

Water saving solutions for the wafer fabrication and semi-conductor Industry

Objective

The objective of this study was to establish a demo-scale plant with 1000CMD capacity to recycle and reuse the used water in semiconductor industry

Research members

Zhou Yan (Asst Professor); Yan Dongning (Research associate); Eng Chin Yee (Project officer); Nipuna Withanage (Research assistant); Liang Qiyi (Project officer)

Abstract

In Global Foundries, two wastewater streams from Continuous Electro Deionization (CEDI) and Local Scrubber (LS)/CDO with flow rate of 1335CMD and 1012CMD respectively were chosen to be recycled. For CEDI Reject Reclaim System, boron selective resin (BSR) and activated carbon filter (ACF) were utilized to remove boron and total organic carbon (TOC) respectively. The water quality was good enough to be used as ultrapure water (UPW) supply. For CDO Reclaim System, the combination of ACF + ultrafiltration (UF) + reverse osmosis (RO) was implemented to recycle the local scrubber wastewater (LSW) for cooling tower top up. Product water from both treatment systems was able to meet the target water specifications. The average cost saving was S\$0.91/m³ of reclaimed water produced.

In Micron, a three-stage system was established for local scrubber wastewater reclamation. The system included pH adjustment/chemical reduction, followed by mechanical filtration, ultrafiltration (UF) and reverse osmosis (RO). A demonstration plant with design capacity of 1050m³/day was designed and built. The demo plant operation performance showed that reclaimed water quality was good enough for cooling tower make up water. Total operational cost was S\$0.96/m³ while the energy consumption was determined to be 0.734 kWh/m³.



GF Demo Plant



Micron Demo Plant