Silicon Wafer Manufacturer Recycles Wastewater using HYDRAcap®MAX

Location:
Taiwan

Feed water source:
Industrial waste water

Application:
Process use

Capacity:
432 m3/day

Start-up date:
June 2012

The Problem

Silicon wafer production involves many processing steps. Two of these processing steps are back grinding, in which the silicon wafer is grinded to a specific thickness, and dicing, in which the silicon wafer is cut to a specific size. Both of these processes require ultrapure water and generate a wastewater stream rich in silicon particles and high in turbidity.

A Taiwanese manufacturing company involved in silicon wafer processing decided to build, install, and operate a microfiltration system to separate the silicon particles from the waste stream in order to reuse the filtrate, decreasing source water consumption and wastewater volume generation.

The Solution

The filtration system was originally installed using a competitor's ultrafiltration hollow fiber membrane modules. However, high suspended solids loading resulted in unacceptably high levels of fiber breaks which caused decline in the filtrate water quality and triggered the need to switch to a more robust and durable hollow fiber membrane. Eight competitor modules were replaced by six HYDRAcap® MAX 60 modules. Since the system has been retrofitted, filtrate quality has consistently met the customer requirements and filtrate is being reused in process application. The customer is considering future treatment capacity expansion with another system using HYDRAcap MAX®.

Figure 1: Feed Water Sample - Turbidity = 1100 NTU

Product Description	
Module Type	Hydranautics HYDRAcap® MAX 60
Flow Path	Outside to Inside
Membrane Area	78 m2 membrane
Pore Size	0.1 µm
Membrane Material	TIPS PVDF

Operating Parameters	
Filtrate Flow Rate	432 m^3/day
Filtration Flux	35 Lmh
Filtration Time	25 minutes
Concentrate Bleed	10% of feed flow
Chemical Cleaning Frequency	Two caustic maintenance cleans per day (0.1% NaOH)

Filtrate Water Quality	
Turbidity (NTU)	<0.1 NTU
Total Suspended Solids (mg/L)	<2 mg/L (Below Detection Limit)

Figure 2: HYDRAcap MAX Filtrate Water Sample