The CHAD loader and unloader solutions utilize standard CHAD WaferMate™ handling workcells to interface seamlessly with the inline process tool to provide a safe and intelligent, integrated wafer handling solution. Examples of inline process tools include reflow ovens, and wafer cleaners.

Wafer Sizes and Presentation Formats
Wafer handling solutions are available for wafer sizes from 50mm to 300mm utilizing different WaferMate™ platforms. WaferMate200 workcells are used for all SEMI standard open cassette presentation formats (typically 100mm to 200mm), while WaferMate300 workcells are used for all BOLTS compatible presentation formats (typically 300mm FOUPs, and 200mm SMIFs or Open Cassette Loadports).

The wafer handlers are configurable for different inventory levels, while each application is designed to ensure that the optimal solution is achieved in the smallest possible footprint. The loader & unloader systems are compatible with standard SEMI presentation formats to make integration with the process tool simple and easy.

Inline Process Tool Interface
A CHAD wafer conveyor is used to interface between the wafer handler and the inline tool. The conveyor provides variable speed belts to match the speed of the process tool belt, therefore providing a smooth and scratch-free transition of the wafer onto the belt. Wafers at the loader are placed onto the static belt, and then the belts ramp in speed to match the speed of the belt.

Processed wafers coming out of the tool are unloaded onto another CHAD Wafer Conveyor that is already running at the same speed as the belt. As the wafers approach the unloader workcell, the belt speeds slow down and come to a stop to register the wafer at the end of the conveyor. This ensures that the wafers are in a reliable and repeatable location to be acquired by the end effector at the unloader workcell.

CHAD WaferMate Loader/Unloader Handling System Features:
- Small footprint
- Integrated design
- Intelligent wafer tracking
- Compatible from 50mm to 300mm
- SEMI standard presentation (FOUP, Open Cassette, SMIF pod)
- Non-scratch wafer handling
- Compatible with flat or profiled belts
- Simple PC software
- OHT compliant interface
- Low cost of ownership
- Wide range of compatible options
- Worldwide support and service
- SEMI S2, S8, and CE compliant
Intelligent Communication
The CHAD WaferMate loader and unloader workcells communicate with each other using an Ethernet connection to track wafers, manage wafer loading, and protect wafers from collision damage.

While the process is in operation, the CHAD software monitors wafer activity on both the unloader and loader workcells, and tracks wafer progress through the process tool.

By monitoring where the wafers are, the workcells prevent a situation where wafers may end up ramming other wafers on the process tool track if the output cassette is not replenished in a timely manner.

When the output cassette reaches capacity, the software alerts the operator (status light and on the GUI) and directs wafers to the storage buffer in the unloader workcell. At the same time the software in the loader workcell starts counting down the number of wafers it loads into the process tool. When the software calculates that it will reach capacity in the buffer, the loader workcell ceases to load more wafers into the tool. In this way every wafer that has been loaded into the process tool has a safe destination in the unloader workcell.

Wafer Buffer
While the full output FOUP/Cassette is being replenished by the operator, wafers continue to be unloaded from the process tool and are placed into the buffer storage within the unloader workcell. Once the empty output FOUP/Cassette has been loaded, wafers are removed from the buffer and placed into the FOUP (or cassette) in the same order that they were stored in the buffer.

Software
The integrated workcell uses CHAD’s proprietary WaferWare™ software suite to allow for simple yet wide-ranging application and GUI controls. Special handling routines have been developed to accurately and safely handle the wafers without damage.

Simple User Interface

Robot & End Effector
The wafers are manipulated using a clean 4-axis robot. The robot has fluid-magnetic seals and can be fitted with vacuum for stringent Class-1 cleanliness requirements. The wafers are gripped using a CHAD vacuum grip end effector. Wafer mapping features are included in the tips of the end effector, and provide cross-slotted, double slotted, and protrusion sensing.
**Performance Specifications:**
- Pre-alignment with +/-0.5 degrees theta accuracy (optional)
- Wafer placement accuracy: +/- 101 µm
- 360 wafers per hour handling capacity
- Standard SEMI and SMEMA interfaces
- Up to ISO Class 2 or better cleanliness at the wafer surface. (Optional Class-1)
- BOLTS interface compatible
- CE, S2, and S8 compliant

**Key Workcell Benefits:**
- Small workcell footprint
- Supports multiple wafer sizes without tooling changeover.
- Configurable workcell design for multiple loadports
- Intelligent wafer tracking to protect wafers
- Compatible with any inline belt profile
- Plug-and-play installation
- Easy access for maintenance and service
- Reliable 4-axis atmospheric robot with absolute encoders

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