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EXPORT DEVELOPMENT - PHASE II

DG/PHI/87/007

PHILIPPINES

Technical report: Surface finishing of furniture*

Prepared for the Government of the Philippines
by the United Nations Industrial Development Organization

Based on the work of Gabriele Varena.
Consultant in surface finishing of furniture

Backstopping Officer: Antoine V. Bassili
Agro-based Industries Branch

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INTRODUCTION

Under a subcontract given to UNIDO by the Export Development Project¹, Gabriele C. Varena, consultant in surface finishing and quality control, was sent to the Philippines on a three month split mission from 9 December 1990 to 3 February 1991 and from 25 April to 29 May 1991.

His terms of reference were:

Phase I - 9 December 1990 to 3 February 1991.

- Assess the current available technology, capabilities, facilities and skills employed by the companies. Identify areas of improvement and recommend measures to upgrade finishing techniques.
- Inform companies on international quality and safety standards in finishing.
- Train company technicians and managers on the latest and more effective technology of finishing, taking into consideration the capability of each company to adopt such. It must be ensured that said technology is "affordable" by third world companies, in terms of costs and availability of facilities.
- Perform practical demonstrations on finishing techniques and ensure the transfer of such skills to the local industry.
- Assist companies in finding sources of finishing materials by providing them lists of suppliers of paints, staining materials, top coatings, etc. including prices and other specifications.
- Conduct actual demonstrations and train company technicians and production supervisors on application techniques for varied finishing materials, "special" finishes, including air-brush techniques, hand-painting, application of non-toxic material for toys, etc.
- Identify companies which have strong potential for finishing and explore the possibility of developing them as specialists in finishing technology. Encourage complementation and cooperation between and among companies, wherein some manufacturers may avail of the finishing expertise of another.
- Work with an understudy, a Philippine national, and train him in all facets of finishing for wood-based products, so that he may become a professional finishing expert to be utilized by Philippine industries.

¹ The Export Development Project is a project of the Government of the Philippines and the United Nations Development Programme, implemented by the Bureau of Export Trade Promotion of the Department of Trade and Industry. Its second phase bears the number PHI/87/007.

PHASE II - 25 April to 29 May 1991

- Visit again the participating companies to assess whether or not his recommendations were properly implemented and improvements were done as to product finishing.
- Advise companies on what measures should be adopted on any finishing problems that may have arisen since his last visit.
- Allocate time for each company to monitor closely, on the factory floor, the finishing materials and method being applied, identifying deficiencies in the process and ensuring that the companies are able to tackle them.
- Conduct one or two day seminars in Manila and Cebu on the basic principles and techniques of finishing, market trends and preferences and sources of material.
- Prepare a technical report on the finishing inputs given to companies, assessing the impact of such, and recommending other measures to further develop the finishing capability of manufacturers.

PHASE I - FINDINGS

The first phase of the mission was spent by the consultant visiting nine factories. Different times have been allocated for the different factories in order to follow the exigencies of the companies assisted. In all cases, the conditions of finishing shops has been found to be very poor: lack of extraction of overspray and solvent fumes, no separation between the finishing and production areas, finishing shops dirty and with poor maintenance conditions; very limited use of spray booth (only one factory adapting a spray booth with a water curtain). All factories visited (except for one, where finishing is not performed) are using the conventional air gun for the application of paints, only one uses an airless system; the compressors in a lot of cases are too small to drive an air gun and the maintenance is very poor and limited. Only one factory has a proper air distribution system, in all the rest, a long rubber hose running on the floor of the factory links the gun to the compressor. Service units (pressure regulator, pressure gauge and air filter) are not used everywhere; and where they are installed they are not properly serviced and maintained. The quality of the spray guns in a number of cases is not good: the gun is small and has limited regulators. Maintenance of guns is almost unknown and cleaning is not always properly performed. Fire extinguishers are only seldom installed in the finishing shops and they are of dimensions inadequate to face an efficient fire fighting situation in the finishing area. Curing and spraying areas are normally not separated and the operators sometimes move from workpiece to workpiece with the spray gun. Sanding between coats is also not done in a separate environment but right on the spot without any precaution regarding dust contamination of the finishing environment. Products utilized for finishes in a lot of cases are not specifically formulated for furniture, so paints for masonry and automotive lacquers are widely used. The main concern in buying paints is to save money without paying any attention to the technical specifications and quality of the products. In some of the factories already well established on the export market, the situation regarding the procurement of finishing products is slightly better, the paints being purchased directly abroad (mainly from the U.S.A.). The only disadvantage in

this case is that the American finishing techniques require many finishing steps and the time involved in finishing is very long due to the poor wearability of the nitrocellulose lacquer utilized and to the high number of staining steps normally applied. In almost all the cases the finished products are of good quality due to the skill of workers involved in finishing. A lot of time could be saved and a lot of problems avoided with a better setting up of the finishing shop. The ignorance regarding finishing products and their characteristics is universal and if, on the one hand the workers know how to handle the application, on the other hand, nobody knows that product they are using or what range of different products the market can offer. The situation among the paint suppliers is also not so good, they are mainly concerned about providing to the market cheap finishing products and, in a lot of cases, nothing is done in order to improve the quality of production or in order to develop new products and teach people how to use better finishing materials. Among the paint suppliers contacted, only one is moving in the right direction trying to promote improvements in the furniture factories.

Job done by the consultant during the first phase.

In all factories, the consultant spent from half a day to three full days analyzing the situation of finishing operations and suggesting improvements. Written notes had been provided to all the factories and copies of brochures or other different reference materials had been distributed according to the various needs of the factories. A one day seminar had also been organized in Cebu and 27 technicians from the industry attended. More details related to the job performed by the consultant can be found in the report (IO/R.191 dated 8 April 1991) already prepared for the first part of the mission.

Phase II - Introduction

For the second phase of the mission, the attention of the consultant concentrated on only three factories in order to make a better impact and obtain better results.

The programme for the second phase had been planned for the three factories assisted as follows:

- **JB Woodcraft:** Assistance in improving the quality of gilding, development of labour-saving techniques in the preparation of the work and the introduction of know-how for antiquing finishes for reproduction furniture, as well as updating their existing finishing techniques.
- **Simbulan Industries:** Develop their painting techniques with particular emphasis on hand painting techniques and ways and means by which hand painting can be done to simulate antiques.
- **Made Philippines:** Develop a method of finishing the reproduction furniture in the shortest possible number of steps consistent with good finishing.

The consultant was to demonstrate the European systems rather than the North American ones, bearing in mind that the results must be compatible in

both markets. He also had to ensure that the methods were fully understood and that they are practical for day-to-day production in the Philippines.

Short mission to Italy

In order to find solutions to the above mentioned problems and to provide a better help and to find suitable materials and constant supply, the consultant spent one week in Italy from April 15 to April 18 plus one more day (23 April) visiting paint suppliers and factories. A short report on these activities has been prepared and submitted to the project authorities.

Job done by the consultant

Consultancy to JB Woodcraft

Betis, Gua Gua, Pampanga

Philippines 2003

Contact persons: Mrs. Myrna Bituin and Mr. Boy Bituin.

This factory was not among the ones the consultant visited in the first phase of the mission.

Findings: The factory is located in two separate places. The old factory area, which will - from now on - be exclusively used for finishing, and the new factory located in a large area more than sufficient for future expansion. The old shed has a structure mainly made of wood, its concrete floor is sufficiently smooth and no enclosing walls are limiting the working area. The new shed has good characteristics: concrete floor, metallic structure and concrete enclosing walls. The surface area is approximately 3000 m². In this new building, all the machining operations will be performed. A good range of machines (some of them new) are already available. The factory started its activities in 1972 and entered the export market in 1986. The production is as follows: 50 percent made up of wooden accessories, boxes and mirror frames and the other 50 percent are reproduction chairs and tables. All items are abundantly carved. 95 percent of production is sold to the USA and the rest to Europe, Canada, Australia, Hongkong. Only rejected items are sold on the local market. The number of rejects is very limited and complaints are due only to the rigid specifications (misunderstandings with customers) but not lack of quality. The total number of workers is 215, but the factory is also relying on 60 to 80 more working as subcontractors.

Finishing and sanding are performed by about 70 persons subdivided into 42 sanding, 20 application of finishing products and 8 gilding.

The gilded items now represent 10 percent of the overall production, but this figure is destined to grow.

The rest of the finishing operations are 45 percent white washing and 45 percent stain plus/clear lacquer.

The products used are from the United States of America and from a local supplier (Dutch Boy). Gilding material is from Italy but has, so far, been purchased in Hongkong.

Consultancy provided to the company: The consultant spent five full days in this factory. He analyzed the situation of gilding. The workers were

using linseed oil for the adhesion between the gold leaves and the items to be gilded. This process did not permit a good adhesion and distension of the gold because the drying time of the oil used is very long (low quality oil). The result was not so good and the gilded surface was matt and without any glow. To substitute the oil, the consultant used glue especially formulated for gilding: the results were much better and the gilding process much faster.

Real gold was also used for gilding. This process is very delicate and took quite a long time to teach and demonstrate. The know-how on preparation and application of "gesso" and "bolo" to the surfaces to be gilded was transferred through practical demonstrations involving the factory's personnel. The consultant provided the factory with a few samples of gold leaves and all the fundamental tools to perform this activity properly. The following tools were supplied: leather pad for gilding, knife (to cut the leaves to the required dimensions), gilding brush, burnishing tools made of agate stone. All gilding steps performed in the factory were analyzed attentively and advice provided to solve problems and to avoid quality failures. The consultant spent the time necessary with the workers to ensure that all phases were understood properly. The possibility of setting up a gilding shop with proper characteristics was discussed with Mrs. Bituin. A tentative layout for this shop was also provided with all the necessary guidelines and information on aspects to be taken into account when gilding with real gold were also provided. A number of samples of glues, gesso, bolo, top coating lacquers and gold leaves were also left with the company for further applications. An order will soon be placed to the Italian company in order to establish a first contact for the supply of materials. The consultant will assist JB Woodcraft in this first operation. The consultant gave to Mr. Boy Bituin some advice on the setting-up of the finishing area. A specific finishing area with all the necessary characteristics was not available and finishing was done in the old factory shed. During the consultant's stay, the old factory was cleared and all production shifted to the new plant resulting in the old shed being available exclusively for finishing. A spray booth with a water curtain will be installed soon (it has already been purchased). Two old kiln dryers for wood which are now in the factory will most probably be transferred to the new factory. They are a fire risk due to the lack of safety features (the furnace is made locally). The space is sufficient and the factory surroundings do not create problems of dust contamination for the finishing area. The compressor is new and has enough power to feed two or three guns. A copy of the manual prepared during the first phase of the mission was supplied to the factory, together with photocopies of brochures and other printed technical information.

A short half day course on furniture finishes with emphasis on proper use and maintenance of the equipment and the various types of finishing products was given to the workers involved in finishing. A short visit was also paid to the factory by the consultant with Mr. Agliati, President of the Adler Friuli Paint manufacturer, for a better understanding of the furniture industry in the Philippines and problems related to finishing of items produced by JB. Mr. Agliati suggested shorter finishing procedures in order to obtain finishes simulating antiques. The only problem is to find a local paint supplier able to produce the type of paints required. The Made Philippines factory will prepare the surfaces for gilding using polyurethane in order to shorten the finishing steps. The personnel of JB should assist in the demonstration. Suggestions were also made for antiquing gilded items. (This demonstration could not be held during the consultant's mission because

of the late arrival of the samples and delays in clearing them through customs.)

Recommendations:

- The finishing shop should be set-up taking into account all the suggestions the consultant made. The written material provided during the consultancy can be used.
- Within the finishing area, a specific shop should be separated for gilding.
- A bench should be set-up for gilding. The bench must be provided with a drawer to catch and store small particles of gold leaves that can be later used to cover small spots left uncovered during the main application of leaves.
- The gilding area must be sufficiently clean and be kept at a temperature of 20 to 25°C.
- Ventilation that can create problems during the application of leaves should be avoided.
- To perform gilding with real gold, it is necessary to have a specific shop within the gilding shop itself.
- The finishing shop for gilding with real gold must have the following characteristics:
 - . the preparation of the surfaces has to be separated from the application of leaves;
 - . the application of leaves must be done in a proper area with a floor which is smooth and easy to clean;
 - . the temperature in this area must be between 20 and 25°C;
 - . the application of gold must be done in such a way that wastage of material is minimized (the cost of gold leaves is high!);
 - . all wasted gold must be collected:
 - All waste material and dirt gathered when cleaning the floor in the gilding area must be conserved together with the envelopes and papers in which gold leaves are stored. The operator must wash his hands in a special container or basin where all the small gold particles can be collected from the water later. Papers, and any dirt and waste from gilding have to be burnt from time to time. The ashes should be sold to a specialized factory to recover the gold.
 - . Air blasts should be avoided in the gilding area, it may affect the delicate operation of gold application.
 - . Dirt and dust from the surface preparation area should not contaminate the gilding area.
- The market should be explored to determine demand for gilding with real gold leaves.

Consultancy to Simbulan Industries
Aquino Avenue, Baliwag
Bulacan, Philippines

Contact persons: Mr. Rene Simbulan, Production Manager, and finishing personnel.

Consultancy provided to the company: This company had already been visited by the consultant during the first phase of his mission. They are now willing to shift the operation to a new factory, which is currently under construction. The minor suggestions made to improve the finishing shop in the present finishing area were put into practice. However, expensive solutions and major improvements involving high costs will be considered in setting-up the new factory. The consultant spent six days with this company developing new types of finishes intended for a new line of products to be produced in the near future by Simbulan Industries. They intend to enter the reproduction furniture market with a range of various hand painted items of furniture of different European and American styles.

In order to better perform his job, the consultant brought from Italy brochures of hand-painted furniture, books illustrating various kinds of decorations and pictures of hand-decorated furniture. The consultant demonstrated to Mr. Rene Simbulan all the aspects of finishing related to this kind of decorated furniture. Mr. Simbulan and the consultant agreed to try to do a reproduction of a cabinet produced in Italy and exhibited successfully years ago during the Milan Furniture Fair. During the construction of the cabinet, the consultant, with the help of the factory staff, produced a few samples of panels hand-decorated in different styles (German, American, etc.). All hand decorations were carried out by a skilled painter engaged by Mr. Simbulan. Different kinds of antiquing using different substances and methods have been demonstrated practically by the consultant. The last part of the consultant's stay in the factory was spent decorating and finishing the cabinet. Antiquing and gilding with gold leaves of some of the parts of the cabinet were the last steps of the demonstration. The results were good and encouraged Mr. Simbulan to produce, in the near future, a few more samples of such furniture to be exhibited in future shows in order to find a market. Pictures of the samples and of the cabinet will be sent by the consultant to a few factories contacted during his mission in Italy who were interested in purchasing low cost hand decorated furniture. One more day was spent by the consultant analyzing the results of his job, and suggesting remedies to avoid the problems encountered during the execution of the prototypes.

Recommendations:

- The kind of products and finishes suggested can be a profitable area for the company since nobody in the Philippines is producing this type of furniture.
- As suggested by Mr. Vernon, the best way to start production is to make some pieces of occasional furniture and later on venture into a specific line of products, such as bedrooms or living rooms.
- The workers need more skill in handling the antiquing in order to obtain uniform results. The following aspects can be considered:
 - . The use of a small spray gun or of an air brush will enable a better control during the application of antiquing solutions and

will help in creating the shadows which are intended to enhance the hand decorated parts properly.

When antiquing is performed utilizing potassium bichromate, it is better to fix it with a coat of clear matt nitrocellulose. This will enable a better control of the successive application of the water-permanganate solution. Any uneven or unpleasant dark shadow can be easily removed or corrected without removing the bichromate solution and bringing back the bright colours of the background.

As much documentation as possible about hand-decorated furniture should be obtained.

A visit to one of the major furniture shows abroad (High Point in the United States of America, Milan in Italy and Cologne in Germany) will provide a very good opportunity for Mr. Simbulan and the artist involved in decorations for a better understanding of the market requirements for hand-decorated furniture.

Consultancy to Made Philippines
Friendship Highway
Riverside Subd.
Angeles City, Philippines
Contact person: Mr. Tony Estacio

Consultancy provided to the company: The factory was also visited by the consultant during the first phase of his mission. The only improvement noticed was the installation of service units for the compressed air. To perform his job in this company properly, the availability of samples of finishing products (from the Italian firm Adler Friuli) was vital. Unfortunately, the strict rules on the transport of inflammable substances and related red tape prevented the samples from reaching the Philippines in time to be used.

The consultant spent three days in this factory performing the following activities: installing the equipment (compressor guns, service units) in order to be able to demonstrate on finishing, the utilization of stains and antiquing glaze (stain and glaze were the only two products available because they had been brought from Italy by the consultant in his personal luggage).

Recommendations:

- The efficiency in finishing should be improved to attract more customers. The current cost of finishing is too high and products are not attractive.
- A new compressor of at least 5 HP should be bought; the two compressors available are too small (4HP each) and totally inadequate to drive a spray gun efficiently.
- Polyurethane (PU) or acid cured (AC) products should replace nitrocellulose (NC) in order to obtain better quality and reduce the finishing steps.
- The spray booth already present in the factory should be set up as soon as possible. Extraction of solvent fumes and overspray is fundamental, mainly with using the new PU and AC products, which are more toxic than NC based products.

- If the factory intends to specialize in furniture finishing, it is fundamental that they shift their activities to a different and more suitable place and consider the introduction of more efficient spraying techniques like airless, airmix or, in the long run, electrostatic spraying.

Other activities

During his mission the consultant spent a few days with Mr. Guiseppe Agliati, President of the Italian paint manufacturing firm Adler Friuli.

As a consequence of the consultant's mission to Italy in April, Mr. Agliati decided to visit the Philippines in order to find a partner to penetrate the national market with the Adler Friuli products. The consultant identified, as a suitable counterpart, the Philippines firm Dutch Boy. PRODEX arranged a meeting between the two parties and the consultant assisted Mr. Agliati during his stay in the Philippines. One day was also spent by the consultant and Mr. Agliati visiting three factories: Vera Wood, Made Philippines and JB Woodcraft in order to obtain a better idea of the situation and needs of the wood-based industry as far as finishing is concerned. The results of this first approach between Adler Friuli and Dutch Boy were encouraging and, in the opinion of the consultant, technical cooperation between the two companies will start soon. Thus, in the near future, good quality finishing products and better technologies will hopefully be available to the Philippine wood processing industries. During his stay, the consultant managed also to visit the following companies he had assisted in the first phase: Grass Roots, Furnitureville, Vera Wood. Time constraints prevented the consultant from visiting or contacting the other companies assisted during the first phase. In Grassroots, no substantial improvements had occurred, according to the Production Manager, Mr. Bot Quizon, the maintenance of equipment has been improved and a lot of finishing is no longer performed in the old factory but has been transferred to the new plant where finishing facilities are definitely better.

The biggest improvement that has been noticed in Vera Wood is that an interesting system of four spray booths has been set up using an original design by the factory owner, and a big air mix unit has been purchased. It is also the intention of the owner to set up as soon as possible a conveyor line and buy more air-mix units. A few pictures and copies of brochures were provided to the factory in order to give the owner some idea for the realization of a conveyor line and a drying tunnel oven.

The consultant also spent half a day with the company Furnitureville. It is now the intention of Mr. Torres, the factory owner, to set-up a small finishing shop. The consultant visited the factory and had a look to the area allocated to finishing. A few suggestions were made and a tentative layout sketched. Pictures and copies of various equipment were given to Mr. Torres for further consideration.

At the end of his mission, the consultant also gave a short one-day seminar in Manila to the local entrepreneurs and factory staff interested in upgrading furniture finishing. It was attended by some 15 persons.

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ANNEX I

SUBSTANTIVE OFFICER'S COMMENTS

The expert appears to have made reasonable observations on the state of the equipment and processes used in finishing. His comments on the low quality of materials used and finishing achieved are in line with our experience and the justification for this part of the project. The first phase was evidently much appreciated and led to the number of factories being reduced from 9 to 3 which could absorb more intensive assistance.

In phase two, his activities were mainly hand-on demonstration of gilding and finishing techniques using improved products and processes (eg of fixing the gold leaves to the items). His recommendations on rearranging the finishing shops are sound as is his decision to prepare these factories for export to both USA and Europe (which have differing styles and requirements).

We endorse also his recommendation for Mr. Simbulan to visit the main furniture shows in USA and Europe.

It is particularly encouraging to note that the President of Adler Friuli is interested in technical cooperation with the Philippine paint firm Dutch Boy to provide improved quality finishing materials to the industry. This should be followed-up.