COMPRESSED AIR IN SEMICONDUCTOR MANUFACTURING

By Creg Fenwick

Stop for a moment and imagine life without electronic devices. We'd have no televisions, smartphones, computers, radios or other 'smart' devices.

Such would be life if it weren't for semiconductors. Semiconductors are important in the fabrication of electronic devices; and the production of semiconductors would not be possible without compressed air. As the need for electronic devices grows exponentially, so does the need for clean, compressed air in the semiconductor manufacturing process.

WHAT ARE SEMICONDUCTORS?

To start, a semiconductor device is an "electronic component that relies on the electronic properties of a semiconductor material – primarily silicon, germanium, and gallium arsenide, as well as organic semiconductors – for its function."

CRITICAL USE COMPRESSED AIR

The semiconductor industry uses the highest standards for compressed air purity.

Critical use applications require extreme levels of compressed air purity to isolate exposure in a zero-contaminant clean room. Clean rooms require Class 0 oil free air – clean air to help ensure the highest quality production.

Critical use, Class 0 oil free air is used for some of the following processes in semiconductor manufacturing:

- As a drying medium after computer chips have been dipped and cleaned
- To imbed materials into chips/boards via compressed air and vacuum systems
- Cooling the chips during the manufacturing process
- Making printed circuit boards

Let's further break down one of these applications. When a circuit board is in the initial process of manufacturing, micro components are placed on the wafer/board. This is the front-end process. At this point, the components are not connected to each other. Compressed air is then used to imbed (compress) solder into microscopic holes in the board. This soldering process fills the holes, which then connect the initial components to begin the process of making a circuit.

THE BEST COMPRESSED AIR SOLUTION? OIL FREE.

Oil free air is mandatory for most of the semiconductor manufacturing process. Any oil can potentially ruin very expensive products (wafers). Many semiconductor manufacturing plants current use oil free rotary screw air compressors – such as the DSP Series oil free rotary screw air compressor – but many have shifted towards centrifugal compressors, especially when energy reduction and lifecycle costs are part of the equation. Tools such as LogAir and AirSuiteTM can be used to accurately measure and support compressed air practices when making the selection.

PUTTING IT ALL TOGETHER

Advancements in semiconductor technology over the past 50 years have made electronic devices smaller, faster and more reliable. How many have you used in the past day? Each of those has devices has been manufactured with electronic materials – and those electronic materials were created with the use of compressed air.

SUMMARY

Semiconductors are important in the fabrication of electronic devices; and the production of semiconductors would not be possible without compressed air. As the need for electronic devices grows exponentially, so does the need for clean, compressed air in the semiconductor manufacturing process.

A Sullair DSP Series compressor helps operate a semiconductor manufacturing facility in Santa Clara, California