Annex 26 List of Machinery and Equipment for the Project

Field	Equipment/Machinery	Q'ty	Availability (Refer to Footnote)	If to be provided, by Jap. or Thai.
Mold Design	Drafter	6	U	Thailand
	CAD/CAM SYSTEM NET-WORK STATION	1set	P	Japan
	AVR UNIT (Server & Client)	1set	P	Thailand
	UPS UNIT (Server & Client)	1set	P	Thailand
	Working Desk and Chair	15set	P	Thailand
	Desk for Printer	1	P	Thailand
	Desk for Server	1	P	Thailand
Mold Processing	Vertical Milling Machine	1	U	Thailand
	Wire-cut EDM	1	R	Japan
	Tools & Jigs	1set	P	Japan
	CNC Vertical Machining Center	1	R	Japan
	Tool Presetter	1	P	Japan
	Tools & Holders	1set	P	Japan
	Electric Discharge Machine	1	R	Japan
	Small Hole Drilling Machine	1	P	Japan
	Polishing Equipment	1	P	Japan
	Profile Grinder	1	P	Japan
	Surface Grinder	1	U	Thailand
	Tool Grinder	1	U	Thailand
	Grinder	1	U	Thailand
	Band Saw	1	U	Thailand
	Lathe	1	U	Thailand
	Horizontal Boring Machine	1	U	Thailand
	Cutting Grinder	1	U	Thailand
	Working Desk	2	U	Thailand
	Tool Stocker	2	P	Thailand
	Rack, Stocker, Shelf	2	P	Thailand
Mold Assembling and	Large Size Injection Machine	1	P	Japan
Trial Shot	Middle Size Injection Machine	1	U	Thailand(NEDO)
	Small Size Injection Machine	1	U	Thailand(NEDO)
	Flexible Mold Temperature Controller	3	U	Thailand(NEDO)
	Flexible Mold Temperature Controller	1	P	Japan
	Temperature Controller	2	U	Thailand(NEDO)
	Temperature Controller	1	P	Japan
	Plastic Material Drier	1	U	Thailand(NEDO)
	Model Mold for Plastic Injection	5	P	Japan
	Welding Machine for Mold Repairing	1	P	Japan
	Assembly Tool Unit	3 set	P	Japan
	Polishing & Fining Unit	2 set	P	Japan

Field	Equipment/Machinery	Q'ty	Availability (Refer to Footnote)	If to be provided, by Jap. or Thai.
	Working Desk (1200mm x 900mm)	4	P	Thailand
	Mold assembling bench (1200mm x 2400mm)	1	P	Thailand
	Mold rack(2000mm x 800mm)	2	P	Thailand
	Tool Locker	1	P	Thailand
	Working Desk (1000mm x 2000mm)	1	P	Thailand
Inspection	Three Coordinate Measuring Machine	1	U	Thailand
	Steel Hardness Tester	1	U	Thailand
	Tool Makers' Microscope	1	U	Thailand
	Pin Gauge	1set	P	Japan
	Clearance Gauge	10	P	Japan
	Gauge Unit	1set	U	Thailand
Others	Visual Education Set etc.	1set	P	Japan
	Text Books	1set	P	Japan
	Fork-Lift	1	P	Thailand
	Cart	3	P	Thailand
	Handlifter	1	P	Thailand

NOTE:U:Existing and to be used.R:Existing but to be replaced.I:Existng but to be Increased in no.P:To be procured

Supplimental Chart for Annex 26			
			If to be provided,
Equipment	Specifications	Q'ty	by Jap. or
			Thai.
1 CAD/CAM Net	**CAD/CAM Network Station Set**	1	Japan
Work Station	IK.CAD/CAM Network System		
	IK.CAD/CAM Skill Packaged		
	IK.CAD/CAM Customize System		
	Compact PC	10	Japan
	OS Windows NT Workstation 4.0		
	Deskpower 5000		
	CPU Pentium II 350MHz		
	Memory 64MB		
	Cashe 512KB		
	VRAM 4MB		
	HDD 8.4GB		
	LAN 10/1000 Mbps		
	ATI RAGE PRO TURBO AGP X2, 4MB SGRAM		
	CD-ROM 32X		
	Keyboard		
	First mouse plus 3 Button Mouse		
	Monitor 19"		
	Trinitoron with USB HUB		
	64 MB Memory		
	Additional Memory 64 MB		
	Standard DeskTop	5	Japan
	OS Windows NT Workstation 4.0		
	Deskpower 7000		
	CPU Pentium II 450MHz		
	Memory 128MB		
	Cache 512KB		
	HDD 8.4GB		
	VRAM 8 MB		
	CD-ROM 32X		
	ATI RAGE PRO TURBO AGP X2, 8MB SGRAM		
	LAN 10/100 Mbps		
	Keyboard		
	First mouse plus 3 Button Mouse		
	Monitor 19"		
	Trinitoron with USB HUB		
	128 MB Memory		
	Additional Memory 128 MB		
	Team Server	1	Japan
	OS Windows NT Networkserver 4.0		

	(with 5 clients)		
	OS Windows NT Networkserver 4.0		
	(additional 10 clients)		
	APC UPS (Power Chute plus)	1	
	Teamserver G820i		
	CPU Pentium II 400MHz		
	Memory 64 MB		
	Cache 512 kb		
	CD-ROM 32X		
	LAN 100/10 Base TX		
	Additional Memory 64 MB		
	Pentium II 400MHz Upgrade		
	Power Supply Redundant		
	DAT Drive (DDS-3)		
	Radio Card		
	HDD 4GB		
	HDD 12GB (Aly Disk)		
	Monitor 15"		
	105 Keyboard Thai		
	Mouse		
	PC Optional		Japan
	SCSI Card for MO External		
	SCSI Cable, External 50 pins Hi-Den		
	Dina MO 640AL		
	APC Back Up UPS 500 VA		
	Network Parts		Japan
	Thick Cable	1	
	Hub 12ports, 10Mbps	1	
	AUI Interface Modules	1	
	AUI Cable	8	
	Twist Pair Cable	5	
	Twist Pair Cable	25	
	ATI Transceiver	8	
	Laser Printer		
	Black and White Printer	1	Japan
	Memory 32MB		
	Paper size A3,A4		
	Support HPGL		
	Resolution 400 and 600 dpi		
	Print time A4=8 pages/min. A3=6pages/min.		
	LAN Card 10 Base T		
	Cut Paper A4		Thailand
	Cut Paper A3		Thailand
	Toner		Thailand
	Copy Power Unit	1	Thailand

	A0 Size Plotter		
	HP Plotter A0(Color)	1	Japan
	Memory 4MB		
	Roll Feeder		
	Toner(black color)	1	
	Toner(three colors)	3	
	Roll Paper		Thailand
	Ink		Thailand
	Power Unit		
	AVR Unit	1	Thailand
	UPS Unit	1	Thailand
	Power Supply Circuit (220V)	1	Thailand
	Working Desk(W x D:1000x500mm),Chair	15set	Thailand
	Desk for LBP(W x D:800x500mm)	1	Thailand
	Desk for Server(W x D:800x1000mm)	1	Thailand
2 Model Mold	**Camera Body**	1	Japan
	Parts Drawing		
	Specifications for Design and Process		
	Check Lists for Design		
	Drawing for Process		
	Drawing for Mold Manufacturing Process		
	Materials for Process Management		
	Materials for Assembly Specifications		
	Check Lists for Evaluation		
	Materials for Mold History		
	Top Case for Desk Type Telephone	1	Japan
	Parts Drawing		
	Specifications for Design and Process		
	Check Lists for Design		
	Drawing for Process		
	Drawing for Mold Manufacturing Process		
	Materials for Process Management		
	Materials for Assembly Specifications		
	Check Lists for Evaluation		
	Materials for Mold History		
	Front Panel for Personal Computer	1	Japan
	Parts Drawing		
	Specifications for Design and Process		
	Check Lists for Design		
	Drawing for Process		

	Drawing for Mold Manufacturing Process		
	Materials for Process Management		
	Materials for Assembly Specifications		
	Check Lists for Evaluation		
	Materials for Mold History		
	Alarm Clock Front	1	Japan
	Parts Drawing		
	Specifications for Design and Process		
	Check Lists for Design		
	Drawing for Process		
	Drawing for Mold Manufacturing Process		
	Materials for Process Management		
	Materials for Assembly Specifications		
	Check Lists for Evaluation		
	Materials for Mold History		
	Pen Tray	1	Japan
	Parts Drawing		
	Specifications for Design and Process		
	Check Lists for Design		
	Drawing for Process		
	Drawing for Mold Manufacturing Process		
	Materials for Process Management		
	Materials for Assembly Specifications		
	Check Lists for Evaluation		
	Materials for Mold History		
3 CNC Wire Cut	**Machine Tool**	1	Japan
Electric Discharge	Maximum Size of Workpiece(X x Y x Z):		
Machine	800x550x260mm		
	Maximum Weight of Workpiece: 900kg		
	Each axis Travel Distance: X-axis: 600mm		
	Y-axis: 400mm Z-axis: 270mm		
	Auxiliary Table Travel U & V axis: 70x70mm		
	Taper Angle: ±15°		
	Wire Diameter: φ0.1 to 0.3mm		
	Wire Tension: 0.2 to 2.8kgf		
	Wire Feeding Speed: 250mm/Sec Maximum		
	Distance From Floor to Table Top: 1000mm		
	Machine Size(W x D x H):1798x2583x2045mm		
	Machine setting dimension(WxD):3405 x 3350mm		
	Machine tool Weight:3700kg		
	Service Tank	1	Japan
	Dimension (W X D X H): 850x2500x1831mm		

	Weight: 500kg		
	Capacity: 940Liter		
	Power Supply Mark 25	1	Japan
	Max. machining current: 40Amp.		
	Power requirements: 200/220V. 50/60Hz		
	Power consumption: 13KVA		
	Standard Accessories		
	Taper cut unit		
	Dielectric fluid cooling unit		
	RS-232-C interface		
	Wire (φ0. 2mm 3Kg／1reel)		
	Hour meter		
	Graphic display		
	Line filter		
	APT(Automatic programing)		
	Super BS circuit(Electrolysis free circuit)		
	Advanced corner control		
	FT II (Fine pick-up function)		
	AWT (Automatic wire threader)		
	Re-try unit		
	Automatic machining condition selection		
	Automatic float control		
	Tool set		
	Optional accessories		Japan
	Transformer	1	
	Plotting table	1	
	Linear scale	1	
	Oscilloscope	1	
	UPS	1	
	Remote controller	1	
	Wire (φ0. 2mm 5Kg)	10	
	Wire (φ0. 25mm 5Kg)	10	
	Wire guide set(φ0.2mm)	2	
	Wire guide set(φ0.25mm)	3	
	Ion exchange(10 Liters)	10	
	Paper filter	6	
	Clamping system	1	
	DNC system	1	
	Model: Sodick A600W + Mark 25		
4 Vertical Machining	**Machine Tool**	1	Japan

Center	Power Souce: AC200/220v.50/60Hz		
	Each axis Travel Distance: X-axis: 900mm		
	axis: 500mm Z-axis: 450mm		
	Distance From Table surface to spindle nose		
	150 to 600mm		
	Working Table Area: 1000x500mm		
	Maximum Weight of Workpiece: 700kg		
	Table Top T-Slot: 18mmx5, 100mm pitch		
	Distance From Floor to Table Top: 980mm		
	Spindle Speed: 15 to 14000min-1		
	Spindle speed range: Electric 2step range		
	Spindle nose hole taper: 7/24 No.40 taper		
	Spindle bearing size: Inside ϕ 90,Outside ϕ 140		
	Spindle drive moter(25% ED): AC 22/18.5kW		
	Spindle starting time: 2.3sec.(14000min-1)		
	Spindle Cooling and Lubrication:		
	Under Race Lubrication/Spindle Core Cooling		
	Rapid traverse(XYZ): 50000mm/min(0.6G)		
	Feed rate for cutting: 1 to 50000mm/min		
	Type of tool shank: JIS B6339 40T		
	Type of retention knob : 40P(JIS B5339		
	or MAS 403,P40T)		
	Tool storage capacity: 15 Tool Pots		
	Maximum Tool diameter:		
	without limitation ϕ 120mm		
	with limitation ϕ 140mm		
	Maximum tool length: 300mm		
	Maximum tool weight: 8kg		
	Tools exchange time: Tool to Tool 1.5sec		
	Chip to Chip 3.9second		
	Air supply: 0.5 to 0.8 Mpa 600L/Min		
	Capacity of cutting solution: 550/440Liter		
	Machine height: 3113mm		
	Floor space: 2400 X 3140mm		
	Machine weight: 9300kg		
	Level method: 3 point support		
	Machine accuracy:		
	Positioning: ±0.0025mm(with out scale feedback)		
	±0.002mm(with scale feedback)		
	Repeatability: ±0.0015mm(with out scale feedback)		
	±0.001mm(with scale feedback)		
	Machine option		
	Moire scale feedback (1 μ M)		
	Coolant temperature Control		
	Portable pulse generator with demand button		
	Air Dryer		

	Controller Unit (Professional 3)	1	Japan
	Option		
	Unidirectional positioning(G60)		
	Additional program storage total 640m		
	Programmable mirror image		
	Data sever		
	Walky-Talkie 1 port		
	Cable for Walky-Talkie (10m)		
	Export transformer 380V		
	Lifting jig		
	Fanuc 2 year warranty		
	Model: Makino V55-A15		
5 Tool Presetter	**Tool Presetter: VDM3040-3**	1	Japan
	with Standard Tool		
	Optional Parts	1	Japan
	Tool Setup Stand: AP50-T40V		
	Tool Holder Unit		
	Tools and Jigs		
	(Detail Specifications of Tools Are to Be Confirmed.)		
6 CNC Electric	**Machine Tool**	1	Japan
Discharge	Work Table Size(W x D): 700x500mm		
Machine	Work Tank Inner Dimension(W X D X H):		
	900x650x400mm		
	Work Tank Fluid Level: 90 to 350mm		
	Work Tank Capacity: 230Liter		
	Each axis Travel Distance: X-axis: 500mm		
	Y-axis: 380mm Z-axis: 350mm		
	Maximum Weight of Workpiece: 1000kg		
	Maximum Weight of Electrode: 80kg		
	Fixed Area for Electrode: 200x200mm		
	Distance between electrode mounting		
	surface and table: 300 - 650mm		
	Distance From Floor to Table Top: 900mm		
	Machine Weight: 4100kg		
	Machine Size(W x D x H): 1910x2275x2550mm		
	Service Tank	1	Japan

	External dimension (WxDXH):		
	830x1300x945mm		
	Weight (Empty): 230kg		
	Capacity: 470liter		
	Power Supply	1	Japan
	Maximum machining Current: 40A		
	Power requirement : 200/220V, 50/60Hz		
	Weight: 600kg		
	Standard Parts	1	Japan
	Automatic extinguisher		
	PIKADEN Circuit		
	RS-232-C Interface		
	TM Pulse Circuit		
	PIKA-1 Circuit		
	Hour meter		
	Graphic Display		
	Paper Filter		
	Neuro Fuzzy Function		
	Remote Controller		
	Tool set		
	Special Parts		Japan
	Oil Matic(0.75kW)	1	
	ATC 16 by Erowa		
	(EROWA ATC16 Piece)	1	
	Transformer	1	
	UPS (Back Up 15min)	1	
	EROWA (ITS-015465/20pcs)	1	
	EROWA (ITS-009214/50Unit)	1	
	EROWA (ITS009217/10Unit)	2	
	EROWA (ITS-009219/12pcs)	1	
	EROWA (ITS-010793/12pcs)	1	
	EROWA (ITS-008457)	3	
	EROWA (ITS-009235)	3	
	Oscilloscope	1	
	Paper Filter	6	
	Magnet chuck(RMWH-3050)	1	
	Reference block (ϕ 5 X L50mm)	2	
	Reference block (ϕ 10 X L50mm)	2	
	Dual dielectric flushing nozzle	1	
	EDM Oil (Vitol-2)	600Liter	
	Modification for PGM	1	
	White 3 for PGM	5	
	Model: Sodick A50 + NF40		

7 Small Hole Drilling	**Machine Tool**	1	Japan
Electric Discharge	Maximun size of workpiece(WxDxH) :		
Machine	250x350mm		
	Each axis Travel Distance: X-axis 200mm		
	Y-axis: 300mm Z-axis: 300mm		
	Maximum Weight of Workpiece: 100kg		
	Max. diameter for Electrode : ϕ0.3 to ϕ3.0mm		
	Distance from electrode guide		
	to worktable surface:70 to 300mm		
	Distance From Floor to Table Top: 995mm		
	Machine tool dimension(W x D x H):		
	866 x 820 x 1977mm		
	Installation size(W x D) :870 x 830mm		
	Machine tool weight: 580kg		
	Power consumption: 3.3KVA		
	Position accuracy: 0.03mm		
	Service Tank	1	Japan
	Directric fluid : VITOL-KS		
	Capacity : 20L		
	Fluid filteration method :		
	Replaceable sponge filter		
	Weight: 2.5kg		
	Standard accessories		Japan
	Splash guard	1	
	TS guide set for ϕ0.8mm	1	
	Pipe electrode for ϕ0.8mm	20	
	High speed dielectric fluid VITOL-KS:20L	1	
	Tool kit	1	
	Optional Parts		
	Transformer	1	
	Model: Sodick K1C		
8 Precision forming	**Machine Tool**	1	Japan
Surface Grinding	Working Surface of The Table(L x W): 500x150mm		
Machine	Traverse of The Table(Long x Cross): 560x200mm		
	Grinding Range(Long x Cross): 450x180mm		
	Distance From Table Surface to Under Part of		
	Wheel: 40 to 300mm		
	Maximum Weight of Workpiece(Exclude Chuck):		
	50kg		

	Working Table T-Slot(Wide x Number): 13x1		
	Turning Speed(Hydraulic Control): 1 to 25m/Min		
	Travel Distance of Handle: 90mm/one Rotation		
	Power Source: 200V, 50Hz		
	Standard Parts	1	Japan
	Vertical and Cross Controller: 0.1 μM Controls		
	Automatic Neutrolator with Adjustable Magnetic Force		
	Vertical Feed Digital Readout Device		
	Cross Feed Digital Readout Device		
	Fine Cross Feed Device		
	Cross Feed Handwheel Clamping Knob		
	Special Parts	1	Japan
	Dust Collector / Coolant Device		
	with Manual Paper Filter Winder		
	Magnetic Chuck with Sin Bar		
	Bench Dresser (Manual)		
	Wheel Flange (3Spares)		
	Wheel Mandrel		
	Wheel Balancer		
	Spindle Inverter(1.5kW)		
	Cross Digital Scale Readout (0.001mm)		
	Working Light		
	Spare Parts for Two Years		
	Motor Belt	2	Japan
	Fine Feed Belt	2	Japan
	Cylinder Packing	2	Japan
	Cylinder Dust Shell	2	Japan
	Long Feed Belt	1	Japan
	Main Shaft Belt	1	Japan
	TFT-LCD Protection Sheet(5piece/1bag)	5	Japan
	Fuse 1A	5	Japan
	Fuse 2A	5	Japan
	Fuse 5A	5	Japan
	Spindle Oil(18 Liter/Can)	1	Japan
	Lubrication Oil (20 Liter/Can)	1	Japan
	Hydraulic Oil (20 Liter/Can)	1	Japan
	Grinding Wheel (D x H x w): 180x31.75x9.5mm	1	Japan
	Diamond Dresser 1/2ct	1	Japan
	Optional Parts		
	Transformer: 380V - 200V.	1	
	Model: Kuroda GS-515PFL		

9 Tool Stocker and	W x D:2000x500mm, 2500x500mm	4	Thailand
Tool Rack for	6000x500mm, 6500x500mm		
Processing Area	Detail specifications are to be confirmed.		
10 Large Size	**Machine Tool**	1	Japan
Injection Machine	Power source: 380Volt 3P4W		
	Injection Unit: 140A		
	Screw Diameter: ϕ 71mm		
	Injection Capacity: 1109cm3/Shot		
	Plasticizing Capacity(P.S.): 203kg/Hr		
	Injection Pressure: 2000kgf/Cm2		
	Injection Rate: 317cm3/Sec		
	Screw Speed: Constant torque 0 to 120rpm		
	Variable torque 120 to 170rpm		
	Hopper Capacity: 90 Liter		
	Mold Clamping force: 361tonf		
	Mold Clamping Stroke: 970mm		
	Minimum Mold Thickness: 350mm		
	Maximum Daylight Opening: 1320mm		
	Clearance Between Tie Bars(H x V): 735x735mm		
	Die Plate Dimension(H x V): 1055x1055mm		
	Ejector Stroke: 150mm		
	Pump Motor: 45kW/4pole		
	Heater Band Capacity: 31.88kW		
	Hydraulic oil quantity: 980L		
	Machine Size(L x W x h): 7940x1740x2150mm		
	Floor Space (L x W): 6950x1360mm		
	Machine Weight: 14900kg		
	Optional Parts		
	Controller : NC 9000G	1	
	Power brake circuit	1	
	(Safety cut breaker,200mA)		
	Modify power source supply for 3P4W	1	
	Transfomer for receptaple 200V	1	
	(separate setting)		
	Heater bandbroken warning	1	
	Expression of language	1	
	(Japanese & English)		
	Printer Interface circuit	1	
	Adiabatic plate (PL-PEM/GT T5)	1	
	Ejector plate backward Confirmation circuit	1	
	Hydraulic core pull circuit(Action A)	1	
	Central lubrication system for moving platen	1	
	(Manual)		
	Standard receptacle plug		

	modify 380V to 200V 30A	1	
	Additional spare receptacle plug		
	2-pcs 200V 30A	2	
	Emergency Stop Button switch	1	
	(Opposite operation side)		
	Hopper with mount	1	
	Clamp nail (Easy Clamp Type L)	12	
	mounting pad EL-190E	10	
	Manual book	2	
	(Japanese and English 1-copy/each)		
	Over ride system for P/L standard	1	
	Model: Nissei FN7000 - 140A		
	Mold Temperature Controller	1	Japan
	Medium: Clean Water		
	Operational range: Max. 120°C		
	Heater Capacity: 8kW		
	Pump Motor: 0.75kW		
	Discharge Pressure: 50L/Min (At 25m. TH)		
	Manifold : 4 way		
	Hose: 3/8B x 3M x 8piece		
	Hose: 3/8B x 0.5M x 4piece		
	Power Source: 200V, 50Hz		
	Model: Matsui MCN-60H		
	Waterless unit	1	Japan
	Temperature set range: +10 to +30°C		
	Cooling capacity: 40000kcal/Hr		
	Water Supply Volume: 100Liter/Min		
	Water Supply Pressure: 2.9kg/Cm2		
	Power: 3φ200V 50Hz		
	Compresser : 5.5 + 5.5KW		
	Fan motor : 0.37 + 0.35KW		
	Pump : 0.845 + 0.48KW		
	Out size dimension (W x D x H) :		
	3210 x 970 x 1790mm		
	Product weight : 900kg		
	Optional		
	Transformer	1	
	Chemical coolant	20L	
	Model: Kannetsu WL-15		

11 Welding Machine	Machine accessories	1	Japan
	Magnetic Electrode E-210 x 2		
	Magnetic Electrode E-211		
	Electrode Pole, Round Type 2 2 x 2		
	Electrode Pole, Round Type 3 3		
	Electrode Pole, Round Type 4 4		
	Electrode for Precision Type 2		
	Electrode for Tungsten ϕ 1.6 X 75mm		
	Additional Powder NAK 80 (50g)		
	Additional Powder SKH 51 (50g)		
	NAK ϕ 0.3 x 150mm (20pcs/Bag)		
	NAK ϕ 0.6 x 150mm (20pcs/Bag)		
	STAVAX ϕ 0.3 x 150mm (20pcs/Bag)		
	STAVAX ϕ 0.6 x 150mm (20pcs/Bag)		
	NAK 0.1t x 5w x100mm (10pcs/Bag)		
	NAK 0.15t x 5w x100mm (10pcs/Bag)		
	STAVAX 0.1t x 30w x 100mm (10pcs/Bag)		
	STAVAX 0.15t x 30w x 100mm (10pcs/Bag)		
	NTA 1 0.1t x 30w x 70mm (10pcs/Bag)		
	NTA 2 0.15t x 30w x 70mm (10pcs/Bag)		
	Tool Box		
	Power Source: 380V,		
	Optional Parts		
	Gauge Argon Gas Hose		
	for regulator (2m)	1	Japan
	3-axis Control Jigs (B Type)	1	Japan
	Microscope with Face Shield	1	Japan
	(Reaction Speed, 1/1000second)		
	Model: Nihon Techno YOZO System		
	Standard Type 4		
12 Air Impact	Hexagon Impact Socket 4S06 6mm	3	Japan
Wrench	Hexagon Impact Socket 4S08 8mm	3	Japan
	Hexagon Impact Socket 4S10 10mm	3	Japan
	Hexagon Impact Socket 4S12 12mm	3	Japan
	Hexagon Impact Socket 4S14 14mm	3	Japan
	Hexagon Impact Socket 4S17 17mm	3	Japan
	Model Vessel No.GT-P14J		
13 Hexagon Wrench	Model: Shinnihon Tool AXS0810	3	Japan

14 Spanner Set	Model: Shinnihon Tool SMS0800	3	Japan
(8mm to 24mm)			
15 Copper Hammer	Model: O·H Industry CO15	3	Japan
16 Shockless	Model: O·H Industry OS-40	3	Japan
Hammer			
17 File Set	Diamond File Set, Precise (S)Type	2	Japan
	(8piceces/Set)		
	Diamond File Set, Precise (S)Type	2	Japan
	(12piceces/Set)		
	Model: Okazaki Seikou Precise (S)Type		
18 Sanding Paper	Fineness Number #100(100pce/Bag)	2	Japan
	Fineness Number #120(100pce/Bag)	2	Japan
	Fineness Number #180(100pce/Bag)	2	Japan
	Fineness Number #240(100pce/Bag)	2	Japan
	Fineness Number #320(100pce/Bag)	2	Japan
	Fineness Number #400(100pce/Bag)	2	Japan
	Fineness Number #600(100pce/Bag)	2	Japan
	Fineness Number #800(100pce/Bag)	2	Japan
	Fineness Number #1000(100pce/Bag)	2	Japan
	Fineness Number #1500(100pce/Bag)	2	Japan
	Fineness Number #2000(100pce/Bag)	2	Japan
	Model: Bell Star Sanding Paper		
19 Polishing Stone	YHB B46D 3t x 6w x100mm	2	Japan
	(20pce/Box) #400		
	YTM M46D 3t x6w x100mm	2	Japan
	(20pce/Box) #600		
	YTM M46D 3t x13w x100mm	2	Japan
	(20pce/Box) #800		
	Oil Stone S8 (205x50x25mm)	2	Japan
	Hand Raper YF 400 (#400)	2	Japan
	Model: Cherry Polishing Stone		

20 Diamond Paste	Model: Curisuton Diamond No.CPO60 (5gr)	2	Japan
21 Air Micro	Model: Vessel GT-MG55SR	2	Japan
Grinding Unit			
22 Felt Buff	Model: Nihonnseimitsukikai No.F3208	2	Japan
A711 with Shaft			
23 Cast Iron Surface	Model: Nabeya T12 450x450mm	2	Japan
Plate for Metal			
Working			
24 Ultrasonic Wave	**Machine Tool**	1	Japan
Polishing Unit	Politer Power Pack P201		
	Politer Handle Piece US21		
	Standard Rotary M21H		
	Anglon M21RA		
	Lablon M21LRV		
	Recipron RE21		
	Min-Belt Sander BS31		
	Foot Switch FS201		
	Rubber Curled RM11 x 2		
	Plastic Case TX01		
	Carrying Case BX02		
	Model: Nihon Miniter CM3021		
25 Pin Gauge Set	AA-0B (0.50,0.51,0.52 - - - 1.00)Set	1	Japan
(ϕ0.5 to ϕ10mm,	AA-1A (1.00,1.01,1.02 - - - 1.50)Set	1	Japan
AA Series 0.01mm	AA-1B (1.50,1.51,1.52 - - - 2.00)Set	1	Japan
Step)	AA-2A (2.00,2.01,2.02 - - - 2.50)Set	1	Japan
	AA-2B (2.50,2.51,2.52 - - - 3.00)Set	1	Japan
	AA-3A (3.00,3.01,3.02 - - - 3.50)Set	1	Japan
	AA-3B (3.50,3.51,3.52 - - - 4.00)Set	1	Japan
	AA-4A (4.00,4.01,4.02 - - - 4.50)Set	1	Japan
	AA-4B (4.50,4.51,4.52 - - - 5.00)Set	1	Japan
	AA-5A (5.00,5.01,5.02 - - - 5.50)Set	1	Japan
	AA-5B (5.50,5.51,5.52 - - - 6.00)Set	1	Japan
	AA-6A (6.00,6.01,6.02 - - - 6.50)Set	1	Japan
	AA-6B (6.50,6.51,6.52 - - - 7.00)Set	1	Japan
	AA-7A (7.00,7.01,7.02 - - - 7.50)Set	1	Japan
	AA-7B (7.50,7.51,7.52 - - - 8.00)Set	1	Japan
	AA-8A (8.00,8.01,8.02 - - - 8.50)Set	1	Japan

	AA-8B (8.50,8.51,8.52 - - - 9.00)Set	1	Japan
	AA-9A (9.00,9.01,9.02 - - - 9.50)Set	1	Japan
	AA-9B (9.50,9.51,9.52 - - - 10.00)Set	1	Japan
	Model: Niigata Seiki Pin Gauge Set AA series		
26 Working Desk	Detail specifications are to be confirmed.	4	Thailand
for Mold Assembling			
and Lapping Area			
27 Mold assembly	W x D:2400x1200mm	1	Thailand
Bench			
28 Mold Rack	Detail specifications are to be confirmed.	2	Thailand
29 Tool Locker	Detail specifications are to be confirmed.	1	Thailand
for Mold Assembling			
and Lapping Area			
30 Clearance	Model: Asahi Gauge 100MZ	10	Japan
Gauge			
31 Surface Tester	Model: Mitsutoyo SJ201	1	Japan
32 Visual	Projector, Screen, TV, VTR		
Educational Material	Detail specifications are to be confirmed.		
33 Textbook	Basic Plastic Tool and Mold (English Version)	1	Japan
	Fundamental on Plastic (English Version)	1	Japan
	How to solve the problems of mold injection	1	Japan
	(English Version)		
	Basic Injection Mold (English Version)	1	Japan
	Illustrated Dictionary	1	Japan
	of Technical term for Tool and Mold		
	Illustrated Dictionary	1	Japan
	of Technical term for Plastic		
	Illustrated Dictionary	1	Japan
	of Technical term for Injection		
34 Fork Lift	Detail specifications are to be confirmed.	1	Thailand
35 Cart	Detail specifications are to be confirmed.	3	Thailand
36 Handlifter	Detail specifications are to be confirmed.	1	Thailand

Annex 27 Necessary Renovation and Conditions Fulfilled by BSID

0 Layout of the Workshop A

Based on the discussions held in this Study, the layout of machinery and equipment in the Workshop A is reviewed as shown in Annex 9.

The major difference with the one prepared in the last Study are as follows:

Construction second floor on the structure covering the Mold Processing Area as a space to be allocated for CAD-CAM room

1 Crane

(1) The Workshop A is now equipped with both the one (1) ton and the five (5) ton cranes.

(2) Though the biggest target product in the Project is expected to be as heavy as one (1) ton, to upgrade the capacity of one (1) ton crane to three (3) ton is recommended, taking the efficiency and easiness of the future services into consideration, as the proposed 350 ton injection machine theoretically produce the product with the mold as heavy as three (3) ton.

(3) The method of upgrading the capacity of one (1) ton crane is the following alternatives which the Thai side can choose at its convenience.

a To replace one (1) ton crane with three (3) ton one

b To equip with three (3) ton crane additionally.

(4) Even in case that the upgrading is hard to be met, such alternative as utilization of forklift or other equipment should be considered for carrying molds within Workshop A.

2 Air-conditioning

The area for processing, lapping and assembling mold should be air-conditioned, while a special attention should be paid to the interface between passage of the said crane and the partition (wall) for securing the air-conditioning effect in the area for lapping and assembling mold.

3 Layout of the new injection machine

It is recommended that three (3) injection machines, two (2) were provided by NEDO and one (1) will be provided by the Japanese side should be installed closely for convenience of the arrangement of utilities like water supply, power supply, chiller, temperature controller as well as efficiency.

Plumbing for water and compressed air, electric wiring, cooling system, the space for the maintenance of this equipment are to be decided, using the NEDO's case as a reference.

Furthermore, BSID is requested to secure the space for both mold keeping and working adjacent to the injection machine.

4 Appropriate Lighting (Illumination)

Appropriate lighting condition are 1,000 luxes on the working tables and the place where machinery and equipment are operated.

Extension cords are to be provided for each working table to have an electric outlet for a table lamp.

5 Electricity, compressed air and water

(1) Electricity

Electrical capacity of Workshop A is sufficient and remained as it is, taking the following points into consideration:

a Total electric power consumption of the machinery provided by by JICA is estimated as 197kw;

b The machinery of welding section which is to be relocated from Workshop A consume 298kw;

c Total electrical capacity of Workshop A is 1,000 kW.

(2) Compressed air

Additional air tank is installed or in case that the said installment can not cover the demand, new air compressor is to to be installed, taking the following points into consideration:

a Existing air compressor's pressure is 9.9Kg/cm2;

b The maximum air pressure necessary for the machine provided by JICA is 8.0Kg/cm2;

c There is some possibility to operate such machine at the same time when the depreciation of the air pressure may be worried.

(3) Water

Water supply for Workshop A is sufficient and remained as it is, taking the following points into consideration:

a Water supply for Workshop A is 50m3/day;

b The existing machinery in Workshop A do not consume tap water;

c The machinery provided by JICA also consume less water.

6 Network

(1) Connection with other network

Local Area Network (LAN) for the equipment provided by JICA should be independent from the existing LAN in BSID to avoid the future hampering.

As such, the said equipment should be used exclusively for the technology transfer, not for OA purpose.

(2) E-mail account

BSID is requested to arrange to open E-mail account for the experts.

(3) C/P in charge

The C/P for the networking will receive intensive training either in Japan or in Thailand.

(4) AVR and UPS

BSID will make its effort to provide AVR (Automatic Voltage Regulator) and UPS (Uninterrupted Power Supply) for a server.

7 The CAD/CAM Room

Construct second floor on the structure covering the Mold Processing Area as a space to be allocated for CAD-CAM room

(a) Because of the machining center's height constraint, the layout of machinery in Processing Area was revised as shown in Annex 15 in order to make use of second floor on the structure covering the Mold Processing Area as effective as possible;

(b) In order to secure the enough strengthness of second floor on the structure covering the Mold Processing Area, necessary measures should be taken for reinforcement floor by the Thai side with the consultation of designer.

8 The office for the three (3) technical experts

The existing new structure next to processing area would be allocated as the office for the three (3) experts in the fields of plastic tool and mold.

In order to secure the enough strengthness of second floor

on the said new structure, necessary measures would be taken for reinforcement by the Thai side with the consultation of designer.

9 Transportation of Molds

It is not suitable to carry the stuff of more than 20 kilo grams by hands, since weights of molds range from hundreds kilo grams to one (1) ton.

(1) Between Mold Processing Area and Mold Assembling and Finishing Area

The following measures are available at present.

- A forklift (Maximum load : 2000kg, gasoline)
- A cart

A new forklift (maximum load : 3000kg, battery) should be provided by TFY 2000, if possible.

(2) Inside Mold Processing Area to carry mold parts

The following measures are recommended to be arranged.

The usage of crane is not recommended.

- A cart
- A hand lifter (up to five hundred (500) kilo grams)

10 Plumbing

In addition to the ones for injection machine, plumbing for water and compressed air, electric wiring, cooling system for the machinery and equipment both existing ones to be shifted from the other area and to be provided by JICA should be done in accordance with the drawing for the Workshop A and its amendment which is shown as Annex 28.

11 Painting on floor and lining or zoning

The floor for Mold Processing and Mold Assembling and Trial Shot should be pained with green.

The machine should be surrounded by yellow line.

12 Quotation

According to the annex 9, 27, 28, 30 and 31 BSID will amend the drawing and estimation for renovation of workshop A by the end of July 1999.

13 Mold processing area

(1) As the mold processing area is also decided to be air-conditioned, mold processing area will be adjacent to CAD/CAM area;

(2) The concrete wall between mold processing area and CAD/CAM area which has been used as a spark shade incurred from welding will be removed.

Annex 28 The amendments to the drawing for renovation of workshop A

1 Door

(1) 2 (two) additional doors should be placed on the wall in the Store Room for easy access from Store Room to other area such as Mold Assembling and Lapping Area, Mold Processing Area and so on. (Refer to attached drawing hereto)

(2) All the doors should be equipped with lock to keep the machinery and equipment safe.

2 Water

(1) Water should be supplied to Mold Processing Area and Mold Assembling and Lapping Area together with sink for daily convenience such as washing hands, scrubbing mops and so on.(Refer to attached drawing hereto)

(2) Water should be supplied to Waterless Cooler.Because it requires water for daily maintenance. (Refer to attached drawing hereto)

3 Compressed air

(1) Compressed air should be supplied to Profile Grinder (P/G) and Milling Machine (M/M) for their daily operation. (Refer to attached drawing hereto)

(2) Compressed air should be supplied to Mold assembling and Lapping Area with 3 (three) outlets to maintain molds. (Refer to attached drawing hereto)

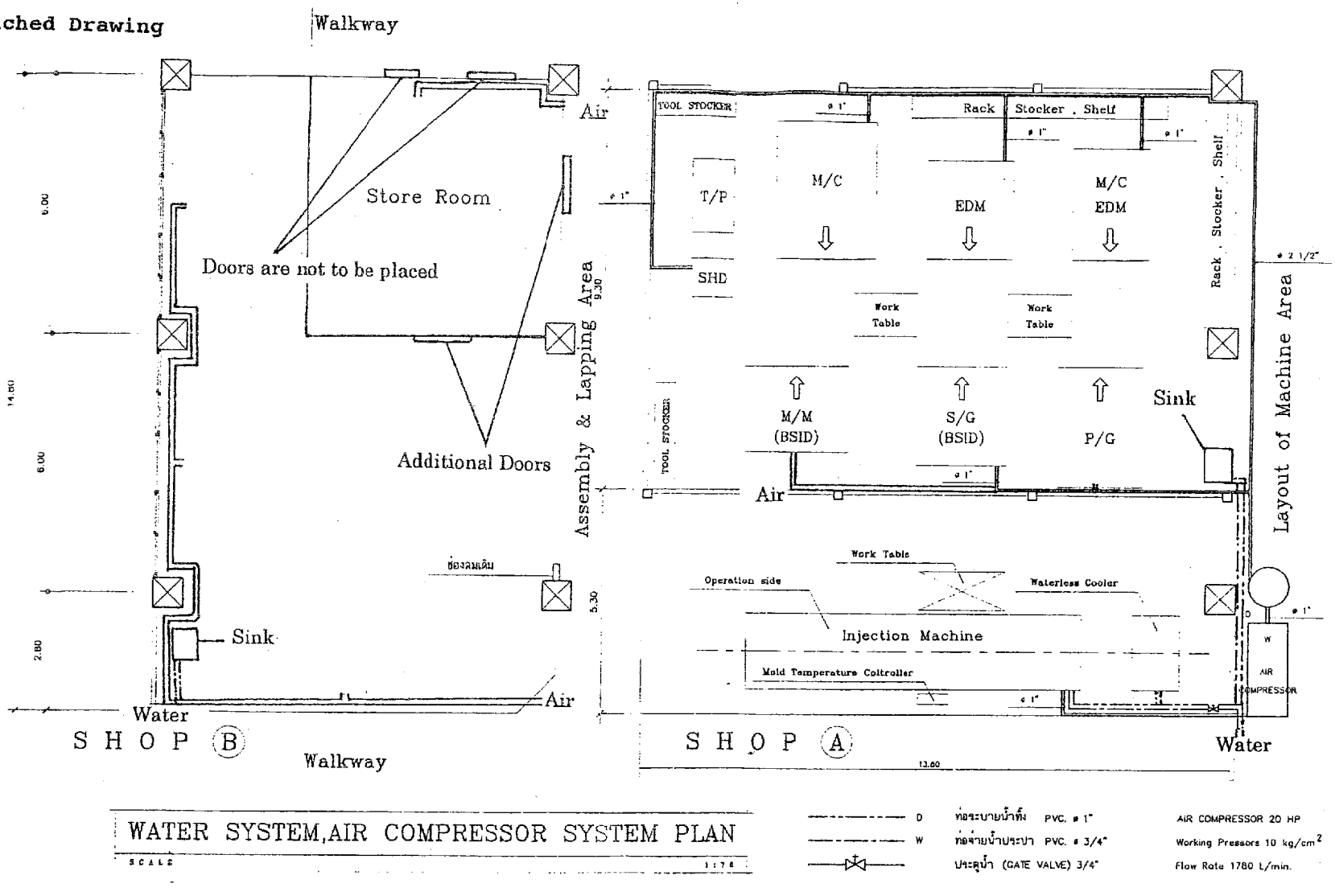
4 Electricity

Electricity to be supplied to Mold Processing Area, Mold assembling & Lapping Area is 380V three phases, on the other hand, the one to be supplied to CAD/CAM room is 220V.

5 CAD/CAM room

The Second floor on the structure covering the Mold Processing Area is to be constructed as a space to be allocated for CAD-CAM room.(Detail described in this Minute of Discussions)

Attached Drawing



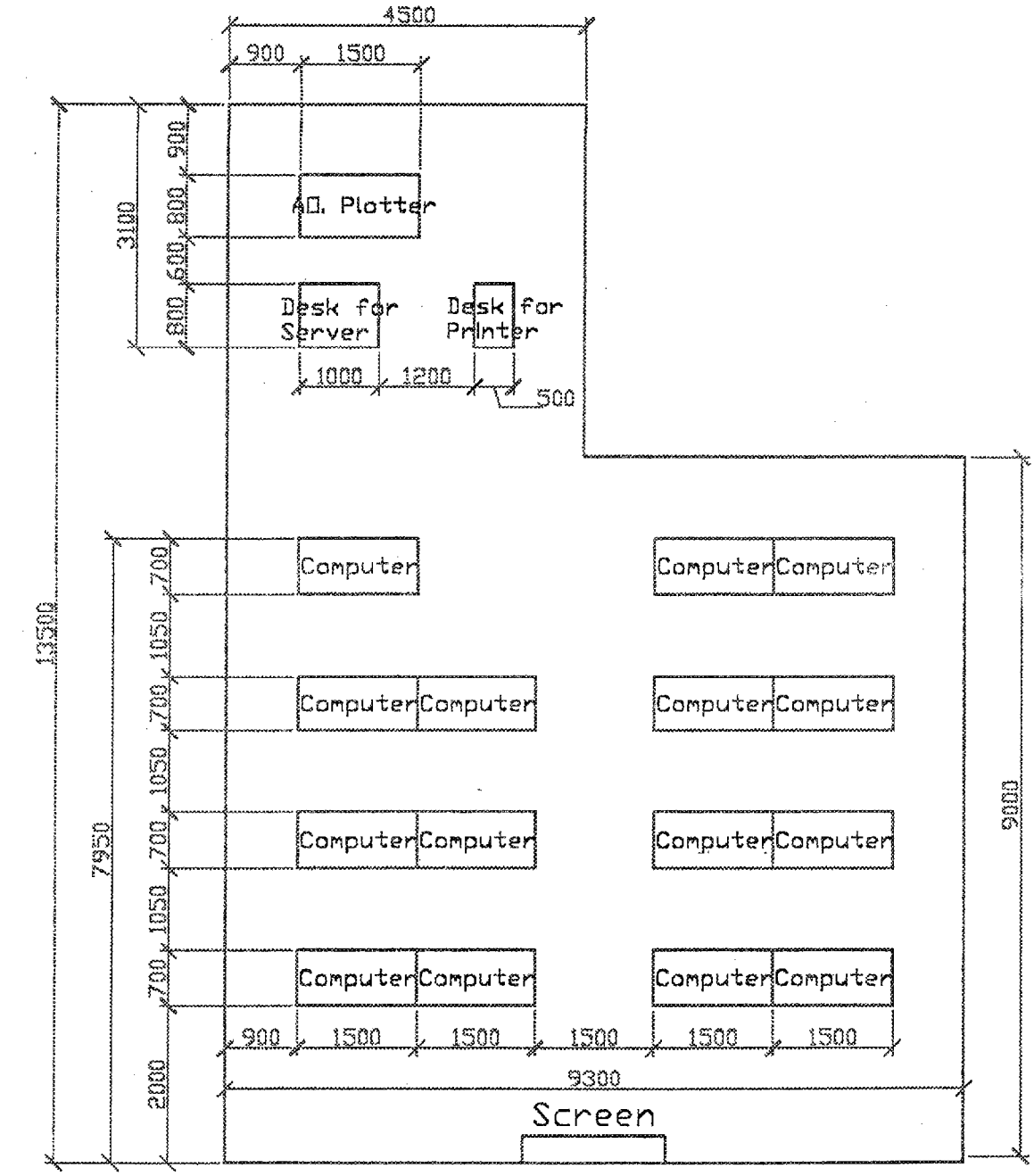
WATER SYSTEM,AIR COMPRESSOR SYSTEM PLAN

SCALE 1:75

D ท่อระบายน้ำทิ้ง PVC. ø 1"
W ท่อจ่ายน้ำประปา PVC. ø 3/4"
ประตูน้ำ (GATE VALVE) 3/4"

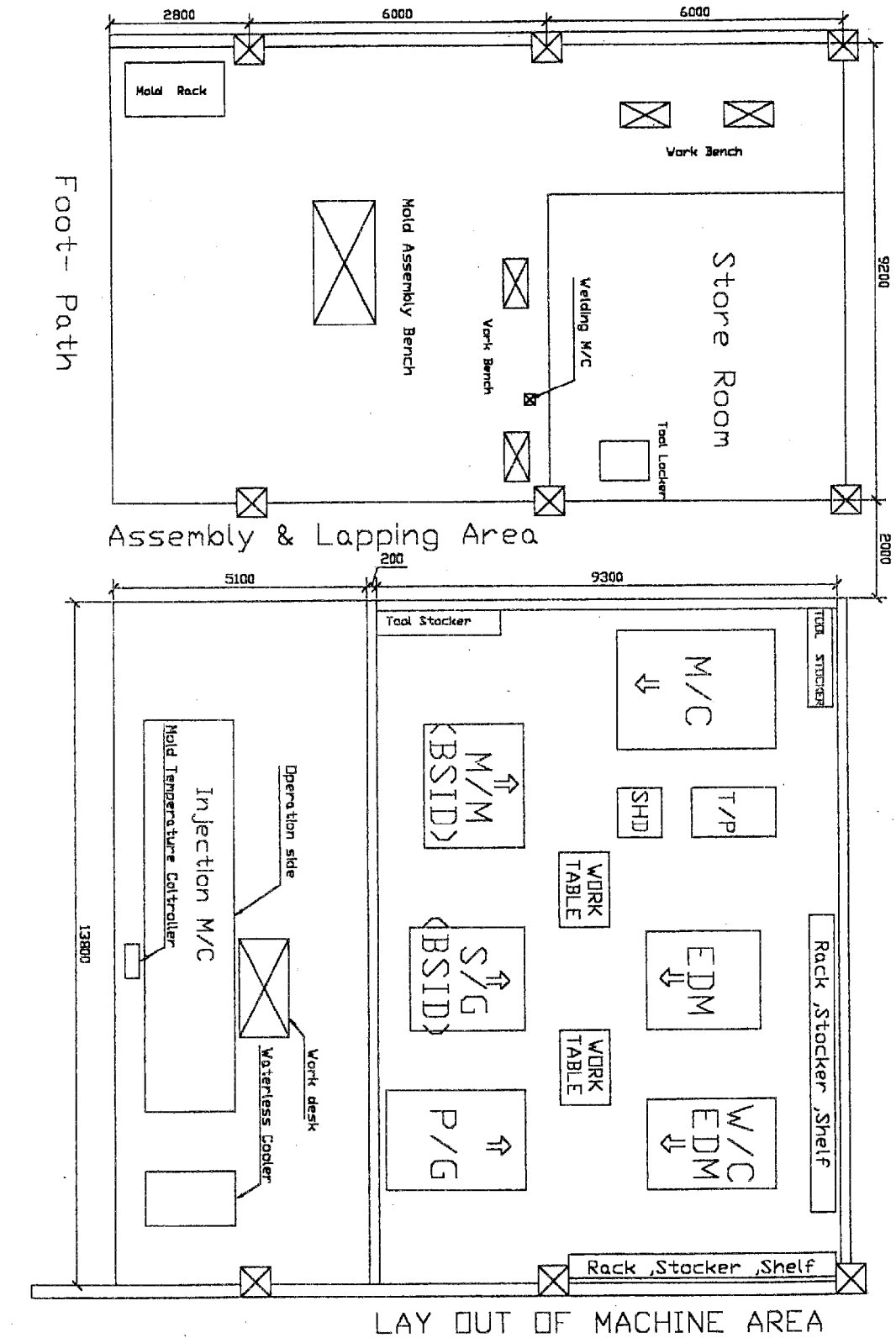
AIR COMPRESSOR 20 HP
Working Pressors 10 kg/cm^2
Flow Rate 1780 L/min.

Annex 30 The provisional layout of CAD/CAM room



Layout of CAD/CAM Room
Scale 1/75

Annex 31 The layout of machinery in processing area



Annex 32 The General Flow Chart for Budget Request in MOI

No.	Action	Due
1	All Departments of the Ministry of Industry (MOI) draft the policy to get approval from the said Ministry.	October
2	MOI holds the meeting with its all Departments to inform its policy.	November 2
3	MOI holds the meeting with the Budget Bureau to be approved the amount (ceiling) of its budget.	November 20
4	All Departments of MOI submit their budget request to the Bureau of Industrial Economics (BIE), MOI.	December 21
5	BIE scrutinize them and submit them to MOI. MOI inform all the Departments of the results.	January 8
6	All Departments of MOI review their budget request and resubmit them to BIE.	January 15
7	BIE submit the budget request to MOI and Minister for Industry.	January 22
8	MOI submit its budget request to the Budget Bureau.	February 5
9	The Budget Bureau review the amount of the requested budget.	March ~ May
10	The House of the People's Representative review the amount of the requested budget.	June ~ September

Annex 33-1 Budget Allocated to BSID (MIDI)

1 MIDI

Items	1991		1992		1993		1994	
	Allocated	Spent	Allocated	Spent	Allocated	Spent	Allocated	Spent
1 Salaries & Wages	5,730,300.00	fully	6,589,400.00	fully	10,193,800.00	fully	11,231,000.00	fully
2 Remuneration, Services other than Personnel and Supplies	2,984,000.00	nil.	4,687,400.00	nil.	4,838,800.00	nil.	7,422,700.00	nil.
3 Equipment, Properties & Conatruction	51,200.00	fully	231,800.00	fully	1,881,600.00	fully	3,589,000.00	fully
4 Public Utilities	2,004,000.00	fully	2,017,000.00	fully	2,399,000.00	fully	2,423,000.00	fully
5 Other Expenses	235,000.00	fully	-	-	-	-	-	-
Total	11,004,500.00	8,020,500.00	13,625,600.00	8,938,200.00	21,313,200.00	18,474,400.00	24,565,700.00	17,243,000.00

2 BSID

Items	1995		1996		1997		
	Allocated	Spent	Allocated	Spent	Allocated	Spent	Carry-over
1 Salaries & Wages	11,181,900.00	fully	13,329,400.00	fully	13,984,700.00	fully	-
2 Remuneration, Services other than Personnel and Supplies	7,248,700.00	8,040,061.00	7,485,700.00	7,301,738.36	8,129,000.00	6,312,525.00	2,008,057.90
3 Equipment, Properties & Construction	5,159,900.00	fully	12,190,000.00	fully	1,531,000.00	fully	-
4 Public Utilities	2,618,500.00	fully	2,673,000.00	2,834,571.58	2,850,000.00	3,236,273.92	-
5 Other Expenses	-	-	6,450,000.00	fully	6,850,000.00	4,425,685.89	-
Total	26,209,100.00	27,000,461.00	42,128,100.00	42,105,709.94	33,344,700.00	29,490,184.81	2,008,057.90

Items	1998			1999		2000
	Initial	Reviewed	Spent	Preliminery Study	Allocated	Requested
1 Salaries & Wages	14,808,900.00	14,808,900.00	fully	16,182,100.00	15,745,100.00	16,682,800
2 Remuneration, Services other than Personnel and Supplies	9,949,870.00	8,990,870.00	6,357,460.00	13,300,000.00	5,898,100.00	5,400,000
3 Equipment, Properties & Construction	2,929,000.00	2,929,000.00	fully	3,035,000.00	No Allocation	5,000,000
4 Public Utilities	2,166,000.00	2,166,000.00	2,123,634.00	2,707,500.00	2,700,000.00	2,843,000
5 Other Expenses	29,289,000.00	10,990,200.00	fully	18,990,000.00	13,550,000.00	28,769,600
Total	59,142,770.00	37,884,970.00	37,209,194.00	54,214,600.00	37,893,200.00	58,695,400

3 SIC Construction

Items	1997		1998		1999		2000	
	Allocated	Spent	Allocated	Spent	Allocated	Spent	Allocated	Spent
Construction	9,600,000.00	fully	34,000,000.00	fully	54,900,000.00	46,842,460.00	35,000,000.00	-
							Total	135,442,460.00
							(estimate)	

Note

1 Composition of Remuneration, Services other than Personnel and Supplies are as follows:

Remuneration	Services other than Personnel and Supplies	Supplies
- Overtime Payment	- Allowances, Accommodations & Transportation	- Office (paper, stationery, etc.)
- Housing	- Vehicle Maintenance	- Fuel & Gasoline
- Honorarium	- Machinery & Equipment Maintenance	- Household Stuff
	- Building Maintenance	- Electrical Accessories
	- Expenses for Service Contracts	- Advertisement & Publications
	- Training & Seminars Expenses	- Educational Materials
	- Expenses for Social Affairs	- Textbooks & Journals
	- Expenses for Taxes & Customs	- Computer (excluding Hardware)

2 The specific reasons for the unique utilization are as follows:

(1) The Equipment, Properties & Construction for 1996
Rapid-prototyping machine was procured.

(2) Carry-over in 1997
Some research was implemented with consecutive two (2) years.

Annex 33-2 Summary of BSID (MIDI)'S Performances and its Income

1 BSID (MIDI) in TOTAL

Activities	1993		1994		1995		1996		1997		1998		1999(Jan-May)		Notes
1 Technical Training & Seminars	82	1,600	68	1,625	91	1,638	83	1,913	70	1,526	83	1449	24	985	
(1) Regular Course	54	1,193	50	1,324	60	1,069	52	641	41	532	42	597	9	243	
in Bangkok	44	948	35	936	48	832	40	432	25	269	23	229	5	99	
in Provincial Areas	10	245	15	388	12	237	12	209	16	263	19	368	7	144	
(2) Courses to support DIP'S Program on Skills Reinforcement	7	93	8	129	10	193	10	182	12	130	16	221	2	72	
in Bangkok	N.A.	N.A.	7	124	7	107	5	72	6	34	7	57	-	-	
in Provincial Areas	N.A.	N.A.	1	5	3	86	5	110	6	96	9	164	2	72	
(3) Special Courses	21	314	10	172	21	376	21	1,090	17	864	25	631	10	670	(courses/attendees)
2 Technical Information & Advisory Services		903		463		1,122		1,377		338*		441*		202*	* excludes no. of services provided on the phone
3 Machining Center Service	86	N.A.	62	510	31	165	54	N.A.	45	767	150	931	25	N.A.	(firms/workpieces)
4 Testing & Inspection Service	186	N.A.	251	2,283	180	1,153	195	1,353	200	1,178	240	1,375	151	728	(firms/workpieces)
Income Return to MOF	279,910.00		378,680.00		420,250.00		484,330.00		376,350.00		248,310.00		74,340.00		

2 Mold & Die

Activities	1993		1994		1995		1996		1997		1998		1999(Jan-May)		Notes
1 Technical Training & Seminars	N.A.	N.A.	N.A.	N.A.	17	394	17	392	21	553	13	274	7	164	
(1) Regular Course	N.A.	N.A.	N.A.	N.A.	12	144	12	142	10	95	8	71	4	61	
in Bangkok	N.A.	N.A.	N.A.	N.A.	12	144	12	142	10	95	6	47	-	-	
in Provincial Areas	N.A.	N.A.	N.A.	N.A.	0	0	0	0	0	0	2	24	4	61	
(2) Courses to support DIP'S Program on Skills Reinforcement	N.A.	N.A.	N.A.	N.A.	0	0	0	0	3	19	0	0	0	0	
in Bangkok	N.A.	N.A.	N.A.	N.A.	0	0	0	0	3	19	0	0	0	0	
in Provincial Areas	N.A.	N.A.	N.A.	N.A.	0	0	0	0	0	0	0	0	0	0	
(3) Special Courses	N.A.	N.A.	N.A.	N.A.	5	250	5	250	8	439	5	201	3	103	(courses/attendees)
2 Technical Information & Advisory Services	N.A.	N.A.	N.A.	N.A.		N.A.		N.A.		20*		88*		36*	* excludes no. of services provided on the phone
3 Machining Center Service	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	5	N.A.	21	N.A.	7	N.A.	(firms/workpieces)
4 Testing & Inspection Service	N.A.	N.A.	N.A.	N.A.	0	0	0	0	0	0	0	0	0	0	(firms/workpieces)

Note

Fee

Technical Training	500-1,000Baht/5days
Seminars	500-1,000Baht/5days
	(in general a little bit expensive than technical training)
Technical Information & Advisory Service	Free
Machining Center Service	300-500Baht/hour
Testing & Inspection Service	100-500Baht/piece

Annex 34 The Items to be followed-up by Thai side

Item	In Charge	Due and the way to follow-up
1 The Progress of the Construction of SIC	The Thai side	Reporting the progress at the end of every month with photographs and the progress chart
2 New floor layout of SIC	The Thai side	Reporting the progress at the end of every month with revised drawing
3 Progress of the IRP	The Thai side	Reporting the progress of each project/program concerned with BSID at the end of every month
4 Reactivate the existing workshops including the repair and procurement of spare parts	The Thai side	Reporting the progress at the end of every month with photographs
5 Progress of the renovation of Workshop A	The Thai side	Reporting the progress at the end of every month in line with Annex 29
6 Submission of reviewed drawings and quotation for renovation of Workshop A	The Thai side	Submission of drawings and the quotation by the end of July 1999
7 Form A1, A2A3, A4	The Thai side	Submission of the original by the end of July 1999

Note: The items to be followed-up mentioned above are the ones at present and subject to increase upon necessity.

Annex 35 List of Attendants of the Discussions

The Japanese side

1 Implementation Study Team

Hiroyuki Arai	Leader
Jun Ikeuchi	Technical Cooperation Program
Akira Tahara	Tool and Die Technology
Atsuhiko Hatakeyama	Technical Transfer Program
Shoji Morohashi	Equipment Planning
Toshiya Otuka	Mold Design (Observer)
Kenichi Machida	Cooperation Planning

2 Embassy of Japan

Hideshi Todaka	Second Secretary

3 JICA Thailand Office

kenji Iwaguchi	Resident Representative
Yoshitaka Sumi	Deputy Resident Representative
Akio Nakamoto	Assistant Resident Representative

3 JETRO Bangkok Center

Tetsuaki Nonaka	Vice President

4 JODC Bangkok Office

Satoshi Matsunaga	Assistant to the Representative

The Thai side

1 Department of technical and economic Development (DTEC)

Banchong Amoronchewin	Chief, Japan Sub-division
Hataichanok siriwadhanakul	Program Offcer, Japan Sub-division
Tanyaporn Lertksana	Program Offcer, Japan Sub-division

2 Department of Industrial Promotion (DIP)

Manu Leopairote	Director General
Damri Sukhotanang	Deputy Director General
Satit Sirirangkamanont	Deputy Director General
Sumonman Kalayasiri	Deputy Director General
Uraiwan Chandrayu	Director, International Cooperation Division

3 Bureau of Supporting Industries Development (BSID), DIP

Nuntapit Nakasarn	Director
Pasu Loharjun	Director, Plastic and Electronic Component Industry Division
Panuwat Triyangkulsri	Chief, Research Section, Plastic and Electronic Component Industry Division
Kittipat Panitaporn	Head, Quality and Environment Development Unit
Paiboon Tekapan	Chief, Machining Subdivision
Prakob Janma	Chief, Product, Mold & Die Design Development Unit
Kijja Chongkwanyuen	Research Subsection
Pongsak Vongrasametong	Chief, Technology Subsection
Paiboon Chaengsach	Technology Section
Taweesit Boonmee	Technology Section
Patima Peungkiatpairote	Chief, General Subsection
Sawitree Krisanawong	Chief, Planning and General Coordinating
Sasiwimol Suthilert	Staff, Planning and General Coordinating
Namthip Trithip	Secretary

4 Thai Tool and Die Industry Association

Chokechai Kaveevathit	Chairman

5 Thai Plastic Industries Association

Suchart Suesujjakul	Chairman

6 Electrical and Electronics Institute

Pakdee Ratanawichien	Chairman

7 Automobile Institute

Alongkot Chutinan	Chairman