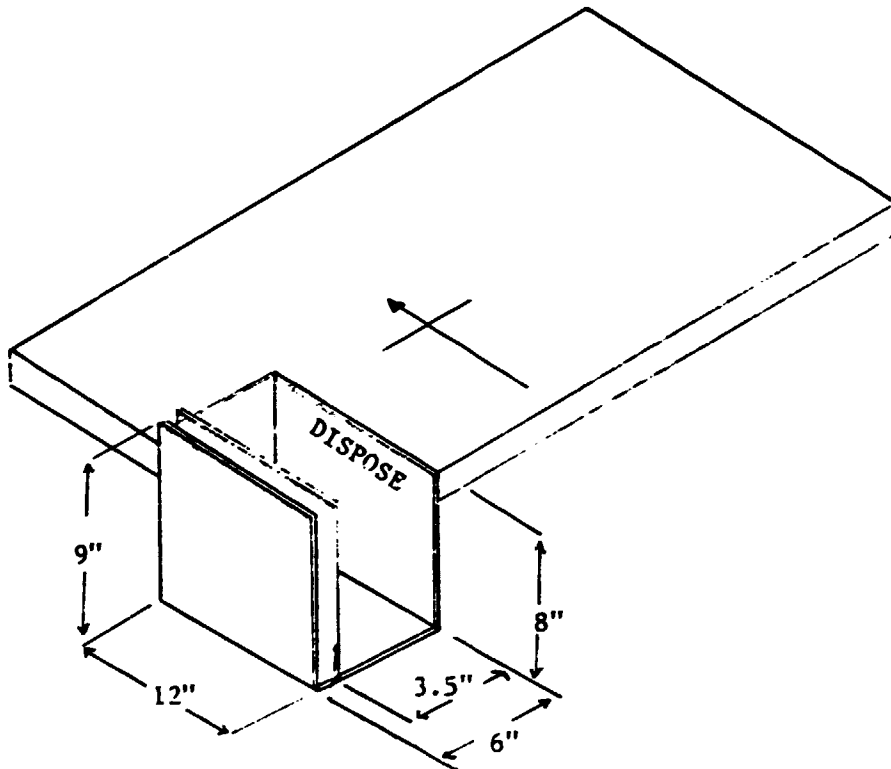
COLLAR DISPOSE BOX



PORTABLE BOARD TO ASSIST COLLARS BEING STACKED NEATLY.

REMOVED WHEN SEWING EXTRA COLLARS.

CUFF DISPOSE BOX



PORTABLE BOARD TO ASSIST CUFF BEING STACKED NEATLY.

REMOVED WHEN SEWING EXTRA WIDE CUFFS.

ANNEX IV

EQUIPMENT

New sewing machines purchased should be to first replace the very old single needle lock stitch machines of the jeans/slacks department.

The Singer Single Needle Lock Stitch Machine Model No D519 300 G is most suitable as both mechanics are fully trained on Singer Machines.

The machine has similar functions to the D 519 200 G, with automatic thread cutter and thread wiper leaving the garment clean of thread ends. This will improve quality and productivity and reduce the number of final cleaners/examiners in the Join Section.

MODEL NO	APPROX UNIT COST U.S. \$	QUANTITY	TOTAL U.S. \$
SINGER D519 300G	2500.00	16	40,000.00

ANNEX IV(CONTINUED)

27 MARCH 1987

MEMORANDUM

FROM: R.A. HARKNESS - UNIDO EXPERT ON GARMENT INDUSTRY PROJECT

TO: MR GABRIEL CARRASCO G- DIRECTOR GENERAL COMPANIA MANUFACTURERA
DE ROPA ARISTOS, S.A. DE C.V.

I am taking this opportunity to record several observations that may require discussion and help ensure further success of the project.

1. Greater variations in style are possible without affecting the current output.

A new lay-out of the shirt department and an increase in personnel of the preparation section, albeit shall, sports shirts production is possible to supplement the long sleeve shirt during summer months.

Alternatively, by increasing personnel in the necessary operations it would be possible to increase the output of the shirt department accordingly.

2. The criteria is similar for "Fashion Shorts" in the jeans/slacks department however, the problems experienced with fabric and the need for a working manager, reporting to the General Manager, make this a long term proposal.

There are many attachments and folders available locally, but especially from America which make seemingly complicated operations very easy.

The cost of these folders vary greatly depending on their nature and place of origin.