

Thermo Scientific Masterflex Peristaltic Pumps Deliver Pure, Precise Control Of Liquid Flows Within Process Tools

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Key Words

- Peristaltic Pumps
- Tubing Pumps
- Pump Heads
- Semiconductor
- CMP
- Slurry Delivery
- Slurry Dispense
- Low Shear

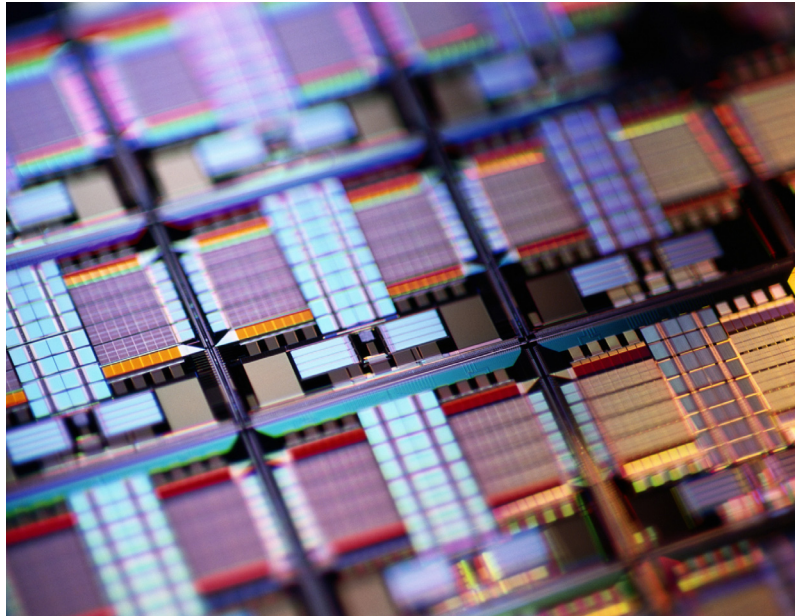
Semiconductor manufacturing demands liquid flows within process tools be precisely controlled at all times. One of the most demanding applications is chemical mechanical planarization (CMP). When CMP tools do not dispense a consistent slurry rate onto the polishing substrate, it can have a highly negative impact on yields, chemical usage and material integrity. Variations in wafer thickness, increased defect densities, tool downtime and increased wafer scrap are just a few of the problems that can result from poor process flow control.

Optimal dispense

Thermo Scientific Masterflex® peristaltic pumps are highly suited for the high purity and corrosive chemical environments of the semiconductor industry. For CMP, Masterflex pumps provide the linearity and repeatability required for optimal point-of-use slurry flow dispense to the wafer during polishing. The pump's low shear force is gentle on CMP slurries, and its variable speed operation allows for precise control of flow or pressure over a wide operating range to maintain process integrity.

Straight flow path

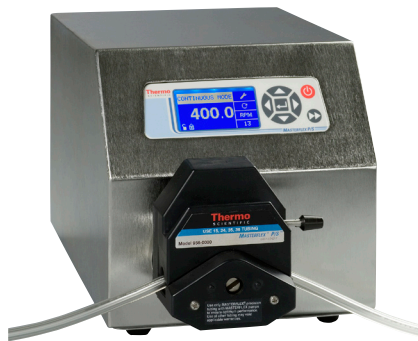
Optimum slurry performance enables superior wafer planarity, and Masterflex pumps help provide for this through the precise control of slurry delivery and dispense. The pump's non-intrusive design provides a straight flow path with no dead flow areas for slurry to agglomerate, harden, and contaminate the process. Flow rates are accurate up to $\pm 0.5\%$. The stable fluid delivery provided by Masterflex pumps not only ensures a constant flow of slurry to the polishing pad, it also minimizes slurry, chemical and DI water waste.



Accuracy, dependability brings significant gains

As wafer technology advances to smaller line widths, accurate control of liquid flow becomes increasingly important for attaining high yields. In these critical processes, the control and management of flows must rely on fluid delivery and dispense systems that provide precision at all times – to maintain process integrity and minimize scrap.

Masterflex peristaltic pumps provide



Masterflex peristaltic pumps provide an accuracy of $\pm 0.5\%$ or better, and at consistent flow and pressure over extended operating periods.

superior flow rate stability and metering accuracy in a totally closed system for contamination-free flow control.

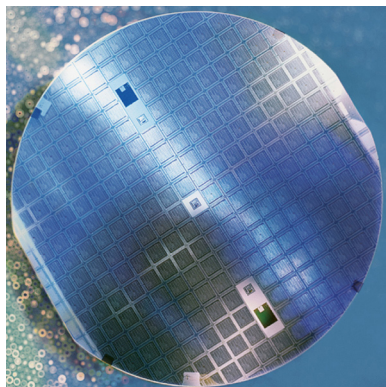
Flows come in contact with only the inside of one uninterrupted length of Style 100 SC high resilience-silicon composite pump tube element, providing for a smooth, seamless flow to prevent the agglomeration of slurry particles that can cause scratch defects and lower yields. Masterflex pumps provide very low shear, avoiding damage to the slurry polymer chains that can negatively alter removal rates, polishing uniformity, scratch density or depth.

In CMP and other critical applications, pump failure is unacceptable because it leads to damaged wafers and high scrap rate. With Masterflex pumps, a maintenance-free brushless motor drive rated for continuous duty and roller and ball bearing pumphead construction, produce a highly dependable and powerful pump. The pump's small size is ideal for

limited-space fab installations, and many models include digital drives with microprocessor controlled calibration, plus LCD displays in sealed washdown enclosures.

Maintaining process integrity

- New formulations in elastomer materials provide for long tubing life with no spallation.
- Very gentle method of pumping will not damage shear-sensitive slurries.
- Requires very little maintenance to keep in peak operating condition.
- Superior performance in corrosive, viscous and abrasive handling applications.
- High reliability minimizes process interruptions and downtime.
- High suction provides quick ramp up from no-flow condition to the desired set point.



We have worked closely with OEMs, including Applied Materials and Novellus, and with end-users including Texas Instruments and Micron Technology.

A versatile, reliable option

Other technologies used for slurry delivery and dispense in CMP applications, such as flow loop controllers, typically require in-house air, which can often present cleanliness issues within process tools. But with Masterflex pumps, slurry remains uncontaminated within the tubing at all

times. And, with the use of Style 100 RF silicone tubing, spallation problems associated with older peristaltic tubing formulations is never an issue, even after 3-6 months of continuous operation – and with no loss in pressure and flow consistency. Masterflex pumps accommodate a large range of tube sizes, and high-tech tubing materials and new, advanced pump head designs provide precise, reliable and reproducible continuous fluid transfer for long, extended periods. Precision extrusion enhances tubing life, flow, accuracy and pressure performance.

Multiple tubing options and a wide array of high performance and Easy-Load® pump heads are available to meet the challenging requirements for semiconductor production, including the delivery of tungsten and oxide slurries, DI water, and ammonium hydroxide. For these critical applications, Masterflex is the pump of choice “when performance counts.”



Masterflex pumps have no valves, glands or seals to wear out, are impervious to highly abrasive fluids and gentle on shear-sensitive materials, such as water based inks and varnishes – so foaming is never a problem.

In addition to these offices, Thermo Fisher Scientific maintains a network of representative organizations throughout the world.

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