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CASE STUDY

VDL Enabling Technologies Group

Aiming at Phenomenal Cleanliness

With the newest Phenom Desktop SEM, VDL ETG is exploring the boundaries of cleanliness

In the high-tech systems industry, the trend is for components, such as vacuum systems, to be cleaner and cleaner. Customers no longer tolerate even the smallest dust particles. However, in order to get rid of them, manufacturers must first be able to see them. With the latest Phenom desktop electron microscope, particles down to one ten-thousandth of a millimeter can be detected. VDL ETG purchased one in the context of research on the cleaning of wafers. In regular production, it has also proven its usefulness.

Methods for cleanliness investigation

"If our clients are going in the direction of increasingly cleaner, then we have to know what we're talking about with them. And knowledge is power," says Geert Jakobs, Managing Director VDL ETG Technology & Development. His company, together with TNO and ASM Europe, is participating in a European research project to develop a new process for cleaning wafers. "We need to gain more understanding of clean manufacturing, and for that purpose, this project is a nice carrier. It is about removing small dust particles, from 100 nanometers (editor: one nanometer is one millionth of a millimeter), from the surfaces of components.

"Our objective in this project is to investigate the production methods we have to use for this. These particles are so small that you can no longer see them with traditional techniques (editor: such as visual inspection using black light). So we searched for a method to detect these particles and to determine where they come from."

Dutch product

Recently VDL ETG purchased the Thermo Scientific™ Phenom Desktop SEM, the tabletop electron microscope from Thermo Fisher Scientific in Eindhoven. The timing is related to the launch earlier this year of the Thermo Scientific™ Phenom ProX Desktop SEM. The new top model attains a resolution (smallest observable detail) of fifteen nanometers at a maximum magnification of 100,000x and features EDX X-ray detection for chemical element analysis.

It is these specifications that won over VDL ETG, says technology manager Luuk Berkelaar. "It was the resolution and magnification that were the most important features for us. In addition, using the elemental analysis, we can determine the chemical composition of the dust particles, so that we can trace their root cause." The deal included the add-on software for the measurement and classification of (dust) particles and for the determination of surface roughness.

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With the purchase, VDL ETG were not taking any chances. It was indeed important that the Phenom Desktop SEM is a Dutch product (VDL foreman Wim van der Leegte's mission is to keep production in The Netherlands), but that was not the deciding factor. A Japanese competitor was also considered. What counted in particular were the superior specifications and—an argument in favor of the Netherlands—the proximity of the expertise centre of Thermo Fisher Scientific.

Berkelaar: "They are very open and you directly sit across the table from people who know what's what." Ruud Bernsen, technical sales engineer at Thermo Fisher Scientific, speaks of a pleasant cooperation. "The people from VDL ETG provide extremely good feedback on how the system works and on the software, noting what can still be slightly different or even better."

The advantage of the Phenom Desktop SEM is also that it is more compact than its competitor, so it can be built into a standard downflow cabinet for the purpose of combating contamination from the environment.

Competence build-up

The Phenom Desktop SEM is now in operation in the clean room at VDL ETG in Acht, Eindhoven. Berkelaar: "We bring variations into our production process for components and to investigate the effects thereof on the particle cleanliness of the parts produced. Think of various surface treatments and production methods."

In addition, the Phenom Desktop SEM is already being deployed to help solve quality problems in the regular production, adds Geert Jakobs. "For example, we are able to look at strange spots, cracks and welding. It has thereby already proven its value and it contributes to a piece of competence building in our organization."

Thermo Fisher Scientific is also entering a new area of competence with the ProX model, Ruud Bernsen says in conclusion. "The specimen at VDL ETG is the first to be used in the Netherlands for monitoring cleanliness in a clean room. We are now looking at applications in other environments that also need to be extremely clean. This way we're able to compete with companies supplying equipment for monitoring clean rooms."

Sample imaged at 350x magnifcation

Chemical analysis on the same sample to investigate the elemental composition

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VDL Enabling Technologies Group (ETG) has been a part of VDL Groep since 2006. VDL Groep, with its head offce in Eindhoven (the Netherlands) is an international industrial company focused on the development, production and sale of semi-finished products, buses and coaches, other finished products, and the assembly of cars.

Find out more at **thermofisher.com/phenom**

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