BY ORDER OF

SCHÜCO TF AND MALIBU

WE OFFER FOR SALE

TWO COMPLETE 60 MW (a-Si/µc-Si) THIN FILM SOLAR PANEL PRODUCTION LINES & R&D TOOLS

ONE LINE SOLD – ONE COMPLETE LINE STILL AVAILABLE

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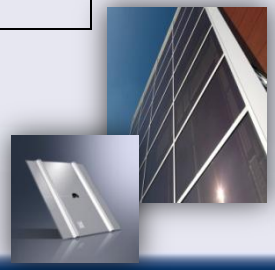
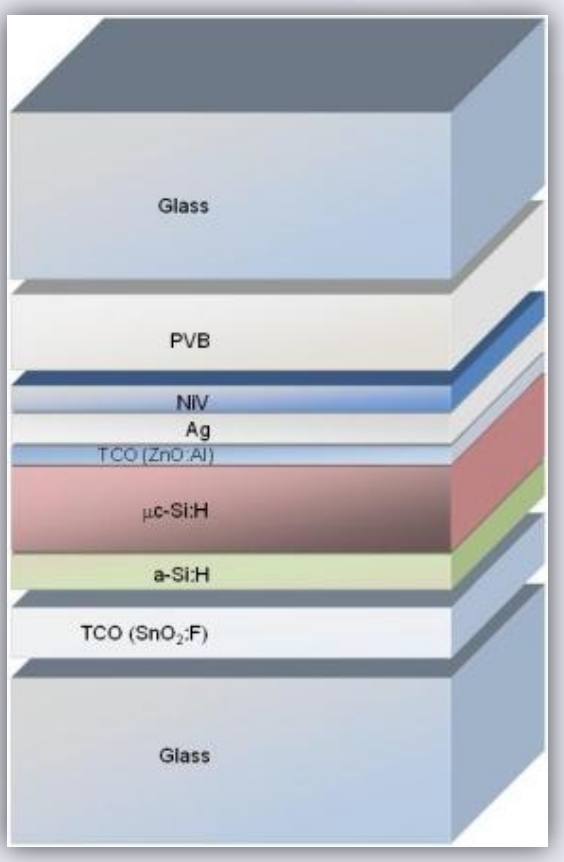
BACKGROUND INFORMATION

- Company activities include research & development as well as production of thin film photovoltaic modules
- Technology is based on thin film silicon tandem junction
- Modules are based on frameless glass-glass laminate with an efficiency of up to 10%
- Possibility to produce different module sizes to address various market segments

The available complete line + the tools from the R&D site can be inspected and purchased with **immediate effect** and isavailable either as whole line or as individual machine packages.

Single pieces of equipment will be sold individually in an
Online Auction on 21 March 2013.





OFFER AND PRODUCT CAPABILITY OVERVIEW

OFFER 1*: Malibu, Osterweddingen

SOLD

- C[illegible]0 MW p.a.
- [illegible]µc-Si, tandem junction
- Flexible module size (max. 2.6 x 2.2m)

OFFER 2*: Schüco TF, Großröhrsdorf

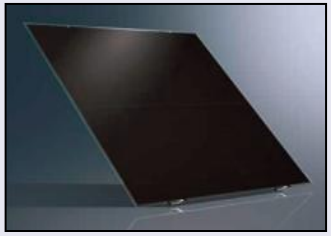
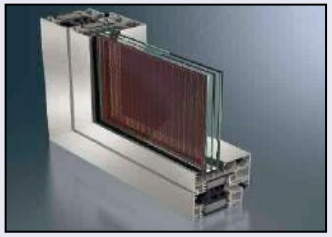
- Capacity: 60 MW p.a.
- a-Si / µc-Si, tandem junction
- Flexible module size (max. 2.6 x 2.2m)
- BIPV Building Integrated Photovoltaic (located in Osterweddingen)

OFFER 3: Malibu, Bielefeld

- R&D at substrate size up to Gen 5 size
- Tool set for pilot production
- Analytic and test capability

EQUIPMENT PARTIALLY SOLD

Products

Bankable modules	BIPV solutions
	

World class products with exceptional **high efficiency rates** which are applicable to residential, **commercial and ground mount markets**

*Buyers have the option to also acquire the current production building and premises.

FACILITIES OVERVIEW

Großröhrsdorf (GRD)

Built:	2007
Start of production:	2008
Products:	Standard modules BIPV (located in OWD)
Size:	39,916 m² production area
Current capacity:	60 MW
Manufacturing facility:	AMAT turn key production line 4 x PECVD AKT 60 1 x PVD Sputter 1 x Cooling facility 1 x Electrical power installation

Osterweddingen (OWD)

Built:	2008
Start of production:	2009
Products:	Standard modules
Size:	15,724 m² production area
Current capacity:	60 MW
Manufacturing facility:	AMAT tu pr AKT 60 PVD Sputter 1 x Cooling facility 1 x BIPV laser patterning system

Equipment SOLD

GENERAL LAYOUT AND PROCESS FLOW

1. Glass Cleaning
2. Laser Scribe P1 (TCO)
3. Glass Cleaning
4. Vapour Deposition of a-Si/µc-Si
5. Laser Scribe P2 (Silicon)
6. Vapour Deposition Back Contact
7. Laser Scribe P3 (Back Contact)
8. Application Side & Cross Contact
9. Application PVB and Back Glass
10. Encapsulation/ Autoclave
11. Attachment Junction Box
12. Final Inspection – Flasher
13. Application Back Bars

PHOTO GALLERY

1 + 3: Glass Cleaning

2, 5 + 7: Laser Scribe

4: Vapour Deposition of a-Si/ µ-Si

6: Vapour Deposition Back Contact

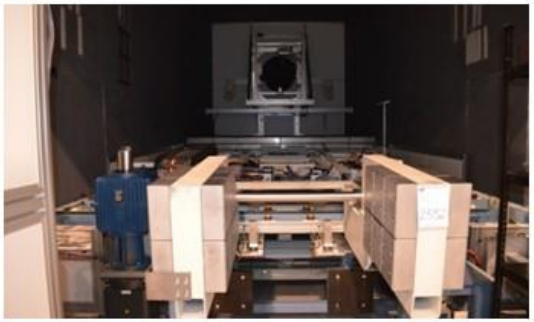
8: Application Side & Cross Contact

PHOTO GALLERY

9: Application PVB and Back Glass

10: Encapsulation / Autoclave

11. Attachment Junction Box



12: Final Inspection – Flasher

13: Application Back Bars

PRODUCTION PROCESS AND INSTALLED EQUIPMENT

60 MW (a-Si/µc-Si) Applied Materials Turn Key Solar Thin Film Module Production Line

Pre-treatment of F-Size front glass	PECVD and PVD	Quartering of the glass	Application wiring	Intermediate foil & back glass assembly	Heating process	Glue and soldering
• Inserting of front glasses in the production line, first quality testing, cleaning of glasses and first laser treatment	• Deposition of silicon layer and metallic back-contact onto the substrates including laser patterning of silicon layer and back-contact	• Quartering of the glasses into Q-size modules (1.43 m^2) including edge processing	• Application wiring for the derivation of the PV-Module • Copper strips & place solder transfer contact paths	• Installation intermediate foil (PVB-foil) & back glass assembly	• Heating process for connecting front and back glass	• Glue and soldering of the junction box in the module
Machines used • Robots (KUKA) • Glass loader (Grenzebach) • ASEM (Benteler) • Glass washer (Benteler) • Laser (Manz)	**Machines used** • CVD-Loader (Grenzebach) • CVD (AMAT) • Abatement (AMAT) • Quality control (Sentech) • PVD (AMAT) • Laser (Manz)	**Machines used** • Quartering tool (Grenzebach) • Seamer (Benteler) • Glass washer (Benteler) • Laser edge delete (Manz)	**Machines used** • Bus tool (ATS)	**Machines used** • PVB cutting tool (Grenzebach) • Robots (KUKA) • Trimming tool (Grenzebach) • Lamination (Klöpper)	**Machines used** • Autoclave (Scholz)	**Machines used** • J-Box tool (ATS)

PRODUCTION PROCESS AND INSTALLED EQUIPMENT

OWD site also runs the BIPV – Building Integrated PV - process.
The production equipment for BIPV is available for sale in connection with the complete line:

			additional processes for BIPV			
Performance & quality control	**Mounting of back rail**	**Packaging**	**Special laser process**	**Special fitting**	**Wiring, lamination, testing**	**Insulating coating & packaging**
• Simulation efficiency determination by flashing/ review of performance • Label printing with performance test result	• Mounting the backs fastening systems	• Packaging of the final modules in standard wooden transport boxes	• Special laser process for structuring the BIPV modules (customized transparency & patterns)	• Special fitting of modules based on customer requirements (size, shape) • Cut & brake of BIPV modules based on customer requirements	• Manual wiring, lamination and testing of the modules • Flash testing and creation of performance report	• Insulating coating in cooperation with sub-contractors • Special packaging according to customer requirement
Machines used • Solar simulator (ATS) • Label printer (ZEBRA)	**Machines used** • Back bar attach tool (Bystronic)	**Machines used**	**Machines used** • Laser (Manz)	**Machines used** • Cutting tool (Hegla)	**Machines used** • Vacuum laminator (NPC) • Solar simulator	**Machines used** • CNC centre (Benteler)

OWD only – still available!

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