

Axiom Process: One Source – One Company

Helping manufacturers recycle water, save energy and reduce waste volumes



- Design and build of membrane filtration systems
- Project management
- Hygienic process plant & assemblies
- Component customisation
- In-house manual & orbital welding
- Machining, fabrication & polishing
- Comprehensive stock of hygienic stainless steel fittings and components including RJT, DIN, IDF, SMS and Clamp Unions, sample valves, sightglasses, manways, filters, sprayballs, flanges, valves

Based in Swansea, South Wales, Axiom Process has earned a reputation as a major player in the field of membrane and filtration technologies, as well as one of the UK's leading hygienic stainless steel fabricators. Utilising combinations of microfiltration, ultrafiltration, nanofiltration and reverse osmosis membrane technology, Axiom Process can supply custom built manual and automatic membrane filtration systems that can provide payback times of often less than 2-3 years.

Membrane technology, which was first developed back in the 1960's, is now used extensively throughout the food, dairy, beverage, brewing and pharmaceutical industries as a cost effective solution to process manufacturing and purification or waste treatment requirements, offering enormous potential for cost savings in terms of reduced water and energy costs, water recovery,

effluent treatment, product recovery and upgrading of waste products.

In order to determine the suitability of membrane technology for a particular process, as well as establish the best membrane for the application, Axiom Process will conduct a series of trials using the customer's feed material. Membranes are tested objectively since the company does not manufacture its own membranes preferring to offer a wider choice from a number of membrane manufacturers. The company has pilot plant facilities to conduct trials both at its manufacturing site in Swansea and at its customers' sites, but for reasons of product stability and freshness, Axiom prefers to operate trials at their customers' premises where possible. This also provides an opportunity for the customer to gain first hand experience with membrane operations using his own feed material. Samples are taken for



Potential payback time for orange juice processing plant = 7.9 months

During orange juice processing, changes of product or periodic cleaning of the plant often leaves large volumes of partly diluted juice from vessels and lines as a result of purging product when chasing through with water. This juice may be diluted to say 10.3% solids compared to full strength juice at 12.25% solids and has no commercial value (or even a negative value as a pollution load). By using membrane technology to increase the concentration of solids and remove some of the water, full

strength juice can be recovered. Here is an example of the economics:

Firstly the juice is treated by Ultrafiltration (UF) to remove the suspended solids, and the filtrate or permeate is then concentrated by Reverse Osmosis (RO) to remove some of the water and so increase the solids. The concentrates from both the UF and the RO processes are added together to re-form a full strength orange juice, which then has significant commercial value.

£90,000 = Capital cost of automatic UF system
£100,000 = Capital cost of automatic RO system
10% allowed for installation of systems
£79/day allowed for operating costs of both membrane systems (8 hrs/day)
24 p/litre wholesale price for full strength orange juice
4,820 litres/8 hour day diluted juice at 10.3% solids
4,005 litres/8 hour day at 12.25% solids recovered juice
£961/day recovered juice value at 12.25% solids
£882/day recovered juice value after operating costs

**Payback time for membrane systems =
(£90,000 + £100,000) x 1.1 = 7.9 months
£882**



Axiom Process has recently designed and built a 3000m³ filtration plant consisting of both tubular ultrafiltration and spiral wound reverse osmosis membranes as part of what is believed to be the UK's first sizeable, 400m³/day wastewater recycling plant that is a closed loop system with zero target discharge to sewer.

analysis and once analytical results are available, a detailed report is issued giving the interpreted trial results and recommendations for plant design, together with indications where further work might reduce plant costs. Using these results, a quotation for the plant is then normally provided together with estimated operating costs, in sufficient detail to enable a commercial assessment to be made.

Choosing the right membrane system is determined by a number of factors including capital costs, energy input, flow channel size, risks of fouling and membrane packing density.

Axiom Process has a wealth of membrane technology experience and by ensuring that a clear understanding of the process requirements, feed stream characteristics, chemistry and anticipated outputs is known, the company can provide the best system to meet its customers' needs as well as provide technical and training support together with plant operating optimisation.

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