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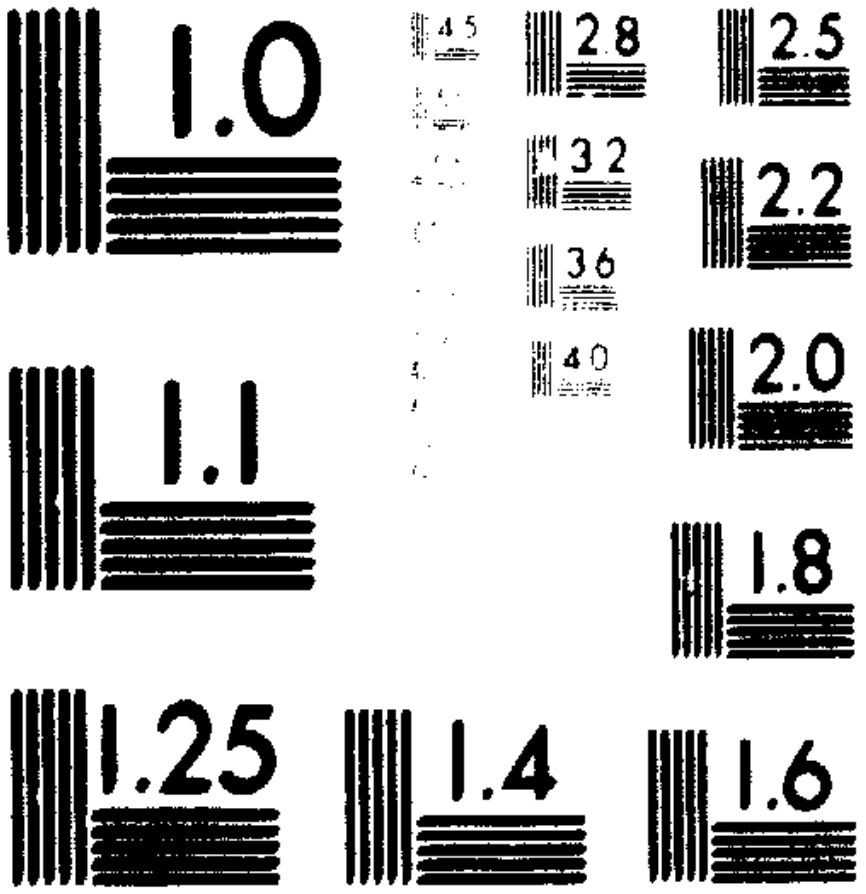

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28 January 1981
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ESTABLISHMENT OF A PACKAGING RESEARCH, TESTING, DEVELOPMENT AND INFORMATION DEPARTMENT AT JAMAICA BUREAU OF STANDARDS, KINGSTON

DP/JAM/77/008

JAMAICA

Technical report: Rigid plastic containers*

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 B. I. Turtle, expert
in rigid plastic containers

United Nations Industrial Development Organization
Vienna

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ABSTRACT

That part of Project DP/JAM/77/008/11.09/31.7.E. which deals with rigid plastics containers has been successfully completed, and the Consultant has returned to the U.K. A survey of the materials and containers used in Jamaica has been made, following visits to retail outlets and discussions with rigid plastics converters and industrial users of plastics containers. The Counterpart in the Jamaican Packaging Centre has been given guidance and instruction in all aspects of plastics containers with emphasis placed on the following vital areas. Food packaging, test, methods, specifications and standards, quality control procedures, and the problems likely to be encountered by users of plastics containers. Finally, detailed recommendations for future action have been made under the headings of, Counterpart, Plastic Containers, Role of the Packaging Centre, and Miscellaneous.

INTRODUCTION

The Government of Jamaica is encouraging the improvement of the standard of packaging technology existing at the present time. As part of this effort they are establishing a Packaging Centre within the existing Bureau of Standards. This Centre will have the equipment and expertise necessary, (a) to enable it to formulate technical specifications and standards, and (b) to enable it to give advice and assistance to manufacturers and users of packaging materials and containers.

A U. N. I. D. O. Project was established in March, 1979 to assist in this activity. It is fully described 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/01/37, April 1978.

The author is one of the twelve Consultants recruited by U. N. I. D. O. to assist in the training of the Centre's staff in packaging technology. He concentrated on the field of rigid plastics containers,with particular reference to those used in Jamaica. The Counterpart was instructed in detail on the selection of the correct plastic containers for both foods and non-foodstuffs. Laboratory testing procedures and the problems encountered with plastics were discussed in detail, also economic and socio-economic aspects. Advice was also given on the establishment of specifcations, standards, and quality control procedures.

...../

JOB DESCRIPTION

The Consultant in Rigid Plastic Containers will work with a team of local specialists to achieve the following:-

(a) Comment on the materials and containers in use in Jamaica.

(b) Identify problem areas and indicate how the problems may be resolved.

(c) Advise Counterpart staff on the selection of plastics with particular emphasis on food packaging, laboratory test methods, and problems encountered with plastics containers.

(d) Advise Counterpart staff on the establishment of specifications, standards, and quality control procedures.

(e) Present a round table discussion on container selection.

(f) Write a brief report on the mission.

Note:

It was decided by the Project Manager to omit (e), instead advising the interested parties that the Consultant was available for consultation if required.

CONDUCT OF THE MISSION

The Consultant arrived in Kingston on 4th October, 1980, and a Workplan was drawn up, shown in Annex II. It included visits to the major manufacturers of plastic containers in Kingston, and to local supermarkets, accompanied by the Counterpart. The contacts made in Jamaica are listed in Annex I. Throughout the mission effort was concentrated on the prime objective of instructing the Counterpart. The Expert left Kingston on 28th October, 1980.

PLASTIC MATERIALS AND CONTAINERS USED IN JAMAICA

Five large supermarkets, a branch of Woolworths, and numerous smaller shops and pharmacies were visited in the Kingston area. The quality of the plastic containers available, with regard to surface finish, cap-fit, and particularly decoration, was very variable. However, the variety of containers observed both with regard to style and also plastic material was similar to Europe. Blow moulded HD bottles were prominent for the normal range of household, pharmaceutical, automotive and miscellaneous products. In addition there was a wide use of these bottles for soya bean and coconut oils as well as the more usual clear PVC ones. Apart from oil, PVC bottles were prominent for shampoos and other toiletries but not for fruit squashes as in Europe, these being in glass. There was less TPS or ABS in evidence than in Europe, particularly because of the absence of the dairy desserts, yoghurts, and creams normally seen in chill cabinets; only yoghurt was observed in thermoformed pots with TPS lids. Crystal styrene and SAN were in use for glace cherries and petroleum jelly respectively. LD and TPS snap on lids and some plugfit LD were also noted. HD and PP and thermoset screw caps with wads were prominent, tamper-evident PP, varieties of dispensing caps, and larger HD types with a semi-plug type closure. One piece "crabs-claw" types were not in evidence, nor the child-resistant Clik-lok or Pop-lok types.

Though a very wide range of plastics containers and closures were in use, many containers were imported, either empty or already filled. Thus, though the Jamaican plastics packaging industry does not at present manufacture a great range of rigid plastics containers and closures, nevertheless it is aware of most of the currently available styles and can, therefore, react quickly to possibilities for home manufacture.

GUIDANCE GIVEN TO THE COUNTERPART

A major part of the Consultant's time was spent in this activity, as it was the prime objective of the mission. The workplan, Annex II, shows the outline of the instruction given, which basically fell into four categories. These were:

(1) Formal lectures.
(2) Individual Instruction Sessions.
(3) Tutorial Sessions.
(4) Accompanied visits to Supermarkets and Plastic Converters.

At the end of the mission the Counterpart had a good working knowledge of:

(1) The nature of thermoplastics,
(2) the way that rigid plastics containers are made,
(3) how they are filled and closed,
(4) what products can be packed in plastics,
(5) how suitability shelf-life, and quality control testing is carried out,
(6) how plastics containers are transported and stored,
(7) how the use of rigid plastics containers may be affected by biological safety legislative and environmental aspects, and
(8) the way specifications, standards, and test methods are established for plastics containers.

The Consultant was greatly helped in this part of the mission by two factors:

(1) The previous instruction given to the Counterpart on flexible plastics packaging by earlier Consultants to the project, and

(2) the high level of intelligence and motivation shown by the Counterpart.

RECOMMENDATIONS

1. COUNTERPART

Additional training and experience should be acquired, as follows, by,

1.1 Working in an established packaging laboratory in the industrial sector, i.e. either a major plastics converter or an industrial research association. In view of the preponderance of imported plastics packaging from North America, a period in a laboratory in the USA would afford the most benefit.

1.2 Continual monitoring of rigid plastics packaging in the market-place so that types new to the Counterpart can be obtained and identified.

1.3 Carrying out the training projects initiated by the consultant on MVTR determination, compression testing, determination of the density of plastics, and cap leakage testing.

1.4 Immediate reading of Consultant recommended books on plastics and food technology, and continued reading of journals on plastics and plastics packaging ordered by the Library.

2. PLASTIC CONTAINERS

Action is required in a number of areas, basically aimed at improving and strengthening the Jamaican plastics container industry.

2.1 There are too many faulty closures on plastics containers, mainly screwcaps. These are largely due to threadform faults on both bottles and caps, and poor application techniques and lack of quality control by some packers. A survey should be carried out to define the problem areaa more precisely, particularly in the popular 28mm size.
The Packaging Centre can then work to improve the capping situation by encouraging converters to conform to standard threads, and advising packers on the correct closing procedures.

2.2 In view of the shortage of raw materials, consideration should be given to establishing a standard range of containers for products such as vegetable oils, detergents, pharmaceuticals, etc. In consultation with Government and Industry the Bureau should establish design parameters which would enable converters:
(a) to use a minimum of resin per unit volume of product and
(b) increase their manufacturing efficiency.
Apart from saving raw materials, such a course would also help to keep the cost of plastics packaging to a minimum.

2.3 In view of the balance of payments situation and also the desirability of encouraging Jamaican Industry in general, the question of import controls should be reviewed. It would seem undesirable to import an empty or filled plastic container solely for marketing reasons of design or shape, when home produced containers are available which are technically suitable for the product to be packed.

3. ROLE OF THE PACKAGING CENTRE

If Jamaica is to benefit to the full from this Project, the Packaging Centre cannot take the passive role of waiting to be asked for assistance. A positive dynamic approach must be taken from the start, to ensure that industry and consumers alike benefit to the full. At first educational aspects will inevitably dominate the Centre's activities, but as confidence in the Centre grows other aspects will follow. At present four major areas should receive particular attention:

3.1 The three items discussed in 2. viz. closures, standard plastic containers, and import controls.

3.2 Education of Government, Industry and consumers in the potential and correct usage of plastics containers, by means of seminars, teaching, lectures, and personal contacts.

3.3 The establishment of contacts with both converters and users of plastics containers, so that both sides of industry can be encouraged to solve mutual problems using the knowledge and sophisticated package testing equipment now available in the Centre. As the Centre gains in stature it will also be able to undertake the valuable activity of arbitration in disputes between suppliers and users of packaging.

3.4 Familiarisation by Centre personnel with world-wide legislation affecting packaging, particularly where foodstuffs are concerned. Jamaican exporters wishing to use plastics may then be advised in this very complicated and difficult area, which is so often a stumbling block to successful exporting for many countries.

4. MISCELLANEOUS

4.1 A bench-type heat sealer for plastic pots and bottles giving control over temperature, head pressure, and dwell time should be obtained. Also a U.V. light tester.

4.2 A packaging engineer with experience of machinery for filling, closing, and handling plastics containers would be a valuable addition to the Centre's staff. Failing this, one of the existing staff with mechanical aptitude should be trained for this function in a part-time role.

4.3 Users of polythene bags should be advised that impulse sealing equipment is advisable to seal unsupported polythene.

4.4 The sterilizable pouch should only be used for catering packs if the A.10 can is not available. Additionally it must only be used for acid foods having no food poisoning hazard, and only for, "in-house," situations.

ANNEX I

CONTACTS MADE IN JAMAICA

BUREAU OF STANDARDS

Dr. Artnel Henry	-	Director
Mr. K. Garfield	-	Head, Materials Science
Mrs. M. Domville	-	Head, Packaging Centre
Ms. I. M. Bennett	-	Retail Pack Specialist
Ms. P. Douce	-	Packaging Materials Specialist
Mr. E. Williams	-	Transit Packaging Specialist
Mr. E. Schmidt	-	Consultant, Transit Packaging

FOOD TECHNOLOGY INSTITUTE OF JAMAICA

INDUSTRIAL DEVELOPMENT CORPORATION

Ms. Y. Hall	-	Head, Food Technology Institute

UNITED NATIONS DEVELOPMENT PROGRAMME OFFICE

Mr. Y. J. Joury	-	Resident Representative
Ms. V. Watt	-	Administrative Head
Dr. A. Aziz	-	Zone 3 Warden

THERMOPLASTICS (JAMAICA) LIMITED

Mr. B. Johnstone	-	General Manager
Mr. Amitirigala	-	Technical Manager

PLASTIC CONTAINERS LIMITED

Mr. Trevor Little	-	Plant Manager
Mr. George Stewart	-	Sales Manager

GRACE FOOD PROCESSORS LIMITED

Miss Mabel Tenn	-	Technical Director, Grace Food Processors Limited

ANNEX II

TRAINING PROGRAMME - RIGID PLASTIC CONTAINERS

IVOR TURTLE - 6 OCTOBER TO 28 OCTOBER 1980

MONDAY, 6 OCTOBER	TUESDAY, 7 OCTOBER	WEDNESDAY, 8 OCTOBER	THURSDAY, 9 OCTOBER	FRIDAY, 10 OCTOBER
	11 a.m. - Visit - Lane and Lennhapp Supermarkets	2 - 3:30 p.m. Talk - Plastics Properties		2 - 3:30 p.m. Talk - Manufacture of Plastics Containers
Counterpart: Nature of plastics, their properties and identification, manufacture of containers.				
MONDAY, 13 OCTOBER	**TUESDAY, 14 OCTOBER**	**WEDNESDAY, 15 OCTOBER**	**THURSDAY, 16 OCTOBER**	**FRIDAY, 17 OCTOBER**
2:30 p.m. - Visit Thermo plastics Jamaica Limited	9 - 10:30 a.m. Talk - Types of Plastic Containers	10 a.m. - Visit Woolworth	9:30 a.m. - Visit Plastic Containers Limited	10:30 a.m. Miss Y. Hall FTI, Retort Pouch
			2- 3:30 p.m. Talk - Closures	2 - 3:30 p.m. Talk - Selecting the Correct Plastic
Counterpart: Correct selection of containers and closures, problems of panelling, collapse, stress cracking, etc.. Biological safety considerations.				

MONDAY, 20 OCTOBER PUBLIC HOLIDAY	TUESDAY, 21 OCTOBER	WEDNESDAY, 22 OCTOBER	THURSDAY, 23 OCTOBER	FRIDAY, 24 OCTOBER
	9 a.m. - Visit - Durable Products Limited. 2 - 3:30 p.m. - Talk - Suitability Testing of Plastics Containers		9 - 10:30 a.m. Talk - The Future for Rigid Plastics	
Counterpart: Laboratory evaluation of containers via storage, abuse, gas transmissions, and polysensory analysis. Standard test methods, statistical validity and reporting.				
MONDAY, 27 OCTOBER	TUESDAY, 28 OCTOBER	WEDNESDAY, 29 OCTOBER	THURSDAY, 30 OCTOBER	FRIDAY, 31 OCTOBER
Counterpart: Report Preparation and Discussion				

ANNEX III

VISITS TO PLASTIC CONTAINER MANUFACTURERS

1. PLASTIC CONTAINERS LIMITED

Present:	Mr. T. Little	-	Plant Manager
	Mr. G. Stewart	-	Sales Manager
	Mrs. M. Domville	-	Packaging Centre
	Ms. I. M. Bennett	-	Packaging Centre
	Ms. P. Douce	-	Packaging Centre
	Mr. B. I. Turtle	-	U. N. I. D. O. Consultant

The object of this visit was three-fold (a) to introduce Packaging Centre staff to bottle-blowing operations, (b) to acquaint Plastic Containers Limited with the aims and objectives of the Packaging Centre and (c) to enable Messrs. Little and Stewart to discuss the blow-moulding business in Jamaica with B. I. T. from both technical and marketing viewpoints.

Plastic Containers Limited have five Bekum machines, three of which have two mould stations, and two have one. At present they only use HD polythene but have the ability to blow PVC containers of quite good quality; however PVC is no longer available due to the lack of foreign exchange. One single lane continuous screen printer and one hand screen machine were ...

used to print bottles two to three colours. Sizes blown range from 16 ounces round up to one gallon, oblong and round.

Products packed in the HD containers include, detergents, bleaches, cleaners, vegetable and mineral oils. The Company is however suffering from the problem of too many short runs, with a great deal of the business barely profitable. Mr. Little considered that the Jamaican Government should legislate to introduce ranges of standard containers, and then tax to discourage the use of non-standard containers. This would save valuable foreign exchange, since many bottles are imported from abroad.

Generally speaking, there were no serious complaints from their customers, the majority being on decoration or bottle quality rather than on technical aspects of performance or leakage. Mr. Little and Mr. Edwards were interested to hear of the success of HD polythene bottles for motor oils in Europe and said they were considering a project for a IL bottle at the moment. A long discussion ensued on the performance of HD for a variety of products, both food and non-food, and the importance of the correct grade of HD for the end-use was stressed.

We were very pleasantly received by these two gentlemen who obviously considered the Packaging Centre could be of benefit to converters such as themselves. The visit ended with a tour of the factory and the quality control laboratory.

2. THERMOPLASTICS (JAMAICA) LIMITED

Present:	Mr. B. Johnstone -	General Manager
	Mr. Amitirigala -	Technical Manager
	Mrs. M. Domville -	Packaging Centre
	Ms. I. M. Bennett-	" "
	Ms. P. Douce -	" "
	Mr J. Salisbury -	U. N.I.D.O. Project Manager
	Mr. B. I. Turtle -	U.N.I.D.O. Consultant.

The aims of this visit were the same as for Plastic Containers Limited, but with the emphasis on injection-moulding rather than blow-moulding. It was interesting that the Company had sold their blow-moulding equipment to Plastic Containers Limited in case of competition with their parent company, West Indies Glass. However, we gained the impression that they were still interested in blow-moulding, since they were keen to hear B. I. T. describe the European market for bottles.

We were given a comprehensive tour of the plant which showed a very well equipped laboratory, and a large moulding-shop Approximately twenty-five screw-injection machines were producing a wide variety of components. These included half-gallon and one quart ice-cream containers in HD, five gallon HD buckets with LD lids for fish, crystal polystyrene, clear or pigmented PP tubes for pharmaceutical tablets, and bottle crates in HD. Non-packaging items included cutlery in TPS, and pipe fitments. We

were also shown the very large PVC extrusion department for both rigid and flexible pipes which was almost shut down due to lack of orders. They also manufacture thermosets screwcaps.

The state of the European market for injection-mouldings was described, including 2½L containers, or lids for emulsion paint in HD or LD, the wide variety of one piece caps available and the polypot business. In view of Thermoplastics in-depth knowledge of plastics processing it was suggested they might consider re-entering the blow-moulding field, possibly to make HD bottles for oil, or PVC or perhaps PET for fruit squashes in view of the glass shortage in Jamaica.

Mr. Johnstone seemed pleased to see us, and also expressed his opinion that the Packaging Centre could be of considerable help to converters, both to give technical advice and also to arbitrate on complaints between user and supplier. He said they were shortly increasing their scope for cap business by obtaining wad-insertion equipment. They had also developed a range of screw-capped containers from 10ml to 250ml to be produced in crystal styrene and polypropylene.

As for Plastic Containers the possible products which could be packed in I.M containers were discussed, and in particular BIT suggestions to pack spices, dark jams, treacle, etc., could interest local food packers, particularly in view of the shortage of glass containers. Another possibility was introducing

machinery to make large loose-head containers for storage of pulped or pureed fruits by Jamaica or Caricom area food processors.

ANNEX IV

SYNOPSIS OF TALKS TO

PACKAGING CENTRE STAFF

1. PLASTICS PROPERTIES

The source, manufacture, and properties of the plastics used in packaging were described, with emphasis on the big volume plastics namely, PVC, the styrenes, the polythenes, and polypropylene. Included were topics such as chemical resistance, gas and moisture transmission, strength, and light effects. The fundamental differences between the plastics used in packaging and impermeable, rigid packaging materials such as glass and tinplate were emphasized.

2. THE MANUFACTURE OF PLASTIC CONTAINERS

The rheological properties of thermoplastics lend themselves to forming methods involving pressure and temperature cycling. The fundamentals of injection-moulding, blow-moulding and thermoforming were explained, together with the advantages and disadvantages of these three mainly used methods. Also reviewed were modifications of the basic processes such as compression rim forming, plug-assist, injection blow-moulding, stretch blow-moulding, and the manufacture of rigid plastics laminate. The economic

factors which often decide between one method and another were also outlined.

3. TYPES OF PLASTIC CONTAINERS

This talk stressed the design versatility of plastics which enables an immense variety of styles and shapes of container to be produced. Discussed at length were polypots, bottles, drums, pails, collapsible and rigid tubes, tubs and plastic cartons. Economic considerations such as the increased expense of injection moulds versus thermoform moulds balancing the expense factor against quality and numbers of containers required were also dealt with. The different approach to in-plant handling of plastics due to their light weight compared to metal or glass was outlined, i.e. the use of air conveying systems, and the avoidance of unstable designs. Labelling and printing options were described with reference again to the cost quality relationship and its inter-relation with sales.

4. CLOSURES

It was stressed that the integrity of the total package cannot be better than that of the closure, and a poor closure on a high barrier plastic container did not make sense. Therefore it was essential at the outset to decide whether a hermetically sealed closure was required, or lesser integrities

such as liquid-tight or perhaps only dust proof.

High barrier closure systems were described, including heat seal foils, induction heat sealing, ultrasonic and spin welding, wadded caps, spigot seals, and Obrist and Grussen caps for carbonated beverages. The need for strict quality control over the closing operation, whether by cap or heat-seal, was emphasized, and the problems frequently encountered in the field due to incorrect application of closures were enumerated in some detail.

Low barrier closures, such as snap-on caps and some wadless screw-on caps were described, together with the situations where they could be used successfully. Finally, the versatility of plastics closures was shown by describing the many different tamper-evident, pour-spout, venting, rotex; metering,and other styles available.

5. SELECTING THE CORRECT PLASTIC

The aspect of this talk was product/container compatibility with respect to both foods and non-foods, and the shelf-lives to be obtained with various plastics. The need for carefully enumerating all the relevant factors before choosing a plastic was stressed. If a non-food, was it flammable, corrosive, volatile, strong-smelling, etc.?

If a food, did it require moisture or oxygen protection, was it microbiologically stable or was there a food poisoning risk? For both categories, what was the storage life required and under what conditions, since overpackaging was to be avoided as well as underpackaging.

Problems with non-foods such as solvent permeation, stress cracking, and panelling with oils and solvents, and the means of avoiding or minimising these effects were described. Panelling and stress cracking could also occur with foodstuffs, and in particular panelling due to hot or warm filling of products. Additionally many aqueous non-acid foods could support the growth of spoilage or food poisoning micro-organisms if the correct package type was not selected for the relevant conditions of storage; the essential criteria to prevent these hazards were outlined. Finally the aspect of biological safety was discussed with reference to the testing procedures and migration limits laid down or proposed by the U. S. F. D. A. and the E. E. C.

6. SUITABILITY TESTING OF PLASTIC CONTAINERS

The laboratory procedures used to establish the shelf-life of a product in a plastic container were described in detail. Physical testing involved dropping, tumbling, vibrating and compression strength evaluation. These methods were discussed together with relevant factors such as the performance to be expected from the different types of plastic.

Shelf-life testing was the only way to be completely sure of the plastics suitability, and was essential where problems of plastic taint might arise. Organoleptic procedures to ascertain whether a taint or flavour change had occurred in a food were discussed, together with possible taint problems which occur with packaging plastics, either by faulty selection or via faulty manufacture.

Predictive short term testing had a value, especially where moisture pick-up was concerned, since higher than normal humidity conditions could be utilized. Where oxidation of fats or colourings was concerned predictive testing was difficult, even though mathematical modelling techniques could help. The use of statistical techniques to assess the confidence level of any predictive made was essential, and such techniques were also valuable in organoleptic testing. The preferred statistical methods were explained.

7. THE FUTURE FOR RIGID PLASTICS

The competitive position of plastic containers with glass and metal containers was unlikely to worsen in the forseeable future because all three types needed oil. Even though glass and metal were not derived from oil as a raw material they were heavily dependent on it as an energy source. Since plastics packaging only used about 1% of the worlds oil it would, because of its essential properties be with us until the world's oil supplies ran out - well into the 21st Century even on conservative estimates.

On a shorter time scale plastics use would increase for paints, adhesives, chemicals etc., especially in the larger sized containers where they were now considerably cheaper then metal. The successful culmination of over a decade of work to develop high barrier laminated containers meant a large increase in the use of plastics as a substitute for pasteurised and sterilized foodstuffs currently in glass and metal. This was mainly because they were intrinsically cheaper and also lighter to transport. The styles of laminated containers now available were described.

Environmentally the more pragmatic approach now being adopted by some legislators was encouraging. Nevertheless, the urge to ban non-returnable containers might slow plastic container development, since re-use was difficult to achieve. However a great deal of work was now being undertaken to overcome the problems of recycling plastic containers, and it was likely that such recycling schemes would be at least as worthwhile as comparable schmes for glass and metals.

ANNEX V

DISCUSSION WITH FOOD TECHNOLOGY INSTITUTE

Present:

Miss Y. Hall	-	Head, Food Technology Institute
Mr. J. Salisbury	-	U.N.I.D.O. Project Manager
Ms I.M. Bennett	-	Retail Pack Specialist
Mr. B.I.Turtle	-	U.N.I.D.O Consultant

This meeting was arranged because Miss Hall had a number of topics which she wished to discuss with the Consultant. The main items discussed are briefly summarized below:

1. Re-use of Plastics Containers

   Since the possible re-use was for foodstuffs the Consultant advised that this was a very difficult area. The main trouble was intermediate use by the consumer for a non-foodstuff which would taint the container, or much more seriously, introduce toxic substances into the walls of the container. The re-use container of interest in Jamaica was the 1 gallon in HD polythene, and it is well known that the polyalkenes absorb a wide variety of aromatic and other substances. Though human sniffing or gas chromatograph techniques could probably detect tainted containers there was no practical way to ensure that harmful residues such as insecticides were not absorbed in the body walls. The problem was made even more intractable by the fact that HD containers would distort under steam or very hot water cleaning techniques. The Consultant advised against the practice of re-use. He suggested that if containers for products such as cooking oil became scarce then consumers should bring their own clean containers to a bulk retail outlet.

2. Hot-Filling of One Gallon HD Containers

Experiments with hot-filling fruit juices in the Food Technology Institute(circa 90°C had indicated a problem with base-welds splitting. It was advised that there was no simple repair technique to seal these splits. Since the HD container manufacturer had not intended his container to be subjected to hot filling he should be asked if he was prepared to supply for this application. There was no technical reason why suitable containers could not be produced, but modifications to the blow-moulding process would be necessary, and perhaps a resin change, and this might prove uneconomic.

3. Sterilizable Foil Pouches for Catering Packs

In general the Consultant reiterated what previous Consultants had made clear, that the Sterilizable pouch could not be used safely under the level of technical control economically viable in the Jamaican Food Industry. The tinplate container was, however, used successfully and should continue to be used by food processors.

However, a query has been raised by a large food company (Grace Kennedy) as to the possibility of using the foil pouch for local deliveries to hotels employing in-house transport, or as storage containers for "out-of-season" fruits. The consultant advised that the fragility of 2Kg catering pack pouches was such that they should only be used as a last resort if A10 cans were not available, since process and transit losses would be much higher than for the can. Additionally they must only be used for acid foods offering no food poisoning hazards.

4. Sealing of Polythene Bags

There have been numerous complaints from food packers concerning the difficulty of sealing LD polythene bags. It appeared, however, that these complaints arose from the use of hot-bar sealers instead of the impulse type of sealer required for unsupported polythene. The Packaging Centre has impulse sealing equipment and will be able to advise users of polythene bags on the correct sealing methods. The Consultant suggested that the incorrect hot bar equipment could be made passably suitable by :

(a) covering the sealing jaws with material such as teflon or heavy gauge cellophane, and

(b) reducing the temperature to the minimum and transferring the seal into cold metal jaws immediately after the sealing cycle.

ANNEX VI

RECOMMENDED TECHNICAL DATA

1. Modern Plastics Encyclopaedia, 1980.

2. Colouring of Plastics, Webber, T.G., The Centre for Professional Advancement, 1979.

3. Packaging Regulations, Sacharow, S., The Centre for Professional Advancement, 1979.

ANNEX VII

TECHNICAL DATA LEFT WITH THE

PACKAGING CENTRE

1. The Chemical Resistance of HD Polythene, BP Plastics Ltd, July 1969.

2. British Standard 3755. Methods of Test for the Assessment of Odour from Packaging Materials Used for Foodstuffs, March 1971.

3. The conduct of Organoleptic Test Panels and Organoleptic Test Procedures, Metal Box Ltd., June 1976.

4. Test for Environmental Stress Cracking, B. S. I., 1970.

5. Unit Conversion Factors, Metal Box Ltd. June 1970.

6. PET Bottles are Big Business, Anon, Modern Plastics International, March 1980.

7. How to Reheat Blow Mould PET Bottles, Shriver, C, Plastics Technology, Volume 23, 1977.

8. Can PET Bottles be Recycled Profitably, Tomaszek, T. R. Beverage World, April 1980.

9. Estimating Long Term Creep Failure, Metal Box Ltd., July, 1980.

10. Effect of Radiation Sterilisation on Packaging Materials, Gopal, N. G. S., Packaging-India, October 1975.

11. Plastic Drums Challenge Steel, Anon, Packaging Today, January 1980.

12. Flavours in Milk, Metal Box Ltd., April 1971.

13. Flexible Packaging, TURTLE, B. I. Institute of Packaging Lecture, June 1980.

14. Theory of Water Vapour, Odour, and Gas Transmission. Through Materials, Turtle, B. I., Institute of Packaging Lecture, June 1980

15. Plastics for Packaging, Turtle, B. I., Institute of Packaging Lecture, February 1980.

16. The Chemical Resistance of Polypropylene, I. C. I. Ltd., January 1971.

17. The Chemical Resistance of PVC, I. C. I. Ltd., November 1969.

18. The Chemical Resistance of LD Polythene, I. C. I. Ltd., August 1965

19. Plastics Suitable for Thermal Processing, Turtle, B. I. , IFST Symposium, September 1977.

20. Packaging Protection for Oxygen Sensitive Products, Karel M, Food Technology, August 1974

21. Plastic Containers for Perishable Foods, Turtle, B. I., LWT Report, October 1976

22. A Rapid Method of Determining Significance of Differences from Rank Sums, Kramer, A. , Food Technology, 14, 1960.

23. Revised Tables for Determining Significance of Differences Kramer, A. , Food Technology, December 1963.

24. Expanded Tables for Determining Significances of Differences for Ranked Data, Kahan, et. al, Food Technology May 1973.

25. Users Guide to Blow-Moulded Plastics Containers, The British Plastics Federation, March 1980