Automated Loading, Unloading & Transfer System for Photovoltaic Silicon Wafer
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Extensive automation systems are essential for the economic production of solar cells for the necessary reduction of costs in photovoltaics.

SINGULUS offers fully automated Loading/Unloading & Transfer systems for silicon wafer based photovoltaic production lines. The modular concept (versatile basic platform) offers to connect different types of production lines from different vendors.

The system is able to cover batch and inline job floor concepts to optimize throughput. Multiple parallel incoming conveyers are possible. Clocked and continuous substrate flow is supported.

The integrated breakage detection system and the camera based positioning system guarantees the correct wafer movement and positioning.

The unload module picks up the wafer from the output conveyor of the previous line. Multiple parallel incoming conveyers are possible. Clocked and continuous substrate flow is supported. An integrated camera system detects the wafer position on the conveyor. In the following step a breakage detection system separates the broken substrates. Depending on configuration the substrates will be transferred to the next line or to a buffer station consisting of a rotation table including a customer specific carrier system.

The load module picks up the wafer from the integrated buffer system as described before or direct from the conveyor of the upstream handling system, depends from configuration. The integrated breakage detection system and the camera based positioning system guarantees the correct wafer movement.

Features
- Versatile basic platform, easy adaptable to the required duty
- Fully automated system for loading/unloading and/or transfer solar cells
- Multiple parallel incoming or outcoming conveyers are possible
- Clocked and continuous substrate flow is supported
- Wafer can be take out or feed in from stack or cassette
- Vision system for position detection, exact positioning and breakage detection
- Cost-conscious: system are optimized and reduce to the required
- Transfer capability: 3600 wafer /hour
Automated Loading, Unloading & Transfer Systems
Batch & Inline

Example Batch to Inline
- Loading of AR coater from ACI cassette or wafer stacker to a clocked or continuous conveyor
- Unloading from clocked or continuous conveyor to ACI cassette or wafer stacker
- The cassette or stacker are placed or removed manually
- Intermediate storage capacity by cassette 500 to 1,000 wafers

Example Inline to Inline
- Inline transfer from PSG to AR coater
- Unloading from clocked or continuous parallel conveyors with direct transfer to AR coater
- Intermediate storage capacity by cassette 500 to 1,000 wafers with feed in or feed out capability
- Transfer capability 1,500 or 3,000 wafers/hour

Example Inline to multiple Inline
- Inline transfer between multiple inline systems
- Transfer from clocked or continuous parallel conveyors to multiple parallel or single conveyors
- Optionally intermediate storage with feed in or feed out capability can be easily retrofit
- Transfer capability up to 3,600 wafers/hour