S.P.M. s.r.l.

Full automatic wet bench for solar cells texturing
S.P.M. s.r.l. Texturing wet bench is composed by:

- 1 process tank KOH – RT/60°C
- 3 QDR
- 1 process tank HF+HNO3 RT/9°C cooled
- 2 process tank KOH+IPA RT/70-85°C
- 1 process tank HF+HCL RT
- 2 cascade rinse tank for final rinse with resistivity meter
- 1 dryer with hot H2ODI and hot air

The machine is controlled by an OMRON PLC and an industrial pc with embedded 15" touch screen. The software is made with WONDERWARE InTouch, that is a leader program for SCADA.
Semaphore for immediate machine status monitor

Balance to monitor the weight loss from load to unload

Heat exchanger - general control

4 carriers automatic Load station with conveyor

Wonderware industrial pc with embedded 15” touch screen. WINDOWS XP Professional Powered

Automatic Unload station with conveyor
SOLAR TEXTURING: front view

Unload balance

Automatic Unload station with conveyor

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SOLAR TEXTURING: lateral view

- Semaphore for immediate machine status monitor
- Heat exchanger general control
- Chiller
- 4 carriers automatic Load station with conveyor
- Wonderware industrial pc with embedded 15” touch screen. WINDOWS XP Professional Powered
SOLAR TEXTURING: Loading

- Optical barrier
- Conveyor for 4 carriers
SOLAR TEXTURING: inside view

2 axys Robot

PNE cover for all process tanks

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SOLAR TEXTURING: Tank
A-B

Process tank
KOH RT-60°C

Rinse tank 1

Load balance

Removable tank floor for cleaning in case of silicon chip presence
SOLAR TEXTURING: Tank C-D-E

- Cooled Process tank: HF+HNO₃
- Rinse tank 2
- Alkaline process tank: KOH+IPA 70-85°C
SOLAR TEXTURING: Tank
F-G-H-I-J

Alkaline process tank
KOH+IPA 85°C

Acidic process tank
HF+HCL RT

Final cascade rinse with resistivity control

Rinse tank 3

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SOLAR TEXTURING: dryer

- Dryer: hot H2ODI and hot air
- 2mm/s vertical Lifter
- Unload balance
- Air heaters
- Blower
SOLAR TEXTURING: Unload

PNE transferrer

3 carriers Conveyor
SOLAR TEXTURING: Robot arms

Robot cover to contain fumes during process tank covers opening

Nozzles for arms drying with N2

1mm Halar coated
Carrier detect sensor
1mm PFA Coated
SOLAR TEXTURING:
Water group (module 1)

- PNE membrane – sphere valves
- Heat exchanger
- Centrifugal pump
SOLAR TEXTURING:
Water group (module 2)

- PNE membrane – sphere valves
- ATEX Centrifugal pump
- Heat exchanger
- Cover piston
- Centrifugal pump
SOLAR TEXTURING:
Water group (module 3)

- PNE membrane – sphere valves
- Centrifugal pump
- ATEX Centrifugal pump
- Heat exchanger
- Cover piston
SOLAR TEXTURING:
Water group (module 4)

- PNE membrane valves
- Centrifugal pump
- H2ODI Recovery tank
SOLAR TEXTURING:
External heat exchanger