KAWA GmbH
Leiterplattentechnik / Industrievertretung

Kuttler Automation Systems (Suzhou) Co., Ltd.

KUTTLER AUTOMATION SYSTEMS

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IL DES machine

Quotation No: WET071101-DES3065B
Date: 2007-11-21

1. Line Specifications

	Line description	**IL DES machine**
	Machine speed	
	Conveyor Speed	1.0-6.0 m/min
	Operating Speed	3.0 m/min (for 1oz copper)
	Machine configuration	
	Working width	650mm
	Conveyor width	730mm
	Conveyor Height	950 mm (+/- 25mm)
	Module materials	Polypropylene
	Conveyor type	Double sided drive for inner layer
	Axle pitch	25 or 35mm
	Main drive shaft	14mm, Hexagon
	Conveyor drive axle	Φ10mm
	Axle/Shaft material(s)	required according process: Stainless steel, Ti
	Main drive gear:	Φ55mm, bevel
	Axle gear:	Φ40mm, bevel
	Gear material:	PVDF
	Bearing carrier:	20mm; Thick, PVDF
	Conveyor rollers	Φ32mm, Φ10mm inner diameter, 6mm thick, Santoprene
	Roller array:	Staggered array
	Working Direction	Left → Right（to be confirmed）
	Panel specification	
	Panel thickness	(0.05mm-3.5mm)+2 x (18um-105um)
	Panel size	100 x 150mm(min.) –550 x 610mm(max.)
	Copper thickness	1/2-3oz (normal 1oz)
	Panel Material	FR4 or other materials
	Elec. & control	
	Power Supply	3 PH+PE+N 380V 50Hz

2. Line Process

Pos.	Description	Module L (mm)	Process L (mm)	Process T (Sec.)	Temp. (°C)	Material
1	Input	750				PP / Ti
2	Develop #1	1760	1488	29.76	30°C	PP / Ti
3	Develop #2	1310	1038	20.76	30°C	PP / Ti
4	Post-develop	610	388	7.76	30°C	PP / Ti
5	5 stage cascade rinse	1420	5 x 138	5 x 2.76	RT	PP / Ti
6	Inspection	1000				PP / Ti
7	Etching #1	2510	2238	44.76	50°C	PP / Ti
8	Etching #2	2510	2238	44.76	50°C	PP / Ti
9	Intermittent	1010	718	14.36		PP / Ti
10	4 stage cascade rinse	1180	4 x 138	4 x 2.76	RT	PP / Ti
11	Inspection	1000				PP / Ti
12	Stripping #1	2560	2288	45.76	50-55°C	PP / SS
13	Stripping #2	2560	2288	45.76	50-55°C	PP / SS
14	Post-Strip	610	388	7.76	30°C	PP / SS
15	4 stage cascade rinse	1180	4 x 138	4 x 2.76	RT	PP / SS
16	Dryer	1760			60-80°C	PP / SS
17	Output	750				PP / SS
	Total:	**24480**				

*RT: Room Temp.

3. Technical Data

Pos.	Description	Water L/Hr.	C. Water L/Hr.	DI water L/Hr.	Exhaust CMM	Comp. Air L/Hr.	Power kW
1	Input				5		0.75
2	Develop #1	15	1080			100	18.2
3	Develop #2	15	1080			100	11.1
4	Post-develop	15	1080		5	100	4.25
5	5 stage cascade rinse	250				150	3.75
6	Inspection				5		1.5
7	Etching #1	15	2160			100	44.8
8	Etching #2	15	2160			100	46.3
9	Intermittent				10	150	0
10	4 stage cascade rinse	250				150	3.0
11	Inspection				5		1.5
12	Stripping #1	15					45.17
13	Stripping #2	15					45.17
14	Post-Strip	15	1080		5	100	4.25
15	4 stage cascade rinse			250		150	3.0
16	Dryer				15		20.8
17	Output						0.75
	Total	**620**	**8640**	**250**	**50**	**1200**	**254.29**

Note: Budget total power: 265kw

4. Process

Pos.1 Input (750mm)

Drive system

Drive motor:	0.75kw

Piping system

Drain:	D32mm

Utilities

Power consumption:	0.75kw
Exhaust:	5CMM, d110mm(including Damper)

Note

Stand by sensor:	2
Emergency stop button:	1

Note:
Panel jam alarm system.

Pos.02 Develop #1 (1760mm)

Module

Side window:	8mm, UV tempered glass
Volume:	520L

Drive system

Squeeze roller:	Φ32mm, Soft PP/Ti, 4 sets

spray system

Nozzle:	FAN quick lock, PP, 168 pcs.
Nozzle pressure /flow:	1.0-2.0 kg/cm^2 , 2.5L/min, top/bot. spray bar adjustment
Nozzle array:	6pcs nozzles each pipe, spray manifolds are diagonally offset, installation of top/bot. spray manifolds are offset
Spray manifold:	PP, top/bot. 2sets spray manifolds, top/bot. 14pcs. spray pipes
Oscillator:	horizontal oscillation 30 times/min, 40mm swing
Oscillator motor:	2 x 0.1kw
Digital pressure gauge:	4pcs., 0-4kg/cm^2
Pump:	3.0kw x 2

Filtration system

Filtration cartridge:	Candle filter 2pcs, PP, 7*20” candle core

Temp. Control System

Heater:	Ti, 4.0kw x 3
Cooling coil:	Ti, D25mm, 12m; L
Temp. control:	2pcs. PT100, PVDF, temp. sensor
Pneumat. Valve:	1pcs.

Piping system

Water inlet:	D32mm
Drain:	D50mm
Overflow:	D63mm (from Pos.3)

Utilities

Cooling water	1080/Hr.
Power consumption:	18.2kw
yellow fluorescent lamp	4pcs.
Compressed air	100L/Hr.

Note: the adjustable valve use the membrane valves.

Pos.03 Develop #2 (1310mm)

Module

Side window:	8mm, UV tempered glass
Volume:	365L

Drive system

Squeeze roller:	Φ32mm, Soft PP/Ti, 4 sets

spray system

Nozzle:	FAN quick lock, PP, 112 pcs.
Nozzle pressure /flow:	1.0-2.0 kg/cm^2 , 2.5L/min, top/bot. spray bar adjustment
Nozzle array:	8pcs nozzles each pipe, spray manifolds are diagonally offset, installation of top/bot. spray manifolds are offset
Spray manifold:	PP, top/bot. 1sets spray manifolds, top/bot. 7pcs. spray pipes
Oscillator:	horizontal oscillation 30 times/min, 40mm swing
Oscillator motor:	1 x 0.1kw
Digital pressure gauge:	2pcs., 0-4kg/cm^2
Pump:	3.0kw x 1

Filtration system

Filtration cartridge:	Candle filter 1pcs, PP, 7*20” candle core

Exhaust system

Condenser:	D500*1 (including pneumatic valve and pipework)

Temp. Control System

Heater:	Ti, 4.0kw x 2
Cooling coil:	Ti, D25mm, 12m; L
Temp. control:	2pcs. PT100, PVDF, temp. sensor
Pneumat. Valve:	1pcs.

Piping system

Water inlet:	D32mm
Drain:	D50mm
Overflow:	D63mm (from Pos.4, to Pos.2)

Utilities

Cooling water	1080/Hr.
Power consumption:	11.1kw
yellow fluorescent lamp	2pcs.
Compressed air	100L/Hr.

Note: use adjustable membrane valves for adjusting. Not ball valve.

Pos.04 Post Develop (580mm)

Module

Cover:	8mm, double layer tempered glass
Volume:	105L

Drive system

Squeeze roller:	Φ32mm, Soft PP/Ti, 4 sets

Spray system

Nozzle:	FAN quick lock, PP, 26pcs
Nozzle pressure /flow:	1.0-2.0 kg/cm^2 , 2.5L/min , top/bot. adjustable
Nozzle array:	7/6 nozzles offset array
Spray manifold:	PP, top/bot. 2 pcs. spray pipes
Digital pressure gauge:	2pcs. 0-4kg/cm2
Pump:	1.1kw x 1

Filtration system

Filtration Cartridge:	Candle filtering 1pcs, PP, 2*10" filter core

Temp. Control System

Heater:	Ti, 3.15kw x 1
Cooling coil:	Ti, D25mm, 5m; L
Temp. control:	2pcs. PT100, PVDF, temp. sensor
Pneumat. Valve:	1pcs.

Piping system.

Water inlet:	D32mm
Drain:	D50mm
Over flow:	D63mm（to Pos.3）

Utilities

Water inlet	15L/Hr.
Cooling water	1080L/Hr.
Power consumption:	4.25kw
Compressed air	100L/Hr.
Exhaust:	5CMM, d110mm (including Damper)

Note: use adjustable membrane valves for adjusting. Not ball valve.

Pos.05 5 stage cascade rinse (1420mm)

Module

Top Lid	8mm; tempered glass
Volume:	56-62-66-70-72L

Drive system

Squeeze roller:	Φ32mm, Soft PP/Ti,16 sets

Spray system

Nozzle:	FAN quick lock, PP, 65 pcs.
Nozzle pressure / flow:	Max 1.5 kg/cm^2 , 2.12L/min,top/bot. adjustable
Nozzle array:	Top 7/6 nozzles offset array; Bot. 6/7 nozzles offset array;
Spray manifold:	PP spray pipe, top/bot. 5 pcs. Spray pipes
Pressure gauge:	10pcs. 0-4kg/cm^2
Pneumatic valve:	2pcs.（one for the 3rd stage water inlet）
Flowmeter	1pcs.
Spray pump:	0.75kw x 5

Filtration system

Filtration Cartridge:	Candle filtering 5 pcs, PP, 2*10” filter core

Piping system

Water inlet:	D20mm
Drain:	D40mm
Overflow:	D50mm

Utilities

Power consumption:	3.75kw
Water inlet	250L/Hr.
Compressed air:	150L/Hr.

Note:

1. Conductivity control in first stage.
2. Use adjustable membrane valves for adjusting. Not ball valve.

Pos.06 Inspection(1000mm)

Drive system

Drive motor:	0.75kw x 2

Piping system

Drain:	D32mm

Utilities

Power consumption:	1.5kw
Exhaust:	5CMM, d110mm(including Damper)

Note

Stand by sensor:	4
Emergency stop button:	1

Note: Panel jam alarm system.

Pos.07 Etching#1 (2510mm)

Module

Side window:	8mm, tempered glass
Volume:	780L

Drive system

Squeeze roller:	Φ32mm, Soft PP/Ti, 4sets

Spray system

Nozzle:	FAN quick lock, PP, 252pcs
Nozzle pressure /flow:	2.0-3.0 kg/cm^2 , 3.0L/min, individual spray bar adjustment for top spray pipes. Bottom spray manifold can adjustable
Nozzle array:	6pcs nozzles each pipe, spray manifolds are diagonally offset, installation of top/bot. spray manifolds are offset
Spray manifold:	PP, welded construction top/bot. 3 sets, top/bot. 21 pcs. spray pipes
Oscillator:	horizontal oscillation 30 times/min, 40mm swing
Oscillator motor:	3 x 0.1kw
Digital pressure gauge:	24pcs. 0-4kg/cm^2
Pump:	5.5kw x 3(frequency control)
Chemical mixing:	Pos.7 -Pos.8 offset spray

Filtration system

Filtration cartridge:	Bag filter 3pcs, PP, mesh 100 μ m

Temp. Control System

Heater:	Ti, 4.0kw x 7
Cooling coil:	Ti, D25mm, 9m x 2; L
Temp. control:	2pcs. PT100, PVDF, temp. sensor
Pneumat. valve:	2pcs.

Piping system

Water inlet:	D32mm
Drain:	D50mm
Overflow:	D63mm
Connect:	D160mm (Pos.7-Pos.8)

Utilities

Cooling water	2160L/Hr.
Power consumption:	44.8kw
White fluorescent lamp	6pcs.
Compressed air	100L/Hr.

Note: Intet rollers at Etching with misting system to avoid crystallization.

Pos.8 Etching#2 (2510mm)

Module

Side window:	8mm, tempered glass
Volume:	780L

Drive system

Squeeze roller:	Φ32mm, Soft PP/Ti, 6 sets

Spray system

Nozzle:	FAN quick lock, PP, 252pcs
Nozzle pressure /flow:	2.0-3.0 kg/cm^2 , 3.0L/min, individual spray bar adjustment for top spray pipes. Bottom spray manifold can adjustable
Nozzle array:	6pcs nozzles each pipe, spray manifolds are diagonally offset, installation of top/bot. spray manifolds are offset
Spray manifold:	PP, welded construction top/bot. 3 sets, top/bot. 21pcs. spray pipes
Oscillator:	horizontal oscillation 30 times/min, 40mm swing
Oscillator motor:	3 x 0.1kw
Digital pressure gauge:	24pcs. 0-4kg/cm^2
Pump:	5.5kw x 3(frequency control)
Chemical mixing:	Pos.8 -Pos.7 offset spray (circulating pump, Pos.8 to Pos.7)

Filtration system

Filtration cartridge:	Bag filter 3pcs, PP, mesh 100 μ m

Exhaust system

Condenser:	D500*1 (including pneumatic valve and pipework)

Temp. Control System

Heater:	Ti, 4.0kw x 7;
Cooling coil:	Ti, D25mm, 9m x 2; L
Temp. control:	2pcs. PT100, PVDF, temp. sensor
Pneumat. valve:	2pcs.

Piping system

Water inlet:	D32mm
Drain:	D50mm
Overflow:	D63mm
Connect:	D160mm (Pos.8-Pos.7)

Utilities

Cooling water	2160L/Hr.
Power consumption:	46.3kw
White fluorescent lamp	6pcs.
Compressed air	100L/Hr.

Pos.9 Intermittent (1010mm)

Module

Top Lid:	8mm; double side tempered glass

Drive system

Squeeze roller:	Φ32mm, Soft PP/Carbon, 3 sets

spray system

Nozzle:	FAN quick lock, PP, 54pcs
Nozzle pressure:	2.0-2.5kg/cm^2
Nozzle array:	interlaced arranged ,triangular, nozzles on top spray pipe is 7/7/6/5/4/3/2 pcs. offset array. and on three bot. spray pipe is 7/6/7pcs. array
Spray manifold:	PP spray pipe, top 7pcs and bottom 3pcs.
Pneumat. Valve:	10pcs. (on each spray pipe)
Spray pump:	from Pos.8 circulation pump

Piping system

Overflow:	D63mm (to Pos.8)

Utilities

Compressed air:	150L/Hr.
Exhaust:	10CMM, d110mm(including Damper)

Pos.10 4 stage cascade rinse (1180mm)

Module

Top Lid:	8mm; tempered glass
Volume:	56-62-66-68L

Drive system

Squeeze roller:	Φ32mm, Soft PP/Ti, 13 sets

Spray system

Nozzle:	FAN quick lock, PP, 52 pcs.
Nozzle pressure / flow:	Max 1.5 kg/cm^2 , 2.12L/min, top/bot. adjustable
Nozzle array:	Top 7/6 nozzles offset array; Bot. 6/7 nozzles offset array;
Spray manifold:	PP spray pipe, top/bot. 4 pcs. Spray pipes
Pressure gauge:	8pcs. 0-4kg/cm^2
Flow meter:	2pcs.(one for bypass to Pos.8)
Pneumatic valve:	2pcs.(one for bypass to Pos.8)
Spray pump:	0.75kw x 4

Filtration system

Filtration Cartridge:	Candle filtering 4 pcs, PP, 2*10” filter core

Piping system

Water inlet:	D20mm
Drain:	D40mm
Overflow:	D50mm(bypass to Pos.8)

Utilities

Power consumption:	3.0kw
Water inlet:	250L/Hr.
Compressed air	150L/Hr.

Note: Conductivity control in last stage.

Pos.11 Inspection(1000mm)

Drive system

Drive motor:	0.75kw x 2

Piping system

Drain:	D32mm

Utilities

Power consumption:	1.5kw
Exhaust:	5CMM, d110mm(including Damper)

Note

Stand by sensor:	4
Emergency stop button:	1

Note: Panel jam alarm system.

Pos.12 Stripping#1 (2560mm)

Module

Module material:	SUS316 outer PP, temp. max. 85℃
Top Lid:	8mm; double layer tempered glass
Volume:	915L

Drive system

Squeeze roller:	Φ32mm, PP/SUS316, 2 sets

Spray system

Nozzle:	FAN quick lock, SUS316, 260pcs.
Nozzle pressure / flow:	2.0-2.5kg/cm^2 , 2.92L/min , top/bot. adjustable
Nozzle array:	7/6 nozzles offset spray
Spray manifold:	SUS316, top/bot. 20 pcs. each
Digital pressure gauge:	4pcs. 0-4kg/cm^2
Spray pump:	4.0kw x 3

Temp. control system

Heater:	SUS316, 4.0kw x 8
Temp. control:	2pcs. PT100, SUS316, temp. sensor

Residue seperating system

PH high flow resist filtration: 1pcs. (pump: 0.37kw x 1, horizontal pump: 0.8kw x 1)

PH drying station: 1pcs. (for Pos.12 and Pos.13 two sets PH high flow resist filtration)

Piping system

Water inlet:	D32mm
Drain:	D50mm x 2
Overflow:	D63mm (from Pos.13)

Utilities

Power consumption:	45.17kw

Option

Cooling coil:	SUS316, D25mm, 12m; L
Pneumat. valve:	1pcs.
Cooling water:	1080L/Hr.
Compressed air:	100L/Hr.

Pos.13 Stripping#2 (2560mm)

Module

Module material:	SUS316 outer PP, temp. max. 85℃
Top Lid:	8mm; double layer tempered glass
Volume:	915L

Drive system

Squeeze roller:	Φ32mm, PP/SUS316, 2 sets

Spray system

Nozzle:	FAN quick lock, SUS316, 260pcs.
Nozzle pressure / flow:	2.0-2.5kg/cm^2 , 2.92L/min , top/bot. adjustable
Nozzle array:	7/6 nozzles offset spray
Spray manifold:	SUS316, top/bot. 20 pcs. each
Digital pressure gauge:	4pcs. 0-4kg/cm^2
Spray pump:	4.0kw x 3

Temp. control system

Heater:	SUS316, 4.0kw x 8
Temp. control:	2pcs. PT100, SUS316, temp. sensor

Residue seperating system

PH high flow resist filtration: 1pcs. (pump: 0.37kw x 1, horizontal pump: 0.8kw x 1)

Exhaust system

Condenser:	D500*1 (including pneumatic valve and pipework)

Piping system

Water inlet:	D32mm
Drain:	D50mm x 2
Overflow:	D63mm x 2(from Pos.14, to Pos.12)

Utilities

Power consumption:	45.17kw

Option

Cooling coil:	SUS316, D25mm, 12m; L
Pneumat. valve:	1pcs.
Cooling water:	1080L/Hr.
Compressed air:	100L/Hr.

Pos.14 Post strip (610mm)

Module

Cover:	8mm, double layer tempered glass
Volume:	105L

Drive system

Squeeze roller:	Φ32mm, Soft PP/SUS316, 4 sets

Spray system

Nozzle:	FAN quick lock, SUS, 26pcs.
Nozzle pressure /flow:	1.0-2.0 kg/cm^2 , 2.5L/min , top/bot. adjustable
Nozzle array:	7/6 nozzles offset array
Spray manifold:	SUS, top/bot. 2 pcs. spray pipes
Digital pressure gauge:	2pcs. 0-4kg/cm^2
Pump:	1.1kw x 1

Filtration system

Filtration Cartridge:	Bag filtering 1pcs, PP, 100um

Temp. Control System

Heater:	SUS316, 3.15kw x 1
Cooling coil:	SUS316, D25m, 5m; L
Temp. control:	2pcs. PT100, SUS316, temp. sensor
Pneumat. Valve:	1pcs.

Piping system

Water inlet:	D32mm
Drain:	D50mm
Over flow:	D63mm(to Pos.13)

Utilities

Water inlet	15L/Hr.
Cooling water	1080L/Hr.
Power consumption:	4.25kw
Compressed air	100L/Hr.
Exhaust:	5CMM, d110mm (including Damper)

Pos.15 4 stage cascade rinse (1180mm)

Module

Top Lid	8mm; tempered glass
Volume:	56-62-66-68L

Drive system

Squeeze roller:	Φ32mm, Soft PP/SUS316, 12 sets; Sponge roller 2sets

Spray system

Nozzle:	FAN quick lock, PP, 52 pcs.
Nozzle pressure / flow:	Max 1.5 kg/cm^2 , 2.12L/min,top/bot. adjustable
Nozzle array:	Top 7/6 nozzles offset array; Bot. 6/7 nozzles offset array;
Spray manifold:	PP spray pipe, top/bot. 4 pcs. Spray pipes
Pressure gauge:	8pcs. 0-4kg/cm^2
Pneumatic valve:	1pcs.
Flowmeter	1pcs.
Spray pump:	0.75kw x 4

Filtration system

Filtration Cartridge:	Candle filtering 4pcs, PP, 2*10” filter core

Piping system

Water inlet:	D20mm
Drain:	D40mm
Overflow:	D50mm

Utilities

Power consumption:	3.0kw(DI Water)
Compressed air:	150L/Hr.
Water inlet:	250L/Hr.

Note :conductivity control in last stage.

Pos.16 Dryer (1760mm)

Module

Module material:	SUS316 outer PP, temp. max. 85℃
Top Lid:	8mm; tempered glass

Drying system

Blower:	3.0kw x 4, 2.2kw x 1
Air knife:	FK air knife 2 sets, air shower 3 sets
Heater:	1.1kw x 6

Piping system

Drain:	D32mm

Utilities

Power consumption:	20.8 kw
Exhaust:	15CMM, d110mm(incl. adjustment valve)

Pos.17 Output (750mm)

Drive system

Drive motor:	0.75kw

Piping system

Drain:	D32mm

Utilities

Power consumption:	0.75kw

Note

Stand by sensor:	2
Emergency stop button:	1

NOTE: Panel jam alarm system.

Electric control

- ➢ Central control cabinet
- ➢ Touch panel control

1. Over temperature protection
2. Temp. control
3. Lid open/close protection
4. Low level switching protection
5. Filtering cartridge switching protection
6. Emergency stop switching protection
7. Stepping activation (Pumps &Blowers)
8. Water/power saving
9. Pre-heating
10. Three-color-lamp+ alarm
11. Production output statistics
12. Failure info and other standard displays

Including

1. Develop dosing system (central supply)
   dosing box: 5L x 2(for water), 1L x 2(for Na2CO3)
   pneumatic valve:8pcs. ball valve: 4pcs.
   dosing mode: dosing by conductivity control (conductivity in Develop#2 module)
   add to Develop#2 and Post develop
2. Etching dosing system (central supply)
   Regeneration system: AQUA-710
   dosing tank: 100L x 1(for H2O2); HCl dosing to Etching module from central supply
   dosing pump: 1pcs.
   pneumatic valve:1pcs. ball valve: 2pcs.
   level switch x 4; HH, H, L, LL
3. Stripping dosing system (central supply)
   dosing box: 5L x 1(for water), 1L x 1(for NaOH)
   pneumatic valve:4pcs. ball valve: 2pcs.
   dosing mode: dosing by conductivity control (conductivity in Stripping#2 module)
4. Develop anti-foam dosing system (manual filling)
   dosing tank: 50L x 1
   dosing pump: 3pcs. level switch x 2; L, LL
5. Stripping anti-foam dosing system (manual filling)
   dosing tank: 50L x 1
   dosing pump: 3pcs. level switch x 2; L, LL
6. Central piping and catwalk
7. All pumps form Renner and all membrane valves from Gemue.
8. PC controller with automatic make-up and cleaning programs. Also include modem.

Operation manual in English 3 sets.