MINUTES OF DISCUSSIONS
THE BASIC DESIGN STUDY ON THE PROJECT FOR THE UP GRADATION OF PLASTICS TECHNOLOGY CENTRE IN THE ISLAMIC REPUBLIC OF PAKISTAN

In response to a request from the Government of the Islamic Republic of Pakistan (hereinafter referred to as "the Pakistan"), the Government of Japan decided to conduct a basic design study on the Project for the Up Gradation of Plastics Technology Centre (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA")

JICA sent to Pakistan the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Yamaura Nobuyuki, Resident Representative of JICA Pakistan Office, and is scheduled to stay in the country from 6 October to 3 November, 2003

The Team held discussions with the officials concerned of the Government of Pakistan and conducted a field survey at the study area

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets

The Team will proceed to further work and prepare the Basic Design Study Report

Islamabad, October 14th, 2003

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ATTACHMENT

1. Objectives of the Project

The Project aims at upgrading the function of PIC's technological know-how, skills, and experiences effectively and efficiently, by means of which the Government of Japan procures PIC the equipment mainly in injection molding and extrusion. This contributes toward the development of small and medium enterprises of plastic industry, which leads to better employment opportunities and helping in poverty reduction.

2. Project site

The site of the Project is Plastics Technology Centre (PTC), in Karachi.

3. Responsible and Implementing Agency

3-1 The Responsible Agency is the Ministry of Industries and Production(MoIP)

3-2 The Implementing Agency is the Plastics Technology Centre (PIC).

Both sides confirmed that in terms of executing proper operation and maintenance of the equipment and facilities as well as enhancing the effectiveness of the Project, PIC should cooperate with the Synthetic Fiber Development & Application Centre (SFDAC) in managing the budget and personnel under joint control.

The organization chart indicating PIC and SFDAC is attached in ANNEX-1

4. Items requested by the Pakistani side

Both side confirmed that the content of the equipment should be basically analyzed based upon the modified equipment list proposed by the Pakistani side at the stage of the Preliminary Study conducted in November,2002. The modified equipment list is attached in ANNEX-2

After a series of discussions on the selection of the equipment based upon the modified equipment list attached in ANNEX-2 and on the necessity of the workshop for the Project, the items described in ANNEX-3 were finally requested by the Pakistani side. Both sides

agreed that the details of the component will be decided based upon the result of further study JICA will assess the appropriateness of the request and will report the findings to the Government of Japan

5 Japan's Grant Aid Scheme

5-1 The Pakistani side understood the Japan's Grant Aid Scheme explained by the Team, as described in Annex 4

5-2 The Pakistani side will take the necessary measures, described in Appendix-1 of Annex 4, for the smooth implementation of the Project on condition that the Japan's grant aid is extended to the Project

6. Schedule of the Study

6-1 A consultant team will proceed to further studies in Pakistan until the 1st of November 2003.

6-2 Based on the result of the field survey and analysis, JICA will prepare a Draft Final Report in English and dispatch a team in order to explain the outline of the Basic Design in and around January 2004

6-3 In the event of the Draft Final Report being acceptable in principle by the Pakistani side, JICA will complete the Final Report and forward it to the Pakistani side approximately by the end of April 2004.

7. Other relevant issues

7-1 Basic Criteria for Equipment Selection and Design

Both sides agreed that the equipment will be examined in accordance with the criteria as attached in ANNEX-5 and the details of the equipment should be finally decided based upon this criteria

7-2 Clarification of activities related to the Project

Both sides confirmed that the major existing activities of PTC related to the Project are Basic Plastic Technology Course(for 3 months), Short Training Courses(1-5 days), Testing

Services and Consulting Services, which contribute to the development of small and medium enterprises of plastic industry

The Team suggested that PIC should grasp the market needs of plastic industry more keenly in order to make these activities more practical and beneficial to the small and medium-sized enterprises. In addition, PIC assured to take necessary steps to improve the content of the related programs in proportion to the level of the equipment to be covered by the Project

7-3 Operation and Maintenance of the Project

PIC agreed to take necessary measures for the proper operation and maintenance of the equipment and facilities to be covered by the Project.

PIC also agreed to allocate the necessary budget for the Project with the support from MoIP

7-4 Improvement of level of existing technical staff

Both sides assured that PIC should improve the level of existing technical staff or allocate proper qualified technical staff in order to satisfy the requirements outlined in the activities related to the Project.

7-5 The workshop for the Project

After a series of discussion, The Team confirmed that the construction of the workshop was requested by the Pakistani side

Both sides confirmed that the workshop should be needed for the smooth and proper operation and maintenance of the equipment to be covered by the Project as well as for securing enough space for the activities related to the Project. Both sides agreed that the layout of the workshop should be decided based upon the result of the further study

7-6 The existing equipment

Both side confirmed that the existing equipment should be utilized to the maximum for effectiveness of the related activities together with the equipment to be covered by the Project.

7-7 Initial Environment Impact Assessment / Environment Impact Assessment

If environmental clearance is necessary for the Project according to the national regulations, the Pakistani side should take necessary measures to conduct IEIA/EIA as required by the time of Exchange of Note Both sides agreed that the cost necessary for conducting IEIA/EIA should be borne by the Pakistani side

7-8. Soft component service and necessity of technical cooperation

PIC requested the implementation of the soft component within the scope of the Project in order to properly operate and maintain the equipment and facilities to be covered by the Project The Japanese side will assess the appropriateness of the request

PIC recognized the necessity of technical cooperation such as dispatch of technical advisor for training programs and testing services The Japanese side explained to PIC that no commitment is made regarding the implementation of technical cooperation within the scheme of the Project and PIC side agreed on it

END

ANNEX-1 : Organization Chart indicating PIC and SFDAC

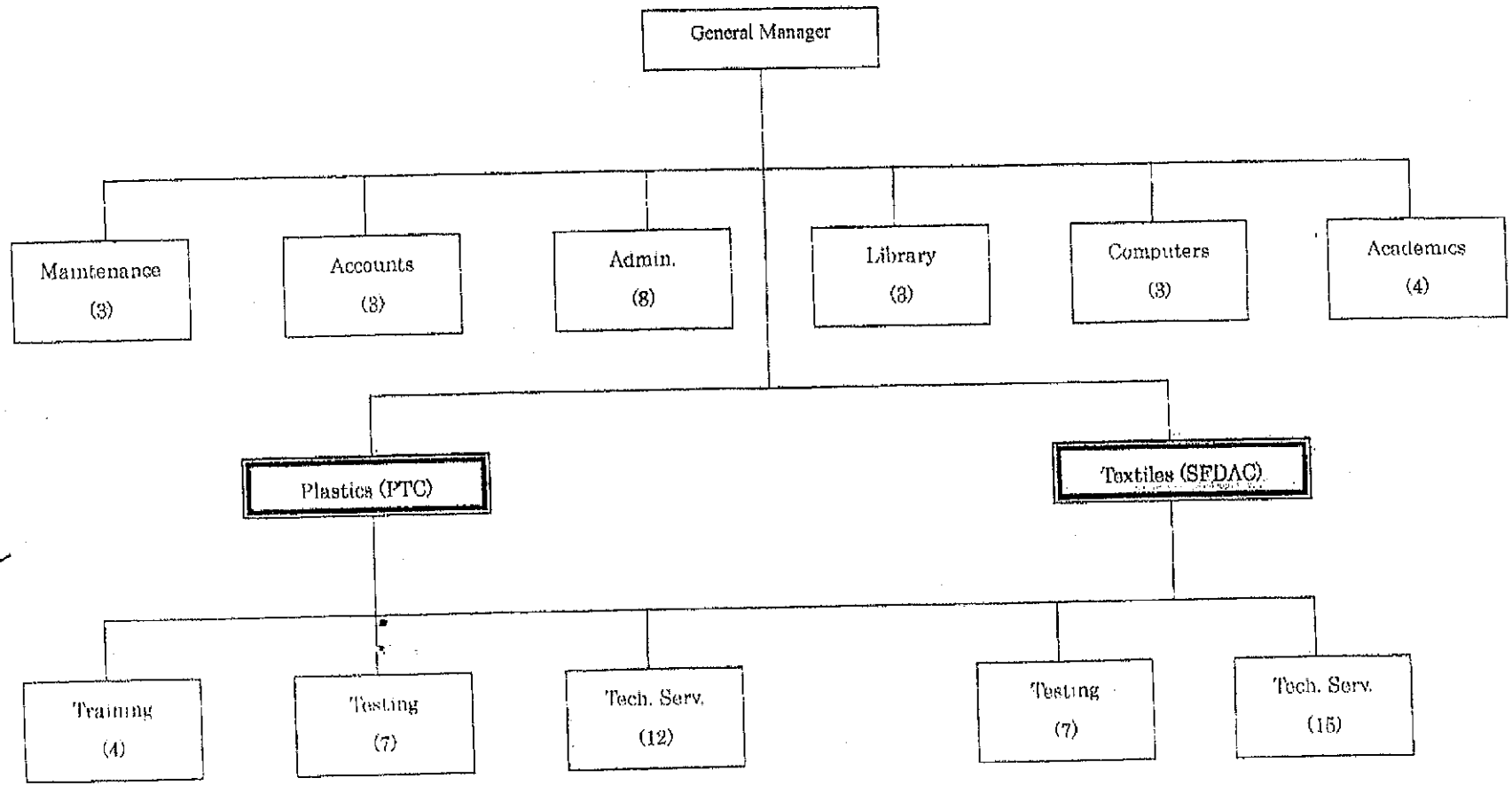
ANNEX-2 : Modified Equipment List

ANNEX-3 : Items Requested by the Pakistani Side

ANNEX-4: The Japan's Grant Aid Scheme

ANNEX-5 : Basic Criteria for Equipment Selection and Design

Plastics Technology Centre (PTC)
Synthetic Fiber Development and Application Centre (SFDAC)



EQUIPMENT LIST

PLASTICS PIPE MANUFACTURING EQUIPMENT

A.	EQUIPMENT NAME	Qty
1 01	High speed mixer with controls and chutes and valves Pneumatic controls, Capacity 100 Kg/hour.	1Set
1.02	Mixer/Cooler complete with control, Capacity 100 Kg/hour	1Set
1.03	Discharge bin, Capacity 500 liter	1Set
1.04	Weighing Scale, 0--20 Kgs.	1Set
1.05	Weighing Scale, 0--1 Kg	1Set
2.00	**Extrusion Line I**	
2.01	Vacuum feeder for hopper, Capacity 25 Kgs/hour	1Set
2 02	Extruder, Twin screw parallel/conical, Dosage feeder , Upto 6" diameter pipes	1Set
2.03	Extrusion Die head, upto6" dia with die trolley complete	1Set
2.04	Die set, For upto 6" Class C and D	1Set
2.05	Vacuum calibration sleeves, Vacuum sizer	1Set
2.06	Water spray bath, for upto 6" dia pipe	1 Set
2.07	Water Spray Bath, For upto 6" dia pipes	1Set
2.08	Haul off, for upto 6" dia, with measuring and auto thickening device	1Set
2.09	Laser printer jet for pipes	1 Set
2.10	Pipe Saw, upto 6" dia, with Chamfering option	1 Set
2 11	Pipe belling machine, Tooling suitable for rubber ring joints upto 6" dia Tooling for Solvent Cement joints upto 6" dia	1Set
3.00	**Extrusion Line II**	
3.01	Single screw line for small diameter pipes especially for medical purposes	1 Set
4.00	**Plastic Injection Moulding Machine**	
4 01	Injection moulding machine (Electric Type), For Pipe fittings Capacity 40--50 Kgs/hour, Clamping force 350 -- 450 Tons	1 Set
4.02	Hooper loader Floor Type, 50 and 75 Kg/hr	2 Sets
5.00	**Injection Moulds pressure type fitting**	
5 01	Injection Moulds for solvent type pressure fitting B S 4346/B S (EN) 2000 One each for: ▪ (90° elbow, Tees, Valve Socket) 1/2" 1 each ▪ (90° elbow, Tees, Valve Socket) 3/4" 1 each ▪ (90° elbow, Tees, Valve Socket) 1" 1 each ▪ (90° elbow, Tees, Valve Socket) 11/4" 1 each ▪ (90° elbow, Tees, Valve Socket) 1 ½" 1 each ▪ (90° elbow, Tees, Valve Socket) 2" 1 each	1 Set
	Option inserts for producing faucet fittings	1 Set
5 02	Injection Moulds for solvent type pressure fitting B S 4346/B S (EN) 2000 One each for: ▪ (90° elbow, Tees, Valve Socket) 3" dia, 1 each ▪ (90° elbow, Tees, Valve Socket) 4" dia, 1 each ▪ (90° elbow, Tees, Valve Socket) 6" dia, 1 each	1 Set
5.03	Injection moulds for SWV fitting, One each for:	2 Sets

	32 mm, 40 mm, 50 mm, (90 ° 45 ° elbows) 1 each	
	Reducer 40 x 50, 50 x 75 mm	2 Sets
	Inserts for M/F	1 Set
5.04	Injection Mould fitting for SWV System, B S 4515/equivalent ISO sweep bend 92 1/2 ° (3", 4"), sweep branch 92 1/2 ° (3", 4") bend 135 ° (3", 4"), branch 135 ° (3", 4")	1 Set
5.05	I/O and M/F INSERTS, For above fittings	16 Inserts
5.06	Gully trap moulds, 50 mm x 110 mm, 50 mm x 75 mm	1Set
5.07	Cowl mould 50 mm	1 Set
5.08	P-Trap Moulds (4" dia)	1 Set

COMPOUNDING WORKSHOP

B.	EQUIPMENT NAME	QTY
1.00	High Speed Mixer, 200 Ltr	1 Set
2.00	Low Speed Cooler, 200 Ltr	1 Set
3.00	Extrusion Feed Hopper, 25 Kg	1 Set
4.00	Twin Screw Extruder, 50 Kg/Hr	1 Set
5.00	Hot Cut Palletizer, 50 Kg/Hr	1 Set
6.00	Metal Detector	1 Set
7.00	Vibrator Motor	1 Set
8.00	Exhaust Fan	1 Set
9.00	DOP Charging Pump, 15 Ltr/Hr	1 Set
10.00	DIOP Charging Pump, 15 Ltr/Hr	1 Set
11.00	DINP/DIDP Transfer pumps	2 Sets

SUPPORT FACILITY

C.	EQUIPMENT NAME	Qty
1.00	Pipe Crushing equipment	
1.01	PVC pipe crusher, Mouth dimension 750 x 750 mm • Output 100 Kg/hour, Cyclone, Dust collector	1Set
2.00	Storage tank, 2 M^3 Capacity	1Set
3.00	Crane Gantry for injection area, (10 Ton) with 10 Ton Hoist	1 Unit
4.00	350 KVA Diesel/Furnace oil Generator	2 Units
5.00	Air conditioner for Laboratory	1 Unit
6.00	Recycling Unit, 15 Kg/hr	1 Unit
7.00	Incinerator, Double Burner Type	1 Unit
8.00	Compressor	2 Units
9.00	Hydraulic Fork Lifter (Hand Type), 1 Ton and 2 Tons, 1 each	1 Unit
10.00	Trolley, 200 Kg	2 Units
11.00	Mould Temperature Cooling	1 Unit
12.00	Mould Temperature Heating	1 Unit
13.00	Material Dryer, 100 Kg	1 Unit
14.00	Auto Color Mixing Unit	1 Unit
15.00	Vacuum Gas Cleaning	1 Unit
16.00	Water and Sewerage Pumps (2 each)	1 Set

PROCESSING MACHINES

D.	EQUIPMENT NAME	Qty
1.00	Injection Moulding Machine (Liquid Silicone Rubber), Small Unit	1 Unit
2.00	Injection Moulding Machine (Thermoset), Small Unit	1 Unit
3.00	Vacuum Forming, Small Unit	1 Unit
4.00	Sheet Forming With Single Screw Extruder Double Type (Co-Extrusion), Small Unit	1 Unit
5.00	Blow Moulding (Intermittent Type), Small Unit	1 Unit
6.00	Compression Moulding, Medium Unit	1 Unit
7.00	Rubber Extruder, 15 Kg/Hr	1 Unit
8.00	Banbury Mixer, 30 Kg/Hr	1 Unit
9.00	Polymerizer, Lab. Scale Unit	1 Unit
10.00	Calendering Machine, Small Unit	1 Unit

QUALITY CONTROL & TESTING LAB. EQUIPMENT

E.	EQUIPMENT NAME	Qty
1.00	Short term (1 hour) Hydrostatic testing bath, (20° C test) 5 station type Upto 12" dia	1 Set
2.00	Long term Hydrostatic test, 20-23° C 5 Station type	1 Set
3.00	Long term Hydrostatic test, 60° C bath, 5 Station type	1 Set
4.00	Methylene Chloride Test	1 Set
5.00	Glycerine test – Heat reversion test	1 Set
6.00	Falling ball/weight Impact test equipment, Auto control	1 Set
7.00	Softening point test machine, HDT/VICAT type	1 Set
8.00	Fracture toughness test equipment, 3" to 12" dia	1 Set
9.00	Water quality test lab	1 Set
10.00	Opacity test equipment	1 set
11.00	Outside dia measurement gauges	1 Set
12.00	Pipe wall thickness measurement gauges	1 Set
13.00	Groove dia and internal dia measurement gauges	1 Set
14.00	Fittings internal dia measurement gauge sets	2 Sets
15.00	Pipe Minimum and Maximum outside dia, Measurement system	2 Sets
16.00	Deionize water unit	1 set
17.00	Distillation Apparatus with demineralizer, 1.8 Lts/hr	1 Set
18.00	Universal Testing Machine, 10 Tons	1 Set
19.00	DigitalHardness Tester: Shore A & D, Rockwell Hardness with Stand	1 Set
20.00	Fume Hood(Draft Chamber), 1.2 m wide	1 Set
21.00	Profile Measurement for Extrusion	1 Set
22.00	Thickness Gauge: ASTM-D 374, ASTM-D 5199	1 Set
23.00	Circumference Measurement for Pipe	1 Set
24.00	Graves Tear Test, ASTM-D 1004	1 Set
25.00	Water Extraction, ASTM-D 3083	1 Set
26.00	Water Vapor Transmission, ASTM-D 814	1 Set
27.00	Torque Tear, ASTM-D 751-B	1 Set
28.00	PPT Resistance, ASTM-D 2582	1 Set
29.00	Trapezoidal Tear, ASTM-D 4533	1 Set
30.00	Puncture Resistance, ASTM-D 4833	1 Set
31.00	Humidity Chamber for Testing	1 Set

32.00	Weather Stress Machine	1 Set
33.00	Color Meter for Plastics	1 Set
34.00	Freezer, Chest Type, -30° C	1 Set
35.00	3-D Measuring Machine (3-D MM)	1 Set
36.00	F T N I R with solid and liquid sample preparation accessories, software with DRS, ATR and IR microscopy accessory	1 Set
37.00	Gas Chromatograph with accessories including software and autosampler ▪ Head Space Injector for GC ▪ Molecular Sieve glass and SS columns for GC, 1/8" and ¼" ▪ Capillary columns for GC and GC-MS	1 Set 1 Set 3 Sets 3 Sets
38.00	Thermal conductivity detector	1 Set
39.00	Thermal Analyzer with TGA and DSC, 1 each	1 Set
40.00	HPLC: ▪ Octadecyl (RP column) for HPLC ▪ Refractive Index detector for HPLC ▪ Gel permeation columns for HPLC ▪ Packed column injector for HPLC	 3 Sets 1 Set 3 Sets 1 Set
41.00	Digital Impact Tester, ASTM-D 1822	1 Set
42.00	Creep Tester, ISO 889	1 Set
43.00	Mullen Type Bursting Strength Tester, Upto 2000 KPa	1 Set
44.00	Oxygen Index Tester, ASTM-D 2863	1 Set
45.00	Ozone Ageing Tester, ASTM-D 1149	1 Set
46.00	Automatic Gas Permeability Tester, ASTM-D 1434	1 Set
47.00	Digital Thickness Tester, JIS-K 6250	1 Set
48.00	Thermally Simulated Current Tester, JIS-K 7131	1 Set
49.00	Ultrasonic Flaw Detector	1 Set

SECOND PLASTIC PROCESSING

F.	EQUIPMENT NAME	Qty
1.00	Slotting Machine suitable for producing Well Screens	1Set
2.00	Belling Machine, 'O' Rubber Ring	1 Set
3.00	High Frequency Welder	1 Set
4.00	Ultrasonic Welder with accessories	1 Set
5.00	Impact Welder	1 Set
6.00	Chamfering Machine	1 Set
7.00	Threading Machine for inner and outer threading	1 Set
8.00	Drilling Machine	1 Set
9.00	Plumbing Tools for 10 students (Several Types)	1 Set
10.00	Bending Machine	1 Set
11.00	Milling Machine	1 Set
12.00	Wire Coating Machine	1 Set
13.00	Printing Machine for plastic packaging	1 Set

PLASTICS DESIGN LABORATORY

G.	EQUIPMENT NAME	Qty
1.00	Hardware	
1.01	Computers Pentium 4 for students with one server	25 Sets
1.02	Pentium 4 for teachers	2 Sets
1.03	Laptop Pentium 4 with printer	2 Sets
1.03	Laser Printer, A4	3 Sets
1.04	Laser Printer, A3	1 Set
1.05	Scanner, A3	2 Sets
1.06	Plotter, A1	1 Set
1.07	HUB (with accessories for Network Setup)	2 Sets
2.00	Software: ▪ Plascam ▪ Mould Flow, 3-D Analysis ▪ Unigraphics Solutions (Mold/Die Design) ▪ Processing/Piping Training ▪ ANSYS (Product Development Software) ▪ Material Selection ▪ Training Software for Extrusion, Injection Moulding, Blow Moulding and Health and Safety in Plastic Processing	1 Set

TRAINING AIDS

H.	EQUIPMENT NAME	Qty
1.00	Multimedia	2 Sets
2.00	Video player and T.V 32", 2 each	1 Set
3.00	Digital Camera with Zoom	1 Set
4.00	Digital Video Camera with portable recorder	1 Set
5.00	Mobile Stand for Camera	1 Set
6.00	DVD player with T.V	1 Set
7.00	Projector for projection of samples	1 Set
8.00	Books, Journals, Videos and CD-Rom (Please see attachment sheet)	
9.00	Testing and Production Standards: JIS, ASTM, BSS, DIN, ISO, 1 each	1 Set

MAINTENANCE EQUIPMENT

I.	EQUIPMENT NAME	Qty
1.00	Mechanical Tools for maintenance	1 Lot
2.00	Electric and Electronic Tools for maintenance	1 Lot
3.00	Multimeter	1 Set
4.00	Oscilloscope	1 Set
5.00	DC Generator	1 Set
6.00	IC Tester	1 Set
7.00	Circuit Tester	1 Set
8.00	Revolution Counter	1 Set
9.00	Repairing instruments for Computerized equipment	1 Lot
10.00	Special Maintenance Tools for Machines	1Set
11.00	Complete spares set for 2 year normal operation for Machines	1Set

3.12.2002.

PTC - Karachi
Pakistan

The Items Requested by the Pakistani Side

Equipment

Code No.	Name of Equipment	Q'ty
Plastics Manufacturing Equipment		
PM-1	High speed mixer with controls and chutes and valves Pneumatic controls, Capacity 200 liter	1
PM-2	Storage tank, 1.5 ton for Pipe Compounds	1
PM-3	Weighing Scale, 0-50 Kgs, 0-10Kgs, 0-1Kgs	1
PM-4	Folk Lift, 2 ton	1
PM-5	Extruder, Twin screw, parallel, Dosage feeder, Venting up to6" diameter pipes, counter rotation, 150Kgs/hour	1
PM-6	Extrusion Die head, up to 2- 6" dia with die trolley complete	1
PM-7	Bush & Pin for Pipe, Class D, 2, 3, 4, 6"	1
PM-8	Vacuum calibration sleeves, Vacuum sizer 2, 3, 4, 6"	1
PM-9	Water spray bath, for up to 6" dia pipe, 6m	1
PM-10	Natural drop water bath, for up to 6" dia pipe, 3m	1
PM-11	Haul Off, for up to 2-6" dia, with measuring and auto thickening device, 0-5m/min	1
PM-12	Inkjet Printer for pipes	1
PM-13	Cutter, up to 6" dia, with Chamfering option (disk cutter, 6m)	1
PM-14	Pipe belling machine, Off line Tooling suitable for rubber ring joints up to 6" dia (RR) Tooling for Solvent Cement joints up to 6" dia (TS)	1
PM-15	Single Screw Extruder for small diameter with Pelletizer for Olefin & PET material, 50Kgs/hour	1
PM-16	Injection moulding machine for UPVC (Hydraulic Type), Clamping force 450 Tons	1
PM-17	Injection moulding machine for PET & PC (Electric Type), Clamping force 150 Tons	1
PM-18	Specimen's mould & fabricate	1
PM-19	Hopper loader Floor Type, 150 Kgs/hour	2
PM-20	Injection Moulds for solvent type pressure fitting B S 4346/B S (EN) 2000 One each for: *(90 °elbow, Tees, Valve Socket) 1" 1 each *(90 °elbow, Tees, Valve Socket) 2" 1 each *(90 °elbow, Tees, Valve Socket) 4" 1 each *(90 °elbow, Tees) 6" 1 each Reducer, Reducing Tee, 2"x4" 1 each Reducer, Reducing Tee, 4"x6" 1 each Option inserts for producing faucet fittings	1
Compounding Workshop		
C-1	Twin Screw Extruder, 50 Kgs/hour	1
C-2	Hot Cut Palletizer, 50 Kgs/hour	1
C-3	Metal Detector	1
C-4	Vibrator Motor	1
Support Facility		
SF-1	Guranulator for UPVC, Output 100 Kgs/hour, Cyclone, Dust collector, Grain 5-7mm	1
SF-2	Guranulator for PET, PE, PP, Output 20 Kgs/hour, Cyclone, Dust collector	1
SF-3	Storage tank for fittings compound, 200Kgs Capacity	1
SF-4	Crane Gantry (For Injection and Extruder) , 2ton	2

SF-5	Chain Block, 2 ton	2
SF-6	Wooden Floor, 2x2m in Die/Mould Shop	1
SF-7	350KVA Diesel/Furnace oil generator with fuel tank	1
SF-8	150 KVA Diesel/Furnace oil generator with fuel tank	1
SF-9	Air conditioner for laboratory	1
SF-10	Recycling Unit, 15 Kg/hr for PET	1
SF-11	Incinerator, double burner type, Small Unit	1
SF-12	Compressor	2
SF-13	Trolley, 1 ton, 6m	3
SF-14	Chiller with temperature controller for pipe and fittings	1
SF-15	Mould Temperature Controller	1
SF-16	Material Dryer, 110℃, 25Kgs, Vacuum	1
Processing Machines		
P-1	Thermoforming Small Unit	1
P-2	Sheet Forming with single screw extruder double type (Co-Extrusion), Small Unit	1
P-3	Calendering Machine, Small Unit	1
P-4	Blow moulding (stretch injection type), Small Unit	1
P-5	Compression Moulding	1
P-6	Vertical Injection Moulding Machine, 10-20 ton	1
Quality Control & Testing Lab. Equipment		
Q-1	Short term (1 hour) Hydrostatic testing bath, (20℃ test) 5 station type up to 12" dia	1
Q-2	Long term Hydrostatic test, 20 - 60℃, one station type, Max. 6", L=1m	1
Q-3	Methylene Chloride Test	1
Q-4	Glycerine test - Heat reversion test	1
Q-5	Falling ball/weight Impact test equipment, Auto control	1
Q-6	Softening point test machine, HDT/VICAT type	1
Q-7	Fracture toughness test equipment, 3" to 6" dia	1
Q-8	Opacity test equipment	1
Q-9	Outside dia measurement gauges	1
Q-10	Pipe wall thickness measurement gauges	1
Q-11	Groove dia and internal dia measurement gauges	1
Q-12	Fittings internal dia measurement gauges sets	2
Q-13	Pipe Minimum and Maximum outside dia, measurement system	2
Q-14	Distillation Apparatus with demineralizer, 1.8 Lts/hr	1
Q-15	Universal Testing Machine, 10 tons	1
Q-16	Digital Hardness Tester: Shore A & D, Rockwell Hardness with Stand	1
Q-17	Profile Measurement for Extrusion	1
Q-18	Thickness Gauge	1
Q-19	Circumference Measurement for Pipe	1
Q-20	Graves Tear Test	1
Q-21	Water Extraction	1
Q-22	Water Vapor Transmission	1
Q-23	Torque Tear	1
Q-24	PPT Resistance	1
Q-25	Trapezoidal Tear	1
Q-26	Puncture Resistance	1
Q-27	Humidity Chamber for Testing (Weather Stress Machine)	1
Q-28	Freezer, Chest Type, -30℃	1

Training Aids		
T-1	Multimedia	2
T-2	Video player and TV 32"	2
T-3	Digital Camera with zoom	1
T-4	Digital Camera with portable recorder	1
T-5	Mobile stand for camera	1
T-6	DVD player with TV	1
T-7	Projector for projection of samples	1
T-8	Books, Journals, Videos and CD-Rom	1
T-9	Testing and Production Standards: JIS, ASTM, BSS, DIN, ISO, 1 each	1
T-10	Copy Machine, A3	2
Maintenance Equipment		
M-1	Tools for maintenance	1
M-3	Multimeter	1
M-4	Oscilloscope	1
M-5	DC Generator	1
M-6	IC Tester	1
M-7	Circuit Tester	1
M-8	Revolution Counter	1
M-9	Reparing instruments for computerized equipment	1

Facilities

1	Utilities for Workshop (Water Supply, Electric Power Supply, Air Supply, Vaccum Piping, Exhaust Fan etc.)	
2	Building for Work Shop	

Q-29	3-D Measuring Machine (3-D MM)	1
Q-30	FTNIR with solid and liquid sample preparation accessories, software with DRS, ATR and IR microscopy accessory	1
Q-31	Gas Chromatograph with accessories including software * Head Space Injector for GC * Molecular Sieve glass and SS columns for GC, 1/8" and 1/4" * Capillary columns for GC and GC-MS	1 1 3 3
Q-32	Thermal conductivity detector	1
Q-33	Thermal Analyzer, TGA & DSC	1
Q-34	HPLC: * Octadecyl (RP column) for HPLC * Refractive Index detector for HPLC * Gel permeation columns for HPLC * Packed column injector for HPLC	 3 1 3 1
Q-35	Digital Impact Tester	1
Q-36	Creep Tester, ISO-889	1
Q-37	Mullen Type Bursting Strength Tester, Up to 2000 Kpa	1
Q-38	Oxygen Index Tester	1
Q-39	Ozon Ageing Tester	1
Q-40	Automatic Gas Permeability Tester	1
Q-41	Digial Thickness Tester (Micrometer)	1
Q-42	Thermally Stimulated Current Tester	1
Q-43	Ultrasonic Flaw Detector	1
Second Plastic Processing		
S-1	Ultrasonic Welder with accessories (Gun)	1
S-2	Plumbing Tools for 10 students (Several Types)	1
S-3	Bending Machine	1
S-4	Printing Machine for plastic packaging	1
Plastic Design Laboratory		
PD-1	Computers Pentium 4 for Student	25
PD-2	Pentium 4 for Teachers	2
PD-3	UPS (Uninterrupted Power Supply)	2
PD-4	Laptop computer 4 with printer	2
PD-5	Laser Printer, A4	3
PD-6	Laser Printer, A3	1
PD-7	Scanner, A3	2
PD-8	Plotter, A1	1
PD-9	Server	2
PD-10	Software: * Plascam * Mould Flow, 3-D Analysis * Unigraphics Solutions (Mold/Die Design) * Processing/Piping Training * ANSYS (Product Development Software) * Material Selection * Training Software for Extrusion, Injection Moulding, Blow Moulding and Health and Safety in Plastic Processing	1

The Japan's Grant Aid Scheme

ANNEX-4

1. Japan's Grant Aid System

(1) Grant Aid Procedure

1) Japan's Grant Aid Program is executed through the following procedures.

Application (Request made by a recipient country)

Study (Basic Design Study conducted by JICA)

Appraisal & Approval

(Appraisal by the Government of Japan and Approval by Cabinet)

Determination of Implementation

(The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request. If necessary, JICA send a Preliminary Study Mission to the recipient country to confirm the contents of the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Programme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

(2) Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project"), is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

a) confirmation of the background, objectives and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation;

b) evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;

c) confirmation of items agreed on by both parties concerning the basic concept of the Project;

d) preparation of a basic design of the Project; and

e) estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even through they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participates in the Study and prepares for a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country in order to maintain the technical consistency between the Basic Design and Detailed Design.

(3) Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with

the relevant laws and regulations of Japan Grant Aid is not supplied through the donation of materials as such

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the project, period of execution, conditions and amount of the Grant Aid, etc , are confirmed

3) "The period of the Grant" means the one fiscal year which the Cabinet approves the project for Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed

However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments

4) Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country

However, the prime contractors, namely consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality)

5) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals Those contracts shall be verified by the Government of Japan This "Verification" is deemed necessary to secure accountability of Japanese taxpayers

6) Undertakings required to the Government of the recipient country

a) to secure a lot of land necessary for the construction of the Project and to clear the site;

b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;

c) to ensure prompt unloading and customs clearance at ports of disembarkation in the

recipient country and internal transportation therein of the products purchased under the Grant Aid;

d) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts;

e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work;

f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Project; and

g) to bear all the expenses, other than those covered by the Grant Aid, necessary for the Project

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid

8) "Re-export"

The products purchased under the Grant Aid shall not be re-exported from the recipient country

9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank") The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the verified contracts

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of recipient country or its designated authority

c) Commission of payment will be arranged and covered by the Government of the recipient country

2 Necessary measures undertakings by each government

Major undertakings to be taken by each government is shown in the Appendix-1

Appendix-1 Necessary measures undertakings by each government

No	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To secure land		○
2	To clear, level and reclaim the site when needed		○
3	To construct gates and fences in and around the site		○
4	To construct the parking lot	○	
5	To construct roads		
	1) Within the site	○	
	2) Outside the site		○
6	To construct the building	○	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1) Electricity		
	a. The distributing line to the site		○
	b. The drop wiring and internal wiring within the site	○	
	c. The main circuit breaker and transformer	○	
	2) Water Supply		
	a. The city water distribution main to the site		○
	b The supply system within the site (receiving and/or elevated tanks)	○	
	3) Drainage		
	a The city drainage main (for storm, sewer and others) to the site		○
	b. The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	○	
	4) Gas Supply		
	a. The city gas main to the site		○
	b. The gas supply system within the site	○	
	5) Telephone System		
	a The telephone trunk line to the main distribution frame / panel (MDF) of the building		○
	b. The MDF and the extension after the frame / panel	○	
	6) Furniture and Equipment		
	a. General furniture		○
	b. Project equipment	○	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		○
	2) Payment commission		○

9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	○	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		○
	3) Internal transportation from the port of disembarkation to the project site	○	
10	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contact such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		○
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		○
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant		○
13	To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for transportation and installation of the equipment		○

ANNEX-5

Basic Criteria for Equipment Selection and Design

The specifications of the equipment to be procured under the Project will be analyzed and decided based upon the basic criteria described below.

1. To meet the market need for small and medium-sized enterprises in the plastic industry.

2. To satisfy requirements outlined in the programs related to the Project such as Basic Plastic Technology Course, Short Training Courses, Testing Services and Consulting Services

3. To consider the level of existing technical staff and easiness in operation and maintenance

4. No duplication with the existing equipment

5. To be able to cover the ISO standards (product quality).

MINUTES OF DISCUSSIONS
THE BASIC DESIGN STUDY ON THE PROJECT FOR THE UP GRADATION OF PLASTICS TECHNOLOGY CENTRE IN THE ISLAMIC REPUBLIC OF PAKISTAN
(EXPLANATION ON THE DRAFT FINAL REPORT)

In October 2003, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for the Up Gradation of Plastics Technology Centre (hereinafter referred to as "the Project") to the Government of the Islamic Republic of Pakistan (hereinafter referred to as "Pakistan"), and through discussions, site surveys and technical examination of the results in Japan, JICA prepared a draft final report of the study.

In order to explain and to consult the Pakistani side on the components of the draft final report, JICA sent to Pakistan the Draft Final Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Ms.Sachiko Misumi, Deputy Resident Representative, JICA Pakistan Office, and is scheduled to stay in the country from 11 February to 19 February, 2004.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Islamabad, February 19th , 2004

Ms Sachiko Misumi
Leader
Draft Final Report Explanation Team
Senior Deputy Resident Representative
JICA Pakistan Office

Mr Ahsan Siddiqi
General Manager
Plastics Technology Centre
The Islamic Republic of Pakistan

Mr. Muhammad Ashraf Khan
Joint Secretary
Economic Affairs Division
The Islamic Republic of Pakistan

Mr. Abdul Hafeez Chaudhry
Joint Secretary
Ministry of Industries and Production
The Islamic Republic of Pakistan

ATTACHMENT

1 Contents of the Draft Final Report

The Pakistani side agreed and accepted in principle the contents of the draft final report proposed by the Team

2. Japan's Grant Aid Scheme

The Pakistani side confirmed the Japan's Grant Aid Scheme explained by the Team and described in ANNEX-4 of the Minutes of Discussions signed by both parties on October 14th, 2003.

3. Final Report

JICA will prepare a final report in English in accordance with the result of discussions and forward it to the Pakistani side around April 2004.

4. Other relevant issues

4-1. Proper Use and Maintenance

Both sides understood that proper use and maintenance of the equipment should be indispensable for their long and effective use. The Pakistani side agreed to execute proper operation and maintenance of the equipment to be covered by the Project by means of allocating administrative and technical personnel and the necessary budget described in the draft final report with the active support from Ministry of Industries and Production.

4-2 Budgetary Measures

The Pakistani side explained that their budget for this Project as per approved PC-1 by Executive Committee of National Economic Council (ECNEC) has already been secured for smooth implementation of the Project. The Pakistani side also agreed to draw up the concrete management plan by the completion of the installation works in order to secure the necessary budget for the recurrent cost of the Project.

4-3. Proper Allocation of Lecturers

Considering the renewal of curricula to be planned under the Project, the Pakistani side agreed to draw up the concrete plan of proper allocation of lecturers to each class for the effective use of the equipment by the completion of the installation works.

4-4. The workshop for the Project

It was pointed out by the Team that the space of existing building is not enough for the implementation of the Project. The proposal of the Team to have separate workshop building of international standard was discussed at some length and it was agreed to provide for a separate workshop building as per layout plan described in the draft final report.

(1) The Team agreed, in principle, that the construction work of the separate workshop should be included in the Project component for securing proper installation of equipment and would be covered by the Japanese side.

(2) The Team explained that the land preparation should be covered by the Pakistani side. The Pakistani side agreed.

4-5 The existing equipment

The Pakistani side agreed that the existing equipment should be secured and utilized effectively for the preliminary training before operating the newly equipment to be covered by the Project.

4-6 Initial Environment Impact Assessment / Environment Impact Assessment

The Pakistani side confirmed that the Project does not require to conduct IEIA/EIA.

4-7 Soft portion of the Project

The component of soft portion of the Project as per detail in PC-1 was reviewed and scope of soft portion was agreed as per detail described in the draft final report. The major aspects of the component are as follows;

(1) To conduct market survey of local plastic industry to grasp the market needs more keenly by means of implementing the survey in order to establish effective plans for training programs
(2) To draw up schedule(s) for training programs and other technical services under the guidance of the Japanese expert based on the estimated number of trainees and allocation plan of lecturers.
(3) To hold a course the relevance of Quality Control in testing and many techniques of plastics
(4) To supervise the project implementation, schedule project activities, prepare tender documents and evaluate the tenders.

4-8 Revision of PC-1

Pakistani side agreed to get the approval of revised PC-1 on time, if necessary.

4-9 Confidentiality of the Draft Final Report

Both sides agreed that the draft final report shall be confidential, be dealt with carefully and not be disclosed to the third parties.

4-10 Necessary Measures to be Taken by the Pakistani Side

The Pakistani side agreed to take necessary measures, described in ANNEX-1 for the smooth implementation of the Project.

END

ANNEX -1 Necessary Measures to be Taken by the Pakistani Side

ANNEX-1

Necessary Measures to be Taken by the Pakistani Side

1. To provide necessary assistance in entry, exit and stay for Japanese Nationals and other personnel related to the Project, including issuance of a certificate and/or other documents

2. To obtain prompt approval and permit related to landing and customs clearance of imported equipment.

3. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Pakistan with respect to the supply of the products and services under the verified contracts

4. To secure transportation routes and temporary yard for construction materials, site office and container for newly procured equipment from outside to the Project site for installation

5. To bear the commissions (advising commission of A/P, other necessary financial charges) to banks for the banking services based upon the Banking Arrangement(B/A)

6. To prepare enough budget for regular operation of equipment in order to maintain equipment condition

7. To allocate enough budget for purchasing of furniture and fixing described in the final report.

8. To improve the level of existing technical staff or allocate proper qualified technical staff in order to satisfy the requirements outlined in the activities related to the Project

9. To provide for infrastructures (electricity and water supply) during the installation and training period to the equipment planed in the Project

資料-6　基本設計概要表

1. 協力対象事業名

パキスタン国・プラスティック技術センター整備計画

2．要請の背景（協力の必要性・位置付け）

(1) パキスタン国（以下、パ国）は 1990 年代に経済が低迷し、十分な雇用機会が確保されず、都市部を中心に貧困層が拡大したため、国家開発計画において中小企業の育成、工業の発展に必要な裾野産業の強化、農業の活性化を掲げ、失業率の削減計画を策定した。しかしながら、高い人口増加率のため、一人当たりの国民所得は近年減少傾向となっており、2000 年にはパ国の全人口の約 1/3 が貧困ライン以下となっている。このため、貧困削減ペーパー(PRSP)では、農業生産の拡大、中小企業の育成及び輸出振興等による産業の活性化を通じて雇用機会の拡大を図るとしており、中でも上下水道管、家庭用品、自動車部品等の様々な工業製品を生み出すプラスティック製品における品質向上や量的拡大は、同国の工業の発展にとって非常に重要な地位を占めているため、パ国は積極的に同産業の強化に努めている。

(2) 一方、プラスティック産業の大部分は技術力の低い中小企業が占めているため、同産業における輸入製品の代替や輸出振興による雇用機会の創出を計画しているパ国政府にとっては、貧困削減の大きな足かせとなっている。かかる背景から、パ国は国内唯一のプラスティック加工分野における公的機関であるプラスティック技術センター(PTC)を通じて、中小企業への技術指導、製品検査、技術情報の提供を行うと共に、アカデミック（学士、ディプロマ修得）コース、短期（技術レベル向上）コース、基礎（初心者）コースを運営し、同分野における人材育成を積極的に進めている。

(3) しかしながら、平成 14 年 11 月に実施された予備調査の結果、本センターの既存機材は故障中の機材や老朽化の激しい機材が多く、民間企業が有する機材に比べ性能が劣っていること、企業ニーズの高い PVC パイプの製造（押出／射出成形）や製品検査等に対応する機材が少なく、中小企業からの要請に十分応えられていない状況であることが判明した。このため、本プロジェクトにおいては、PTC に対する機材整備を実施し、各種研修活動や技術指導等を充実させることにより、本センターの機能強化を図ることを目的とする。

3．プロジェクト全体計画概要

(1)　プロジェクト全体計画の目標（裨益対象の範囲および規模）

プラスティック技術センターにおいて実習用機材、試験用機材及びそれらを収容する建物が整備され、340 人／年の研修生、400 件／年の外部委託検査を行うことが可能となる。

(2)　プロジェクト全体計画の成果

ア．機材の収容施設が建設される

イ．機材が調達される

(3)　プロジェクト全体計画の主要活動

ア．機材運営のための人員を配備する。

イ．技術指導を実施する。

ウ．市場調査を実施する。

エ．カリキュラムを策定する。

オ．研修生を募集する。

カ．広報活動を実施する。

キ．機材を使用した実習・試験を開始する。

(4)　投入インプット

日本側：無償資金協力 8.04 億円

相手国側

ア．プロジェクト実施に必要な人員（教員、維持管理要員）

イ．建設用地の確保

ウ．実習・試験を行うための材料費、維持管理費

(5)　実施体制

主管官庁　：　工業産業省

実施機関　：　プラスティック技術センター

4. 無償資金協力案件の内容

(1) サイト
パキスタン国カラチ市コランギ地区　プラスティック技術センター

(2) 概要
プラスティック技術センターの実習・試験用機材の調達および施設建設

(3) 相手国側負担事項
建設用地の確保、外構、インフラ工事

(4) 概算事業費 8.06 億円（日本側 8.04 億円、パキスタン国側 194 万円)

(5) 工期
詳細設計・入札期間を含め約 19 ヶ月（予定）

(6) 貧困、ジェンダー、環境および社会面の配慮
・実習場に女子専用の更衣もできる便所を設置した。
・騒音を発生する機材は独立した作業場に設置した。

5. 外部要因リスク

・パ国のプラスティック産業の需要が減少しない。

6. 過去の類似案件からの教訓の活用

特になし

7. プロジェクト全体計画の事後評価にかかる提案

(1) プロジェクト全体計画の目標達成を示す成果指標（注）

(1)研修生数（年間）

研修内容		実績（注）(1999～2002 年平均)	2009 年度計画定員
基礎コース			
	3 ヶ月コース	31 人	60 人
短期コース			
	ﾌﾟﾗｽﾃｨｯｸ材料	年度により開講の有無にばらつきはあるが、各コースの平均は約 10 人である。	60 人
	押出成形		60 人
	射出成形		60 人
	熱成型		20 人
	ﾌﾞﾛｰ成形		20 人
	試験機		60 人
	合計	56 人	280 人
	総合計	87 人	340 人

(2)外部委託試験数（年間）

実績（注）(1999～2002 年平均)	2009 年度計画試験数
200 件 引張強度試験(60 件)、硬度試験(40 件)、材料の定性分析（20 件）等	400 件

(2) その他の成果指標
特になし

(3) 評価のタイミング
・ 2009 年以降：（新カリキュラムによる研修が実施される初年度以降）

注：年間ベースで実績が安定してきた 1999 年から現在 2002 年までの年間平均値を採用。

資料-7　収集資料リスト

調査団名　パキスタン国プラスティック技術センター整備計画基本設計調査

番号	名　　称	形　態 図書・ビデオ 地図・写真等	オリジナル コピー	発行機関	発行年
1	Prospectus Plastics Technology Centre Synthetic Fibre Development & Application Centre	図書	オリジナル	College of Textile & Polymer Engineering	2002 年
2	Digest of Industrial Sectors in Pakistan	図書	オリジナル	Expert Advisory Cell (EAC) Ministry of Industries & Production	2003 年
3	Pakistan Plastics Buyer's Guide	図書	オリジナル	Plastipack Machines	2003 年
4	PAK PLAS	図書	オリジナル	Pakistan Plastics Manufacturers Association	
5	Physical Infrastructure Pakistan	図書	オリジナル	EAC	2003 年
6	Pakistan Investment Guide	図書	オリジナル	EAC	2003 年
7	Federal Budget in Brief	図書	オリジナル	Government of Pakistan Finance Division	2003 年
8	Explanatory Memorandum on Federal Receipts	図書	オリジナル	Finance Division	2003 年
9	Annual Budget Statement	図書	オリジナル	Finance Division	2003 年
10	Budget Speech 2003-2004	図書	オリジナル	Finance Division	2003 年
11	Demands for Grants and Appropriations	図書	オリジナル	Finance Division	2003 年
12	Statistical Bulletin	図書	オリジナル	State of Pakistan	2003 年
13	Basic Plastics Technology Certificate Course	図書	オリジナル	Plastics Technology Centre	

資料-8　計画機材リスト

Code No.	機材名	数量
A:原材料混合機材		
NA-1	原材料混合装置	1
NA-2	搬送用コンテナ	1式
NA-3	秤	1式
B:成形機材		
NB-1	押出成形機(パイプ用)	1
NB-2	冷却水槽（スプレー式）	1
NB-3	冷却水槽（降下式）	1
NB-4	引取機	1
NB-5	パイププリンタ	1
NB-6	パイプ用切断機	1
NB-7	受口加工機	1
NB-8	射出成形機（中径継手用）	1
NB-9	射出成形機（小径継手用）	1
NB-10	継手用金型	1式
NB-11	熱成形機	1
NB-12	ブロー成形機	1
C:リサイクル機材		
NC-1	帯鋸・粉砕機	1式
NC-2	ペレット製造装置(PVC用)	1
D:成形機補助機材		
ND-1	フォークリフト	1
ND-2	門型クレーン	1
ND-3	手押し車	1式
ND-4	金型温調機	1
ND-5	原材料乾燥装置	1
ND-6	掃除機	1
E:検査機材		
NE-1	短長期静水圧試験機	1
NE-2	落錘型インパクトテスター	1
NE-3	HDT試験機	1
NE-4	パイプ濁度測定器	1
NE-5	パイプ肉厚測定ゲージ	1
NE-6	パイプ溝および内径測定ゲージ	1
NE-7	パイプ継手内径測定器ゲージ	1
NE-8	パイプ最大最小外径測定ゲージ	1
NE-9	脱イオン機能付き蒸留装置	1
NE-10	万能試験機	1
NE-11	デジタル硬度試験機	1
NE-12	パイプ外周測定ゲージ	1
NE-13	水蒸気透過率測定器	1
NE-14	破裂抵抗試験器	1
NE-15	耐候試験器	1

Code No.	機材名	数量
NE-16	超低温冷凍機	1
NE-17	フーリエ変換赤外線分光光度計	1
NE-18	ガスクロマトグラフ	1
NE-19	熱分析試験器	1
NE-20	液体クロマトグラフ	1
NE-21	デジタル衝撃テスター	1
NE-22	クリープテスト試験機	1
NE-23	ミューレンタイプ破裂試験器	1
NE-24	酸素指標測定試験器	1
NE-25	オゾン劣化試験機	1
NE-26	ガス透過率測定装置	1
NE-27	デジタル測厚機	1
NE-28	超音波探傷検知機	1

F:2次加工機材

NF-1	軟質塩ビ超音波溶着機	1
NF-2	配管工具	1

G:教育支援機材

NG-1	コンピュータ（生徒用）	15
NG-2	コンピュータ（教員用）	1
NG-3	UPS（コンピュータ用）	1
NG-4	小型コンピュータ（プロジェクター用）	1
NG-5	レーザープリンタ	1
NG-6	サーバー	1
NG-7	ソフトウェア	1式
NG-8	マルチメディアプロジェクターセット	1式
NG-9	ビデオ／DVDプレーヤーセット	1式
NG-10	デジタルビデオカメラセット	1式
NG-11	各種文献等	1式
NG-12	各国標準規格集	1式

H:メンテナンス機材

NH-1	機械工具セット	1式
NH-2	マルチメーター	1
NH-3	電気工具セット	1式