KEKO EQUIPMENT

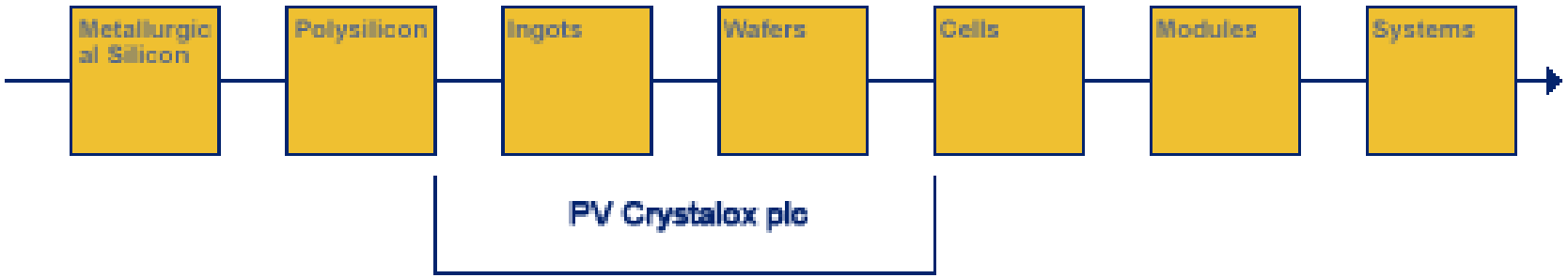
Solar cell production process

Keko – Oprema d.o.o. Žužemberk

Tone Konda

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Processing steps



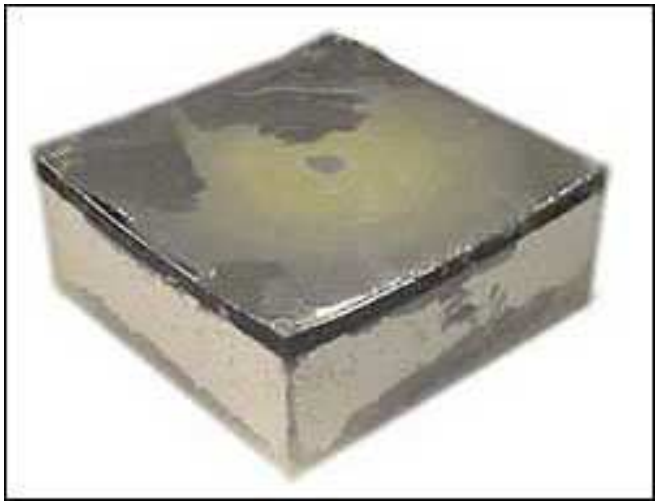
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From silicone to Ingots

- Silicon is the second most abundant element in the earth's crust (after oxygen), and is commonly found as sand, which is in the form of silicon dioxide.
- Metallurgical silicon is produced by removing oxygen in a carbon-arc reduction furnace. This is then purified through a complex chemical process involving chlorination and distillation. The distilled gas is fed into a deposition furnace where it is decomposed into solar grade polysilicon. 90% of the world's solar cells are made of silicon.
- The polysilicon is placed into a crucible, which is put into a furnace. There it is heated to melting point, reaching temperatures of 1500ºC.
- The molten liquid is then crystallised into a solid state through the process of cooling from the base up, in which the few remaining impurities rise to the top. This results in a multicrystalline ingot of extremely pure silicon weighing up to 275 kg.

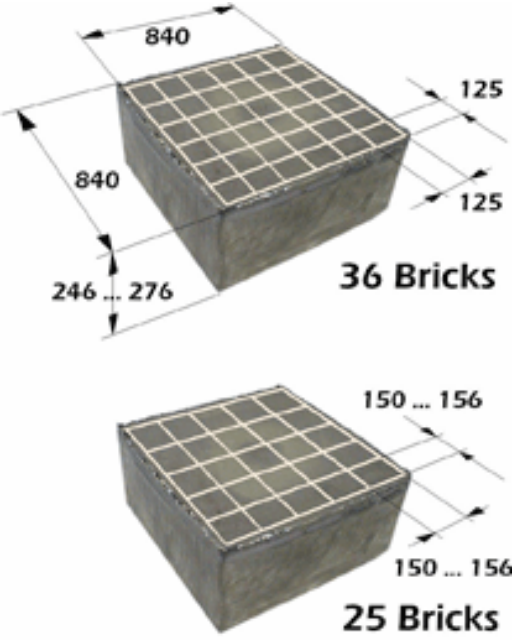




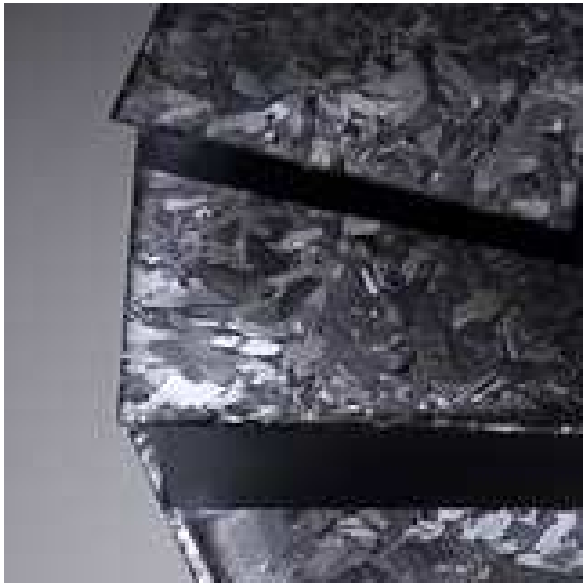


From Ingots to wafers

- The ingots/rods are cut into smaller bricks by high-precision wire saws, which are in turn cut into very thin slices, known as 'wafers'. The thickness of the wafer varies, but can be as low as one fifth of a millimetre.
- There are about 50 wafer producers globally, of which the top five have almost 50 percent of the market.



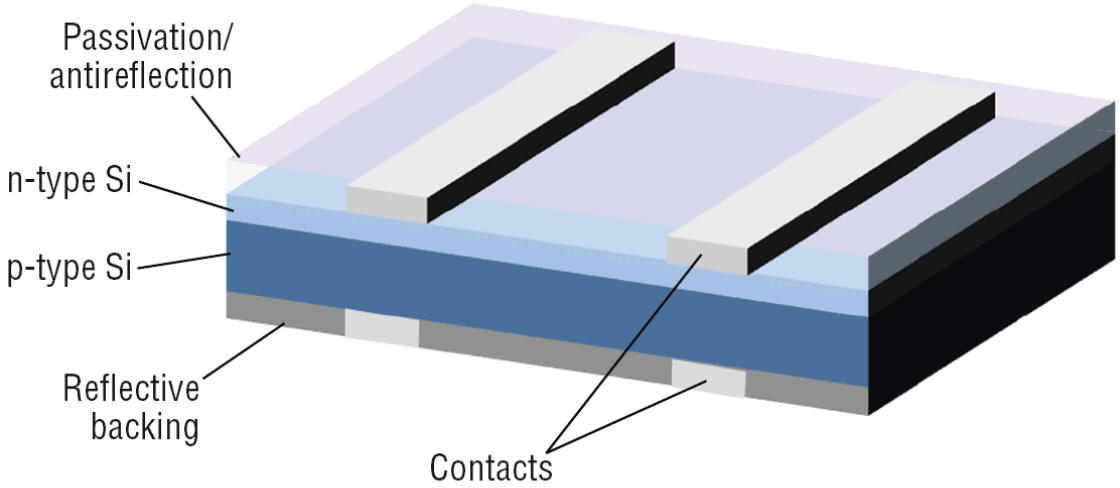




Wafers to cells

- An alkaline solution is used to smooth away any damage the wire saws may have caused to the wafers, followed by the etching of the outer face to give the surface a texture to increase the level of sunlight absorbed. Next a dopant element is added to in low concentrations in order to alter the optical/electrical properties of the semiconductor, followed by a thin layer of anti-reflecting material to maximise light absorption. The last step is to add electrical contacts, usually through screen-printing.





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Cells to Modules

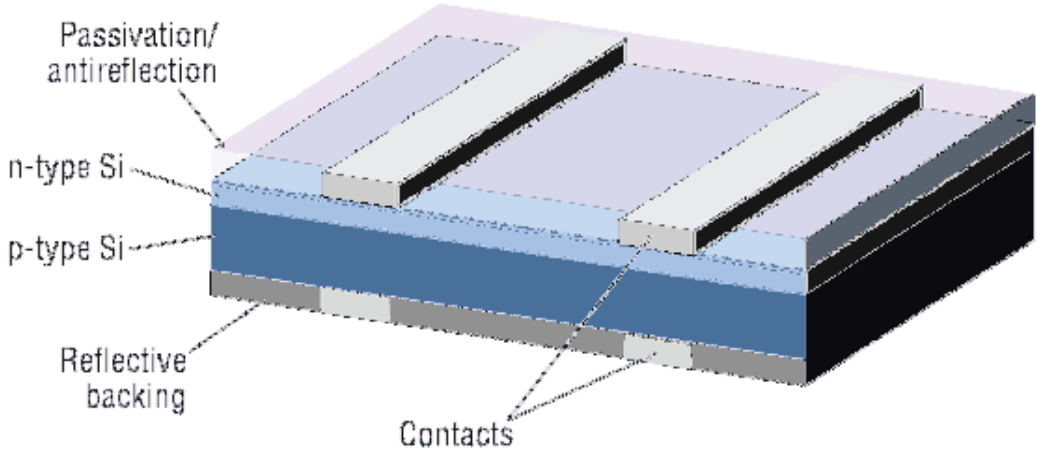
- Solar cells are the heart of solar modules. The cells are connected into strings that are then encapsulated in polymers under glass. Modules can produce up to 500 watts and manage up to 1000 volts.
- Modules are the sections of a solar system. A system can be just one module, or thousands. Systems are tailored to meet specific needs, with variations such as battery storage to provide AC or DC power, inverters, connectors and power controls.





Keko Oprema activity

- Printing of electrodes to wafers :
- - print 1 (reflective backing), drying with IR drier
- - print 2 (contact one side), drying with IR drier
- - print 3 (contact another side), electrode sintering



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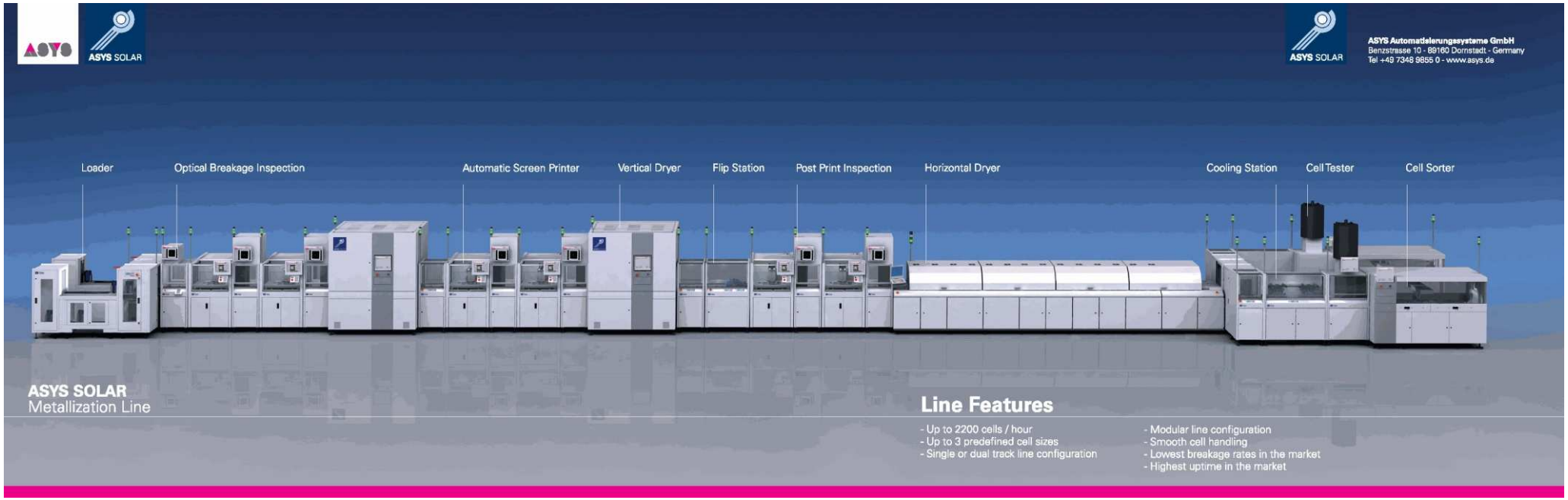
Manual line



Printer P-200ASC :
- printing area up to 200 x 200 mm
- printing speed up to 300 mm/s
- auto vision alignment of solar cell
- advanced cell handling mechanism
- possible inline integration
- IR drier option

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Automatic line



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Keko line



Fully automatic solar cell printing line SOC-6A :
-Screen printers : 3 stations
-IR drier : 2 stations
-Up to 2000 solar cells per hour production capacity