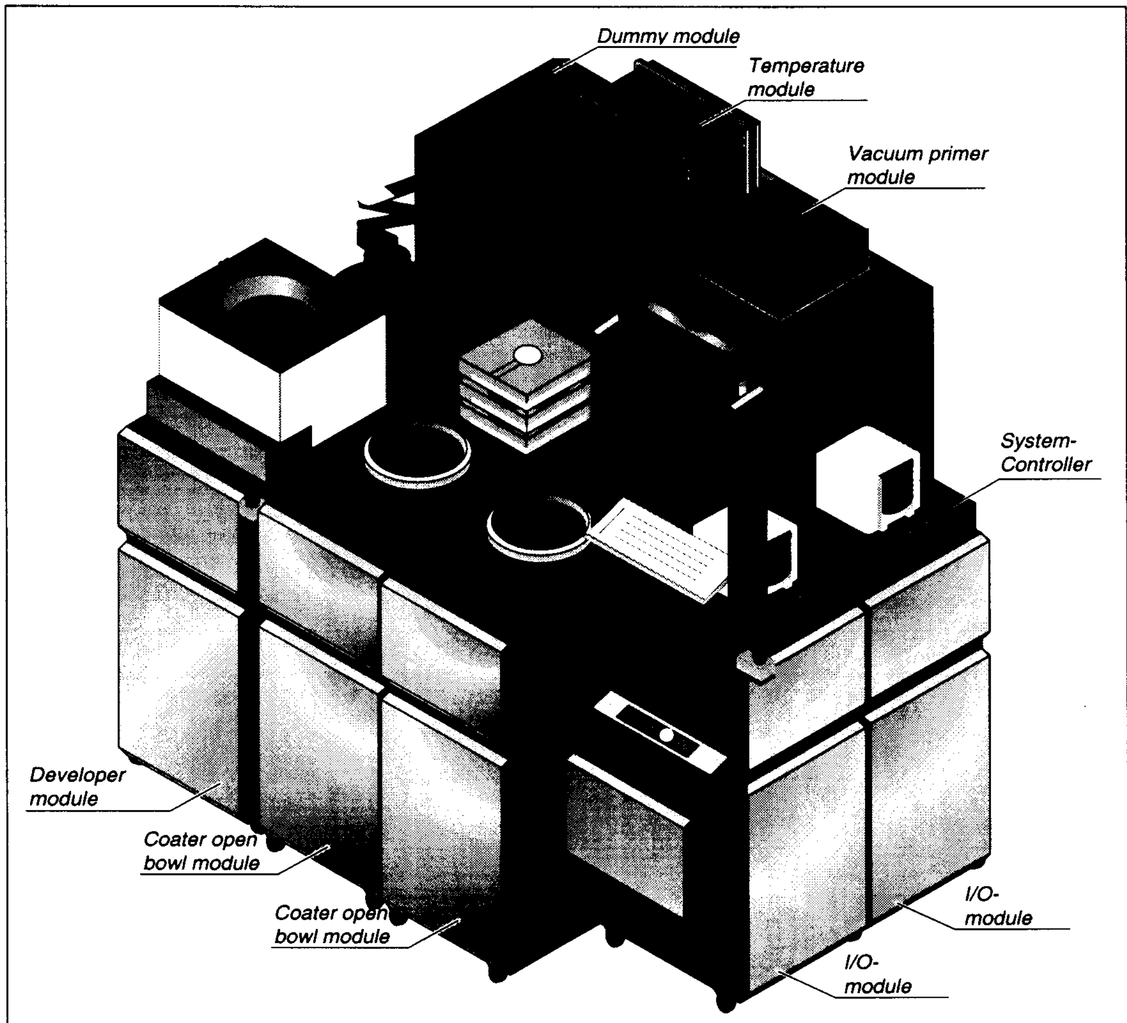
General description

This system is a SUSS MicroTec Technologies Microlithographic Processing System type Falcon. Falcon is a cluster of automatic stand alone modules.

This system, machine no. AK 20122 is designed for the processing of 100 mm and 150 mm wafers. Modules included and the configuration of these are indicated in the following drawing.

Fig. Configuration of machine



Handling module

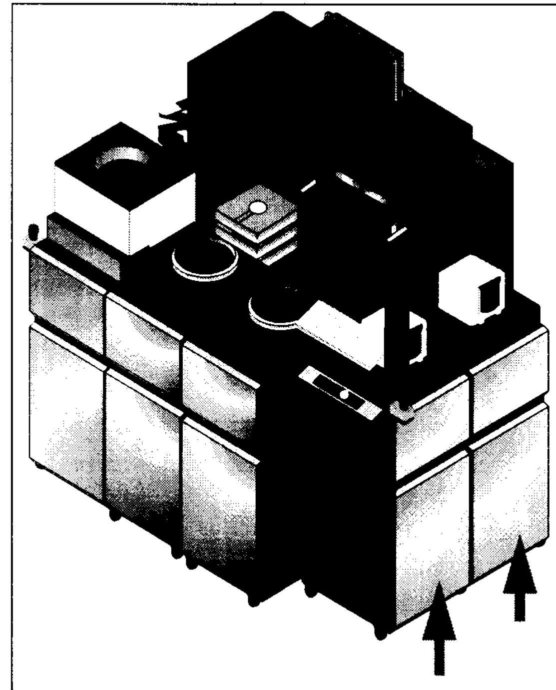
I/O module

The input/output modules are carrier and wafer handling systems with following features:

- Carrier-positioning platform with:
  - carrier detection
  - wafer detection
- Wafer pick and place arm for inserting and removing
- Flat orientation chuck
- Wafer centering on orientation chuck
- Flat detection with lase light sensors (optional)
- Pilot mode for test wafers

Wafer out and in are defined in the respective the flow and processing recipes on the System Controller.

Fig. I/O module of machine



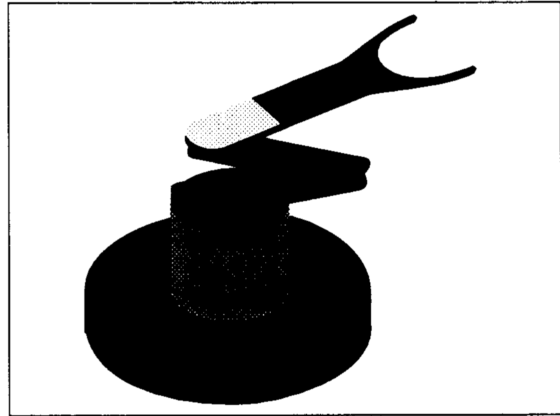
Robot

Wafer handling is performed by a "Genmark" robot type GENCOBOT IV. It is a cylindrical co-ordinate robot designed especially for wafer handling system that must operate in a class 10 cleanroom. Each robot can perform three basic movements.

- Rotation of the arm in the horizontal plane around the T-axis center axis.
- Extend and retract the arm in the horizontal plane from the center position of the robot to full extension (the arm R-axis straight).
- Up and down movements in a vertical plane Z-axis

The transport paths for the robot (flows) are programmable on the System Controller. Various flows, based on normal operation with the specified tool configuration, are preprogrammed in the System Controller.

Fig. Genmark Roboter

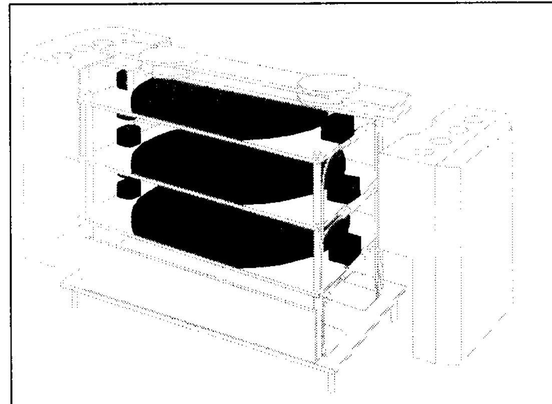


Storage

Storage data

Coolplate
Temperature range: . . . . .20 - 25 °C

Fig. Handling system Storage



Process module/Coater open bowl

Applica tion:

Pos.-/resist

- Anti-reflective coating (ARC)
- E-beam resist

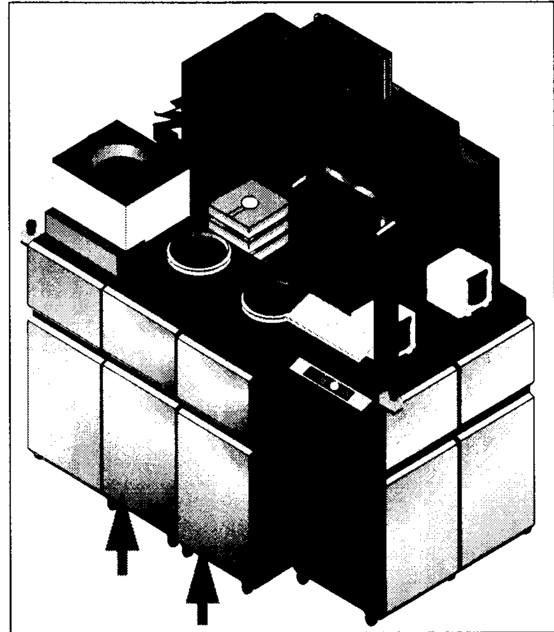
Basic module incl.:

- Module cabinet
- Module controller
- Brushless motor (motor and flange temperature controlled)
- Centering unit
- Dispense arm with max. 3 resist lines
- Solvent vapor bath for nozzle tips
- Backside rinse
- Programmable EBR on second arm
- Programmable exhaust control
- Filtration in module
- Prewet
- Controlled flow meters
- Dispense arms phi-and z-position and speed recipe programmable
- Rota stop for maintaining wafer orientation
- Programmable pre- and dummy dispense

Dispense systems

- Teflon bellow pump "Wafertec F30F" with reservoir (see description Appendix)
- 2 pressurized containers (Helium) for 2 dispense lines
- Cybor (Option)
- Syringe dispense system (Option)
- Other dispense systems on request
- Solvent containers
- Solvent: pressurized canisters with manual or automatic filling system, stored in central media supply cabinet.
- Options
- Common resist temperature control
- Solvent vapor bath and rinse nozzle tips
- Temperature control of individual resist lines (for max. 2 resists).

Fig. Coater open bowl module



Technical data:

Spin speed range: . . . . .10 - 6,000 rpm
Programmable increments: . . . . 1 rpm
Spin speed accuracy: . . . . < 1 rpm
Acceleration range 4", 6": . . . 10 - 7,000 rpm/s
Acceleration range 8": . . . . . . 10 - 4,000 rpm/s
Chuck without cover:
Acceleration range: . . . . 10 - 15,000 rpm/s
Acceleration accuracy: . . . . 1 rpm/s
Wafer centering:. . . . . ± 0.1 mm
Dispense arm pos. accuracy: . . . .±0.1 mm
Dispense arm Z-movement: . . .programmable
EBR positioning accuracy: . . . . ± 0.1 mm
Exhaust regulation accuracy: . . . . 10 %

Process module/Developer

Ap plication:

- Develop positive resist
- Stripping (alkaline)

Basic module

- Module cabinet
- Module controller
- Brushless motor (motor and flange temperature controlled)
- Centering unit
- Programmable dispense arm for
  - max. 2 puddle and 2 binary nozzles or
  - max. 2 ultrasonic nozzles
- DI-water backside and topside rinse
- Programmable exhaust damper with 2 positions
- Filtration in module
- Controlled flow meters
- Dispense arms phi- and z-position and speed recipe programmable
- Rota-stop for maintening wafer orientation
- Programmable pre- and dummy dispense
- Positive and negative spin speeds

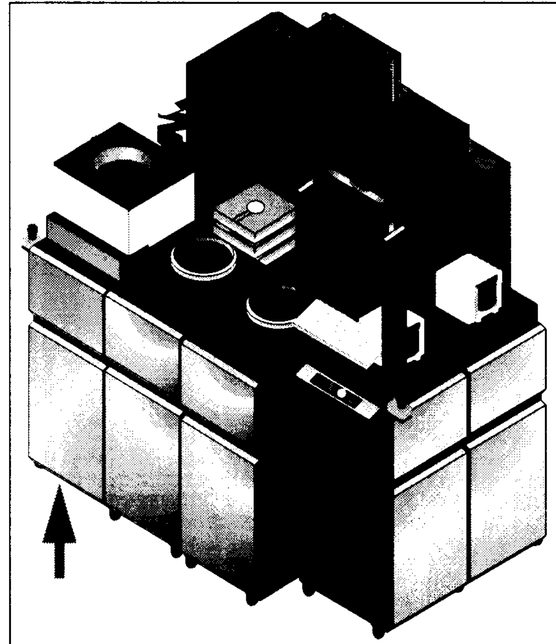
Developer containers

- Pressurized canisters with manual or automatic filling system, stored in central media supply cabinet

Technical data:

Spin speed range: .... ±(10 -6,000) rpm
Programmable increments: .... 1 rpm
Spin speed accuracy: .... < 1 rpm
Acceleration range: .... 10-50,000 rpm/s
Wafer centering: .... ±0.1 mm
Dispense arm pos. accuracy: .... ±0.1 mm
Puddle nozzle dispense rate: ...... > 10 ml/s
Temp. range (developer): .... 20-35 °C
.... 0.1 °C increments
Developer filtration: .... 0.1 micron

Fig. Developer module



Vacuum primer module

Vacuum primer is designed for applying primer coatings on wafers. The module is equipped with 2 hotplates for a faster priming process and a bubble system for wafer priming.

The temperatures for the hotplates are programmable on the System Controller.

Technical data:

Hotplate 250
Hotplate temperature range: . . . . 60-250°C
. . . . ± 0.5 K at 100°C
Hotplate 350
Hotplate temperature range: . . . . . . .60-350 °C
. . . . ±0.5 K at 100 °C
Vacuum pressure: . . . . 1x1 p^{-2} mbar
Cycle time. . . . .
HMDS:. approx. 75 sec
TMSDES: .appr. 45 sec
Contact angle range: . . . .≤ 60°-70°
Contact angle uniformity: . . . .±1

Fig. Vacuum primer module

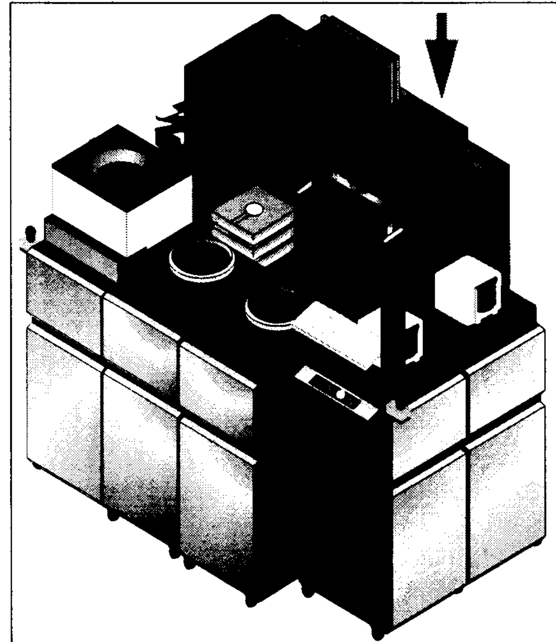
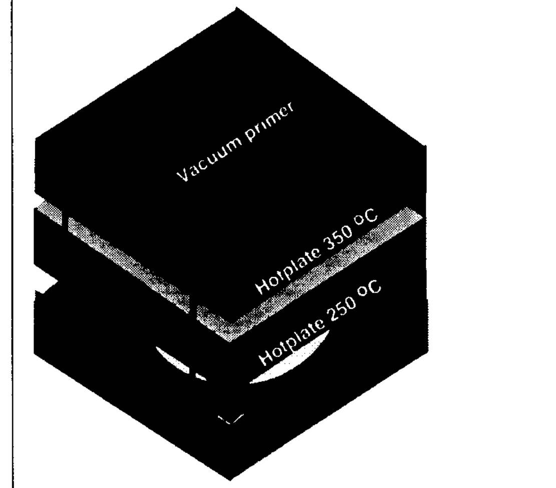


Fig. Schematic Stacked Vacuum Primer



Temperature module

The temperature module, sometimes refered to as stocked module, consists of a column (stack) of individual temperature cassettes (i. e. hotplate, coolplate, and UV-cleaner cassettes). This system is equipped with the stack indicated in the diagram below.

Each individual temperature cassette is incased in its own housing, and is equipped with an automatic trap door for loading and unloading wafers.

Temperatures for the cassettes are programmable on the Tool Controller.

Technical data

Hotplate 350
Temperature range: . . . . .60 - 350 °C
Coolplate
Temperature range: . . . . .20 - 25 °C

Fixed proximity pin position: . . . . .0.15 mm
Programmable pin position: . . . 0.2 - 15.0 mm

Fig.. Temperature module

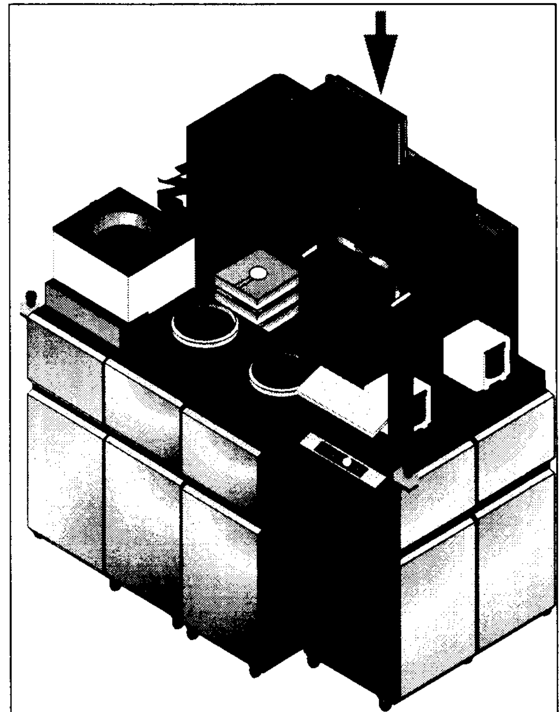
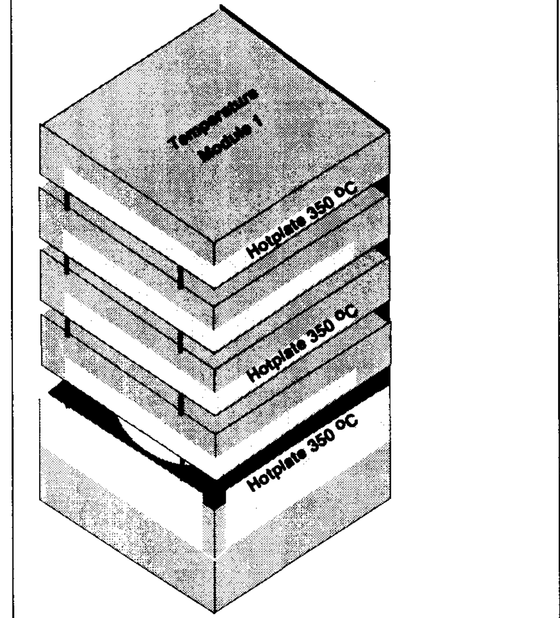


Fig. Stacked Temperature module 1



System Controller

Each of the Falcon modules is equipped with its own controller. These controllers are controlled via a central P.C. (SUSS MicroTec). The System Controller controls the entire system. It consists basically of:

- 586 PC with an 800x600 active Matrix Flat Panel Display
- SUSS MicroTec Technologies developed software

The software contains features such as:

- Creating and loading process recipes
- Assembly of sequences to process wafers
- Selecting of predefined sequences
- Monitoring of process parameters (temperatures, pressures ...)
- Monitoring of media tank levels

The System Controller is also equipped with a well designed and very detailed diagnostic system.

For details of the System Controller, see section 6.