

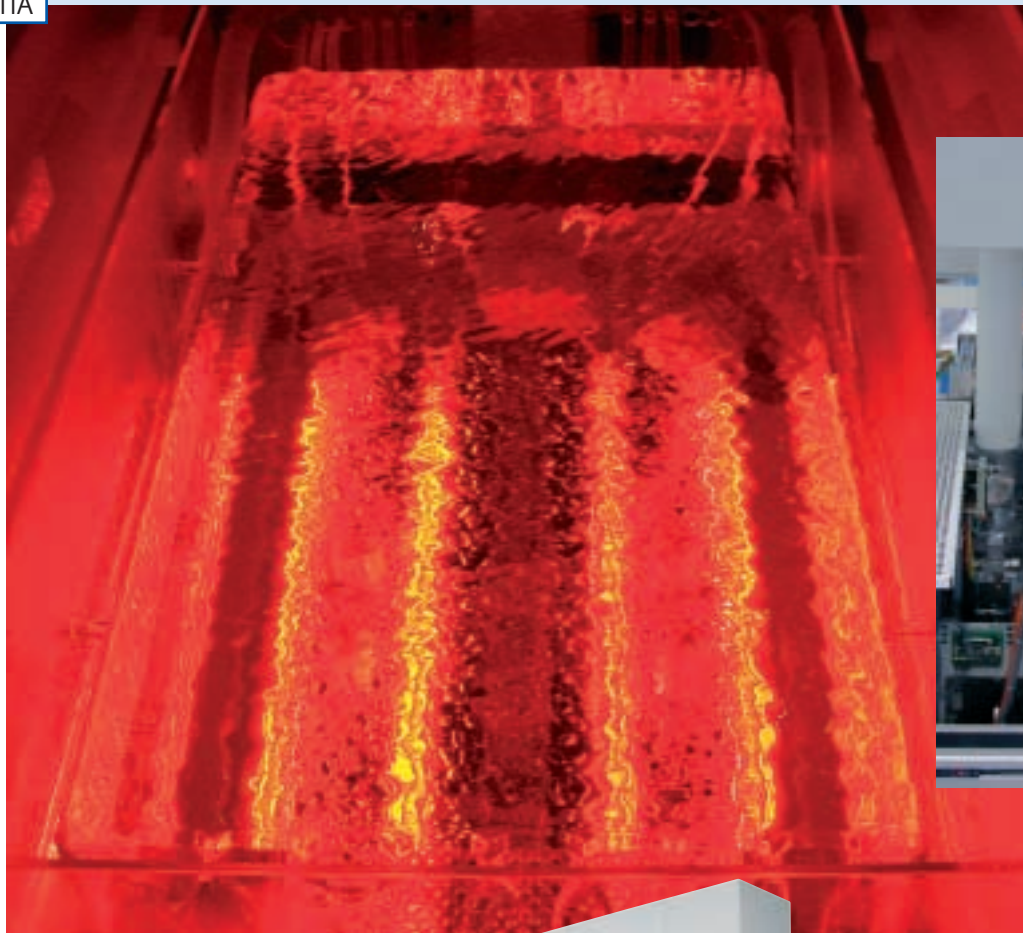
First 300 mm equipment with a fail-safe controller, approved by TÜV Rheinland according to SEMI S2

# Pole position

Wet processing has always been a preferred area for the use of Programmable Logic Controllers (PLC). SEZ, a pioneer in single wafer technology, decided to use Simatic fail-safe controllers for their new 300 mm immersion tool. Fail-safe controllers break down the last conventional barrier between standard and safety automation. Their safety-related functionality fits seamlessly into Totally Integrated Automation and permits safety automation solutions with reduced effort.

During the eighties and nineties a broad variety of different equipment types were developed to serve different process needs on one side and to introduce new chemicals and new processes on the other side. By the end of the nineties, and especially with the introduction of 300 mm wafers in a larger scale, there seemed to be two equipment types which will survive for future wet chemical processing – the single wafer processor and the immersion tool for batch treatment.

The SEZ Group, a leading supplier of wet surface preparation equipment for the global semiconductor manufacturing industry, read the sign of the times by acquiring an immersion tool manufacturer two years ago. With the company's proprietary Spin-Processor technology (single wafer technology) as well as its new immersion equipment for batch processing it forms the basis of a broad equipment solution portfolio for wafer cleaning and decontamination.



The electronics and semiconductor industry is characterized by annual price decreases of between 25 % and 30 % and shorter innovation cycles. Semiconductor equipment manufacturers must constantly increase their productivity and simultaneously reduce their costs. The only way to resolve these issues is to implement a comprehensive modular equipment architecture.

## Plug & play in automation

Each component in a SEZ system is a independent module with autonomous mechanical and electronic components including its own application programs. "Systems that have been engineered according to this principle for particular applications – say chemical, rinse and drying modules – are clear and logical in design, easy to expand and a lot simpler to maintain than systems with a centralized configuration", notes Juergen Funkhaenel, project manager at SEZ. Moreover, such a system is extremely flexible. System components can be used for multiple purposes without additional effort, which short-



**300 mm wet bench with stocker and loadports in front and process modules, IO handler in the background. A flush-mounted LC display with touch SCD 1597-ET is used for operator control and monitoring**

ens engineering and construction times substantially. And finally, modularity of complex structures makes the entire system considerably simpler in layout and easier to manage. An important resource in this process is the Simatic CFC engineering tool, which allows simple graphical configuring of the communication relationships between the software components instead of requiring elaborate programming.



**Wafer transfer from transport cassettes (FOUP) to the process carrier**



**Process bath load/unload by automated tool robot system**



**The clean structure of the interior of a typical module control cabinet, with the local control components, including the fail-safe related parts**

The first step is to request the components from the library and move them per drag & drop onto the wiring schematic – just like a drawing board – where they are displayed with their technological interfaces irrespective of the bus system used. The next step is to simply draw lines to establish the communications relationship between the technological interfaces of the modules. “This method substantially reduces the time required for implementation as well as start up, and it also provides a technological perspective of the entire system. Simatic engineering tools really are making plug & play happen in automation”, Funkhaenel explains enthusiastically.

#### **More flexibility with fail-safe technology**

Wherever safety of people, machines, environment, or processes have to be guaranteed, conventional automation technology soon reaches its limitations. Conventional PLC technology then always had to be combined with electromechanical solutions, so-called hardwiring. Fail-safe Simatic controllers integrate both worlds by switching or remaining in a safe condition when a

fault occurs, but with the flexibility of a PLC. The realization of all the interlocks in the old style – hardwired with relays – needs more space in the equipment. “The shrinking available spaces of the compact equipment design with increasing demand for space for control components requires a number of additional external cabinets. This space is no longer available and we were happy that Siemens had, as one of the first suppliers, a system that fits perfectly to our applications”, explains Mr. Funkhaenel. Safety-related and standard automation components of Totally Integrated Automation are integrated in one system and all communications between the central controller and I/O are performed via Profibus DP and PROFIsafe profile, which forms a simple single network system. In fact, safety technology only has to be used at relevant points. This not only saves costs but also cuts down configuration and programming, installation and commissioning work considerably. Further advantages include a smaller space requirement in cabinets, faster fault diagnostic, and minimal spare part stocks.

#### **Benefits at a glance**

Siemens was one of the first manufacturers of automation solutions to seriously consider making safety technology an integral part of its systems. The PROFIsafe extension allows safe automation solutions which function without an additional safety bus at field level. With this, the safe and standard components combine a homogeneous system without losing the open character of the Profibus concept. For the user, this also means getting the best of both worlds: an open distributed and modular system which can be used in safety applications up to SIL 3. And that means:

- Reduction of assembly time from 21 weeks to 12 weeks (= 40%)
- Reduction of commissioning by 30% (no assembly and test of modules at customer site)
- Less wiring, “plug & play” philosophy, worldwide service.

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