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DP/ID/SER.B/614
27 May 1988
ENGLISH

16932

IMPROVEMENT OF BREAD PRODUCTION
AND DISTRIBUTION

SI/PDY/85/802/11-01

DEMOCRATIC YEMEN

Terminal report

Prepared for the Government of Democratic Yemen
by the United Nations Industrial Development Organization
acting as executing agency for the United Nations Development Programme

Based on the work of Martin Hilpert, expert in
bakery technology

Backstopping officer: S. Miranda da Cruz,
Agro-based Industries Branch

539

United Nations Industrial Development Organization
Vienna

V.88-25097
4714T

Explanatory notes

The monetary unit in Democratic Yemen is the dinar (YD).

Definitions

Dual:	White bread of medium length
Suntuk:	Small white pan bread
Shamier:	Flat bread
Hops:	Small, flat goods baked in fat
Su..busa:	Pancake filled with vegetables and meat and baked in fat
Direct feed of dough (straight dough method):	Yeast propagation and dough formation in one operation

ABSTRACT

In response to a request by the Government of Democratic Yemen to the United Nations Industrial Development Organization (UNIDO) to provide the services of an expert in bakery technology, the project "Improvement of bread production and distribution" (SI/PDY/85/802) was approved in August 1985. The expert's assignment totalled three man-months and was split into two missions, the first December 1985 and January 1986, and the second July to September 1986.

The immediate objective of the project was to assist in solving technical problems in the operation of the two State bakeries in Aden, with a view to achieving a steady production of quality bread, to improve the distribution system and to train counterparts.

The recommendations made by the expert in respect of the production process and the technological changes so far introduced have resulted in products of good quality. The expert also prepared model forms and vouchers for the mechanical workshop, and the procurement and storage of spare parts, which have been adopted, and service and maintenance work are being performed in conformity with detailed instructions elaborated by him.

He further gave training courses and practical demonstrations to the staff of the production and maintenance departments and the laboratory which are considered by the management of the bakeries as providing a sound basis for dealing with the production problems that continuously arise. However, owing to the lack of vocational training for the baker's trade in the country, the expert urges the Ministry for Industry and Supply to provide such training for the personnel currently employed or to be employed.

The report contains further detailed recommendations in the following areas: inspection and servicing of existing equipment; spare parts; quality of wheat flour; service shop equipment; technical and technological modifications; utilization of existing capacity; general administration; and training of personnel.

CONTENTS

	<u>Page</u>
INTRODUCTION	7
A. Project background	7
B. Official arrangements and objectives	7
RECOMMENDATIONS	9
<u>Chapter</u>	
I. CONDITIONS FOUND AND ACTIVITIES INITIATED FOR CHANGING PRODUCTION PROCESSES	12
A. Raw materials	12
B. Dough making	13
C. Dough processing	14
D. Baking process	15
E. Technical condition of machinery and equipment	16
F. Sales and marketing	18
G. Training of personnel	19
II. APPLICATION OF RECOMMENDATIONS AND PROPOSALS FOR IMPROVEMENT IN PRODUCTION, MAINTENANCE AND SKILL LEVELS	21
A. Production department	21
B. Maintenance department	21
C. Further training for employees	22
III. CONCLUSIONS	23

Annexes

I. Maintenance: Flour plant	25
II. Maintenance: High-speed mixer S 250	26
III. Maintenance: Lifting tipping bowl	28
IV. Maintenance: Fully automatic dough moulding machine	29
V. Maintenance: Pre-fermentation cabinet	31
VI. Maintenance: Long rolling machine	33
VII. Maintenance: Transport and roll belts	34
VIII. Maintenance: Oven BN 50	35
IX. Maintenance: Dough fermentation centre - steam generator and oil storage tank	37
X. Maintenance: Dough fermentation centre - refrigeration machine, small cooling tower and piping	38
XI. Maintenance: Dough fermentation centre - water softening plant	39

	<u>Page</u>
XII. Record of goods ordered	40
XIII. Record of quantities ordered and delivered per day	41
XIV. Delivery bill	42
XV. Record of empties per object	43
XVI. Production order for bakery	44
XVII. Record of daily production	45
XVIII. Account of raw material consumption	46
XIX. Raw material consumption per month	47
XX. Accounting of raw materials	48
XXI. Repair order	49
XXII. Maintenance report	50
XXIII. Spare parts request form	51
XXIV. Stock card	52
XV. Shift occupation plan	53
XXVI. Dough sequence for continuous production	54
XXVII. Machine stock-taking card	56

INTRODUCTION

A. Project background

The main types of bread consumed in the People's Democratic Republic of Yemen are wheat-based, called "Dual" and "Suntuk". Also popular, especially in the towns and in the capital, are Shamier, Hops and Sumbusa (see "Explanatory notes"). A statistical survey based on questioning a representative group of the population indicates that Dual and Suntuk, account for about 60 per cent of consumption and Shamier, Hops and Sumbusa for about 40 per cent.

In the eight parts of Aden city, 72 private bakeries and two large-scale State bakeries provide the population with bread. The capacity of the private establishments vary between 1,000 and 11,000 pieces per day. (The weight of one piece is in the range of 150 to 200 grams.) The two large-scale State bakeries have a capacity of 5,000 and 6,000 pieces per hour, respectively, which means a total capacity of 176,000 pieces (with a weight of 120 to 180 grams) if the plants are operated in two shifts. The daily capacity of the 72 private bakeries is around 290,000 pieces. The population of Aden is about 250,000.

B. Official arrangements and objectives

Following the construction of the two State bakeries, problems of technology control arose, whereupon the Government requested the United Nations Industrial Development Organization (UNIDO) to provide the services of an expert in bakery technology. The project "Improvement of bread production and distribution" (SI/PDY/85/802) was approved in August 1985.

The main purpose of the project was to instruct the personnel of newly built State bakeries in the operational steps of production and in handling the related equipment and technology. The period set for this task was three months. The expert commenced his work on 10 December 1985, but had to stop on 13 January 1986. The assignment was taken up again on 29 July 1986 and completed on 8 September 1986. The work performed included:

- (a) Instructing and training personnel in the operation of machines and equipment;
- (b) Providing practical technological demonstrations consistent with existing equipment and available raw materials;
- (c) Training personnel in the fundamentals of raw material preparation, dough-making and processing, and the fermentation and baking process;
- (d) Instructing technical personnel in the maintenance and servicing of machinery and equipment;
- (e) Working out a proposal for ensuring stocks of the spare parts required;
- (f) Working out a plan for the distribution of manpower among the technological units;
- (g) Instructing laboratory personnel in matters concerning the raw materials required;

(h) Instructing personnel in increasing production capacity and in marketing activities.

In carrying out the above-mentioned tasks it became obvious that the key to the realization of smooth production in the newly built bakeries in Aden is the training of managing, production and maintenance personnel.

The assignment is now completed and the following results can be reported: production in both State bakeries runs smoothly; the operators of machinery and equipment are familiar with the operating instructions; and the service personnel carries out, for the most part, all maintenance work in conformity with the instructions and maintenance plans given.

The management of the enterprises surveyed should continue to observe the instructions given them concerning the opening up of new marketing areas for their plants thereby ensuring higher profitability.

The management of the bakery at Mansoorah is recommended, moreover, to supplement its existing equipment by smaller machines and units and to take up the production of fancy wheat biscuits and other biscuit goods. As a first step, however, before commencement of such new production, a feasibility study should be undertaken.

In accordance with a request of the Ministry of Industry, the project work was concentrated on the two State bakeries in Aden; production processes and the training of personnel were not investigated in other parts of the country.

RECOMMENDATIONS

1. Training of personnel

To ensure the continuous, smooth operation of both State bakeries, it is necessary to provide training for management, production and maintenance personnel:

(a) Training of managerial personnel. It is recommended training one or two managerial staff in similar enterprises for about two or three months. For this training, assistance would be needed from UNIDO;

(b) Training of production personnel. In the private establishments also, due to the further mechanization of this industrial branch, it is necessary to provide both theoretical and practical vocational training in the bakery trade over a period of two or three years. Two or three staff members should be sent to a country in which such vocational training is provided, in order, in turn, to be able to establish a vocational training centre at Aden. As an immediate support measure, however, it is recommended that UNIDO send an expert with experience in vocational training to establish the foundations of vocational training. Also in this area, other forms of assistance should be given by UNIDO;

(c) Training of maintenance personnel. Technical personnel should be sent to those countries, from which equipment is purchased, for one or two years, to give them specific training on the equipment and plant. Participants in such training courses should be nominated by the Ministry of Industry.

2. Inspection and servicing of existing equipment

To ensure trouble-free production, it is recommended that maintenance inspections be performed half-yearly, by the supplier, on the basis of service contracts, up to the time when the bakery's own maintenance personnel will be able to do this work. The latter personnel should also be present when modifications, inspections and maintenance work are being carried out. The management of the enterprises is responsible for ensuring this. Detailed maintenance instructions for all equipment are given in annexes I-XI.

3. Spare parts: improvement of stock and storage

The spare parts stock in the Maalla bakery should be supplemented by the parts that have been found to be required. Due to the production rhythm of this bakery, which is also continued on holidays, it is recommended that interchangeable components be procured for the most essential machines and equipment, to ensure that defective components can be replaced in a relatively short time in case of trouble. The management of the bakery is responsible for ensuring that this measure is taken. For the Mansoorah bakery, a spare parts store should be established and the necessary parts procured.

4. Improving wheat flour quality

At present, local and imported flours are processed in both State bakeries. Because the imported flours often have baking properties inferior to the local ones, it is recommended that management store the flours in the State store house and always to consume those received first in order to avoid excessive storage periods.

To reduce the degradation of proteic substances and starch, it is recommended that the flours be stored on grids, protected against the sun by cross-stacking. This will ensure a sufficient ventilation of the flours. Because the capacity of the wheat flour mill in the town part of Maalla is utilized only to 75 per cent at present, it is recommended reducing the proportion of imported wheat flour and increasing the proportion of imported wheat. This will enable management to exert a greater influence on the quality of the flours. The Ministry of Industry should be responsible for seeing to this.

5. Improving service shop equipment

A precondition for proper maintenance and service work is a properly equipped service shop. Therefore, it is recommended that the management of both State bakeries equip a central service shop with the machines and tools required. This shop should undertake all maintenance work for the two bakeries.

6. Technical modifications at Maalla and Mansooro

Maalla bakery

To eliminate the frequently occurring problems at the pre-fermentation cabinet in the Maalla bakery, it is suggested increasing the gear at the reversal point of attachments by two teeth to prevent the attachments from striking against the cabinet. The bakery management should therefore contact the supplier (in the German Democratic Republic) for help in eliminating this source of trouble. Furthermore, the management is advised, in view of the high load of the kneading machine, to plan a general overhaul for this machine in the near future and to procure a second internal kneading drum.

Mansooro bakery

To avoid a high rejection rate, and the need for additional manpower during the transfer of dough pieces from the fermentation cabinet to the fermentation tunnel, the management should contact the suppliers (in Canada) and give them the order for eliminating this fault.

7. Technological modifications at Maalla and Mansooro

Maalla bakery

The management of this bakery should install a dosing unit, for warm and cold water, in the dough station to maintain the dough temperature required. The installation of such a unit ensures, simultaneously, that the amount of water can be measured exactly.

Mansooro bakery

The existing equipment for the flour unit should be installed immediately. Using the flour unit, the different flour sorts can be blended to give a flour mixture with a good strength. Through the screening and mixing process, the flour is simultaneously leavened, which is particularly advantageous for the dough formation. The management of the bakery is responsible for ensuring that this task is performed.

8. Improving the flow of work in the spare parts store

The management of the State bakeries should introduce the practice of using prepared vouchers (such as the receipt for taking spare parts from the store, the stock card for each type of spare parts, and the repair order). On the basis of these vouchers, the demand for spare parts required can be determined for each machine and unit. The worker delegated to this task should be instructed extensively in the work to be done.

9. Improving the utilization of existing capacity

To further increase the utilization of existing capacity, it is recommended that the enterprises' management improve their marketing operations. The bakeries should open up new markets in areas where no or only few private establishments exist; e.g. the new building areas at Al Mansoorah, Al Sheikh Othman and Kormaksar.

The present output of the Mansoorah bakery - 3,000 breads per day - is no longer economically acceptable. To ensure a higher utilization of this bakery, the Ministry of Industry and Supply should (a) undertake studies on commencing production of fancy wheat biscuits and other biscuit goods and (b) supplement the existing equipment by smaller plants. In this connection, a study on the planned technology, the production profile and the additional financial resources required should be drawn up.

10. Improving administration

The bakeries' management can improve the administrative processes by introducing the voucher patterns for production accounting, determination of demand, registration of empties and accounting of raw materials (specimens are shown in annexes XII to XX).

I. CONDITIONS FOUND AND ACTIVITIES INITIATED FOR CHANGING PRODUCTION PROCESSES

A. Raw materials

Conditions found

Some of the raw materials required - such as flour, yeast, sugar, edible oil and fat - are obtained exclusively from imports. Fifty per cent of the flour comes from the local mill, while the remainder is imported. Salt is produced in the country. Inspections of flour quality have shown that the imported flours have, for the most part, baking properties inferior to those of the local flours. This phenomenon can be attributed to local climatic conditions and, in part, to the inadequacy of storage conditions: the degradation of starch and proteic substances in the flour begins already during the storage period. Other factors are that the flours are stored over an excessively long time and are subject to attack by beetles, mites and mealworms. The laboratory set up for the control of raw materials and which should have had an influence on technological processes is non-operational.

Activities initiated

In the raw-material storehouse of the Maalla bakery, the storage of flour sacks on grids was initiated, by which a sufficient ventilation of flours was achieved. Furthermore, the management was encouraged to stamp the date on the flour sacks so that the sacks coming in first would be used first.

All incoming flours are inspected for quality by the laboratory. The following types of inspection were also demonstrated:

- Determination of odour and taste
- Determination of flour colour
- Determination of content of wet crude gluten
- Determination of water content
- Determination of extensibility and elasticity of gluten

Based on the results of the inspection, the production department can be informed about the mixing ratio required for individual flour sorts and the amount of water necessary for dough making. The management was advised to store the wheat flour for no longer than three or four months from the date of manufacture. The best storage conditions for flour include a temperature of 20 °C and a relative humidity in the range of 60 to 65 per cent.

Regarding the determination of yeast quality, different dough-raising powers were demonstrated by adding various amounts of yeast. The laboratory personnel were instructed in the dependence of yeast amount on salt amount and water temperature. They were advised to add the following amounts of yeast to 100 kg of flour:

- "Saf-levure" yeast: 1.5 kg
- "Saf-instant" yeast: 1.0 kg
- "Fermipan" yeast: 1.0 kg

The salt amounts to be added for all three sorts of yeast are in the range of 1.5 to 2.0 kg. Due to the large crystal size of salt, the instruction was given to add the salt as a solution to the dough.

The water amount to be added during dough making depends on the quality of the gluten. Based on the technology used, it was advised adding 60 to 65 litres of water per 100 kg of flour. The management was advised to ensure that the water amount required for each mixing ratio of flour be specified once a week by the laboratory personnel (for the production department).

B. Dough making

Conditions found

Dough making is carried out by means of high-speed mixers, the dough being fed in directly. The yeast is added in conformity with the experience gained on the previous day; the same applies to the addition of water. Inspections showed the doughs to be either too soft or too rigid. Due to the practice of continuously adding water or flour, the dough-making process is delayed, which results in quality variations in the doughs. The raw materials used for the dough making are dosed by means of beakers, while the water is added with buckets. This method does not guarantee exact dosage. The dough maturing period (preceding the further steps of dough processing) is in the range of 120 to 180 minutes when "saf-levure" yeast is used and in the range of 0 to 5 minutes when "saf-instant" yeast is used.

Activities initiated

With regard to dough making, it was proposed maintaining the straight dough method using the following formula as a guide:

Flour:	100.0 kg
Yeast:	1.5 kg ("saf-levure" yeast)
	1.0 kg ("saf-instant" yeast)
Salt:	2.0 kg
Fat:	1.0 kg
Sugar:	0.5 kg
Water:	62.0 litres (depending on the flour quality)

For processing the yeast, the following instructions were given:

(a) "Saf-levure" yeast: this yeast should be dissolved in 10 litres of water at a temperature of 30 °C before dough making and subjected to swelling for 10 minutes;

(b) "Saf-instant" or "fermipan" yeast: when using these yeast sorts, the flour and the yeast should be mixed evenly before dough making.

Dough making is an important technological operation because the quality of baking is greatly influenced by this process. Errors made during the dough-making phase can be corrected only with difficulty in the subsequent steps of the operation, such as dough maturing, moulding and fermentation. The following guidelines were given:

(a) The dough-making process is started by mixing the raw materials. During the mixing operations, the raw materials - flour, yeast, salt, sugar and fat - should be mixed quickly and intensively with the water to ensure that all flour components and other raw materials are evenly swollen and dissolved;

(b) The mixing operation is completed if flour and water components and other raw materials are no longer visible and the dough is slightly torn during drawing;

(c) Refilling of water has a negative effect on the dough formation by delaying the latter process or by causing an uneven swelling process;

(d) When the dough is kneaded, the swelling and dissolving process is continued in order to cause the dough formation. During kneading, the proteic substances of flour have the function of binding the water added. Therefore, the amount of water depends on the quality of proteic substances;

(e) Using the existing equipment, the mixing and kneading operations of dough making should be completed within 18 to 20 minutes;

(f) The dough-making process should be followed by a dough-maturing phase. During this phase, the gas-holding properties of the dough are improved which, in turn, has an influence on the loaf size or volume. The dough-maturing phase also has an influence on the elasticity, dryness and "woolliness" of the dough. The duration of this phase depends on the sort of yeast used and the quality of proteic substances contained in the flour. It is recommended observing the following periods of dough maturing for the individual yeast sorts:

"Saf-levure" yeast: 90 to 120 minutes

"Saf-instant" and "fermipan" yeast: 10 to 15 minutes

(g) In both State bakeries, owing to the high-capacity kneaders used, the mechanical energy fed to the dough is converted into heat, which results in an increase of dough temperature. After the dough-making phase, the dough temperature should be around 28 or 29 °C.

In order to have exact control over the water temperature and the dosing required, it is recommended installing a water measuring and dosing unit in the dough station of the Maalla bakery. Flow sequences for continuous dough production are shown in annex XXVI.

C. Dough processing

Technological sequence found

The subsequent steps of dough processing are as follows:

Division of dough to the weight desired

Moulding the dough pieces to obtain a circular shape

Initial proofing of circular pieces

Dough moulding the circular pieces

Inserting the moulded dough pieces into pan moulds or placing on sheets

Transferring the filled pan moulds or sheets to the fermentation station

Transferring the proofed dough pieces to the baking station.

Inspection showed that the operators make some technological errors during the dough-processing phase which affect the quality of the products and result in higher wear on the plant. The operating and maintenance personnel were instructed in how to correct the technological errors found.

Improving the technological sequence

The operators were instructed as follows:

(a) When further processing the doughs, make sure that doughs which have a maturing phase of more than 30 minutes are kneaded again intensively before the processing is started;

(b) Clean the kneading machine carefully after every shift. Flour should not be blown off the machine components because it penetrates into the bearings, gears and motors, causing the grease to become encrusted and thus defective. It is recommended sucking away the flour during the cleaning procedure;

(c) In a demonstration, the machine operator was instructed in the feed rate of flour required at the roll stand of the kneading machine and in the adjustment of strippers at the roll stand;

(d) Clean or replace the drum of the kneading machine after four hours of operation, otherwise the dough pieces will not mould properly;

(e) Adjust the dough weight only when kneading machine is running. In standstill position, the weight cannot be adjusted exactly, which also results in defects with the weight adjusting device;

(f) Adjust the required kneading speed, in each case, in order to ensure a proper shape of dough;

(g) Observe the precise feed of dough pieces when transferring the circularly shaped pieces to the pre-fermentation cabinet. In case of nonconformity, the feed should be corrected immediately, otherwise the attachments may become defective. It is recommended modifying the technical equipment by increasing the gears at the reversal point of attachments by two teeth to prevent the attachments from striking against the cabinet;

(h) The pre-fermentation period in the pre-fermentation cabinet is eight minutes and should not be changed in order to avoid shaping errors during the dough moulding phase;

(i) The running direction of belts of the long rolling machine was adjusted. This should be checked before each shift, otherwise the belts may run obliquely, resulting in high wear;

(j) Time in the fermentation cabinet depends on the quality of the dough, especially the yeast, but also on the temperature and the humidity in the cabinet itself. A temperature in the range of 35 to 38 °C was recommended, and a humidity of 95 per cent. Using these parameters, the fermentation period for the dough pieces is 40 to 50 minutes.

D. Baking process

Conditions found

For baking the various sorts of wheat bread, wire-mesh belt ovens are available. These ovens are oil-heated and divided into several baking zones. The baking speed depends on the type of goods to be baked and can be adjusted to obtain a tunnel time of 5 to 105 minutes.

The whole oven baking area is 50 m². Because of the size of the oven, present technological processes are not suitable: the production batches are too small, which means frequent interruption in the baking process. This frequent starting and stopping results in large variations of temperature in the individual baking zones which substantially affect the "bloom" of the baking goods (i.e. they are either too brown or not brown enough). It should be noted, however, that baking times of more than 50 minutes have been used. Such long baking times have caused the baking goods, based on 180 g of weighed-in dough, to be dried out completely during the baking process.

Activities initiated

The operating personnel were instructed in proper baking procedures and in the factors that influence these procedures. Such factors include: (a) the size of the baking goods; (b) the temperature in the individual baking zones; (c) the area utilization of wire-mesh belt; and (d) the kind and sort of baking goods.

The personnel were given the following guide values for baking times and baking zone temperatures:

"Dual" baking goods (baking time: 20-24 minutes):

Zone 1: 250-260 °C
Zone 2: 220-230 °C
Zone 3: 220-240 °C
Zone 4: 250-260 °C
Zone 5: 220-230 °C

"Suntuk" baking goods (baking time: 26-28 minutes):

Zone 1: 270-280 °C
Zone 2: 230-240 °C
Zone 3: 240-250 °C
Zone 4: 270-280 °C
Zone 5: 230-240 °C

It was stressed that temperatures in the individual baking zones must be 20 °C higher than the values given in the table during the initial phase of baking process. The management was recommended to pursue a technological course that would provide the conditions for a continuous, uninterrupted baking process.

E. Technical condition of machinery and equipment

Conditions found

In general, the technical condition of the machinery and equipment in both State bakeries could be assessed as still satisfactory, after a production time of 2 and 2 1/2 years, respectively. Exceptions were the moulding machine and the pre-fermentation cabinet in the Maalla bakery and the station used to transfer the dough pieces onto the fermentation belt, as well as the cold-water treatment plant, in the Mansooro bakery.

The manpower available for mechanical and electrical maintenance (9 and 3 workers respectively) is sufficient. The standard of equipment in the workshops is very different, however. The electrician's workshop at the Maalla bakery has the necessary tools and machines for doing repair work, while the one in Mansooro is inadequately equipped. The mechanical workshops of both bakeries are insufficiently equipped for maintenance and service work. The level of expertise of the maintenance personnel also varies greatly. There are well-trained workers with extensive practical and theoretical knowledge, but also semi-skilled workers who have had only short training courses in maintenance.

After an operating period of over two years, the stock of spare parts at both bakeries is sufficiently depleted to hinder scheduled maintenance work. Moreover, the spare parts are stored where temperatures are between 35 and 40 °C and where humidity, in the summer months, is more than 80 per cent. Such conditions result in corrosive damage to the parts. A further limitation is that all procurement, administrative and handing-out work in the spare parts storehouse is done by one worker who has no technical training.

Activities initiated

With a view to increasing the technical reliability of machines and equipment, and ensuring smooth production processes, demonstrations were given and recommendations made, as follows:

Maintenance

(a) The operating and maintenance personnel were instructed again in the proper operation, control and care of (especially) the moulding machine and the pre-fermentation cabinet. The latter were given practical demonstrations in continuous maintenance and care of the units and provided with maintenance schedules for individual machines (annexes I-X);

(b) To eliminate the types of technical defects and imperfections found in the machines and equipment, without disturbing production, the management was recommended to give short, daily briefings on corrective measures to production and maintenance supervisors;

(c) The management was recommended to change the working pattern in the maintenance department so that at least two fitters and one electrician could be used in the production-free period to perform necessary maintenance work and repairs;

(d) To support the in-house maintenance work done on the machines and equipment, the management was recommended to have service and maintenance work done by the supplier of the machines and equipment at intervals of six months (or on the basis of the service contract agreed). The bakeries' own maintenance personnel should be involved in this work, which should be regarded as a form of training;

(e) To eliminate the frequently occurring problems with the pre-fermentation cabinet in the Maalla bakery, a practical demonstration was carried out which showed that the problems were due to insufficient control on the part of operators and to inaccurate adjustment of feed of the dough pieces. To increase reliability for the reversal of attachments, the management was recommended to contact the supplier and suggest increasing the pinion used by two teeth;

(f) To solve a technical problem related to the transfer of dough pieces to the fermentation belt in Mansoor bakery, the management was recommended to call in a specialist of the supplier;

(g) To ensure higher quality of maintenance work, the management was advised to equip a workshop for both bakeries with the machines and tools required;

(h) For improving planning in the field of maintenance, the management of the technical department was provided with model "Repair order" and "Maintenance report" forms (see annexes XXI and XXII);

Spare parts

(i) Measures to establish a spare-parts store in the Maalla bakery should be continued. The parts should be stored separately for individual machine types. Parts that are lacking should be ordered from the supplier. A spare-parts store should be established for the Mansoorah bakery and an order placed for the required stock;

(j) To increase their durability and prevent corrosion, all ball bearings, gears, chains and metallic parts should be lubricated with grease. The management was advised to provide an air-conditioning plant for the spare-parts store;

(k) The worker in the spare-parts store should be given a training course to provide him with the necessary technical knowledge;

(l) To ensure an overall view of the spare parts, the request form and stock card shown in annexes XXIII and XXIV respectively should be introduced into the administrative work of the storehouse;

(m) In view of the continuous production cycle, and thus the short time available for major repair work, the management was recommended to request interchangeable components from the supplier for the most important machines and plant.

F. Sales and marketing

The situation at present

Customers of the two State bakeries include private tradesmen, enterprises, hotels, restaurants, State facilities and shops. When placing orders, the customers come personally, order by telephone, or send a driver. There are no marketing activities on the part of the enterprises. Their products are distributed as follows:

	<u>Per cent</u>
State-run shops	11
Private tradesmen, restaurants and hotels	17
Enterprises and State facilities	71

The goods are delivered by the bakeries' own vehicles between 10 a.m. and noon; 2 p.m. and 4 p.m.; 1 a.m. and 3 a.m. The Ministry of Industry and Supply has not made a statistical survey of per capita consumption of wheat bread. However, questioning a representative group of the population has shown that per capita consumption is 180 to 200 grams per day. The population is also sufficiently supplied with Shamier, Hops and Sambusa in all parts of Aden.

Proposals for extending the markets

On the basis of the private bakeries' distribution network and the population density in individual parts of town, it was recommended opening up markets in the new building centres of Aden, for example, at Mansoorah, Sheik Othman and Kormaksar. A proposal was also submitted to change the production cycle to ensure that the goods come to the consumers in a fresh condition, i.e. at 7 a.m., noon and 6 p.m. Also to ensure the quality of the products, proper packing is very important. The present pattern of packing 50 pieces per tray should be reduced to 40 (because of the large volume of what bread).

To increase the utilization of the Mansoorah bakery, the production of fancy wheat biscuits and some other biscuit sorts should be started, using existing equipment and supplementary units.

To facilitate the administrative work in the marketing department, the recording and accounting methods outlined in annexes XI-XV should be introduced.

G. Training of personnel

Present level

None of the production workers employed in the country's bakeries have completed any vocational training. This applies also to the employees of the State bakeries in Aden. The country has no tradition of vocational training in the baker's trade. All workers are semi-skilled, having received only a short training course at the start-up stage of the individual bakeries or when new machines were being introduced.

In the maintenance department, some personnel have completed a vocational training course; however, a large number have merely gained practical experience through years of work in the department.

The managerial and administrative staff also includes personnel who have gained the knowledge required through years of practical work. But, quite recently, this staff has begun to include personnel who have completed formal training courses in economics, either at home or abroad.

Proposals and activities initiated for further training

In the time available, the production personnel were instructed in methods of operation and control of equipment and plant. This instruction was provided through practical demonstration during the regular production cycle.

The maintenance personnel were also trained in the work required at the existing units. The training programmes included common inspections of machines and plant.

The laboratory assistant was instructed, through practical demonstration, in the evaluation of the raw materials, the monitoring of the production technology and the evaluation of the final product.

Proposals for production planning and recording as well as for keeping account of raw material consumption (annexes XVIII-XIX) were submitted to production management. A proposal for a shift plan to optimise used equipment and plant (annex XXV) as well as a flow diagram (dough sequence) for the kneaders were also worked out (see annex XXVI).

For the book-keeping department, proposals were made concerning the monthly accounting of raw materials (annex XX) and the establishment of a machine inventory file for the registration of units (annex XXVII).

With regard to the improvement of training possibilities for all bakery employees, a proposal was submitted for the establishment of a vocational training system that would provide both theoretical and practical training. Moreover, to improve the skill level of technical personnel, and to ensure their being qualified for specific tasks, it was proposed sending some workers for six-month training courses to the countries supplying bakery equipment.

To enhance understanding of the complex tasks to be solved in managerial and administrative processes, it was recommended that management send one or two bakery employees to comparable bakeries in other countries for three or four months of training in the processes concerned.

II. APPLICATION OF RECOMMENDATIONS AND PROPOSALS FOR IMPROVEMENT IN PRODUCTION, MAINTENANCE AND SKILL LEVELS

A. Production department

Preparation of raw materials

The flour sacks are stored on grids, separately, according to date of delivery. The flour store is cleaned every week to ensure that the flour is not contaminated by vermin. Laboratory investigations of raw materials include flour, yeast and water analyses. The results of these investigations determine the mixing ratio of flour and the amounts of yeast and water to be added.

Dough making

In connection with the straight-dough method, the formula proposed has been introduced in the dough-making phase. The instructions given regarding kneading during the dough-making phase have been observed in part. The fermentation periods specified for the dough-maturing phase, in accordance with the yeast sort used, are being observed. The same is true for the dough temperature (specified at 28-29 °C). The processing features for the individual yeast sorts have also been taken into account. Under consideration by management are training courses to impart the knowledge still lacking with regard to dough making, especially in the areas of raw materials and biological and chemical processes.

Dough processing

The proposals submitted for dough processing are being applied by the machine operators. The instructions given for proper operation and control of the pre-fermentation cabinet are also being observed. The management plans to change the drum of the kneader when the second kneading drum, on order, has arrived.

The management of Maalla bakery has placed an order for technical modifications to the pre-fermentation cabinet. The guide values given for the fermentation process in the dough room (temperature, 35-38 °C; relative humidity, 95 per cent) are being used.

Baking process

The operating personnel are observing the parameters given for baking temperature and baking time. The management plans to introduce the continuous baking process when production output is increased.

B. Maintenance department

The recommendations for the maintenance of equipment and plant are to be put into effect immediately. The shift arrangement for maintenance and service personnel has been changed. The proposal to have the suppliers perform service and maintenance work on the units is still under consideration by the management. Forms have been introduced in the maintenance department and the spare-parts store (annexes XXI-XXIV and annex XXVII). An order for the spare parts required has been placed with the supplier.

C. Further training for employees

As a first result, six maintenance personnel are taking part in a three-year vocational training course in the German Democratic Republic which began in September 1986. The laboratory assistant has taken a short course in the brewery at Aden. In line with a scientific-technological agreement between the two countries, a bakery specialist from the German Democratic Republic will work for two or three years in the People's Democratic Republic of Yemen.

III. CONCLUSIONS

The project results can be summarized and assessed as follows:

(a) The training courses and practical demonstrations given in the production and maintenance departments, and in the laboratory, are considered by the bakeries' management as providing a sound basis for dealing with the production problems that continuously arise;

(b) The recommendations made in respect of the production process, and the technological changes introduced in production, have resulted in products of good quality;

(c) The responsible maintenance personnel consider that the recommendations made for maintenance and repair work on equipment and plant, as well as for procurement and storage of spare parts, are of help in performing technical tasks;

(d) The model forms and vouchers prepared for the maintenance department (annexes XXI-XXIV and annex XXVII) have already been adopted, to an extent, in the mechanical workshop, the spare parts store, and the requests department;

(e) Service and maintenance work are being performed in conformity with the maintenance instructions suggested (annexes I-XI);

(f) Owing to the lack of vocational training for the baker's trade in the country, the production personnel has very little knowledge of technological and technical processes. Therefore, before this industrial branch is further mechanized, the management of the bakeries and the Ministry for Industry and Supply are urged to establish a system to provide vocational training for the personnel currently employed or to be employed;

(g) Studies made to determine the demand for wheat bread in Aden show that, at the present time, total requirements for such bread are met by the existing private bakeries and the two State bakeries. To better utilize the Mansoorah bakery, therefore, it is proposed that this bakery start production of sponge cake and fancy wheat biscuits. However, any modifications should be made in such a manner that, if the demand for wheat bread increases, the production programme can be changed again immediately to wheat bread;

(h) Before new production capacities are opened up, the Ministry of Industry and Supply should estimate exactly the demand, taking into account the capacity of the existing bakeries and consumer trends in the country.

Annex I

MAINTENANCE: FLOUR PLANT

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Checking V-belts of compressor	Weekly
Checking oil level in motors, gearing and compressor	Weekly
Checking of sluices, switch points, filters, screening devices and conveying screws for proper operation	Monthly
Oil change for all motors, gears and compressor	Yearly
Cleaning of air filters	Quarterly
Cleaning of silo interiors	Yearly
Inspection of compressor for proper operation	Quarterly
Cleaning of screens	Weekly
Cleaning of entire screening system	Monthly
Cleaning of compressor air-filter	Quarterly
<u>Electrical maintenance and repair</u>	
Checking and cleaning all terminal and contact points	Monthly
Checking all contactors and relays in switch room	Twice yearly (February and August)
Checking filling-level indicator for proper operation	Monthly
Cleaning the motors	Yearly (March)
Cleaning the switch rooms	Yearly (April)

Annex II

MAINTENANCE: HIGH-SPEED MIXER S 250

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Lubricating lifting spindle	Monthly
Lubricating star for mixing bowl transport	Monthly
Lubricating and tightening pins of bowl carriage holder	Monthly
Lubricating all joints of pedal for disengaging bowl	Monthly
Checking oil level in gearing	Monthly
Checking and tensioning V-belt	Monthly
Checking and re-tightening all bolted connections	Monthly
Checking and re-adjusting slipping clutch	Monthly
Functional test of control and safety facility	Monthly
Lubricating joints and wheels of dough bowls	Monthly
Change of gear oil	Yearly (February)
Cleaning machine of dough and flour residues	Weekly

continued

Annex II (continued)

Operation	Frequency
<u>Electrical maintenance and repair</u>	
Checking bolted connections and terminal points for tightness	Quarterly (March, June, September, December)
Checking condition of insulation and effectiveness of protective measures	Quarterly (March, June, September, December)
Checking values adjusted at thermal overcurrent release switches	Quarterly (March, June, September, December)
Checking switching devices for signs of wear such as contact burn of moveable parts	Quarterly (March, June, September, December)
Checking closing facilities and solenoid switches	Monthly
Cleaning motor and control	Twice yearly (April and October)

Annex III

MAINTENANCE: LIFTING TIPPING BOWL

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Checking cables	Monthly
Lubricating cables	Monthly
Checking lifting device	Monthly
Lubricating entire lifting device	Monthly
Checking gear oil level of lifting motor	Monthly
Gear oil change	Yearly (February)
Checking brake, safety facility and control facility for proper operation	Quarterly (February, May, August, November)
Cleaning plant and pit	Monthly
<u>Electrical maintenance and repair</u>	
Checking bolted connections and terminal points for tightness	Quarterly (March, June, September, December)
Checking condition of insulation	Quarterly (March, June, September, December)
Performing functional test under rated load	Monthly
Checking electrical and technical equipment for proper condition and effectiveness of protective measures	Quarterly (March, June, September, December)
Cleaning drive motor	Twice yearly (June, December)

Annex IV

MAINTENANCE: FULLY AUTOMATIC DOUGH MOULDING MACHINE

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Lubricating moulding drum and universal joint	Per shift
Cleaning all gear wheels of flour, using wire brush	Weekly
Oiling and lubricating all chains and gear wheels of drive	Weekly
Checking oil level and adding oil	Monthly
Changing oil	
Inspecting roller mill and checking bearings	Quarterly (February, May, August, November)
Inspecting moulder drive and replacing all defective parts	Yearly (March)
Renewal of flour bowls of roller mill	Yearly (April)
Checking to make sure moulding rate is properly adjusted	Yearly (March)
Checking all roller chains and readjusting them	Yearly (May)
Overhauling and renewing all protection devices	Yearly (June)
Overhauling cleaning brushes of moulding drive	Yearly (February)
Checking knives and scrapers	Per shift

continued

Annex IV (continued)

Operation	Frequency
Checking moulding and spreading belts	Per shift
Cleaning moulding drum, roller mill, hopper, moulding belt, cutting system and cleaning brushes	Per shift
<u>Electrical maintenance and repair</u>	
Checking all bolted connections and terminal points for tightness	Quarterly (March, June, September, December)
Checking condition of insulation and effectiveness of protective measures	Quarterly (March, June, September, December)
Checking values adjusted at thermal overcurrent release switches	Quarterly (March, June, September, December)
Checking switching devices for signs of wear such as contact burn on moveable parts	Quarterly (March, June, September, December)
Checking closing facilities and solenoid switches	Monthly
Cleaning motor and control	Twice yearly (April, October)

Annex V

MAINTENANCE: PRE-FERMENTATION CABINET

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Cleaning attachments and dishes	Yearly (June)
Cleaning chains and system	Monthly
Checking oiling chains	Monthly
Checking gear oil level and adding oil	Monthly
Changing gear oil	Yearly (April)
Lubricating transfer drum and drive shaft	Monthly
Checking and lubricating universal-joint shaft and intermediate shaft with drive	Monthly
Checking tension of and lubricating chain	Quarterly (February, May, April, November)
Checking transfer drum and transfer belt	Four times per shift
Checking attachments	Per shift
Cleaning collecting trays	Per shift
Inspecting all bearings	Yearly (May)

continued

Annex V (continued)

Operation	Frequency
<u>Electrical maintenance and repair</u>	
Checking bolted connections and terminal points for snug fit	Yearly (April)
Checking insulation	Twice yearly (May, November)
Checking heating	Monthly
Checking limit switches	Monthly
Cleaning contacts and terminal points	Yearly (June)

Annex VI

MAINTENANCE: LONG ROLLING MACHINE

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Checking belt run and adjusting it anew	Per shift
Cleaning system	Per shift
Checking and re-tightening all bolts	Weekly
Checking gear oil level and adding oil	Monthly
Inspecting gearing and bearings	Yearly (March)
Inspecting drive unit	Yearly (March)
Changing gear oil	Yearly (March)
<u>Electrical maintenance and repair</u>	
Checking all terminal points	Yearly (July)
Cleaning motor and checking it for proper operation	Twice yearly (March, September)

Annex VII

MAINTENANCE: TRANSPORT AND ROLL BELTS

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Checking all rolls and drive stations	Monthly
Checking gear oil level and adding oil	Monthly
Changing gear oil	Monthly (August)
Applying grease to all bearings, gear wheels and drive chains	Quarterly (March, June, September, December)
Cleaning rolls	Monthly
Checking belt for proper run and readjusting	Monthly
<u>Electrical maintenance and repair</u>	
Checking all terminal points	Yearly (August)
Cleaning motors	Yearly (August)

Annex VIII

MAINTENANCE: OVEN BN 50

<u>Operation</u>	<u>Frequency</u>
<u>Mechanical maintenance and repair</u>	
Draining condensed water	Weekly
Lubricating off-gas lever and flushing flaps	Weekly
Cleaning oven shell from dust	Weekly
Oiling wire-mesh belt	Monthly
Checking tensioning device of wire-mesh belt and adjusting proper tension	Monthly
Cleaning burner, nozzles, filter and oil line	Monthly
Lubricating vapour exhaust system	Monthly
Lubricating pillow blocks of fan for burner compartment.	Monthly
Lubricating bearing of oven drive	Monthly
Greasing drive chains	Monthly
Checking oil level of drive gear and adding oil	Monthly
Changing oil in all gears	Monthly
Removing fan from burner compartment and cleaning fan compartment	Yearly (June)

continued

Annex VIII (continued)

Operation	Frequency
Lubricating bearings at oven inlet	Monthly
Cleaning orifice of burner behind ignition electrode	Monthly
Lubricating lower roll at oven inlet	Monthly
Checking drive gear	Yearly (April)
Checking tension of chain and wire-mesh belt and lubricating	Monthly
<u>Electrical maintenance and repair</u>	
Checking all clipped connections	Monthly
Cleaning contacts in switch cabinet	Yearly (April)
Checking and cleaning all motors	Yearly (September)
Cleaning switch cabinet of dust	Yearly (August)
Checking ignition electrodes, photo cells and limit switches of burner	Monthly
Changing line routing of burner	Yearly (February)

Annex IX

MAINTENANCE: DOUGH FERMENTATION CENTRE - STEAM GENERATOR AND OIL STORAGE TANK

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Checking fittings for proper functioning	Per shift
Checking valves for proper operation and re-tightening	Per shift
Checking liquid level and performing functional test	Per shift
Checking inlet for proper operation	Per shift
Cleaning burner	Monthly
Checking salt level	Daily
Rinsing boiler	Twice weekly (Saturday, Wednesday)
Operating drain valve	Per shift
Cleaning boiler with chemicals	Twice yearly (March, October)
Cleaning heating pipes	Twice yearly (March, October)
Cleaning oil reservoirs	Yearly (June)

Annex X

MAINTENANCE: DOUGH FERMENTATION CENTRE - REFRIGERATION MACHINE, SMALL COOLING TOWER AND PIPING

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Refrigeration machine:	
Adding oil	Yearly (May)
Adding refrigerant	Yearly (May)
Cleaning pressure vessel	Yearly (June)
Checking temperature and high-pressure gauge	Per Shift
Checking water for contamination	Weekly
Venting chilled medium circuit	Weekly
Small cooling tower:	
Adding cooling water	Weekly
Changing water	Monthly
Cleaning filter	Yearly (April)
Piping:	
Checking valves for smooth motion and greasing them	Weekly
Re-tightening stuffing boxes and replacing defective ones	Monthly
Greasing valve spindles	Weekly

Annex XI

MAINTENANCE: DOUGH FERMENTATION CENTRE - WATER SOFTENING PLANT

Operation	Frequency
<u>Mechanical maintenance and repair</u>	
Greasing all fittings, valves and spindles	Monthly
Checking valves for smooth operation and applying grease to them	Monthly
Re-tightening stuffing boxes	Monthly
Venting pumps	Weekly
Taking stand by pumps into operation	Weekly
Cleaning pressure vessel of pressure increasing station	Yearly (June)
Checking filter medium (Wofatit)	Twice yearly (June, December)
Cleaning salt containers of softening plant	Yearly (September)
Freeing line from lime	Yearly (September)
Cleaning soft water container	Yearly (April)
Cleaning water reservoir	Yearly (July)
Cleaning nozzles (jets) in water softening plant	Quarterly (March, June, September, December)

Annex XII

RECORD OF GOODS ORDERED

Date: _____

Sales item	Dual quantity	Suntut quantity	Remarks
Hotel Gold Mohur	200	100	
Government, port	400	600	
Restaurant Shing	50	100	
Shop, bakery Maalla	500	2 000	
Shop, bakery Khormaksar	400	1 000	
Ministry of Industry	50	100	
...	
...	
...	
Total	15 500	32 000	

Annex XIII

RECORD OF QUANTITIES ORDERED AND DELIVERED PER DAY

Month: February

Date	<u>Quantity ordered</u>		<u>Taken over from production</u>		<u>Quantity dispatched</u>		<u>Difference</u>		Comments
	Dual	Suntuk	Dual	Suntuk	Dual	Suntuk	Dual	Suntuk	
1	15 500	320 000	15 350	31 900	15 350	31 900	-	-	
2	17 000	34 000	17 100	34 000	17 050	34 000	-50		
3	16 500	33 500	16 450	33 550	16 400	33 500	-50	-50	
4	18 000	35 000	18 050	35 050	18 050	35 000	-	-50	
...	
...	
...	
Total	480 500	1 050 800	481 300	1 048 200	481 000	1 048 000	-300	-200	

Signature: _____

Head of Sales Department

Annex XIV

DELIVERY BILL

Maalla Bakery/Mansoor

Aden

Sales facility

Date of delivery

Range of products	Quantity (pieces)	Price per piece	Total price
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Dual

Suntut

Signature of bakery:

Signature of shop:

Order for next delivery:

Date:

- **Dual:** **pieces**

- **Suntut:** **pieces**

Return of empties:

Date:

Trays received: **pieces**

pieces

Trays returned: **pieces**

pieces

Signed by:

Driver:

Retail shop:

Annex XV

RECORD OF EMPTIES PER OBJECT

Month: February
Object: Government, Port

Date	Quantity of trays received	Quantity of trays returned	Still open claim	Comments
1	22	20	2	
2	22	20	4	
3	24	20	8	
4	20	24	4	
5	22	22	4	
...	
...	
...	
Total	685	680	5	

Annex XVI

PRODUCTION ORDER FOR BAKERY

Date of production:

Shift: **Morning shift**

Type: Dual **15 500 pieces**

Suntut **32 000 pieces**

Signature:

Head of Production Department

Annex XVII

RECORD OF DAILY PRODUCTION

Month: February

Date	Production		Quantity handed over to sale		Difference/refuse		Comments
	Dual	Suntut	Dual	Suntut	Dual	Suntut	
1	15 500	32 000	15 350	31 900	-150	-100	Burnt
2	17 000	34 000	17 100	34 000	+100	-	
3	16 500	33 500	16 450	33 550	-50	+50	Weight too high
4	18 000	35 000	18 050	35 050	+50	+50	
...	
...	
...	
Total	480 500	1 050 800	481 300	1 048 200	+800	-2 600	

Signature: _____

Head of Production Department

Signature: _____

Head of Sales Department

Annex XVIII

ACCOUNT OF RAW MATERIAL CONSUMPTION

Day/month:

		Pieces per day	Flour (kg)	Yeast (kg)	Salt (kg)	Sugar (kg)	Fat (kg)	Make-up flour (kg)	Oil for moulds (kg)
Raw materials handed out by store	Dual	15 500	1 550.0	23.25	31.00	7.750	15.5	46.5	6.5
	Suntuk	<u>32 000</u>	<u>3 600.0</u>	<u>54.00</u>	<u>72.00</u>	<u>18.0</u>	<u>36.0</u>	<u>108.0</u>	<u>15.0</u>
	Total	47 500	5 150.0	77.25	103.00	25.750	51.5	154.5	21.5
Raw materials consumed in production process	Dual	15 350	1 535.0	23.025	20.70	7.675	15.350	46.05	6.447
	Suntuk	<u>31 900</u>	<u>3 584.0</u>	<u>53.76</u>	<u>71.68</u>	<u>17.92</u>	<u>35.840</u>	<u>107.520</u>	<u>15.050</u>
	Total	47 250	5 119.0	76.785	102.38	25.595	51.190	153.570	21.497
Total, raw materials taken from store			5 150.0	77.25	103.0	25.750	51.5	154.500	21.500
Total, raw materials consumed in production process			5 119.0	76.785	102.38	25.595	51.190	153.570	21.497
Difference		-250	-31.0	-0.465	-0.620	-0.155	-0.310	-0.930	-0.003

Annex XIX

RAW MATERIAL CONSUMPTION PER MONTH

Month: February

Date	Flour		Yeast		Salt		Sugar		Fat		Oil	
	Desired value	Actual value	Desired value	Actual value	Desired value	Actual value	Desired value	Actual value	Desired value	Actual value	Desired value	Actual value
1	5 273.5	5 304.5	76.78	77.25	102.38	103.0	25.59	25.75	51.19	51.50	21.49	21.50
2												
3												
...												
...												
...												
Total												

Annex IX

ACCOUNTING OF RAW MATERIALS

Month:

	Flour	Yeast	Salt	Sugar	Fat	Oil
Initial stock determined in stock-taking						
+ Incoming raw materials for the month concerned						
= Stock						
- Outgoing materials acc. to production output and handout from store						
= Stock at the end of the month						

Annex XXI

REPAIR ORDER

Maalla Bakery

Type of machine: _____ **Machine No.:** _____
Division No.: _____

Repair order: _____

Possible cause of the defect: _____

Clearance of the machine for repair:

Date: _____ **Time:** _____

Signature of ordering party: _____

Reception of order by Maintenance Department

Date: _____ **Time:** _____ **Signature:** _____

Work performed: _____

Actual cause of the defect: _____

Total repair time: _____ **Downtime:** _____

End of repair:

Date: _____ **Time:** _____ **Signature of the worker:**

Handed over to Production Department

Date: _____ **Time:** _____ **Date:** _____ **Time:** _____

Signature: _____ **Signature:** _____

Maintenance Department

Production Department

Annex XXII

MAINTENANCE REPORT

Maalla Bakery

Machine:

Machine No.:

Date	Description of maintenance work performed	Description of cause	Spare parts/ material required	Repair time	Downtime	Signature
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Annex XXIII

SPARE PARTS REQUEST FORM
(For spare parts requested from spare parts store)

For machine: _____

Machine No.: _____

Spare part required: _____

Value of the spare part required: _____

Requested by Maintenance Department

Date: _____

Signature: _____

Handed out by store

Name: _____

Date: _____

Signature: _____

Receipt of the spare part

Name: _____

Date: _____

Signature: _____

Annex XXIV

STOCK CARD

Maalla Bakery/Aden

Item: _____ Machine No.: _____
Value of item: _____ Supplier: _____
Maximum stock: _____ Delivery interval: _____
Minimum stock: _____ Shelf No.: _____

Date	Incoming stocks	Outgoing stocks	Actual stock	Signature
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Annex XXV

SHIFT OCCUPATION PLAN

Machinery and equipment	Manpower required
Flour plant	1
Dough station	1
Moulding machine	1
Pre-fermentation cabinet	2
Discharge side - long rolling machine	3
Discharge - pans and trays	1
Fermentation room	1
Oven charging	1
Oven discharge side	2
Oven operator	1
Applying fat to trays and pans	1
Packaging/shipping	2
Shipping/distribution	1
Responsible for production department	1
Dough fermentation centre	1
Mechanical workshop	1
Electrical workshop	1

Annex XVI

DOUGH SEQUENCE FOR CONTINUOUS PRODUCTION

A. Using "saf-instant" yeast

Dough maturing time: 15 minutes

Dough sequence	Mixing of yeast and flour	Start of dough making	End of dough making	Start of maturing time	End of maturing time	Start of dough processing
1	6.20	6.25	6.45	6.45	7.00	7.00
2	6.28	6.33	6.53	6.53	7.08	7.08
3	6.36	6.41	7.01	7.01	7.16	7.16
4	6.44	6.49	7.09	7.09	7.24	7.24
5	6.52	6.57	7.17	7.17	7.32	7.32
6	7.00	7.05	7.25	7.25	7.40	7.40
7	7.08	7.13	7.33	7.33	7.48	7.48
8	7.16	7.21	7.41	7.41	7.56	7.56
9	7.24	7.29	7.49	7.49	8.04	8.04
10	7.32	7.37	7.57	7.57	8.12	8.12
11	7.40	7.45	8.05	8.05	8.20	8.20
12	7.48	7.53	8.13	8.13	8.28	8.28
13	7.56	8.01	8.21	8.21	8.36	8.36
14	8.04	8.09	8.29	8.29	8.44	8.44
15	8.12	8.17	8.37	8.37	8.52	8.52

continued

Annex XXVI (continued)

B. Using "saf-levure" yeast

Dough maturing time: 90 minutes

Dough sequence	Dissolving the yeast	Start of dough making	End of dough making	Start of maturing time	End of maturing time	Start of dough processing
<hr/> <u>Time</u> <hr/>						
1	5.00	5.10	5.30	5.30	7.00	7.00
2	5.08	5.18	5.38	5.38	7.08	7.08
3	5.16	5.26	5.46	5.46	7.16	7.16
4	5.24	5.34	5.54	5.54	7.24	7.24
5	5.32	5.42	6.02	6.02	7.32	7.32
6	5.40	5.50	6.10	6.10	7.40	7.40
7	5.48	5.58	6.18	6.18	7.48	7.48
8	5.56	6.06	6.26	6.26	7.56	7.56
9	6.04	6.14	6.34	6.34	8.04	8.04
10	6.12	6.22	6.42	6.42	8.12	8.12
11	6.20	6.30	6.50	6.50	8.20	8.20
12	6.28	6.38	6.58	6.58	8.28	8.28
13	6.36	6.46	7.06	7.06	8.36	8.36
14	6.44	6.54	7.14	7.14	8.44	8.44
15	6.52	7.02	7.22	7.22	8.52	8.52

Annex XXVII

MACHINE STOCK-TAKING CARD

Machine No.: _____

Model: _____ Model No.: _____

Type: _____ Weight: _____

Dimensions: _____

Value at purchase: _____ Current value: _____

Date: _____ Date: _____

Capacity: _____ Motor type: _____

Service performed: _____

General information: _____
