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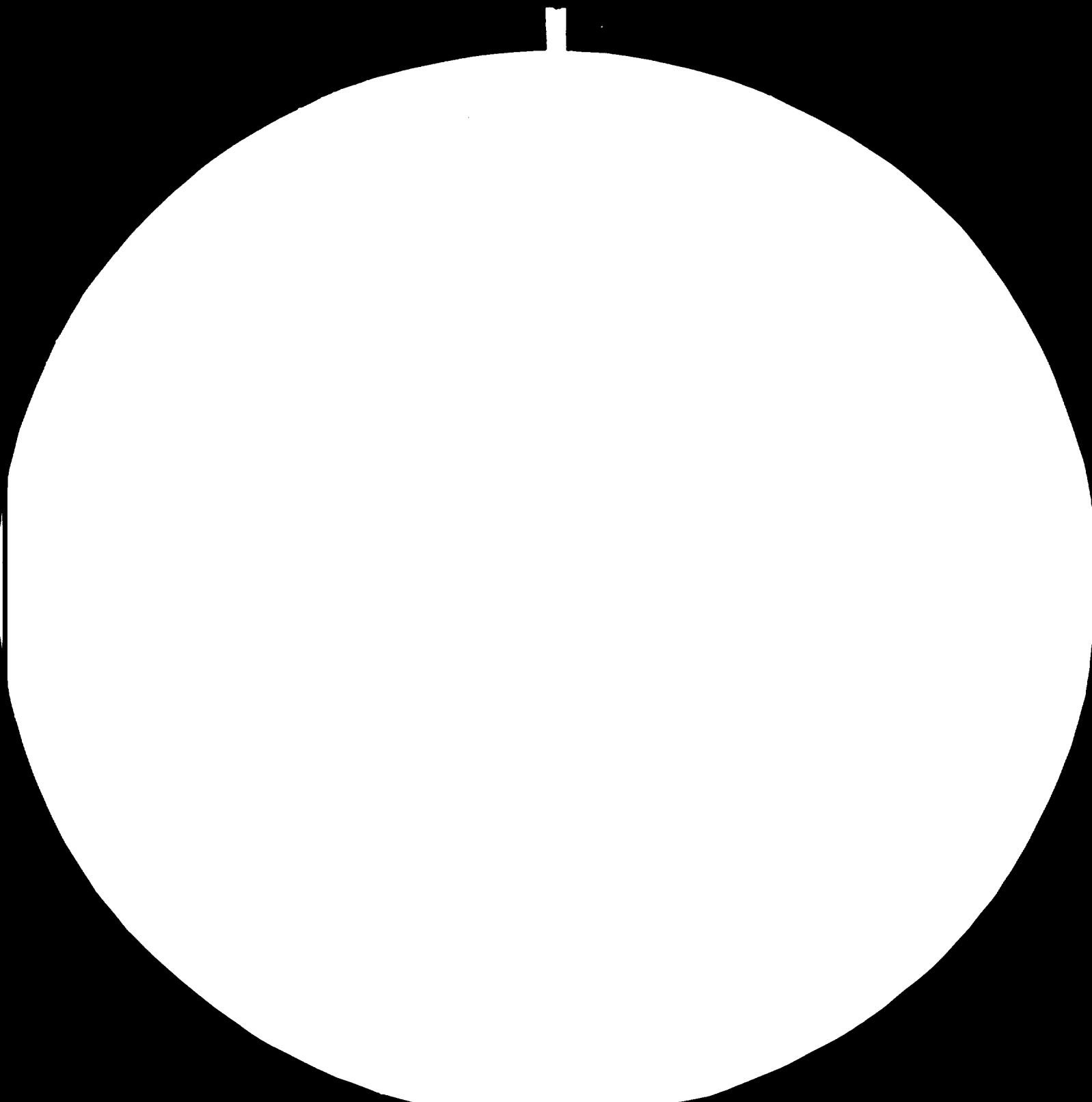
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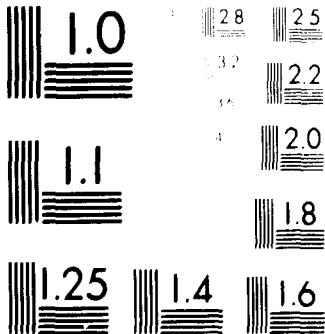
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MINIMUM RESOLUTION TEST TARGET

U.S. GOVERNMENT PRINTING OFFICE: 1963 O 358-101

RESTRICTED

DP/ID/SER.A/276
29 January 1981
English

10426

ESTABLISHMENT OF A PACKAGING RESEARCH TESTING, DEVELOPMENT
AND INFORMATION DEPARTMENT AT JAMAICA BUREAU OF STANDARDS

DP/JAM/77/008

JAMAICA

Technical report: Packaging with paper and board based materials *

Prepared for the Government of Jamaica
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of F.A. Paine, paper and board expert

United Nations Industrial Development Organization
Vienna

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V.81-20819

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SUMMARY

A survey necessarily of a somewhat superficial nature, has been made of the situation in Jamaica of the quality and availability of packaging made from paper and board. Virtually no paper or board for packaging is produced in the country and the material imported is currently restricted by financial problems. The converters of the materials, i.e. bag, carton and fibreboard case producers while currently handicapped by spare part and maintenance difficulties are capable of good quality conversion and are beginning to introduce Quality Management for which the new Packaging Laboratory and the Quality Assurance Group of Jamaican Bureau of Standards can provide an essential back up in terms of equipment and technical know how on test methods.

The principal task of the consultant was to train the counterpart personnel in J.B.S. Packaging Laboratory in technique and methods of evaluating packages and in relating these to tests on packaging materials wherever possible. While this involved instruction in the operation of apparatus we were more concerned with the interpretation of the results and their use in tackling problems in industrial situations. (Full details of the work programme are given in Annex 1).

In this connection a series of lectures was given and at the Round Table presentation an appeal was made to the local users of packaging, and packaging materials producers to supply packings and materials to the laboratory for examination to establish standards as to present levels of use.

Several opportunities arose during the mission to assist local firms with specific problems and these also formed a basis for further training of the respective counterpart personnel.

Finally, some discussions were held with the Head of the Packaging Laboratory on Laboratory organisation in R and D testing particularly in relation to enlisting the aid of local industry, and the advantages (at as early a date as possible) of collaboration with ISO, and with other packaging institutes particularly through IAPRI, the International Association of Packaging Research Institutes.

A. INTRODUCTION

The Government of Jamaica, recognising the important contribution good packaging makes both in domestic as well as the export trade and realizing the role specifications, standards and testing facilities play in upgrading the quality of existing packaging, has established a Packaging Research, Testing, Development and Information Group at the Jamaican Bureau of Standards in Kingston. The project is fully outlined in the project document, Establishment of a Packaging, Research, Testing Development and Information Department at the Jamaican Bureau of Standards, Kingston, JAM/77/008/A/01/ April 1978.

Mr. Paine is the fourth of twelve specialists to report to UNIDO on the assistance provided in training the local laboratory personnel in packaging technology. The consultant concentrated on problems associated with the Paper and Board Packaging Sector and the laboratory and field techniques and methods for examining problems in improving packaging performance or reducing packaging cost. Advantage was taken of his experience as an administrator over the past years in R & D and Testing to discuss problems concerned with the running of a Packaging Laboratory and the possibilities of utilising co-operation between packaging producers, users, transport authorities, machinery manufacturers and others in tackling those logistic problems of Physical Distribution in which the packaging element has an important role.

Recommendations were made in respect of utilizing waste paper and board to produce, in the first place, moulded pulp packaging for eggs and later fluting medium and chipboard. It was also suggested that a study of the fiberboard cases used in Agro industries should be undertaken by the Laboratory co-operating with all parties concerned in this most important area of the Jamaican economy.

B. TERMS OF REFERENCE - PAPER AND BOARD

Working with a small team of local specialists on problems associated with paper and board material and containers :-

- i) Survey the existing situation in the country with reference to paper and board quality and availability.
- ii) Advise counterpart personnel on the use of laboratory equipment for the evaluation of such characteristics as crush, stiffness, smoothness, porosity, tear strength, tensile strength, oil absorption, water absorption. The interpretation of the results and explanation on how these relate to performance under field conditions is the important part of this work.
- iii) Assist local companies with specific problems.
- iv) Advise counterpart personnel of the preparation of paper and board containers for storage trials, the type of tests used to follow quantitative and qualitative changes during storage and the relationship between these results and field performance.
- v) Advise on the evaluation of materials used in corrugated box manufacture, the design of corrugated cases their specification and standardization for certain industries especially for Fruit and Vegetables.
- vi) Present a Round Table conference on paper and board testing with special reference to corrugated box technology.
- vii) Prepare a report setting out the findings of the mission and giving recommendation on further action which might be taken.

NOTE

In discussion with the Project Manager before taking up the assignment and by agreement with him and the Jamaican Bureau of Standards shortly after his arrival it was agreed that advantage should be taken of the consultants wide experience in Packaging R & D at Pira to cover any other aspects of Packaging, training, technology and administration that the Packaging Group felt could be useful to them in the time available,

C. CONDUCT OF THE MISSION

Mr. Paine arrived on the 19th June 1980.

Immediately on arrival a work programme was drawn up to ensure that all subjects in the terms of reference and such additional areas as agreed would be covered as adequately as possible in the time. Details of the actual programmes as modified during the period are given in Annex I. An article for the Journal was written (Annex II) fifteen (15) formal presentations (lectures) were made (See Annex III) six (6) of which were based on Pira visual aid kits which were left with the Laboratory for the appropriate counterpart personnel to use in talks to be given to Industry. Two Self Introduction Manuals one on use of the Pira Board Creaser and the other on the Board and Crease Stiffness Tester were also provided.

Two further lectures were recorded on cassette and left with the Bureau for later reference. Some notes on the others were provided.

Visits were made to both the Corrugated board plants in Kingston; to two of the largest Carton Makers; to Grace Kennedy, and numerous supermarkets and stores in different areas of the town, (see work programme).

A talk illustrated by slides was given to the Packaging group of the Jamaica Management Association in their board room. A preliminary scheme for quality management in W.I.P.P. Corrugated Factory was worked out with J.B.S. Quality Assurance Group, and the QMS personnel at WIPP Annex IV.

On the 23rd July a Round Table discussion was held following a slide presentation and a lecture on "Problems in packaging with paper and board" which some thirty (30) visitors from industry, and in addition to the Packaging Group, and other members of JBS staff, attended. (Notes in Annex V)

A list of contacts is given in Annex VI.

The consultant left Kingston on Thursday 7th August, one day later than scheduled due to hurricane problems.

D. OBSERVATIONS AND RECOMMENDATIONS

1. Situation within Jamaica with reference to paper and board availability and quality.

Virtually all paper and board with the exception of toilet tissue (made largely from corrugated waste trim and rejects) is imported. In addition a large proportion of the goods packed in paper and board are from overseas and hence the retail market presents a wide spectrum of paper based packaging from many sources both at home and overseas. The quality of the paper and board packages varies from poor to excellent. While as might be expected, because of the current financial situation, the home produced packaging constitutes the lower quality end of the range, in general there is considerable evidence that given reasonable materials Jamaican converters can produce high quality printed cartons and other retail packs for foods, household products, cosmetics and toiletries. In the corrugated fiberboard field the use of non kraft papers from Venezuela principally and problems with corrugator and printer slotter tool spares has reduced quality considerably in the recent past but both plants in Kingston were visited and both had obvious expertise in corrugator operation. No formal Quality Measurement is currently practised at either but steps are in hand to develop such procedures in an effort to reduce waste, currently running at a high level.

At a guess one third of this waste is due to inferior materials particularly the fluting medium which lacks elasticity and hence cannot be fed with uniform tension into the corrugating rolls. It was noted that Mr. C. Swinbank had recently examined the paper sacks situation (see his report pages 9 & 10) and no further action was taken in this area, although one problem with regard to sifting through the closure of sacks for flour was brought to our attention.

Recovery and Repulping of Waste Paper and Board

At present we understand that some selected waste paper and board from certain factories is collected and repulped for toilet tissues of various grades. There is still quite a considerable amount of selected waste from the paper based converting industry which is not at present collected. We understand that there are plans for a paper mill in hand and it would be advantageous if this mill were to concentrate initially at least on the production of such materials as fluting medium and chipboard largely from recycled fibre. The fluting medium could be an adequate alternative to imported material and the chipboard could provide the raw material for a solid board paster which would be a better material for reusable fiberboard cases particularly if later on they could be coated with an LDPE composite such as could be applied by the Steinneman Coater at JPI.

Such a development could take some time to introduce (1½ - 2 years) but a more immediate use of recovered paper fibre would be for the production of moulded pulp packaging such as egg and fruit trays, egg boxes etc.

A small scale paper pulp packaging production unit for use in such circumstances has been developed by Development Techniques Limited and Mr Allen Jones, UNIDO expert on Techno-economics has already investigated this possibility which appears to be viable. It requires:

- One man to prepare the pulp
- one man to operate the forming table.
- and one man to operate the dryer.

No special skills are needed and the raw material requirement for one (1) shift working is about 500-600 pounds of waste fibre per week and 70 gallons water per hour at 5 lbs/sq in pressure together with small quantities of water soluble wax emulsion and aluminium sulphate. Standard moulds for egg trays and retail egg packs are available and the machinery can produce 120; 30 egg trays or 1440 retail packs for 6 eggs per hour. For full details see the Techno-economic Report "Reuse and Reconstitution of Packaging Material " July 1980, by consultant Jones.

2. PACKAGING OF FRUIT AND VEGETABLES FOR HOME TRADE AND EXPORT

During the course of the mission the inefficiencies of the Banana box were several times mentioned, and some time was spent in examining the whole question of Fiberboard cases for the Agro-Industry sector. The Banana box itself has dimensions approx. 19.7/8" x 13½" x 8½" (500 x 333½ x 210½ mm) and although it would, therefore, be usable on either the 1200 x 1000 (48" x 40") ISO pallet (5 cases (3 and 2) in each layer, reversing) and the 1200 x 800 (48" x 32") ISO pallet (4 cases in each layer, all layers the same) it will fit much better into the 1100mm x 900mm module preferable for use with freight containers using one way pallets and where chilled transport is needed for with these the internal width will not permit the ISO standard pallets to be used unless they are of the more expensive 4 way entry type. The box itself is of a telescopic lid/tray type erected by stapling and the latter have caused problems in the past.

The situation with other agro industry cases is less satisfactory and it is recommended that the J.B.S. Packaging Laboratory should study the possibilities of a modular set of packs with say only 2 or 3 base dimensions allowing the height to vary to accommodate the required number or weight the last not exceeding 15 kgs if possible. Base dimensions of about 550 x 350, and 500 x 333mms should be suitable.

The grade of board required, the design of the case and the method of packing should be worked out in co-operation with the growers of the produce, the box makers and the transport authorities as well as the customers (i.e. wholesale, retail and processing organisations).

This is a most important area of work since Jamaica Agro-industries have a great export potential.

3. ACHIEVING OPTIMUM PACKAGING

In a situation where shortages of material exists and containers are at a premium very often one has to use the material or container that is to hand rather than the one that would have provided the optimum result. For this reason it is advisable that every package using company should make a survey of every package it uses at regular (say once every 12 - 18 months) intervals.

The J.B.S. Packaging Laboratory can carry out those tests which either simulate or reproduce the effects of normal handling in transport. For the export market most of the requirements remain similar to those in other countries but the domestic market needs to be surveyed to ascertain the levels of test required in terms of drops, inclined plane impacts, stacking heights and vibrations so that standard journey tests can be devised against which alternative packages can be compared with existing ones. Such a survey can initially be undertaken by visits to Production units, warehouses, interchange depots, docks, railheads, markets etc, where visual observations will give much of the data needed. A tentative suggested home trade journey sequence has been produced and the means of improving it should be discussed with the UNIDO specialist on Transport Hazards , Mr. Schmidt during his visit.

4. FACTORY VISITS

In the visits made one of the major points noted was that most factories had little or no apparatus or equipment for tackling problems of either producing or using paper board packages. They could all find the existence of the Packaging Laboratory of great benefit.

In the first instance quality measurements as a check (quality audit) on a limited number of samples along the lines of the scheme suggested for WIPP (Annex 4) would probably be most useful.

5. VISITS TO STORES AND SUPERMARKETS

The conditions in these varied widely from district to district. Many, however, do not practise good housekeeping and many areas are untidy with broken, leaking and pilfered packs left lying on the shelves far too long.

It was obvious that with many local products the package was what could be obtained rather than what would be best, but even bearing this in mind it was obvious that some education for store personnel carrying out in-store packaging operations would be immediately advantageous.

Unventilated polythene bags for fresh produce and the practise of packaging inferior, bruised or damaged produce into such bags only leads to more rapid deterioration of the good produce and causes the customer to open and inspect, thus damaging the pack and in many instances this results in unhygienic packs.

A simple training programme to give the basic requirements of in-store packing to retail supervisors and store managers should be considered by the Bureau.

6. APPARATUS, EQUIPMENT AND STAFFING

All the apparatus relevant to the Paper and Board sector which was available was demonstrated and used whenever possible for a specific problem. Advice was given on the type and suppliers of a suitable Universal tester (for tensile, stretch and compression measurements) as although one of the other J.B.S. Groups has a tensile tester its range was not suited to paper and board or plastics films) particularly in respect of elastic properties.

A Pira humidity cabinet and an LAB type Vibration tester arrived during the consultancy and assistance was given in respect of installation and use.

It is recommended that several sizes of templates for sample cutting be made or purchased and a balance capable of weighing up to 1kg with an accuracy of 0.10 gm for shelf life work was recommended.

The basic idea that recruitment of staff for the laboratory should take place as work increases is the correct one but once the WIPP Quality scheme is started there will be a need to provide technician level assistance immediately in the Materials section and soon in the Transport Packaging Section. It is recommended that advertising and recruitment for both posts be initiated before the end of August 1980.

ANNEX 1

WORK PROGRAMME

- 19th June - Arrive in Jamaica
- 20th June - Registration at UNDP; General introduction at Jamaican Bureau of Standards, Packaging Group and outline of project.
- 23rd June - Discussion and planning of work programme with Project Manager and Head of Packaging Group.
- 24th June - Lecture on 'Guidelines to Cost Effective Packaging'. Instruction on calibrating and using the Beach Puncture Tester.
Discussion on soap wrapper problem for local firm. Set up and use of Sutherland Rub Tester and procedures for product compatibility.
- 25th June - Initial discussions on Quality Management at West Indies Paper Products Ltd. with Miss Nsombi Jaja of Bureau of Standards. Quality Control Group.
Part tour of Jamaica Bureau of Standards Laboratories.
- 26th June - Discussion of Packaging of dried pawpaw and dried ginger for a local company selling to Gourmet Food outlets in Jamaica. Set up of experiments to determine ERH of product and moisture protection required.
Set up induction experiment for Ring Crush and Flat Crush tests.

- 27th June - Complete tour of Jamaican Bureau of Standards Laboratories.
- 28th June - Wrote an article for Jamaican Bureau of Standards News Journal, 'Packaging as an aid to industry and agriculture in developing countries'.
- 30th June - Lecture on Paper and Board Machines.
Visit to Grace Kennedy Ltd. -
Miss M. Tenn
- 1st July - Lecture on main printing processes.
- 2nd July - Lecture on ink drying mechanisms.
Visit to West Indies Paper Products -
Corrugated Factory.
- 3rd July - Attended Round Table discussion for H. Wolfrum, UNIDO Consultant on Plastics Films and Laminates.
Lecture on paperboard requirement for the main packaging processes.
Set up, operate and instruct use of Ring and Flat Crush test - Arranged for examination of samples obtained at West Indies Paper Products.
- 4th July - Lecture on graphics for package designers.
Set up and operate Bendtsen smoothness & porosity tester.
Discussion on problems in hand for local firms.
- 7th July - Lecture on specifications and Quality Management - General principles.
Set up and operate the inclined plane friction tester.

- 8th July - Lecture - Shipping Containers
Part 1. General.
Talk to Jamaica Management Association Ltd.
Packaging as an aid to developing a
countries resources.
Further discussions with Nsombi on QMS for
West Indies Paper Products.
- 9th July - Visit to Graphic Arts Ltd.
- 10th July - Lecture - Shipping containers
Part 2. Corrugated fibreboard cases.
(Given by counterpart after instruction
on technique)
- 11th July - Discussion on organisation of Packaging
R & D Laboratories.
Discussion on problems in hand for local
firms.
- 14th July - Lecture on 'Adhesives'.
Continued discussion on organisation
problems.
Discussions on estimating journey hazards
and building test schedules.
- 15th July - Lecture on 'Cartons and Cartoning'.
- 16th July - Discussion with representative from
TAG Ltd. on problem.
Visit to Henkel Ltd. (Adhesives)
- 17th July - Lecture on 'Relevance of Paper Tests in
solving Packaging problems - wrappers,
bags etc.
- 18th July - Lecture on 'Odour, Taint and Compatibi-
lity Problems, FDA, EEC, and other regula-
tions.

- 21st July - Lecture on 'WVTR, Gas Permeability and Shelf life'.
Set up an experiment on shelf life determination on biscuit packs.
- 22nd July - Lecture on 'Labels and Labelling'.
Further discussions on QMS for West Indies Paper Products.
- 23rd July - Round Table Conference.
Talk on: 'Technical problems in the use of packaging made of paper and paperboard'.
Discussion with Seprod on detergent packaging problem. (Change from carton to PE bags).
Jamaica Flour Mills - problem of sifting through flour sacks closure (stitching).
and CHALLENGE on introduction of larger purepak milk carton in country districts.
- 24th July - Visit to West Indies Paper Products to introduce QMS and to see carton factory.
Set up details of studies to deal with Seprod and CHALLENGE problems discussed on 23rd.
- 25th July - Visit from Quality Inspectors and Mr. Nicholas of West Indies Paper Products to see laboratory facilities and comment on QMS Scheme given to them on 24th.
Report preparation.
- 28th July & 29th - Discussions with counterparts on problems with local firms & report preparation.

- 20th July - Packaging Committee Meeting on
Reuse & recycling of packages and
materials.
visit to Jamaica Packaging Industries.
- 31st July - Report preparation.
Visit and talk to West Indies Paper
Products.
- 5th August - Article for Jamaica Institute of
Management on 'The Importance of Packaging
in the future economy of Jamaica.

ANNEX II

PACKAGING AS AN AID TO INDUSTRY & AGRICULTURE IN
DEVELOPING COUNTRIES

Man has many competitors for the food he produces. Rodents, insects and micro-organisms (moulds, yeasts and bacteria) all cause losses at various stages in growth, harvesting, processing, storage, transport and sale: if permitted to flourish in food, micro-organisms make it un-attractive and cause waste by putrefaction, fermentation and mould growth. Such organisms, particularly bacteria, can render food poisonous to man causing sickness and even death. The provision of food which is nutritious and safe to eat is essential to that industry and to a nation's economic well being. Packaging plays a decisive role in achieving these objectives of safety and waste prevention. Food must be available wherever there are people, and with modern population tendencies this is less and less where it is grown. Food must be provided all the year round irrespective of the growing season. It must ^{be} presented in a way that is easy to purchase and use. In most instances this means it must be packaged.

The choice of suitable packaging involves a number of considerations. For food products the overriding decision is that the package provides the optimum protective properties to keep the product in good condition for the required shelf life. It must also, of course, be of convenient size and shape and have graphics to attract the eye of the purchaser.

Food is however only one, even if a most important one, of the products that packaging protects. All products whether grown or manufactured must be delivered to a customer and packaging is the means of achieving this delivery in sound condition at minimum cost overall.

In developing countries, as in the more sophisticated societies the same considerations apply. Decisions on materials, movement, machinery and line efficiency, management and men are needed.

Materials The developing countries usually have less developed material resources and must import some of the packaging materials required. It is important therefore that they be selected carefully and utilised to the full without waste. A packaging laboratory capable of selecting and testing all necessary materials and advising on their use is vital in this connection.

Movement Once packed all products ultimately leave the packaging factory for the outside world where the packaging alone stands between the product and the mechanical and climatic hazards of the journey to the customer. Drops, vibration, stacking loads, heat, damp, cold and drying out must be prevented from damaging the product. All the care and skill in making that product will be lost if the package is inadequate. The study of the hazards of transport and the use of laboratory techniques to reproduce or simulate those hazards under controlled conditions can provide rapidly the answers to three basic questions:-

- 1) How can an unsatisfactory package be made to perform satisfactorily without a major increase in cost?
- 2) Can a satisfactory package be reduced in cost or material without becoming unsatisfactory.
- 3) What packaging is needed for a new product or a new market.

The answers to these are of great importance to all producers of goods both for domestic and export markets.

Machinery & Line efficiency

Jam ups on packaging lines and down time because of material in-adequacies reduce the efficiency of the often older types of packaging machines far below what could be if an understanding of the properties required in the material were used to specify its requirements. Particularly where imports from the sophisticated areas of the world are concerned little difficulty should be encountered in meeting the specification. The need is for the packaging laboratory to determine what properties are required.

Management and men

Materials, machinery and movement must all be welded together by an appreciation by management that only packaging can ensure delivery of a quality product to the customer.

The design brief for every product should incorporate the requirement to design the packaging, at least in its protective and preserving role, at the same time as the product is formulated or designed.

Generally, a product formulated or designed to be easily packaged will be a better product with lower cost packaging, less waste, reduced losses and higher profit.

ANNEX III

Lectures given to counterpart staff during course of Mission.

- 1) Guidelines to cost effective packaging - Notes
 - 2) + Board making
 - 3) The main printing processes for packaging
 - 4) Ink drying mechanisms
 - 5) Paper & board requirement for the main printing processes
 - 6) Graphics for packaging designers
 - 7) Specifications and Quality Management - General - Cassette
 - 8) Shipping Containers - General
 - 9) Corrugated shipping containers - Pira VAK
 - 10) Adhesives in packaging - Cassette
 - 11) Cartons and cartoning
 - 12) Relevance of properties in problem-solving - Notes
 - 13) Odour, Taint and Compatibility
 - 14) WVTR gas permeability and shelf-life - Text Book (1)
 - 15) Labels and Labelling - Text Book (2)
-
- 1) Packaging for climatic protection - Cairns, Oswin & Paine
 - 2) Packaging Media (Chap. 5.3) Paine

+ Nos 2-6 and No 9 based on Pira VAK's .

a) ii) As used

When each reel arrives at the corrugator and is readied for running take a 1 metre (approx.) full width sample and mark MD with → and write Reel and Job Number underneath. If difficult for any reason to sample at this time a similar sized sample may be taken from the reel stub on removal from the corrugator.

These samples should be taken to the Quality Measurement Room and examined as follows:

Using an approximate sized template cut into sheets.

15" x 10" with the 15" dimension parallel to the MD. At least 6 sheets must be obtained.

Determine and record grammage and caliper on 3 and retain 3 more for Bureau of Standards, Packaging Laboratory for possible testing. Retain the 3 sheets measured and any extras in Q.M. for 3 months before sending for repulping.

Bureau of Standards, Packaging Lab. will measure BW and caliper after conditioning Bursting Strength on Liner and Ring Stiffness on Liner and Fluting. The 3 sheets will all be used for BW and caliper. 2 will then be used for burst. 6 up, 6 down. 1 for ring stiffness. 10 MD. 10 CD.

b) Corrugator samples (removed at the cut off)

Sample

6 blanks to be set aside from each job run. Samples taken at random and individually not together. Then samples taken to Q.M.S. and the best and the worst visually examined as follows:

1) Check uniformity of corrugations

Record	O.K.
	High/Low
	Leaning flute
	Crushed flute
	Other defect

2) Check adhesion of liners

Record O.K.
 SF not completely glued
 DB not completely glued
 Other defects

3) Check general appearance

Record Blisters in SF/DB liner
 SF/DB liners scored or wrinkled
 Warp (state direction & height
 at centre)

4) Measure total caliper

Remaining 4 reserved for Bureau of Standards, Packaging Laboratory, possible examination who will in addition measure flat crush, basis weight and burst.

c) Finished Products

Select 4 specimens from the centre of 4 bundles and take to Q.M.S. for examination of 2 as attached procedure. Other 2 to be retained for possible examination by Bureau of Standards, Packaging Laboratory.

NOTE: After discussion with West Indies Paper Products Quality team it was decided that the samples sent to Bureau of Standards, Packaging Lab. should be -

a) A selection from each weeks run of liners and fluting from 10 most important jobs.

i.e. 10 x (2 liners 1 fluting) x 3 sheets
i.e. 90 sheets 15" x 10"

b) Corrugator samples

2 sheets each from the same 10 jobs
i.e. 20 sheets

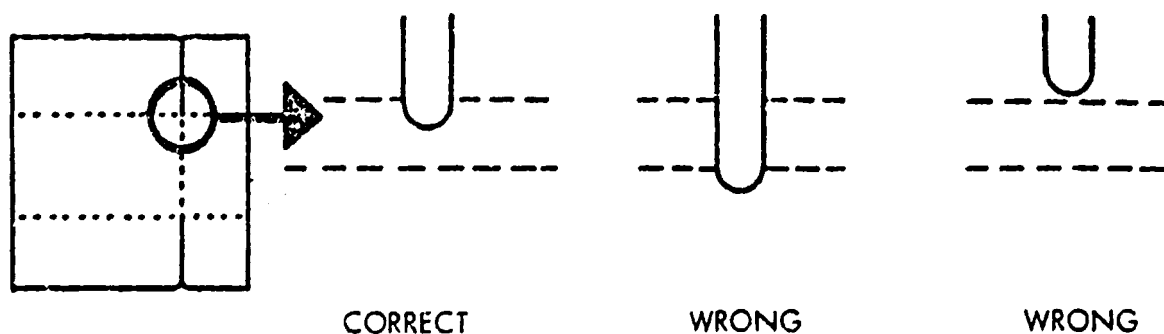
c) Finished products

2 specimen cases from the same 10 jobs
i.e. 20 cases

A PROCEDURE FOR VISUAL INSPECTION OF CORRUGATED CASES

Items marked x may not matter for particular products.

- 1 SAMPLING
One case should be extracted from the middle of each bundle and examined.
- 2 Examine the case in the flat and check:
 - a Print is:
 - right colour
 - in correct position
 - not smeared
 - legible and clear
 - does not smear when rubbed with wet thumb
 - b Case is squarely and cleanly cut
 - c Creases are correctly placed and no unwanted creases
 - d Slots are correctly placed relative to horizontal creases



- e Board is not 'wash-boarded', i.e. no impression of flute tips is seen from outside
- 3 Open the case and check:
 - No splits in inner liner
 - Slot over joint is square and correct width
 - Joint lap is correct width, usually 32 mm (1 1/4 in)
 - Joint (see overleaf at 8 for examination of different types of joint)
 - x No objectionable odour
 - x No print set-off.

A PROCEDURE FOR VISUAL INSPECTION OF CORRUGATED CASES

4 Bend flaps through 180° and check no splitting of horizontal creases.

5 Cut sample piece of board about 75 x 25 mm (3 x 1 in) from centre of one panel and check:

- Correct materials used
- Correct flute used
- Flute properly formed



RIGHT



WRONG
(CRUSHED)

Pull components apart and check adhesion is good.



WRONG
(LEANING)

6 Close bottom flaps and check:

- flaps meet or overlap as required
- internal dimensions (height, width, depth).

7 Close top flaps and check:

- flaps meet or overlap as required.

8 Examination of joint

a Glued joint

Tear joint apart. Failure should be by tearing of the paper, not failure of the glue.
Glue should extend full length of gap.

b Stitched joint

Check:

- Correct number of stitches
- Correct and even spacing of stitches
- Stitches central to joint lip
- Stitches not rusted
- Stitches correctly formed:

CORRECT



WRONG



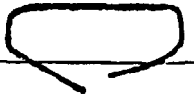
(break)



(too short)



(protruding)



(not turned over)

c Taped joint

Check:

- Correct tape used
- Tape correct size
- Tape centrally and squarely placed
- When tape pulled off, failure is by paper tear, not adhesive failure

NOTE

A check on the weights of the components can only be done accurately by formal test requiring air-conditioning and an accurate balance.

An indication of whether weight is correct may be obtained by weighing cases after they have been well dried. An unusually light case is likely to be made of under-weight materials.

A rough check may also be made by measuring the thicknesses of the components and using the following table:

Thickness		Weight	
in	mm	lb/1 000 ft	g./m ²
.0075	0.19	26	125
.011	0.28	42	200
.0125	0.32	47	250
.017	0.43	64	300
.023	0.58	90	440

REPORT ON VISIT TO WEST INDIES PAPER PRODUCTS

ON JULY 24, 1980

Present were:

Mr. E. Nicholas	-	Group Sales Manager - WIPP
Mr. N. Brown	-	Production Manager "
Mr. R. Taylor	-	Q.C. Inspector "
Mr. Nicholson	-	" " "
Mr. F. Paine	-	Paper and Board Consultant - UNIDO
Mr. B. Williams	-	Packaging Centre - JBS
Ms. P. Douce	-	" " "
Nsombi Jaja	-	Quality Audit Section - JBS

BACKGROUND

The development of the quality control programme at WIPP has progressed to the stage where training of the quality control inspectors has begun and the plant is ready for the implementation of the actual working programme.

The Packaging Centre of the JBS has been assigned from UNIDO a Packaging Consultant in Paper and Board - Mr. Frank Pain, who has had wide experience in developing quality control programmes for corrugated cardboard factories. His visit is most timely and the maximum possible use is being made of his expertise in the field, in assisting with this programme at WIPP.

Following discussions and a visit to the company, Mr. Paine prepared a "Quality Measurement Scheme" providing practical suggestions for measuring the quality level of incoming material and finished products.

PURPOSE OF THE VISIT

A meeting was scheduled with the Production Management Team of WIPP along with Mr. Paine and members of the JBS Packaging and Quality Audit staff to discuss the most convenient, and workable situation applicable.

Members of WIPP were provided with copies of the document which was discussed and the following suggestions made:

1. The programme - Quality Measurement Scheme Part (ii) should begin with a dummy run where the number of samples recommended should be recorded, without the samples being actually taken. This should give a fair idea as to the practicality of such a sampling scheme in the light of the available measuring and testing resources of both WIPP and the JBS Packaging laboratories.

2. The first nine (9) months of the programme should be spent observing, measuring, collecting and analysing data to provide enough evidence for corrective measures. No major changes to operations should be made within this time unless enough evidence is provided to merit the change.
3. It should be made clear to the factory staff that the function of the Quality Measurement Department is one of providing quality information service and not one of actual control. The initial responsibility for quality rests with the people who are actually making the boxes - production operators.
4. Quality measurement room should be so designed that there is no secret in its operations. Posters indicating the functions and purpose of the room could be of some help in this area.

The discussion continued around the problems being faced in the

- (1) corrugating and
- (2) printing operations

and some possible solutions. One of the major problems was the wide variation in the quality of the raw material being obtained from Venezuela. This led to constant machine adjustments and consequently high scrap rate.

It was suggested that one way of coping with this is to use the raw material in the sequence in which it is manufactured e.g. date of manufacture could determine manufacturing sequence. This could cut down on the wide or ad hoc variation since the variation in raw material - paper - manufactured in sequence would more often than not be gradual.

The reels as they are inspected on arrival could be given sequential coding to guide the stacking operations and consequently the order in which the reels are used.

The following was recommended as immediate needs of the Quality Measurement Room;

1. Sloping bench for examining blanks.
2. Flat bench for cutting
3. Water sink
4. Caliper
5. Gammage balance.

A tour of the JBS' Packaging Laboratories to observe the equipment and testing methods was considered necessary to give the quality control inspectors an idea of the tests that the boxes and boards sent to the JBS will be subjected to and the information obtained re product quality.

This was arranged for the following day and an educational and beneficial session was conducted jointly by Mr. Paine and Ms. Douce. The Inspectors were able to clear up a number of areas of uncertainty in the valuable discussion session that followed.

NOTES ON PRESENTATION TO ROUND TABLE , JULY 23, 1980.

TECHNICAL PROBLEMS IN THE USE OF PACKAGING MADE OF
PAPER AND BOARD

Introduction

Mr. Paine opened his lecture with 3 illustrations, (one a puzzle and two examples⁺ of simple solutions to past problems using corrugated fibreboard) to emphasise the fact that packaging is only a part of the total logistics problem of Physical Distribution and that one has often to look beyond the simple packaging alternatives to find the most economic solution which consists of delivering a product in sound condition, to the ultimate user at minimum overall cost. For this, the packaging material cost may not be the lowest that is possible.

In commenting on the 5 year plan 1978-82 he reminded the meeting that while standardization of bottles in certain product groups was a highly desirable and worth while objective it should not be pursued too far as shape is a form of recognition for many products and we rely on it far more than is generally realised.

•	•	•	•	Draw 4 straight lines to	<u>Solution</u>
	•	•	•	connect all 9 points with-	
		•	•	out taking pencil from	
			•	paper or going twice over	
				any part.	

+ Example 1 The use of a single fitment to provide separators for packs of 3, 4 and 6 bottles of an expensive drink.

Example 2 The use of single faced corrugated board for the bulk packaging of clinical thermometer or other long fragile items.

What do we need to know to produce successful packaging

This formal part of the talk was illustrated by slides of checklists which are reproduced as Appendices 1 - 3 to this paper.

Required for successful package development are:-

Facts about the product,

Facts about the hazards of the journey the package must undergo,
and facts about the marketing requirements.

These together with a knowledge of packaging materials, machinery and labour will lead to the desired solution largely achieved by a process of elimination.

The best package is the one which does the job required for the lowest overall cost.

Optimising the packaging contribution is not merely minimising pack costs. If, for example, reducing these costs leads to increased downtime on high speed lines, or to greater transit damage, the effect of the reduction may be to lower overall profitability. On the other hand, increasing the pack cost can increase profitability, for example, the aluminium end ring pull can for beer and soft drinks was appreciably more expensive than the flat top can it replaced; but added customer convenience led to larger sales and greater profitability.

Mr. Paine then illustrated the 6 functions of a package, 3 primary and 3 secondary. They are:-

Primary functions

- { To contain
- { To Protect and Preserve
- { To communicate

Secondary
Functions

- { To be convenient
- { To handle well on packaging lines
- and { To sell

Quality Management

In this section the lecturer stressed the importance of co-operation between package supplier and product manufacturer in getting the specification written correctly.

The ideal specification should be no more than a means of communicating to one party what the other requires and should have 3 parts.

Part 1 should state in plain english what the material, pack or product is required to do?

Part 2 should give an agreed and limited list of the properties of the material, pack or product which are believed important, and

Part 3 will give an agreed practical procedure to be adopted if the properties are not fully correct, before the batch is accepted or rejected.

Mr. Paine then outlined some of the work he had carried out with his counterparts in Jamaican Bureau of Standards, Packaging Laboratory[†] and made the point that Industry could assist by producing samples. (6 specimens of 2 major packs) together with information on their use, so that some norms could be established on current packs used in Jamaica tested on the new equipment installed at the laboratory.

Given this help he predicted that within months the staff at the Laboratory would be able to assist by giving tests and advice to -

- 1) Enable satisfactory packages to be reduced in cost,
- 2) Improve unsatisfactory packs without excessive cost increases,
- 3) Developing packs for new product, and existing products for new markets.

It is a major exercise to set out, quantify and cost all the factors relative to a packaging system.

In practice, decisions often therefore have to be made on specific areas.

Typically, a cost comparison between two systems would focus on the following facts:

- a) Packaging material (or container) prices. To be strictly comparable, quotations should be obtained at the same date (or as close to each other as possible), for the same quantity, with identical terms of sale. Primary, secondary and tertiary packaging must all be included.

[†] See section D of the main report

- (b) Machinery cost. The capital cost will be depreciated over a number of years, in accordance with company policy.
- (c) Machine efficiency. This should be output achieved as a percentage of theoretical maximum output (e.g. if a machine can run at 1,000 per hour, but gives an actual output of 800 in one hour, then its efficiency is 80%). Losses are due to many causes, including jams, minor delays, change over time, operator fatigue and the need to make adjustments.
- (d) Machine speed. As purchased should always be in excess of initial requirements, to allow for growth later.
- (e) Line efficiency. If two machines, each running at 85% efficiency, are linked in sequence the line efficiency cannot be greater than 72.25% (85% of 85%), unless we arrange to hold a buffer stock between operations, so that if the first machine stops, production can continue (if the second machine stops briefly, the buffer stock will increase).
- (f) In a sequence of machine operations, it is desirable for each machine to run slightly faster than the one before it. The required output may also be achieved by a single fast machine, or by two or more slower machines in parallel. These alternatives will usually result in different costs, because of differences in capital, labour requirement and efficiency. Remember that if the entire production comes from one machine, a major breakdown stops production completely, whereas a breakdown on one machine in a group of three still permits two thirds of the operation to continue.
- (g) Labour costs. Manning requirements, rates of pay, including supervision and maintenance.
- (h) Inflation. It is sensible to try to make allowance for the effects of inflation. It is, however, fairly sure that a machine bought today will cost less than a similar one bought next year. A slight labour saving this year is likely to become a larger labour saving (in money terms) next year because of increased wages. However, if a material saving is made by a pack change this year, the saving may increase, or may turn into a loss next year, depending upon the relative price movements of materials, and these cannot be reliably predicted.

The foregoing guidelines underline the great importance that the packaging of a product can have on the success of the business producing it. We have spoken as if each business had only one product, a situation which is rarely encountered. Most businesses have several if not many products and to stay up to date it is vital that the packaging should be revised at suitable intervals, Indeed a packaging audit utilising independent experts, say once a year, or biennially, can uncover many overall cost improvements and should be a regular feature in progressive industrial concerns. Under these conditions packaging can be recognised as a benefit to be optimised rather than a cost to be minimised.

PRODUCT ASSESSMENT

1. PHYSICAL STATE

Gas
Mobile liquid
Viscous liquid
Paste
Liquid + solids
Powder (free flowing?)
Granules
Tablets
Capsules
Solid block

2. GENERAL NATURE

Corrosive
Toxic
Volatile
Odorous
Perishable
Sticky
Corrodible
Fragile
Abrasive
Easily scratched

3. HOW CAN IT BE DAMAGED?

By mechanical shock? - Fragility factor
By vibration? - Frequency range
By abrasion? - Surface finish
By crushing? - Safe load
By temperature changes - Safe range
By moisture and rh changes? - Critical values
By oxygen? - How?
By odours? - Which?
By light?) Fading
By spoilage?) Chemical
) Changes

By incompatibility
with materials?
By rodents, or insects?

4. HOW CAN THE PACKAGE BE UNSATISFACTORY?

Admits dirt
Leaks
Not siftproof
Not compatible

(a) Transfers odours or flavours to product
(b) cause corrosion of product
(c) reacts chemically
(d) loses strength in contact with product

Easily pilfered
Stains easily
Gets damaged in transit

DISTRIBUTION HAZARDS

1. Mechanical hazards

	<u>Basic hazard</u>	<u>Typical circumstances</u>
Impact	(a) Vertical	(i) Package dropped to floor during loading and unloading on to or off nets, pallets, vehicles landing boards etc.
		(ii) Package rolled over or tipped over to impact a face
		(iii) Fall from chutes or conveyors
		(iv) Result of throwing
	(b) Horizontal	(i) Rail or road vehicle stopping and starting
		(ii) Swinging crane impacts wall etc
		(iii) Arrest by stop or other packs on chute or conveyor
		(iv) Arrest when cylindrical package stops rolling
		(v) Result of throwing
	(c) Stationary package impacted by another	All above where circumstances cause the falling pack to impact another
	Vibration	(i) From handling equipment (in factory, depot and at transhipment points)
		(ii) Engine and transmission vibration from road vehicles
(iii) Running gear - suspension vibration on rail		
(iv) Machinery vibration on ships		
(v) Engine & aerodynamic vibration on aircraft		
Compression	(i) Static stacks in factory, warehouse and store	

- (ii) Transient loads during transport in vehicles
 - (iii) Compression due to method of handling, e.g. crane grabs, slings, nets, squeeze clamps etc.
 - (iv) Compression due to restraint
- Racking or deformation
- (i) Uneven support due to poor floors, storage etc.
 - (ii) Uneven lifting due to bad slinging, localized suspension etc
- Piercing, puncturing, tearing, snagging
- Hooks, projections, misuse of handling equipment, or wrong method of handling

2. Climatic hazards

- High temperature
- (i) Direct exposure to sunshine
 - (ii) Proximity to boilers, heating systems etc
 - (iii) Indirect exposure to sun in sheds, vehicles etc, with poor insulation
 - (iv) High ambient air temperature
- Low temperature
- (i) Unheated storage in cold climates
 - (ii) Transport in unheated aircraft holds
 - (iii) Cold storage
- Low pressure
- Change in altitude, particularly in unpressurized aircraft holds - aircraft pressurization failure
- Light
- (i) Direct sunshine
 - (ii) uv exposure
 - (iii) Artificial lighting
- Liquid water (a) fresh
- (i) Rain during transit, loading and unloading, warehousing and storage
 - (ii) Puddles and flooding
 - (iii) Condensation and ship sweat etc.

Liquid water (b) polluted	(i) Salt sea spray - deck cargo, lightering surf boats, etc.
	(ii) Salt water puddles on docks etc
	(iii) Bilge water and sea water in holds
	(iv) Industrially polluted puddles and spray e.g. at chemical works
Dust storms etc.	Exposure to wind driven particles of sand, dust, grit, etc.
Water vapour	Humidity of the atmosphere, both natural and artificial.

3. Other hazards

Biological (a) micro-organisms	Are ubiquitous and adapt themselves to varied conditions. Require moisture and generally will not grow at relative humidities of less than 70%. Will grow over a wide range of temperature
fungi	
moulds	
bacteria	
(b) insects	In general high temperatures are more favourable for development than low ones and, below 15°C, development is unlikely. A relative humidity of 70% is very favourable for most insects but some will develop at below 50% r.h.
beetles	
moths	
flies	
ants	
termites	
	Infestation usually starts from eggs laid on packaging materials, penetration then being made by the small newly-hatched insects. Migration from adjacent packs or from natural habitat (particularly in tropical localities) may occur.
(c) mites	As for insects, but they are less tolerant of dry conditions (few survive and develop slowly at about 60% r.h.) and they develop over a lower temperature range
(d) rodents	May be present in warehouses, transit sheds, storage areas, holds etc. Will attack most materials to keep in condition, and softer materials for making nests (or for food).

Contamination by
other goods

- (a) By materials or adjacent packs
Obliteration of marking, printing etc. by rusty metalwork - strapping, wire bands. Effects of damp packing materials, especially hessian, on non-water resistant materials, adhesives and metal parts.
- (b) By leaking contents of adjacent packs
Damage to containers of liquids, powders and granulated substances may result in leakage of the contents. The effect of the resultant contamination on adjacent packs can range from the spoiling of external appearance to complete disintegration of a pack and its contents, depending on the nature of the contaminant, the packing materials and the contents of the pack contaminated.
- (c) By radio-activity

MARKETING AND MERCHANDISING

1. THE PRODUCT

What is the competition?

- (a) Packages used?
- (b) Quantities sold?
- (c) Price bracket?

What are the selling points of

- (a) Competitive products
- (b) Our product.

2. THE RETAIL OUTLET

Self-service?

Department store?

Mail order?

Doorstep?

How do competitors sell?

3. THE CUSTOMER

Age

Sex

Income group

Social level

Location (home, local, regional, national or export)

4. THE PACKAGE

- (Size, shape, weight
- (Standard, gift, seasonal
- (Bag, envelope, pouch, sachet
- (Rigid or folding box, card pack
- PRIMARY (blister, skin etc)
- PACKAGE (Metal container
- (Glasscontainer
- (Collapsible tube (metal or plastics)
- (Plastics container, (Blown, injection or thermo-form)
- (Moulded pulp container

- (Size, weight, shape, number of units
- (Wooden case or crate
- TRANSPORT (Fibreboard case or drum
- PACKAGE (Sack (paper, textile, plastic
- (Metal drum
- (Glass carboy
- (Plastics
- (Bale

5. CONVENIENCE AND USE

The primary package

Inspection before purchase?
Easy opening?
Reclosure?
Measured dose?
Dispensing aid?
For storage out of sight?
Or for use when attractiveness important?
Easy grip?
Special function?
 e.g. spray, cook-in-pack, squeeze use etc.
Disposal?

The transport package

Weight?
Shape?
Display conversion?
Disposal?
Returnable?
After use?
Pallet movement?
Containerized transport?
Hand holds?
Fork truck?
Slinging?

6. GRAPHICS AND DESIGN

Brand name
Logo
Maker's name
Product name
Content
Colour code
Legal requirement of text
Instructions
Price panel
Colours and relation to product
Legibility
Visibility
'Impact' and 'Personality'

ROUND TABLE SEMINAR

Mr. C.F. Brown	- Banana Company
Mr. N. Williams	- Banana Company
Mr. P. Scott	- Challenge Enterprise
Mr. A. Campbell	- Challenge Enterprise
Mr. A. McKoy	- Coates Brothers
Mr. P. Hammersley	- Coates Brothers
Ms B. Lopez	- Desnoes and Geddes
Mr. N. Chin	- Graphic Arts
Mr. G. Brown	- Graphic & Supplies Limited
Ms M. Tenn	- Grace Kennedy
Mr. L. Douglas	- Grace Kennedy (DaCosta Bros.)
Mr. K. Walters	- Jamaica Frozen Foods
Mr. S. Campbell	- Jamaica Frozen Foods
Mr. G. Finch	- Jamaica Packaging
Mr. F. Crooks	- Jamaica Packaging
Mr. G. Hanna	- Jamaica Packaging
Mr. D. Prendegast	- Jamaica Packaging
Mr. C. Williams	- Jamaica Flour Mills
Mr. H. Spoerri	- Kaleel Paper Products
Ms J. Reid	- Nutrition Products Ltd.
Mr. L. Brown	- Shell
Mr. T. Simpson	- Stephenson's Letterpress
Ms A. Hochoy	- Seprod
Mr. H. Brown	- Seprod
Mr. K. Walker	- Storage & Infestation - Division, Ministry of Commerce
Mr. M. Brown	- Tapes Adhesives Glues
Mr. E. Dunkley	- West Indies Pulp and Paper
Mr. R. Gayle	- West Indies Pulp and Paper
Mr. C. McDonald	- West Indies Pulp and Paper
Mr. E. Nicholas	- West Indies Pulp and Paper

ROUND TABLE SEMINAR (Cont'd).

Dr. A. Henry	- Director, Jamaican Bureau of Standards
Mr. K. Garfield	- Jamaican Bureau of Standards
Mr. N. Oram	- Jamaican Bureau of Standards
Ms.O. Lewis	- Jamaican Bureau of Standards
Ms.J. Wellington	- Jamaican Bureau of Standards
Miss P. Douce	- Jamaican Bureau of Standards
Miss I. Bennett	- Jamaican Bureau of Standards
Miss Y. Allen	- Jamaican Bureau of Standards
Mr. E. Williams	- Jamaican Bureau of Standards
Mr. J. Salisbury	- Project Manager, Jamaican Bureau of Standards
Mr. A. Jones	- Consultant, Jamaican Bureau of Standards
Miss Nsombi	- Jamaican Bureau of Standards
Mrs. J. McKenzie	- Jamaican Bureau of Standards

ANNEX V1

LIST OF CONTACTS

Bureau of Standards

Dr. A. Henry	-	Director
Mr. K. Garfield	-	Head, Materials Science
Mr. H. Brown	-	Head, Engineering.
Nsombi Jaja	-	Quality Assurance Section
Mrs. Cuthbert	-	Quality Assurance Section
Mrs. M. Domville	-	Head, Packaging Centre
Miss P. Douce	-	Packaging Materials
Miss I. Bennett	-	Retail Packaging
Mr. E. Williams	-	Transport Packaging
Miss Y. Allen	-	Techno-economic

INDUSTRY

Mr. S. Cooper	-	Graphic Arts
Mr. I. Pickersgill	-	WIPP
Mr. E. Nicholas	-	WIPP
Mr. N. Brown	-	WIPP
Mr. C. MacDonald	-	WIPP
Mr. R. Gayle	-	WIPP
Mr. E. Dunkley	-	WIPP
Mr. Nicholson	-	WIPP
Mr. R. Taylor	-	WIPP
Mr. G. Finch	-	Jamaica Packaging
Mr. G. Hanna	-	Jamaica Packaging
Miss F. Cronk	-	Jamaica Packaging
Mr. D. Prendergast	-	Jamaica Packaging
Mr. Pitter	-	Jamaica Paper Sacks
Miss M. Tenn	-	Grace Kennedy
Miss L. Douglas	-	Grace Kennedy
Mr. A. Barnes	-	Grace Kennedy

Mr. Richards	-	Ministry of Agriculture (Inspector)
Mr. C.F. Brown	-	Banana Company
Mr. N. Williams	-	Banana Company
Miss A. Hochoy	-	Seprod
Mr. H. Brown	-	Seprod
Mr. C. Chin	-	Henkel
Mr. L. Duval	-	Henkel
Mr. M. Browne	-	Tapes Adhesives Glues
Mr. C. Williams	-	Jamaica Flour Mills
Mr. P. Scott	-	Challenge
Mr. P. Sibblies	-	Coffee Industries Limited



