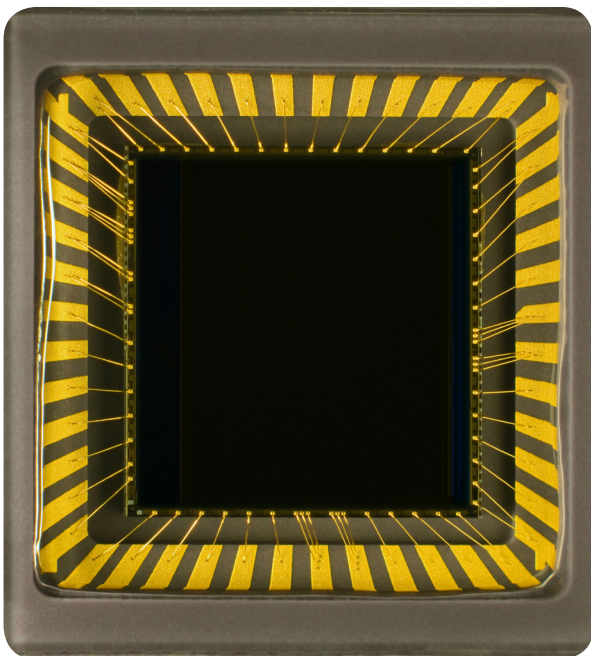


EDWARDS BV-80 SERIES TURBOMOLECULAR PUMPS

Edwards BV80 Series Turbomolecular Pumps Reduce Particle Contamination in Cell Phone Image Sensor

The customer is a major semiconductor manufacturer, making image sensors for mobile applications such as cell phones and tablets.

Particle contamination was causing them to suffer yield losses – sometimes contamination outbreaks occurred in which the number of particles would jump to high levels from a relatively stable baseline. Their existing vacuum pumps required service every three months.



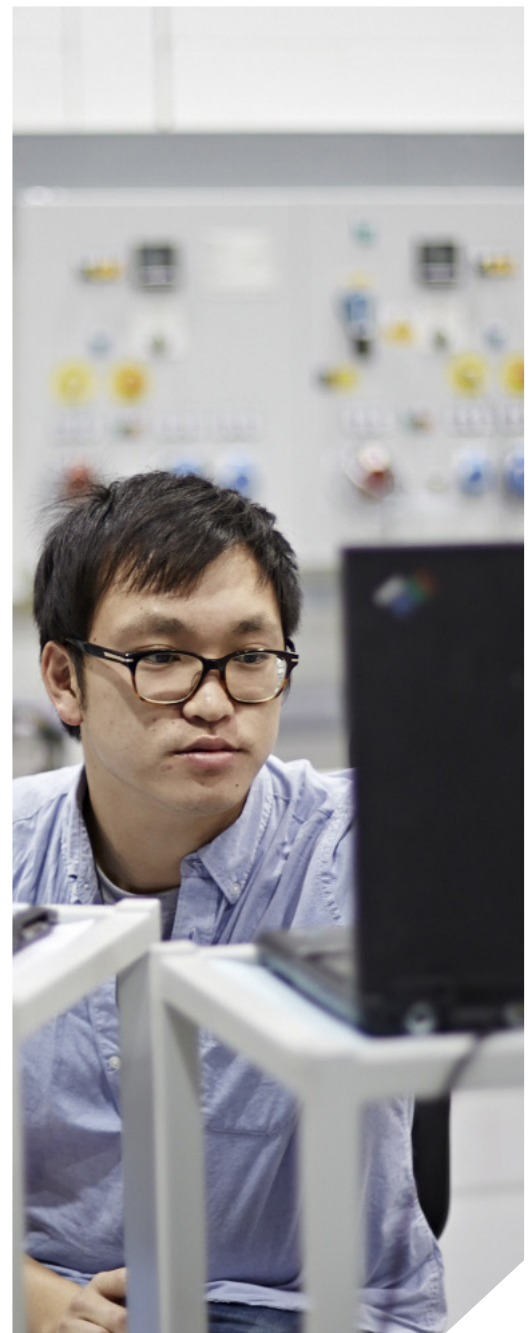
KEY FACTS

Customer: Major Semiconductor Manufacturer

Region: Asia

Sector: Semiconductor

Benefit: Meantime between service extended from 3 to 8 months, plus improved yield of up to 40%



1 CHALLENGE

The customer wanted to reduce costs - by minimising or eliminating the particle contamination outbreaks which would improve yield, and by extending the maintenance interval.

They also wanted to ensure that any pump modification or substitution caused minimum disruption.

Research had determined that the contamination was caused by the rebound of particles from the rotor and stator blades of the turbomolecular pumps used to evacuate the process chamber.

Outbreaks occurred when a relatively large particle, probably caused by the condensation of process by-products on cool surfaces, was splashed back into the process chamber by a collision with the pump blades. These outbreaks were unpredictable.

2 SOLUTION

The Edwards STP BV80 series of magnetically levitated turbomolecular pump is optimised to reduce particle contamination.

The leading edge of the upper rotor blades is shaped to reduce the number of particles rebounding back into the chamber.

The upper stator blades include a specialised rim to reduce locations where process by-product can accumulate.

The new black coating on the blades enhances heat radiation and permits operation of the pump at higher temperatures, reducing by-product condensation. This reduces the number of particles formed in the pump and increases service intervals. The pump can be installed on most process chambers without modification, and with no effect on pumping speed.

3 OUTCOME

Installing BV80 series turbomolecular pumps reduced the particle levels measured on monitor wafers by 80%, and improved process yields by 20-40%.

Particle outbreaks were eliminated. Particle contamination levels measured on monitor wafers were observed to increase at a low, predictable rate, allowing this measurement to be used as an indicator for pump maintenance. The maintenance interval was extended from 3 months to 8 months.

The Benefits:

- Extended maintenance interval from 3 to 8 months
- Eliminated unpredictable outbreaks of particle contamination
- Reduced the level of particles on monitor wafers by 80%
- Improved process yield by 20-40%
- Provided a reliable indicator for pump maintenance
- Reduced the cost of each maintenance procedure
- No special tool modification or process tuning is required, simply bolt onto the chamber

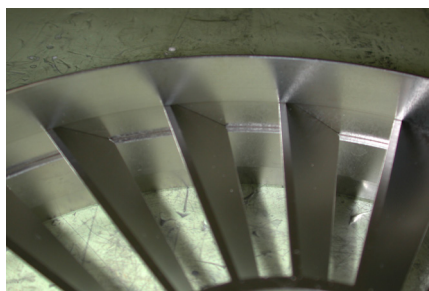
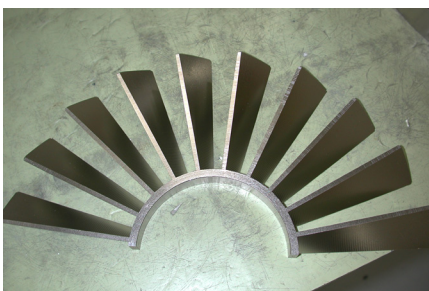


Figure 2: - Changing the shape of the leading edge of the upper rotor blades reduces the number of particles that rebound back into the process chamber (simulation results). A new rim on the stator blades reduces the accumulation of by-products.