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INVESTOR ADVISORY ASSISTANCE SERVICE

DP/SUD/85/011

REPUBLIC OF SUDAN

Technical report: Wheat/Sorghum Mills Evaluation\*

Prepared for the Government of the Republic of Sudan  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme

Based on the work of Kurt Schnellbacher, expert in grain storage and processing technology

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United Nations Industrial Development Organization  
Vienna

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\* This document has not been edited.

V.89-60677

Abbreviations and exchange rates:

S.D.C.                    Sudan Development Corporation

B.I.                      Bureau of Investment

1 US\$ = 4.5 LS. (industry rate)

1 US\$ = 12.1 LS (tourist rate)

1 US\$ = 1.85 DM (Deutsche Mark)

## I. ABSTRACT

Technical appraisal of wheat/sorghum milling in the Republic of the Sudan (DP/SUD/85/011/11-55)

During his 2 weeks stay at Khartoum the consultant had to cooperate with the managements of "The Flour Mills Co. (s) Ltd." and the Sudan Development Corporation as well as with the representatives of the Bureau of Investment in order to:

- investigate the possibility of utilizing the existing milling systems and the available plant area to connect a sorghum mill to the wheat mill.
- evaluate the existing wheat mill and utilities and ascertain reliability and compatibility with the proposed sorghum line.
- advise on the new machinery and equipment required as well as the building structures and estimate their costs.

Besides "The Flour Mills Co.(s) Ltd." also Ahlia Flour Mills Ltd. and the Food Research Centre were visited.

On condition that valid technical rules are respected which are basically required in industrial milling it can be stated that it is technically possible to install on the available plant area a new sorghum milling line and flour blending installation for the production of composite flours in connection with the existing wheat milling systems and/or the production of sorghum flour separately.

The installation of such an industrial milling pilot sorghum line with blending plant can be recommended, allowing the production of precise formulas of composite flours as well as quality sorghum flours to be introduced into the market. (Milling capacity 100 (160) t/24 h. raw sorghum).

After the proven acceptance by the consumers similar systems could be attached to other industrial mills. The successful introduction of composite flours will depend mainly on a sound solution for the price basis of the presently subsidized wheat and the price for sorghum as well as technically on the observance of precise admixing formulas over a longer period. Bakers can produce bread of acceptable quality if they receive uniform flour as continuously as possible.

The consultant expresses his gratitude to the representatives of all institutions involved whose collaboration made this report possible.

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## III. INTRODUCTION

The Republic of the Sudan is presently producing about 30% of its total wheat requirements which amount to about 1 million t/year. (see annex No. 4, tables 1-4)

The production of sorghum (about 2-3 mill. t/year) exceeds the demand and even allows exports in good years (see annex No. 4, table 6). It would be in the national interest to partially substitute imported wheat by locally available sorghum. This could be made possible by

- a) producing uniform composite bread flour over a longer period in industrial mills, allowing the bakers to adapt and to turn out acceptable loafs of bread.
- b) producing superior quality sorghum flour in sufficient quantities for traditional Sudanese food.

During recent years the Food Research Centre - Khartoum has proved by extensive research and published results that excellent bread can be produced from composite flours containing 10-20% or even more of sorghum flour. Till now, however, the suitability of sorghum/wheat composite flour for bread has been tested on a very small scale only. As a logical next step, the production of composite flour in a pilot plant in connection with an existing industrial wheat mill is envisaged in order to introduce composite flour on a larger scale into the market.

For various reasons co-milling does not solve the problem to the satisfaction of the Food Research Centre and the mills. Upon the request of the SUDAN DEVELOPMENT CORPORATION and in cooperation with its management and the mill management as well as the BUREAU OF INVESTMENT the consultant checked the technical feasibility of installing a separate new sorghum mill and flour blending equipment at "The Flour Mills Co(s) Ltd." - Khartoum for the production of composite flour in connection with the existing three milling systems.

Apart from scrutinizing the technical conditions at the site of "The Flour Mills Co(s) Ltd." and Ahlia Flour Mills Ltd. were also visited.

Sorghum milling to be introduced for combination with existing industrial wheat milling systems for the production of composite flour has to respect basic technical rules in order to be successful - rules that are normally not required for the already known simple and small decorticating and grinding installations in the Sudan.

The Project has been checked and discussed in detail along these rules laid down in chapter V-D of this report with the technical mill management. Full agreement was reached concerning the technical equipment required for a new sorghum mill and a flour blending installation to be connected to the existing mills and flour packing installation.

For understandable reasons "The Flour Mills Co.(s) Ltd." would be favoring the installation of a new 300 t/24 h. wheat mill in combination with the envisaged new sorghum mill, thus allowing a neat and complete new installation in one building. Yet in view of the fact that the Sudan wheat milling industry is already under-utilized (utilization degree about 55% of its nominal capacity) the readiness or possibility to release foreign currency funds for additional wheat milling capacity financing seems to be limited at present.

This report is the result of thoroughly checking the technical possibility for attaching a new sorghum line and flour blending system in one compact steel building to the existing mills and flour packing system. This possibility can be confirmed. The proposed technical solution is also adaptable to other existing wheat mills if the necessary space on site is available.



## IV. RECOMMENDATIONS

After checking the situation on site closely and discussing the problems involved with the mill management, the Sudan Development Corporation, the representatives of the Bureau of Investment and the Food Research Centre, it has been found that the combination of a new sorghum milling system with the existing wheat mill of "The Flour Mills Co.(s) Ltd." is possible and the following recommendations can be given:

1. "The Flour Mills Co.(s) Ltd." and the authorities have to agree about the silo and sorghum milling capacity to be installed. If the full wheat flour capacity of 480t/24h and a hulling degree of 25% are to be taken into consideration for the final layout of the sorghum mill, the latter should have a cleaning and decorticating capacity of 160t/24h and a milling capacity of 120t/24h. This would allow the production of 600 ton of composite flour per day.
2. Renowned suppliers have to be asked to submit the already requested offers for the silo (12000t) with bins of 2000t capacity and with connection to the existing intake and to the new sorghum plant; (c+f Port Sudan) (including erection supervision, required tools, time schedule and spare parts for 2 years operation).
3. Buhler-Miag should be requested to submit their final offer for a pilot industrial sorghum mill of the decided upon capacity, with mill bins, steel building and blending plant. (c+f Port Sudan) ( including the erection supervision, required tools, time schedule and spare parts for 2 years operation).
4. After the successful start-up of this plant and after successfully testing the introduction of composite flour into the market, the other industrial mills in the Republic of the Sudan could be equipped along the same lines.

## V. R E P O R T

A. Purpose of the project

The purpose of the project is the evaluation of the technical possibility to combine a new sorghum line with the existing wheat mill in order to produce composite flour at the plant of "The Flour Mills Co.(S) Ltd." - Khartoum.

B. Investigation of the possibility to utilize the existing mill and the available plant area to connect a sorghum line to the wheat mill

As a result of the repeated and intense discussions with the technical management of the mill and the assessment on site it can be confirmed that a new sorghum line can be erected on the free space available. The location of this plant must respect the future development of "The Flour Mills Co.(s) Ltd." concerning:

- a new wheat mill of 300t/24h capacity (17)
- a new finished products store (18)
- the packing of flour on the existing packing plant, which will be modernized shortly (11).
- additional silo bins (19)

This means that the installation of a new sorghum line with a flour blending plant (15,16) has to be a first step within the future planning of the company and has already now to be integrated into the final plant layout.

Annex No.1 shows the existing site plan and indicates the location of the proposed sorghum and blending line as well as the required silo and the future wheat mill and finished products store area.

C. Evaluation of the existing wheat mill and utilities

The existing wheat milling systems (3 x 200t/24h) were overhauled 5 years ago. For the flour packing plant (11), 3 new double packers with sewing stations and belts have been ordered and will replace shortly the 3 existing old single flour packers. The packing station will then comprise 4 modern flour packing machines which are sufficient to pack 600t of flour per 24 h. (This would be the maximum capacity if the presently possible production of 480t/24h of wheat flour would be mixed with 120t/24h of sorghum flour in order to produce 600t/24h of composite flour).

As indicated on Annex No.1, the main packing of flour (11) is done inside the big flour store (12). The wheat flour is conveyed from the flour bins of the 3 milling systems to the packing station. (6 flour bins of 65t capacity each.) As this flour store (12) is situated between the wheat milling buildings (6,7) and the envisaged sorghum plant and blending installation (15,16), the composite flour can be transported pneumatically to the centrally situated packing plant (11). As a matter of fact, this line would even be slightly shorter than the present flour transport from the mills to the packing plant.

The spare part situation of the mill has considerably improved by substantial supplies during recent months. Licenses are granted without delay, even though the release of foreign currency may take up to several months.

On the whole it can be confirmed that the wheat milling lines can be kept running for normal production. They are, however, at present underutilized (working at about 50% of their nominal capacity) owing to shortages in the supply of wheat. A new sorghum line and blending plant would be compatible with the

existing mills and packing plant for the production of composite flour.

D. Rules to be respected in industrial sorghum milling for the production of composite flour

Industrial sorghum milling differs completely from the few small scale decorticating and grinding plants already set up in the Republic of the Sudan. The latter show the well known problems of fast wear and tear or repeated breakdowns, technical problems or reduced capacities during continuous operation. An industrial mill has to operate 300 days a year day and night during 24 hours. Therefore a sorghum mill to be attached to a wheat mill must be of the same high technical standard as a wheat mill for continuous trouble-free and full capacity production. If this basic pre-condition is not fulfilled, then interruptions or capacity reductions of the sorghum mill will stop or reduce the capacity for composite flour and, in addition, lay still the about 4 times bigger grinding capacity of the attached wheat mill.

The following main recommendations have to be respected when setting up a sorghum mill for composite flour production.

1. Sufficient silo bin capacity with pre-cleaning machinery has to be provided for raw sorghum in order to safeguard the seasonable purchase of suitable varieties of sorghum ensuring the continuous work of the mills.
2. Enough mill bin capacity for raw sorghum has to be foreseen for the continuous automatic feed of the cleaning section during 24 hours of operation.
3. In the cleaning section - apart from the required weighing, sieving, air-sifting, magnetic separation of iron and dry-destoning - the flow diagram should foresee precision graders which allow the very precise elimination of immature small

kernels without flour yield and of foreign seeds bigger than sorghum.

4. An industrial sorghum mill must produce a uniform fine flour of similar moisture and granular spread as wheat flour. This means that the mill should have sufficient grain damping and conditioning equipment for flexible treatment of different sorghum varieties. Conditioned sorghum is easier to decorticate and requires less power for grinding.
5. In order to safeguard a well aspirated, careful and comprehensive decorticating process with low moisture loss, two-stage decortication on two subsequent decorticating machines is required.
6. The decorticating rings of the machines should be out of silicium carbide which is harder and more resisting than corundum rings.
7. After control weighing the decorticated sorghum, milling should be performed on roller mills which are the suitable machines for cool and continuous operation. As these machines are exclusively used in wheat mills, the milling staff know how to maintain them.
8. The sorghum flour should be sifted on plan-sifters, thus guaranteeing a very fine and uniform flour without specks. The sorghum flour can either be packed separately or be foreseen for blending with wheat flour into composite flour.
9. In order to avoid negative experiences when introducing composite flour on a bigger scale, the mixing of wheat flour and sorghum flour has to be done in an absolutely precise way according to the proposed formula and over a longer period, allowing the bakers to get used to composite flour. Composite flour according to formula and reliably produced during day and night operation of the mills can only be achieved by an automatic electric control system, as f.i. a punch-card control for the batch weighing and mixing system. Volumetric dosing has to be excluded. It may be recalled that

the introduction of admixing maize flour to the wheat flour in industrial mills in Ethiopia resulted in a complete flop as the mills were by far insufficiently equipped technically for the admixing process. Consequently the consumers did not adopt the bread made from wildly varying composite maize flour

10. The gradual introduction of composite flour should be planned in close cooperation with the mills and a sound price relation between wheat and sorghum be created.

The highest possible percentage of sorghum flour to be admixed (f.i. 20-30%) should be avoided in the beginning.

11. For the building, a steel construction is recommended, as it offers various advantages like:

- lower price than concrete building.
- insulated roof and walls provide cooler inside temperature than concrete buildings during the hot season.
- completion can be realized according to planned schedule.
- import duties are low within a new project.
- modular construction allows pre-fabrication and adaptation to varying capacities.

12. Spare parts for two years operation (about 5% of machinery value) should be included in the supply.

13. In view of the fact that the introduction of composite flour represents a critical step and failure should be avoided under all circumstances, only a renowned manufacturer with profound experience in machine building and process technology for industrial decorticating and milling systems should be selected as the supplier of a first plant. The only firm which produces the full range of the required machinery and also the batch weighing system in their own machinery program and possesses extensive decorticating and milling experience also for sorghum is Buhler-Miag/Germany.

E. Layout for a new sorghum line  
with blending installation

For the layout of the plant the following capacities can be foreseen:

8000 t	silo plant
1500 t	raw sorghum bins
20t/24h	secondary reception
100t/24h	cleaning and decortivating
80 t/24h	sorghum mill
60 t	sorghum flour bin storage
30 t	wheat flour bin storage
40 t/h	composite flour blending
40 t/h	packing for composite flour
10 t/h	packing of sorghum flour

This plant could produce 400t/24 h of composite flour.

An increase of the sorghum mill capacity for processing the complete flour production of "The Flour Mills Co.(s) Ltd." into composite flour is possible.(see G - Cost estimate)

The arrangement of silo and sorghum plant is shown on the site plan (Annex No.1). Annex No.2 shows the project drawing of the sorghum plant with 2 raw sorghum bins and the required extension for the blending plant indicated on the plan view. (7,8 m.)

From the new 8000 t. silo a conveyor brings the raw sorghum to the raw sorghum mill bins (1500 t) which feed the cleaning and decortivating section continuously during 24 hrs.

The conditioned and decorticated sorghum is weighed and milled continuously. The flour produced is control-sifted, weighed and stored in the storage bins, from where it can either be packed separately inside the flour store or be extracted for being mixed into composite flour in the blending plant.

The wheat flour to be blended with sorghum flour is pneumatically transported from the packing station (11) to the wheat flour bin (30 t) in the blending plant. For the composite flour production,

wheat flour and sorghum flour are mixed in the batch weighing and mixing plant according to a pre-selected formula and exactly by weight. After mixing the composite flour it is transported pneumatically to the packing station (11) in the flour store. The flow diagram (Annex No.3) illustrates the process.

The fully automatic batch weighing and mixing process guarantees absolutely accurate and repeatable thorough mixtures of composite flour according to any pre-selected programme.

The print-out of the production allows a perfect control of the process for each milling shift.

The sorghum bran may temporarily be packed in the store (12) or in the area to be foreseen for the new wheat mill until the new finished products store (18) is set-up. The final decision will be made by the mill management, depending on local conditions.

F. Machinery specification for a sorghum mill to be installed at "The Flour Mills Co.(s) Ltd." - Khartoum for the production of composite flour (all motor drives included)

Raw product: Sorghum

Main varieties to be milled for composite flour:

- a) Dabar (medium hard - spec. weight:74)
- b) Safra ( hard - " " 71)
- c) Hageen Dura (hybrid, hard " 77)

Moisture content: 7-8%

- a) Storage silo 8000t (200t/h conveying cap.)  
(with connection to existing intake and new sorghum mill)
  - 1. 75 m metal grating for intake hopper
  - 2. 6 chain conveyors
  - 3. 4 bucket elevators
  - 4. 1 electronic weigher
  - 5. 1 rotary pre-cleaner
  - 6. 2 sweep augers (50t/h)



7. 2 screw conveyors 100t/h
8. 1 aspiration system  
(1 fan, 1 cyclone, 1 pre-fabricated ducting)
9. 1 plant accessories (7 two way diverters, spouting sacking bench, steel profiles and plates, nuts, bolts, equipment anchors)
10. 2 high level indicators
11. 1 automatic pellet dispenser
12. 1 compressed air station
13. 1 electrical equipment (control switchboard, cables between switch board and motors, cable shelves and pipes fastening material, local switches, emergency stop buttons, warning sirens, lighting system, lighting and distribution panels)
14. 1 pre-fabricated steel structures (2 storage bins, 4000 t each, set of walk ways, head house)

b) Sorghum mill 100 t/h

Machines and parts for intake, pre-cleaning and 2 mill bins (20 t/h)

- 1 intake hopper
- 2 bucket elevators
- 2 screw conveyors
- 1 separator
- 1 cyclone
- 1 fan
- 1 auxiliary parts (spouting system, outlet slides, pre-fabricated aspiration ducting, erection material)
- 1 electrical equipment (switch cabinet, cables between switch cabinet and motors, installation material)
- 2 mill bins for 750 t each

Machines and parts for the cleaning and decortivating section

- 1 magnet

4 bucket elevators  
 2 automatic electronic scales  
 1 separator  
 1 dry de-stoner  
 2 dampeners  
 6 screw conveyors  
 2 level indicators  
 2 multiple discharge outlets  
 2 flow balancers  
 4 pearler - whiteners  
 1 tool box  
 2 intermediate separators  
 2 cyclones  
 2 fans  
 1 bagging bench  
 1 auxiliary parts (spouting system, pre-fabricated  
 aspiration ducting, erection material)  
 2 grading cylinders

Machines and parts for the grinding section

1 magnet  
 3 roller mills  
 1 plansifter  
 2 impact detachers  
 1 hammer mill  
 1 pneumatic conveying system  
 1 filter group  
 2 screw conveyors  
 1 flour control sieve  
 1 bagging bench  
 1 auxiliary parts (spouting system, pre-fabricated  
 aspiration ducting small erection material)  
 1 compressor group  
 1 roller lifting device

- 1 plansifter sieve tightening device
- 3 roller mill base frames
- 2 sifter outlet plates
- 1 electrical equipment (motor drives for roller mills, switch cabinet, cables between motors and cabinet and installation materials)
- 1 electronic flour net weigher

c) Machines and parts for the finished products section

- 1 bucket elevator
- 4 screw conveyors
- 1 level indicator
- 2 discharge apparatus
- 2 slides
- 1 gross bagging scale
- 1 auxiliary parts (spouting system, pre-fabricated aspiration ducting small erection material)
- 2 bag sewing machines
- 1 electrical equipment (switch cabinet, cables between drives and cabinet, installation material)

d) Machines and parts for the blending section for composite flour (40 t/h)

(70 - 85% wheat flour, 5-30% sorghum flour)

- 2 compressors
- 3 fluid lifts
- 5 level indicators
- 3 tube screw conveyors with variable drives
- 1 discharge apparatus
- 1 batch hopper scale
- 1 horizontal mixer
- 1 screw conveyor
- 2 connection hoppers (between scale and mixer as well as between mixer and screw conveyor)

- 1 filter group
- 1 fan
- 1 auxiliary parts (spouting system 220 mm, pre fabricated aspiration ducts, small erection material.
- 1 electrical equipment (switch cabinet, cables between drives and limit-switches and cabinet, installation material)

e) Mill building of steel design

(2 grain bins for sorghum, 3 flour bins 4 floors, blending plant section). for erection on a concrete foundation to be provided locally.

G. Cost estimate

This cost estimate is based on

E. Layout for a new sorghum line with blending installation and

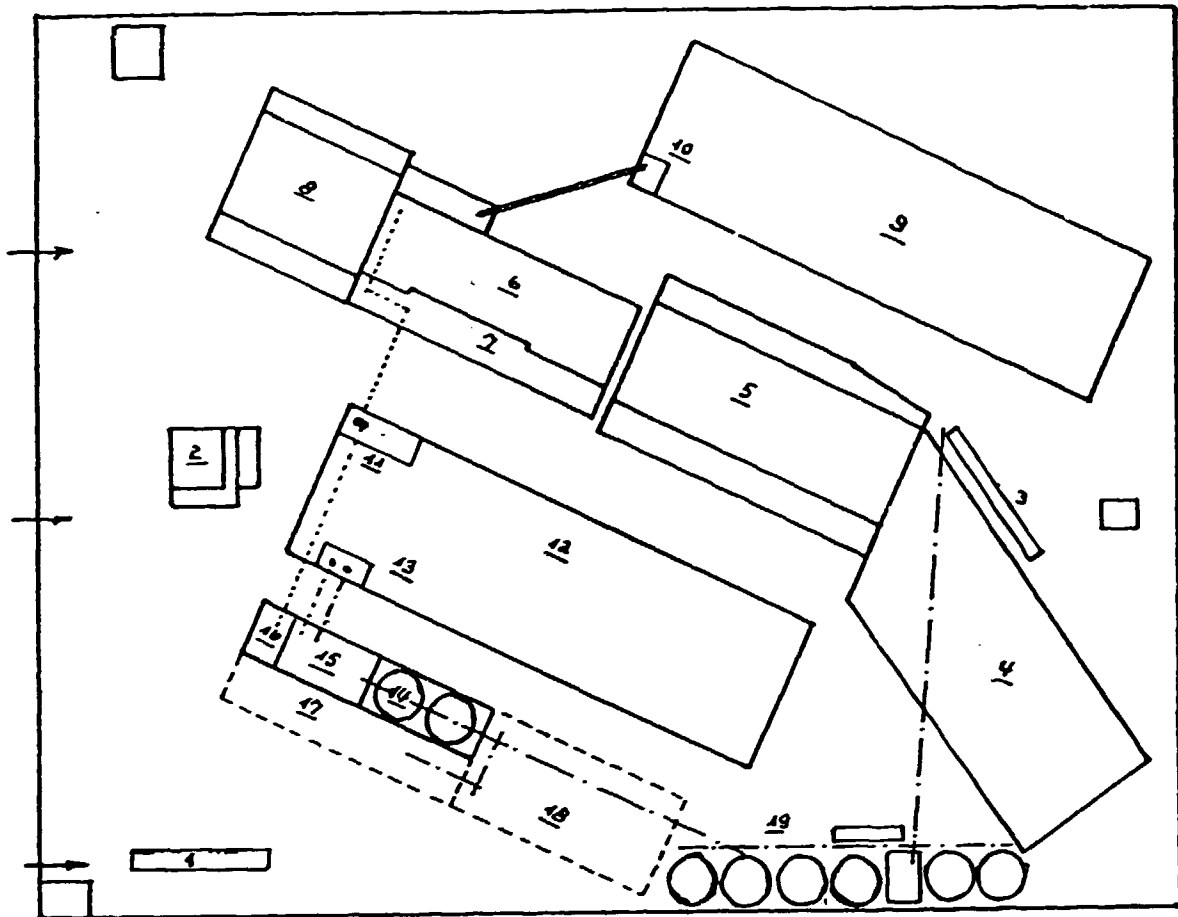
F. Machinery specification for a sorghum mill.

Price basis: C+F Port Sudan with sea worthy packing:

- |    |  |      |             |
|----|--|------|-------------|
| a) | Storage silo 8000t   | US\$ | 1,900,000.- |
|    | (Estimated additional price for 12000 + silo with 6 bins                       | US\$ | 300,000.-   |
| b) | Sorghum mill 100t/24h<br>(100t/24h decorticating cap<br>80t/24h grinding cap.) |      |             |
| c) | Machines and parts for<br>the finished products section                        |      |             |
| d) | Machines and parts for the<br>blending section                                 |      |             |
| e) | Mill building  |      |             |
|    | Total b-e  | DM   | 4,258,000.- |
|    | (estimated additional price for  |      |             |

The Flour Mills Co (S) Ltd. - Khartoum

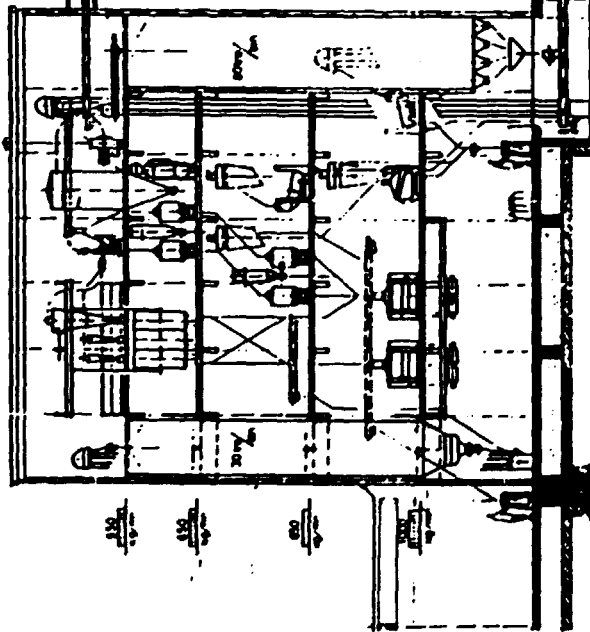
Proposed Siteplan for New Sorghum Line



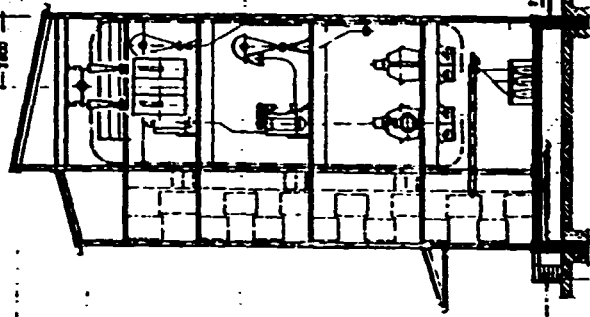
- 1 Weighbridge
- 2 Office
- 3 Bulk Intake
- 4 Wheat Store
- 5 Wheat Store
- 6 2 Golfetto Wheat Mills (2 x 200t/24h)
- 7 1 Buhler Mill (200t/24h)
- 8 Flour Store
- 9 Bran Store
- 10 Bran Packing
- 11 Flour Packing
- 12 Flour Store
- 13 Sorghum Flour and Bran Packing
- 14 sorghum Raw Bins
- 15 Sorghum Decortivating and Milling Plant
- 16 Flour Blending Installation
- 17 Future Wheat Mill 300t/24h
- 18 Future Finished Products Store
- 19 Sorghum Silo

..... Flour Conveying to Packing  
 - - - - - Bran " "  
 - - - - - Grain " "

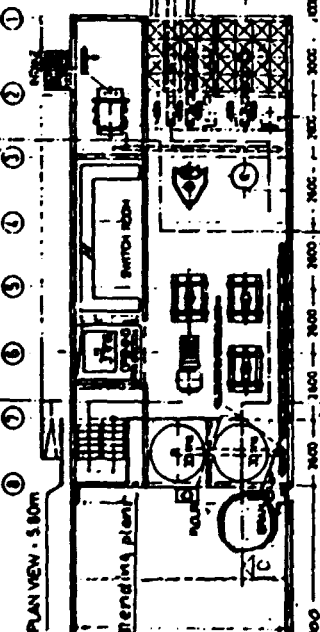
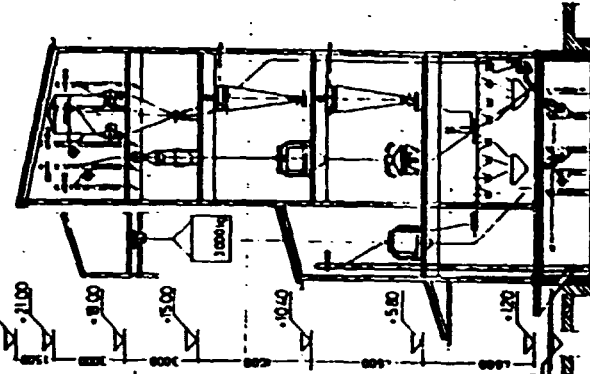
LONGITUDINAL SECTION D - E



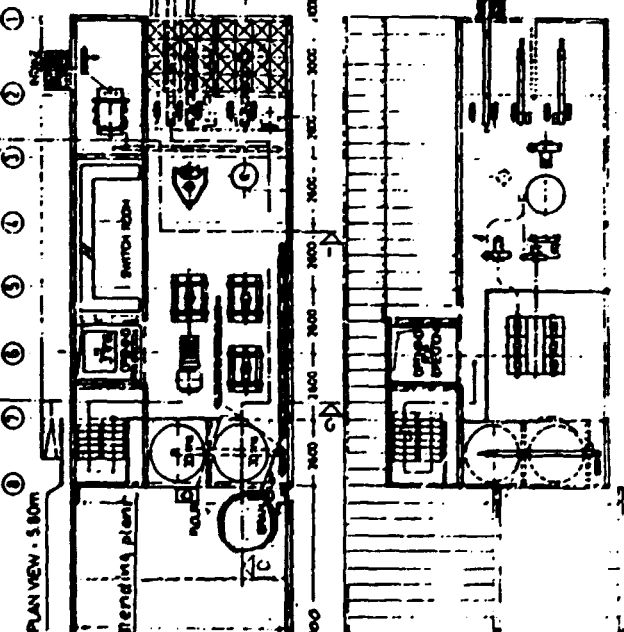
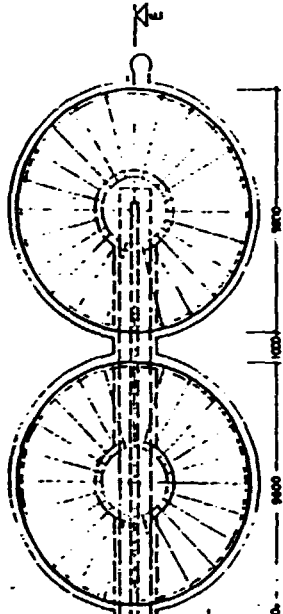
CROSS SECTION P - Q



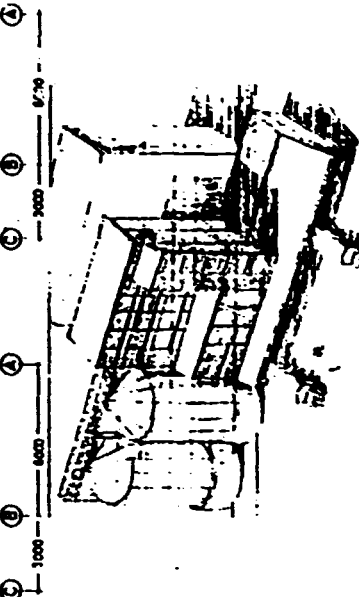
CROSS SECTION H - J



PLAN VIEW - 5.80m



PLAN VIEW - 18.00m

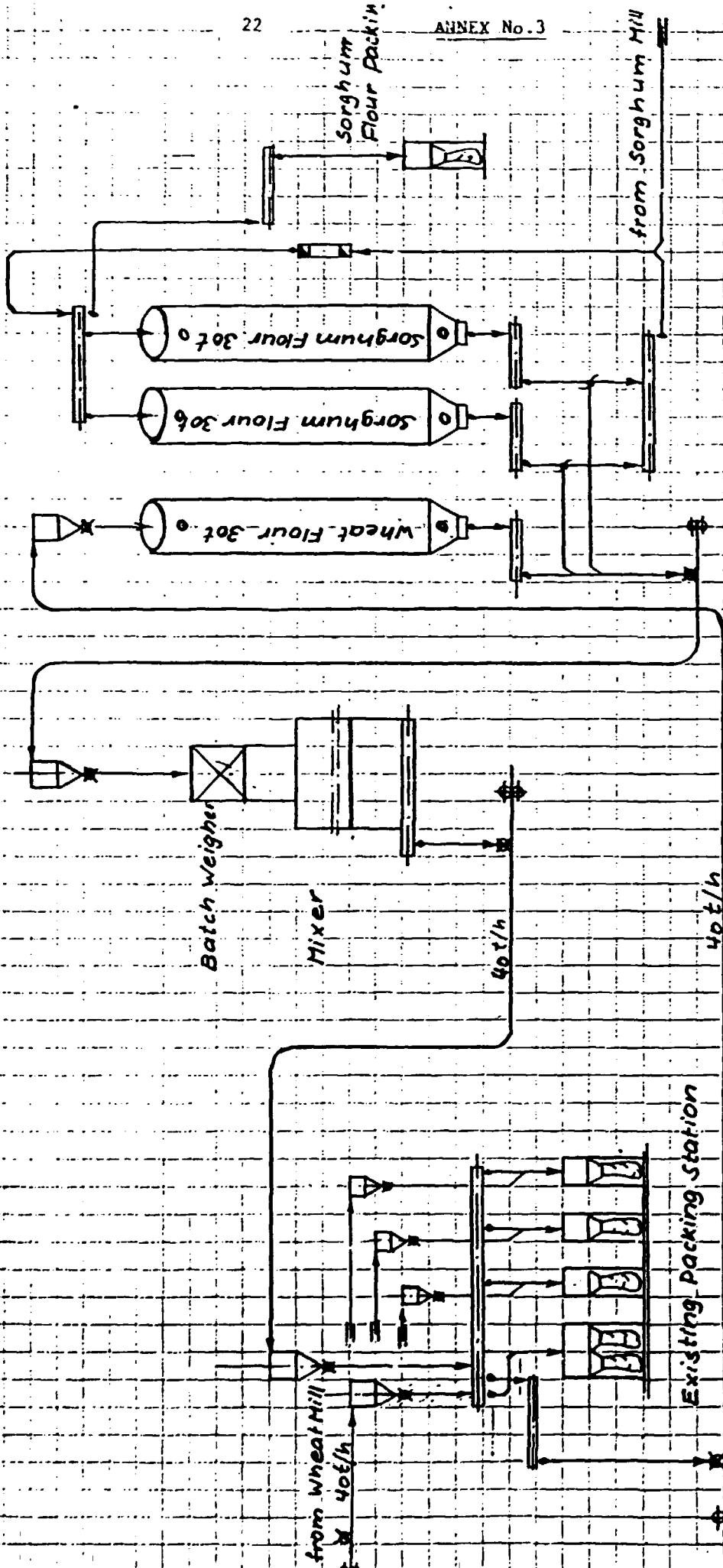


PERSPECTIVE VIEW

THE FLOUR MILLS COMPANY - KHARTOUM/SUDAN  
PROJECT OF A BORDUR MILL CAPACITY 180,000 TON

NO.	REV.	DATE	BY	CHKD.	APP.

MEAN 0733



The Flour Mills Co. Ltd. - Kharطوم  
 Blending and Packing Plant  
 for Composite and Sorghum Flour

Flow Diagram

10/10/1989  
 Ahmed

	160t/24h sorghum mill (160t/24h decorticating cap 120t/24h grinding cap.)	DM	722,000.-
f)	Spare parts for 2 years operation (mill)	DM	173,000.-
g)	Erection supervision for		
	- silo erection		
	- silo machinery erection		
	- mill machinery and blending section		
	- steel building erection and mill bins erection		
	- start up		
	- electrical erection	DM	362,000.-
	(estimated additional price for 160t/24h sorghum mill)	DM	45,000.-

For contingencies 10% of the estimated prices have to be calculated.

The estimate prices do not contain items listed in H. "Local Requirements"

#### H. Local requirements

Apart from the costs for silo, machinery, steel building and erection supervision, "The Flour Mills Co.(s) Ltd." will have to provide the following main items locally as they are not included in the cost estimate:

- transport and insurance of all equipment from Port Sudan to the mill site storage at Khartoum.
- all earthworks, foundations and other civil or masonry works.
- Survey of the site area and soil investigation.
- import customs, taxes and dues arising in Sudan.
- erection of silo, building and machinery.
- rooms for: spare parts with shelves.



- rooms for: erectors (lockable)
- rooms for: erection tools (lockable)
- water pipe installation up to damping apparatus.
- hoisting equipment for machinery erection (manual and electrical hoists, fork lift, crane).
- fire fighting equipment, lighting protection.
- air conditioners for switch rooms.
- cleaning utensils.
- boarding, lodging and transportation of erection personnel
- necessary temporary residence and working permits for erection personnel.
- temporary permits for import and export of necessary equipment for the execution of the works.
- skilled and unskilled personnel for the start-up.
- all materials for the start-up like electric current, lubrication materials, raw sorghum bags etc.
- final coat of paint (paint and execution).
- cleaning of site and floors during erection.
- sanitary installations, furniture.
- road preparation.
- supports and works in existing buildings for the connection to the wheat mills.
- lighting for mill building with panel.
- low voltage main distribution.
- transformer and transformer house.
- the main cables between transformer and low voltage main distribution as well as between low voltage main distribution and the switch cabinets.
- power factor improving system.

Remark: In case the last 5 items have to be imported with the plant equipment they have to be quoted for by suppliers and to be added to the cost estimate.



Table 2Per Capita Wheat Flour Consumption^R

Year	Total Population (millions)	Total Flour Consumption (tons)	Per-capita Consumption (kg)
1983/84	20.3	517,000	26
1984/85	20.7	778,000	36
1985/86	21.9	759,000	35
1986/87	22.8	820,000	37

Source: FAO Statistics

Remarks:

Price for flour to bakeries LS 1.35 per kg (subsidized price)

Table 3  
Wheat Imports  
(1982 - 1987)

Year	US Programme (tons)	Commodity Loans (tons)	Grants (tons)	Total (tons)
1982	245,407	-----	14,091	259,498
1983	230,233	-----	10,504	241,337
1984	363,996	99,700	26,408	490,104
1985	271,706	-----	61,000	332,706
1986	362,741	44,000	27,900	434,641
1987	402,912	35,000	35,000	472,912

Source: Ministry of Finance and Economic Planning  
(Budget Department)

Remarks:

Wheat price per ton to the mills: LS. 894.27 (subsidized price)

Table 4  
Wheat Flour Imports  
(1982 - 1987)

Year	US Programme (tons)	Commodity Loans (tons)	Grants (tons)	Total (tons)
1982	45,735	33,000	83,094	116,829
1983	67,019	-----	84,439	151,458
1984	64,138	22,000	62,471	148,609
1985	73,375	4,000	99,793	177,168
1986	86,934	-----	50,796	137,730
1987	92,000	-----	60,243	152,377

Source: Ministry of Finance & Economic Planning  
(Economic Department)

(Estimate 1989:           300,000 tons)

Table 5  
Wheat Flour Mills in the  
Sudan

Item	Name of Mill	Location	Capacity
1	Flour Mills Co.	Khartoum	600
2	Ahlia Flour Mills Co.	Khartoum North	500
3	The Blue Nile Flour Mills Co.	Wad Medani	300
4	Port Sudan Flour Mills Co.	Port Sudan	240
5	Union of Co-operatives Gezira & Managil Farmers	Goz Kabaro	240
6	Gezira Flour Mills	Wad Medani	200
7	New Halfa Flour Mills	New Halfa	200
8	Arabian Mills Co.	Khartoum North	220
9	White Nile Flour Mills	Kosti	120
10	Atbara Flour Mills	Atbara	80
11	Zein El Abdin Flour Mills	Khartoum North	60
12	Albageir Flour Mill		300
	Total		3,060

Source: Bank of Sudan Annual Report

Remarks:

Under construction: 150t/24h wheat mill at Atbara (Buhler Miag)  
150t/24h " " " Hassaheisa (VEB DRESDEN)

Newly offered mills with licenses (seeking financing: 5 mills  
mills with licenses (seeking financing: 5 mills

Table 6  
Sorghum Production  
(1983 - 1987)

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Year	Production (tons)
1983	2,044,000
1984	1,819,000
1985	1,017,000
1986	1,119,000
1987	2,340,000
1988	3,000,000

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Source: Ministry of Agriculture

Remarks:

Price for sorghum per ton: 1,000.- - 1,950.- LS.





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 Mr. Mustafa M. Mustafa - Engineering Manager of  
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9/10/1989

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Holiday - Draft report

14/10/1989

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