



AP&S INTERNATIONAL GMBH

Automation, process and equipment development for 300mm production lines

AP&S International GmbH is a leading supplier of wet process equipment for the surface treatment of wafers under cleanroom conditions. The company employs 125 people across Germany and has subsidiaries in Malaysia, Singapore, China and Italy. The product portfolio includes manual, semi-automatic and fully automatic wet process systems that can be used for cleaning, drying and etching a wide variety of substrates. AP&S systems are used worldwide by companies in the semiconductor industry, opto-electronics and sensor technology, as well as in the research and development sector.

Challenges

Power electronics are used in numerous important user industries such as electromobility, mechanical and plant engineering, energy technology and information and communication technology. In the industrial manufacture of power semiconductors, the switch from 200 mm diameter wafers to 300 mm wafers is now becoming more common, as it

increases throughout and reduces costs. However, the 300 mm format poses major challenges for the thin wafers needed in power electronics. In particular, for the processing and handling of the wafers developed. The system platform planned in the project for 300 mm wafers of the wafers requires special handling devices with high demands on reliability, accuracy and stability. In order to achieve the degree of automation required for 300 mm systems extensive adaptations and new developments are also necessary.

Objective

The aim of the project is to develop a system platform for the fully automatic handling and wet chemical processing of wafers with a diameter of 300 mm. The aim is to cover both processes for microelectromechanical systems (MEMS), which have particularly deep structures, and semiconductor processes for the latest technology nodes, which are associated with particularly small structures and must exclude contamination as far as

possible. In parallel, a new, modular software platform is being developed with which production planning and throughput can be optimised in the sense of Industry 4.0 integration. In order to support the planned logistics control, the integration of new sensor technology for online analytics is also to be managed in the project. A European plant engineering company that offers application-specific solutions for the critical production steps in the promising 300 mm wafer format, strengthens the entire industry and thus contributes to the successful implementation of the goals of the overall integrated European project.

Approaches

The tasks to be worked on in the project include the development, implementation and evaluation of a plant platform that meets the process and logistical requirements of future wet process plants for 300 mm wafers. AP&S's focus is on the processing of special substrates, in particular on thinned, flexible and thus fracture-prone



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wafers with thicknesses of 35-1000µm. Among other things, the new platform will include a special logistics and storage station, which will automatically transfer the wafers, which are mounted on special stacking rings, individually or as a stack from the transport boxes to the process area. In addition, special drying processes are being developed for the variable and deep structures of MEMS. In order to implement the high degree of automation appropriately on the software side, AP&S is developing a new, modular software platform in parallel to the plant hardware. To support the planned logistics control and automated process control the project is also working on the integration of new sensor technology for online analysis. In addition to highly accurate process control, this will also enable situational operation and the exchange of process baths as needed..

Perspectives

The modular plant platform developed by AP&S forms the basis for the volume production of innovative products in the field of power electronics. Non-European equipment manufacturers only address the requirements of MEMS and power semiconductor applications, which are strong in Europe, to a limited extent. It is precisely with the modular platform being developed in the project that AP&S can efficiently meet application-specific requirements of the European microelectronics manufacturers. With the innovative equipment from AP&S, these manufacturers can produce higher-quality products more cost-effectively. To ensure the dissemination of the results, cooperation with universities and research institutions in the form of scientific papers and publications is planned. This project therefore also promotes the training of young scientists. Moreover, AP&S is working together with

numerous companies from the microelectronics industry on the continuous further development of manufacturing processes for power semiconductors. With the development of the planned plant platform for the 300 mm wafer format, the AP&S project contributes to advancing the key technology of micro- and nanoelectronics as a common European goal and to addressing the societal challenge of digitalisation.

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