The production of integrated circuits, which are essential for Smartcards, USB memory sticks, smartphones, handheld music players and other ultra-compact electronic products, requires that the silicon wafers used have a very high degree of flatness during manufacturing. As part of the process of producing the wafers, the backside of these wafers is ground prior to dicing into the individual microchips, often as thin as 50 to 75 μm. This conventional grinding step is referred to as wafer backgrinding and utilizes a diamond and resin bonded grind wheel mounted on a high-speed spindle to remove the necessary material. The wafer is positioned on a porous ceramic rotating vacuum plate (chuck) with the backside of the wafer facing upwards (towards the grind wheel). Both the grind wheel and wafer chuck rotate during grind. The wafers are continuously washed with deionized water throughout the process to provide cooling and wash away material particles generated during the grind.

The two-step process first uses a coarse grind that performs the bulk of the material removal, followed by a fine grind. The fine grind typically removes 30µm of material or less and provides the final finish on the backside of the wafer. Standard finishes for conventional grind include 1200 grit, 2000 grit, poligrind and polish.

- 1200 grit is a rough finish where the grind striations are clearly visible
- 2000 grit has improved roughness and the grind marks are less apparent
- Poligrind is a near-mirror finish with the smoothest roughness.
- A polished finish is a mirror finish, removing only 2-3µm of material and is typically only performed on silicon.

**CASE STUDY**

A California based semiconductor wafer manufacturer that produces technology leading, high performance, high quality, semiconductor devices including Radio Frequency Integrated Circuits (RFIC), millimeter wave integrated circuits for the wireless markets, power devices for power electronics and photodetectors, and lasers for optical communications markets, utilizes filtration for the deionized water in the wafer backgrinding process. The process incorporated an absolute rated 1 micron bag filter (PALL/FSI X-100) as a final filter to remove the dust from the water stream necessary for cooling and cleaning of the wafer. Some defects were being identified in the wafers due to inadequate particle management and a better filtration process was investigated.
Bag filters are best suited as an early economical step to remove higher levels of solids, but typically fail to provide consistent, high efficiency removal due to the nature of the filter media. Since these were absolute bags, the higher cost of this type of product allowed for the potential to introduce cartridge filters into the process without impacting the economics. There was a continuous feed filter system using a paper media as a preliminary solids removal step. The second stage bag filters were then replaced with a 0.45 PME Series followed by a 0.2-micron PME Series. The PME offered absolute rated efficiency and yet were competitively priced against the absolute bag filters. The result was better cleanliness of the deionized water which resulted in less defects/higher product yield, providing an overall savings and process improvement.