Miasolé

Vacuum Deposited Thin-Film Solar Cells Using Roll-to-Roll Processing

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MAKING AFFORDABLE THIN-FILM SOLAR CELLS A REALITY

Miasolé Background

- Founded in late 2001; shifted focus to thin-film solar in 2003
- Products: CIGS solar cells on flexible substrates; rigid and flexible modules
- Considerable vacuum system design expertise
- Extensive experience with high volume thin-film component manufacturing

Miasolé's Technology Approach

- Thin-film (CIGS) solar cells on stainless steel foil
- Continuous "All Sputtered" vacuum deposition
- Wide area deposition for economies of scale
- Internally designed and built equipment

Vacuum System Features

- Meter wide coil
- 5 kilometers in length
- 2 feet per minute line speed
- 7 different film layers
- 250,000 square meters per year
- Long-life rotary targets
- Modest footprint

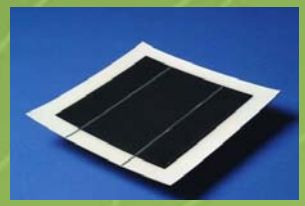
CIGS Solar Cell History

- Researched for more than 30 years
- Research almost exclusively conducted on bell jar evaporators
- Startups focused on high volume production techniques

Why Choose CIGS?

- **CIGS has the highest demonstrated efficiency of all thin-films at 19.5%**
- **CIGS can be deposited on flexible substrates enabling lightweight flexible modules**
- **No inherent material limitations or hazardous chemicals**

Miasolé's Paradigm Shift



Thin-film Cells vs. Crystalline Silicon

Flexible vs. Rigid Glass Modules

Building Integrated vs. Retrofit

Goal: Grid Parity by 2010 (10¢/kwh)

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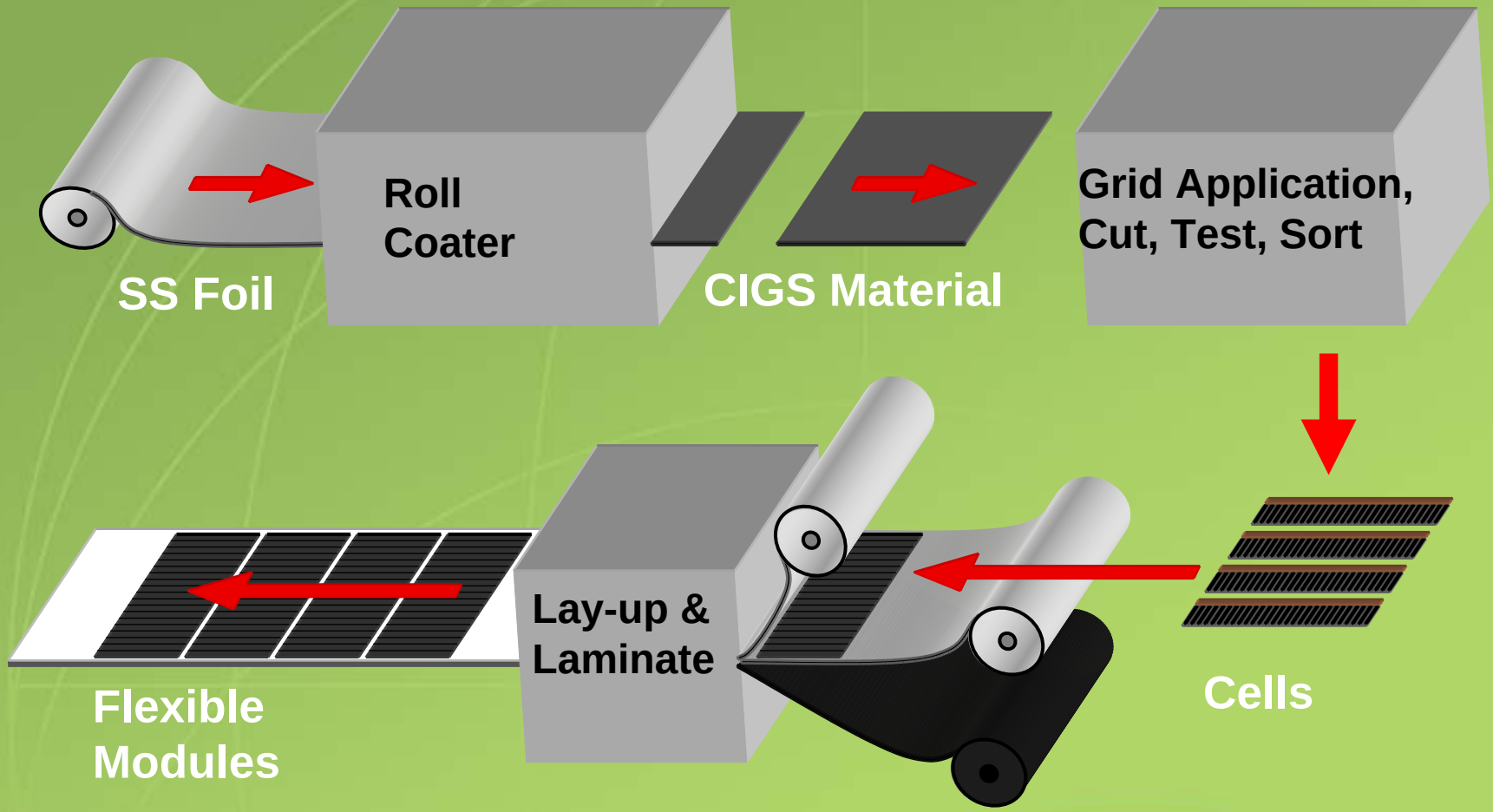
Roll-To-Roll PV Cell & Module Process Flow



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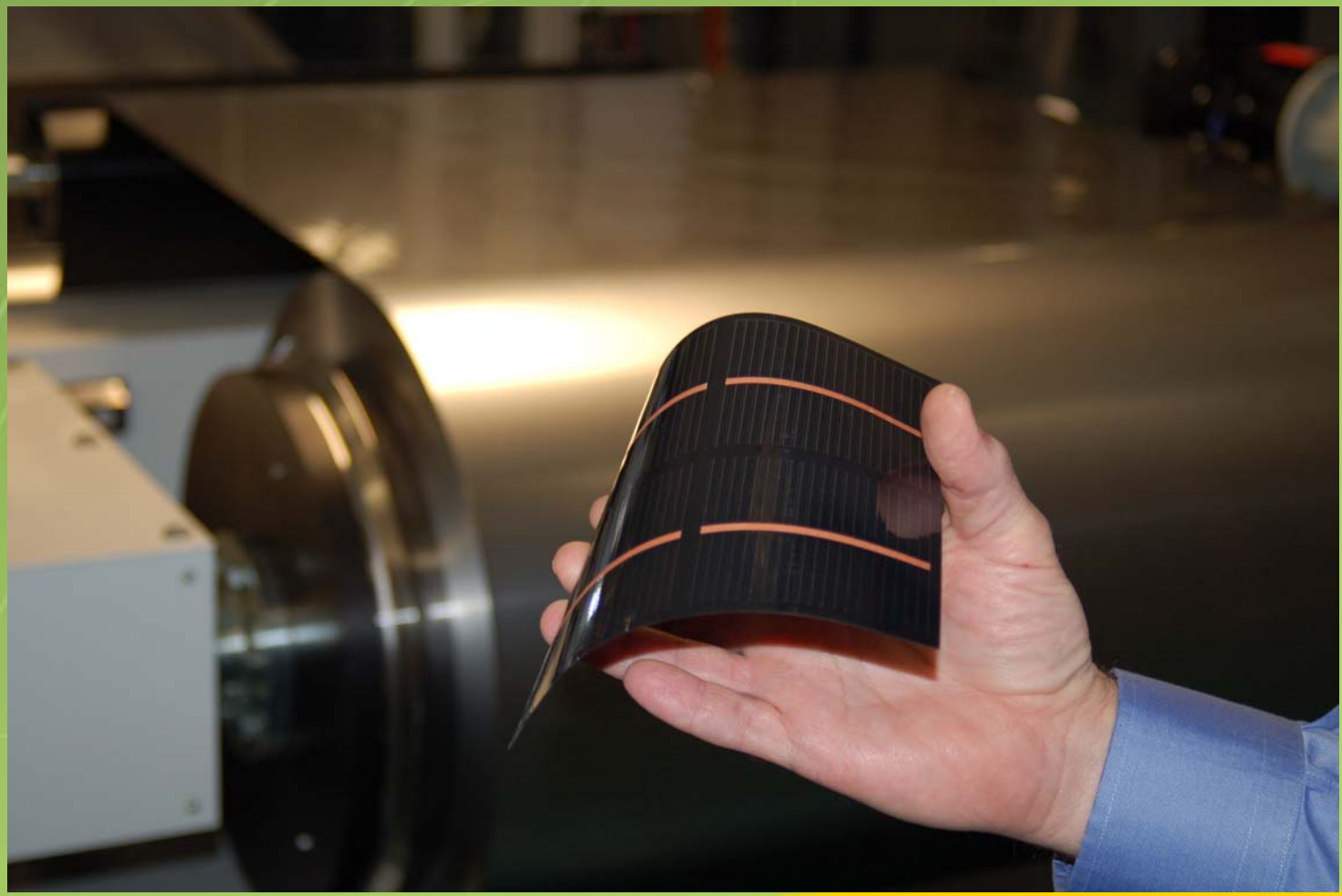
Roll Coater Manufacturing System

Miasole Finished Product



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Miasolé's Cost Goals
vs.
Current Crystalline Silicon Costs

- 80% reduction in solar cell costs
- 70% reduction in module costs
- 60% reduction in installed system costs

Capital Efficiency
(Investment per 100MW Annual Capacity)

Vertically integrated crystalline silicon line	$200M
Miasolé CIGS thin-film line	$25M

Thank You