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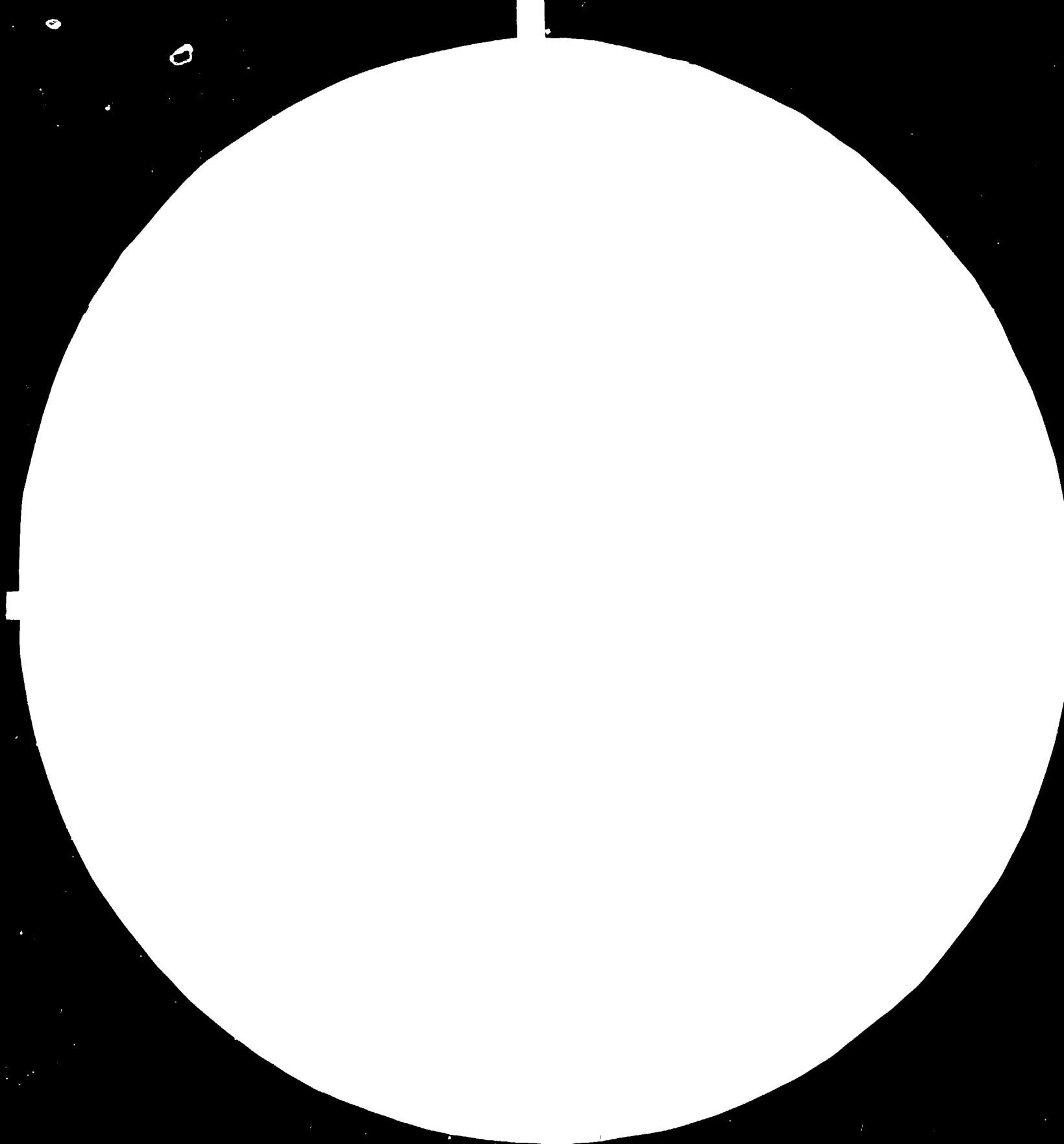
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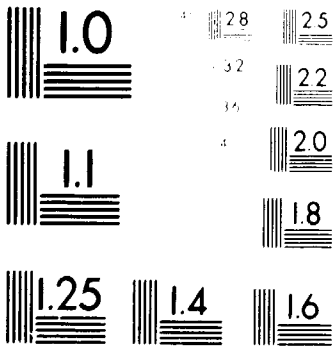
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PROJECT FOR THE MANUFACTURE OF  
ALUMINIUM WINDOWS AND DOORS IN GUANGZHOU ,  
THE PEOPLE'S REPUBLIC OF CHINA

PROJECT NUMBER : DP/CPR/80/045/11-03

MACHINE INSTALLATION  
(SECOND PHASE)

REPORT

BY

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VIENNA

This report has not been cleared with the United Nations Industrial Development Organisation which, therefore, does not necessarily share the views presented.

*received from Mr. Shen*

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1. BACKGROUND

This report covers the work carried out on mission DP/CPR/80/045/II-03 at the Guangzhou Aluminium Windows Factory, Leide Road, between 19th September and 14th December 1984 after briefings in Vienna and Beijing.

J.S. Arkwright travelled with Consultant W.G. Fancourt who handed over the project during their joint time on site. This report deals essentially with the work carried out at the Factory after Mr. Fancourt's departure on the 6th October. A report up to this time has already been submitted. The previous work on the project up to January 1984 is contained in the report headed "Visit Report to Paul Anton GmbH FRG".

## 2. GENERAL REVIEW

This mission has consisted of two main parts.

- 2.1 The installation and testing of machinery with initial operator training.
- 2.2 Assistance with factory operations and continuing operator training.

Because the new design profiles are not yet available the factory continues to produce the 'old' design windows and not the 'new' design as was originally intended. It is expected that this will be for only a short interim period until the new profiles are introduced. Some layout problems did arise in the early stage of the project but these were satisfactorily resolved.

The Installation and Testing of all machinery and equipment was completed on time in accordance with the agreed programme. The Chinese workers are to be thanked for their full co-operation in making this possible. Training of operators continued and a number of suggestions on Methods, Management, Organisation, Production Control and the establishing of a Quality Control Section were made.

Although orders for windows continued to flow through the workshops the throughput was not as heavy as expected, particularly in casement windows. This was because of major demands on labour for site fixing and the uncertainty of continuing supplies of good quality extrusions. Alternative sources of supply are being sought but good quality extrusions are not readily available in China. Therefore extrusions are likely to be imported in the short term but it is the view of the Directors that the best long term solution to this serious problem is for the factory to produce its own extrusions. This was taken a step nearer to reality with the signing, in November, of a letter of Intent to form a Joint Venture Enterprise with Arthur Shaw Limited of Willenhall, United Kingdom, to produce high quality extrusions in Guangzhou. The design and production of new hardware will also form part of this Joint Venture.

From time spent in the factory it is clear that supervision and middle management needs strengthening especially as output demands increase. Steps have been taken to improve this area and a number of organisational changes and new appointments have been made.

It also became apparent that Quality Standards required urgent improvement and a new Quality Control section has been established by Mr. Wu Cai.

This mission has been deliberately cut short after discussions with Mr. Sissingh, for it seems sensible to allow a "settling in" period with the new machines and also to enable both the methods improvements and organisational changes which have been suggested to become fully effective.

In this way the time saved on this mission can be used more effectively for the Chinese by adding it to the next phase of the project which is to train the workers in the use of the 'new' section and also to establish a specialist training service as a model window factory in the People's Republic of China.



Also during this next phase any difficulties and problems which might arise during the interim period between missions can be resolved on the return of the Unido experts and incorporated in the training programme.

The points in this General Review (and others) are described in greater detail in the paragraphs which follow.

The timing of the next mission is difficult to determine exactly but it is likely to be around mid to late 1985 and will depend to a large degree upon the availability of the new profile.

### 3. MACHINERY INSTALLATION

Although the programme agreed at the start of the mission was considered to be "tight", the installation and testing of all the Anton machinery was satisfactorily and successfully completed on time on 19th October. The successful completion was only made possible with the help and full co-operation of everyone at the factory. As expected with installations of this size a number of problems arose and several modifications to layout, tooling and equipment were made.

The opening ceremony (ribbon cutting) was carried out on the 26th October with nearly 300 people (including the Deputy Mayor, local Leaders of various organisations and factory workers) being present. Full press, television and radio coverage was given to the occasion; radio Beijing broadcast the event in its overseas service, and a celebration banquet was held later in the evening.

### 4. DELIVERY OF EQUIPMENT

Machinery and equipment appears to have been delivered generally in accordance with the original order. There were a number of minor alterations, notably substitutions for different spare parts. One air filter lubricator for example was substituted for a pedal switch and there were variations to some punch spares. The two small items of missing spare parts referred to in the previous report were not found but alternatives have been substituted.

A demurrage charge of 3306 Rmb has been levied by the Shipping Line against the Guangzhou Aluminium Windows Factory and they have made a request for assistance by Unido in meeting this claim. At the time of writing this report details of the shipping terms were awaited from Anton. Until this information is available it is not possible to determine if the claim is valid.

Apart from those items already mentioned further detailed inspection revealed no further "shortages". A full report and listing will be given in Vienna.

### 5. DAMAGE TO MACHINERY

Other than damage to an impulse counter and breakage of a profile support arm, no further damage was found on subsequent installation and inspection. The electronic impulse counter has already been replaced by Anton and all four double mitre saws are operating fully. The broken profile support arm has not yet been replaced but this is causing no operating difficulties. An independent assessors report for insurance purposes is to be arranged by the Chinese, but is not yet to hand. In the meantime a separate report has been submitted by the Unido expert in the hope that the Insurers will accept the damages claim. The Window Factory are also to send a letter confirming these items in the meantime

6. MACHINERY HANDOVER

On completion of the installation and testing, the machinery was handed over to the Chinese. Each item of equipment being accepted as satisfactory by Mr. Wu Cai, Director, the Unido expert, and the Anton Engineer. Copies of the Acceptance documents will be deposited with the Unido buyer in Vienna. Anton and the Chinese also have copies.

7. PLANT REGISTER

A Plant Register listing the new equipment has been compiled and handed to the Chinese technicians. All machines have been given a Plant number by the Chinese.

8. OPERATOR TRAINING

This has been on a continuous basis. The Chinese have learned to operate the machines remarkably quickly and readily appreciate the adaptability and efficiency of the machinery. A number of problems have arisen but these have been satisfactorily resolved. Operator competence is improving rapidly as they become more familiar with the equipment.

Between now and the introduction of the new profile in 1985 it seems sensible to allow a "settling in" period to enable the Factory to reach reasonable levels of efficiency and competence and to allow the method and organisational changes (referred to elsewhere in this report) to become established.

During this period any problems or operator difficulties will be highlighted and this will indicate the areas upon which future training needs should be concentrated.

Since the next part of the project is for training, discussions have been held with Mr. Wu Cai and Mr. Wu Zhong Yao and a tentative programme for this next phase has been agreed. It is outlined in the paragraph headed "Recommended Further Action".

As part of the current programme a detailed Training Manual for the double mitre saws has been prepared in draft form and this will become a part of the future Training Manuals.

9. PRODUCTION METHODS

A preliminary review of production methods has been carried out and many suggestions for methods improvements have been made and discussed with Mr. Wu Cai and Mr. Wu Zhong Yao. At the time of preparing this report all the improvements had been accepted but they have not yet been completed. These improvements should make a contribution to creating a more efficient operating unit. A list of these agreed changes has been left at the factory.

9. PRODUCTION METHODS Continued

To maximise productivity in a Window Factory of this size there is a need to examine and improve manufacturing techniques on a continuous basis.

In the United Kingdom this very important function is carried out by an \*Industrial Engineer who by applying specialist skills and with proper direction normally makes substantial improvements in productivity and reduces operating costs.

No doubt a similar appointment at the factory could also yield important benefits and it is suggested that the Chinese seriously consider appointing a suitably qualified person to this important position. If such a person is not available it is suggested consideration be given to providing training in Industrial Engineering techniques to a suitably qualified Engineer.

10. WORK FLOW

The factory is presently producing the "old" design of window and since this will be for only a short period the machines were installed in accordance with the layout for the "new" window profile. This has led to a slightly less efficient flow of work.

A bottleneck has arisen in the Slider Shop with the routing of the jamb bars and this has caused interruptions to work flow. As production levels increase this bottleneck will become worse and Unido assistance is requested in providing an additional twin header copy router. Work measurement of output levels confirms the bottleneck.

Efficient work flow also requires good organisation and a disciplined approach by Foremen and Managers. Unfortunately, this was not the case in the early part of this mission and although management changes have been made supervision must be constantly alert to this problem.

This has been discussed with the Directors and they have taken steps to improve this situation.

\* Industrial Engineer

This is an American term used to describe an Engineer whose primary activities (among others) are, design of tools and equipment, facilities, layout, methods of manufacture, development of wage incentive plans, improvement and design of control systems, materials handling and all other activities associated with manufacturing.

## II. MOVEMENT AND HANDLING OF MATERIALS

Top quality aluminium products need care in handling. Movement of materials by the present design of truck is not really satisfactory. Two new trucks have been designed and built and are now on trial. The better of the two designs will be adopted gradually throughout the Factory. New support stands, frames and racks have been introduced to reduce possible damage to extrusions.

Work tables are to be fitted with 'plastic' type covering to avoid surface scratching, several "pot" holes throughout the shop floor are to be infilled with concrete which will make transport easier. Ideally the workshops floors should be 'screeded' with a granolithic type covering and this will probably be carried out at a later date.

## 12. PRODUCTIVITY

During this mission an assessment was made of productivity levels. By U.K. standards these are low and are estimated to be around 35 - 40 on the BSI.100 scale.\* This assessment is based on the writer's experience and by some actual work measurement.

In the U.K. for example productivity levels are expected to reach 95 on the BSI.100 scale.

This matter has been discussed with Mr. Wu Cai and Mr. Wu Zhong Yao who recognise the problem and are taking steps to improve the situation.

In window factories with which the writer has been associated productivity (in addition to good management) has been increased significantly by the introduction of soundly based incentives which pay bonus for increased levels of working.

By the use of work measurement techniques such schemes can be simple and very effective; providing they are properly applied. The Industrial Engineer referred to earlier could undertake this as a first task.

The introduction of an incentive scheme is worth consideration and would appear to be compatible with Government policy. In 'China Daily' dated 12th November 1984, Mr. Lu Dong (Minister in charge of the State Economic Commission) is quoted as saying, to CPCC, "A wage system embodying the principle to each according to his work will be established".

\* BSI.100 performance is defined in British Standard 3138: as, "The rate of output which qualified workers will naturally achieve without over exertion as an average over the working day or shift provided they know and adhere to the specified method and provided they are motivated to apply themselves to their work". This is represented by the figure 100 on the B.S.I. scale. In practical terms it is the equivalent of walking at the rate of about 4 miles per hour (6.4 Km.p.h.).

13. PRODUCTION CONTROL DOCUMENTATION

A preliminary review has been made of Production Control documentation in collaboration with Mr. Xui Jin Kuei (Production Planning Engineer) and Mr. Guan Yang Mei (Factory Manager) and their staff.

From this review a new works order has been designed and is presently being introduced. This new order form reduces the number of separate documents from 7 to 3 (together with their associated copies) and as a result of separating window types should improve workshops control and efficiency.

The writer has formed the opinion that the Production Control function will need further more detailed review and will need to introduce further controls (such as detailed shop loading) if the Factory is to cope effectively with the high volume of window production which is forecast. Mr. Xui Jin Kuei agrees with this view. Such controls need not be sophisticated, for in general terms simple Production Control systems are usually the most effective.

14. MANAGEMENT AND SUPERVISION

During the considerable amount of time spent in the workshops the expert formed the opinion that the quality of supervision and management was not of a sufficiently high standard. Organisation of work was poor and discipline was lax. This has been discussed with Mr. Wu Cai and Mr. Wu Zhong Yao and although there were extenuating circumstances which have contributed, they both have recognised this as a major problem.

As a result, organisational changes have now been made and a new Workshop Manager and Vice Manager have been appointed.

It is confidently expected that Management competence will improve (and there are encouraging signs for this) for without good, sound, professional management it is difficult to operate an efficient organisation.

15. QUALITY CONTROL

Product Quality requires improvement primarily through better control. Many problems are being caused on site through inaccuracies in manufacture, frames out of square, poor finishing, and other faults most of which are probably due to carelessness on the shop floor. The quality of hardware also needs attention.

Mr. Wu Cai recognises this as a major problem and a new Quality Control Department has been formed. The Unido expert has assisted with the establishment of this Department.

16. EXTRUSIONS

It is understood that the supply of good quality extrusions from Harbin is now no longer available. Other extrusions are available within China but the quality is understood not to be of the required standard. Mr. Wu Cai is urgently trying to secure alternative sources of supply and this is likely to mean importing.

This will doubtless be unacceptable to the Chinese in the long term and the establishment of an Extrusion and Anodising plant in Guangzhou, under the control of the Factory, is seen as of paramount importance by the two Directors. Obviously, the lack of an adequate supply of good quality extrusions can be potentially serious having an effect not only on Production, sales and the "new" design but also on the continuing viability of the Factory.

Mr. Wu Cai has taken a step towards removing this potential problem by signing a letter of Intent with a United Kingdom manufacturer, Arthur Shaw Limited of Willenhall to provide extrusion and anodising facilities in China.

Both Mr. Wu Cai and Mr. Wu Zhong Yao would like support from Unido in presenting the urgency of the case to the China State Construction Corporation and would also welcome Unido assistance in helping them establish the Joint Venture.

17. HARDWARE

In the previous report by Mr. Fancourt, mention was made of the unresolved question of product design and manufacture of handles and hinges.

Since that report was prepared a meeting has been held between representatives of Arthur Shaw Limited, Willenhall, U.K. and the Chinese in November and a letter of Intent to form a Joint Venture Enterprise to produce hardware has been signed.

(This joint venture also includes an Extrusion and Anodising plant mentioned in Paragraph 16).

18. MANNING LEVELS

These have been discussed with Management and operatives have been allocated to machines and departments in accordance with production capacities which have been calculated on an appropriate basis.

19. SAFETY MEASURES

A number of safety measures have been recommended and are now being implemented. Guards are now being fitted to power presses (mainly in the Door Department) which are currently potentially very dangerous; to drilling machines, and general safety measures are being tightened.

20. MACHINERY MAINTENANCE

The newly installed up to date machinery requires regular maintenance if it is to give trouble free service. The expert has spent time with the Chinese technicians on this matter and a regular programme of machinery checks is now being carried out.



21. SUGGESTED FURTHER ACTION21.1 TRAINING

With the new machinery installed and the Chinese operators initially trained to operate the equipment it is sensible to allow the Factory to reach reasonable levels of competence between now and changing to the "new" design. During this "settling in" period the various methods and organisational changes should become established and any latent problems and difficulties which might arise during this time can be resolved on the return of the Unido experts and can be incorporated in the training programme. The task of monitoring progress between this and the next mission has been given to Mr. Liang.

The objective of the next part of this project is to provide a specialist training service as a 'model' Factory in the People's Republic of China and to this end discussions have been held with Mr. Wu Cai and Mr. Wu Zhong Yoa and both agree that the following programme (though tentative) should form the basis for the next phase of this project.

Stage 1 A "settling in" period to allow operators to reach reasonable levels of competence between now and the introduction of the "new" section and also to highlight any latent problems which might arise.

Then, with the help of Unido to commence :-

Stage 2 To train operators to understand fully the "new" design and to produce the new windows using the new machines.

To resolve any design or design related problems.  
To resolve any production problems or difficulties which may have arisen during the settling in period between missions.

Stage 3 To help select and train instructors in how to teach.

Stage 4 To devise a "model" training programme incorporating the requirements and range of people to be trained.

Stage 5 To equip the department. Suggestions have been made and most of the equipment recommended will be made available by the Chinese.

Stage 6 To establish a "dummy" (experimental) training programme, guiding the Chinese instructors and thus finally establishing a realistic pattern for training as a 'model' factory in the People's Republic.

Stage 7 To review and consolidate.

During the implementation of this programme there will be a very heavy demand upon the experts time particularly during Stage 2 when both new training and new designs are introduced. In order that the Chinese should have maximum benefits from the experts time on site and to avoid spreading this help too thinly and causing unnecessary disruption to production, it is suggested that the Design Expert (Mr. Fancourt) should also be at the Factory during this stage. This would be for a period of about 4 weeks and would be included within the time allocation of the next phase.

It is difficult at this stage to determine a firm date but the timing of the next mission is likely to be around mid to late 1985 but this will depend to a large extent upon the availability of the new profile.

#### 21.2 EXTRUSIONS

As was mentioned earlier the Directors are anxious to establish extrusion facilities in Guangzhou as quickly as possible.

The Chinese would like Unido to consider providing whatever help and assistance is possible in :-

21.2.1 Helping to present the case to the State Construction Corporation for the urgent need of establishing Extrusion and Anodising facilities.

21.2.2 Providing assistance with the monitoring and establishment of the proposed Joint Venture for Extrusions mentioned earlier.

It is suggested that these latter two points be considered by the appropriate Unido departmental heads.

#### 21.3 ROUTER

There is a bottleneck with the routing of the jamb bars in the Slider Shop and the Chinese have requested assistance from Unido in providing an additional twin headed copy router. As a first step it is suggested that quotations be obtained from Anton and the request be then further considered by Unido.

#### 21.4 INDUSTRIAL ENGINEER

The writer feels the appointment of such an Engineer would be of benefit to the Factory and it is recommended the Chinese give careful thought to this. If Unido are able to provide training if necessary, no doubt the Chinese would welcome such assistance.

#### 21.5 INCENTIVES

Although incentives are not the sole criteria for improving productivity it is suggested that the Chinese consider introducing a suitably structured, yet simple, bonus scheme which pays bonus for increased levels of working and which, if properly applied should contribute to increased productivity especially since such schemes are believed compatible with Government Policy. Incentive schemes have certainly been beneficial within Factories with which the writer has been involved.

22. ACKNOWLEDGEMENTS

Thanks are due to everyone at the Factory, for without their help and co-operation this project could not have been completed so successfully.

Special thanks are due to Mr. Wu Cai, Director, Mr. Wu Zhong Yao, Vice Director and Mr. Lin Jian Shan, Senior Interpreter for their untiring help and kindness.

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