



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

18886

DP/ID/SER.A/1452
18 March 1991
ORIGINAL: ENGLISH

STRENGTHENING GUYANA MANUFACTURING AND
INDUSTRIAL DEVELOPMENT AGENCY

DP/GUY/86/011

GUYANA

Technical report: Findings and recommendations*

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

Based on the work of William E. Swift, consultant for
finishing of wooden furniture for export

Backstopping Officer: V.K. Chanana
Institutional Infrastructure Branch

United Nations Industrial Development Organization
Vienna

* This document has not been edited.

V.91 22766

Abstract

DP/GUY/86/011/11-59

Project duration - 2 months.

Principal object - to give technical assistance to a designated client company of GUYMIDA.

This report summaries the work carried out at Precision Woodworking Limited, Georgetown, Guyana, to raise the levels of operator skills, productivity, degree of mechanisation and overall quality. It details the progress made in moving from a semi-mechanised general woodworking plant to a specialised highly productive operation. The longer term programme required to complete this change is discussed.

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. COMPANY BACKGROUND	2
III. START OF MISSION	3
IV. ACTIVITIES	4
V. CONCLUSIONS	6
VI. RECOMMENDATIONS	7

Annexes

1. Consultant's job description	11
2. Senior counterpart staff	14
3. Programme for seminar on Furniture Production	14
4. List of companies visited	15

I. INTRODUCTION

The client company, Precision Woodworking Limited requested technical assistance from UNIDO through GUYMIDA.

On arrival at the factory it was apparent that there was considerable scope for action in all areas, not just in the finishing department. It was considered that the major effort should be concentrated on raising quality levels and productivity throughout the factory.

The current management systems do not give an accurate indication of the short term performance of the factory so it was not possible to objectively assess the effectiveness of the assignment. Steps have been taken to remedy this short coming. The directors of the company however, considered that the programme was beneficial.

II. COMPANY BACKGROUND

Precision Woodworking Limited is a privately owned company in business since 1985. They manufacture a range of beds, bunks, dining sets and cabinet furniture for export to Barbados and Trinidad together with contract furniture and one off specials, including upholstered items for the home market. Principal timbers used are crabwood (andrioba) and locust (courbaril).

They have a comprehensive range of machinery, mostly second-hand but in good order. They have available a skilled engineering force to repair or recondition their equipment.

From their inception they have strived to progressively upgrade their operations and quality levels.

The quality of their work is acceptable in their current markets and there are no major weaknesses. However, there are numerous small problems which while not in themselves of major importance effectively reduce the overall perceived value of the product. These problems are capable of rectification without major expenses. The standard of finishing is acceptable in the existing markets.

III. START OF MISSION

The situation at the beginning of the mission was as follows:-

1. Much of the work done by the skilled tradesmen should have been done in the machine shop.
2. Due to the lack of understanding of the possibilities of jigs many operations were being carried out in several stages instead of one. Also, in both the machine and assembly areas each item was being marked out by hand.
3. It was not appreciated that products can be designed so that when they are accurately machined they can be assembled without the need for individual hand fitting.
4. The requirement for comprehensive technical information on each product was not appreciated.
5. There was little evidence of effective cost or production control.

IV. ACTIVITIES

1. Action was concentrated on the following areas:-
 1. Instruction of supervisors in the design and construction of machine and assembly jigs.
 2. Construction of air operated assembly jigs and the application of air operated clamping cylinders to existing machinery.
 3. Design and use of jigs to eliminate the marking out by hand of each component.
 4. Training of staff in elementary overhead router operations.
 5. Design and use of jigs to upgrade the accuracy of machining thus eliminating or greatly reducing the need for hand shaping of curved components by skilled craftsmen.
 6. Reduction of non-productive time and overall throughput time by the use of jigs to combine several operations previously carried out separately.
 7. Product design to eliminate the need for hand fitting. Drawings were prepared of a modified design of an existing chest-of-drawers. The new design features drawer slides grooved to take the runners, which can be fitted by jig before cabinet assembly. Current type runs on the bottom edge of the drawer. All components were produced according to the drawing and the cabinet was successfully assembled. The drawers are interchangeable and required no hand fitting.
 8. Instruction to supervisors on the preparation of fully dimensioned drawings for all existing products
 9. Advice on the equipment needed to greatly reduce the handling in the finishing department.
 10. Instruction to Directors and supervisors on the requirements for more effective quality control.
 11. Use of length gauges for checking components.
 12. Identification of all jigs, templates and gauges in use.
 13. Minor improvements in the machine layout to improve work flow.
 14. Method improvements for existing products.
 15. Instruction in the implementation of a basic labour estimating system and in basic production planning and control techniques.

16. Construction of a twin spindle horizontal boring machine using components from a scrapped special purpose machine.
17. Use of FIRA meg-back dial guage as an aid to machine setting.
2. A seminar on furniture production was held in conjunction with Guyana Manufacturing and Industrial Development Agency (GUYMIDA). The topics covered are listed in ANNEX 3.
3. A series of visits were arranged to other furniture factories in the country to familiarise the consultant with the prevailing conditions in the industry. The factories visited are listed in ANNEX 4.

V. CONCLUSIONS

1. The work carried out, much of it of a practical nature has indicated the scope of the improvements possible in the fields of productivity and quality standards.
2. This requires:-
 1. A more formalised approach to cost control, production planning and control and quality control by the Directors.
 2. An education policy whereby the quality aims of the Company are understood by all employees. This should lead to a significant rise in standards.
 3. Continuing efforts must be made to transfer as much work as possible on to the machines.
The Directors of the Company have indicated that they agree with the proposed actions and will implement them.
3. The supervisors have understood the concepts of methods improvements, design and use of jigs and the need for greater mechanisation. They have enthusiastically adopted the ideas put forward and have made numerous jigs to the required standards.
4. If the anticipated improvements are achieved this will open up the Company further export markets and also safeguard the future.

VI. RECOMMENDATIONS

1. The Directors should set down their long term policy with regard to the range of products manufactured, degree of specialisation and target markets. It is suggested that the Company concentrates its efforts on beds, chairs and tables and sub-contracts work of a similar nature, with a lesser effort on cabinet furniture and to maintain a presence in its home territory, contract furniture. It should stay with the Caribbean market until it has raised its quality standards and productivity to levels which will enable it to compete successfully in North America.
2. Basic cost and production planning and control systems must be introduced.
 1. Labour and material estimates should be prepared for every product. Operation times can, initially be based on observations and/or experience of the Supervisors. A library of times should be maintained and updated as necessary. These should represent an achievable, sustainable level of performance. This information will help the Directors to determine which products offer the best returns.
 2. Output should be valued weekly in terms of standard hours and this figure should be compared with the actual hours expended. This will give an indication of factory efficiency.
 3. A sales budget for the year should be prepared and then broken down into monthly elements. These should be further broken down into weekly production programmes for the factory operation (monthly ones are too difficult to control effectively).
 4. For the production control system to operate correctly the size of the programme must be equal to the factory's capacity for that period.
 5. With a weekly programme the aim should be to complete it before the end of week 3.
 6. Batch sizes should be a carefully chosen balance between the non-productive setting up time and excessive process time thereby slowing down the throughput time. It is suggested that no batch should take more than one day to process at any one operation.

7. Where possible making for stock should be avoided. No overage should be permitted except where authorised to cover expected rejects at later stages.
 8. Job cards should be used for each unit/component showing all the information required. As well as the dimensions, materials and quantity on order it should give details of drawing, number, jig, template and length gauge numbers.
 9. Product check lists should be prepared listing all the components and a summary of the operations. This will enable the Supervisor to rapidly check the status of the batch if necessary, and instigate corrective action.
 10. The operation times in the labour estimate can be used to calculate machine loadings and to highlight possible bottlenecks. They can also be used as a basis for setting targets for operators.
3. A technical information system is required. For each product this should include:-
 1. A distinctive name and code number and a brief description.
 2. A list of parts with names and code numbers.
 3. Raw materials.
 4. Type of finish.
 5. Labour and material estimates.
 6. Drawing(s) including general arrangements, with part numbers and fully dimensioned component drawings.
 7. Lists, with reference numbers, of marking out templates, drilling, shaping and other jigs and length gauges.
 8. Job card listing sequence of operations.
 9. Product check list.
4. Efforts must continue to upgrade quality and quality control procedures.
 1. A quality control inspector, responsible to the Managing Director should be appointed.
 2. Detailed quality specifications should be written for each product.
 3. Operators must be made fully aware of the quality levels required and if necessary review further training.

5. The Company must press on with its efforts to move to a higher level of mechanisation and to apply more sophisticated methods. Engineering concepts should be applied to operations. With the experience gained in recent weeks further detailed study of UNIDO publications ID/265 Manual on Jigs for the Furniture Industry and ID/154 Low-cost Automation for the Furniture and Joinery Industry should be worthwhile. They should try to eliminate all mark out and cut operations replacing them with drawings, templates and jigs as appropriate. Further indoctrination of the workforce with these concepts is required.
6. The following machinery and equipment purchases are suggested. They should all produce major productivity benefits.
 1. Clamp Carrier for laminating panels - on order.
 2. Altenforf F45 panel saw - on order.
 3. Heavy Duty Spindle Moulder (double spindle type if available) with powerfeed and cutter blocks for grooving and rebating (TCT disposable) and shaping and profiling (HSS blanks to be ground as required).
 4. Matched round end mortiser and tenoner.
 5. Hand or table top glue spreader for use with 6.2.
 6. Toggle clamps - various sizes and styles for jig making.
 7. Air cylinders, foot valves and hand operated valves for construction of assembly jigs.
 8. Selection of profile cutters and long cutting edge cutters for use with R9 Router.
 9. In the longer term the triple drum sander should be replaced with a wide belt sander.
 10. "Carbo-cut" or similar abrasive wheels should be obtained for profile sanding. A single vertical spindle machine with adjustable speeds and height adjustable spindle should be made.
7. Finishing operations currently have a very large element of handling which can be reduced.
 1. Construct trolley racks to hold flat components.
 2. Special pallets should be made for transporting components and sub-assemblies from main factory to finishing department.
 3. See if it is possible to upgrade the roadway between the

buildings so that parts suffer less jolting.

4. Adjustable height turntable to provide better working position for the operators.
 5. Adjustable height swivelling wire frame suspended from ceiling so that operator can turn components such as chair frames or bed headboards and spray both sides.
8. Finishing methods.
1. Change to filling holes and sanding before applying sanding sealer to bed heads. With the current method most of the sealer is being sanded off. When the matched mortiser and tenoner are in use this operation will be eliminated.
 2. Do detailed time study to see if it is quicker to seal individual parts by hand before assembly or to spray on sealer to the completed sub-assembly.
 3. 3M "Scotchbrite" pads should be obtained for de-nibbing turned and moulded parts.
 4. Further tests should be carried out with AC lacquer. It should be cheaper to use and will provide a very durable finish suitable for contract furniture. However, a ventilated drying room will be needed.
 5. On the evidence available the new Binks HVLP type spray gun should provide major material savings, if this can be proved - gun should be purchased.
 6. In the longer term consideration should be given to purchasing a filter type spray booth and installing it in an air tight room with intake filters.
9. Sundry items
1. Paint lines on the floor to mark gangways.
 2. Build noise reduction enclosures for the moulders and in the meantime provide the operators with ear defenders.
 3. Laminate large sections from kiln dried 1" boards.
 4. Make one person responsible for the movement of all work in progress.
 5. Provide several small work tables (30Lx20Wx36H) as aids to production.

ANNEX 1JOB DESCRIPTIONDP/GUY/86/001/11 59/J12103

- POST TITLE** : Consultant for Finishing of Wooden Furniture for Export
- DURATION** : Two (2) months
- DATE REQUIRED** : As soon as possible
- DUTY STATION** : Georgetown, Guyana with travel with the Country
- PURPOSE OF THE PROJECT** : To strengthen the role of Guyana Manufacturing and Industrial Development Agency (GUYMIDA) in promoting, developing and modernizing industries and in its performance as a "One-stop" agency.
- DUTIES** : The Consultant will be a member of an international team assigned to GUYMIDA and will work in close collaboration with the National Project Director (Executive Director, GUYMIDA), its other staff members, the other international experts and consultants under the overall guidance of the Chief Technical Adviser of the project. He will perform the following duties mainly related to the operations of a designated client company of GUYMIDA, involved in manufacturing for export of wooden furniture to the North American market.
- 1 Advise on the standards of finish of wooden furniture necessary to meet the requirements of the North American and European markets,

along with the preparation and techniques to attain such standards. Finishing in this context will mainly relate to the results of sanding, staining, filling, sealing, lacquering, drying and packaging for export.

- 2 Test and experiment with the various finishing materials currently available and advise on their usage to achieve the superior results in keeping with the expectations and requirements of the export market.
- 3 Conduct a training programme for the workers of the furniture factories to upgrade their finishing skills so that the output reaches the expected superior standards of export quality.
- 4 Advise on the requirements of proper equipment and other materials necessary to achieve and sustain such standards of excellence in finish.

The Consultant will be expected to prepare a report giving the details of his findings and recommendations as to the processes, equipment requirements and specifications.

QUALIFICATIONS : Trade School diploma or equivalent in Wooden Furniture Manufacture. Extensive shop floor knowledge of finishing wooden furniture for the markets of North America/Europe.

LANGUAGE : English

BACKGROUND INFORMATION : Guyana is renowned for its forest wealth. It has many varieties of usable timber and a sizeable logging and sawwood industry. Recently, some of the timber is being diverted to furniture industry and several units have started

functioning and a few have commenced export.

The Guyana Manufacturing and Industrial Development Agency (GUYMIDA) was established in December 1984 as a national body with responsibility for the establishment, promotion and development of the Manufacturing sector in Guyana with special attention given to small and medium scale enterprises. The major tasks identified with the Agency relate to fiscal incentives administration, conduct of preinvestment studies, technical and managerial consultancy and the formulation of industrial policies, strategies, and programmes. To this end, the UNDP/UNIDO project presently in train is intended to provide technical assistance in the institutional strengthening of GUYMIDA, to enhance the capital goods development capabilities of engineering related industries and to provide fellowships and training opportunities to functionaries within the manufacturing sector in areas of national priority. Project activities are closely integrated with those of other internal development agencies and the wider manufacturing sector organisations.

ANNEX 2

Mr. Ashis B. Ghosh
Chief Technical Adviser

Guyana Manufacturing &
Industrial Development Agency

Mr. C. Duncan
Executive Director

Guyana Manufacturing &
Industrial Development Agency

Mr. C. Beetham
Director

Forestry Industry
Development Unit

ANNEX 3SEMINAR ON FURNITURE PRODUCTIONTOPICS:

1. Understanding quality
 - Definition
 - Standards
 - Management/Worker responsibilities
 - Importance of quality control.
2. Raw materials
 - Kiln drying
 - Storage
 - Stock control/stock rotation
3. Equipment
 - Choice of machines
 - Machine capabilities
 - Utilisation
 - Tooling and sharpening
 - Maintenance and spares holding
4. Production operations
 - Factory layout
 - Services, compressed air, dust extraction
 - Housekeeping
 - Training
 - Safety
 - Materials handling
 - Methods, including jigs

SEMINAR ON FURNITURE PRODUCTION (Continued)

5. Cost control
Basic costing - labour, materials
6. Production planning and control
Information required, drawings, component lists
Paperwork required
Basic elements
Scheduling
Capacity planning
7. Finishing
Preparation
Materials and equipment
Layout
Methods
8. Visit to Precision Woodworking Limited

ANNEX 4

Furniture factories visited

- | | | |
|----|---|--|
| 1. | Fries Furniture
Mr. Winfried A. Fries
Managing Proprietor | Factory 38, Industrial Site
Ruimveldt
Georgetown |
| 2. | Industrial Domestic &
Electrical Appliances Ltd.
Mr. J.P. Lewis,
Works Manager | Soesdyke,
East Bank Demerara |
| 3. | Aziz Bacchus Ltd.
Mr. Jalil Khan,
Managing Director | Anna Regina |
| 4. | WAICO
Mr. D. Ameerally,
Managing Director. | New Amsterdam |
| 5. | Shiva Ltd.,
Mr S. Singh,
Chairman. | Enmore
East Coast Demerara |