Increase Water Recovery with On-line TOC Monitoring

With the availability of adequate water supplies dwindling and the costs of producing sufficiently pure water increasing, microelectronics facilities are looking to extend ultrapure water (UPW) recovery. With the help of reliable, low maintenance METTLER TOLEDO Thornton TOC sensors, an Italian foundry has done exactly that.

Major European foundry
LFoundry Srl is one of Europe’s largest semiconductor foundries. The production capabilities of its advanced manufacturing facility in Avezzano, Italy includes, CMOS imaging chips, backside illumination technology and secure microcontrollers. With a capacity of 40,000 200 mm wafers per month, the cost of producing sufficient UPW is a major concern and LFoundry looked into methods of recycling or recovering a greater quantity of UPW. One possibility they found was to send waste water of some equipment to the facility’s water plant. As contamination from organics entering the water system has to be prevented, it was decided to monitor the recovered water for Total Organic Carbon (TOC) levels.

The importance of TOC measurement
Confirming the absence of organic contaminants in water-reliant processes is essential for ensuring the quality of its products, so LFoundry uses five TOC sensors at various points of use. However, facility technicians were unhappy with the performance of their existing TOC analyzers: slow measurement, long sampling time, high costs of maintenance and spare parts were frustrating and potentially jeopardizing to production. With the monitoring of recovered water in mind, METTLER TOLEDO Thornton was given an opportunity to present our fast TOC sensor measurement technology to LFoundry managers.
A better approach

Instead of batch oxidation that requires analysis times of typically 7 to 15 minutes, our TOC sensors use the dynamic UV oxidation process. A sample stream of the UPW continuously passes through the sensor in a flowing stream. First, the entry conductivity is measured, then the sample flows through a quartz coil and is irradiated with high-energy UV light. The exposure to strong UV light results in any organic molecules present in the solution breaking down into carbon dioxide and water.

The carbon dioxide generated during UV exposure partly dissolves in water, which in turn leads to the formation of carbonic acid. The UPW now has a slightly higher conductivity, which is measured, and the TOC content is calculated using the difference in conductivity before and after UV oxidation.

This method is especially fast and also maintenance-friendly, since moving parts such as pumps, and chemicals and membranes have been eliminated. With a detection limit of 0.025 ppb C and a response time of less than a minute, the stringent requirements of the semiconductor industry are completely satisfied.

Significant increase in water recovery

LFoundry was impressed with our TOC sensor technology. If they were going to increase water recovery, they needed a sensor that would be accurate, reliable, and rapid in response. The METTLER TOLEDO 4000TOC delivers on all counts and four sensors were installed in two water recovery loops.

A few months after installation, LFoundry is happy to report that, thanks to the 4000TOC sensors, 3.5 m³/h of water which previously was discharged is now being recovered with less maintenance required to support TOC measurements.

www.mt.com/TOC
Convenience at a Touch
Next Generation M300 Transmitter

The enhanced M300 multi-parameter transmitter offers exceptional measurement performance and ergonomic design. A combination of greater flexibility, improved usability, and attractive pricing make it highly suited to end-users and water system fabricators alike.

Designed for today and tomorrow
The popular M300 transmitter series has been updated with new features to provide improved performance and greater ease-of-use.

The one-/two-channel M300 now accepts analog probes as well as digital Intelligent Sensor Management (ISM®) sensors, making it a logical investment in a plant’s future. Multi-parameter ability means one M300 can be used for many process analytical applications and also reduces replacement stock.

Pre-calibrated sensors and Plug and Measure feature ensure fast, error-free measurement point startup; meaning even less operator time spent at the transmitter.

Avoid unplanned shutdowns
ISM sensor diagnostics allow operators to monitor the “health” of sensors so that maintenance, calibration or replacement can be scheduled to minimize downtime.

The next generation of M300 multi-parameter transmitters creates a measurement solution perfectly suited for your water applications.

Find out more at:
➤ www.mt.com/M300

M300 Transmitter
• One- or two-channel, multi-parameter transmitter
• Touchscreen interface/display
• Measures pH/ORP, dissolved oxygen, conductivity/resistivity, and dissolved ozone
• Available in a water resistant ½ DIN enclosure for wall and outdoor installations and ¼ DIN for panel mounting

Intuitive operation simplifies use
The M300 provides user-friendly operation in 10 selectable languages, with a 4”, high-contrast black and white touchscreen, easy-to-read display of important measurement information and intuitive menu structure.

Less configuration time
Using the unique M300 Transmitter Configuration Tool, transmitter configurations can be uploaded to the M300 via a PC or USB stick. For consistent functionality throughout a system, a configuration can be downloaded from an M300 to a USB stick or PC for upload on another unit.
**Confirm Water System Sanitization with Reliable Ozone Measurement**

Ozone is being increasingly used in the sanitization of microelectronics water systems. The new pureO$_3$™ sensor provides fast, dependable measurements plus the lower operating cost benefits of Intelligent Sensor Management (ISM®).

**A natural and powerful oxidizer**
Dissolved ozone, a naturally occurring form of oxygen, is one of the most aggressive oxidizers used to manage and control biological contamination in microelectronics grade water systems. Ozone is an effective oxidant that quickly destroys biofilm and aqueous microbial contamination with low, easy-to-control dosages and minimal contact time. The molecule’s very short half-life is typically accelerated with exposure to UV light (at 254 nm wavelength) leaving no residual chemicals or traces of ozone after sanitization.

**Control of biological contamination**
Microbiological monitoring and control is essential for ultrapure water production. System operators diffuse ozone gas into their water loops at the precise quantities needed to sanitize the system to protect against contamination. Once sanitization is complete, the remaining ozone gas is destroyed using UV light. Monitoring and control are required to limit the total ozone gas levels needed for sanitization (100 – 150 ppb) and also to confirm that all ozone gas is removed from the water system after sanitization and prior to release. Ozone monitoring and analysis manages this process exactly.

**Stable and repeatable ozone determination**
For determining ozone oxidation levels to confirm complete sanitization, METTLER TOLEDO Thornton’s new, robust pureO$_3$ sensor with ISM offers a fast responding measurement that is stable and repeatable. The pureO$_3$ sensor measures trace levels of dissolved O$_3$ to confirm that all ozone is destroyed after sanitization and prior to water distribution and use.

**Lower operating costs**
ISM technology allows pre-calibration of sensors for fast, error-free, Plug and Measure startup. In addition, ISM offers advanced sensor diagnostics that provides...
longer measurement point uptime and more efficient maintenance which can be scheduled in advance. ISM’s features decrease operational costs and simplify sensor handling while allowing operators to make more informed decisions about process conditions.

When coupled with an innovative transmitter from METTLER TOLEDO such as the multi-parameter, multi-channel M800, the pureO₃ measurement solution provides convenient, state-of-the-art dissolved ozone monitoring and control to enhance plant performance and safeguard against contamination.

**Resilient and economical solution**

Dissolved ozone is an attractive option for sanitizing ultrapure systems because it is easily infused and controlled while reaching all parts of a water system. Ozone eliminates potentially dangerous handling of chemical oxidants or the expense of heat sanitization. And it is easy to remove, leaving no residual compounds prior to use. The METTLER TOLEDO pureO₃ sensor with ISM provides a durable and cost-effective solution to monitor and control dissolved ozone sanitization effectively and efficiently.

► [www.mt.com/pureO3](http://www.mt.com/pureO3)
Need Quick Profiling of TOC?
Go Portable!

Multiple-point monitoring of total organic carbon (TOC) can identify contamination sources in water systems, but full system profiling with fixed analyzers can be very costly. The portable 450TOC analyzer is convenient, easy to operate and provides a measurement in under a minute!

The portable 450TOC offers quick and easy connectivity at multiple points. The analyzer can be used to quickly measure at points in the system not usually monitored due to lack of fixed analyzers for those locations. Rapid measurement technology allows immediate monitoring, providing first results 80% faster than traditional methods.

The 450TOC utilizes the same UV oxidation measurement technology as its fixed analyzer counterpart (5000TOCi), providing uniformity in measurement method, as well as results in less than a minute. With its portability and rapid TOC measurement technology, the 450TOC analyzer can reduce system profiling time by 75%.

Your benefits

- **Fast measurement**
  Provides first results 80% faster than traditional methods.

- **Rapid contamination isolation**
  Portability combined with simultaneous data log and print output means pure water production problems can be quickly located and resolved.

- **Low maintenance**
  Rugged design with optional protective base and ease of access to internal assemblies leads to low and easy maintenance.

➤ [www.mt.com/450TOC](http://www.mt.com/450TOC)
Portable 450TOC Analyzer
Get in-line with METTLER TOLEDO

Get the Most
from Your Sensors and Analyzers

METTLER TOLEDO Service ensures you receive maximum performance and accuracy from your process analytical instruments. From Setup and Configuration, to Calibration, to Preventive Maintenance Services, you can expect a professional response by well trained and well equipped service technicians to meet accuracy and international regulation requirements.

Maximize product performance with METTLER TOLEDO Service for:
- Conductivity Sensors
- Ozone Sensors
- Silica Analyzers
- Sodium Analyzers
- TOC Sensors

> www.mt.com/pro-service