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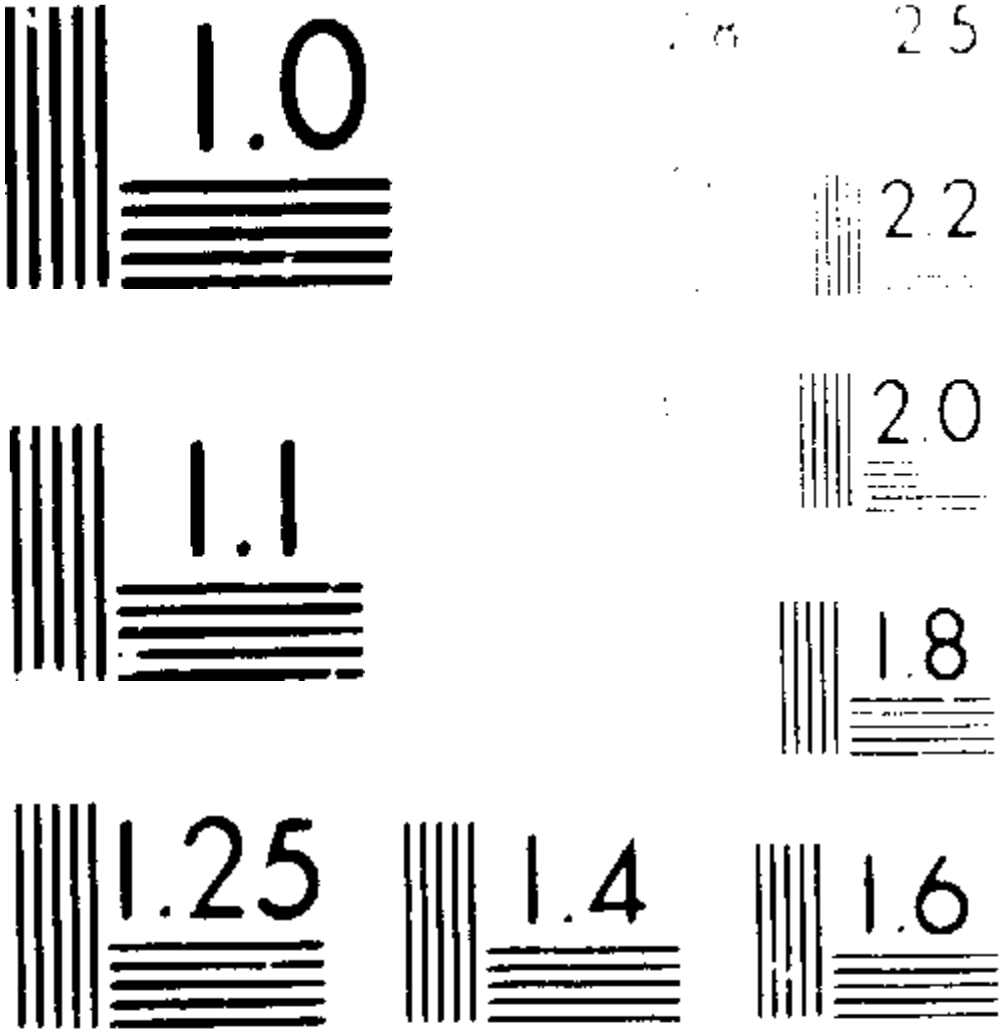
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STRENGTHENING THE NATIONAL PACKAGING CENTRE

SI/POR/80/801

PORTUGAL

Technical report: [illegible]

ABSTRACT

This mission report concerns retail package and material testing assistance given to The Centro Nacional de Embalagem, Portugal. The mission was part of the support project SI/POR/80/801 jointly funded by UNIDO and UNCTAD/GATT/ITC. Mission dates September to December 1981.

The equipment needed for a packaging laboratory specialising in these subjects are given and the problems encountered in providing the kind of service that the local converting and user industries require is discussed, together with proposals for a method of working that should lead to more effective application of the equipment available. The scheme centres on the use of video training films in packaging materials and containers.

INTRODUCTION

A major factor in the present development aims of the Portuguese Government is the development of export orientated industry. It is recognised that developing exports is an increasingly complex matter and the role played by the packaging involved is of constantly increasing importance. Not only must the exported product meet the needs of the buying public in the target markets but the number and complexity of the legal requirements related to the type of packaging used is growing rapidly. This is especially true of the EEC which is a vital market in Portugal's export growth plans. It is not possible to separate the relatively high technology needs of the export market from the needs within the country; the general level of technology in the supplier and user industries must be raised for effective change to be brought about. It is the Government's wish that such technology should be available to the industry through the country's indigenous institutions as one step towards industrial improvement and expansion.

In 1962 a Portuguese Packaging Institute was created as part of the drive to improve exports. This Institute had no technical facilities.

In April 1972, the name was changed to The National Packaging Centre and in 1974 a start was made in establishing technical facilities in the present premises. Assistance was given by the French Packaging Institute in the selection of equipment but no specialised training was given at that time. The Centre has therefore been able to provide some technical services to industry.

In 1978 a joint evaluation mission by UNCTAD/GATT.ITC. and UNIDO recommended that consideration be given to an assistance project, supported by UNDP, of approximately 300,000 US $ to strengthen the equipment and expertise of the Centre so that it may play a more positive role in the development of the countries industry and export efforts. Such a programme was not possible at that time therefore interim support was given during 1980 and 1981 by UNCTAD/GATT.ITC. (14,100 US $) and UNIDO (US $ 37,800), largely in the form of consultancy help.

The first consultancy was concerned with transit pack testing (2 m 1980) the second consultancy was concerned with certification (2 months,1980). This third and present consultancy was concerned with material and containers

for retail packaging and future planning.

1. RECOMMENDATIONS

1. The project proposal in Annex 4 should be implemented as part of the UNDP Country Programme starting in 1982.

2. If the budject for the proposed UNDP project is cut, any revised document should concentrate on aquiring the equipment necessary for offering a first class materials testing service, and on ways that the Centre staff can become expert in it's use.

3. The Centre's technical staff should concentrate for at least the next two years on becoming established experts in the test equipment and test methods used in the materials testing of paper, board, plastic films and laminates, and in transit pack testing, and giving a first class service in these subjects.

4. Special efforts should be made to create video training films concerning test methods and their applications because they can make a major contribution to the future growth of the Packaging Centre, both financially and in it's impact on the level of packaging technology in Portuguese industry.

5. Since the video training technique is applicable to new packaging laboratories in many other countries, the help of the International Aid Organisations (E.E.C. for example) could be sort in covering the cost and expertise involved.

6. The concept of training industrial technical staff in testing procedures and applications and then allowing them access to the Centre's test equipment should be very seriously considered because it helps resolve the problems of confidentiality and the short time in which results are so often required.

7. Investigational work on the relatioship between material properties and machine performance is perhaps better done by industry's staff using the Centre's facilities.

8. High priority should be given to the work at present being done in preparing detailed test methods, in Portuguese, for all existing equipment and for new equipment. These should first be established as the Centre's Test Methods and should be based as closely as possible on those proposed by the International Standards Organisation or a body of similar international standing. The methods should be reviewed by a committee representing those organisations involved in Portugal and them agreed as National Standards.

9. The work involved in shelf life testing retail packaged products is time consuming and expensive. The Centre should arrange to provide the facilities necessary, such as climatic chambers, storage trial planning and programming, but the sample preparation and periodic product evaluation should be done by industry's technical staff.

10. The technology associated with tinplate containers, and to a lesser extent glass containers, should not be considered by the Centre for at least three years. The cost of the equipment needed is high and it is believed that the subject is being adequately covered by another organisation.

11. The courses presented by the consultant in Folding Carton Technology and Flexible Packaging Technology should be translated into Portuguese and presented in the future at intervals of one year by a specialist from Portuguese industry. Other courses should be developed for regular presentation by the Centre, with the help of specialists from industry.

12. The technical staff of the Centre will need to be increased eventually to include at least 5 graduates if it is to make a viable contribution to it's own costs.

13. Assistance to other Portuguese speaking countries should be limited for some years to transit packaging problems but should aim to progress to the training aspects to be developed for the Portuguese industry.

2. OBJECTIVES AND ACTIVITIES

The principal objective of the Mission to work with the staff of the Packaging Centre on the testing of retail packaging and the materials associated with this activity. The Centre needs additional equipment and this was described and a list of possible purchases prepared. A programme of work was prepared to cover the period 1982 to 1984.

Special attention was paid to the problems associated with creating a testing service that will be attractive the manufacturing and user industries and to the role of the Centre in training personnel from industry, and other Portuguese speaking countries.

The above information was embodied in a project proposal document for presentation by the Centre to the Portuguese Government with the request that it be made part of the UNDP Country Programme due to begin in 1982.

A number of visits were made to the carton converting industry and the plastic films and laminates industry.

Two training courses were given for Portuguese industry:

1. December 3/4 Folding Cartons for Food Packaging
2. December 9/10/11 Plastic Films and Laminates for the Packaging of Food.

The course programmes are given in Annexes 2 and 3. The list of participants and the companies they represented are given in Annexe 1. There were 25 participants in the Carton Course and 30 in the flexible packaging course.

A report describing the mission was prepared and submitted on 18 December 1981.

The consultant arrived at the Packaging Centre on 1st September and left on 18 December 1981.

3. CONCLUSIONS AND DISCUSSION

3A. CONCERNING RECOMMENDATION 1. THE PROJECT PROPOSAL FOR UNDP

When the consultant arrived in Portugal, the Centre was in the process of preparing a submission for a proposed project to be placed before the Portuguese Government for consideration as part of the 1982/1985 UNDP Country Programme of Assistance. As a major part of the consultants work was in preparing a fundamental programme of work for the future, considerable effort was put into assisting the Centre Management and Directors with this activity.

The proposal was based on the recommendations made after the joint UNIDO/ITC mission in 1978 that recommended an assistance programme costing in the region of US $ 300,000.

The full, final, Project Proposal Document, is attached as Annex 4, and some some of the key points made are:

a) That equipment concerned largely with materils and retail package testing costing in the order of US $ 100,000 would be required to enable the Centre to offer a good standard of testing service to the industry. Detailed equipment recommendations are given in Section 3B.

b) That a special effort should be made to ensure that any training exercises such as visits by consultants, should be recorded in such a way that for years afterwards they are available for training new Centre staff, technical personnel from industry, and for use in any efforts to give assistance to other Portuguese speaking countries. It is suggested that this can be done by the preparation of video training films. This approach is described in more detail in Section 3D.

c) That suitable consultancies could be the following:

	m/m
1. Training and Project management	5
2. Materials testing (Paper & Board)	2
3. Materials testing (Plastics)	2
4. Food Packaging	2
5. Export Certification	2
6. Transit testing	1
7. To be specified	1
Total m/m	15

3B. CONCERNING RECOMMENDATION 2. POSSIBLE MODIFICATIONS TO THE PROJECT PROPOSAL

The final decision by the Government on the proposal for a UNDP project in the order of US $ 300,000 had not been taken by the time the consultant left, but early discussions had indicated that since only 1m US $ was available to the Ministry, and demands in the order of 1,600.000 US $ were being considered, it seemed unlikely that the full amount requested could be granted. It seems therefore wise to indicate what form a revised document could take, and to indicate priorities.

It is suggested that the equipment purchased would be selected from the following list:

EQUIPMENT	PRIORITY
1. Gas chromatograph (retained solvents)	1
2. Burst tester	1
3. Leak tester (for pouches)	2
4. Water vapour permeability tester	3
5. I G T Absorbtion and pick tester	1
6. Modifications to the climatic cabinets storage rooms	1
7. Air porosity tester. Gurley	3
8. Surface smoothness tester Bendtsen	1
9. Coating thickness testers	3
10. PIRA crease Stiffness tester	1
11. PIRA Creasability tester	1
12. Box stapling equipment	3
13. Sample cutters	1
Tensile test	
Ring crush test	
Guilliotine for corrugated box samples	3
14. Box strapping equipment	3
15. Taber stiffness tester	1
16. Visual aid equipment	1
Video playback equipment	
Cameras, movie and 35 mm.	
Projector	
Screen	
Slide copier	
Tape recorder	
17. Controlled temperature oil and water baths	2
18. Furnace for paper ash content	2
19. Intercomm equipment	3

EQUIPMENT	PRIORITY
20. Spare parts for the above equipment	1
21. Small miscellaneous laboratory items (to be specified)	
22. Oil Retention Time Tester (ORT)	3
23. Dennison Wax Pick Test	1
24. Cap Torque Tester (Owens Illinois)	1
25. Vacuum desiccators for ERH Tests (6)	1
26. Friction Tester. Inclined plane type	1
27. Rub Tester (Sutherland)	1
28. Small Spring Balances (Chantillion)	1
29. Flat electrode for surface pH.	1
30. Reflectometer for whiteness, brightness and opacity	2
31. Low power stereo microscope (x 10)	3

Probably the main attraction of a central laboratory is that is has equipment available, and the expertise to use that equipment correctly, that individual companies cannot afford to buy and maintain. Most of the above equipment is concerned with the laboratory testing of packaging materials for the paper, board, plastic films and laminates industries because here is where the most technical help is needed. If the equipment for the testing tinplate materials and containers and for glass containers was to be added, the cost would probably exceed 200,000 US $, a sum that does not seem relevant to these present proposals.

It is concluded that if cuts have to made, they should be in the consultancy help envisaged and in the fellowships abroad, although some balance has to be kept because projects dominated by equipment purchases are not normally accepted.

What is absolutely vital, however, is that the maximum benefit must be obtained from the 400,000 US dollars worth of equipment already in the Centre and any new equipment that is added to it. Any modified project proposal must have this as it's principle aim.

3C. CONCERNING RECOMMENDATION 3. FOCUSSING EFFORTS ON PAPER, BOARD, PLASTIC FILMS AND LAMINATES AND ON TRANSIT PACKAGING.

If the laboratory is to make a worthwhile contribution to the technological growth of industry, it must be better at the activities it undertakes than industry itself. Being well equipped is important but the use of the equipment and the best means of interpreting it's results takes a considerable time to

really master. If, the requested help on equipment purchase through the UNDP Project is agreed, there will be many new pieces of test equipment to bring into use, in addition to the testing activities normally carried out. These latter activities are expected to increase greatly in the coming year due to an agreement to carry out a considerable amount of testing work for the paper sack industry. There are over 100 tests associated with paper, board, plastic films and laminates and with transit pack testing, many of them associated with the new equipment. To master these methods in a way that makes them readily available for use in a meaningful way will take a great deal of time and effort yet it cannot realistically be foreseen that the technical staff available for the task is likely to be increased beyond the present very low figure of two.

At present the Centre does not work in the area of metal containers and does very little in the technology of glass. In general, companies operating in canning have a "know how" agreement with a foreign company (or they are a subsidiary of such a company) and therefore they have good access to the technological help they need. To some extent the same applies to the glass industry. The equipment necessary to make a contribution to the technology of these two subjects would cost between 50,000 and 75,000 US $, and there is nothing to suggest that such an amount could be made available. It would seem, therefore, good sense to concentrate on the subjects outlined above where the Centre already has a good start, and to establish a good working relationship with industry before attempting to expand the range of activities undertaken by the Centre. There are some exceptions, of course, such as aerosol pressure testing which would be continued as a useful special service.

What industry is most interested in are ways in which the efficiency of the increasing complex equipment in which they are investing can be improved. This calls for more and more materials testing so that Quality Control and Raw Material Assessment techniques can be gradually introduced and it is in this area that the Centre laboratory can be of most help.

3D. CONCERNING RECOMMENDATIONS 4.AND 5. VIDEO TRAINING FILMS AND POSSIBLE WAYS OF FINANCING SUCH AN ACTIVITY.

It is very important for the Centre staff to become thoroughly familiar with the equipment and to prepare standard test methods, in Portuguese, that are accepted by the Portuguese industry. This calls for a lot of time and effort on the part of the technical staff of C.N.E. and of any consultants who may visit the project, yet so often in the past the full benefits of such efforts have not

been achieved because the knowledge aquired by those engaged in the work is not readily available to others.

It is suggested that during the proposed new project, video training films are madefor as many of the test methods investigated as possible, there are over 100 methods associated with paper and board and flexible packaging alone. These films should not only illustrate the correct procedure for carrying out the test, but give details of the more common errors that are made, deal with the interpretation of the results and outline the applications in industry where the use of such methods have proved useful.

The video training films would be available for the training of new, Centre staff, in Portuguese, of course, but they can also form the basis of training programmes for technical personnel from industry and from other Portuguese speaking countries. Their great advantage is that they are available at any time, and at a reasonable cost to the user since the services of the Centre's senior staff are not being tied up each time. The person being trained can be confident that the information they are receiving is exactly the same as that passed on to all other people using the same facility and that it is information from an authorative source.

This is the vital step of "familiarisation" for the technical staff from industry refered to earlier, they can be trained in the correct use of the test equipment and afterwards allowed to practice on the actual equipment so that they become completely familiar with that the Centre has to offer and hence better able to apply the Centre's expertise to the problems they are experiencing in their Quality Control, Raw Material Assessment or Trouble shooting activities.

The point worth stressing here is that all of the preparatory work for the films has be done anyway if the equipment is to be thoroughly understood. The function of the films is to extend immensely the benefits that will be obtained from all that effort.

It was envisaged that the film making would be part of the proposed UNDP project and has been described as an activity in the project proposal given in Annex 4 and a timetable suggested. This is still a viable approach but there is another interesting possibility.

Many other countries are starting to build up laboratories to apply packaging technology to their industry and exports. Their needs and problems are exactly the same as those being faced by the Centre at the present time. For this reason video training films will be of immense help to them, especially in those countries where the language difficulties make it very difficult to

c) Industry does not like to expose it's problems and weaknesses to a central body. Many companies do not accept that their problems and test results can be kept fully confidential because one of the most important functions of the Centre is to make it's knowledge and techniques available to all members.

d) Industry feels that the information gathered by the testing activities of the central laboratory may be used later in the formulation of regulations and standards that could be detrimental to their interests.

e) Industry feels that the central laboratory staff can never thoroughly understand the actual problem under investigation, because they only have access to a limited part of the information available. Nor do they feel that the Centre staff can apprecaite the implications of any solutions they may propose because of their limited knowledge of industrial practices. Likewise to effectively interpret results from laboratory tests the technical person in industry has to thoroughly understand the test method, but at present he has little opportunity to do this.
If a wide range of video training films is available a whole new way of working with industry can be considered.
Technical personnel from industry have often sought direct access to the test equipment so that they may, on accasions, carry out tests at their own pace and with the confidentiality that doing it yourself brings. Also when you have carried out the tests yourself the results are so much easier to interpret.
In the past this was rarely granted because of the liklihood that the equipment would be damaged by people not able to use it properly and training outside personnel in it's correct use would be too time consuming and hence costly. Yet the idea is so attractive that it deserves re-examining to see if it can be made to work; perhaps all that expensive equipment could be providing desperately needed regular income instead of being idle 90% of the time. The technical staff of the Centre would not have to be increased greatly yet the potential for rapidly introducing a firm technological base into local industry would have been created. The senior staff of the laboratory would be available to advise on the selection of suitable test techniques that might prove useful in investigating specific problems, or the best tests for Quality Control purposes, but the industry would be providing the person to actually carry out the test work.
What is envisaged is that any company wishing to have acess to the facilities

to use certain kinds of equipment. To keep administration problems to the minimum the company would be charged for every hour that their representative is on the Centre premises, irrespective of the number of tests they carry out or the equipment used. This is not only simple, it ensures that the equipment is efficiently used.
The Centre, therefore, is deriving an income from it's assets and services in three ways:

a) Via the type of membership fee that companies pay at present (but now more would have an incentive to join).

b) Via a fee for training personnel from industry in testing technology.

c) Via the actual number of hours that their personnel spend in the Centre.

Industry will have kept control over exactly what they are paying for and have the confidentiality they rate so highly. It has been said that allowing industrial personnel onto the premises means a loss in confidentiality over the work being carried out by the Centre staff, but in the great majority of cases it is highly doubtful if any useful information is gained by just seeing samples, the Centre staff would not be discussing the technical work they have on hand. On those rare occasions that complete confidentiality is required, special arrangements can be made as is the case in industry, or part of the week can be kept free of visitors.
If personnel from all parts of industry are regularly visiting the laboratory, the Centre staff will have the opportunity to become much more informed about the equipment, procedures and the problems industry faces in their efforts to improve efficiencies or change to new packaging materials or containers. These personal contacts are the lifeblood of the Centre.

3F. CONCERNING RECOMMENDATION 7. RELATING A MATERIALS PHYSICAL PROPERTIES WITH MACHINE PERFORMANCE

One of the greatest values of understanding the effect that various physical properties have on the performance of Converting and User machinery in industry is that eventually specifications can be drawn up that describe to the supplier some of the characteristics that are needed. Not all desirable properties can be specified, of course. Before Raw Material Assessment schemes, or Quality Control schemes can be drawn up, a lot of basic data is needed about how the physical properties affect machine performance and their

watching the interaction that takes place under a wide variety of conditions. Obviously, the technical staff in the Centre's laboratory cannot do this for it means being on the site of the machine for very long periods and especially when difficulties are being experienced. Such background data is essential for comparison with the data obtained, when troubles are being experienced in the plant, one cannot recognise "abnormal" results likely to cause trouble if one does not know what a "normal" result is. The only people who can study these relationships effectively are the technical staff in the various factories but on many occasions they are going to need test results very quickly if they are to apply and expand their understanding of what is happening. For this reason it is urged that such people be trained in the use of the test equipment and allowed free access to it.

Naturally they will discuss some of their findings with the technical staff of the Centre who will learn a great deal from such discussions and in turn be able to contribute to problem solving activities by making suggestions based on what they have learned from the more theoretical approach, built up from reading the technical literature and their own work. This combination of theory and ideas with the hard practical experience, that can only be obtained dealing with real problems on the factory floor, is the very essence of introducing technology into the industry in a way that it brings about improvements.

3G. CONCERNING RECOMMENDATION 8. TEST METHOD DEVELOPMENT

There are a vast number of test methods in use in th the principal National ones in packaging being those from France, Germany, U.K., and the United States of America. But there are also many methods put out by International bodies, especially European, and great efforts are being made by the International Standards Organisation (ISO) to bring all these together so that throughout the world the methods of test are the same. The problem therefore is to decide whose method one should adopt, it being a very unwise move to develope ones own methods when so much work has already been done and the fact that the results would not be accepted by a supplier or customer in another country. The best starting point is those of I.S.O. and where-ever possible these should be adopted. However, the number of methods available from I.S.O. is limited and agreement on new ones can take years in each case. The Centre cannot wait for the agreed methods to be published and in those cases where nor exists at present a choice must be made from the National and International methods available. In making that choice the Centre has to bear in mind what methods are already well entrenched in Portuguese industry since changes ar

very hard to bring about and there has to be good reason for such a change. The next step is that the agreed form has to be translated into Portuguese so it is of use to all (most methods are used by relatively junior staff who often do not understand foreign languages). That method then becomes the Centre's method and is brought into use. It is essential to verify that this method is accepted by the Portuguese industry and each tentative method should be examined by a committee representing the various interested bodies in Portugal with the aim of making the Centre's method, into one that can be accepted as a Portuguese Standard. This too is a lengthy process, which is why the Centre must develop it's own methods and use them as a basis for the work of the committee who may well modify in due course as a result of the discussions with all concerned.

Those agreed as Portuguese Stanaard Methods will then be published in the normal way and so become available to all users throughout Portugal. Another important facet is that the type of equipment in use should be standardised as far as possible and it is an important function of the Centre laboratory to be well informed on the advantages and disadvantages of the various types in use throughout the world and try to encourage standardisation of equipment type throughout Portugal.

3H. CONCERNING RECOMMENDATION 9. SHELF LIFE TESTING OF PACKAGED PRODUCTS

Testing packaged goods for their shelf life is a service normally offered by a packaging laboratory such as has been established at the Packaging Centre. There are two climatically controlled cabinets that could be fitted with shelves and used for this activity. The Centre staff can do a great deal, eventually, in guiding the planning of shelf life experiments which are quite complicated to do well. What the Centre staff will find very difficult is the preparation of the required samples, which is very time consuming and demanding since the samples made up for storage must be representative of what is produced in the factory. The other problem concerns the evaluation of the state of the product which must be done periodically. The decisions as to what constitutes an unsatisfactory state for the product in terms of appearance, or taste, or moisture content, etc., are often subjective ones based on experience of what sells and what doesn't in the market place; what the customer accepts in other words. The staff of the factory are really the only people who can make such decisions in many cases. It is suggested, therefore that this is another instance where co-operation between the Centre and the technical staff in industry will produce the best results, the Centre provides the equipment, together with advice as to how to plan and programme such tests while the customer accepts responsability

for the preparation of the neccessary samples and the periodic evaluation of the state of the stored products. Again, a big advantage to the industry is that greater confidentiality has been achieved and they will have a better understanding of the results.

3I. CONCERNING RECOMMENDATION 10. TRAINING COURSES IN BASIS PACKAGING TECHNOLOGY

Presenting courses in basic packaging technology should be an important activity of the Centre. As an illustration of the form that such courses can take, the consultant presented two that represented a summary of the subject of the mission, is plastic films and laminates and Folding Cartons. The full course programmes are attached as Annexes 2 and 3 and detialed courses notes have been issued (in English). It is suggested thut these two courses now be translated into Portuguese and presented as an annual activity with the presentation being carried out by a specialist from the industries involved. Some 30 people attended the flexible packaging course despite it's presentat ion in English, which gives a measure of the interest. This activity can provide much needed income for Centre and needs to be followed up, and expanded.

A course that dealt with the use of the laboratory test equipment associated with flexible packaging was introduced into the packaging laboratory in Brazil by the consultant in 1971 and has been run every year since. This could be a next step. A course on transit packaging with actual use of the test equipment could be popular. Basic aerosol technology would be of interest and courses aimed at specific industries, eg "The Packaging of Pharmaceuticals", or "The Packaging of Ceramics". The Centre could be the focal point for such courses but they would need the help of specialists from the industry involved. Another approach would be for one of the present staff to take the Correspondence Course of the Bristish Institute of Packaging. This is o course in basic packaging technology and could form the basis of a similar series of lectures to be put together by the Centre technical staff.

3J. CONCERNING RECOMMENDATION 11. NUMBERS OF TECHNICAL STAFF

At present there are only two technically qualified staff in the laboratory. The amount of work than be turned out is therefore strictly limited and the contribution that two people can make to the overhead costs of the Centre cannot ever be very large. This is especially so when it is appreciated that a good

part of a technologists time must be spent absorbing new information about techniques and their applications, helping technical staff from industry with their problems and in arranging the maintenance, repair and calibration of existing and new equipment.

There are plans for a new graduate to specialise in the needs of the medium and small industries; a part of the existing staff's time must be allocated to his training but this will be of considerable help.

Because the technology of the various forms of packaging is so diverse, it is usual to introduce some degree of specialisation, for example in plastics, films and laminates, transit packaging, in paper and board, glass containers, metal containers, etc.. Some laboratories also employ an economist to specialise in techno-economic feasability studies. To cover these wide areas adequately, the Centre will eventually need at least, five graduate staff. Each should have more than one speciality so that if one leaves for industry or for other reasons, the service the Centre can offer is not seriously affected and a new person can be quickly trained.

The number of laboratory assistants required in the future will depend entirely on the amount of relatively routine testing work that is requested bu industry, but normally does not exceed the number of graduate staff.

3K. CONCERNING RECOMMENDATION 12. ASSISTANCE TO OTHER PORTUGUESE SPEAKING COUNTRIES

There is considerable interest in the possibility of the Centre giving assistance in the field of packaging to other Portuguese speaking countries, a visit was made recently by a member of the laboratory staff to Mozambique to examine this possibility. From the technical point of view, it is suggested that dealing with specific packaging problems in other countries is unlikely to be successful. This observation is based on the attempts to establish regional centres for just this purpose in several parts of the world which have not been very successful in this field. However, there is no doubt that once the Centre has a training scheme organised this can be of considerable help to these other countries. If people from Mozambique, Angola, etc. have been trained in Portugal, they can carry out investigations in their own country, using the testing facilities of the Portuguese Centre as and when they are required. It is feasible to provide a specialised testing service for overseas companies if the person using the service understands well that tests are available and how they apply to problem solving.

The problem with training personnel from overseas is that it is expected that a high proportion of the time of the senior staff member is made, available while the trainee is in the laboratory. With a small staff this is just not possible, especially if something important comes up at the same time. With a large staff it is still an expensive way of doing things, for example one major laboratory in U.K. charges £500 per week for this type of training and still does not want to do it because of the disruption to the normal work programme.

Another approach, suggested elsewhere, in this report, is that once video training films are available for use in Portugal, they can be applied to training in the other countries, they could perhaps be made available through a local technological centre. Again, idea would be to show very clearly what services the Portuguese Centre had to offer and how to apply the results of tests to bring about improvements.

ANNEX I

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ANNEX I

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GEL-MAR - EMPRESA DISTRIBUIDORA DE PRODUTOS ALIMENTARES

- Maria Helena Rebordão Morais

IGLO - INDÚSTRIAS DE GELADOS, LDA.

- Dália Maria de Oliveira

IMPRESSÃO E MANUFACTURA NEOCEL, LDA.

- Luís Antônio Rito Carvalho
- Maria Emília Veiga Ribeiro
- Rui Assis

INDÚSTRIAS LEVER PORTUGUESA, LDA.

- Ana Maria Soberano
- Graciete Paulino

INSTITUTO NACIONAL DE SEGUROS

- Carlos Alberto da Costa Fernandes

INSTITUTO PORTUGUÊS DE CONSERVAS DE PEIXE

- Teresa Jesus Florêncio

JUNTA NACIONAL DAS FRUTAS

- Luisa Maria de Carvalho e Vasconcelos Ferro

JUNTA NACIONAL DOS PRODUTOS PECUÁRIOS - COMPLEXO IND. MANIQUE

- Jorge Manuel Ferreira Dias Pablo
- José Luís Martins Ferreira A. Atanásio

KNORR PORTUGUESA - PRODUTOS ALIMENTARES, SARL.

- Joaquim José Soares Simões

LABORATÓRIO NORMAL - PRODUTOS FARMACÊUTICOS, LDA.

- Maria Ascensão Ceia
- Mário Rodolfo Pinheiro Aguiar

LUSOFANE

- Joaquim dos Santos
- António Gonçalves da Silva

MANUEL RUI AZINHAIS NABEIRO, LDA. (DELTA CAFÉS)

- Rui Augusto Pereira dos Santos

MONTARROIO - SOCIEDADE COMERCIAL DE CAFÉS, LDA.

- Elisa Maria Dias Oliveira

MONTEIRO, RIBAS - INDUSTRIAS, SARL.

- Maria Helena Castelo Branco e Costa

NESTLÉ PRODUTOS ALIMENTARES, SARL.

- José António Campos Pereira

PROEMBA - PRODUTOS DE EMBALAGEM, SARL.

- Gabriel da Silva Fernandes de Almeida

SEMPA - SOCIEDADE DE EMPACOTAMENTO AUTOMÁTICO, SARL.

- Manuel Filipe Fidanza

ANNEX I

PARTICIPATING COMPANIES IN FOLDING CARTONS COURSE

COLGATE-PALMOLIVE PORTUGUESA, LDA.

- Luís da Costa de Sousa de Macedo

COMPANHIA DE PAPEL DO PRADO, SARL.

- Alcino Pires Costa
- Ângelo dos Santos Loureiro
- Augusto Jacinto Góis
- Fernando Dias dos Santos
- João Matos da Cruz
- Júlio César da Fonseca
- Manuel Firmino da Costa
- Manuel Veríssimo Rodrigues
- Rua Vieira Neves

IGLO - INDÚSTRIAS DE GELADOS, LDA.

- Ramiro Ribeiro

INDÚSTRIAS LEVER PORTUGUESA, LDA.

- José Augusto Menano
- Graciete Paulino

INSTITUTO NACIONAL DE SEGUROS

- Carlos Alberto da Costa Fernandes

KNORR PORTUGUESA - Produtos Alimentares, SARL.

- João Vicente Lourenço
- Dante Pupo Lacerda Dias

J. M. DA FONSECA (INTERNACIONAL) VINHOS, LDA.

- Luís Serzedello de Almeida Machado

LITOGRAFIA PORTUGAL

- Carlos Manuel Peres
- Carlos Jorge Peres

MATOS & RODRIGUES, LDA.

- Carlos Alberto Mendes Pereira dos Santos

NESTLÉ PRODUTOS ALIMENTARES, SARL.

- Celso Ribeiro
- José Antônio Campos Pereira

SOCIEDADE PORTUGUESA NOVEMBAL, SARL.

- Carlos Afonso Barros Lobo Manteigas
- Maria Teresa Vasconcelos
- Rui Silva Pinto

ANNEX 2

PLASTIC FILMS AND LAMINATES FOR THE PACKAGING OF FOOD

PRESENTED BY: The Centro Nacional de Embalagem and the United Nations Industrial Development Organisation

PRINCIPLE SPEAKER: John Salisbury B. Sc. F.R.I.C.

Fellow of The Institute of Packaging UK.

Mr. Salisbury qualified in 1955 as an industrial chemist and worked in Research and Development until 1958 when he began to specialise in packaging.
For 10 years he was Head of The Research and Development Department and Group Scientist to 14 factories in The Metal Box Paper Group who manufacture folding cartons, labels, composite containers, plastic films and laminates.
For three years he was Technical Works Manager of a flexible packaging factory which gave him a deeper insight into the special problems of Production and Sales.
Since 1971 he has worked for the United Nations and the British Government helping to raise the level of packaging technology in developing countries, work that has taken him to more than 15 countries.

OBJECTIVES	To present a basic course in the technology of Plastic Films and Laminates. Special emphasis will be placed on the applications of scientific principles as they relate to food packaging.
OF INTEREST TO	Technical Managers, Production and Quality Control Managers. Works Engineers in the Flexible packaging and Food Packaging industries. Marketing people and Technical Representatives. Buyers of packaging materials. Lecturers and students in related topics eg production engineering, chemical engineering, marketing, graphic design, food science.
DATES	WED/THRUS/FRIDAY - 9/10/11 DEC. 1981.
PLACE	Lisbon. COPRAI-Praça das Indústrias - 1300 LISBOA
COST	2,000 Esc.
LANGUAGE	English.

PROGRAMME

FIRST DAY

14,30 - 15,00 h - Reception and Opening Session.
15,00 - 16,30 h - The most Important Properties of Plastic Films and Laminates and How those properties are measured in the laboratory.
16,30 - 16,45 h - Recess
16,45 - 17,45 h - Principle manufacturing Methods for Plastic Films and Laminates.

SECOND DAY

9,00 - 10,30 h - The Plastic Films and Cellophanes. Their characteristics Properties.
10,30 - 10,45 h - Recess
10,45 - 12,00 h - Aluminium Foil and the Laminates. What makes them so special.

14,30 h - Visit to a Manufacturer of Plastic Films and Laminates.

THIRD DAY

9,00 - 10,30 h - Applications. The requirements for the Principle Food Types and how to Select Films and Laminates that can meet those requirements.
10,30 - 10,45 h - Recess
10,45 - 12,00 h - Applications continued.
12,00 - 12,30 h - Discussion and Closing Session.

COURSE CONTENT

1. MOST IMPORTANT PROPERTIES OF FLEXIBLE PACKAGING MATERIALS AND HOW THESE PROPERTIES ARE MEASURED

   a. Description of the principle properties.

   b. Some reasons why those properties are important to convertersand users.

   c. Testing techniques. A brief outline of the principle methods used for measuring the above properties. Equipment used illustrated by slides.

   d. Properties covered will include: Thickness, Basis Weight, Density, Melt Index, Yield, Tensile Strength, Orientation, Stretch, Blocking, Treatment level, Heat Sealability, Heat Resistance, Seal Stregth, Bond Strength, Water Vapour Permeability, Gas Permeability, Friction, Mis-register, Ink Adhesion, Alkali and Detergent Resistance, Solvent Resistance, Rub Resistance, Odour and Taint, Moisture Content.

2. PRINCIPLE FACTORY OPERATIONS IN THE MANUFACTURE OF FLEXIBLE PACKAGING MATERIALS

   a. A resume of what is happening in the factory during such operations as: Printing, Lamination, Extrusion, Casting, Blowing, Waxing and Orientation.

3. MOST IMPORTANT MATERIALS USED IN FLEXIBLE PACKAGING AND HOW THESE PROPERTIES AFFECT THEIR SELECTION FOR USE

   a. The principle properties associated with the following will be discussed: H.D. and L.D. Polyethylene. Polypropylene (cast and O.P.P.). P.V.C., P.V.D.C., Nylon, Polyester, Aluminium Foil, Cellulose Acetate, Cellophane. (N/C, MXDT, MXXT/A,MXXT/S etc), and Laminates such as Cello/wax/cello, Cello/poly/foil/poly, paper/poly/foil/poly, Paper/wax, Paper/P.V.d.C., Nylon/poly, Poly/P.Vd.C./poly.

   b. A comparison will be drawn between the more important materials and laminates and L.D. polyethylene film, examining in what ways they are better or worse than this well known material. A comprehensive table will be provided.

c. How the properties of individual materials can be combined to provide a wide range of useful laminates.

4. PRINCIPLE OPERATIONS IN THE FACTORY OF A USER OF FLEXIBLE PACKAGING

a. A resume of the operations of heat sealing, bag and pouch opening, pouch sterilisation.

5. APPLICATIONS. THE NEEDS OF THE PRINCIPLE FOOD TYPES AND HOW TO SELECT PLASTIC FILMS AND LAMINATES THAT CAN MEET THOSE REQUIREMENTS

a. A look at the products normally packed in flexible packaging materials; examining their needs in terms of oxygen barrier, water vapour barrier, heat sealability, puncture resistance, grease resistance, light barrier, heat resistance, sterilisibility, visual appeal.

b. How the equilibrium relative humidity concept can help in film and laminate selection.

c. How to anticipate and estimate the changes that must be expected in the shelf life of a product when a change in a material or container type is contemplated.

ANNEX 3

FOLDING CARTONS FOR FOOD PACKAGING

PRESENTED BY: The Centro Nacional de Embalagem and The United Nations UNIDO

PRINCIPLE SPEAKER: John Salisbury B.Sc.. F.R.I.C..

Fellow of The Institute of Packaging UK

Mr. Salisbury qualified in 1955 as an industrial chemist and worked in Research and Development until 1958 when he began to specialise in packaging.
For 10 years he was Head of The Research and Development Department and Group Scientist to 14 factories in The Metal Box Paper Group who manufacture folding cartons, labels, composite containers, plastic films and laminates.
For three years he was Technical Works Manager of a flexible packaging factory which gave him a deeper insight into the special problems of Production and Sales.
Since 1971 he has worked for the United Nations and the Bristish Government helping to raise the level of packaging technology in developing countries, work that has taken him to more than 15 countries.

OBJECTIVES — To present a basic course in folding carton technology with special emphasis on the applications of scientific principles.

OF INTEREST TO — Technical Managers, Production and Quality Control Managers Works Engineers in the Carton making and carton using industries. Marketing people and technical representatives. Buyers of packaging containers. Lecturers and Students in related topics eg, production engineering, chemical engineering, marketing, graphic design, food science.

DATES — Lisbon. Thurs/Friday 3/4 DEC 1981.

PLACE — Lisbon. COPRAI - Praça das Indústrias - 1300 LISBOA

COST — 2,000 Esc.

LANGUAGE — English.

PROGRAMME

First Day

9,00 - 9,45 h	Reception and Opening Session.
9,45 - 10,30 h	The Manufacture of Carton Board and How these Processes influence Carton Board Characteristics.
10,30 - 10,45 h	Recess
10,45 - 11,30 h	The Manufacturing Processes for Folding Cartons.
11,30 - 11,45 h	Recess
11,45 - 12,30 h	Testing a Variety of Carton Board Properties.

14,30 h - Visit to a carton manufacturing factory.

Second Day

9,00 - 10,30 h	Considerations in the Structural Design of Folding Cartons. Styles and Carton Systems. Types of Carton Board Coatings.
10,30 - 11,00 h	Recess
11,00 - 12,00 h	Examination of the Needs of Typical Food Products and How Folding Cartons can be structurally designed to meet those Needs.
12,00 - 12,30 h	Discussion and Closing Session.

COURSE CONTENT

1. THE MANUFACTURE OF CARTON BOARD AND HOW THESE PROCESSES AFFECT THE BOARD CHARACTERISTICS

a. Cylinder and Fourdrinier boards, manufacturing methods and essential differences.

b. Description, manufacturing methods and characteristics of the following boards:

Solid white - uncoated
Duplex - uncoated
Triplex - uncoated
. The coating Processes, on machine and off machine, Cast coating.
Chip or Waste boards. White lined chip board, cream lined chipboard.
Machine Glazing (M.G.)

2. THE MANUFACTURING PROCESSES FOR FOLDING CARTONS.

a. The principles, differences, advantages and disadvantages of the main printing methods, ie:

Letterpress
Flexograghy
Gravure
Offset litho
Dry offset
Varnishing.

b. Cutting and Creasing.
Die types, makeready preparation. Die station problems. Embossing. Automatic stripping.

c. Stripping.
Manual and semimanual.

d. The Waxing Operations
Dry waxing and Gloss waxing. Principles. Pattern waxing.

e. Windowing
The nature of the process, and it's weakness.

f. Gluing
Straight line gluing, right angle gluers, types of adhesives eg dextrin, P.V.A., hot melt. Pattern application.

g. Some special operations
The Purepak Converter, Bag in Box systems, (Hermatet), Hot Die Stamping.

3. TYPES OF CARTON BOARD COATINGS

a. Cellophane and Polypropylene

b. Glassine lined.

c. Aluminium foil lined. Inside and out.

d. Polyvinyl alcohol.

e. Paraffin wax, micro wax and hot melt blends.

f. Polyethylene. Inside, outside and both sides. Sealability, appearance water and water vapour protection. Liquid containing cartons.

4. CARTON STYLES AND CARTON SYSTEMS

The basic styles outlined such as:

Lock corner
Glued corner
Seal end
Van Buren Ear
Tuck end
Lock end
Snap bottom

The meaning of Carton Systems. The principle ones available, advantages and disadvantages.

5. CONSIDERATIONS IN THE STRUCTURAL DESIGN OF FOLDING CARTONS

The points that have to be considered when designing folding cartons such as:

a. Board characteristics, eg., Mill deckle, board type, whiteness, toxicity, cushioning (is supplementation necessary) Print surface.

b. Print quality required - when the various Printing methods are suitable.

c. Production limitations, the converter must be able to do what you want, on equipment designed for the job.

d. User limitations. What equipment does the user have? He may have automated, high speed, or be all annual operations. Top or side loading.

e. Market requirements. Conditions in transit. Easy opening, reclose, long shelf life, damp kitchen, pilferage, visibility.

f. Siftproofness.
The methods of achieving it. Extended glue flap, Van Buren ears, fibre tear.

g. Water resistance, is the product packed wet.

h. Is protection against water vapour, oxygen, odours etc needed. How is it achieved.

i. Grease resistance.

j. Aseptic packaging
What it is and how it is achieved in the case of Tetrapak.

6. TESTING THE VARIOUS BOARD PROPERTIES

The type of equipment used in examining the various properties mentioned above will be illustrated by slides and an explanation given of the principle involved in measuring:

a. Stiffness
b. Creasing properties
c. Crease folding resistance
d. Water absorbtion.
e. Oil absorbtion
f. Pick resistance
g. Grease resistance
h. Smoothness
i. Compression
j. Rub resistance
k. Water vapour resistance
l. Oxygen, Gas and odour resistance
m. Wicking.

7. EXAMINATION OF THE NEEDS OF TYPICAL FOOD PRODUCTS AND HOW FOLDING CARTONS CAN BE STRUCTURALLY DESIGNED TO MEET THOSE REQUIREMENTS.

a. Powders
The design of siftproof cartons, pouring devices

b. Odour problems
Solvent retention, water based inks, oxidised wax and polythene coatings can transfer odours to sensitive products such as chocolates and fish.

c. Grasy foods such as butter or margarine. Bacon inserts.

d. Liquid tight cartons.

e. Moisture loss or gain
The use of bag in a box or the special systems like Hermatet. The problems with frozen foods, instant tea.

f. Bottled products inside a carton. The need for good closures.

g. Breakfast cereals. Reclose, moisture protection, easy open, low cost.

h. It is hoped that the participants will raise specific problems so that the principles covered during the course can be used in discussion to seek viable solutions to these real situations.

ANNEX 4

UNITED NATIONS DEVELOPMENT PROGRAMME

PROJECT PROPOSAL

COUNTRY - PORTUGAL

TITLE - Consolidation of The National Packaging Centre, (CNE).

PROJECT NUMBER

DURATION - Two years

GOVERNMENT COUNTERPART AGENCY - Direcção-Geral da Qualidade
- Fundo de Fomento de Exportação
- Ministry of Industry, Energy and Exportation

EXECUTIVE AGENCY - UNIDO

STARTING DATE - August 1981

GOVERNMENT CONTRIBUTION -

UNDP CONTRIBUTION - US $ 306,800

DATE OF SUBMISSION - September 1981

APPROVAL

CLEARED BY: - DATE:

CLEARED BY: - DATE:

AMOUNT APPROUVED: SOURCE OF FUNDS - COUNTRY PROGRAMME

PART B

1. BACKGROUND AND JUSTIFICATION

In 1962 a Portuguese Packaging Institute was created as part of the drive to improve exports. This Institute had no technical facilities.

In April 1972, the name was changed to The National Packaging Centre and in 1974 a start was made in establishing technical facilities in the present premises. Assistance was given by the French Packaging Institute in the selection of equipment but no specialised training was given at that time. The Centre has therefore been able to provide some technical services to industry.

In 1978 à joint evaluation mission by UNCTAD/GATT.ITC. and UNIDO recommended that consideration be given to an assistance project, supported by UNDP, of approximately 300,000 US $ to strengthen the equipment and expertise of the Centre so that it may a more positive role in the development of the countries industry and export efforts. Such a programme was not possible at that time therefore interim support was given during 1980 and 1981 by UNCTAD/GATT.ITC. (14,100 US $) and UNIDO (US $37,800), largely in the form of consultancy help.

A major factor in the present development aims of the Portuguese Government is the development of export orientated industry. It is recognised that developing exports is an increasingly comples matter and the role played by the packaging involved is of constantly increasing importance. Not only must the exported product meet the needs of the buying public in the target markets but the number and complexity of the legal requirements related to the type of packaging used is growing rapidly. This is especially true of the EEC which is a vital market in Portugal's export growth plans. It is not possible to separate the relatively high technology needs of the export market from the needs within the country; the general level of technology in the supplier and user industries must be raised for effective change to be brought about. It is the Government's wish that such technology should be available to the industry through the country's indigenous institutions as one step towards industrial improvement and expansion.

In accordance with these Government development aims the Department of Quality (Direcção-Geral da Qualidade) in the Ministry of Industry and Technology proposed in their document of the 25 February 1981, the inclusion of this proposal for inclusion in the 1982 - 1986 UNDP country programme and gave a high priority to the undertaking.

2. SPECIAL CONSIDERATIONS

2A. The value of such projects as this has often been reduced by the subsequent loss of trained staff to industry in the period immediately following project termination. New staff does not have the benefits of fellowship training or contact with the consultants who visited the project.

In this project a major effort is to be made to develop video training films during each consultants visit so that these are available later for the following applications:

a. training C.N.E. staff members who speak only Portuguese or for other reasons were not able to benefit from contact with the consultant.

b. training new staff at the C.N.E.

c. training courses to be given to personnel from Portuguese industry, commerce and institutions.

2B. There are a number of Portuguese speaking countries that will be seeking assistance with packaging technology development in the future. As part of the move to encourage technical co-operation between developing countries (T.C.D.C.) it is proposed that the strengthened Portuguese National Packaging Centre could play a useful role in meeting this future requirement, especially in the training of technical personnel from these countries and in providing specialised test services.

2C. The Portuguese Government is concerned about the special problems associated with becoming a member of the European Comunity (E.E.C.). Strengthening the local technological institutes will enable Portuguese industry to cope better with the technical changes that will be involved.

3. OBJECTIVES

3A. LONG TERM OBJECTIVES

1. To help raise the level of packaging technology in Portuguese industry, so improving efficiency and productivity and helping to reduce costs.

2. To enable the C.N.E. to play an effective role in helping exporters meet the increasingly complex packaging requirements of their markets, especially those of the E.E.C. countries.

3. To establish the C.N.E. as a Centre of excellence, capable of training personnel from Portuguese industry and commerce in packaging technology.

3B. INTERMEDIATE OBJECTIVES

1. To extend the range of equipment available at the C.N.E., especially that associated with material testing.

2. To improve the packaging information system and the service being offered to industry.

3. To raise the effectiveness of the existing staff by fellowship training and consultancy help.

4. To lay the foundations for an effective training centre by creating the necessary facilities and developing a number of courses that can be offered on a regular basis.

5. The improve the layout of the C.N.E. premises, especially the acess conditions.

4. OUTPUTS

1. New test equipment, installed and operating.

2. Test methods written in Portuguese for all the new equipment and the more important of existing equipment.

3. Video training films that explain the use and applications of the new equipment.

4. Some training courses (based on the above films) that can be offered periodically to personnel from industry, commerce and various institutions.

5. An improuved information retrieval system.

6. Reports from the visiting consultants and a terminal report prepared by the project manager that include specific recommendations as to the needs of local industry and suggestions as to ways in which the Centre can meet these needs.

7. A lecture room equipped to give periodic training courses in packaging technology for up to 35 people.

8. An improved material testing service with document outlining type of service offered with indications of the cost involved.

9. A document outlining how the training activities of the C.N.E. can be further developed with a view to training people from other Portuguese speaking countries. This may take the form of a project proposal.

5. ACTIVITIES

ACTIVITY	LOCATION	STARTING DATE	PROPOSED DURATION (MONTHS)
1. Selection and ordering equipment.	LISBON	AUG. 82	1
2. Installation of equipment.	LISBON	FEB. 83	6
3. Preparation of Project work plan.	LISBON	AUG. 82	1
4. Consultant in Training and Project Management.	LISBON LISBON LISBON	AUG. 82 OCT. 83 APR. 84	1 2 2
5. Consultant in Food Packaging.	PORTUGAL	MAR. 84	2
6. Consultant in Materials Testing (Plastics).	PORTUGAL	SEPT. 83	2
7. Consultant in Materials Testing (Paper & Board).	PORTUGAL	NOV. 83	2
8. Consultant in Transit Testing.	LISBON	MAY 84	1
9. Preparation of Intermediate Progress Report.	LISBON	JULY 83	1
10. Preparation of Final Report.	LISBON	JUN. 83	1
11. Preparation of written Test Methods (in Portuguese).	LISBON	SEPT. 83	11
12. Preparation of Video Training Films in Plastics Testing.	LISBON	OCT. 83	2
13. Preparation of Video Training Films in Paper & Board Testing.	LISBON	OCT. 83	2
14. Preparation of Video Training Films in Transit Testing.	LISBON	MAY 84	1
15. Fellowship Training in Package Development.	U.S.A.	JAN. 83	3
16. Fellowship Traning in Food Packaging.	U.S.A.	APR. 83	3
17. Study Tour in Packaging Institute Technical Management.	EUROPE	AUG. 83	1
18. Presentation of Training Course in Laboratory Testing (F.P.).	LISBON	OCT. 83	1/2
19. Presentation of Training Course in Laboratory Testing (P & B).	LISBON	NOV. 83	1/2
20. Presentation of Training Course (Transit Packaging).	LISBON	MAY 84	1/2
21. Development of Brsic Buying Specifications for Plastics films, Plastics bottles, Blister packs, shrink wrapping films, the principle flexible packaging laminates.	LISBON	SEPT. 83	2
22. Development of Basic Buying Specifications for Printed cartons labels, overwraps.	LISBON	NOV. 83	2

6. IMPUTS - UNDP

6A. Consultancies covering the subjects:

	m/m
1. Training and Project management	5
2. Materials testing (Paper & Board)	2
3. Materials testing (Plastics)	2
4. Food Packaging	2
5. Export Certification	2
6. Transit testing	1
7. To be specified	1
Total m/m	15

6B. Equipment

Major items of equipment to be selected from the following list:

1. Laboratory compression tester
2. Burst tester
3. Leak tester
4. Water vapour permeability tester
5. I G T Absortion and pick tester
6. Modifications to the storage rooms
7. Air porosity tester (Gurley and/or Bendsten)
8. Surface smoothness tester
9. Coating thickness testers
10. PIRA Stiffness tester
11. PIRA Creasability tester
12. Box stapling equipment
13. Sample cutters
    - Tensile test
    - Ring crush test
    - Box sample guilliotine
14. Strapping equipment
15. Taber stiffness tester
16. Visual aid equipment
    - Video playback equipment
    - Cameras, movie and 35mm.
    - Projector
    - Screen

Slide copier
Tape recorder.

17. Controlled temperature oil and water baths
18. Furnace for paper ash content
19. Intercomm equipment
20. Spare parts for the above equipment
21. Miscellaneous laboratory items (to be specied).

A total equipment allowance of 100,000 US $/ is suggested.

6C. Information Systen

An important part of the Packaging Centre's work is associated with information on technical and commercial subjects. It is envisaged that help will be obtained, perhaps on a subcontract basis, from one of the institute with wide experience in this field to design and install an information system in the C.N.E.. It is estimated that this will cost in the order of 55,000 US $

6D. Training

1. Fellowships

a. 2-3 months training courses in food packaging, with special reference to plastics and flexible packaging materials and the performance testing of the various packaging materials and containers.

b. 2-3 months training in the development techniques for retail and transit packaging.

2. Study tours

A study tour of similar packaging institutes for the Head of the Packaging Laboratory.

3. In Service Training

The preparation of video training films recording the techniques being taught by the various consultants.

The training component cost is estimated at 23,500 US $.

6E. Premises

If the training activities of the Centre are to be substantially increased, there will be a need for modifications to be made to the existing premises. It is expected that these will be provided as part of the Governments contribution.

COUNTRY: PORTUGAL

PROJECT Nº

PROJECT TITLE: CONSOLIDATION OF THE PORTUGUESE NATIONAL PACKAGING CENTRE

10. PROJECT PERSONNEL

11. EXPERTS/POST TITLE

	TOTAL		1982		1983		1984	-	-
	m/m	US $	m/m	US $	m/m	US $	m/m	US $	
11-01 Training and Project Management	5	36,600	1	7,000	2	14,800	2	14,800	
11-02 Materials Testing (Paper & Board)	2	14,800			2	14,800			
11-03 Materilas Testing (Plastics)	2	14,800			2	14,800			
11-04 Certification	2	14,800	2	14,000					
11-05 Transit Testing	1	7,400					1	7,400	
11-06 Food Packaging	2	14,800					2	14,800	
11-07 To be Specified	1	7,400			1	7,400			
11-99 SUBTOTAL	15	109,800	3	21,000	7	51,800	5	37,000	

12

		TOTAL		1982		1983		1984	-	-
		m/m	US $	m/m	US $	m/m	US $	m/m	US $	
12-99	SUBTOTAL	15	109,800	3	21,000	7	51,800	5	37,000	
13	SUPPORT PERSONNEL									
14	VOLUNTEES									
15	EXPERTS TRAVEL		4,500		1,500		1,500		1,500	-
16	OTHER PERSONNEL COSTS		3,000		500		1,500		1,000	
19	TOTAL PERSONNEL COMPONENT		117,300		23,000		54,800		39,500	
29	TOTAL SUB-CONTRACTS COMPONENT		55,000						55,000	
30	TRAINING									
31	FELLOWSHIPS	5	17,500	3	10,500	2	7,000			
32	STUDY TOURS G. TRAINING	1	3,000			1	3,000			
33	IN SERVICE TRAINING		3,000				2,000		1,000	
39	TOTAL TRAINING COMPONENT	6	23,500		10,500	3	12,000		1,000	
49	TOTAL EQUIPMENT COMPONENT		100,000		75,000		20,000		5,000	
59	TOTAL MISC. COMPONENT		11,000		3,000		5,000		3,000	
99	GRAND TOTAL		306,800		111,500		91,800		103,500	

PROJECT BUDGET COVERING GOVERNMENT CONTRIBUTION

COUNTRY: PORTUGAL

(IN LOCAL CURRENCY)

PROJECT NO

PROJECT TITLE: CONSOLIDATION OF THE NATIONAL PACKAGING CENTRE, (C.N.E.).

		TOTAL		1982		1983		1984		
		m/m	P.Esc.	m/m	P.Esc.	m/m	P.Esc.	m/m	P.Esc.	
19	TOTAL PERSONNEL COMPONENT	166	5,810,000	30	1,050,000	82	2,870,000	54	1,890,000	
30	TRAINING									
31	FELLOWSHIPS	6	360,000	3	180,000	3	180,000			
32	STUDY TOURS TRAINING	1	60,000	1	60,000					
33	IN SERVICE TRAINING	6	360,000	1	60,000	4	240,000	1	60,000	
39	TOTAL TRAINING COMPONENT	13	780,000	5	300,000	7	420,000	1	60,000	
40	EQUIPMENT		7,000,000		7,000,000					
43	PREMISES		3,000,000*		3,000,000					
49	TOTAL EQUIPMENT COMPONENT		10,000,000**		10,000,000					
50	MISCELLANEOUS									
59	TOTAL MISC. COMPONENT		650,000		108,000		434,000		108,000	
99	GRAND TOTAL	192	17,240,000 (265,000 US$)	40	11,458,000	96	3,724,000	56	2,058,000	

* Cost in 1974. Present value in order of 12,000,000.

** Cost in 1974. Present value in order of 28,000,000.

1 US $ = 65 Portuguese escudos (P.Esc.).

ANNEX 5

THE ROLE OF A PACKAGING LABORATORY IN FOOD PACKAGING IMPROVEMENT

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A fully functional Packaging Centre would be concerned with the following activities:

a) Information

b) Training

c) Scientic Testing

d) Development

e) Research

Providing information about many aspects of packaging and about the proliferating laws and regulations throughtout the world, is a key activity. Training is a most important function for a Packaging Centre, when it is sufficiently well established to do this. Research?, well as long as it is very much applied research, particularly when concerned with the use of indigenous materials, this can be a legitimate activity but there is so much existing information that concerns packaging technology that one feels that the emphasis for some years in a developing country should be on collecting and comprehending available information and extracting from it that which apperars to be helpful to the country's development interests.

However, in this paper I want to focus only on the Development and the Scientific Sections, in particular the application of a scientific approach to problem solving because that is what I have been mostly concerned with for the past 25 years.

Packaging Manufacture and the applications of packaging have traditionally been craft based i.e., they have relied to a great extent on the aquired skill of the people enganed in the industry. Up to a point in a country's industrialisation this operates very well indeed, but there comes a time when the quantities of materials or containers being produced becomes so large that studies

aimed at improving machine effeciences can be justified. Also there comes a time when exporters are attempting to break into sophisticated, demanding, markets and they find more and more that they are called on to meet exacting specifications and to show that they really are in a position to meet the legal and transit regulations existing in the target market.

The change from a purely craft based industry to one that uses a technological approach too is undoubtably a painful and rather expensive process, therefore it is not suprising that year by year this change is postponed. Operating solely on experience is fast, relatively inexpensive in any country where labour rates are not high and very satisfying, but the real weakness of such a system becomes apparent in comunications. Often these comunication take the form of material or container specifications or concern performance failures. If the supplier, or customer is some distance from the factory, comunication about ones needs and problems becomes very difficult. Also developing the kind of flexibility demanded by modern marketing techniques in a competitive environment means that new "know how" has to be periodically aquired, and rapidly aquired too, which is where a technological approach can be helpful as distict from going straight into factory or field trials. It would seem relevent at this stage to discuss what is "the technological approach" or the "scientific method" as it is sometimes known, and then to consider why on certain occasions it can be of help in packaging.

The usual starting point is with the Greeks, because they did not like the approach atall. Their approach to development was through the medium of discussion; endless discussion. They firmly believed that the examination of ideas current at the time and the mental and verbal analysis of any new ones led to progress in all things. An essentially intellectual approach. Of course there are many organisations today who appear to still adopt this Greek approach, but while it led to great achivements in art and sculpture it was not too effective when it came to solving pratical problems. However, when you have a few million slaves and can go out and collect more if need be, efficient use of labour was hardly a pressing problem and the capital cost of the equipment in use was generally rather low; a few logs, ropes, cxisels, etc. Little progress was made in understanding the forces of nature, and the laws that related them, in a way that could lead to harnessing them in the

service of mankind until much later when the idea of putting ones ideas to pratical test became respectable. We all know about Galileo doing the first drop tests from the Leaning Tower of Pisa. The goods he used were not pre-packed, but his reason for doing it was the same as that of any laboratory technologist; he was dropping the balls to find out what really happened instead of just relying on what the Council Elders said would happen.

So here then we have an explanation of what has become known as "the scientific method", that is: to study and comprehend as fully as one can, what is already known about the subject under examination, then condense that understanding into a theory, (this can be something as mundane as the belief that cases of a bottled product will survive a journey to the Middle East without excessive breakage). Then, and this is the essential part so often missed out in real life, to devise tests that will prove or disprove your theory and apply them under carefully controlled conditions. If the results obtained from these tests do not support the newly developed theory, and you have complete faith that your tests are meaningful and bear a clear relationship to the characteristic being studied and to the environment being imagined, then the theory must be modified or even changed for a new one that does fit the available information. Eventually, one's understanding of the problem is such that not only can observed features be explained adequately, but predicitons can be made as to what is likely to happen if certain changes are made. In packaging terms, that might mean the ability to make a reasonable prediction of the new shelf life of a product if a currently used laminate was to be changed for a cheaper, less protective one, or that the shipment being sent for market trials that will cost perhaps 200,000 US $ stand a reasonable chance of sucess so avoiding the situation in which the product arrives in such a deplorable condition that the importers lose interest for the next five years. I say "seasonable chance of sucess" deliberately because the final proof has to be what happens in practice. Laboratory results are of very little value until they are coupled with wide experience of what happens in reality. It is the feedback from the field that provides the final part required by "the scientific approach", namely, did things go as expected. Of course, getting that final information in a clear form is extremely difficult, even for the people working close to the action; for the people in the packaging laboratory it is often impossible to get it first hand, they must rely on others to complete the picture, or they must accept that their principal function is to measure and report results and leave the evaluation of the results to others.

Sometimes all the skill of a printer cannot produce an acceptable printed image no matter what he bries. The board, or other material supplied, may have physical properties such as smoothness, absorbency, pick resistance, etc., that make it quite unsuitable for the process he is handling and all his accumulated "tricks of the trade" cannot cope. On some accasions a customer can recept the news calmly that he is not going to get his supply of cartons on time and he can wait three months or so until a new supply of board is obtained, or he can accept, and get away with an inferiour product on that occasion. In such a case their is no big problem, but as the market developes so these kind of situations become less and less. There may be expensive advertising booked, perhaps a product launch in another country to consider. To avoid such situations the printer eventually has to know what are the properties of the materials he buys that affect his machines and what are the tolerances within which he can operate effectively Guidelines are available in some cases from previous studies aed established technology, but if he is having to consider the rejection of a large consignment of board because he says he can't use it, his supplier will not be interested in generalities or opinions. The supplier may say that the delivery has the same properties as all those previously sent, then a stalemate situation can be reached, one that is best broken by acceptable proof that the rejected material really is lacking in some way that can reasonably be expected to interfer with the satisfactory performance of the machine (or give inadequate protection to the product, etc.)..Eventually suppliers take the attitude that they are only going to accept rejections if the properties required have been properly specified and that implies prior agreement as to how those properties are to be tested and what are the aceptable tolerances about any declared value. When this situation arrives, and it is not a question of if it arrives, but only at what stage in a country's developement it arrives, someone has to be able to measure those properties in an accurate and reproducible way. Measurement is not just the basis of Quality Control, or Raw Material Assessment, it is also the basis for package development too, because if you cannot quantify that which you are seeking to improve, how can you relate the direction and degree of change achieved to the cost of that achievement and so keep a balance between costs and results. It is not enough to just improve some troublesome feature of a pack or process,

the improvement must be achieved at the minimum cost, or the competition will soon have you out of the business.

Companies with very big outputs could possibly justify the cost of the equipment and the trained personnel needed to introduce this kind of approach into their factories, (multinationnals have the very real advantage of having worked out and specified their needs in many other countries), but when we look at the range of test equipment later, we will see that only the wealthiest can even consider it, certainly in the early stages. For example in Jamaica, a newly equipped packaging laboratory has 100,000 US $ worth of equipment. Brazil has spent well over 500,000 US $ on equipment for two packaging laboratories and Mexico's expenditure on equipment for one packaging technology centre exceeds 1 million US $.

A point that I want to strongly emphasise in this paper concerning the role of a packaging laboratory is that the results from this test equipment mean very little until they have been related to what happens in practice and there are a number of ways in which this relationship can be established. Three of the principal ones are:

a) Test results from published data. This would be especially important in the case of health hazards, eg., the maximum acceptable lead content in a canned food, or the maximum acceptable extractable monomer content in a polymerised material that is in direct contact with foodstuffs. The test results might be compared to those given in a specification supplied by a user describing the physical properties that for example, the outer corrugated case must have to ensure that the purchased goods arrive in good condition. Or the packed goods may have to be subjected to a series of tests, the parameters of which have been clearly defined by a central body such as the U.N. (eg for dangerous goods) or the railways, or the shipping companies and their insurers. It is important to note that while tests are being more and more clearly defined, (for example, in the transit test standards published by the International Standards Organisation, ISO), the acceptable limits are often not stated because the conditions during transit vary so much, and the demands of the various products and markets are so different that it is better for the acceptable results limits to be left as a matter between the supplier and the buyer. There is a tendency to imagine that for every test carried out in the packaging laboratory there is, somewhere, a figure for coparison that represents the desirable level and that this can

be used for comparison. This is just not so in the majority of cases. The equipment gives results that are useful pieces in the jig-saw of information necessary to come up with a solution to a given packaging problem. Naturally the more the test equipment has been used, and background data collected that can be compared with the new test results, the quicker and better can sense be made from new results. In a highly industrialised country, and in companies that have been examining the physical properties of the materials they use for some time, they know a lot about what is "normal" and what are "desirable" test levels. In most developing countries that background data does not exist so the only two courses open are to import data know to be relevant to a licensor or parent company, or to build up and comprehend that background data, and that is the painful part I refered to earlier because it is expensive and the benefits are not apparent immediately.

b) Test results from investigational work carried out in the field by the staff of the packaging laboratory.

This was done, for example, by PIRA in the U.K., for their work into the development of an instrument to measure the behaviour of different folding box boards when creased. The same organisation spent a lot of time with flexible packaging manufacturerers and users studying the interaction between materials and machines and trying to identify and mesure the physical properties that must be controlled if high running effeciences are to be achieved on a regular basis. My own company spent a great deal of time and money building up this essential comparative data before attempting to specify to suppliers the physical properties that they felt were conducive to good machine efficiences and product quality. It is important to note that the application of packaging technology into a converte, for example does not mean that the skill required by the machine operators is thereby reduced, it should mean that the variations he is called upon to cope with are within limits that corrective action on the machinery can be quickly accomplished by askilled operator and he is not being asked periodically to do the impossible with all the acrimony that can result from such a situation. However, the point being made is that while in a strongly developed industry this may be possible, in a developing country this is exceptional difficult because most manufacturers jealously guard information about what they regard as the secrets of their processes and the "know

how' that they feel gives them the edge on their present or potential competitors and one has got to appreciate that this is a legitimate point of view, even if one that has a limited life. In addition, the newly formed packaging laboratory will not have sufficient staff available for such investigational work who can understand well enough the complexity and restrictions under which people in the production, marketing and transit fields have to work. In fact most new laboratories cannot obtain enough finance to recruit enough staff for their own needs and the number of experienced staff available at any one time is usually limited by the departure of trained personnel for industry.

c) Experimental work carried out in the field by the technical staff in the Convertors factory, or in the users factory, or by people actively involved in handling the packaged goods during transit or those marketing people who are in a position to observe exactly what takes place in the marketplace.

In this way results take on real meaning and can be used to specify a users needs to his suppliers, or to describe a product to a buyer, or to settle a claim concerned with material said to be unsatisfactory. In developing countries this type scientific of investigation is rarely done, often for good reasons such as the necessary comparative data is not available or the volume of the business does not justify the expected cost of the investigations and the potential savings involved are too small, or there is no-one to do theat type of work. It can be that the catalyst is not economics alone but because if a regulation is not met or an important customer is not satisfied, there may not be any more business. There can be no doubt that this third approach involving interpretation and application by factory technical staff is the most effective, the problem is, how best to achieve it.

The most usual start is to create a central laboratory and equip it with the right instruments. The next step has to be to sort out from the wide range of test methods available those most suitable to the country in question, but giving preference to those issued by I.S.O., and to translate those methods into the language of the country so that they can be widely used without hindrance. The laboratory staff have to become expert in the use of these methods, (and there are more than 100 of them) so that test

work can be carried out in the minimum time, yet with complete confidance in the results.

Let us have a look at the kind of equipment that one would expect to find in a well equipped packaging laboratory and mention some of the applications that make them of use to industry.

a) Strength. A tensile tester for measuring the resistance of materials to stretching forces, such as those endured by web fed materials, or in containers such as paper sacks, bags of all kinds. The same equipment is used to measure the strength of heat seals and glued bonds. Equipment to measure the resistance to tearing, to flexing, and puncture, all associated with the physical strength required to contain the product when subjected to the stresses of handling and transit. A rather special property but a contraversial one is the resistance of a material to bursting forces. This is widely used as a means of rating the strength of corrugated board and paper although there are some doubte as to exactly how this property relates to the kind of physical strength one would like to see, in a corrugated box for example.

b) Crush resistance. This property would normally be associated with the performance of the container in resisting the forces tending to crush it during transit and when stacked in warehouses and when an improvement in performance is needed, it may be that design changes can bring about the desired result. But it is often the case that the crush resistance of the materials used in the containers construction need to be changed and so equipment to measure this property is needed; flat, on edge and in the form of a selfsupporting ring.

c) Smoothness. If good print quality is required, the surface of the material must be smooth so that good, even, transfer of the ink can take place and it is the smothness when the paper or board is compressed under roller pressures that is important. The laboratory uses test equipment like a small printing press to measure this property.

d) Absorbency. This must be low if the ink is to be retained on the surface of the paper or board so making maximum effect at minimum cost, but it could

be that too low an absorbency can be the cause of many machine problems. The ink may "set off" onto the sheet above and in the case of adhesives a relatively high absorbency may be needed to remove the water quickly from the applied film to build up the tack necessary for an instant bond to the container. This latter condition is most important in controlling the performance of labelling machines. Users are often paying a premium for water resistance to be built into their cartons, corrugated boxes, overwraps, etc. but do little to check that what they are actually getting for their money.

e) Loose material. If particles of cellulose fibre or dust occur to any great extent on the surface of paper and board they can seriously interfer with the quality of the print obtained. It can be so bad that it may be necessary to stop a litho press after only 20 minutes running time. The resulting print quality is poor and the machine efficiency very low. In one U.K. factory it was estimated that this problem was causing losses in excess of £50,000 per year yet then (1963) there was no way of measuring it. Today equipment does exist. Sometimes the problem is not loose particles but that the high tack of the inks necessary for the litho process will pull out pieces of the surface coating, a problem known a picking. It is possible to measure the resistance of board or paper coatings to this effect and to specify tolerable minimum values.

f) Rub resistance and Mar resistance. If a glossy coating has been applied, it is important that the gloss is retained as much as possible during the rubbing it is likely to receive during transit when one carton rubs against the next, or labels are rubbed against the rough sides of a corrugated box. There are a number of quite sophisticated pieces of equipment available to measure the effect of rubbing but it can also be measured on quite simple equipment too. This raises an interesting point about test equipment cost and complexity.

g) Permeability. Protection against water vapour ingress is a most important property when considering the shelf life of many products. Actually a lot of data is available about the permeability of materials to water vapour and to gases but often it is the permeability of the completed package that is the most interesting to the food manufacturer. It is not just the entry or loss

of moisture that can effect shelf life, of course it can be loss of volatile constitutents such as essential oils, or the ingress of oxygen causing rancidity, mould growth, and bacterial activity. Equipment for measuring the permeability to gases is expensive and the aquisition of such equipment can only be justified if it is likely to be used a good deal, which is unlikely in a small laboratory.

h) Stiffness. One of the most interesting properties of paper and board for folding cartons is stiffness. The performance of folding cartons is affected not just by the stiffness of the board but also the resistance of the crease to folding can be of paramount importance in getting good performance on fast, automatic, cartonning equipment. For the carton maker, it is important to gauge the moment when he must change the makeready on the cutting and creasing press and measurement of folding resistance is a means of monitoring the changes in crease quality.

i) Creasability. When a carton manufacturer has been buying his board from the same source year after year, he will have worked out the best conditions for creasing it. When he has to change to other suppliers, however, or new boards are introduced into an existing suppliers range, it is helpful to examine the creasing properties in the laboratory, before embarking on factory trials.

j) Odour. Foods can be tainted by the smell from solvents retained after the printing or laminating processes. This effect used to be measured by smelling the material but today the level of retained solvent can be checked by a test instrument known as a vapour phase chromatograph or gas chromatograph.

Transit testing. Drop, vibration and compression. Test can be carried out to simulate the hazards to which packaged goods are subjected during long journies within a country or during exportation. These are principally Drop, Vibration and Compression and the Portuguese Packaging Centre is well equipped to carry out such tests. A point worth stressing, however, is that the most effective way of using such equipment is when containers of known performance in the field, are compared with others that are being considered as replacements, either because they are cheaper, or give better

protection or better handling. A question like "will this pack give more protection against breakage during a sea journey to the USA than the one we have been using for some years?" can be dealt with very effectively by means of simulated travel testing. A question like "We are going to export our bottled product for the first time to the USA in this pack, will breakage be at a tolerable level?" can be very difficult to answer because the conditions to which the pack will be subjected during the journey are unknown. However, a reasonable test series can be made up to simulate a given journey but the results must be treated with much more reserve than when comparisons to established packs are possible. It is the same with all laboratory testing, it is at it's best seeking differences between the physical, (or occasionally the chemical), properties of good and bad samples so that the information can be used define what kind of material or container will consistently give the best results. For this reason it is a very good disipline for packaging converters and users to keep samples of all batches of materials so that if trouble is experienced with a new delivery it is possible to compare the suspected feature (stiffness, absorbency, smoothness, etc.) in the troublesome delivery with the same featare in a least three or four deliveries known to have given satisfactory performance.

Transit pack testing is playing an important role in the development of the sterilisible pouch. The major problem with the pouch is not the selection of appropriate materials for the pouch walls but to establish how it will resist puncture forces during handling and transit when may cause failures that lead to the entry of bacteria.

The above tests are only some of those that an established packaging laboratory would carry out, there are many, many more but these serve to illustrate the range of activities undertaken.

It is necessary for a central packaging laboratory to have relatively sophisticated test equipment, accepted as accurate and reproducible by authorities throughout the world. This is because the laboratory will be involved in checking materials against specifications and if certain properties are found to be outside the desired values, an expensive claim may be the result. Obviously in cases like that highly accurate equipment is required. They also should act as a reference point for calibration of similar equipment throughout the industry. But such sophisticated equipment

is often too expensive for purchase by companies concerned more with quality control activities. In a number of cases, simple and inexpensive equipment can give very useful results, and any central laboratory should be aware of, and ready to use such equipment parallel to it's more sophisticated kind so that once a use has been established, the industry can introduce testing into their activities at reasonable cost. It could be that a most useful activity for the central laboratory is to arrange for the local production of simple equipment to measure, for example, water absorbtion, rub resistance, grease resistance, seal and bond strengths, at much less cost and trouble than is associated with importation. If the technical staff in industry are to co-operate effectively with the central packaging laboratory staff in amassing and comprehending the background data described above then they need to have a through knowledge of the equipment available in the laboratory, how the test results are obtained and have a good working knowledge of the applications in which such tests have been found useful previously. The central packaging laboratory therefore must carry out an active training role for technical people from the industry on the use of the it's test equipment, by running regular courses specifically for this purpose. A start is being made next week with two courses, one in folding carton technology and the other in the technology of plastic films and laminates. Many more are needed and so too is the project being considered by the Government at the moment designed to upgrade the equipment available and the staff specialisations at the Portuguese National Packaging Centre (CNE). But if the package manufacturing industry and the user industry do not accept their key role in applying packaging technology to their problems, then progress will be very slow indeed.

When change is contemplated it makes sense to check that the chances of success are good. When materials are bought on a large scale, it makes sense to check that what you are paying for is really what is being delivered and if an improvement is sought in efficiency or performance, it makes sense to measure the relevant properties before and after the change. To make such measurements one needs a packaging laboratory.

ANNEXE 6

Centro National de Embalagem (C.N.E.)

Outline of a Proposed Work Programme designed to ensure Maximum use of the C.N.E. Equipment and to Generate more support from the Packaging Manufacturing and User Industries.

A. Long term Objectives of this Proposal

To speed the process of introducing packaging technology into Portuguese industry so that they are better able to cope with the growing complexities of exporting to sophisticated markets, with the technical requirements associated with E.E.C. membership and to increase the efficiency of local packaging manufacture and use.

Immediate Objectives of this Proposal

1. To improve the present range of equipment at the Centro National de Embalagem.
2. To obtain good utilisation of existing and new equipment.
3. To introduce effective training methods for Centre staff, technical personnel from Portuguese industry and other Portuguese speaking countries.
4. To increase the support given to the C.N.E. by the packaging manufacturing and user industries.

B. Some of the Problems facing the Laboratory in the Packaging Centre

In a number of countries packaging laboratories have been established to assist in introducing a scientifically based approach into the Raw Material, Package Manufacturing and Package User industries. It is generally accepted that this can best begin from a cental laboratory because of the high cost of equipment and staff training. Such Central Laboratories are faced with many problems which the following:

a. The laboratory may have been equipped with first class test equipment but the staff have to become skilled in the use of that equipment and in understanding how the results obtained relate to the problems being experienced in practice. The first need is for background data as to what constitutes "normal" and "abnormal" results. These data are neccessary before useful advice can be given about desirable Quality Control figures, reasonable Raw Material Assessment levels(and the tolerances that must go with them) and in identifying results that might explain problems on Coverting or User machinery, etc.

To build up this data the staff at the Centre have to work very closely with the technical staff in the various industries, but establishing these close relationships is very difficult.

b. When industry is faced with a problem in which testing of the physical or chemical problems could be useful, they often need that information within hours so that corrective action can be taken. A central laboratory can rarely fulfil such a need.

c. Industry does not like to expose it's problems and weaknesses to a central body. Many companies do not accept that their problems and test results can be kept fully confidential because one of the most important functions of the Centre is to make it's knowledge and techniques available to all members.

d. Industry feels that the information gathered by the testing activities of the central laboratory may be used later in the formulation of regulations and standards that could be detrimental to their interests.

e. Industry feel that the central laboratory staff can never thoroughly understand the actual problem under investigation, because they only have access to a limited part of the information available. Nor do they feel that the Centre staff can appreciate the implications of any solutions they may propose because of their limited knowledge of industrial practices. To effectively interpret results from laboratory tests the technical person in industry

has to thoroughly understand the test method, yet at present he has little opportunity to do this.

f. Industry will look to the Packaging Centre for the training of it's technical personnel but to put together an authorative training programme takes a lot of experience as to what industry actually needs. The Centre staff have little opportunity to gain such experience.

Training costs have to be kept reasonably low because in industry personnel are often moved to other activities and the need arises to train a successor.

g. Packaging Centres are often the training grounds for industry's senior packaging staff but when an experienced staff member is lost to industry the service that the Centre has to offer can be seriously impaired for years. In a small contry the staff of a Packaging Centre can never be large (their are only two technically qualified staff in the C.N.E. at the present time with no effective chance of expanding that number in the foreseeable future due to budget restraints).

The Centre staff who do stay on year after year, so building up the kind of expertise the laboratory must have if it is to prosper, will want to enter an advisory or consultancy role rather than continue to spend a major part of their time in actual practical work. They will need to spend more time on developing their knowledge and understanding of newer techniques and technology if the Centre is to gain and maintain it's position as a leader in this field.

h. The C.N.E. has been asked about the possibility of helping other Portuguese speaking countries with their packaging problems. Two of the most practical ways of meeting this need are in training personnel and in providing a testing service. The problem is how can training be given at an acceptable cost and without seriously effecting the normal work of the laboratory. The same applies to the specialised test service, how does the Centre explain clearly what it can offer to people thousands of miles away.

C. A Proposed New Approach to Help Resolve the Problems Outlined in Section B.

Any future plan of activities for the Portugues Packaging Centre must be relevant to it's problems and perhaps needs to be a different approach to those tried at various times over the last five years.

Equipment

The C.N.E. needs to extend it's range of test equipment, especially that associated with materials testing. It is believed that this can be achieved with UNDP assistance and a proposal for a project has been prepared and presented for consideration by the Portuguese Government. The type of equipment suggested is described in that document, a copy is attached as Annex 1. A likely cost of US $ 100,000 is envisaged.

Testing Techniques

The next step would be for the Centre staff to become thoroughly familiar with the equipment and to prepare standard test methods,in Portuguese, that are accepted by the Portuguese industry. This calls for a lot of time and effort on the part of the technical staff of C.N.E. and of any consultants who may visit the project. Yet so often in the past the full benefits of such efforts have not been achieved because the knowledge aquired by those engaged in the work is not readily available to others.

It is suggested that during the above phase, video training films are prepared for as many of the test methods investigated as possible, there are over 100 methods associated with paper and board and flexible packaging alone. These films should not only illustrate the correct procedure for carrying out the test, but give details of the more common errors that are made, deal with the interpretation of the results and outline the applications in industry where the use of such methods have proved useful.

Training Personnel in Testing Technology

The video training films refered to above would be available for the training of Centre staff, in the Portuguese language, of course. They can also form the basis of training programmes for technical personnel from industry and from other Portuguese speaking countries. Their great advantage is that they are available at any time, and at a reasonable cost since the services of the Centre's senior staff are not being tied up each time. The person being trained can be confident that the information they are receiving is exactly the same as that passed on to all other people using the same facility and that it is information from an authorative source.

This is the vital step of"familiarisation" for the technical staff from industry refered to earlier, they can be trained in the correct use of the test

equipment and afterwards allowed to practice on the actual equipment so that they become completely familiar with what the laboratory has to offer and hence better recognise in their own work when the services can be of assistance in their Quality Control, Raw Material Assessment or Trouble shooting activities.

Copies of these same video films can be made available in the other Portuguese speaking countries and would play a vital role in showing exactly what can be done by the Centre's laboratory and explain how such work can be applied to industrial development .

This training service can be regarded as an extension of the information service and handled in the same way, leaving the technical staff more time for their normal activities.

Maximum utilisation of Equipment

The approach outlined so far has only tackled some of the problems outlined in section 8, no method has yet evolved to deal with the most difficult ones. These are:

a. The need for speed on occasions when results are needed in hours so that appropriate action can be taken in the factory.

b. Many companies insist on complete confidentiality in all their activities and their technical staff are not allowed to discuss problems with "outsiders". For this reason they will never send materials or containers to the Centre for testing.

If a wide range of video training films is available a whole new way of working with industry can be considered.

Technical personnel from industry have often sought direct access to the test equipment so that they may, on occasions, carry out tests at their own pace and with the confidentiality that doing it yourself brings. When you have carried out the tests yourself the results are so much easier to interpret, too. In the past this was rarely granted because of the liklihood that the equipment would be damaged by people not able to use it properly and training outside personnel in it's correct use would be too time consuming and hence costly. Yet the idea is so attractive that it deserves re-examining to see if it can be made to work; perhaps all that expensive equipment could be providing desparately needed regular income instead of being idle 90% of the time. The technical staff of the Centre would not have been increased yet the potential for rapidly introducing a firm technological base into local industry would have been created. The senior staff of the laboratory would be available to advise on the selection of suitable test techniques that might prove useful

in investigating specific problems, or the best tests for Quality Control purposes, but the industry would be providing the person to actually carry out the agreed tests.

What is envisaged is that any company wishing to have access to the facilities of the Centre must first send one or more technically qualified personnel for training. That person will then be certified by the Centre as eligible to use certain kinds of equipment. To keep administration problems to the minimum the company would be charged for every hour that their representative was on the Centre premises, irrespective of the number of tests they carry out or the equipment used. This is not only simple, it ensures that the equipment is efficiently used.

The Centre, therefore, is deriving an income from it's assets and services in three ways. Firstly via the type of membership fee that companies pay at present (but now they would have more incentive to join). Secondly, via a fee for training personnel from industry in testing technology. Thirdly, for the actual number of hours that their personnel spend in the Centre. Industry will have kept control over exactly what they are paying for and have the confidentiality they rate so highly. It has been said that allowing industrial personnel onto the premises means a loss in confidentiality over the work being carried out by the Centre staff but in the great majority of cases it is highly doubtful if any useful information is gained by just seeing samples, the Centre staff would not be discussing the technical work they have on hand. On those rare occasions that complete confidentiality is required, special arrangements can be made as is the case in industry, eg part of the week can be kept free of visitors.

If personnel from all parts of industry are regularly visiting the laboratory, the Centre staff will have the opportunity to become much more informed about the equipment, procedures and problems of industry in their efforts to improve efficiencies or change to new packaging materials or c containers. These personal contacts are the lifeblood of the Centre.

D. Sources of Finance

It is suggested that since new packaging laboratories all over the world have similar problems and would benefit greatly from the existence of the video training film described above, support for their production could be sought from the international aid organisations. A draft project proposal is attached as Annex

E. Possible Programme

Period	Activity
1982 to 1984	Implementation of the UNDP project described in Annex 1. Selection, procurement and installation of new equipment. Establishment of the testing techniques. Training of Centre staff.
1983 to 1984	Production of video training films in Paper and Board, Plastic Films and Laminates, Transit testing and some other specialised topics such as aerosols.
1983 onwards	Training and Certification of technical personnel from industry and access by them to the Centre test equipment
1984 onwards	Training of personnel from other Portuguese speaking countries.