

## Heat Exchangers





# Heat Exchangers

The Syngineering Group  
Brisbane, Sydney, Auckland  
**Phone: 1300 662 326**  
E: [info@syngineering.com.au](mailto:info@syngineering.com.au)

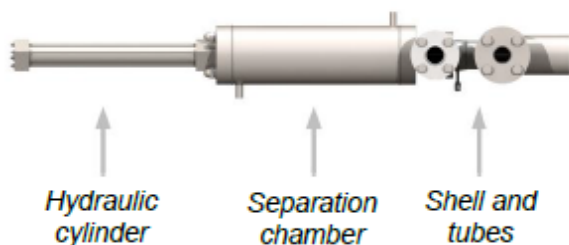
## Scraped Surface Heat Exchangers

The scraped surface heat exchanger ideal for industrial and hygienic applications. Based on the traditional shell and tube heat exchanger, the scraping elements inside each interior tube that are moved back and forth by hydraulic action. This is to ensure that any fouling on the tube wall is removed. Additionally, the scraping movement introduces turbulence in the fluid increasing heat transfer. This design makes an ideal heat exchanger for high fouling and viscous fluids.



### Elements of the Scraped Surface Heat Exchanger

The Scraped Surface Heat Exchanger consists of a hydraulic cylinder that moves the scraper bars, the heat exchanger and a chamber that separates both elements. The hydraulic cylinder is connected to a hydraulic power pack that is included in the supply. Smaller models of the Scraped Surface heat Exchanger can be supplied with a pneumatic cylinder.



### Scraped Surface

The scraping system consists of a stainless steel rod to which the scraping elements are fitted. Various types of scrapers are available. For each application, the optimal scraper is selected and fitted. The Scraped Surface Heat Exchanger can

work with fluids containing big particles due to its unique design.



### Products

- ↪ Dairy: Cheese, yoghurt, cream, whey concentrate, ice cream, condensed milk
- ↪ Fruits: Juice concentrate, fruit purée, diced fruit
- ↪ Vegetables: Fried vegetables, tomato concentrate
- ↪ Convenience Food: Eggs, mashed potato, ketchup, mayonnaise, baby food, spreads, fats, oils
- ↪ Proteins: Visceras, meat slurry, MDM, meat stuffing, minced meat, pet food
- ↪ Confectionary: Chocolate, pie filling, paste, marmalade, syrup, gelatine, starch, butter
- ↪ Beverages: Coffee extract, juice freezing, yeast-malt extracts
- ↪ Cosmetics: Lotion, cream, gel
- ↪ Environmental Waste: Waste concentration, manure, food plant effluent, chemical waste, solvent recovery
- ↪ Biofuels: Oil extraction for biodiesel, biomass pre-treatment, thermal hydrolysis, fermentation digestate concentration

### Evaporation

A special version of the Scraped Surface Heat Exchanger has been developed for evaporation applications. The design consists of a shell and tube heat exchanger with scraping rods in the interior tubes. During evaporation, fouling and reduced heat transfer can become a problem for traditional evaporators. In the Scraped Surface Heat Exchanger, the scraping action keeps the heat transfer surface clean and maintains high heat transfer, allowing the Scraped Surface Heat Exchanger to concentrate to levels where traditional technologies fail. The Scraped Surface Heat Exchanger evaporators can be applied in a multi-effect setup or in combination with mechanical vapour recompression. The scrapers allow continuous operation and reduces downtime of the plant.

The Scraped Surface Heat Exchanger evaporator can operate under vacuum and is ideally suited for volume reduction of environmental waste to reduce shipping costs.



## Applications

### Agricultural waste:

Pig manure, Cow manure, abattoirs, AD & Biogas plants: Digester feed concentration, Digestate, concentration,

### Food industry waste:

Proteins, sugars, others

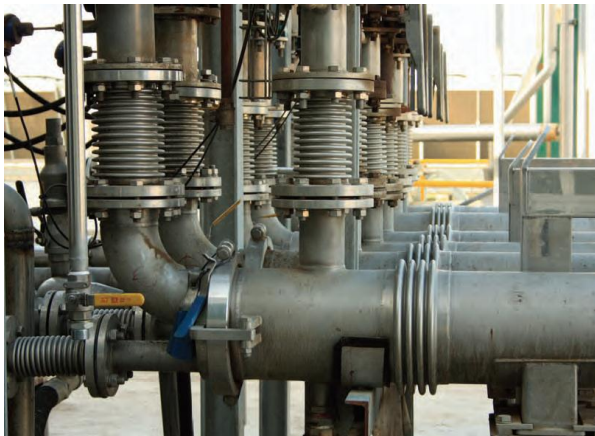
### Industrial waste:

Pharmaceuticals, solvents, industrial waste water

### Municipal waste water.

Leachate, Brines, others.

Evaporation is an effective way of reducing the impact of environmental waste. It is a thermal process where energy is invested to separate water volume. The evaporated water, when condensed, can be reused again. In environmental processing, the substance. Normal evaporators would have a limited operation time between stops for cleaning. HRS Heat Exchangers have overcome this problem by applying the scraped surface evaporator. Scraped surface means constant removal of fouling maintaining the evaporation capacity constant. The scraped surface evaporators can evaporate to very high levels of concentration.



## Pilot Plants



### Case Study 1 – Pig manure Evaporator

Feed : 2.5tonnes/hour  
Evaporation Capacity : 2tonnes/hour  
Nr Effects : 1  
Energy Source : CHP cooling water 85-70°C

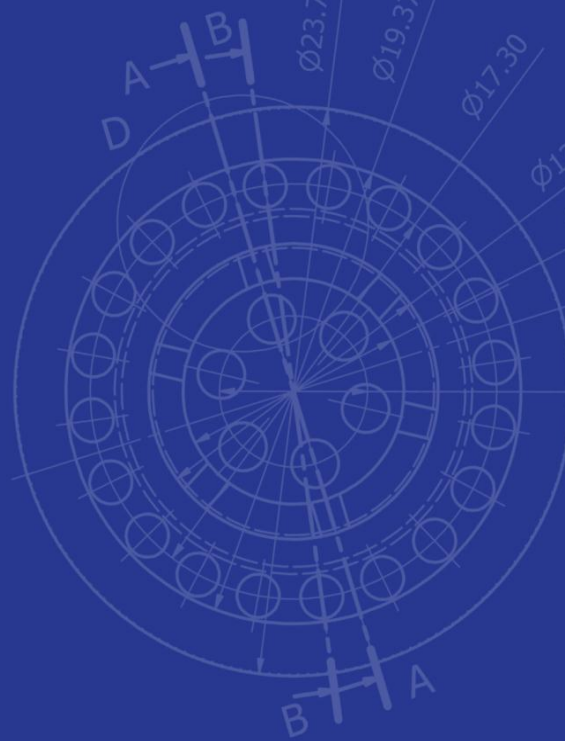
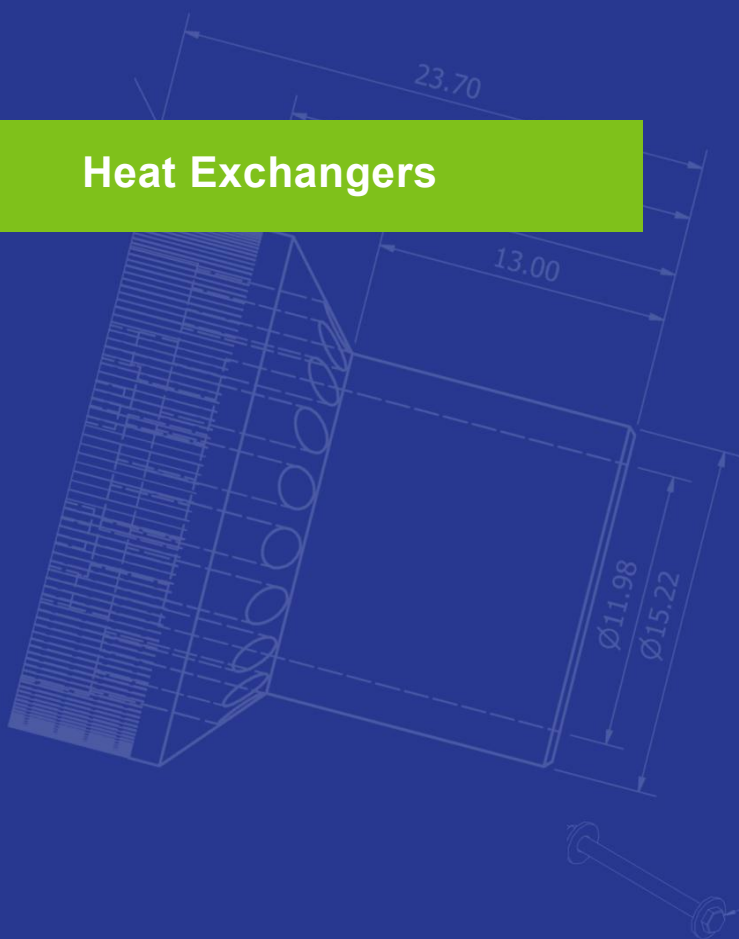


### Case Study 2 – Brine Evaporator

Feed : 10m<sup>3</sup>/hour  
Evaporation Capacity : 7m<sup>3</sup>/hour  
Nr Effects : 2  
Energy Source : CHP exhaust gas



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Syngineering Water Pty Ltd  
Ph: 1300 662 326  
E: [info@syngineering.com.au](mailto:info@syngineering.com.au)  
W: [www.syngineering-water.com.au](http://www.syngineering-water.com.au)



[www.syngineering.com.au](http://www.syngineering.com.au)