



## COMPOUND SEMI MANUFACTURING USE CASE

### KEY REQUIREMENTS:

- Matches existing process
- High throughput and yield
- Flexibility for different wafer sizes



### BACKGROUND

For manufacturers in the compound semiconductor space, devices such as RF power transistors, LEDs and laser diodes are driving extremely high demand in optical communications, consumer electronics and other important sectors.

One hypothetical manufacturer, Manufacturer L, approached Denton Vacuum about a solution for high-volume production of compound semiconductor devices for telecom, datacom, 3D sensor and industrial laser applications. Meeting a high demand for these devices requires a deposition system that produces repeatable, uniform thin films with a high throughput and reliable uptime.



### MANUFACTURING CHALLENGES

For lower volume applications, Manufacturer L might be able to rely on a single process module from a physical vapor deposition equipment provider in order to produce high-quality coatings for compound semiconductors. But high volume applications require a higher throughput, without missing critical performance specs or losing key process steps.

Manufacturer L explores a number of thin film deposition solutions to match their existing deposition process while adding new capabilities and upgrading to a higher manufacturing volume. They're looking for a semiconductor-grade system that is capable of producing high throughput and yield while still maintaining excellent precision and process control.

Their current thin film deposition process is magnetron sputtering, which offers the best scalability, but they know that a single magnetron sputtering module is still not enough to meet throughput demands. They'll need a configuration that consists of multiple sputtering chambers to produce multiple layers of metal coatings in an efficient manner. Manufacturer L also needs a system that is built on a standardized platform, but offers flexibility in terms of wafer size and unique process requirements.



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### OUTCOME & BENEFITS:

- Excellent adhesion and yield
- Maximized process efficiency
- Customizable charting



### SOLUTION AND PROCESS

For these types of demanding compound semi applications where scaling the full process into high volume is a concern, a cluster platform like Denton's Versa tool is the right solution. The manufacturer approached Denton about designing a suitable configuration with the Versa platform. Because the manufacturer needs to coat multiple adhesion and conduction layers at a time with different metals, at least two process modules are needed.

The semiconductor coatings also need to have excellent adhesion for the highest yield possible, ensuring that factory output needs are met. Manufacturer L will need another chamber for pre-clean processing, to remove water molecules and improve adhesion.

Denton Vacuum worked with Manufacturer L to design a system with four sputter process modules for coating and two cassette load locks for loading the wafers. Two of those modules will feature platinum and one will feature titanium for multilayer metallization coatings, and the final chamber will be used to pre-clean each wafer and prevent contamination of the deposition modules. The standardized system is able to handle 3-, 4- and 5-inch wafer sizes and can be customized to Manufacturer L's unique process requirements.

While the Versa platform provides the automation needed to meet throughput needs, the manufacturer also needs to ensure that these complex process steps will be carried out with no hiccups, and the wafers will move through each of the chambers with maximum efficiency. With Denton Vacuum's proprietary, SEMI E95-compliant ProcessPro HV software, the manufacturer can fully support the multilayer coating process with a robust, semiconductor-grade software package. The software's customizable charting capabilities enables process engineers at Manufacturer L to gain a streamlined view of all process steps and feedback.

### Achieve Results with Denton Vacuum

Denton Vacuum's Versa cluster platform, Discovery sputter module and proprietary high-volume software can help you achieve the throughput and thin film quality you need for compound semiconductor manufacturing. A four-chamber, dual cassette load lock configuration can help you coat up to 250 chambers per hour.

Along with developing reliable equipment and software, we are dedicated to providing you with the highest quality knowledge, service and support over the life of our partnership.

To learn more about our thin film deposition solutions for high-volume manufacturing, [contact us today](#).