1 General

- EC Declaration of conformity (certification done by EVG)
- PC controlled operating environment
- Solid State Drive and Hard Drive - for high availability and reliability
- Separated control rack for remote operation of GEMINI
- Graphical User Interface for manual and fully automated operation.
- DVD backup system - system software and data backup tool integrated
- Separate process capability of each chamber, independent sequence, monitoring and data storage.

1 NRTL Certification

- NRTL labeling (depending on AHJ (Authorities Having Jurisdiction) requirements (e.g. UL61010A-1, NFPA79 – current version at time of evaluation)
- System is designed for UL61010 and NFPA79 compliance
- Equipment certifications through independent and objective Third Party Evaluator as mutually agreed between the parties
- Evaluation will be performed at EVG prior to shipment of the system
- Letter of compliance will be supplied to buyer at time of installation
- **NFPA79 :**
  Electrical Standard for Industrial Machinery
- **UL61010:**
  Electrical equipment for laboratory use – general requirements

1 **SEMI S2/S8 Third Party Inspection**

NOTE: The "Electrical Safety Inspection" or the "NRTL Inspection" are a prerequisite for the SEMI Inspection

- System is designed for S2/S8 compliance - latest version will be used at time of evaluation
- Equipment certifications through independent and objective Third Party Evaluator as mutually agreed between the parties
- Evaluation will be performed at EVG prior to shipment of the system
- Evaluation Report will be supplied to buyer at time of installation
- **SEMI S2 (current version at time of evaluation e.g. S2-0709):**
  ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINE FOR SEMICONDUCTOR MANUFACTURING EQUIPMENT
  This guideline applies to equipment used to manufacture, measure, assemble, and test semiconductor products.
- **SEMI S8 (current version at time of evaluation e.g. S8-0308):**
  ERGONOMICS ENGINEERING OF SEMICONDUCTOR MANUFACTURING EQUIPMENT
  The guidelines address safety aspects of ergonomics engineering in the design of semiconductor manufacturing equipment. It should be noted that in order to ensure comprehensive coverage of potential safety hazards, some guidelines also address general design goals for effective human-machine performance. The guidelines apply to the design, operation, maintenance, and service of semiconductor manufacturing equipment, as well as, to a limited extent, equipment installation.

1 **SEMI F47 Third Party Inspection**

- Equipment certifications through independent and objective Third Party Evaluator as mutually agreed between the parties
- Evaluation will be performed at EVG prior to shipment of the system
- Evaluation Report will be supplied to buyer at time of installation
- **SEMI F47 (current version at time of evaluation e.g. F47-0706):**
  SPECIFICATION FOR SEMICONDUCTOR PROCESSING EQUIPMENT VOLTAGE SAG IMMUNITY
  This specification sets minimum voltage sag immunity requirements for equipment used in the semiconductor industry. Immunity is specified in terms of voltage sag depth and duration. This specification also sets procurement requirements, test methods, pass/fail criteria and test report requirements.

1 **Software**

- MS-Windows® based process software for recipes, processing and diagnostics
- Automated recording of process parameters
- Storage of files and presets on hard disk or network
- Password protected access levels for operator, engineer, and maintenance

1 **SECS II / GEM - Hardware / Software Interface**

Hardware

Hardware (SEMI E4 or SEMI E37 connection) to be defined on order:

- SEMI E4 - SEMI EQUIPMENT COMMUNICATIONS STANDARD 1 MESSAGE TRANSFER (SECS-I) Hardware interface RS232
- SEMI E37 - HIGH-SPEED SECS MESSAGE SERVICES (HSMS) GENERIC SERVICES Hardware interface Ethernet TCP/IP

Software

- SEMI E5 - SEMI EQUIPMENT COMMUNICATIONS STANDARD 2 MESSAGE CONTENT (SECS-II)
- SEMI E30 - GENERIC MODEL FOR COMMUNICATIONS AND CONTROL OF MANUFACTURING EQUIPMENT (GEM) Detailed specification as per EVG SECS_GEM_Manual Additional options for 200mm equipments on request

1 **Wafer ID Reader**

- SEMI T1 (barcode), SEMI M12, SEMI M13 (both alphanumeric), SEMI T7 (data matrix code) compliant
- Software to read and log ID numbers from wafers
- For double sided reading

Continuous Mode of Operation (CMO)

- Lot and slot integrity even when lots get mixed in the machine during lot change
- System allows processing of different lots at the same time with different recipes and/or using different process modules
- No interruption of processing during lot changes

1 **Ballroom Substrate handling module**

- **For wafer handling between load cassette, and alignment stage**
- **3 ergo cassettes (optional)**
- 4 axis industrial robot for loading/unloading
- Wafer handling endeffector for robot unit
- Programmable for all wafer / substrate sizes **up to 200mm**
- With **external** optical prealigner.
- Robot control is fully integrated into the graphical user interface
- Standard: wafer handling with vacuum from bottom side

1 **Bondchuck handling module**

- for Bond chuck handling between alignment station, bondchamber,…
- For automated operation of up to four bond modules
- 4 axis industrial robot for loading/unloading of bond chucks to bond chamber
- Integrated cooling station for each bond chamber for increased throughput
- Unclamp station with handshake to Linear Transfer Station

1 **Linear Transfer Station**

- To move substrate to receive station next to send station
- Using SMIF stations (optional) instead of open cassettes possible
- Positioned next to alignment station

3 **Ergo Load Cassette Station**

- Cassette present sensor
- Cassette empty sensor
- Adjustable for different semi standard wafer cassette sizes
- Cassette not included
- Tilt mechanism for wafer cassette according to Semi S8

1 **Scanning endeffektor for wafer handling robot unit**

- to detect missing or cross sloted substrates in send cassettes

1 **SmartView®NT Alignment Unit**

For face-to-face alignment of two substrates (alignment keys in bond interface)

- High resolution alignment stage with DC servomotors in X, Y and Theta.
- Top and bottom wafer chuck with position measurement system
- Complete computer control of all mechanical movements in the aligner through PC
- Joystick control of all alignment movements and microscope
- Unique three spindle alignment stage for shift free Z movements.
- Measurement systems to verify alignment within 1um
- Self diagnostics during machine start up. Automatic initialization of all motors, position end switches, sensors and pneumatic.
- Remote Diagnostics

1 **SmartView Microscope**

- Fully motorized split field microscope for double side viewing.
- Display and storage of objective positions.
- High resolution digital CCD cameras
- Integrated magnification unit manually adjustable from 1x - 3x
- Alignment with split field microscope, monitored on process window

4 **Objective 10x**

1 **Loading Chuck for 200mm Wafer**

- For loading and alignment of top wafer
- Recess for spring loaded clamping pins

1 **Automatic alignment**

- With vision system (integrated in PC)
- Storage of trained substrate patterns on hard disk
- Software fully integrated in the alignment system computer control.
- User trainable alignment marks
- Easy operation with menu assisted training of alignment marks.
- Alignment results are dependent upon process conditions and material properties.

Bonding modules

1 Bond module

- Universal bond chamber with top and bottom side heaters
- Flag pulling mechanism
- Up to 550°C and 3.5kN optional 10kN, 20kN, 40kN, 60kN or 100kN
- Atmospheric capabilities down to **1 x 10 $^{-3}$ mbar (7.5 x 10 $^{-4}$ Torr)**
  Optional: 1x10 $^{-5}$ mbar (7.5 x 10 $^{-6}$ Torr)
- 3 bar abs. pressure
- Separate connections for evacuation, purge and vent
- Independent temperature controllers for top and bottom side of each chamber
- Electronic pressure regulator for controlled contact force
- Bond chamber will have maintenance port to connect RGA -
  Software trigger and scope of requirement will need to be clearly defined by both parties.
- **Pneumatic wafer bow pin**
  - For most accurate alignment of separated wafers
  - Spring-loaded pin in bond chamber
- **Rapid Cooling:**
  - for **Bottom** Side Heater
  - for **Top** Side Heater
  - For symmetric top/bottom side cooling at identical rate
  - Forced water cooling
  - Silent operation
  - Programmable cooling rate
  - Secure fluidic path without seals in vacuum
- *The Gemini bond chamber does have the ability to initiate contact with the bow pin feature only.*
  This feature is in the current system configuration. Bow Pin can be selected in recipe control with the flags in place to evacuate and initiate minimal contact.
  Piston force applied during bond sequence, EVG Product Management does not recommend applying force with the spacer flags in place.
  This will inevitably cause wafer breakage. This is the reason EVG bonders have hard coded software not allowing this function.
- *EVG bonders can be configured with 500um flags.*
  EVG and Freescale will need to discuss and define clearly the post bond alignment impact and specification due to this requirement.