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ESTABLISHMENT OF A PACKAGING UNIT AT INSTITUTE FOR RESEARCH AND DEVELOPMENT OF CHEMICAL INDUSTRY (BBIK)

DP/INS/86/005

REPUBLIC OF INDONESIA

Technical report: Establishment of the packaging materials testing laboratory*

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

Based on the work of John Salisbury, materials testing consultant

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Vienna

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* This document has not been edited.

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Contents

Abstract

The report deals with the methods used to bring into use test equipment supplied by UNIDO to establish a packaging materials laboratory in Indonesia. Equipment involved included that for testing WVTR, Gas permeability, Burst, Thickness, Water absorbtion, Board and Crease Stiffness, Rub resistance, Moisture content, Heat sealing, RH measurement.

Additional equipment is recommended.

Key Words

Indonesia, testing, materials, packaging, equipment, UNIDO, methods, WVTR, Gas permeability, Burst, Thickness, Water absorbtion, Board and Crease Stiffness, Rub resistance, Moisture content, Heat sealing, RH measurement. .

I. INTRODUCTION

The purpose of this UNIDO project is to establish packaging test facilities at the Chemical Industries Research Institute in Jakarta. Equipment has been bought and delivered to the Packaging Materials Testing Laboratory and this report describes the work of the Consultant assigned to bring it into use and train the staff of the institute in its operation.

II. TERMS OF REFERENCE

The specific duties of the Consultant were:

1. To bring into use the UNIDO supplied packaging materials test equipment.

2. To teach the local staff how to use the equipment and how to interpret the results.

3. To give training courses to the staff on the main characteristics of packaging materials.

4. To organise a seminar, (in co-operation with the UNIDO Consultant in Retail Packaging, Ivor Turtle) for Indonesian industry concerned with the testing of packaging materials and retail containers.

5. To prepare a brief report.

III. DESCRIPTION OF THE MISSION

The Consultant left UK Jan. 1 and arrived in Jakarta on Jan. 2 1989.

The first period in the BBIK laboratory was from Jan 2 to Jan 31 and the second period was from June 1 to July 31.

The Consultant left Jakarta on Friday 29 July for debriefing in Vienna and return to UK on Monday 31 July.

The mission focussed entirely on teaching the BBIK Packaging Materials Laboratory staff how to use the UNIDO supplied packaging materials test equipment.

IV. OBSERVATIONS AND CONCLUSIONS

1. TEST EQUIPMENT All of the materials testing equipment had already arrived, or arrived before the Consultant left, but there were some problems eg.:

a. The Universal tester (not supplied by UNIDO) is too insensitive for use on packaging materials. The only cell supplied is for 500 Kg f (5.0 kN). The Project Manager had tried in vain to obtain cells of lower value, eg 2 and 0.5 kN but without success. It may be that this model has been discontinued and if this proves to be the case, it is suggested if the that a new Universal tester be obtained for the laboratory. A typical specification and details of possible suppliers is given in Annex 5.

The platens on the Universal tester proved quite unsuitable for Crush testing therefor it was not possible to try out the ring and pin adhesion test equipment supplied. Rigid platens probably can be fitted by a local engineering workshop and BBIK are arranging to do this.

2. EQUIPMENT STATUS REPORTS. A report on the status at the end of the mission for each piece of equipment supplied by UNIDO is attached as Annex 4.

3. NEW EQUIPMENT. When the funds are available, consideration should be given to adding the following equipment to the materials testing laboratory:

CUTTER FOR TENSILE AND RING CRUSH TEST PIECES - PUNCH & DIE TYPE

HEAT SEALER - IMPULSE

MICROMETER FOR CORRUGATED BOARD BENCH MODEL

SMOOTHNESS/PERMEABILITY AIR/COMPRESSIBILITY

TEAR - PAPER & PLASTICS - ELMENDORF

TEMPERATURE AND HUMIDITY CONTROLLED CHAMBER

HOTPLATE

PICK TESTER - DENNISON WAX

TIMER - STOP CLOCK

VISCOSITY - FORD CUP

FRICTION - DYNAMIC - TNO MODEL

TOOLS - GENERAL

A description of each instrument suggested, together with the cost estimate and possible sources of supply, are given in Annex 5.

4. INSTRUMENT MECHANIC Test equipment of this type , and elsewhere in BBIK, is bound to need overhaul and repair periodically. The Bench micrometer and the Mullen Burst tester (paper) both need repair by a skilled mechanic. BBIK **must** locate an instrument repair shop in Jakarta and arrange for such repairs to be carried out. Without such back-up the laboratory will eventually become unable to operate due to equipment in need of repair.

5. STANDARD TEST METHODS

The characteristics of the many national and international test methods and their inter-relationships were explained. A copy of the appropriate ISO test method has been included in the DATABOOK for each instrument. Any ISO T.M. that are needed in the future can be obtained very cheaply from the Indonesian standards institution.

6. TEST PROCEDURES The laboratory had a staff of 2 graduates and 5/6 technicians. However, only the Laboratory Head spoke English well enough to understand the instruction being given. This problem was overcome by the Consultant working together with the Laboratory Head in developing TEST PROCEDURES that described in detail the steps that have to be taken when carrying out the many tests required. These PROCEDURES were based on the internationally recognized laboratory test methods, adapted to a specific instrument. Other information was obtained from the manufacturers Manual and other relevant test methods, eg BS, SCAN, ASTM, etc. They also contain notes on technical matters that make the operator better able to understand the test he/she is carrying out. Before being able to translate the detailed PROCEDURES into Indonesian, the counterpart staff had to thoroughly understand the English version which necessitated a good deal of useful discussion.

An example of one of these PROCEDURES is attached as Annex 3.

Laboratory procedures developed and translated included those related to: Thickness, Taber Stiffness, Crease & Board Stiffness, Rub resistance, Puncture, Flat crush, Edge crush, Water Vapour Permeability, Gas Permeability, Heat sealing. Conditioning, Burst of Corrugated Board, Burst of Paper, Thickness, Water Absorption (Cobb), Friction, Moisture Content, Flat Crush, Edge Crush, Measurement of RH by

Assmann, Wetting Tension.

What made this work particularly effective was the availablity of a good computer and printer at BBIK, modifications to the written PROCEDURES could be made quickly and easily. The newly delivered computer was brought into use by the Consultant and (at the Director's specific request) the counterpart was also taught how to operate it so as to enable her to continue the work of PROCEDURE development after the Consultant's departure.

Many of the BBIK PROCEDURES were discussed with the Cellulose Institute (Bandung) technical staff so as to ensure homogenity of methods between the two laboratories.

7. STAFF TRAINING Apart from the day to day training in developing the test PROCEDURES, five, 1.0/1.5 hour, lectures were given on the basic properties of the most common packaging materials and how these are tested in the laboratory. These were attended by personnel from all the packaging laboratories.

8. INDUSTRY SEMINAR A 5 day seminar was organized in co-operation with the Retail Pack Consultant and was attended by 91 people from local industry and other organisations. It was a joint exercise with the Indonesian Packaging Insititute (IPI) and supported by the UNDP and UNIDO offices in Jakarta. Subjects covered included and other information is given in Annex 6.

9. LABORATORY FURNISHING The laboratory does not have sufficient working bench space, two island benches should be added as soon as possible. There is an urgent need for racks on which to place samples of paper and board for conditioning. These take the form of open slatted shelves.

V. RECOMMENDATIONS

1. Certain pieces of test equipment are recommended for purchase when funds are available. These are detailed in Annex 5.

2. The programme of work for the staff of the materials testing laboratory detailed in Annex 2 should be carried out.

3. Many of the pieces of test equipment already installed need some action taking. These actions have been detailed in the Instrument Status reports in Annex 4. Special attention should be paid to the more sensitive cells for the Universal tester and for Crush testing.

5. The laboratory needs two island benches and conditioning racks.

6. Association with an instrument repair company is essential.

7. The technique of writing test PROCEDURES should be continued by the Head of the laboratory, as well as improving existing ones.

8. The staff need more guidance from an experienced consultant in the execution of testing techniques and the interpretation of results. At least 3 months, preferably 6 months, will be required.

ANNEX 1

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ANNEX 2

PROGRAMME OF WORK FOR THE MATERIALS TESTING LABORATORY
JULY 1989 to APRIL 1990

The laboratory staff must work diligently to achieve a high state of proficiency and speed in carrying out the testing PROCEDURES so far developed and to carry on the process of improving these PROCEDURES.

In particular, they should:

1. Obtain as many samples of materials, printed and unprinted, (eg. paper, board, cartons, corrugated boxes, plastics films, laminates, etc.,) from Converters and Users in industry and from any other suitable source.

2. Use the test procedures to test as many of those samples as possible, recording the results in the appropriate DATABOOKS.

The Head of the Materials Testing Laboratory should continue the preparation of versions of these procedures in the Indonesian language, in a form considered suitable for the local laboratory technicians. Procedures should also be prepared for the test equipment that has been in use for some time in BBIK. Having International Test Methods in English is not enough, these must be modified so that they are applicable to local conditions and equipment and are translated into Indonesian so that all technicians, in BBIK and in local industry, can use them easily and correctly.

To be welcome in forums that are struggling to resolve important problems, one has to have something to contribute and one of the important contributions the BBIK laboratory can make is the fast, accurate, measurement of physical (and some chemical) properties. For example, what the Standards Committees need most from the laboratories is a fast and reliable, independent, testing ground to help resolve the often conflicting view points of their committee members.

3. Periodically, collate and examine the results for each physical property for as many applications as possible. In this way, an appreciation as to the characteristics of packaging materials in use in Indonesia and abroad (many materials from imported products are available, BBIK staff members should be asked to bring them in for testing). This information is essential as background data when making judgements about any given results.

4. When the staff feel competent in any one test method and the test equipment is known to be satisfactorily commissioned, local Converter and User companies should be approached and invited to submit materials for testing for that particular property. The results obtained should be correlated to machine efficency or finished product quality.

5. Where the procedure outlined in 5 is successful, the results obtained should be used to start the process of developing material buying specifications that the company can use in the future. At some later date, the development of manufacturing and selling specifications should be considered.

When Converters and Users are satisfied that the laboratory staff are competent, they could well be interested in co-operating with the BBIK in introducing Quality Measurement activities to their factories, provided the cost is tolerable. They have a real need for this service since more and more they are being asked to verify that their packaging conforms to quoted specifications and disputes as to whether these requirements have been met are becoming more numerous.

This activity would involve both the BBIK Materials Testing Laboratory and the Consultancy Service of the Indonesian Packaging Institute. It is essential that BBIK and IPI co-operate in this activity, and it is strongly recommended that selected IPI personnel have direct access to the test equipment.

Once the service has been established for a number of client companies the value of the service can be truly assessed by existing and potential users.

7. The Materials Test Laboratory should join the PIRA, UK, Calibration Service which periodically distributes test pieces of standard materials to some 50 laboratories throughout the world, collates and advises the results so that any laboratory can see how their figures relate to the others. At least for the first year, this service is vital but should be started separately for each piece of equipment only when the local staff are satisfied that it is fully operational and they are skilled in its use.

8. COSTING OF SERVICES. Policy decisions have to be made very early about charges to be made for the institute's services. This is a most difficult operation. It is reasonable that the Testing and Consultancy services contribute to the overhead costs of the Institute, but it is equally reasonable that industry is not going to pay for work that takes a long time to complete and is carried out by individuals who are obviously unskilled in their business. A compromise has to be reached. It is suggested a realistic scale of charges be established as early as possible but discounts are applied for the first year or so of operation. For example, for the first 6 months after a piece of test equipment is brought into full use, no charges are made for testing on that equipment. For the next 6 months a 50% discount could be applied. The charges made for services will depend on the degree of financial support available to the Institute but if concessions are not made in the early days, the Institute will find it very difficult, if not impossible, to get those services off the ground.

9. TEST LABORATORY ATMOSPHERE. The present equipment is quite unsuitable for maintaining standard temperature and humidity in the testing laboratory. Fitting suitable conditioning equipment is the

Institute's responsibility and every effort must be made to bring this into existance as soon as possible. The laboratory will not be fully accepted until this is done.

10. RESEARCH v DEVELOPMENT. There is a vast amount of information available on packaging technology, far more than the staff of the Materials Testing Laboratory could absorb in several years of diligent study. Applying the abundant information that is already available to local problems, modifying it as necessary to suit the Indonesian environment should receive the total attention of all the technical staff for some years to come until a firm foundation exists on which some limited 'RESEARCH' programmes can be based.

The DEVELOPMENT activities of BBIK can be expected to emerge from the activities of the IPI CONSULTANCY service.

11. INFORMATION SOURCES.

The International Trade Centre has an excellent, computer based, information system, refered to as PACKDATA. It is suggested that ITC be requested to permit the system to be installed on the BBIK computer. It will be of some help to the Materials laboratory, but of immense help to the Retail Packaging Laboratory.

12. EDUCATION AND TRAINING OF BBIK STAFF.

It is unfortunate that staff in a newly created laboratory are usually much more concerned with receiving training from others than in self education and self training. While training from people with experience in a given subject is very helpful, each staff member has a responsibility to seek out information and train him/herself in the knowledge and techniques relevant to his/her function within the Institute.

Whatever their specialist role within the BBIK, each member of staff needs a basic training in all aspects of packaging technology. A good guide to the subjects covered is given in the Syllabus of the European Packaging Federation. It is divided into approximately 25 sections.

The British Institute of Packaging have been running a correspondence course that can be used as the basis for an ongoing training activity for the staff members. It is suggested that the course subjects be divided up so that specialists in a given subject handle that subject in the course. They would be responsible for teaching their subject to the rest of the staff, using the course material as guidelines as to content and depth of study. The Correspondence course could be scheduled to cover a 1 to 1.5 year period, the normal time for an individual taking the course is 2 years.

The above course is considered a useful framework from which to prepare for the examination for the Associateship of the British Institute of Packaging which can give a goal to those taking part.

13. TRAINING OF BBIK STAFF IN LOCAL INDUSTRY.

There is no substitute for actual experience in the factories of local converters and users. If staff members could be placed for even one month in the technical or quality control sections of such factories they will benefit enormously in gaining a better understanding of existing processes and techniques. In return, the BBIK could offer training in the use of relevant test equipment and demonstrate the testing facilities of their laboratories so that factory management could assess the value of such testing to their operations. The same applies to transport organizations, ports, warehouses, etc. The contacts made during such practical training sessions can be invaluable in the future.

ANNEX 3

EXAMPLE OF BBIK TEST PROCEDURE

BBIK MATERIALS LABORATORY PROCEDURE

SUBJECT: BOARD AND CREASE STIFFNESS TESTING

No: 12A ISSUE No: 4 FILE NAME: PRCREASE.WS2 DATE: 07.07.89

BASED ON STANDARD TEST METHODS: INSTRUCTION MANUAL. Note 8

PREPARATION OF THE TEST PIECES

1. Condition the samples overnight according to BBIK Proc. No 3.

2. Identification of the grain direction . Cut a square of board (approx 50 mm side) and flex it between the fingers in both directions. The board will feel stiffer when the MD (machine direction) runs from hand to hand. Mark the MD on the sample. Note 1.

3. **TEST PIECES FOR BOARD STIFFNESS.** The required test piece size is 70 mm x 38 mm, the board direction being tested is the one running along the 70 mm length. See Diagram 1.

Mark off on your sample where the creased and uncreased CD & MD test pieces can best be taken from then cut the carton with a knife or scissors along the short edge of the test pieces so as to make it easier to insert in the special test piece cutter. Note 4.

Mark each test piece as either MD or CD, at this stage and in the case of the test pieces with creases on them, put the mark close to the crease so that it is not lost when trimming.

Place the sample under the special cutter provided, the edge of the board must be against the stops at the hinge end of the cutter aperture. Press down.

Cut 10 test pieces for both MD & CD:

4. **TEST PIECES FOR CREASE STIFFNESS TESTING.** See diagram 2 which illustrates MD & CD test pieces with creases across them. Note 2.

The same special cutter is used but more operations are involved.

Firstly cut the test piece as for board stiffness, but with the crease running across the test piece approximately central and parallel to the cutter stops. See diagram 3.

Place the test piece in the cutter again, positioning it so that the crease is placed along the mark parallel to the cutter edge (use the left hand edge of the crease for alignment, see diagram 4A). The right hand edge of the test piece is now trimmed away (take care with your fingers).

The test piece is then turned round (as in diagram 4B) lining up the previously trimmed edge with the LH edge of the side plate. Trim off the other edge.

The test piece is now ready.

Take 5 test pieces for each crease being tested. Note 4.

INSTRUMENT CHECKS

1. Use the PIRA CREASE & BOARD STIFFNESS TESTER, supplied by H.E. Messmer, UK. See line drawing attached.

2. Plug in and switch on (at A) the instrument. The light B should be on. The digital display (C) will probably indicate some random number; this should be cleared by by pressing the ZERO-CHECK button (K). Allow 30 minutes warm - up before using.

3. Zero the instrument by holding down the ZERO-CHECK button (K) and turning the SET ZERO knob (E) until the indicator reads zero. Release the ZERO-CHECK button. This is the only adjustment needed in normal use.

4. Checking of the calibration is only needed very 12 months, see Manual for details.

5. At no time during use should the force on the load bar exceed 400 g.

PROCEDURE

A. BOARD STIFFNESS

1. Swivel the LH clamp into the start position.

2. Fix the test piece in the clamp (J) so that it is just touching the load bar, but not pressing on it. If necessary, loosen the curl adjustment knob and turn the clamp until the test piece just touches the load bar. Lock the curl adjustment knob. Note 5.

3. Measure the board stiffness by rotation of the LH clamp anticlockwise through 15 deg against it's stop. Take the reading when the timer light goes out after 15 secs.

4. Note the reading on the display in the DATABOOK Results Sheet. Note 6.

5. Return the left hand (LH) clamp to the start position and remove the spent test piece (make sure that it is not used again in a later determination). Press the zero check button and zero the instrument.

6. Repeat the test for the remaining pieces, 5 with one board face towards the bar and 5 with the opposite board face towards the bar.

B. CREASE STIFFNESS

1. Swivel the RH clamp into the start position.

2. Open the jaws of the clamp by turning the fish-tail knob a quarter of a turn either way and insert the larger panel of your test piece with the role of the crease facing outwards. Seat the test piece well into the base and back of the clamp, then close the jaws by turning the fish tail knob into the vertical position.

3. Rotate the clamp clockwise through 90 deg against it's stop. Note 7.

4. Take the reading when the timer light goes out (15 secs) and write it in the DATABOOK results sheet.

5. Return the clamp to the start position and press the ZERO CHECK button.

6. Repeat the test for the remaining test pieces.

EXPRESSION OF RESULTS

1. Calculate the mean values for the displayed board stiffness for each face and take the mean. Do this for both the machine and the cross grain directions.

2. Calculate the mean value for the crease stiffness results for each grain direction.

3. The critical factor is the ratio of crease stiffness/board stiffness, both measurements being made in the same grain direction of the board.

When calculating this ratio, divide the crease stiffness (in g.cm) by the board stiffness (in grammes) taking the values as shown directly on the display. No s 9 & 10.

TEST REPORT

The test report shall include:

a. Reference to BBIK Procedure No: 12A.

b. Full identification of the material tested, in particular origin, grammage, thickness, any special test requirements.

c. The test temperature and humidity:

d. The arithmetic mean (average) for board stiffness (in g.). for both the MD & the CD.

e. The arithmetic mean for crease stiffness (in g.cm.) for both the MD & the CD.

f. The ratio of the above two results for the MD & the CD.

g. Comment on the appearance of the roll of the crease.

h. Any details of procedure that are optional, or not included in this procedure, together with any other information that may have a bearing on the results.

NOTES

1. **GRAIN DIRECTION.** Board is manufactured in a continuous strip and the direction in which it moves through the board making machine is called the **Machine Direction** (MD) of the board. Board is always stiffer in the MD than the direction perpendicular to it which is called the Cross Direction (CD).

The PIRA Stiffness Tester is used to measure the force required to bend creased and uncreased board in the machine direction (MD) and the cross direction (CD).

2. **NAMING THE DIRECTIONS WHEN CREASE STIFFNESS TESTING.** The **MD crease** is the one running across a MD test piece as used for board stiffness testing and the **CD crease** is the one running across the CD test piece. The reason for this is that the board stiffness uncreased is to be compared with the board stiffness after creasing.

It helps when deciding where to cut the testpieces for crease testing from a given carton, to take an already cut and trimmed, creased, test piece, and to place this on the carton so as to decide where to place guillotine cuts so as to allow easy access to the special test piece cutter. If this is not done, you may not get enough samples from the cartons avaliable.

3. **SAMPLE SELECTION** Take care not to bend the crease when preparing the test pieces.

4. **WHERE TO MARK OFF TEST PIECES and DIE STATIONS.** With the board stiffness test pieces there is no problem. However, which creases are chosen for measurement does matter and depends on knowing which ones are likely to cause problems. In general, these will be the ones on flaps that have to be bent and tucked into slots at speed, the factory Production personnel will know which these are. If no creases have been specified as critical, either take a selection or pick out which appear to be the best and the worst from their appearance and do those separately.

Each die station on the cutting and creasing machine in the factory is creating cartons with different crease characteristics. In some cases, each die station will have to be tested.

5. **BEND ANGLE**

BOARD STIFFNESS is measured by bending the board through 15 degrees.

Not all test pieces are flat and any bend already existing in the test piece must be compensated for by adjustment of the position of

the clamp before testing begins. This is done by loosening the knurled knob, moving the clamp until the test piece just touches the bar, then tightening the knob.

The force value displayed by the instrument is taken after 15 secs (when the timer light does out) and is in grammes. The test conditions are fixed as the same for most stiffness testers, that is the test piece is 38 mm across and the force is applied 5 cm from the clamped end.

If the result is required in mN.m, multiply the grammes reading by 0.4905.

Because board surfaces have different properties, 5 samples are tested with one surface of the board in contact with the bar, then 5 with the other surface in contact.

CREASE STIFFNESS is measured by bending the crease through 90 deg.; the force experienced after 15 secs has elapsed is held on the display.

The display for crease stiffness reads in g.cm. The force is in grams and the distance from the crease to the bar is 1 cm.

If the results are required in mN.m the g.cm reading is multiplied by 0.0981

6. **INTERNAL TIMER** The internal timer starts automatically and after 15 secs. the crease stiffness value will be displayed.

Should you wish to read the crease or board stiffness reading after the 15 second period, depress the ZERO CHECK button.

7. **STANDARDS.** BS 3748 : 1964 is applicable to the board stiffness part. No standards are know for crease stiffness testing)

8. **APPEARANCE OF CREASES.** The quality of a crease can initially be assessed by it's appearance. Cracking of the liner or back of the board are obvious defects. An irregular, crumpled appearance of the rib on the inside of the folded flap can also indicate a potentially unsatisfactory crease in carton erection and closure.

9. **DESIRABLE RATIOS.** Studies of packing line performance have shown that successful carton performance can be anticipated when the ratio of crease stiffness/board stiffness falls within the following ranges:

Machine Direction	1.5 to 3
Cross Direction	3 to 7

This is a general guide that can be modified as specific results are accumulated. The results were obtained under test conditions of 23 C and 50% RH, if these conditions are not used then the desirable ratios will be different, eg in higher humidities the ratios will be

lower. If creases are too stiff, the made up carton can be distorted and the force made even pull newly glued joints apart.

PIRA CREASE STIFFNESS RESULTS SHEET

DATE: TESTED BY: BBIK Proc. No: 12A

TEMP.: %RH:

SAMPLE IDENTIFICATION No & MATERIAL TYPE:

A. BOARD STIFFNESS RESULTS (g)

MD, FACE IN	MD, FACE OUT	CD, FACE IN	CD, FACE OUT
1.....	1.....	1.....	1.....
2.....	2.....	2.....	2.....
3.....	3.....	3.....	3.....
4.....	4.....	4.....	4.....
5.....	5.....	5.....	5.....
Mean:	Mean:	Mean:	Mean:

Mean: Mean:

B.CREASE STIFFNESS RESULTS

MD	CD
1.....	1.. .....
2.....	2.....
3.....	3.....
4.....	4.....
5.....	5.....
Mean:	Mean:

CREASE STIFFNESS/BOARD STIFFNESS IN MACHINE DIRECTION:

CREASE STIFFNESS/BOARD STIFFNESS IN CROSS DIRECTION:

(File Ref: A:PRCREASE.WS2, page 6)

ANNEX 4

STATUS OF THE UNIDO EQUIPMENT IN THE MATERIALS TESTING LABORATORY

1. TABER - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Taber Stiffness Tester. Model 150 - B. Cutter, Manual, Weights (2000,1000,500,10)

2. Accessories or manuals required: Calibration strip. Paper stiffness attachment.

3. State of readiness: In full use at end of mission.

4. Calibration: Not done, no calibration strip.

5. TEST PROCEDURES written: Yes, No 12

6. Action: Need calibration strip, Paper stiffness attachment. Compare BBIK Procedure to that in the Indonesian standard.

7. General Comments:

a. **PRACTICE**. As with all the following pieces of test equipment, the staff of the laboratory **must** practice carrying out the BBIK PROCEDURE many times on many different samples of materials. Without this practice they cannot hope to reach the level of speed and accuracy that will encourage industry to send in samples for testing.

b. **PIRA CALIBRATION SERVICE** It would be most helpful if BBIK could participate in the PIRA Calibration service (details elswhere in this report)

c. **ALTERNATIVE EQUIPMENT** - The following equipment may be found in use in industry and the BBIK laboratory should know the differences: L & W Stiffness Tester, Kenley.

2. RUB TESTER - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: PIRA/WALLACE Rub tester, A7. Wts 0.5, 1.0 & 2.0 lbs. Manual.

2. Accessories or manuals required: Templates for test piece cutting 50 mm and 115 mm in diameter.

3. State of readiness: Ready for use.

4. Calibration: Not applicable, but need to make up some standards for comparison purposes on a specific job where rub is known to be a problem.

5. TEST PROCEDURES written: Yes. No 13

6. Action: Templates made up. More practice. Obtain copy of BS 3110 and make up the hand rub tester shown in it because it will be of considerable interest to industry.

7. General Comments:

1. **ALTERNATIVE EQUIPMENT** - The following equipment may be found in use in industry and the BBIK laboratory should know the differences: Reciprocating arm type Rub testers eg Sutherland, Radian and hand type (As in BS 3110).

3. GRADED HOTBAR HEAT SEALER - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Toyoseiki Gradient Heat Sealer. No 884. Compressor. Manual for Sealer OK but that for Compressor is in Japanese !.

2. Accessories or manuals required: English version Compressor manual.

3. State of readiness: In full use.

4. Calibration: Not applicable

5. TEST PROCEDURES written: Yes, No 28.

6. Action: Compressor manual. Need Impulse sealer for thermoplastic films.

7. General Comments:

1. **ALTERNATIVE EQUIPMENT** - The following equipment may be found in use in industry and the BBIK laboratory should know the differences: Non graded hot bar sealers of the SENTINEL type, impulse type sealers.

4. WATER ABSORPTION, COBB TESTER - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Messmer Cobb equipment, stopwatch, Measuring cylinder, Metal roller,

2. Accessories or manuals required: Good supply of suitable blotting paper. 250 ml plastic measuring cylinder.

3. State of readiness: In use.

4. Calibration: Not applicable

5. TEST PROCEDURES written: Yes, No 11

6. Action: Blotting paper supply

7. General Comments:

1. Practice, build up more data on typical Indonesian papers, carton boards and corrugated boards.

5. MULLEN BURST - BOARD - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Messmer Model 1555. One gauge. Spare diaphragms. Glycerine. C Spanners. Calibration foil.

2. Accessories or manuals required: More diaphragms.

3. State of readiness: In use. Diaphragm bust but this has been changed and the instrument recalibrated.

4. Calibration: O.K.

5. TEST PROCEDURES written: Yes No 4

6. Action: 10 More diaphragms Ref Neoprene PUJUM. Templates 300 x 300 mm & 150 mm x 150 mm. Get gauges checked for accuracy in Bandung Institute.

7. General Comments:

6. MULLEN BURST PAPER - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Messmer Model 1556. Test foils. Manual.

2. Accessories or manuals required: Glycerine supply. 10 Spare diaphragms.

3. State of readiness: Has been in satisfactory use, but gauge has started to leak fluid. Needs to go to Bandung Institute for repair.

4. Calibration: O.K. Test foils.

5. TEST PROCEDURES written: Yes. No 5

6. Action: Get gauge repaired.

7. General Comments:

7. WATER VAPOUR PERMEABILITY - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: BK Water Vapour Permeability Tester. Manual.

2. Accessories or manuals required: Template 85 + 0.5, - 0.0 mm Calcium chloride in granulated form at the particle size recommended in BS 3177.

3. State of readiness: In use

4. Calibration: Not applicable

5. TEST PROCEDURES written: Yes. No 1

6. Action: The testing should be done at 38 C and 90 % RH for best results. At present we use the prevailing laboratory temperature (usually 23 C +/- 2) and consequently the salt solution only gives 85 % RH. Testing the dishes in a contclled cabinet at 38 C and 90 % will be much better, perhaps it can be done in the Retail Pack Laboratory ?. Template. Correct grade CaCl2.

7. General Comments:

8. GAS PERMEABILITY - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Brugger Single Cell Instrument. Manual.

2. Accessories or manuals required: New Hi-vac pump. Correct pressure tubing (thick wall but highly flexible). Means of measuring flow rates.

3. State of readiness: In use.

4. Calibration: Not applicable.

5. TEST PROCEDURES written: Yes No 1a.

6. Action: Tubing (when available the Distributor should be connected up according to the Manual, not enough tubing at present. Vac. Pump. Flowmeter.

7. General Comments:

9. BEACH PUNCTURE TESTER - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: BEACH PUNCTURE TESTER by Van der Korput (Buchel model). Manual. Weights A,B & C.

2. Accessories or manuals required: Template 175 x 175 mm

3. State of readiness: In use

4. Calibration: No. Suggest co-operation with another laboratory or Bandung Cellulose Institute.

5. TEST PROCEDURES written: Yes. No 2.

6. Action: Template 175 x 175 mm. . Means of releasing the knurled knob on the weights attachment (known as "Footprints" in Uk, as used by plumbers

7. General Comments:

1. **ALTERNATIVE EQUIPMENT** - The following equipment may be found in use in industry and the BBIK laboratory should know the differences: Other models eg TMI, which may have the scale calibrated in CE units or kg f/cm.

10. THICKNESS, PAPER AND PLASTICS - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Messmer Microcal Micrometer, Model 170M. Manual.

2. Accessories or manuals required:

3. State of readiness: Not in use. It was prepared and used for some months but developed and internal fault (mechanism sticking) that needs attention from an instrument mechanic.

4. Calibration: Pressure on testpiece checked but not possible to check other properties, eg parallelism and accuracy do to none availability of slip gauges.

5. TEST PROCEDURES written: Yes No 9

6. Action: Repair by instrument mechanic. Slip gauges 5 to 5000 microns. Companion model in accordance with the ISO test method for corrugated board (see Procedure 10)

7. General Comments:

11. OVEN - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Oven, by Pickstone. Manual.

2. Accessories or manuals required:

3. State of readiness: In use

4. Calibration: Not applicable.

5. TEST PROCEDURES written: Yes No 22.

6. Action: Write to the makers and ask what is the maximum permitted temperature.

7. General Comments: The fan is far too strong, more than seems necessary, blows contents about. Needs checking.

12. MOISTURE CONTENT - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals:

AQUAMEASURE AUTOMATIC MCISTURE CONTENT METER.

2. Accessories or manuals required:

3. State of readiness: Ready but not calibrated yet.

4. Calibration: Not yet done. Very simple; determine the moisture content by the oven content method for paper types of interest and adjust the 'density' control to read the correct value. From then on, moisture content can be read off directly.

5. TEST PROCEDURES written: No

6. Action: See calibration.

7. General Comments:

13. AIR CONDITIONING EQUIPMENT- EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: The laboratory is conditioned by three normal 'window' type air conditioners (only two working at present.)

2. Accessories or manuals required: Temperature and humidity contoller that can positively maintain 23 C +/- 2 C, and 50% +/- 5% plus 27 C and 65% +/- 5% RH.

3. State of readiness: In use more than 6 months

4. Calibration: Atmosphere in the laboratory mointored by calibrated thermohygrograph and (suprisingly) the temperature an humidty usually fell within the requirements for 23 C and 50% RH (the conditions to be used until the Cellulose Institute in Bandung changes theirs to tropical ISO).

5. TEST PROCEDURES written: Yes Conditioning No 3.

6. Action: When funds available, contract local company to fit proper scientific laboratory atmosphere contol equipment. Bring 3rd conditioer into use as standby.

7. General Comments:

14. THERMOHYGROGRAPH - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Karl Schroder K6, 7 day. Spare charts.

2. Accessories or manuals required:

3. State of readiness: In use many months

4. Calibration: Yes, against the Assman wet and dry bulb equipment.

5. TEST PROCEDURES written: No, not necessary.

6. Action: A second one should be aquired as back-up to this vital equipment

7. General Comments:

15. PIRA CREASE STIFFNESS - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: PIRA CREASE STIFFNESS TESTER, ex Messmer. Manual.

2. Accessories or manuals required:

3. State of readiness: In use

4. Calibration: Not required for 12 months. Can be done by weighing suitable objects on the analytical balance (in range 50 to 350 g) on to the pressure bar.

5. TEST PROCEDURES written: Yes No 12a

6. Action: Compare board stiffness to Taber results, they should match when converted to same units.

7. General Comments:

16. AIR COMPRESSORS - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: IWATA AIR COMPRESSOR. Model DSP - 02P. Manual (in Japanese !!!)

2. Accessories or manuals required: Manual in English.

3. State of readiness: In use

4. Calibration: Not applicable

5. TEST PROCEDURES written: No

6. Action: Write for English Manual.

7. General Comments:

17. RING CRUSH AND PIN ADHESION ACCESSORIES - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: Holder for ring crush and PIN adhesion received in good condition but unfortunately platens on the Universal Tester not suitable (top one floating.)

2. Accessories or manuals required:

3. State of readiness: Not in use

4. Calibration: Not applicable

5. TEST PROCEDURES written: No.

6. Action: Need platens adapting by local engineering firm to conform to ISO standards (see BBIK Procedures15 & 16) and more sensitive cells for the Universal tester (suggest 20, 5 and 1 kN).

7. General Comments:

20. FRICTION - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: TOYOSEIKI TILTING PLANE. Manual.

2. Accessories or manuals required:

3. State of readiness: In use. Design fault caused the equipment to break a cable on being plugged in when in the partially tilted state. Replaced by temporary solid wire but this needs changing to cable as soon as possible as the wire is too strong.

4. Calibration: Not applicable

5. TEST PROCEDURES written: Yes No 14.

6. Action: Write to Toyoseiki for new cable.

7. General Comments:

19. DENSITY COLUMNS - EQUIPMENT STATUS REPORT

1. Details of existing equipment, accessories and manuals: TECHNE DENSITY GRADIENT COLUMNS (DC-2).

2. Accessories or manuals required: New filling tube

3. State of readiness: Not in use. Was prepared for filling with graded solutions but water tank found to be leaking. So far leak not sealed adequately.

4. Calibration: No

5. TEST PROCEDURES written: None

6. Action: Need to seal leak in water jacket **from inside** with super glue and Araldite. Carry out filling procedure described in Manual and ISO standard. While doing this, counterpart must prepare a BBIK PROCEDURE.

SPECIFICATIONS FOR RECOMMENDED MATERIALS TEST EQUIPMENT

ANNEX 5

PRICE INDICATION IN US DOLLARS FOR BUDGET PURPOSES:

UNIVERSAL TESTER	INSTRON UK LHOMARGY FRANCE LLOYD UK L & W SWEDEN ZWICK FRG	US $	50 000

PURPOSE: For tensile, elongation, compression and other tests relevant to a packaging laboratory

DESCRIPTION: Test equipment for use with ISO 1924 - 1976 & ISO 1184 - 1970. Capable of stretching a specimen at a defined rate to rupture and measuring the tensile forces involved at an accuracy of +/- 1% and elongation up to an accuracy of +/- 0.5 mm. Max. force 10kN. Electronic amplification and recording. The rate of loading shall adjustable such that failure can be reached in 20 +/- 5 sec.. The cells should operate in the compression mode too. The distances between the clamping lines to be 180 mm +/- 2 mm at the start of the test and shall remain parallel to within 1 deg.. for the duration of the test.

If cells are interchangeable, 10kN, 2kN and 200 N required. Mechanical jaws for 10kN and 2kN, 25mm and 50mm wide and plane faced. Pneumatic clamps for 2kN and 100/200N with plane, serrated and rubber faces, all 25 mm wide. Two compression plates (or compression anvils), approximately 150 mm in diameter. Also, if possible, a crushing device capable of carrying out the standard crush tests on corrugated board to international standard test methods. Attachment for measuring dynamic friction. Recorder, XY preferred.

Extensometry equipment is not required but the elongation as measured by jaw separation must be recorded to an accuracy that satisfies normal plastic film testing requirements.

Computer control will be considered, together with relevant software but should be shown as optional costs, if possible.

ELECTRICITY: 220V 50 Hz

TENSILE AND RING CRUSH CUTTER - PUNCH & DIE TYPE	MESSMER UK TMI USA LLOMARGY FRANCE	US $	1 300

PURPOSE: For cutting the accurate specimens needed for the tensile test on paper, board and laminates and for cutting ring crush test pieces.

DESCRIPTION: Punch and die type cutter to cut specimens 25 +/- 0.5 mm wide and at least 250 mm long.

ELECTRICITY: None

HEAT SEALER - IMPULSE	KOPP FRG CEAST ITALY PACKAGING INDUSTRIES USA	US $	8 000

PURPOSE: For heat sealing packaging materials by the electrical impulse technique in a packaging materials laboratory

DESCRIPTION: Impulse sealer for thermoplastic packaging films. Laboratory model with precise control over: pressure (1 - 6 bar), heat input by controlled voltage and time and cooling time. Top and bottom bands independently activated. Water cooled jaw. Spare jaw covering material. Spare Heating strip and covering material.

ELECTRICITY: 220 50Hz

MICROMETER FOR CORRUGATED BOARD BENCH MODEL	L & W SWEDEN LHOMARGY FRANCE MESSMER UK OGAWA SEIKI Japan TMI USA	US $	3 000

PURPOSE: For the accurate measurement of the thickness of corrugated board

DESCRIPTION: Bench micrometer with area of contact of the plunger to be 10 +/- 0.2 sq. cm. Measuring surfaces parallel to within 1 part per thousand of their diameter. Pressure 20 +/- 0.5 kPa. Accuracy to permit measurement to the nearest 0.05 mm. Mechanized lowering device. Metric. Digital read-out.

ELECTRICITY: 220V 50Hz

SMOOTHNESS/PERMEABILITY AIR COMPRESSIBILITY	L & W SWEDEN MESSMER UK KARL FRANK FRG TMI USA	US $	5 000

PURPOSE: For measuring the roughness , air permeability and compressibility of papers and boards in a packaging laboratory.

DESCRIPTION: Bendsten type roughness tester. To meet the requirements of ISO 2494 - 1974 (E). Compressor to supply air to the measuring head at a constant pressure of 1.47 +/- 0.02 kPa. Device to measure the air flow accurate to +/- 5%, typically 5 - 3000 mls/min. The measuring head to weigh 267 +/- 2g. Weight for compressibility testing. Calibration device.

ELECTRICITY: 220V 50Hz

TEAR - PAPER & PLASTICS (ELMENDORF)	L & W SWEDEN DAVENTEST UK LHOMARGY FRANCE	US $	3 500

VAN DER KORPUT NETHERLANDS

PURPOSE: For measuring the tearing resistance of paper, plastics and light weight boards by the Elmendorf technique

DESCRIPTION: Tear tester that meets the requirements as defined in ISO 1974 - 1974 (E).Single tear propagation tester. Initial cut type. Clamping surfaces at least 25 mm wide and 15 mm deep. Interchangeable pendulums, range up to 7500 mN. Calibration weights. Specimen cutter.

ELECTRICITY: 220V 50 Hz

TEMPERATURE AND HUMIDITY CONTROLLED CHAMBER	HERAEUS FRG FISONS UK PGC USA BLUE M USA TENNEY USA	US $	10 000

PURPOSE: For storage of samples at predetermined temperature and humidity in a packaging laboratory

DESCRIPTION: Working space in the order of 1000 x 750 x 750 (h)mm. Full aperture door. Relative Humidity range 30% to 95%. (+/- 5 % acceptable but prefer +/- 3%). Temperature range +15 to 60 deg. C. Injection control. Forced circulation. Fast recovery. 7 day chart recorder for temp. and RH plus 200 spare charts. Entry port preferred, about 50mm in dia.. 3/4 removable shelves.

ELECTRICITY: 220 V 50 Hz

HOTPLATE	GALLENKAMP UK HERAEUS FRG KOLB FRG	US $	100

PURPOSE: For general purpose use in a packaging laboratory

DESCRIPTION: Electric hotplate for laboratory use. Two, flat, steel plates.

ELECTRICITY: 220V 50Hz

PICK TESTER - DENNISON WAX	L & W SWEDEN KARL FRANK FRG VAN DER KORPUT NETHERLANDS	US $	500

PURPOSE: For measuring the surface strength of paper and carton board

DESCRIPTION: For pick resistance testing according to TAPPI T459 os - 75. Graded waxes of varying strengths, usually 20. Test specimen holder.

ELECTRICITY: None

TIMER - STOP CLOCK	KOLB FRG MESSMER UK FISONS UK	US $	100

PURPOSE: For timing experiments in a packaging laboratory

DESCRIPTION: Interval timer with alarm. Bench only. Range 120 min.. Spring operated. Face at least 100 mm.

ELECTRICITY:

VISCOSITY - FORD CUP	MESSMER UK KOLB FRG BAIRD & TATLOCK UK	100
FRICTION - DYNAMIC TNO MODEL	VAN DER KORPUT NETHERLANDS	
MICROSCOPE - LOW POWER	GALLENKAMP UK FISHER USA ZEISS DRG	500

FOR

PACKAGING MATERIALS AND RETAIL PACKAGES

DATES: Monday 19 June to Friday 23 June 1989 (5 mornings but attendance 1 to 5 days possible, according to interests).

TIMES: 9.00 am to 12.30 pm each day.

LOCATION: The new Packaging Materials and Retail Package Testing Laboratories at the Balai Besar Industri Kimia (BBIK) Pekayon. Pasar Rebo. Jakarta. Tel: 8401913

SUPPORTED BY: The Ministry of Industry, BBIK, UNDP, UNIDO and the Indonesian Packaging Institute (IPI)

SPEAKERS: UNIDO Consultant JOHN SALISBURY B.Sc. C.Chem. F.Inst. Pkg.
UNIDO Consultant IVOR TURTLE B.Sc. C.Chem. F.Inst. Pkg.

LANGUAGE: ENGLISH & INDONESIAN

SUBJECTS:

1. International, Regional and National Test Methods.
2. The protective properties of packaging materials.
3. The principles and use of laboratory test equipment.
4. Packaging specifications.
5. The causes of deterioration in packaged foods.
6. How to choose the best package for your product.
7. Recent developments in food packaging, Mod. Atms., Irradiation.

INTEREST: People with a science education between high school and graduate levels who are engaged in the manufacture or use of packaging materials and containers made from paper and board, plastics or combinations of these materials. Especially relevant to those whose work is related to Quality Assurance, Buying, Marketing, Standardisation or Development of packaging materials and containers.

COST: No fee (costs bourne by UNDP/UNIDO and BBIK)

CFRTIFICATION: Certificate if attendance 4 or 5 days.

TO ENROL: Contact BBIK

FOR MORE INFORMATION CONTACT:

BBIK Tel: 8401913 (Karyadi or Robiatun)
IPI Tel: 333663/333641 (Sutanto or Budiono)