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REPAIR AND REHABILITATE TANNING MACHINERY AT  
THE KHARTOUM AND WHITE NILE TANNERIES  
KHARTOUM, GEZIRA TANNERY WAD MEDANI

UC/SUD/83/251

SUDAN

Technical report: Tannery machinery maintenance\*

Prepared for the Government of the Democratic Republic of the Sudan  
by the United Nations Industrial Development Organization

Based on the work of K. C. Howard  
Expert in tannery machinery maintenance

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EXPLANATORY NOTES:

Reference to Dollars (\$) are United States Dollars

The Monetary unit of the Democratic Republic of Sudan is the Pound (£LS) there are one hundred piastres to one pound. During the period covered by this report, the value of the Pound in relation to the Dollar was LS 2.44=\$ 1.00.

UNDP -- United Nations Development Programme

UNIDO-- United Nations Industrial Development Organization

LIC -- Leather Industries Corporation

GT -- Gezira Tannery

KT -- Khartoum Tannery

WNT -- White Nile Tannery

SUMMARY:

With the installation of spare parts received the present capacities of Khartoum Tannery and White Nile Tannery have been increased proportionally. Other spare parts now ordered will on arrival help Khartoum Tannery to repair one other production unit.

However, even with the assistance of these spare parts, the lasting effect will depend on correct and regular maintenance applied by the departments attending to these duties. Therefore some training in the disciplines of Tannery Engineering will be required to ensure present and future stability in the mechanical and electrical field.

ABSTRACT:

The project UC/SUD/83/251/11-01/31.7. D. Entitled "Tannery Machinery Maintenance Expert Engineer" was of a Split Mission Nature. The first part during 20th September/ 11 11 October 1984 was to detail and purchase the immediately required spare parts for the continuation of leather production. The second part of this mission was to fit these spare parts upon their arrival in Sudan and to supply any further help possible. The second part of this Mission was actively started on the 3rd September 1985 until the 24th October 1985. The sum of \$ 12,000 Dollars was provided by UNIDO for project equipment.

The main conclusions are that while the project's objective was entirely fulfilled at the maintenance department of WNT, such level of successful implementation cannot be claimed as having been reached at WNT and KT.

The expert would recommend that future projects concerning these tanneries be considered, but only when the necessary parts are held in stock at the specific tannery.

INTRODUCTION

The activities of the project commenced on 20 th September 1984 in the first part of the mission. This portion lasted until 15 th October 1984. The objectives of this portion were to visit the tanneries of LIC which are Khartoum Tannery, White Nile Tannery and Gezira Tannery to advise which spare parts were critical for the continued production of leather. These objectives were attained and the various parts ordered through the UNIDO office in Vienna.

The second portion of the Mission commenced on 3rd September 1985 and lasted until 22nd October 1985. The objectives of this portion of the mission were to fit these spare parts, so that part of the potential capacity could be realized.

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After which any other type of assistance in this field should be freely given. The objectives of this portion were attained. However, one machine at White Nile Tannery still requires some electrical parts to bring this machine into full operation. The expert was led to understand that these electrical parts were available locally but as yet have not been purchased.

Other assistance given was the design and manufacture of a tanning drum door which could be used extensively throughout White Nile Tannery. The expert was still awaiting the purchase of timber for this project at the end of the Mission.

FINDINGS:

Gezira Tannery is situated at Wad Medani which is some 200 KM outside Khartoum and was commissioned in 1976.

It is by far the most superior tannery of the group, having better quality machinery and a carefully planned layout. The machinery and the electrical equipment are well maintained by using a preventative system. The general atmosphere is one of order and cleanliness. There are only two problems that require attention, the first one being that after almost ten years of operation the liming paddle baskets and drivers need replacing. The second is that of the tanning drum drivers; again these units have served their useful life and should be replaced.

The fullest co-operation was given to the expert by all levels of management and staff

Khartoum Tannery is situated on the outskirts of Khartoum and was established in 1962.

As this tannery is now some 25 years old it is appreciated that some type of rehabilitation is required. Some machinery in the hides section i.e.-- fleshing, splitting and shaving and sheep skin fleshing machines have already been replaced by modern types of machinery, also the buffing and plating section have received replacement machines. However, the continuing production capacity of these machines will be dependent on the future maintenance of these units which requires more than the occasional look. The general outlook of the tannery is not distinguished and improvements would offer immediate benefits.

The senior management was extremely helpful during the visits of the expert, however, at times the co-operation received from the maintenance department appeared to be somewhat restrained.

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White Nile Tannery, is situated adjacent to Khartoum Tannery on the outskirts of Khartoum and was started up in 1975.

The general condition is somewhat inferior to that of Khartoum Tannery and well below the standard of G. zira Tannery. Full rehabilitation of this tannery is necessary to achieve a continuous meaningful production of leather. Problems here start with a collapsed floor in the lime section and end with a replacement problem with the measuring machine.

Again more co-operation from the maintenance department would have been appreciated.

These findings have been purposely kept short as any attempt to give more details would have involved the whole of the project time span .



RECOMMENDATIONS:

Due to the differing mechanical and electrical conditions of the three tanneries a uniform type of assistance programme cannot be made. Therefore should future assistance be considered the expert recommends that:

- 1) Gezira Tannery would only require one annual visit to monitor the maintenance system already in progress and to offer further advice and recommend any necessary changes.
- 2) In the cases of Khartoum Tannery and White Nile Tannery which have current and foreseeable future maintenance problems.
  - a) That no action should be taken until the necessary spare parts have been verified as held in stock.
  - b) That future visits by experts should be in the main for a specific tannery.
  - c) That future visits be curtailed to periods of 1.5 months maximum.
  - d) That future visits for mechanical repairs are kept to one specific area where practical.
  - e) That any future visiting expert should recommend the spares for the next visit.

These recommendations are based on the strong possibilities that the Leather Industries Corporation Tanneries are to be rehabilitated in the near future, and if accepted will reduce the possibility of the overstocking of spare parts that would be surplus to requirements.

The expert does not recommend any further external training on the current machinery at this time.

OBJECTIVES:

The objectives of this project were to repair and rehabilitate the tanning machinery of the public sector tanneries with spare parts supplied from UNIDO funds. To repair and/or adjust other machinery not covered by these spares. To prepare a maintenance schedule, and identify the spare parts needs for current machinery and forthcoming rehabilitation programme.

### ACTIVITIES

The following activities are in compliance within the terms of reference of the project.

The visit to Gezira Tannery by the expert consisted of the inspection of the entire plant with the resident engineer. The plant was found to be in excellent condition after being in use for approximately ten years. The only two items in the plant that could give rise for concern are liming paddles and the drum drive mechanism, both items being subject to fair wear and tear. The former being the most difficult to repair or replace the expert advised the tannery to consider replacement by alternatively using hide processors. In the case of the second problem the expert advised the tannery to replace these drive units with exactly the same type as these units had given reliable service in the past.

A chart for the calculation of consumable parts based on the production of three hundred hides per day is given in Annex I. Annex II is a day-to-day maintenance programme which should be followed .

As there were no spare parts to be fitted the visit was made in an advisory capacity.

The visits by the expert to Khartoum Tannery for installation of spare parts were made over the time span of the mission. As Khartoum tannery and White Nile Tannery are adjacent, actual working time could be saved by giving instruction on the method of work preparation and then returning later to effect the necessary repairs and assembly, so in consequence several visits were made enabling repairs and servicing to be made on sheepskin fleshing machine, hides hydraulic shaving machine, with further advice and instruction on the correct operation of the hides fleshing machine, splitting, buffing and spraying machinery.

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With more cooperation from the maintenance department further improvements could have been done.

Annex I and II if applied will give a consistent production in the future.

White Nile Tannery accounted for the major portion of the time period of the mission. The expert installed the spare parts supplied by UNIDO but as several different parts of the machines had been utilized for other purposes the machines could not be used for a production run. However, a testing run was achieved and the machinery performed well. During these tests White Nile Tannery suffers from every known affliction in the Tannery World, and while every piece of plant was examined by the expert very little could be achieved in the time allowed, without the necessary spare parts. Again more co-operation from the tannery maintenance department could have achieved better results from the visits of the expert.

Annex I, II, and III should be strongly applied for a consistent production of leather during the pre-rehabilitation periods and continued after rehabilitation.

This Annex is based on a production of 300 hides per day for one year and takes into account that the production will remain in full hides until after tanning .

The Annex does not take into account the ordering and delivery periods.

The Annex, takes into account the usage of consumable spares only, and does not cover the wear and tear of machinery .

Any variations of production levels above or below the basis figure will require the adjustment of ordering of spares either by volume or delivery time factor.

<u>Fleshing Machine 3200 mm/1800 mm</u>	<u>Order Level</u>
Knife blades with caulking	1 set
Grindstones	3 pieces
Pneumatic tube ( Outer)	1 piece
<u>Splitting Machine 3200 mm/1800 mm</u>	
Splitting knives	14 pieces
Grindstones	12 pieces
<u>Sammying Machine 1800 mm x 2</u>	
Felt Sleeves	16 pieces
<u>Shaving Machine 1800 mm</u>	
Shaving Blades with caulking	3 pieces
Grindstones	12 pieces
<u>Buffing Machine 1600 mm</u>	
Underlay Paper	3 pieces
Production buffing papers are dependent on individual requirements. Therefore no assessment can be made in this annex	

All other spares can be termed as non-consumable and the rate of requirement will depend on the quality of maintenance.

This Annex should be used for general maintenance purposes, for special services, refer to manufacturers handbook.

Daily

- 1) Check and top up all cylinder bearings which are lubricated by oil bath and ring method.
- 2) Check all grinder beds and slides for lubrication
- 3) Lubricate all pedal shafts on wet machinery
- 4) Check and lubricate all other shafts that are in contact whether by spray or immersion in liquids
- 5) Check and top up where necessary all hydraulic reservoirs

Weekly

- 1) Lubricate all other shafts that have open metal bearings
- 2) Check and top up all oil baths
- 3) Lubricate all chains
- 4) Check and top up all lubrication oil reservoirs
- 5) Lubricate all sealed bearings
- 6) Check all oil seals for damage or leaks

Monthly

- 1) Check and readjust all chain drives
- 2) Check and readjust all belt drives
- 3) Check and retighten all drum drives
- 4) Check and realign all conveyors

Bi- Annually

- 1) Lubricate all electric motor bearings

Annually

- 1) Inspect and replace where necessary all machinery switchgear and contactors.

This Annex is directed at White Nile Tannery and is divided into two parts. Part one being a most urgent section which will allow the tannery some consistent production within the next few months. Without these spares hide production is doubtful. The second part should be ordered within nine months to enable a continuing production. Cost of immediate spares will be in the region of US\$ 30,500.00 and the cost of the secondary element will be approximately US\$ 13,600.00

<u>Fleshing Machine 3200 mm</u>	<u>Immediate</u>	<u>After Nine Months</u>
Fleshing blade set with caulking	1	1
Grindstones	3	2
Microswitch	6	2
Air compressor	1	
Microwave unit	2	
Rubber roller	1	
<u>Splitting Machine 3200 mm</u>		
Rubber Roller	1	
Magnetic transport roller hangers	2	
Knife jaw plates	8	pieces = 1 set
Knife wheels left and right hand	2	one each
Knives	10	10
Ring Jaw plate nosing	1	
Section roller (brass)	1	
Grinder jaw plates	2	pieces = 1 set
Grindstones	0	12
<u>Sawmy Machine 1800 mm x2</u>		
Felts	16	16
Hydraulic ram complete	1	
Shock absorber	1	
Micro switch	1	
Hydraulic ram seals	2	sets
<u>Shaving Machine 1800mm</u>		
Variable speed driving belt	1	
Shaving blades with caulking	2	sets 2
Grindstones	12	12
Grindstones driving belt	2	
Rubber roller	1	
Main bearings	3	pieces=1 set
<u>Setting Machine 1800 mmx2</u>		
Rubber roller large	1	1
Rubber roller small	1	1
Oil seals	2	sets 1 set

ANNEX IV

SPARE PARTS SUPPLIED AND FITTED

Sequence for distribution and fitting followed:

**1) Khartoum Tannery:**

One (1) Rubber roller for Turner Fleshing Machine 1800 mm wide  
Ten (10) Microswitch for Rizzi RL 9x2 Shaving Machine 1800 mm wide  
and Rizzi Fleshing Machine 2300 mm wide  
One (1) Felt sleeve for Turner Sammying Machine 1800 mm wide

**To follow:**

One (1) Felt sleeve for Rotary Mostardini Ironing Machine  
Three(3) Grind stones for Rizzi RL9x2 Shaving Machines

**2) White Nile Tannery:**

One (1) Rubber roller for Kostros Fleshing Machine 1800 mm wide  
One (1) Rubber roller for Kostros Scudding Machine 1800 mm wide  
One (1) Pneumatic tube for Kostros Fleshing Machine 3200 mm wide  
One (1) Spare outer tube only for Kostros Fleshing Machine 3200 mm wide  
One (1) Felt sleeve for Kostros Sammying Machine 1800 mm wide

Other work carried out by the expert at Khartoum Tannery consisted of the setting of various speed output control valves on the Rizzi Hides Fleshing Machine, realignment of hydraulic tubes on one other Rizzi Shaving Machine.

At the White Nile Tannery the expert gave instructions on the local manufacture of a universal drum door (sketches see ANNEX V) The TurnerMoenus Splitting Machine required resetting to compensate for extensive wear, this was finally achieved and a great improvement was made to the operation of this machine. The Turner Airdusting Machine was also inoperative; this machine had to be stripped down and be cleaned to achieve a good effect on the leather. The extra work involved by the expert and the fitting department determined that a seven-day working week was observed.

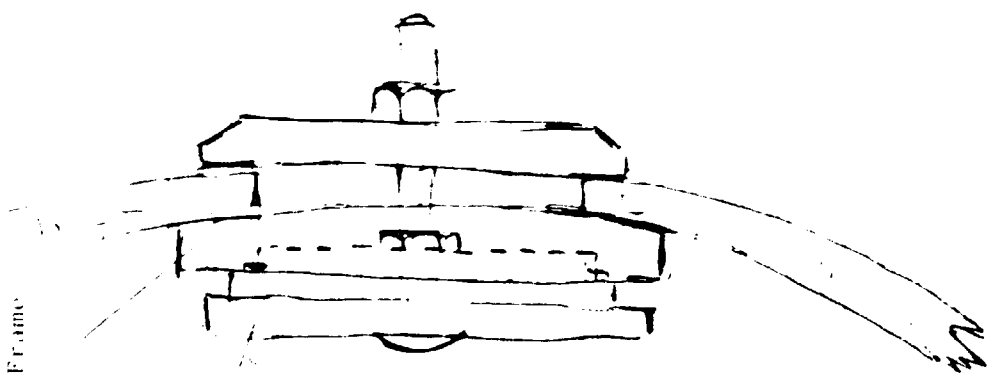


DRUM DOOR



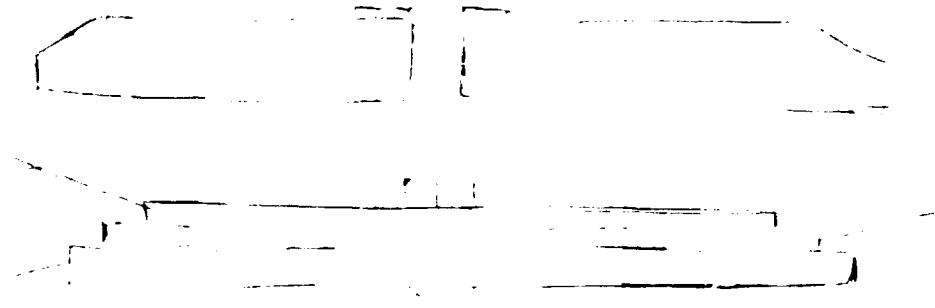
Frame

Door



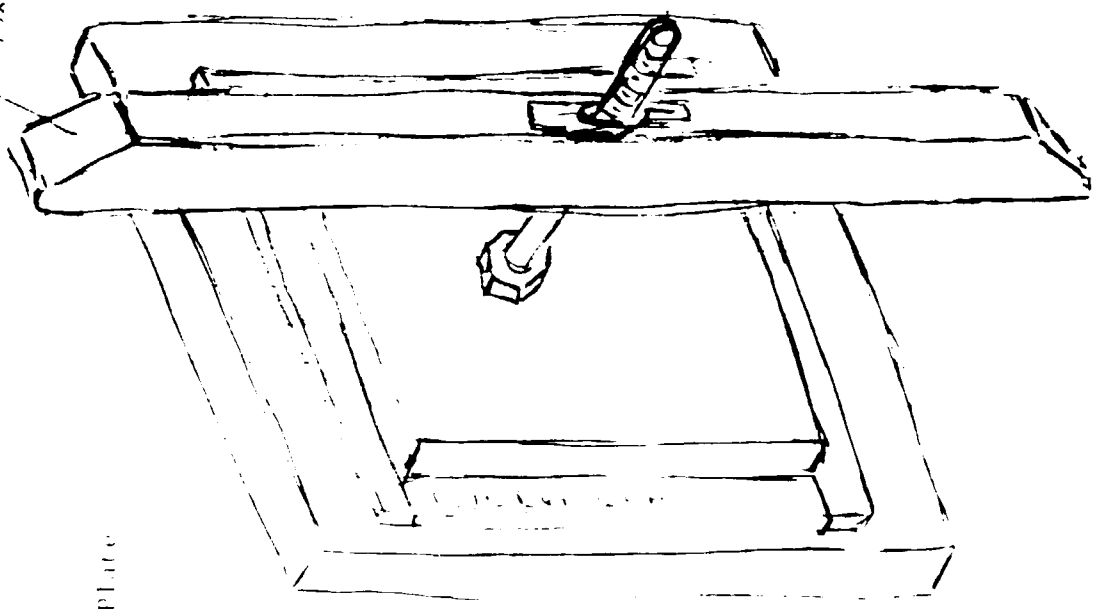
25 mm

25 mm



Rubber Seal (15mm thick x 35mm wide)

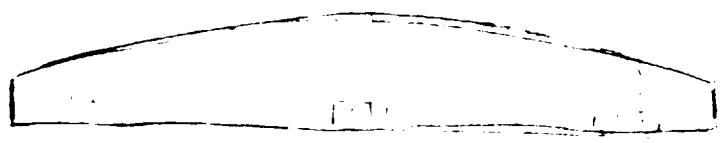
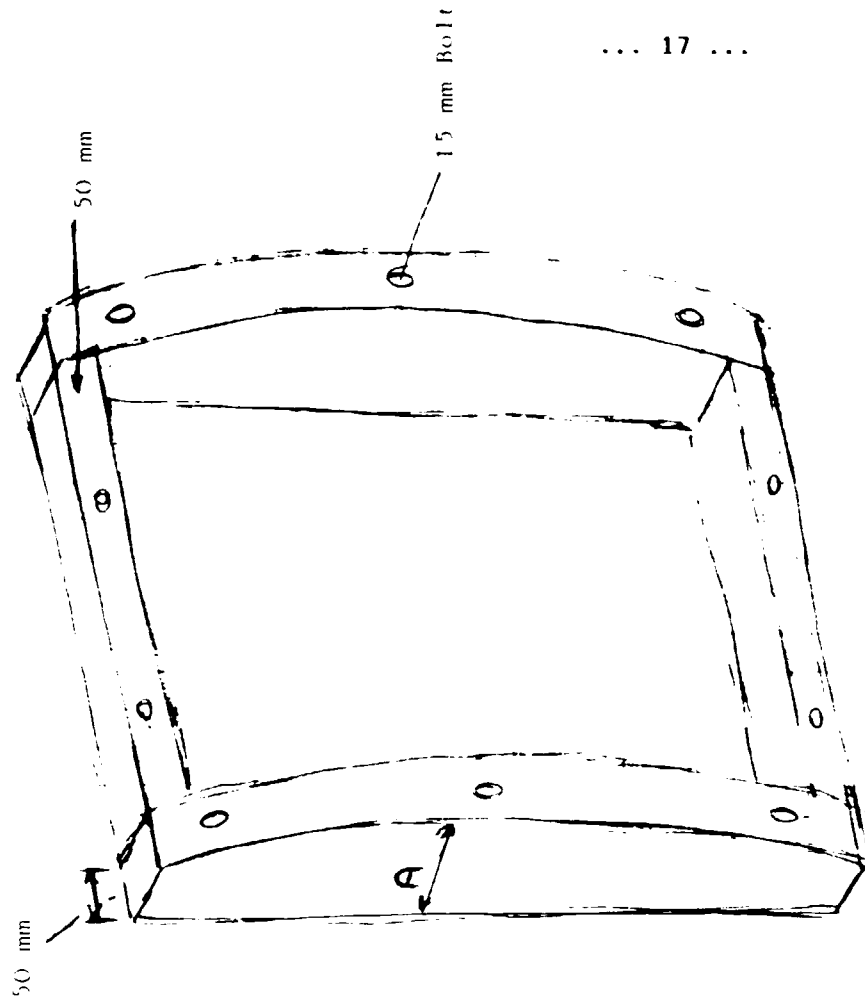
75 x 75mm



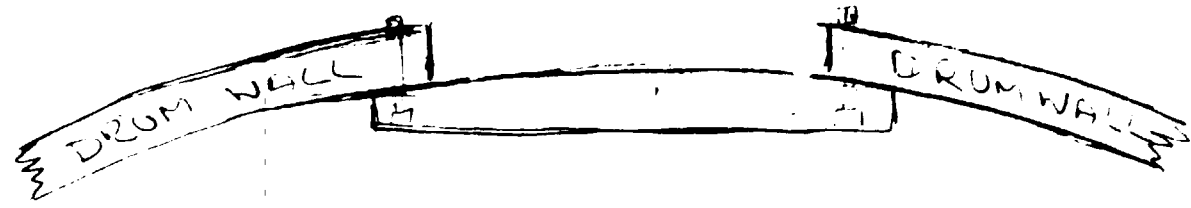
Steel Plate

25mm Bolt

Drum Door to suite Frame + 50 mm



DOOR FRAME



Door Frame to suit original opening

A - Maximum 100 mm