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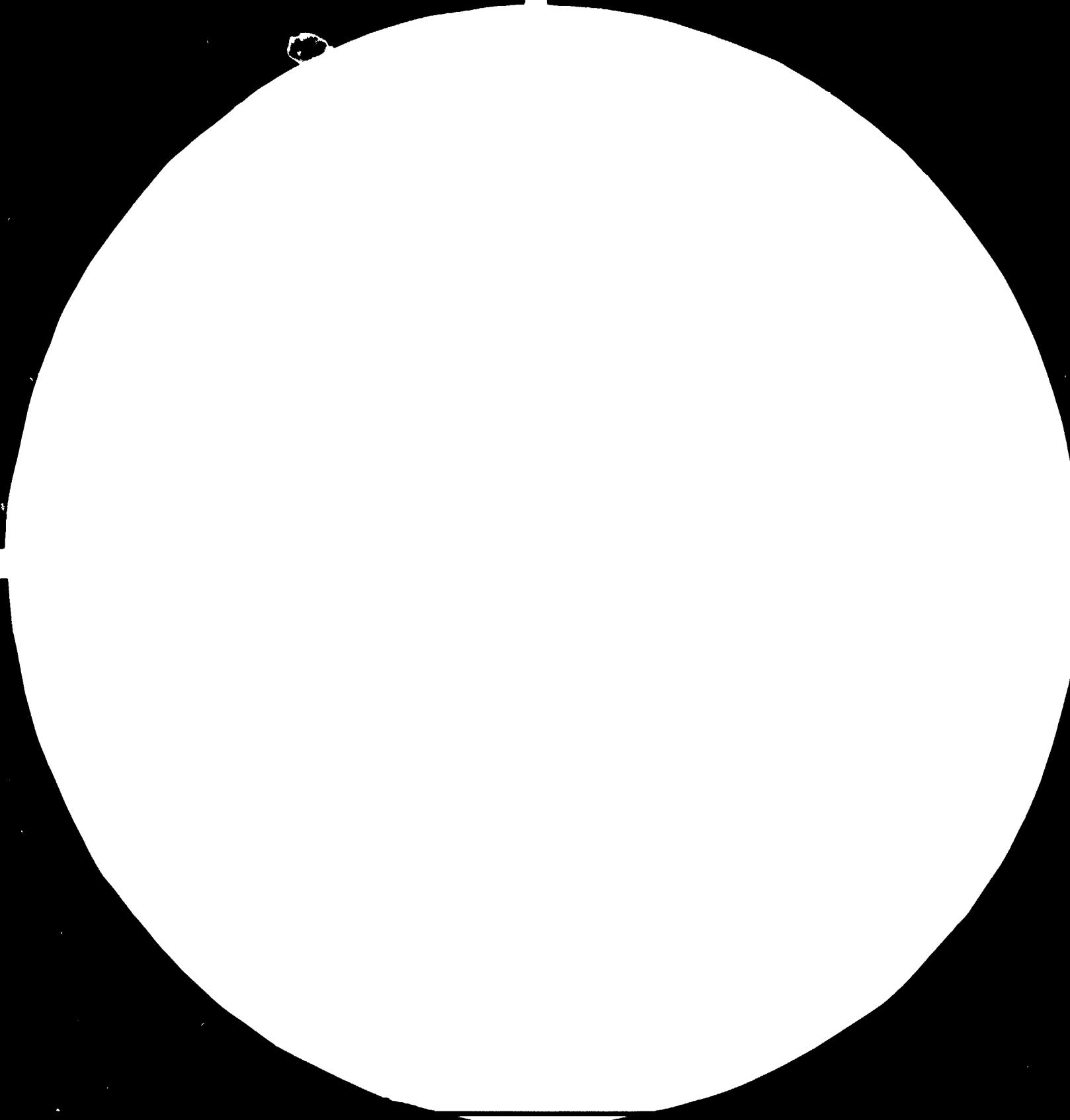

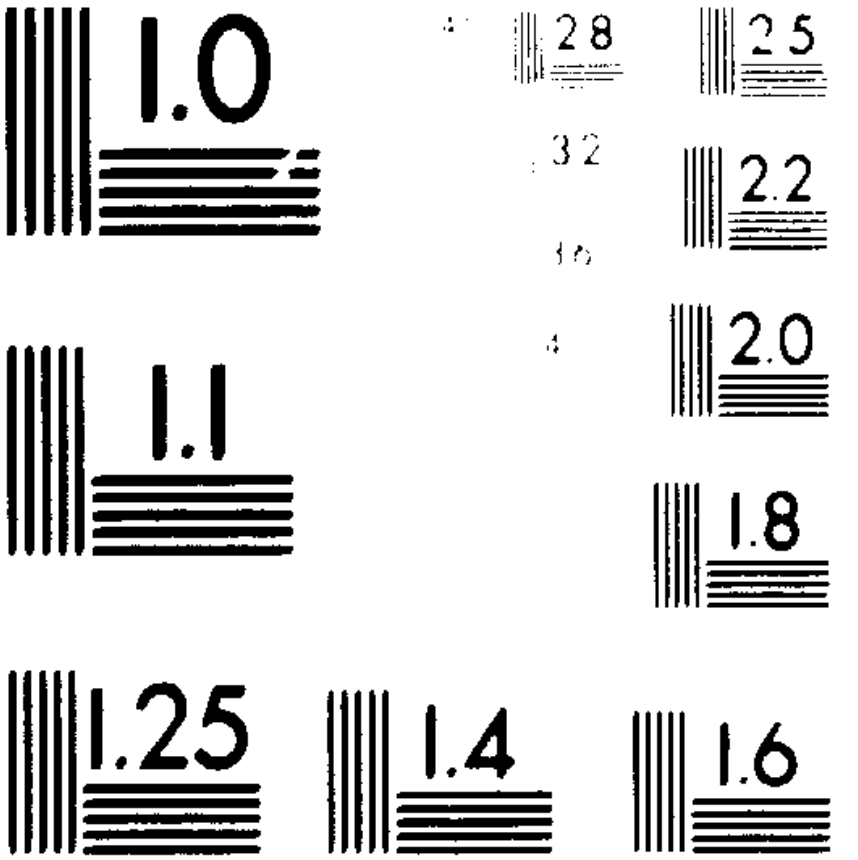

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28th OCT. 1983

ENGLISH

India.

SETTING UP WEATHERING AND TESTING FACILITIES AT CIPET, MADRAS

DP/IND/82/044/11-02/32.1.E

INDIA

H. BURNS
UNIDO Expert

1763

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
VIENNA, AUSTRIA

1. CONTENTS

ANNEXURES

2. INTRODUCTION AND TERMS OF REFERENCE

CIPET, Central Institute for Plastics Engineering and Tools, is an Institute for training in Plastics Testing, Engg. and technology together with good facilities for testing, evaluation and consultancy for Indian Plastics Industry. The Institute is assisted by UNDP with equipment, fellowships, scholarships, study tours and provision of UNIDO mission experts.

The present mission relates to new weathering and ageing facilities at CIPET, Madras. The terms of reference are :-

1. Put into operation the testing equipment;
2. Organize the testing of plastics under artificial and natural exposure;
3. To evaluate the stability of plastics to varied influences of weather in different regions of India.
4. Prepare and introduce to the industry new standards in respect of plastics 'ageing';
5. Train laboratory staff;
6. Deliver lectures on subjects relating to the speciality; suggest technical bibliography;
7. Lay the groundwork for future training programmes in the speciality;

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3. RECOMMENDATIONS

3.1 The build up of the remaining natural weathering facilities should be completed by November 1983.

3.2 A comprehensive weathering programme should be commenced as soon as possible covering all materials likely to be exposed to UV light.

3.3 The marine site should be commissioned as soon as possible and a programme of exposure triels with polyester/glass undertaken in conjunction with a relevant manufacturer.

3.4 Further trials are required on Atlas Weather-Ometer to ensure continuous running. A parallel programme with 43 should be commenced to establish correlation factors.

3.5 Further Weathering short programmes should be organised but on a two day basis.

3.6 A survey should be carried out to ascertain reasons for the poor response to Cipets' testing facilities and service. Changes in charges structure may be necessary.

3.7 Improvements in Work Assignment Register and the new Laboratory work memorandum should be implemented.

3.8 The project work allocated should be monitored on a regular basis and encouragement given for good progress.

3.9 Staff should keep abreast with modern developments through circulation of library journals and books.

3.10 More delegation of work is required to foreman supervisor and chargemen from the Head of P.T.C.

4. ABSTRACT

A three months mission to CIPET(Central Institute of Plastics Engineering & Tools, Guindy, Madras - 600 032, India) has been completed. The main purpose of the mission (DP/IND/82/044/11-02/32.1.4) was to set up natural weathering stations in India and an accelerated (indoor) ageing facility at Madras. The accelerated ageing Atlas Weather-o-meter has been commissioned and is in use. A latitude weathering rack at 13° has been constructed and commissioned at CIPET, Madras. Two other racks at 45° are in course of construction and due for completion in November 1983. A marine site has been secured in Madras Harbour but not yet commissioned. Assistance has been given to CIPET, Madras on testing, procedures, standardisation and customer problems. Two extensive tours were undertaken including factory visits and technical discussion and three presentations given in formal session at Bombay, Baroda and Bangalore.

FINDINGS AND
5. REPORT OF MISSION

5.1 Natural Weathering:

Two Cipet analytical chemists Dr Sudhakar and Dr Vijai Kumar were allocated to assist with the setting up of weathering facilities in India. It was agreed to consider a Hot/Wet Site (Madras), a Hot/Dry Site (location to be decided) and a Marine Site (Madras Harbour) (annex. reference 1. Details of the rack arrangements for the hot/dry and marine sites were decided within a few weeks (annex. References 2, 3, 4 and 5),6 & 7.

Discussions with Madras Harbour authority were successfully completed on 15th September and an area put aside for Cipet use (annex. reference 8). Discussions were also held with the Director and Staff, Metrological Regional Office, Madras for use of Weather data from Meenambakkam (Air-port) Station, closeby Cipet Site. These were also successful and regular data on Sunshine hours, humidity, temperature etc. are being received, as required.

Construction of one rack a 13° latitude weathering rack has been constructed and is operational. Material and design for the two 45° racks is in hand and construction will commence as soon as monsoon conditions allow.

Training in international methods and procedures for natural weathering has been carried out. Once all three racks are in position a comprehensive weathering programme should be undertaken with plastics materials of known composition and processing conditions. Careful attention is needed to assemble all information on materials and testing required before commencement.

5.2 Accelerated Ageing:

An Atlas Weather-Ometer, model C165, was purchased by UNDP before arrival but not commissioned mainly because the refregeration unit was not included in original delivery. A locally made unit was ordered but considerable delays were experienced before delivery in mid October 1983. All systems are operating correctly, except the wet bulb, hydgrometer controller, and the machine has been commissioned and used on several occassions but only for short periods of 1 - 3 hours. Further trials are required to ensure safe and reliable operation over longer (or continuous) periods.

Assistance has been given to CIPET in the provision of International Standards on the full range of weathering and accelerated ageing test methods.

Three computer print outs covering a comprehensive list of literature references (with brief summaries) were handed over to P.T.C. for their retention. A parallel programme on Atlas Weather-Ometer should be undertaken on same materials to be used in natural weathering programme. One purpose is to find correlation factors between natural and artificial ageing techniques.

5.3 Marine Site:

Reinforced plastics - especially unsaturated polyester resins and glass fibre are extensively used in shipping for pleasure boats and seagoing Vessels. Little information appears to be available on the performance of the Indian produced reinforced plastics in marine applications.

Discussions were held with the Madras Harbour authority which led to approval to use a stretch of Harbour exclusively for submersible racks. The stretch is about 7 metres in length with access via concrete steps.

It is now required to purchase or have manufactured three steel wire cages fixed to the Harbour wall. The cage design has been suggested and method of fixing is understood. One cage should be placed tidally, another fully submerjed at all times and another clear of the water.

5.4 Training Programmes:

5.4.1 Materials and Testing (19 - 24th September):

Assistance was provided for a training programme on materials and testing at which 18 trainees attended. On 19th September a presentation was given on "Introduction to Plastics Materials and Testing" to the trainees of one hour duration and the written paper distributed. The response was generally good but some candidates wished to see CIPET providing some Specialist Courses.

5.4.2 Short Programme on "Weathering" (Specialist Course):

This was held on 24th October to twelve candidates from 9a.m - 5p.m. (Annex. reference 9). The Programme (Annex. reference 8) and practical work Schedule (Annex. reference 10) are attached.

The response from candidates to this Specialise Course was very good but it is recommended that in future such programmes should run to another day as one day is too rushed.

5.5 Industrial Tours and Presentations:

Two tours were undertaken for presentations to representatives of the Plastics Industry and related Organisations and to visit Plastics Factories and Institutes.

5.5.1 Bombay/Ahmedabad/Baroda/Bombay:

This was undertaken on 25 - 30th September 1983 with Dr K.Ramamurthy, Head of Plastics Testing Centre (PTC). A full report is attached (Annex. reference 11). Several Industrial Operations were visited and technical discussions took place with considerable follow up required by CIPET. Meeting were held with Gujarat Plastics Association in Ahmedabad while in Baroda a presentations was made to the PRI in the IPCL Complex. Other details of the visit, including press coverage, is include in annex. reference 11.

5.5.2 Bangalore and Mysore:

A tour was undertaken to Bangalore and Mysore to visit Plastics Industrial Sites to hold technical discussions with the managements from 15th September to 19th September 1983. A technical presentation was given to the local PRI in Bangalore, attended by Thirty members. The presentation covered Quality Control Testing, Industrial toxicity and Weathering. A report is attached (Annex. reference 12).

5.6 CIPET Testing and Facilities:

The expertise and ability of Technical Staff at P.T.C was found to be excellent. Staff are willing and helpful in all matters. The quality of work, such as accuracy, attention to detail, records, reporting and care/maintanance of equipment was entirely satisfactory. Improvements to procedures were suggested and agreed, as follows:-

(a) Technical reports should be written on all non-routine work with proper registers to be kept. Visit reports also should be included in such written reports.

(b) An more comprehensive procedure for project and routine work assignment register was drawn up and agreed to be implemented.

(c) A list of medium and long term projects was drawn up for the technical staff so that each man receive two such projects. These have been discussed with the staff and it will be necessary to monitor progress on each project regularly by the Head of P.T.C. (Annexure No. 13)

(d) Staff need to keep abreast with modern developments in testing and evaluation of plastics. It is suggested that technical lecture be circulated regularly to technical staff on a distribution rota.

(e) More delegation of work - physical and customer consultancy- should take place from Head (PTC) to the rest of the Staff. This will help to ensure better Staff Development and less reliance on a few key personnel.

(f) A full set of standards for testing is required and UNDP may be able to help. The work load into CIPET from Industry and Institutions for testing is disappointly low. It does fluctuate but in the annual period April 1982 - March 1983 total test assignments were 140 (previous year 132) which is less than three per week. The total number of determinations was 536 (547 in 81/82) which is ten per week. Considering the vast number of Small Plastics Manufacturers in India who are potential customers of CIPET, this response is too small. Some industrialists have cited the "high charges" as a reason for not sending work to CIPET

Certainly the name and facilities of CIPET are spreading rapidly but it is not possible to pin point the reasons for this state of affairs. It should be looked into to see how the response from Indian Plastics Industry can be improved.

5.7 Customer's Technical Problems:

Over the mission period many customer's technical problems were discussed in conjunction with CIPET Staff. In most instances advice was given how to proceed and in others further work was recommended at CIPET. Many customers and visitors queries related to specific processing problems and this highlights the need for a UNIDO Expert on processing Plastics - extrusion, injection moulding recipes etc. to attend to so many of the fabricators immediate problems.

ANNEXURE - 1

TERMS OF REFERENCE

To decide on the technical requirements and implement agreed proposals for the setting up of one or more Weathering Stations in India as a service to the Plastics Industry and for development purposes. Possible sites are hot/wet; hot/dry; temperate and marine.

To examine the accelerated ageing technique with a view to commissioning the existing equipment and advise on improvements in facilities. Attempt to establish correlation factors between natural and accelerated ageing for a wide range of plastics.

To examine other forms of degradation example Thermal and Chemical Ageing.

To set up standards, training, procedures, reporting and recording facilities for these activities.

ANNEXURE - 2

PLASTICS TESTING CENTRE

WEATHERING WORKING PROJECT TEAM

Minutes of the 1st meeting held on 17.08.1983

Members Present:

Mr H.Burns	:	UNIDO Expert
Dr K.Ramamurthy	:	Head of Testing Centre
Dr Vijai Kumar	:	Foreman Instructor (Testing)

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1. Terms of Reference:

Finalization of terms of reference (attached)

2. Appointment of Chairman and Secretary:

Mr H.Burns	:	Chairman
Dr Vijai Kumar	:	Secretary

3. Weathering Stations:

(i) Discussed setting up of Weathering Stations at various places for plastics assessment

(ii) Selection of natural exposure sites for different types of climates was initiated K.R.

a) Hot - Wet Climate exposure site to be stationed at Madras, CIPET (Decided)

b) Marine Site - At Madras Harbour (Decided) K.R.& H.B.

c) Hot-dry Climate - can be stationed either at Hyderabad or at Kanpur (To be discussed further)

d) Temperature Climate - To be decided later

e) Canal Lining - To set up experiments with existing facilities available in the country. V.K.

contd/..2

4. Equipment:

Discussed regarding the equipment/instruments requirements:

i) Solar Meter ii) Rain Gauge
iii) Humidity iv) Temperature — H.B.

v) Making provision of HVT at the exposure sites for housing control samples, instruments etc. — K.R.

Purchase of instruments may take several months and in meanwhile there is a possibility of obtaining weather data from Metrological station at Madras. — V.K.

Chairman suggested use of Textile Standards (Blue Scale) to supplement instrumentation — H.B.

Procurement of these standard indicators to be done.

5. Next Meeting:

Wednesday - 25th August 1983 (A.M.)

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ANNEXURE - 3

PLASTICS TESTING CENTRE

"WEATHERING WORKING PROJECT TEAM"

Minutes of the Second Meeting on 25th August 1983.

Members present:

Mr H.Burns : UNIDO Expert
Dr K.Ramamurthy : Head of Testing Centre
Dr Vijai Kumar : Foreman Instructor (Testing)

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Exposure Panels: Action.

It was decided to erect exposure panel of slotted angle iron having wooden horizontal racks.

Size of Panel : 9' x 6'4".

Angle of Exposure : 2 Panels of 45° angle.
1 Panel of 13° angle.

It was decided to locate the weath-ering site at CIPET opposite PTC Building.

Weather Data:

It was decided to obtain weather data from Metrology Department Meenambakkam.

Instruments:

Discussed regarding procurement of instruments for monitoring weather at exposure site. List of instruments to be prepared. H.B.

It was decided that Hut for housing the instruments was not necessary.

Samples for Weathering:

To obtain samples from various industries for weathering tests in time for 24th October programme. Black PE sheets samples to be put up for exposure.

contd/...2.

Standards:

i) Chairman provided ISO/BS standards on weathering for making copies (xerox). — V.K.

ii) Blue Standards to be procured from Organisation of Textile Research. — H.B.

Weathering Stations:

i) Harbour authorities to be contacted for setting up marine site at Madras Port. — K.S.

ii) Other sites such as Hot - Dry and Temperature climate to be taken up at a later stage.

iii) Canel lining site: Chairman pointed out that it was not necessary to set up a site for weathering effect on canal lining.

Accelerated Weathering:

i) To follow up the procurement of low temperature circulation unit for Weather-Ometer — V.K.

ii) To contact SISCO for demonstration of working of Weather-Ometer.

Short Term Programme:

i) It was decided to conduct a One day Short Term Programme on Weathering & Testing on 24th October 1983.

ii) Chairman was requested to deliver a lecture on Testing of materials and products in Short Term Programme on Quality Control and Testing of Plastics (19th to 24th September 1983). — H.B.

iii) Preparation of a brouchre for Short Term Programme on Weathering to be prepared. — H.B.& V.K.

iv) The details of the Weathering Course were discussed.

Next Meeting: 1st September at 1 P.M.

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ANNEXURE - 4

PLASTICS TESTING CENTRE

"WEATHERING WORKING PROJECT TEAM"

Minutes of Third Meeting held on 1st September 1983

Members present:

Mr H.Burns	:	UNIDO Expert
Dr K.Ramamurthy	:	Head of Testing Centre
Dr Vijai Kumar	:	Foreman (Testing)
Dr D.Sudhakar	:	Foreman (Testing)

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		Action.
1.	Weather-Ometer operation - to contact Service Engineer.	D.S.
2.	Discussed the design & construction of outdoor weathering racks.	
3.	Discussed the collection of weather data from Metrology Department.	H.B & V.K.
4.	Exposure of sheets of ABS/HIPS, Acrylic sheets of the course.	H.B & V.K.
5.	Marine site - to followup the authorities for permission.	H.B & V.K.
6.	Procurement of Black PE sheets for weathering	K.R & D.S.
7.	Short Term Programme :	
	i) Preparation of Brochure	V.K & D.S.
	ii) Total number of Candidates - 20	
	iii) Brochures to be sent by 19th Sept. '83	
	iv) Date of Course - 24th September 1983.	
	Meeting for Short Course on 5th September 1983	
8.	Abstracts on Weathering handed over to counter-part by Chairman.	H.B & V.K.
9.	National Physical & Oceanographic Labs to be contacted for setting up Marine site.	K.R & H.B.
10.	To take up the enquiries sought by industries on Weathering/ageing in next meeting.	

Next Weathering Meeting on 9th September 1983 P.M.

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ANNEXURE - 5

PLASTICS TESTING CENTRE

"WEATHERING WORKING PROJECT TEAM"

Minutes of Fourth Meeting held on 9th September 1983.

Members present:

Mr H.Burns	:	UNIDO Expert
Dr K.Ramamurthy	:	Head of Testing Centre
Dr D.Sudhakar	:	Foreman (Testing)
Dr Vijai Kumar	:	Foreman (Testing)

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Action.

1. Weather-Ometer - operation, cooling unit attached, planned to have trial runs on 20th September 1983, Senior Engineer present. — D.S & V.K.

2. Outdoor weathering racks - purchase to be finalised — H.B & V.K.

3. Discussed the collection of data from observatory. Agreed to collect the following data on monthly basis.

i)	Sunshine hours	- daily
ii)	Rainfall	- daily
iii)	Relative humidity	- at 6 hours interval from 6 a.m.
iv)	Temperature	- 6 a.m.: 9 a.m : Noon 3 p.m : 6 p.m : Midnight

Data to be collected monthly.

4. Procurement of sheets for outdoor weathering in time for Short Programme (October 24). — V.K.

5. Marine site - Meeting arranged with port trust authorities on 14th September 1983.

Proposal for marine site at MPCL, Cochin dropped.

contd/..2.

6. Collection of P.E. films from Polyene General Ind. — K.R & D.S.

7. Short-term Course:

Brochure draft prepared.
Discussed the formats and printing of the Brochure.
Agreed to have total no. of candidates as 15.

8. Discussed the enquires received for weathering tests - both natural a-nd accelerated artificial weathering.

9. Agreed to have weathering site at CIPET - open place opposite to PTC.

10. Discussed and agreed to draw imprest money for hardwood and other expenditure. — K.S., K.R. & H.B.

Next meeting Working Project Team on 15th September 1983 at 3.00 P.M. (Held over owing to unpending short course 19th September 1983).

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ANNEXURE - 6

PLASTICS TESTING CENTRE

"WEATHERING WORKING PROJECT TEAM"

Minutes of Fifth Meeting held on 4th October 1983

Members present:

Mr H.Burns	:	UNIDO Expert
Dr K.Ramamurthy	:	Head, Plastics Testing Centre
Dr Vijai Kumar	:	Foreman (Testing)
Dr D.Sudhakar	:	Foreman (Testing)

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1. Discussed the developments in running the Weather-Ometer:

   (a) Temporary cooling unit fixed; — Dr Sudhakar
   (b) Trial runs conducted; — Dr Vijai-Kumar
   (c) Defects such as wet bulb, wet bulb depression, time count down, rack spray noticed;
   (d) Repairs undertaken along with the Service Engineer.

2. Procurement of plastics samples for out door weathering from various manufactures — Dr K.Ramamurthy, Mr H.Burns

3. Test standards on weathering to be procured — Dr K.Ramamurthy, Dr Vijai Kumar

4. Design of caps for marine site-discussed — Mr H.Burns, Dr Vijai Kumar

5. Procurement of samples from Vadyar Boats for Weathering at Marine site.

6. Refresher Course-Agreed upon to deal with the topics:-

   (i) Introduction to Weathering & Effects of UV Stabilizers — Mr H.Burns

contd/..2.

(ii) Accelerated Weathering	Dr D.Sudhakar
(iii) Mechanism of degradation	Dr Vijai Kumar
(iv) Evaluation of Weathering	Dr Ramamurthy

7. Samples set up on the roof of Tool Room for Weathering:-

Acrylic sheet	(9th Sept. 1983)	- 1 No.
HIPS sheet	(-do-)	- 1 No.
PVC Sheet	(14th Sept.1983)	- 1 No.
Clear Plastic PVC Sheet	(5th Oct.1983)	- 1 No.
PP Tensile Specimens	(5th Oct.1983)	- 5 Nos.
HDPE Izod Specimens	(5th Oct.1983)	- 6 Nos.

8. Agreed to carry out the following tests for the specimen exposed for weathering :-

i) Tensile Strength & Elongation @ Breck;
ii) Unnotched Izod;
iii) Visual tests - Surface cracking, crazing, gloss, warping, colour, roughness;
iv) Surface Hardness;
v) Clarity/Light transmission;
vi) Surface & Volume Resistivity.

9. Metrological department agreed to provide the data on monthly basis - arrangements to be made to collect the data as planned.

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ANNEXURE - 7

PLASTICS TESTING CENTRE

"WEATHERING WORKING PROJECT TEAM"

Minutes of Sixth Meeting held on 21st October 1983

Members present:

Mr H.Burns	:	UNIDO Expert
Dr K.Ramamurthy	:	Head, Plastics Testing Centre
Dr D.Sudhakar	:	Foreman (Testing)
Dr Vijai Kumar	:	Foreman (Testing)

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1. Permanent cooling unit attached to the Weather-Ometer, Water spray in the test chamber regularised and Trial Test conducted. — D.S & V.K.

2. Tests on the specimens of outdoor exposure were conducted according the standard procedures listed: — H.B & K.R.

Test	Standard (ASTM)
Tensile Strength & Elongation at break	D 638
Hardness	D 785
Surface Resistivity (500 V)	D 257
Gloss	D 523
Izod (Unnotched) Impact	D 256
Breakdown Voltage (If available)	D 149
Clarity	D 1746

3. Setting up of outdoor exposure weathering rack with 13° inclination - work in the final stages. — H.B., D.S & V.K.

contd/...2..

4. Progress on the preparation of lecture notes various topics for the short course 'Introductory programme on Weathering of of Plastics' - reviewed. — H.B & K.R.

5. Programme for the short course on Weathering of Plastics discussed and finalised — H.B & K.R.

6. Agreed to invite guest lecturer from metrological department to speak on weather and its measurement for the short course

7. Discussed the design and procurement of cage for marine site.

8. The Chairman appraised the members regarding his industrial visits to Bangalore and Mysore — H.B.

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ANNEXURE - 8

N O T E

Sub: Request for provision of suitable site for conducting Weathering Experiments in the Madras Harbour - Reg.

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On 14th September 1983, the UNIDO Expert Mr H.Burns accompanied by Shri K.V.Sivasamy and the undersigned visited the office of the Dy. Chairman, Madras Port Trust to discuss the possibility of locating a suitable site inside the harbour to carry out the Weathering Experiments of Plastics in Marine Environment.

Mr H.Burns explained in detail to the Dy. Chairman, Mr. Ashok Joshi, I.A.S., and the Harbour Master, Capt. V.K. Kapur the significance of the application of plastics to marine uses and stressed the importance in the evaluation of such properties when faced with marine environment.

After the explanation and short discussion on the subject, the Dy. Chairman immediately responded to allot a suitable site for conducting our experiments involved, notwithstanding the duration of such a test and directed Capt. V.K. Kapur to show the CIPET team a suitable site inside the Harbour. A suitable has located and earmarked for CIPET to go through the test. It was also indicated by Capt. V.K.Kapur that as the entrance inside the Harbour was restricted and could only be allowed on production of proper identity cards, we wereasted to make a formal request to him indicating the number of personnel from CIPET who would be involved in the work so as to enable him to issue the entry passes. He also assured the CIPET team that he would extend all help that is required to make the experiment a specticular success. In the meantime, action is being taken to fabricate three cages for holding into the waters the plastics specimens towards carrying out the above experiments.

Sd/-....
(K. RAMAMURTHY)
Senior Plastics Engineer (Testing)

To
The Director, CIPET, Madras-32.

CC. to Mr H.Burns.

ANNEXURE - 9

CIPET

Offers

Introductory Course

on

Weathering of Plastics

Course Director

H. BURNS

UNIDO Expert

CENTRAL INSTITUTE OF PLASTICS
ENGINEERING AND TOOLS
Guindy, Madras-600 032

Grams : CIPET Tel : 432371

INTRODUCTORY COURSE

ON

"WEATHERING OF PLASTICS"

Venue :

CIPET, Madras

Date :

24th October 1983 between 09.00 and 17-00 hours

Objectives :

To introduce the concept of weathering and stability of Plastics.

To acquaint the factors that affect the Weathering of Plastics and the changes in properties.

To describe methods of natural and accelerated Weathering of Plastics and the tests to evaluate the property changes.

Tentative Scope :

Introduction to Weathering.

Natural Weathering.

Accelerated artificial Weathering.

Testing and evaluation of Plastics.

Laboratory observation and study.

Final discussion and evaluation.

Methodology :

Lectures, Practical demonstrations and discussions.

Quality control managers, Inspectors, Supervisors and Enterprenuers in Plastic Industry.

Eligibility :

University Degree, Diploma or Equivalent qualification in Science, Technology/ Engineering

Some experience in plastics/application of Plastics.

Preference will be given to sponsored candidates.

Course Fee :

Rs. 250/- (Non residential-includes course materials and lunch)

Intake Capacity :

15

Closing Date for Registration :

14th October 1983

Selected candidates will be intimated by

15th October 1983

Cheque/draft should be drawn in favour of The Director,

CIPET,

Guindy, Madras-600 032

INTRODUCTORY COURSE

ON

"Weathering of Plastics"

Plastics Testing Centre

CIPET

Madras-600 032

INDIA

Name .....

Age .....

Qualifications .....

Designation .....

Specialization... .....

Experience .....

.....

Mailing Address .....

.....

.....

Tel No .....

Date

Signature of Applicant :

CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TOOLS

GUINDY, MADRAS - 600 032

Introductory Course

on

"WEATHERING OF PLASTICS"

Practical Work

Introduction:

Course members will participate in a practical demonstration of natural weathering of plastics at Madras, CIPET Station (Hot/Wet). The details of materials assessed are given overleaf. Control samples (identical in composition, processing and dimensions with exposed samples) were stored indoor (27°C : 65 % R.H.) and tested a few days before the course.

Exposed samples, some 15 days, 31 days and 36 days outdoors were withdrawn at 09.00 A.M. on 20th October 1983. Owing to the large number of tests required to be done within three hours, most of "exposed" testing was carried out just before the course started.

Results of all these tests will be given to course members for insertion in table of results overleaf. The origin composition and processing of these materials is not known and hence the results obtained may not be typical for the relevant material.

The tests will be performed to following standards:-

Test	Standard (ASTM)
Tensile Strength & Elongation at break	D 638
Hardness	D 785
Surface Resistivity (500 V)	D 257
Gloss	D 523
Izod (Unnotched) Impact	D 256
Breakdown Voltage (If available)	D 149
Clarity	D 1746

Material	Date Exposed 1983		Exposure Period(days)	Sunshine Hours	Rainfall mm	Average Humidity % Noon	Average Temp. Noon
	Stard	End					
1. Polypropylene (Injn. Moulded)	5 Oct. 10.00 AM		15	135.1	9.6		
2. H D P E (Injn. Moulded)	10.00 AM 5 Oct.		15	135.1	9.6		
3. Plastic PVC Film (Clear) 0.1 mm thick	5 Oct. 11.00 AM	20th Oct.	15	135.1	9.6		
4. Green HIPS Sheet (3 mm thickness)	9 Sept. 14.30 PM	09.00 A.M	36	262.9	262.3		
5. Clear PMMA (1.95 mm thickness)	9 Sept. 14.30 PM		36	262-9	262.3		
6. UPVC Thin sheet (35 mm thickness)	14 Sept. 14.20 PM		31	234.5	189.1		

PROGRAMME TESTING DATA

Material	Test	Units	Control Results	Exposed Results	% Change
(1)	(2)	(3)	(4)	(5)	(6)
1. Polypropylene	Izod Impact (Unnot)				
	Tensile Strength (Yield)	kg/cm^2	324	315	- 2.8
	Tensile Strength (Break)	kg/cm^2	277	274	Nil
	Elongation at Break	%	17.4	18.3	+ 5.2
	Hardness				
	Surface Condition				
2. HDPE	Izod				
	Tensile Strength (Yield)	kg/cm^2	238	232	- 2.5
	Tensile Strength (Break)	kg/cm^2	113	108	- 4.4
	Elongation at Break	%	168	178	+ 6.0
	Hardness				
	Surface Condition				
3. High Impact Polystyrene	Izod				
	Tensile Strength (Yield)	kg/cm^2	423	Too brittle	-
	Tensile Strength (Break)	kg/cm^2	358	272	- 24.0
	Elongation at Break	%	3.35	1.53	- 54.3
	Hardness				
	Surface Condition				
	Surface Resistivity	ohm cm			

(1)	(2)	(3)	(4)	(5)	(6)
4. PMMA	Tensile Strength (Yield)	kg/cm^2	Too brittle	634	-
	Tensile Strength (Break)	kg/cm^2	620	399	- 24.9
	Elongation at Break	%	2.9	11.6	+ 300
	Hardness				
	Clarity				
	Surface Resistivity	ohm cm			
5. Clear PVC Film	Tensile Strength (Yield)	kg/cm^2	371	368	- 1.0
	Tensile Strength (Break)	kg/cm^2	363	347	- 4.5
	Elongation at break	%	217	210	- 3.5
	Hardness				
	Clarity (Transmission)				
	Surface Condition				
6. UPVC Sheet	Tensile Strength (Yield)	kg/cm^2	658	645	- 2.0
	Tensile Strength (Break)	kg/cm^2	548	484	- 12
	Elongation at break	%	33	57	+ 73
	Hardness				
	Gloss.				
	Surface Condition				
	Surface Resistivity	ohm cm			

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ANNEXURE - 11

Tour Report

Visit of Mr H.Burns, UNIDO Expert and Dr K.Ramamurthy, Senior Plastics Engineer to Bombay - Ahmedabad - Baroda from 25-09-1983 to 30-09-1983 - Regarding (see Annexure - I)

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The tour was undertaken by Mr H.Burns, UNIDO Expert and Dr K.Ramamurthy, Senior Plastics Engineer (Testing) in order to acquaint the Plastics Industries/Institutes in these region about the facilities available at CIPET/PTC Madras and the various programmes that are being taken up by CIPET.

A meeting was organised by the All India Plastics Manufacturers' Association co-sponsered with Plastics and Rubber Institute, Bombay on 26th September 1983 at the West and Hotel. Bombay at 3.30 p.m. The meeting was attended by more than 100 members of All India Plastics Manufacturers' Association and Plastics Rubber Institute. Mr H.Burns spoke on Testing of Plastics for Quality Control and the Senior Plastics Engineer (Testing) on Facilities available at CIPET/PTC. There was a good discussion following these lectures. Welcome speech was read out by Mr R.S. Rishood of Plastics Rubber Institute on behalf of Mr J.R. Shah, Chairman of Plastics Rubber Institute. The newspaper coverage on this matter which appeared subsequently is attached for reference (Annexure II) which gives more information on this meeting.

Before and after the meeting the UNIDO Expert and Senior Plastics Engineer (Testing) were met by the following personnel for discussing various problem.

Mr A.H.Srikanta Aiyar Hon. Secretary	- A.I.P.M.A., Bombay
Mr M.S.Kulkarni General Manager (Tech.)	- Heliplastics Ltd., Thane.

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Mr Kishore Kumar Project Engineers	-	Plastics Technology & Dies, Bombay.
Dr D.N.Bhattacharyya	-	Alkali & Chemical Corporation of India Ltd., Thane.
Mr P.V.Datar Manager	-	Polychem Ltd., Bombay.
Mr Madhu B Shah Manager Plastic Division	-	SLM - Maneklal Industries Ltd., Bombay.
Mr Kishore Thakker	-	Kishore Enterprises, Bombay.
Mr M.C.Dalal Projects Manager	-	Analog Services Private Ltd., Bombay.
Mr K.K.Kurup	-	Reporter, Financial Express, Bombay.

Their problems will be refered to CIPET for taking further action. Mr J.K.Vadodaria, Chairman, Plastics Rubber Institute, Bombay wanted CIPET to explore the possibility of organising a 3 day programme on Quality Control & Testing of Plastics at Bombay. This is being followed up.

On 27-09-1983 a visit was made to the Supreme Industries Limited Bombay where Mr J.M.Totala General Manager was met and TIFCO where Dr Vasudevo, Dr Pradeep Bakshi and Dr D.V. Sharma were met and the Indian Institute of Packaging where Mr Narayanan Joint Director was met. The facilities were visited and the activities discussed. Especially at TIFCO technical discussion were held inconnection with sponsering certain project to PTC on reinforced the rmo plastics materials and on testing assignments. This is being followed up.

On 28-09-1983 the executive committee members of Gujarat Plastics Manufacturers Association along with Dr Trivedi, Advisor, Govt. of Gujarat met the UNIDO Expert and Senior Plastics Engineer (Testing) at Ahmedabad through the initiation of Mr Thundia, Liaison Officer at CIPET extension centre Ahmedabad and had a general discussion on the

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various aspects of Plastic Industries in Gujarat. They expressed their desire to visit CIPET and other Plastic Industries at Madras in December 1983/January 1984 which is to be organised. The G.S.P.M.A arranged visits, to various Plastics Industries in that region and also held discussions on problems facing them. The plants visited were:

V.R. Cables (Mr Ramesh Dubal), Ahmedabad

Gujarat Plastics, Ahmedabad

Poly Folien (Mr P.N.Mehta), Ahmedabad.

The CIPET extension centre at Vatva industrial estate and the office in the city were also visited during the stay at Ahmedabad.

On 29-09-1983, Mr P.R.Seshan of Plastics Application Centre I.P.C.L. Baroda through Mr Kamat Senior Engineer of Plastics Application Centre arranged a meeting on behalf of Plastics & Rubber Institute (Gujarat Centre) in which Mr H.Burns and the Senior Plastics Engineer (Testing) spoke more or less on the same lines as that of Bombay meet. It was again well attended. The discussions followed were interesting and informative. In the afternoon a visit to the Polyethylene plant, R & D Centre and Product Application Centre were under taken.

On 30-09-1983 factory visits at Bombay to M/s R.H. Windsor one of the largest manufacturers of Plastics Processing Machinery in India was arranged by Mr P.C.Bolur Regional Manager Madras through Mr F.Pinto Marketing Manager of R.H.Windsor - Bombay. This visit as well as the subsequent visit to Larsen & Toubro at Bombay were very useful. The whole ranges of processing machineries produced at

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R.H.Windsor together with the latest developments in the field as well as range of thermoset moulding facilities at L & T were seen. Problems related to warpage during automatic moulding of Phenolic were discussed at L & T and this is being refered to CIPET by them for a deeper study.

During the visits the facilities available at CIPET/PTC were made known to all concerned in utilizing them and brouchures on PTC and Weathering of Plastics training course were also distributed.

On the whole the tour was successful.

Follow up action:

1) Thanks giving letter are being sent.
2) Action is being initiated for organising a short-term course at Bombay.
3) Work is planned to attend to TIPCO assignment which is expected on 24th October '83 when their personnel come to attend training programme on Weathering of Plastics.
4) Action is also being taken to organise G.S.P.M.A visit.
5) As and when the problems discussed during the visits are referred they will be looked into.

Sd/-..

K. RAMAMURTHY,
Senior Plastics Engineer (Testing)

Sd/-..

H. Burns,
UNIDO Expert.

Encl.: 2

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ANNEXURE - II

Tour Programme

Bombay / Ahmedabad / Baroda

25-09-1983 to 30-09-1983

Mr H.Burns, UNIDO Expert & Dr K.Ramamurthy, Sr.Plastics Engineer (T)

25-09-1983	-	Departure (11.00 A.M.) Madras for Bombay
26-09-1983	-	A.I.P.M.A & P.R.I. arranged programme West end Hotel, Bombay at 3.30 P.M. "Facilities at CIPET/PTC" - Dr K.Ramamurthy
		"Testing of Plastics for Quality Control" - by Mr H.Burns, UNIDO Expert.
27-09-1983	-	Visit to Supreme Industries Ltd., TIPCO/ Indian Institute of Packaging.
	-	Departure Bombay for Ahmedabad.
28-09-1983	-	F.N. - Meeting with G.S.P.M.A members
	-	Factory Visits: V.R.Cables/Gujarat Plastics/Poly Folien
	-	A.N. - Visit to CIPET Extension Centre.
	-	Departure Ahmedabad for Baroda - 05.00 P.M.
29-09-1983	-	I.P.C.L. Baroda
	-	F.N. - P.R.I Meeting "Facilities at CIPET/PTC" - Dr K.Ramamurthy.
		"Testing of Plastics for Quality Control" - by Mr H.Burns, UNIDO Expert.
	-	A.N. - I.P.C.L. Plant visits.
	-	Departure Baroda for Bombay.
30-09-1983	-	F.N. - Visit to M/s R.H.Windsor & Co., & L & T.
	-	A.N. - Departure for Madras.

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"FINANCIAL EXPRESS"

TUESDAY, SEPTEMBER 27, 1983

Plastic units make headway

By A Staff Reporter

BOMBAY, Sept 26 - The plastic industry in India has taken rapid strides and within the next five years the production will be doubled, according to Mr. Harold Burns, UNIDO expert in plastic testing.

Speaking at a seminar on "Plastic product testing and quality control," jointly organised by the Plastics and Rubber Institute, Indian section and the All India Plastic Manufacturers' Association, here today Mr. Burns said the country would soon achieve a unique position as user and processor of wide range of plastics among developed countries.

He said the industry was in for a massive expansion not only in the areas of production and processing but also in the manufacture of various machines and equipment, he said and added that the country would reach such a stage in the near future that it would no longer need any foreign technology or expertise in this field.

Mr. Burns said under the UNDP special programme, UNIDO had granted $ 10.1 million to India for the development of plastic industry in the country of which $ one million would be utilised by the Central Institute of Plastics Engineering and Tools (CIPET) in Madras for research and development. Mr Burns is currently stationed at CIPET for a three-month study on weathering effect on plastics.

Touching upon the quality aspect, he said Indian goods were relatively good but more emphasis should be given on strict standard for quality control and testing at all level of manufacturing. Even in the selection of machinery and equipment this aspect should be considered seriously, he added.

Dr. K. Ramamurthy, head of Plastic Testing Centre, CIPET, explained various activities of the Institute. He said the plastic testing centre was fully equipped with testing facilities for measurement of mechanical, electrical and chemical properties of plastic and quality of the raw materials.

Earlier in his welcome speech, Mr. J. K. Shah, Chairman of the Plastic and Rubber Institute, said the raw material consumption by plastic industry had touched about 3.5 lakh tonnes and this would increase three-fold in the next 10 years. He cautioned the plastic manufacturers that due to the use of substandard raw material and inadequate attention to quality control, the industry today had acquired a sort of phobia from large number of users since the products were regarded as a cheap substitute for traditional materials. To change this attitude, strict quality control was the only answer, he added. Mr. Shah's speech was read out in his absence by Mr. R. S. Risbeed of Plastic and Rubber Institute.

Mr. Bogilal Gandhi, Vice-President, AIPMA, and Mr. J. K. Vadodaria, Chairman, Bombay Centre of Plastic and Rubber Institute also spoke.

"TIMES OF INDIA"

SEPTEMBER 28, 1983

UNIDO expert lauds Indian plastic industry

BOMBAY, September 27 (PTI): The plastic industry has made tremendous progress in India and the country would soon be the leaders in plastic industry in Asia, the United Nations Industrial Development Organisation (UNIDO) expert R. Harold Burns said here.

Speaking at a seminar on plastic product testing and quality control, organised by the All India Plastics Manufacturers' Association, he said the plastic testing centre (CIPET) at Madras was bringing in training man-power for the plastic industry.

UNIDO has sanctioned Rs. three crores for establishing testing centres in other parts of the country. It had also given a grant of Rs. 10 crores the year 1983-84 for the development of engineering plastics in country, he said.

Mr. Bhogilal J. Gandhi, vice president of AIPMA, said the raw material consumption in India is approaching the 3.5 lakh tonne-capacity and was likely to increase at least three folds in the next ten years.

Earlier, Dr. K. K. Ramamurthy, head of plastic testing centre (CIPET) at Madras, demonstrated with slides plastic injection and quality testing equipment used in the industry to delegates attending the seminar.

ANNEXURE - 12

Tour Report

Report of Industrial Tour to Bangalore & Mysore 15th to 19th October 1983.

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This tour covers the visits of Bangalore and Mysore. The aim of this tour was to visit Plastics Industries, to hold technical discussions and make presentations to the P.R.I at Bangalore.

Visits were made to two industries in Mysore and are in Bangalore:-

1) Jalvahanini Pipe & Chemical Pvt. Ltd., - Mysore
2) Wiltech India Ltd., - Mysore
3) Indian Telephone Industries - Bangalore.

A. INDUSTRIAL VISITS:

1) Jalvahanini Pipe & Chemical (P) Ltd., - Mysore:

It is a Small Scale Industry and producing Rigid PVC pipes of different diameter. They have two twin extruders with testing equipments. They held assistance from CIPET on following points:-

(a) Drawing of latest design stress rupture equipments and fittings.

(b) CIPET should have the long term rupture equipment available for Small Industries use.

(c) ISI should change the idea for keeping long term test for Small Scale Industries.

(d) Detail of Saline drip project as used in hospitals.

(e) Details of Blow moulding Bottles for Food Packaging.

(f) Comparison of Brabender Curve/value and Processing Parameters for PVC.

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2) Wiltech India Limited:

This plant manufactures Plastic Blades, Razors and its fittings. They have 3 injection moulding machines and other machines for Blades & Fittings. They have already switched to High Impact PS as guided by CIPET. We have sent 3 each samples of Medium and High Impact PS to Du Pont U.S.A for laboratory evaluation.

3) Indian Telephone Industries (ITI):

A visit was made to Plastics Division. They have problems of Flow Blooming of pigments on components from Injection Moulding of ABS. We have suggested to contact Dr Mennig in the month of December, as he is coming to CIPET as a Expert in the field of Rheology.

B. PRI PRESENTATIONS:

A formal meeting of PRI members was held in Bangalore on 18th October at 6 P.M. at IPCL Offices at which 30 members were present. Mr H.Burns presented an illustrated talk on Quality Control of Plastics, Weathering and an introduction to industrial toxicity. Mr Sanjay Kumar spoke on the facilities and seminars available at CIPET, Madras. Great interest was shown and a full discussion held in question time. Both presenters were invited to a reception at the Century Club, hosted by Mr A.Gowrishankar.

Sd/....

H.Burns,
UNIDO EXPERT.

Sd/...

SANJAY KUMAR.

ANNEXURE NO. 13

22nd September 1983

PTC - PROJECT ASSIGNMENT

1.	Information Data Bank on Plastics: Samples taken from current production of Indian manufacture for comparison with Western Sources	Mr. S.K.Sharma Mr. A.K. Gupta
2.	Development of testing instruments of simple design and cheap manufacture suitable for low resource manufacturers or users.	Mr. C.S.R.Manickam
3.	Project in conjunction with Processing Section to assess how mechanical properties are effected by processing condition changes	Mr. C.S.R.Manickam Mr. Sanjay Kumar
4.	Project in conjunction with Tool Design Section to assess the effects of gating (or other parameter in Tool Design	Mr. A.K. Gupta
5.	Provide natural weathering facilities at CIPET, Madras (hot/wet) and a marine site at Harbour, Madras. Commission Atlas Weather-o-meter and carry out trials to establish correlation between natural/accelerated ageing.	Dr. D.Sudhakar Dr. Vijai Kumar
6.	Preliminary exercise in assessing CIPET role in monitoring and controlling atmospheres in raw material and plastics manufacturing plants with view to ensuring safe working conditions.	Dr. D.Sudhakar Dr. Vijai Kumar
7.	Calibration and Standardisation of instruments and equipments at PTC	Mr. P,Poomalai Mr. Sanjay Kumar
8.	Project to be provided by M/s.Bush Boake Allen using natural resins.	Mr. P.Poomalai Mr. S.K. Sharma

&

H Burns.

(H. BURNS)
UNIDO Expert