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Meeting of Experts/Decision Makers for Promotion
and Development of Machine Tool Industries in
Developing Countries of Asia and the Far East

Tbilisi, Georgia, USSR, 5 - 15 October 1974

A REPORT

ON

/ BANGLADESH MACHINE TOOL FACTORY 2/

by

industry/

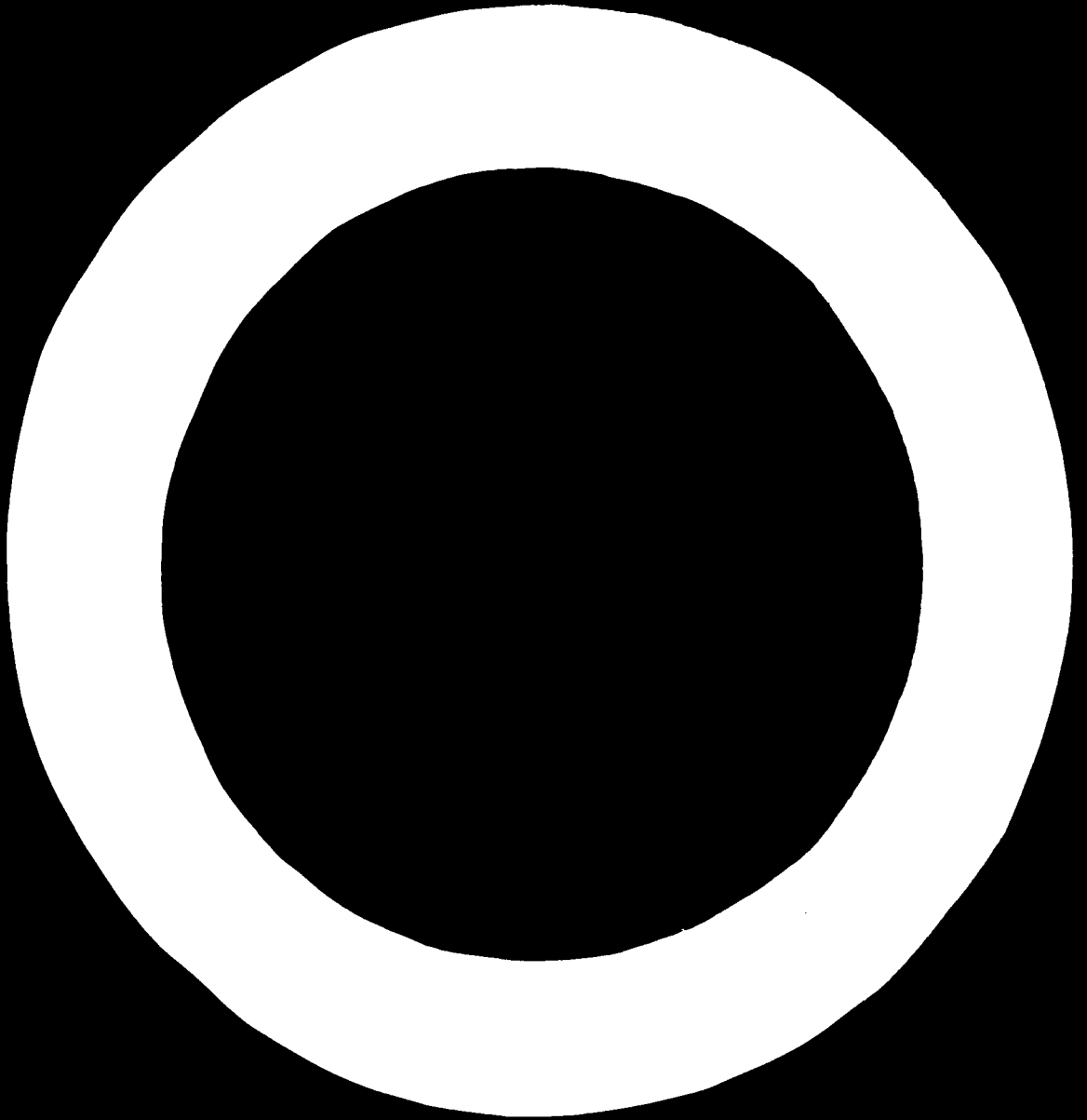
S. M. Rahman *

* General Manager, Bangladesh Machine Tool Factory
Joydevpur, Dacca, Bangladesh

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1. INTRODUCTION :

a) THE CONCEPT.

The concept of establishing a Machine Tools Factory in Bangladesh was the outcome of the economic and industrial disparity that was prevailing in the country in 1966. While preparing the Third Five Year Plan the necessity of building up Industrial Infrastructure in the field of Machine Tools and allied metal industries was keenly felt. Following these necessities the foundation stone of this factory was laid in the early part of 1966 against various odds and obstacles on its way. In fact, the factory started its construction even before the approval of PC-1 by the EC of MEC of the then Govt. of Pakistan. But due to the nonavailability of foreign exchange and subsequently the heavy damage by bombing during the War of Liberation, retarded the progress of Implementation of the project. In short, the present overall progress compared to the final stage of the factory is approximately 35%.

b) COST OF THE PROJECT.

It is fortunate that after the War of Liberation an all out effort and assistance has been given by the Govt. of Bangladesh to complete the project in the shortest possible time under a revised programme. Accordingly, this factory has been included in the First Five Year Plan of the country with an estimated allocation of Tk.390.00 million (revised). In the Revised Project Evaluation Proforma of the project the estimated cost has been foreseen as under :-

(Taka in millions)

Amount already incurred upto June, 1974			Amount to be incurred			Total cost of the project.		
L.C.	F.C.	Total	L.C.	F.C.	Total	L.C.	F.C.	Total
135.87	69.58	205.45	260.74	197.46	458.20	396.61	267.04	663.65

c) MACHINERY AND EQUIPMENT PURCHASED SO FAR : Taka 52.00 Million.

d) EXPECTED YEAR OF COMPLETION : 1977-78.

e) AREA OF THE FACTORY :

i) Factory Area : 69.00 acres.

ii) Roads and residential area : 94.16 "

FACTORY BUILDING COVERED AREA :

i) Tech. Training Centre 40,000 sq.ft. completed.

ii) Tech. Training School 42,000 " " "

iii) Machine Shop 216,000 " " "

iv) Assembly Shop	121,084 sq. ft.	completed.
v) Maintenance Shop	25,600 "	" " "
vi) Central Tooling Shop	38,400 "	" " "
vii) Pattern Shop	25,560 "	" " "
viii) Foundry-III Shop	30,400 "	" " Under construction.
ix) Foundry-I Shop	54,000 "	" " to be constructed.
x) Forge Shop	35,861 "	" " "
xi) Forge Heat Treatment Shop	19,680 "	" " "
	Total :	648,585 sq. ft.

f) INSTALLATION FOR SERVICE.

- i) Water supply - Tank capacity 200,000 Gallons. Complete.
- ii) Power supply - Installed capacity - 30 MVA under construction
- iii) Emergency power supply - Installed capacity - 1100 K.W. Only 300 K.W. installed.
- iv) Compressed Air - Total Cap. $9,400 \text{ M}^3/\text{H}$ at $7.5 \text{ Kg}/\text{CM}^2$ To be completed.
- v) Natural Gas $3,000 \text{ M}^3/\text{H}$ at 7 PSI To be completed.
- vi) Fire Fighting Installation capacity - 150 M^3/H at 50' H To be completed.

g) MAN POWER :

Officer. Staff. Technician. Helper Total.

i) Strength as per full Set-up	195	734	1,112	169	2,210
ii) Present strength	87	350	413	208	1,058

h) PRODUCTION CAPABILITIES :

<u>Item</u>	<u>Capacity after completion.</u>	<u>Present capacity</u>
i) Casting	9,000 Ton per year in two shifts.	1,500 Ton per year in two shifts.
ii) Forging	1,875 Ton per year in single shift.	Nil.
iii) Machining	875,000 hrs. per year in two shifts.	210,000 hrs. per year in two shifts.
iv) Assembly	100,000 hrs. per year in two shifts.	50,000 hrs. per year in two shifts.

i) MAJOR PRODUCTION ITEMS :

- i) Machine Tools (Lathes, Drills, Hacksaw etc.) 230 Nos. per year.
- ii) Cutting Tools (Turning Tools, Drills, Taps and Dies, Hacksaw Blades etc.) 600,000 Nos./sets per year.

- iii) Hand Tools
(Agricultural & mechanical) 220 Ton per year.
- iv) Deep Well Turbine Pump - 3,000 Nos. per year.
- v) 2 Cusec Centrifugal Pump - 3,000 " " "
- vi) Fractional Pump. 3,000 " " "

j) PRODUCTION PROGRESS :

During the War of Liberation the damage occurred due to heavy bombing to this factory was enormous. The roof of the factory building were perforated by shelling from the Air, roads were blown away by bombing, electrical cables and equipments completely destroyed, huge portion of machinery and installations burnt into ashes. The total damage was estimated to the tune of Taka 12.00 million. After the War of Liberation, the Government sanctioned Taka 5.00 million to undertake the reconstruction programme and an all out effort was made to rebuild the damaged factory so as to bring it to the production stage to a limited capacity by mobilising the man and material we had in our command. With the co-operation from all sides we have succeeded in our efforts to a great extent. In 1973, the following agricultural equipments and machine tools were produced and sold to make the "GREEN REVOLUTION" and industrial progress of the country a success.

k) PRODUCTION DURING 1973.

<u>Product.</u>	<u>Quantity.</u>	<u>Sales (Taka in million)</u>
1) Deep Well Turbine Pump.	600 Nos.	8.46
ii) Centrifugal Pump	993 "	2.24
iii) Machine Tools	120 "	0.80
		Total : <u>11.50</u>

1) PRODUCTION PROGRAMME FOR 1974.

<u>Product.</u>	<u>Quantity.</u>	<u>Estimated sales Taka in million.</u>
1) Deep Well Turbine Pump.	1400 Nos.	20.00
ii) Centrifugal Pump.	5000 "	15.00
iii) Machine Tools.	30 "	1.80
		Total : <u>36.80</u>

2. ESTIMATED NUMBER OF UNITS USING MACHINE TOOLS IN BANGLADESH.

The estimated number of general Engineering work shops in Bangladesh using Machine Tools approximately 2000 of which 1200 units are relatively larger, well organised and having on an average about 4 Machine Tools per unit and the rest are smaller workshops with an average of about 2 Machine Tools per unit.

3. ESTIMATED MACHINE TOOLS POPULATION.

The estimated Machine Tools Population in Bangladesh in 1974 is given below :-

i)	Lathe	small	3000
		medium	1500
		large	1600
ii)	Drills	Radial	150
		Column	1500
		Bench	2000
iii)	Hacksaw		480
iv)	Shears		300
v)	Grinders		1600
vi)	Wood working Machine		60

4. AVERAGE ANNUAL GROWTH RATE.

<u>Machine Tools</u>		<u>Estimated Annual Average Growth Rate 1974-78.</u>
i)	Lathes	Small 12.5
		Medium 9.0
		Large 10.5
ii)	Drills	Radial 10.0
		Column 8.5
		Bench 8.5
iii)	Hacksaw	7.0
iv)	Shears	7.0
v)	Grinders	10.5
vi)	Wood working Machine	10.0

The Growth rates shown above consists of (a) The Growth of new units and (b) The expansion of the existing units.

In addition it is estimated that approx. 1.50% of the Machine Tools will be required for replacement & modernisation of the old units.

5. ANNUAL AVERAGE DEMAND OF MACHINE TOOLS AND AGRICULTURAL PUMPS IN BANGLADESH FOR THE PERIOD 1974-1978.

<u>1) Lathes:</u>	<u>Annual average demand during 1st 5 year plan.</u>	<u>Fulfilment by local product.</u>	<u>Fulfilment by import.</u>
Celtic-14 (small size)	460 Nos.	60 Nos.	400 Nos.
Celtic-17 (Medium)	150 Nos.	25 Nos.	125 Nos.
Celtic-20(Large)	220 Nos.	40 Nos.	180 Nos.

ii) Drills :

Radial	20 Nos.	10 Nos.	10 Nos.
Column	150 Nos.	45 Nos.	105 Nos.
Bench	150 Nos.	45 Nos.	105 Nos.
iii) Hack saw	40 Nos.	20 Nos.	20 Nos.
iv) Shears	25 Nos.	-	25 Nos.
v) Grinders	200 Nos.	-	200 Nos.
vi) Wood working	7 Nos.	7 Nos.	-
vii) 2 Cusec Turbine Pumps.	3000 Nos.	3000 Nos.	-
viii) 2 Cusec Centrifugal Pumps.	5000 Nos.	5000 Nos.	-
ix) 0.5 Cusec Centrifugal Pumps.	3000 Nos.	3000 Nos.	-

6. LABOUR PRODUCTIVITY :

In general, the productivity of labours of our country is considered low compared to that of European standard. However, by study and practice it was found that the average labour productivity of our country are as follows :-

i) Machining	- 1 : 1.3	} Compared to the labour productivity of our country with that of European Standard.
ii) Foundry	- 1 : 1.5	
iii) Forging	- 1 : 1.5	
iv) Assembly	- 1 : 1.2	

7. PROCUREMENT OF MAN-POWER :

Basically there is a great dearth of trained and efficient technicians, such as, Machinist, Forge and Foundrymen, Fitters etc. due to obvious reasons of industrial backwardness of this country. With the gradual growth of metal industries the need for experienced professional person was greatly felt. In order to meet this demand, technical institutes were established throughout the country to supply the required man-power in different trades. After completion of a basic education upto 10th class, the students are selected through an aptitude test for their training in different trades in those institutes. The courses of study spread over a period of three years giving more emphasis on the practical aspects of the trade backed with necessary theoretical knowledge. On successful completion of their courses of study, the students are taken into industry for on the job training for a period of another year. Then they are absorbed as Junior Technician. For other industrial helping hand there is no qualification and efficiency bar.

8. MAIN RAW MATERIALS REQUIREMENTS.

Metal consumption by products/year.

i)	Fig Iron	-	8000	Tons.
ii)	<u>Forging Steel</u> :			
	- Cr-V steel	-	900	"
	- High Carbon Steel	-	400	"
	- Medium carbon steel	-	700	"
iii)	<u>Cutting Tools</u> :			
	- H.S.S.	-	200	"
	- Medium carbon steel for shank	-	100	"
iv)	Carbon and alloy steel material for Machine Tools.	-	50	"
v)	Stainless Steel	-	350	"
vi)	Steel Pipes	-	950	"
vii)	M.S. Channel	-	400	"
viii)	Coke	-	2000	"

9. PRODUCTION AND IMPORT OF MACHINE TOOLS IN BANGLADESH.

Bangladesh Machine Tools Factory has a production Programme of producing only 380 Nos. of Machine Tools when it will be completed in the year 1977-78 which is only approximately 27% of the total countries requirement. It is presumed that beside BMTF other small organisation producing Machine Tools can only fulfil 13% of the total requirement. Hence the rest 60% requirement of Machine Tools for the industrialisation programme of the First Five Year Plan will have to be fulfilled by importing from other countries.

CIF price of Machinery worth Taka 118.20 million (approx. \$ 14.78 Million) to be imported for BMTF only during the period 1974-78 for the completion of the First phase only.

10. INVESTMENT ALLOCATION.

In the First Five Year Plan of the country an amount of Tk. 8996.22 million has been allocated in the industrial sector out of which an estimated 35% of the amount may be foreseen as capital investment in respect of machinery and equipments. It is felt that a certain percentage of the required machinery can be locally procured by modernising and expanding the existing metal industries and also completing the inherited on-going projects. These will achieve to a considerable extent the such

needed development of industrial infra-structure in the field of manufacture of machinery and equipments.

In the 5 year plan, an amount of Tk. 1041.9 million has been provided for the development and gradual mechanisation of the age-old agricultural system. But unfortunately there is no worth mentioning industry for manufacturing agricultural equipments. Hence, unless the new manufacturing facilities are created for the agricultural equipments the main feature of the plan to attain self-sufficiency in the field of food production will fall far off the target. Hence, establishment of metal industries for producing agricultural and mechanical equipments i.e. machine tools, pumps, plough, power tiller, hand tools etc. found to be justified in view of the overall economic growth & enhancement of gross national product.

11. POWER SUPPLY, RAILWAY SIDING & CONSULTANCY :

The electrical energy will normally be supplied by the Power Development Board of the Government. For emergency use there is a stand-by emergency electrical generating set.

The Railway sidings provides facilities for import & export of Machine & Materials at BMTF with internal net works to various production shops.

The labour resources of BMTF is fairly encouraging compared to other industry because of its location being near to Dacca.

The design and estimate documents were prepared and elaborated by the consultant SERI Renault Engg. of France for manufacturing machine tools and cutting tools. For the Deep-Well Turbine Pumps, the design and estimate have been done by the Licencer M/s. Rotos Pompe of Italy.

12. SOURCES OF FINANCING :

The financing of the project will be done out of the local foreign exchange resources and foreign credits & collaboration to be negotiated by Govt.

- The local construction firms have already undertaken the construction of R.C.C. building and heavy duty structural shops.
- The civil engineering construction of BMTF may be completed without any training but for commissioning and initial operation of equipments, foreign experts will be needed.

The Machine Tools Factory (BMTF) is a Government owned enterprise under the administrative control of the Sector

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Corporation, Bangladesh Engineering & Shipbuilding Corporation (BESC), which is governed by the rules and regulations of the Government of the Peoples Republic of Bangladesh.

13. UTILIZATION IN DEVELOPMENT OF MACHINE TOOLS INDUSTRIES IN BANGLADESH.

The machine tools industries in the country need to concentrate to develop the industries like automotive, Engineering, Agriculture, Petro-chemicals, Jute, Sugar, Fertilizers, Tea, Food processing and textiles.

All the above industries require machinery and equipment for their normal operation and for the development of such industry the first consideration is the provision of Machine Tools and accessories for the production of the equipments. The machine tools is the only product that is capable of reproducing itself. For this reason, machine tools play a key role in the expansion of industrial production. The machine tool is never an end product, but it is a means of manufacturing the end product. In Bangladesh we can call the Machine Tools Industry as the mother Industry to produce other Industries.

The war torn country is very much under-developed and needs development by giving its priority to build up a well-equipped, comprehensive, balanced Machine Tools Industry.

During the initial period of the development the requirements of machine tools can be met by imports. With the growth of industries in future it will be uneconomical to import machine tools due to the considerable disparity in the cost of imported machinery and the price of the Agricultural products and raw materials that are produced and exported. Therefore, for Bangladesh it is necessary to pay attention to the development of the metalworking industry where machine tools plays an important part.

In order to achieve the goal the country needs good designers with production abilities, skilled labour, facilities for castings, forgings, electrical equipments, spare parts and tools. As a first step in this direction, the machine tools industries are to be developed.

Present mass production needs the manufacture of Jigs, fixtures, dies, moulds, cores etc. which requires extensive labour utilisation and very expensive to import from countries where labour rates are much higher than Bangladesh. and it is desirable that these activities should be undertaken locally.

The production of Jigs, fixtures, dies, moulds & cores is

a specialised operation requiring a highly skilled team of management and labour. Initially the guidance and technical know-how can be obtained from the principal suppliers or the licensors and then they can be developed according to local conditions of Men and Machines. Afterwards it can be improved by undertaking design and manufacturing techniques locally.

We have sufficient stocks of equipment which are not being fully & properly utilised. The main reasons for their underutilisation are technological, economic and organisational factors.

The main economic reasons influencing the underutilisation of machine tools in Bangladesh are, limited internal market for Engineering products, lack of raw materials and foreign currency, shortage of qualified & skilled labour and other related factors.

14. INTERMEDIATE TECHNICAL ASSISTANCE NECESSARY FOR BANGLADESH MACHINE TOOLS FACTORY :

In order to improve the general condition of Bangladesh Machine Tools Factory we need technically experts & advice on the following subjects :-

- 1) Completion of the remaining works of the factory in 1st phase on turn-key basis.
- 1a) Training of our personnels by providing Technical experts at our end for a period of one year or so in the following sections :-
 - a) Production Planning & Control.
 - b) Design.
 - c) Quality Control
 - d) Machining
 - e) Heat Treatment
 - f) Cutting tools.
 - g) Foundry.
 - h) Forging.
 - i) Manufacture of Jigs & fixtures.
 - j) Assemblies.
 - k) Die Making.
 - l) Pattern & Core making.
 - m) Efficient & economical material handling.

The working temperature in the various shops in Bangladesh specially from March to October in every year is high and uncomfortable for the workers to continue their jobs with concentration & efficiency. In order to make the shops cooler and comfortable some economical scientific assistance is needed

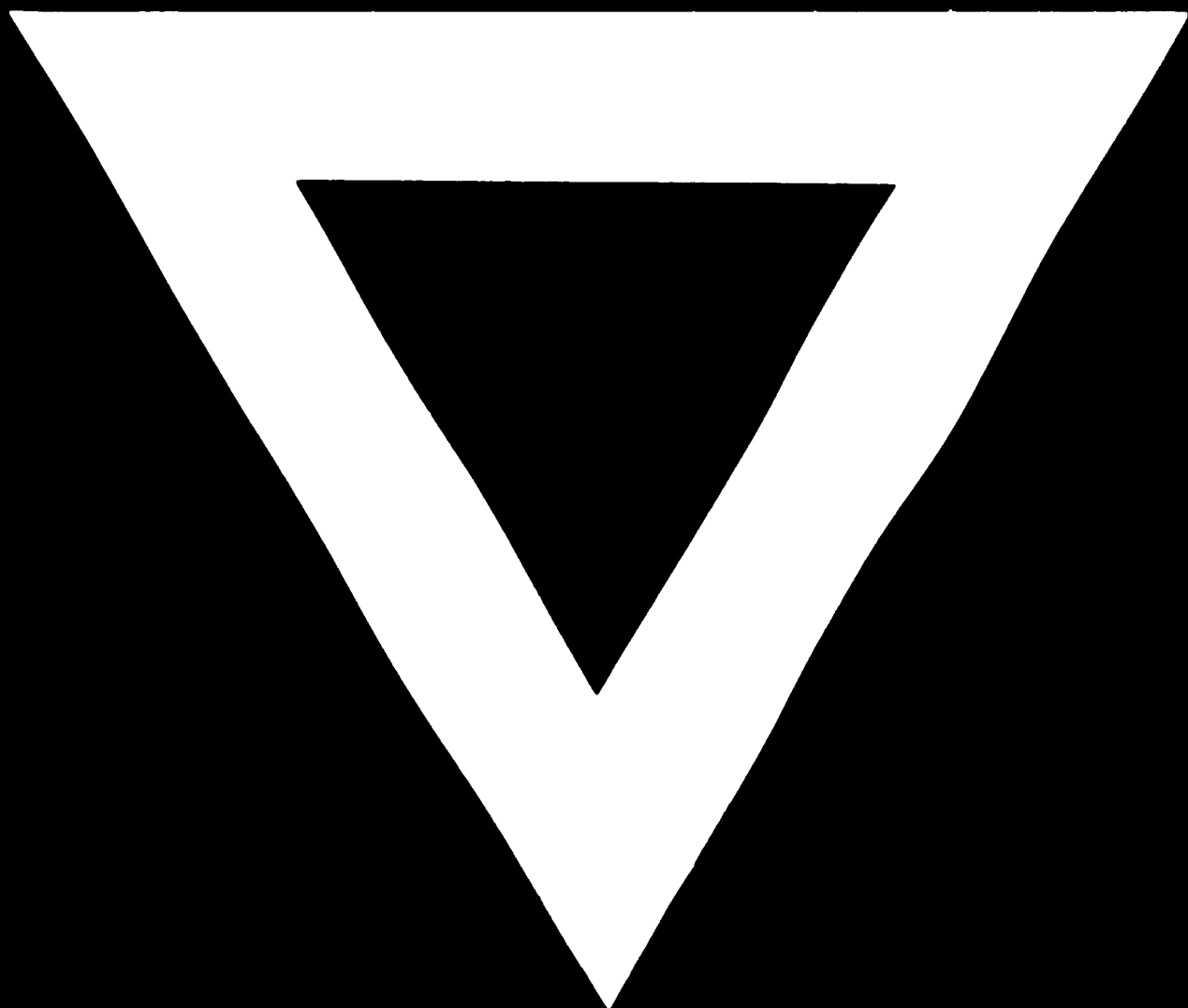
from UNIDO to overcome this big problem.

15. CONCLUSIONS :

The meetings & seminars organised by the UNIDO seems to me very useful in exchanging our ideas, intellectual outlook, developing our knowledge in Machine Tools and industries.

It also helps us in exchanging experts and better utilization of Men and Machines. Bangladesh will definitely be benefitted from the UNIDO Services and will be waiting anxiously to extend the hand of co-operation.





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