

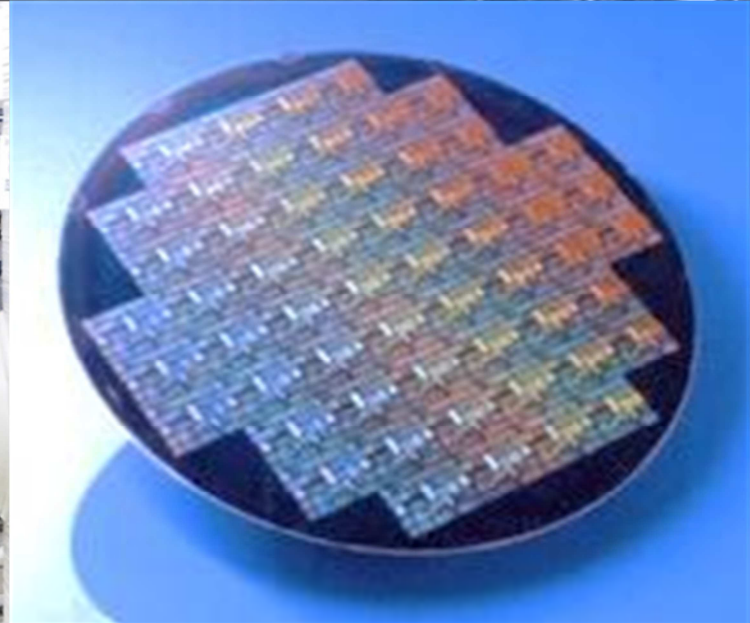
## CASE HISTORY

SEMICONDUCTOR  
SOLAR  
PHARMA  
POWER GENERATION  
FOOD & BEVERAGE  
PULP AND PAPER  
CHEMICAL  
OIL AND GAS  
MINING  
AEROSPACE AND TRANSPORT



# Shin-Etsu Handotai

## Livingston, Scotland



Shin-Etsu Handotai is the world's largest producer of semiconductor materials, with factories worldwide. Their factory in Livingston was opened in 1984 to manufacture silicon wafers for the semiconductor industry.

The manufacture of silicon wafers requires large volumes of high purity (so-called "Ultrapure") water and all work is carried out in clean room conditions in order to avoid contamination of the highly sensitive products.

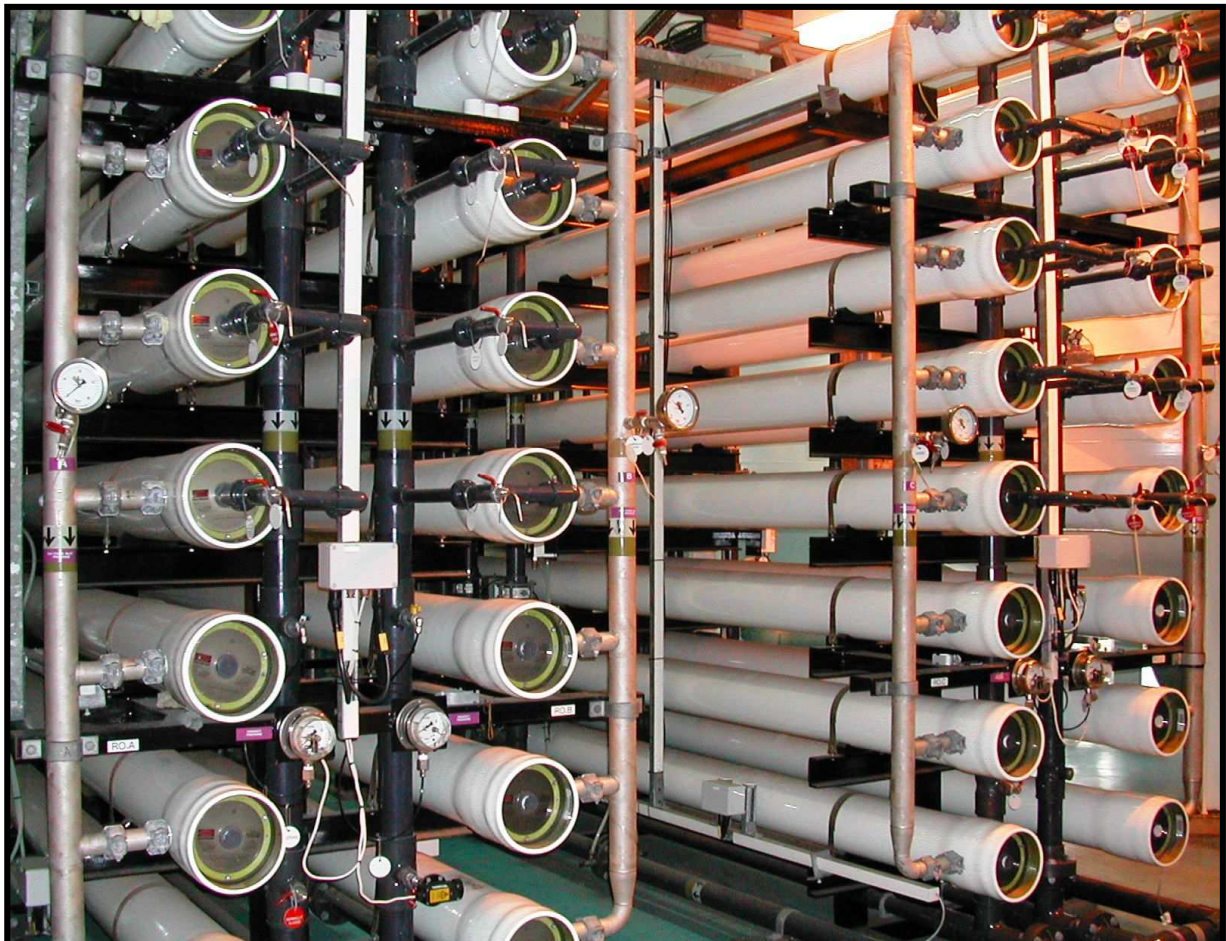


Organic Traps

H+E designed and supplied the water treatment plant for Shin-Etsu and, since its first commissioning, we have provided continuous technical and engineering support services and minor upgrades. There is also an ongoing process of system re-evaluation, which has resulted in many improvements in the system (some small and some large), thereby continually reducing operating costs. Some of these innovations result from work done in our R&D Laboratories, and others from the on-site engineers' detailed understanding of the operational requirements of the facility. Whatever the source, this factory remains a testament to what can be achieved by ongoing cooperation between the client and the supplier. In many cases, system developments and savings realised in one of Shin-Etsu's factories can be implemented in the other Shin-Etsu facilities, whether in the USA, Japan, Malaysia or Taiwan, all of which have water treatment plants built by H+E.

This is typical of our approach to creating long-term relationships with our clients wherever possible. Our experience is that ultimately such relationships are to the benefit of both parties: Our clients ensure their plants continue to operate at peak efficiency and obtain periodic reductions in operating costs. For H+E the benefits are to ensure that the plants we build continue to operate properly, that our customers are content, and that our reputation as a supplier of high quality systems is maintained.

Like all ultrapure water plants, the system includes a number of different treatment stages, each of which contributes to an ever improving water quality until the finally required ultrapure water is obtained.



**Primary Reverse Osmosis Units**

The treatment stages include:

1. coagulation
2. turbidity removal filters
3. granular activated carbon filters
4. organic traps
5. degassing
6. ultraviolet sterilisation
7. pre-filtration
8. primary RO systems
9. Mixed bed polishers
10. Secondary RO systems
11. Ultrafiltration

This system produces very high purity deionised water, which is thereafter continually recirculated through the facility, supplying the essential ultrapure water to various stages of production. At these points of use, the ultrapure water has a Resistivity of 18.2MΩ and contains only tiny concentrations of trace elements measured in low Parts Per Trillion (PPT).



High Purity Ion Exchange Polishers

A number of internal re-treatment and recirculation systems are also included to minimise the actual consumption of water. This not only saves the cost of the water itself, but also reduces the cost of its treatment, which is expensive.

Since the original plant was installed, H+E has worked in co-operation with Shin-Etsu to develop many enhancements to the system, all with a common purpose; to increase operational efficiency and minimise operating costs.

In many cases, following the Japanese tradition of kaizen (meaning continuous improvement), the changes have been quite minor, although their accumulative effect has been substantial.

In others, substantial improvements have been introduced, including:

- Recovery and recycling System for a wastewater stream
- Glycol Coolant Recovery System
- Polishing Slurry Recovery System

H+E also supplied the wastewater treatment system for the whole site and, again, has supplied on-site technical support, spare parts etc. ever since the plant was built.

This plant, designed for a peak treated water flow rate of 400m<sup>3</sup>/h, included a range of treatment technologies for a number of chemically different incoming flows.

A hydrofluoric acid-containing stream is treated with lime to precipitate calcium fluoride prior to settlement.



**View of biological treatment outside the main plant building**

Another, far higher flow is treated separately with the addition of a coagulant prior to neutralisation and settlement. Following this, the stream is treated biologically and then with activated carbon to reduce its organic load before it is safe to discharge.

Regeneration wastewater streams require only neutralisation before they are discharged.

All necessary supporting systems including bulk storage of treatment chemicals and automatic dosing systems, sludge dewatering, all necessary health and safety systems etc. are included.

**For more information, please contact H+E UK Ltd**

H+E ranks among the world's leading suppliers in the fields of: water & wastewater treatment, and energy efficiency. Based on its global presence, the **H+E GROUP** has completed projects in over 50 countries.



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