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REGIONAL AFRICA

HIDES & SKINS, LEATHER AND LEATHER PRODUCTS IMPROVEMENT SCHEME

US/RAF/88/100/11-04

MISSION REPORT (*)

in ZAMBIA
From 9 to 28 September 1992

Based on the work of

Mr. Carlos Marzo, Tannery Expert

Backstopping officers: Juhani Berg, Aurelia Calabrò
Agro-Based Industries Branch

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L.D.C.= Leather Development Center, Nairobi Kenya

1.0- ASARIA TANNERY

1.1- People Meet

Mr Azim Mawji ----- Director
Mr Kirit Menta ----- Director
Mr Abdul Rasheed ----- Technical Manager
Mr Chandra Sekar ----- Leather Technologist

1.2- Introduction

Asaria tannery is situated in an industrial area near Lusaka. The tannery has a daily production of 200 wet blue hides/day. The percentage of raw material used is approx. 35% green and the rest as wet salted hides.

During the experts mission, white and black crust leather was produced. Very unfortunately the finish of this crust was spoiled when black lacquer was erroneously added on top of the white leather. The expert had first no more time and secondly no more chemicals left to repeat the trial.

Asaria on the other hand seem not to be so much interested on the production of this type of leather and asked the expert to concentrate on the improvement of the crust production for safety boots. A softer crust is wanted, several trials carried out with the use of the chemicals available. At the end of the mission the results where discussed and some recommendations made.

1.3- Machinery

Soaking Pits -----	six	
Liming Drums -----	two	good condition
Tanning Drums -----	two	good condition
Retanning drums -----	one	good condition
Splitting machine ---	one	in need of adjustment
Fleshing machine ----	one	in good condition
Sammying Machine ----	one	in good condition
Shaving machine -----	one	in need of adjustment
Toggle unit -----	one	with 10 extensible frames
Boiler -----	one	manually operated, low capacity
Vacuum drier -----	two	in need of adjustment, no thermometers installed
Buffing machine -----	one	in good condition
Dedusting machine ---	one	not yet operational
Spray unit -----	one	with airless spaying guns
Ironing press -----	one	embossing plates in need of repair
Rotopress -----	one	it had not been used yet but reported to be in good condition
Pin wheel measuring -	one	reported to be in good working condition
Roller coating -----	one	reported to be in good working condition but not being utilized. No finishing chemicals available
Compressor -----	one	in working condition but of small capacity for tannery needs.

1.4- Effluent Treatment

The effluent treatment plant is currently working but during inspection to the site the following points were observed :

- 1) Drying beds for chrome sludge still needs to be constructed
- 2) Effluent was still being discharged to the sewage without any previous flocculation, precipitation or sedimentation, since no chemicals were available.
- 3) One of the two portable pumps was reported stolen
- 4) The lagoon for bacteriological treatment was still under construction

1.5- Technical Recommendations

- a) Wet blue should be stored in piles of no more than 100 hides in order to avoid excessive drying
- b) Piles of wet blue should be covered with a none porous material otherwise quick evaporation will occur. Wet blues should always be kept with some moisture otherwise if they are left to dry is almost impossible to wet them back.
- c) Asaria should consider the construction of new facilities for storage of the wet blues. This new facilities should be constructed in such a way that an adequate humidity and temperature is kept.
- d) A more efficient quality control system for the every day production should be implemented. Especially during the production of wet blues.
- f) Liquid indicators such as phenolphalein and bromocresol should therefore by adquired for that purpose.
- g) Through out deliming should be carried-out in order to get a similar type of leather from day to day. If later on a firm leather is required this could be achieved during the crusting operations.
- h) Wet blues should be wetted- back correctly with the use of a more apropiate wetting agent.
- i) Small additions of oxalic acid should be added on the first wash prior rechroming in order to strip out some of the unfixed chrome tanning salts.

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1.6- General Information

During the visit the tannery expert was asked to comment on the purpose and use of some of the machines the following points are therefore included hoping that will be of use.

1.6.1 Vacuum Dryer

Water under normal atmospheric pressure (sea level) boils at a 100 C but if we reduce this external pressure then boiling point is also reduced.

During vacuum drying this pressure is reduced by creating in an hermetic chamber allowing the leather to dry under temperatures below 100 C.

Hides are placed with the grain on the steel plate therefore the heat is transmitted from the grain to the flesh being the flesh the first to dry and the part of the leather that is less protected from the heat.

Hides which has been vacuum dried normally present a smooth and a more firm grain, the leather has a flat surface very similar to those which has been paste dried however in this case without having to apply and later remove the paste on the leather.

The following are some important factors to be considered when vacuum drying:

- a) good adjustment of the pressure that hold the leather during drying is crucial.
- b) If the hides are to be vacuum dried then crusting has to be done carefully as to avoid or reduce the amount of dry matter not fix on the leather, otherwise this will be removed during drying blocking the metallic sheet on top, producing a poor drying and a hard leather.
- c) Vacuum drying can be done in two shift, this normally produces better results.
- d) Some vacuum dryers are fitted with devices that allow to compensate the head pressure in such a way that one can regulate the pressure that the leather has to hold during drying. In order to obtain a leather of good quality the working pressure should be somewhere between 400 gr/cm, this is only indicative and it should be understood that different will require different pressures. Considerations such as thickness and the process carried out during retanning are very important.
- h) For the production of soft type leathers longer drying times and lower temperatures should be employed.

- j) Use sodium bicarbonate or any other synthetic basifying agent for the basification of the chrome used during retanning.
- k) During neutralization a combination of sodium formate and sodium bicarbonate is better than the current 3% soda ash used
- l) It is believed that the retanning agent currently used gives to much of a plastic feel to the leather if used in large quantities, therefore percentages larger than 1.5% should be used with caution.
- m) Gluterhaldehydes or any other retanning material used for soft or mellow leather should be employed.
- n) If proper wetting back, retanning, and neutralization is done then amount of fatliquor used could be reduced. The tendency to increase the amount of fatliquor in order to improve the softness does not always work, and it can be both expensive and detrimental to the quality of the leather produced.
- o) Before shaving and splitting hides should have uniform moisture content though out the leather, otherwise uneven splitting and shaving will occur. Therefore a good wetting back and a proper sammying should be considered a priority before shaving and splitting take place.
- p) Buffing paper should be attached to the roller without the use of a piece of leather otherwise paper will brake as in the present. In the other hand if a leather is still used then use a hard leather eg. vegetable leather with no stretch.
- q) Required chemical and auxilliaries should be purchased for the finishing unit.
- r) Ford cups for the measurement of viscosity should be obtained (important in order to adjust viscosity prior application on roller coater).
- s) A balance should be purchased for the preparation of chemicals in the finishing unit.
- t) The construction of a maintenance workshop unit should be considered as a priority.
- u) Improve relation with workforce through recognition and better training.

1.6.2- Shaving

- a) Wet blues which have rested overnight on the horse will contain approximately 70-80% humidity, prior shaving the humidity of the hides has to be reduced to approx. 50-55% by means of the samming operation for a good shaving/splitting operation otherwise poor and uneven thickness will occur.
- b) The shaving operation is done first by a more deep shaving and then with one or two more shaving to adjust to the required thickness.
- c) In order to get the same thickness when dry, hides have to be shaved in such a way that the flanks are left a bit thicker than the butt area, necks are left somewhere in between. If this is not done and hides are attempted to be shaved the same thickness all over at this stage, then they will become hard and with uneven thickness when completely dry due to the differences of the fiber structure within the different parts of the hides.
- d) Also another important factor that can have an effect during the shaving operation is the crusting process and method used during retanning.

2.0- KEMBE TANNERY

2.1- People Meet

Mr. Ch. Spiron ----- Director
Mr. M.S. Alaudeen ---- Technical Manager

2.2- Introduction

Kembe tannery is situated about 65km from Lusaka. The tannery is currently producing about 200-250 wet blue hides per day for the export market.

Green hides are brought every day straight from the abattoir by trucks. The hides which are among the best in Zambia are graded the following way prior entering into production :

Bellow 17 Kg --- Under
17 up to 20 Kg - Light
20 up to 23 Kg - Medium
23 up to 26 Kg - Heavy
26 and above --- Ex. heavy

The tannery is having no problems in exporting its wet blues, most of the hides find costumers on the booming upholstery market due to its good size and to its relatively good structure.

The management is hoping that it will be able to start soon the production of finishing leather, second hand machines have already been bought and are already on the premises. Installation of these machines is well under way and could be finish by the end of 92.

On the technical aspects the tannery reported having problems during the deliming operation, approximately 10% of ammonium sulphate was being employed. During my mission a few trials were carried out in order to see if this amount could be reduced. Eventually after modifying the liming process the amount of ammonium sulphate was reduced to 5%.

Water treatment is none existing and effluent is discharged into a nearby lagoon without any primary treatment.

Water supply to the tannery comes from a well situated near the above referred lagoon. The tannery bases the problem encountered during deliming on the possibility of having to usewater from well, liquely containing unespecified chemicals and salts as a result of the leaching proces in the lagoon area.

It was suggested that sampies from the above mention well should be analyzed.

On the other hand I believe other possibilities such as a none adequate soaking or a none efficient liming should also be considered as a possible cause of the problem.

2.3- Machinery

Soaking pits	-----	six	
Liming drums	-----	two	: one is 2.5x3 and the other 2x2.5 meters.
Tanning drums	-----	three	: two of them 2.5x2.5 and one 2.5x2 meters.
Fleshing machines	-----	two	: only one is operational.
Samming machine	-----	one	: old model but good working conditions.
Splitting machine	-----	one	: old model, to small.
Shaving machine	-----	one	: in need of replacement.
Retanning drums	-----	two	: new ones both 3x3 meters.
Ironing press	-----	one	: with one embossing plate.
Toggle dryer	-----	one	: under installation.
Measuring machine	-----	one	: second hand pine wheel.
Spraying unit	-----	one	: manually operated and with no dryers available.
Boiler	-----	none	
Setting out machine	---	one	: under installation during mission.

2.4- Effluent Treatment

No water treatment as such exist yet, at present the effluents from the tannery are discharged together on the same channel into a nearby lagoon. The tannery has already requested assistance to the project, it is hope that an effluent treatment plant is going to be constructed in the near future.

2.5- Technical Recommendations

- a) There is some times the believe that green hides do not need to be soaked and that they're already soaked. In fact the soaking of fresh hides is sometimes more difficult that the soaking of wet salted raw material. If no proper soaking is done, problems of penetration of the chemicals employed in the following processes will occur.
- b) When hides are salted a modification on the natural fat on the leather takes place. This chemical modification assist on the removal of this fat, and also in the removal of blood or and any other degraded protein during soaking. Unfortunately this is not the case when working with fresh hides as in Kembe tannery. Therefore special precautions such as longer soaking, utilization of well selected fat dispersing agents fat dispersant or the use of salt during soaking should be considered.
- c) If possible hides coming from the nearby farms should be given a temporary or short preservation.

- d) Ideally hides should be processed immediately after arrival to the tannery, but if on the other hand this is not possible then the following should be considered:
- 1) Green fleshing
 - 2) Place hides on the pits and add water, preservative and salt,
 - 3) Next morning start process by soaking two times before liming. The first soaking can be done with the use of 5% salt together with an emulsifier and wetting agent. No need of adding salt on the second soak.
 - 4) Choose carefully the soaking agents and bactericides to be employed, they should be none ionic and carefully follow the recommendation from the manufacturer.
- e) During liming enough water should be added to the drum to ensure that pelts are covered before leaving drum for the overnight process. Normally 150-200% water based on green weight is enough.
- f) Hides are not fleshed after liming therefore a good washing is necessary in order to remove as much lime as possible prior the actual delimiting operation. If washing is done properly by letting the water to drain completely then one or two washings are sufficient.
- g) Due to the thickness of the hides the delimiting time should be increased to 5-6 hours for full penetration of the delimiting chemicals.
- h) The amount of ammonium sulphate employed should be in the region of 3 to 3.5% .Larger amounts are unnecessary, expensive and have a negative effect on the BOD of the effluent.
- i) Some acid can be employed for assisting the delimiting process. Weak acid such as formic, lactic or boric can be successfully employed in small quantities. Strong acids such as sulfuric acid should not be employed as a substitute of these weak acids.
- j) If wanted a small percentage of ammonium sulphate (0.5%) can be employed during the last lime washing before delimiting starts.
- k) Delimiting should be done with no bath
- l) The time of pickling of thick hides should be increased to 4-5 hours before tanning takes place
- m) Short baths can be employed for better penetration of the chrome tanning salts during tanning but it must be checked that temperature does not increase too fast or otherwise penetration problems will arise due to a fast basification of the self basifying chrome tanning salts.

Firm: ASARIA TANNERY LUSAKA ZAMBIA

N of pieces: 6 SIDES

Date: 26 SEPTEMBER 1992

Weight: 21 Kg

Type of leather: WHITE UPPERS

% refers to: WB SHAVED

PROCESS	C	QUANTITY		TIME		NOTES
		%	KG	MIN.	HOUR	PH VALUES
WASHING						
Water	35	300				
Formic Acid		0.3				
Wetting Agent		0.5		25		Drain&Wash
NEUTRALIZATION						
Water	30	100				
Basyntan DLE		2.5				
Relugan D		2.0		45		
Sodium formate		1.0		15		
Sodium Bicarbonate		0.3		20		Drain&Wash
RETANNING						
Water	45	50				
Fatliquor BSFR		3.5				
Fatliquor IC		1.5		30		
Basyntan DLE		2.5		30		
Fatliquor CB		2.5		45		
Formic Acid		1.5		20		Drain well
WHITENING						
Water	40	100				
White Pigment		1.5		30		
Formic Acid		0.8				Drain&Wash
Horse, Setting, Toggle, conditioning, staking.						

Firm: ASARIA TANNERY, LUSAKA ZAMBIA

N of pieces: 6 PIECES

Date: 26 SEPTEMBER 1992

Weight: 22 Kg

Type of leather: BLACK UPPERS

% refers to: WB SHAVED

PROCESS	C	QUANTITY		TIME		NOTES PH VALUES
		%	KG	MIN.	HOUR	

WASHING						
Water	35	150				
Formic Acid		0.3				
Wetting Agent		0.5		25		DRAIN&WASH

NEUTRALIZATION						
Water	40	100				
Basynta DLE		1.0				
Tamol NNOL		1.5		30		
Sodium Formate		1.5		10		
Sodium Bicarbonate		0.3		45		DRAIN&WASH

RETANNING/FATLIQUORING						
Water	45	80				
Relugan D		2.5				
Basyntan DLE		1.5		30		
Black Dye		0.3		40		
Water	65	100				
Fatliquor CB		4.0				
Fatliquor BSFR		2.5				
Fatliquor IC		1.5		60		
Formic Acid		1.3		30		DRAIN&WASH

Horse overnight, setting, toggle, condition, staking						
