

FORELINE AND EXHAUST HEATING IN SEMICONDUCTOR MANUFACTURING

Better temperature uniformity decreases maintenance time and expense

Application

Semiconductor manufacturing is a complex process that includes various steps such as Chemical Vapor Deposition (CVD) and Etching to create chips. This requires the delivery of different gases and chemicals that react with the semiconductor material to create thin layers or patterns on the wafer surface. The processing produces unwanted by-products that need to be removed from the chamber. Foreline and exhaust lines are parts of the vacuum and exhaust management system that transport the process gases and by-products from the chamber to the abatement system, where they are treated and disposed of safely and efficiently.

The foreline system is a vacuum line from the process chamber to the vacuum pump. Flowing through the piping system is unconsumed gas, partially reacted compounds, and reaction by-products. The exhaust piping is the system downstream of the pump that moves these by-products from the pump to the abatement system where gases are destroyed or neutralized before they can be released into the environment. Both the foreline and exhaust systems include various types of valves, traps, and purge lines. They also require heat to prevent liquid vapors from condensing in the lines that can not only cause corrosion, but also narrowing of the flow paths. These increase the frequency and duration of system maintenance.

Solution

To prevent condensation and freezing of the vapors, foreline and exhaust lines need to be heated to a temperature above the dewpoint of the gases. Heating foreline and exhaust lines can also improve the performance and efficiency of the vacuum system by reducing the pressure drop and increasing the gas flow rate. This can help achieve higher vacuum levels and faster pumping speeds. The optimal temperature depends on the type and composition of the gases; it is usually between 80°C and 150°C (176°F and 302°F) but may be as high as 180°C (356°C).

This is where BriskHeat can help semiconductor manufacturers reach their goals of quality and efficiency. Cloth heating jackets are custom manufactured to fit tightly around foreline and exhaust systems to provide even and energy efficient heat. From pipes and fittings to flowcontrol components, each jacket is manufactured to include a heating element, temperature sensor, and insulation. BriskHeat offers jackets with various outer materials, types of insulation, and wiring to meet almost every need.

Each jacket can be controlled with an individual LYNX® temperature controller, and connected to a LYNX® Operator Interface. A LYNX® OI allows a technician to control everything from an individual jacket to an entire system of up to 1,024 heating zones. Individual sensing and control of each jacket increases temperature uniformity within the system. Jackets can be easily removed for maintenance and quickly reinstalled to reduce downtime. LYNX® control modules feature highly visible status LEDs to identify and problems within the heating system. Systems are expandable and can interface into a complete CMS.



Industries

Semiconductor, Flat Panel,
Photovoltaic/Solar

Types of Users

Tool Managers in Fabs and Foundries
Tool Designers/Engineers