



Fluid Dynamics

Heat Exchange Solutions since 1981

Capability Presentation

Presented by: Mike SurrIDGE - General Manager



Heat Transfer

Fluid Dynamics has remained at the forefront of heat exchanger technologies since 1981. From our base in Melbourne, we offer the following services to our very broad customer base: .



Fabrication & Service
Facility



Ultrasonic Cleaning
System



In House Inspection
and Testing



Design, Sales and
Service for new,
replacement & rebuild
of all heat exchangers



Accreditation to ISO
9001 SAI Global



Site Installation
Capability



Site Inspection



Strategic supply
partners to enhance
our own manufactured
heat exchanger
technologies



HEAT RECOVERY

Waste Heat Recovery
Heat Recovery Consultancy



Factory & Facilities

We have a dedicated team of fitters, welders and in house service technicians who know what is needed when it comes to your heat exchangers.

With Fluid Dynamics your heat exchangers are in good hands.

When we receive your unit, our team will : -

- Carry out initial inspection and detail findings
- Pre-clean the heat exchanger if required
- Carry out a preliminary pressure test and further assess the unit
- If instructed, contact you to discuss all findings in detail and advise our recommendations and what corrective actions should be taken.
- If instructed, clean the heat exchanger using our advanced ultrasonic cleaning system
- Carry out final assembly; replace all seals as required; carry out final pressure test and a close inspection. All findings and results are noted.
- Finally your unit will be dried, painted if instructed, packed and made ready for delivery.

Most Types of Heat Exchangers

including:

- Finned Tube
- Shell & Tube
- Scraped Surface
- Gasketed Plate
- Double Wall Plate & Tubes
- Semi Welded Plate
- Fully Welded Plate
- Brazed Plate
- Aluminium Radiators
- Finned Coil
- Dry Air
- Air Cooled Condensers
- Corrugated Tube
- Diffusion Bonded
- Printed Circuit
- Custom Build

Heat Exchange for Most Applications

including:

- Hydrogen
- Energy
- Carbon Capture
- LNG
- Oil & Gas
- Intercooling
- After Cooling
- Flue Gas Cooling
- Waste Heat Recovery
- Desublimation
- HVAC
- Dairy Food & Beverage
- Pharmaceutical
- Marine
- Steam
- Lean Amine

Gasketed Plate Heat Exchangers

OEM or our own **FluidEX** Range

Wide range
Modern / Efficient

Industrial
Painted frames

Hygienic
All stainless-steel frames

Plate Materials
316, 304, Titanium,
Hastelloy, Inconel, etc.

Gasket Materials
HT NBR, HT EDPM, HNBR,
Viton

Capacity
1m³/h to 4,500m³/h

25bar
Max working pressure

Operating Temps
-20°C to +190°C

Standard Connections
DN25 to DN500

Hygienic Dairy Fittings
Connections
1" to 6"



Plate Heat Exchangers Spares & Service

- Fluid Dynamics supplies high quality Plates & Gaskets for most models including:
APV, Alfa Laval, FluidEX, GEA, Vicarb, Mueller, Sondex, Tranter, Hisaka, Reheat, HRS, Sepak, AHTT, API Schmidt Bretton, Arsopi, Barriquand, Fischer, Funke, SWEP...
- On-site service, gas testing and maintenance of your PHE units
- In-house cleaning and crack detection of plate packs
- Ultrasonic cleaning system for plates and associated components
- In-house refurbishment and rebuilding of plate heat exchangers
- Redesign and design changes for most ranges possible
- Swap out frames for many sizes with minimal modifications required
- Flexibility to offer tailored service and spares solutions to meet specific requirements and needs



Fully Welded Heat Exchangers



SUITABLE FOR A
WIDE RANGE OF
APPLICATIONS



GAS TO LIQUID
OR
GAS TO GAS



ALUMINA
SLURRIES OR
SIMILAR
PROCESSES,
ELUATES ETC.



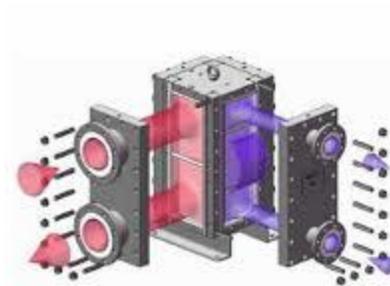
HAZARDOUS
FLUIDS –
CHEMICALS AND
PETROCHEMICAL



HIGH PRESSURE
APPLICATIONS,
VAPOURS AND
REFRIGERANTS



REFRIGERATION
AND CO₂



FluidEX[®] Brazed Plate Heat Exchangers

Very large range

Suit almost any application.

Brazing

Copper or Nickel

Very compact
High Thermal Efficiency.

Easy Installation

Long life

Proven
Durability & Reliability

Corrosion Resistant

available

Materials

316L, SMO254 plates, Cu
& Ni Brazing

Twin Wall

Safety Plates

available

Dedicated Oil Coolers

(DOC)





Kelvion K°Bond

COMPACTNESS & PERFORMANCE BONDED TOGETHER



DESIGN & FUNCTION

For decades, we have been supplying the oil & gas industry with reliable and efficient heat exchange technology for a wide range of applications. Our broad experience and knowledge of the market has enabled us to develop and enhance our product portfolio with innovations.

K°Bond, Kelvion's diffusion bonded heat exchanger, is ideal for applications involving extreme process temperatures and pressures. Combining design with welding expertise, K°Bond withstands pressures up to 1,000 bar and temperatures from cryogenic -200 to 600 °C, while providing significant savings in weight and footprint compared to common heat exchanger solutions.

K°Bond with its diffusion bonding technology is perhaps one of the most significant and game-changing solutions for projects with restricted space – May it be for offshore plants (e. g. as high pressure vaporizer) and reliquefaction on floating units.

ADVANTAGES

- ▶ PRESSURE RESISTANCE UP TO 1000 BAR
- ▶ WORKING TEMPERATURE RANGE FROM -200°C TO 600°C
- ▶ HIGH HEAT TRANSFER RATE THANKS TO FLUIDS PROXIMITY ALLOWING TEMPERATURE APPROACH UP TO 2°C
- ▶ LEAKAGE FREE AND SAFE
- ▶ HIGH RESISTANCE TO CYCLIC SERVICES
- ▶ UP TO 6 TIMES SMALLER THAN CONVENTIONAL S&T HEAT EXCHANGER

K°BOND APPLICATIONS



LNG



GAS COMPRESSION OFFSHORE



FSRU



RENEWABLES



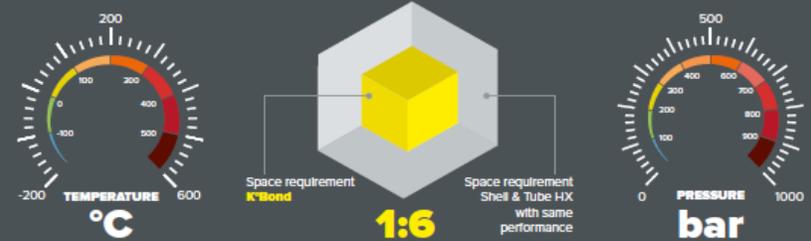
HYDROGEN



SUPERCritical CO₂



K°BOND PERFORMANCE



DIFFUSION BONDING

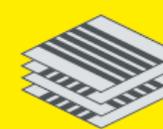
1. Patterns are designed for each service and chemically etched on stainless steel plates.
2. Etched plates are stacked and welded through diffusion bonding process, converting them into one solid block of metal (core).
3. When required, multiple cores are welded together. Nozzles and headers are welded on cores to form final K°Bond.



Plate



Plate with etched channels



Single plates



Solid block



+



Diffusion bonding



Optimized In-house design software



Available in stainless steel 304L & 316L



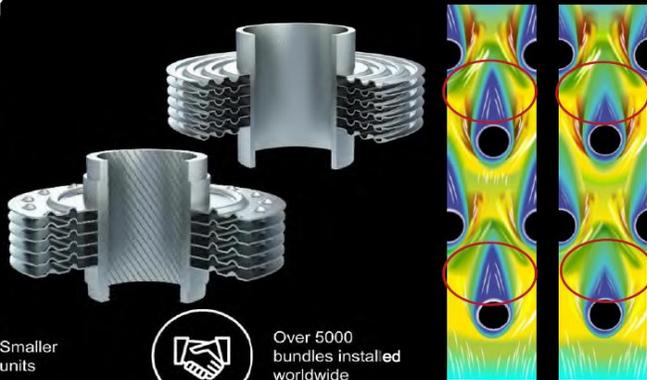
Designed as per ASME rules, CE-marked and / or U-stamped



GROOVY & DIESTA ARE ABLE TO BOOST YOUR EFFICIENCY

FIN SHAPE

- ◁ Reducing "dead zone" by air guidance
- ◁ Increasing turbulences on tube and air sides
- ◁ More than 20% increase of air side heat transfer coefficient at equivalent fan power and equivalent CO2 emissions reduction



Kelvion patented technology



Smaller units

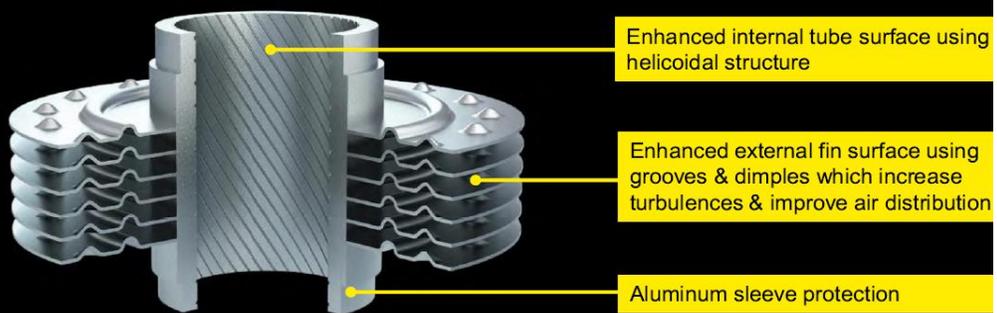


Over 5000 bundles installed worldwide

A more detailed presentation on the Groovy and Diesta is available on request

DIESTA TUBES – DESIGN

DIESTA = Dual Internal & External Structured Tube for Air Fin Cooler



Enhanced internal tube surface using helicoidal structure

Enhanced external fin surface using grooves & dimples which increase turbulences & improve air distribution

Aluminum sleeve protection

AIR FIN COOLER ALU GROOVY TUBES

Groovy embedded fins:

Fins are embedded on core tube

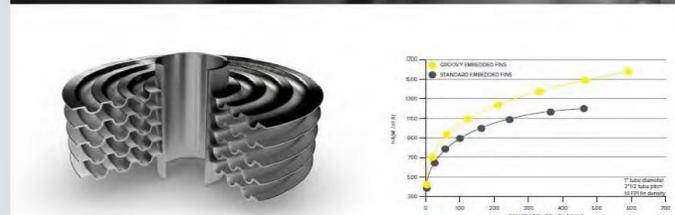
Groovy extruded fins:

Fins are embedded on an aluminum sleeve covering the bare tube;

Groovy extruded is a commercial name highlighting the benefit being equivalent to regular bimetallic extruded. It is not the result of an extrusion process.

BIWA:

Bimetallic Wrapped Aluminium finned tube



- Low pressure drop
- Low electricity consumption
- Low piping
- Low installation cost
- Low maintenance cost
- Low footprint
- Low CO2 emissions

AIR FIN COOLER ALU DIESTA TUBES

DIESTA finned tube:

Dual Internal & External Structured tube for Air Cooler

DIESTA is bimetallic:

Fins are embedded on an aluminum sleeve covering the bare tube as per groovy Extruded.

BIWA:

Bimetallic Wrapped Aluminium finned tube

BIWA:

Bimetallic Wrapped Aluminium finned tube

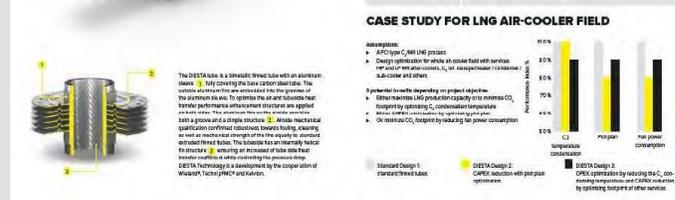
BIWA:

Bimetallic Wrapped Aluminium finned tube

BIWA:



DIESTA PRODUCTION PROGRAM					
TUBE MATERIAL	TUBE OD	FIN MATERIAL	FIN OD	FIN MATERIAL	FIN DENSITY
Carbon steel (BIMETALlic)	1 inch (25.4 mm)	Aluminum	0.015 inch (0.38 mm)	Aluminum	100 ft³/ft³ (2.5 g/cc)
DIESTA INTERNAL STRUCTURES ARE AVAILABLE FOR:					
Gas cooling	Condensation	Liquid cooling (high temperature)			



KEY FACTORS OF AIR FIN COOLER PERFORMANCE



 FAN POWER CONSUMPTION	 TUBES & FINS	 PLOT SIZE	 AMBIENT CONDITIONS
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AFC FORCED DRAFT



AFC INDUCED DRAFT



Kelvion

AIR FIN COOLER

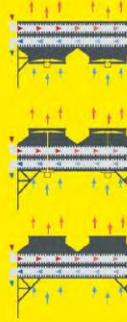
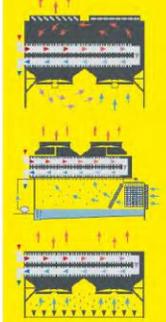
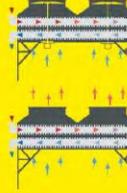
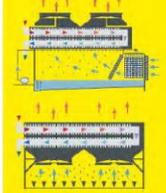
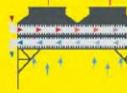
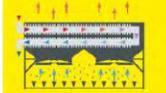


 15 PATENTS SINCE 2007	 OVER 120,000 TUBE BUNDLES SOLD SINCE THE 1970'S	 FIRST AIR FIN COOLER INSTALLED IN 1927
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WORKING PRINCIPLE

- < Working Fluid / Refrigerant flows inside the tubes
- < Ambient Air is forced / induced through tube bundles

MULTIPLE AFC DESIGNS

<p>Forced Draft</p> <p>Using the forced draft, the air is pushed through the tube bundles. This configuration provides only a small increase in the tube bundle area, especially regarding maintenance and replacement of the tubes. By using the forced draft on compact units with an air fan diameter (AFC) it is possible, depending on the fan speed, to reduce the fan power consumption due to lower resistance flow in the tube bundle.</p>		<p>Recirculation</p> <p>All modern heat exchangers with indirect refrigeration systems are used in extremely cold climates (polar, sub-polar, permafrost). They require a unit to recirculate the cooling air regardless of ambient air temperature. This allows, for example, changing the fan speed to control the recirculation systems requires the use of positive and negative speed adjustments.</p>	
<p>Induced Draft</p> <p>The fan pulls the ambient air through the tube bundle. This design of induction is induced. Due to the compactness of the fan bundles from atmospheric and environmental conditions, the fan structure design provides cost and weight specific effects.</p>		<p>Air cooled exchanger with an fans/induced flow in spray</p> <p>For certain outdoor spaces in hot countries with a high ambient temperature, the ambient air temperature is too high for the normal operation of the fans. In such cases, the fans are replaced by the fans currently equipped with a spray nozzle. The fans are designed to be installed in special conditions where it is necessary to use fans with a spray nozzle. The fans are used to cool the ambient air. Much auxiliary equipment, such as the fan speed control, the spray nozzle and the fan speed, is added to the air cooled exchanger to be the humidification of the ambient air.</p>	
<p>Natural Draft</p> <p>Natural draft systems do not require any mechanical devices to operate. They are driven by natural convection, which is the result of the difference in density between the hot and cold air. The hot air rises and the cold air falls, creating a natural draft effect.</p>		<p>The humidification system can be installed after the fan has been installed and when the air cooled exchanger is in regular operation through change in climatic conditions or periods.</p> <p>The system is used to cool the ambient air by using a high pressure pump. The thickness of the droplets allows better wetting of the ambient air. This system is generally operated without a recovery tank.</p>	

Kelvion



Fluid Dynamics

Heat Exchange Solutions since 1981

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Kelvion Thermal Solutions for

CARBON CAPTURE & STORAGE

**FLUE GAS
COOLING**



Rekuluvo/Rekugavo
Flue Gas Cooling

**AMINE CO₂
REMOVAL SYSTEMS**



Air Fin Cooler
Lean amine cooler

**CCS BY
DESUBLIMATION**



Desublimators
Direct exhaust gas capture

**CCS
ABSORBER**



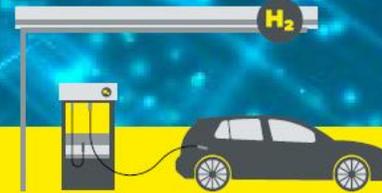
Cooling Tower
Direct air capture

Kelvion



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Cooling solutions for the entire value chain of
HYDROGEN



PRODUCTION & PRODUCTION UPSCALING



Air Fin Coolers
High performance tube technology



Cooling Towers
Smallest footprint



Desublimators
Unique technology for carbon capture



Heat recovery
Wide range & experience

DISTRIBUTION



K°Bond
Diffusion bonded heat exchanger
with highest pressure resistance

INTEGRATED SOLUTIONS & UTILIZATION (FUEL CELLS)



Customized and
integrated solutions
beyond heat exchangers

Bar and Plate (Aluminium & Copper)

- Large stock of components carried at all times
- Ability to custom build to just about any size
- Aftermarket units are a specialty – quicker, cheaper and stronger than OEM
- Replacement / Renewal of existing core
- Cooling systems can be fitted with 12v/24v DC, 3 phase hydraulic and Pneumatic motors,
- Shrouds, mounting base, stone guards can also be supplied
- BSP port sizes and locations are fitted to individual requirements
- High performance for heavy duty hydraulic and lubricating applications
- Maximum working pressure 26bar
- Service, Testing, Repair and Ultrasonic Cleaning
- Serving all industry sectors



Oil Cooler Solutions

Fluid Dynamics is your one stop solution for automotive and industrial oil coolers

Fluid Dynamics is an Australian owned and operated company specialising in a wide range of heat exchangers.

- Full service for oil coolers including ultrasonic cleaning, testing, repair re-engineer and replacement.
- Large range of stock and equipment for even the most complicated projects.
- Supply of OEM and aftermarket oil coolers ensuring the best solution, the best quality, and very competitive pricing.



Fluid Dynamics - for all your oil cooler needs

Coil & Finned Tube Heat Exchangers

All industries served to the highest standards

All types of Coils & Finned Tube units designed & manufactured to all major industrial standards.

Special coatings applied to all coil units where required



Dry coolers – single through to multi core, multi fan, condensers and adiabatic coolers

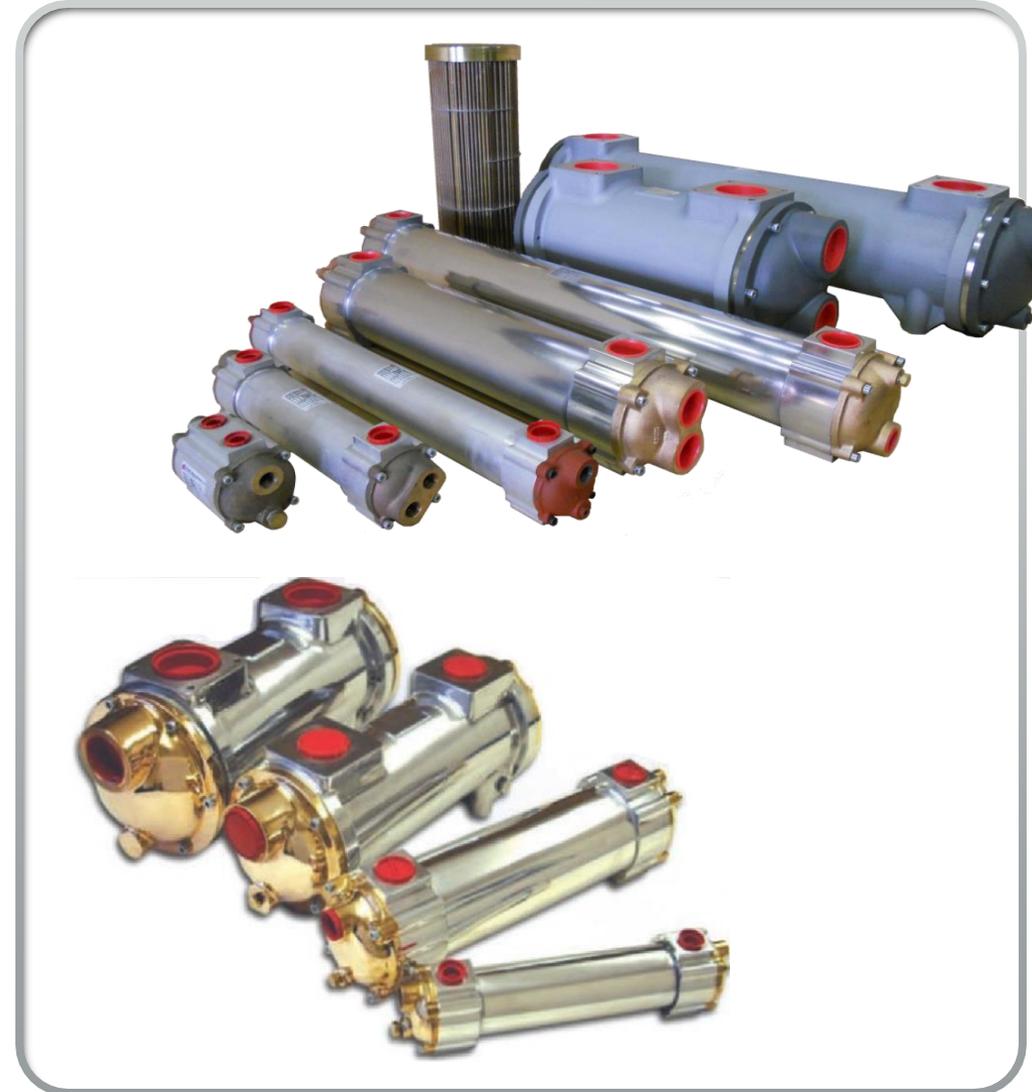
Round tubes, elliptical tubes, compact fin, single fin, spiral fin, rectangular fin

All materials available including carbon steel tubes and fins, Cu tube and fin or Al fin, CuNi tubes and stainless or Al fin, stainless tube and fin



Shell & Tube (off the shelf)

- Fluid Dynamics has been synonymous with shell and tube heat exchangers for over 40 years
- One of Australia's largest Stockists of shell & tube oil coolers, Custom Build, transmission oil coolers & water to water coolers. Most standard ranges are available ex stock
- We offer a full range of services including like for like replacements, new units, repairs, testing, service and ultrasonic cleaning, new tube bundles, repairs to existing tube bundles and re-tubing. All carried out in our well-equipped Hallam factory
- Ideal for many applications – marine, industrial, on-road & off-road etc.



Shell & Tube-Custom Build

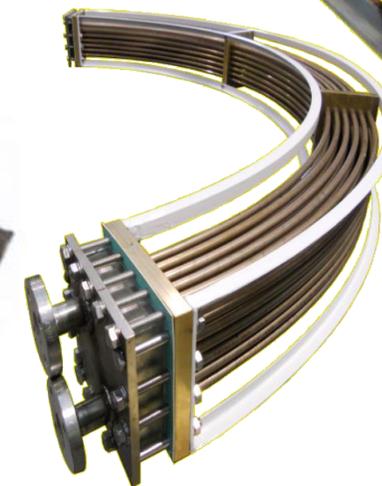
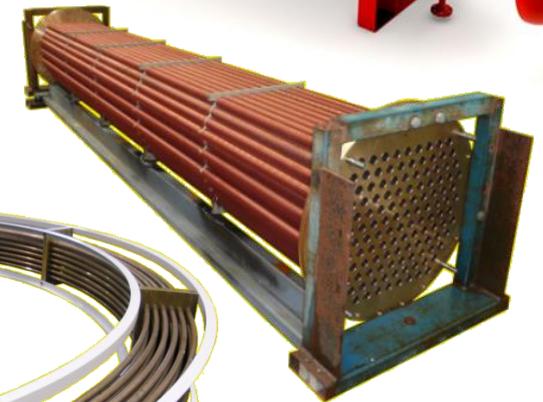
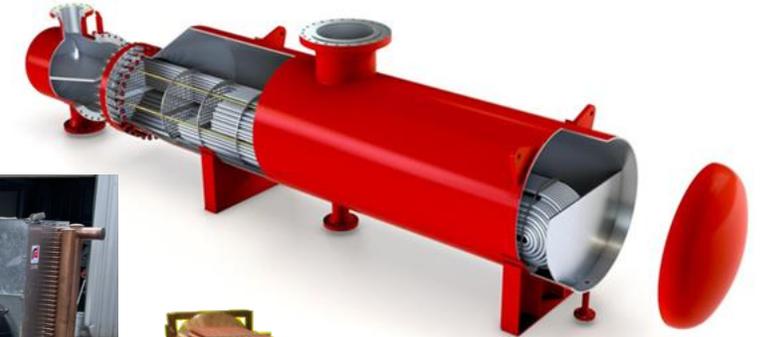
- One our key strengths is our ability to design, re-engineer, manufacture, refurbish, test, clean & and repair all types and sizes of shell and tube heat exchangers
- We provide heat exchangers for all applications
- Built to the highest standards and using the best quality materials
- We can provide new tube stacks built to exact standards to fit into your existing shell as well as manufacture the entire shell and tube exchanger



Special Project Heat Exchangers

At Fluid Dynamics we pride ourselves in our skills and ability to provide solutions for almost every project.

- Hydrogen Coolers
- Thrust Bearing Coolers
- Large Transformer oil Coolers
- Generator Coolers
- Large Cooling Coil Systems
- No matter what the requirement Fluid Dynamics can provide the correct technology and solution to match it



FluidEX[®] Corrugated Tube Heat Exchangers



Highly efficient all stainless-steel shell and tubes with other materials available



Twice the heat transfer coefficient of smooth tube heat exchangers



Working temperatures up to 550°C



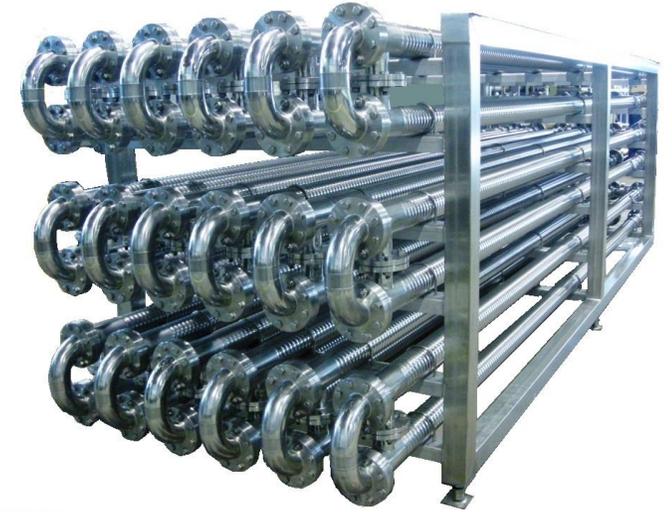
Hard start through to multi-start corrugation designs for different fluids



Suitable for almost every feasible hygienic or industrial application

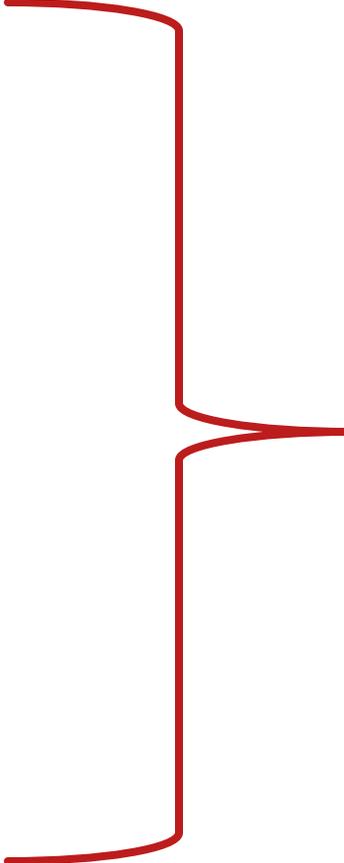


Ideal for shear-sensitive, viscous or highly viscous products



What Heat Transfer Application are you looking for?

- Heating
- Cooling
- Regeneration
- Pastuerisation
- Desuperheating
- 2 Stage Heating / Cooling
- Waste Heat / Energy Recovery
- Condensate Recovery
- Exhaust Gas Heat Recovery
- Evaporation
- Condensing



- **Fluid Dynamics**

If your application is not listed, then please ask.

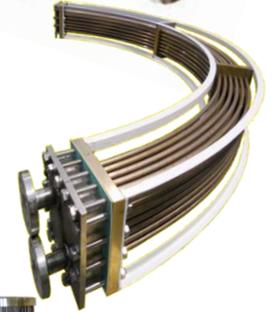
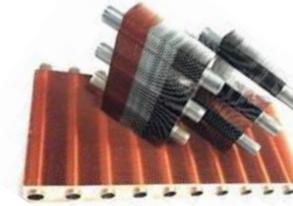
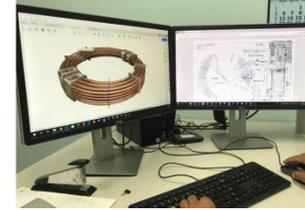
Ultrasonic Cleaning

- Our Ultrasonic Cleaning System uses special fluids (not harsh acids).
- Huge industrial sized tank
- Although it operates normally at 50°C to 60°C our system can heat to 90°C if required.
- When combined with the power of ultrasonics the system effectively removes carbon, rust, oil, epoxies, scale etc..



Heat Exchanger Spares OEM & FluidEX[®]

- Spare or Replacement Custom Heat Exchanger Re-Builds
- Spare or Replacement Tube Bundles & Tube Nests
- Spare or Replacement Tube Plates (blanked or pre drilled)
- Spare or Replacement Aluminium Cores
- Spare or Replacement Finned Tubes – (most types)
- Replacement Spare Parts for all plate heat exchanger makes including complete plate packs
- Replacement Brazed Plates, SWEP, SONDEX, APV, WTT, FUNKE etc.

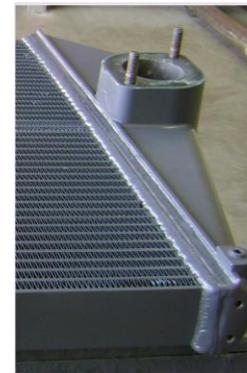
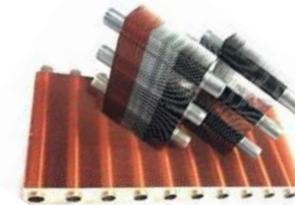
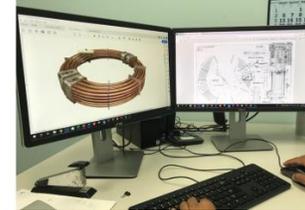


Heat Exchangers - In House Servicing

- In house Cleaning, Testing, Inspection & Repair of almost any type of Heat Exchanger:

Shell & Tube; Steel, Copper & Aluminium Radiators & Oil Coolers; Finned Coil; Finned Tube; Aluminium Bar & Plate; Thrust Bearing Coolers; Hydrogen Coolers; Condensers; Evaporators; Fin Pack Units, Fin Coil Units, Charge Air Coolers, Generator Coolers, etc.

- Custom Heat Exchanger Builds and Re-Builds
- Replacement Tube Bundles and Cores
- NDT - Eddy Current; Ultrasonic and Borescope
- Camera inspections of tubes and internal surfaces
- Material analysis
- Replacement Spare Parts
- Redesign and Design Engineering Services including site laser scanning and 3d modelling



Servicing & Maintenance on Your Site

Fluid Dynamics has an experienced and well-equipped team of professional heat exchanger service technicians covering all States in Australia and at your call.

Cleaning, Testing, Inspection & Repair

The list of what we can do on your site is extensive and includes:

- Gas Integrity Testing
- Inspection and Evaluation
- Inline Chemical Cleaning
- Installation and Removal
- Re-gasketing
- Replacement of Spare Parts
- Replacement of Plates and Plate Packs
- Complete Heat Exchanger Builds and Re-Builds
- Repair and Re-builds of Tube Bundles
- Finned tube removal and replacement
- Leak Detection
- Borescope Inspections
- Material & Failure analysis
- Non Destructive Testing - Eddy Current, Ultrasonic etc.
- Waste disposal etc.



All Heat Exchangers

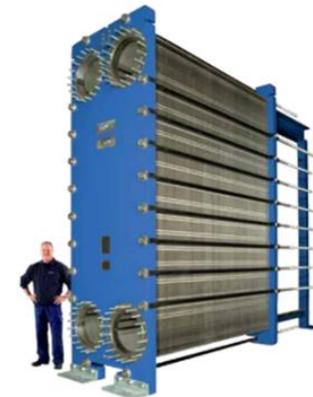
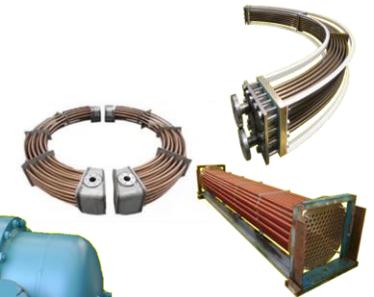
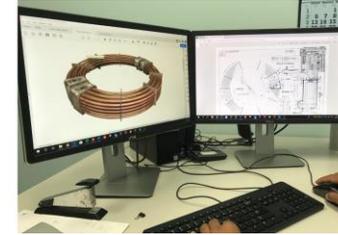
Shell & Tube; Finned Tube; Finned Coil; Thrust Bearing; Plate (Gasketed, Welded and Semi-Welded); Aluminium Radiators etc.

All Applications

Oil, Air and Water Cooling & Heating; Condensers & Evaporators; Generator Air Coolers; Refrigeration; Steam

On Site Service

- Cleaning, Testing, Inspection & Repair of almost any type of Heat Exchanger: *Shell & Tube; Oil Coolers; Finned Coil; Finned Tube; Thrust Bearing Coolers; Plate and Shell & Tube Condensers & Evaporators; Coolers, Generator Coolers, etc.*
- Plate Heat Exchanger Builds and Re-Builds
- Replacement Tube Bundles and Re-builds
- Inline chemical cleaning, waste disposal
- Camera inspections of Shell & Tube internal tube nests and internal surfaces
- Offsite Material and Failure analysis
- Replacement Spare Parts, Replacement Plate Heat Exchanger Plate Packs
- Offsite cleaning and testing of Plate Heat Exchanger plate packs,
- Redesign and Design Engineering Services including site laser scanning and 3d modelling
- Onsite Inspection and Evaluation of your heat exchanger including but not limited to : Finned Tube Air Coolers, shell & Tube, Plate Heat Exchanger (Gasketed, Welded or Semi Welded), Custom Coolers such as Bearing Coolers etc.



Pumps & Valves

Fluid Dynamics provides sales and service for a wide range of pumps and valves used in modern production facilities supported by our experts who are on hand to provide service, spares and support to ensure efficiency and performance from all your equipment.

- Service, Repairs, Overhauls, Refurbishment
- Maintenance - General & Planned
- Plant Obsolescence Management
- Rotating & Spare Parts Replacement
- Plant Monitoring
- Training
- Sales

Valves

Single and Double Seat Seal • Ball • Butterfly • Check • Mixproof

Pumps

Positive Displacement • Centrifugal • High Pressure • Lobe



Homogenisers & Buttermaker's

Fluid Dynamics now offers expert onsite servicing of Homogenisers and Buttermaker's and other similar equipment - Australia-wide.

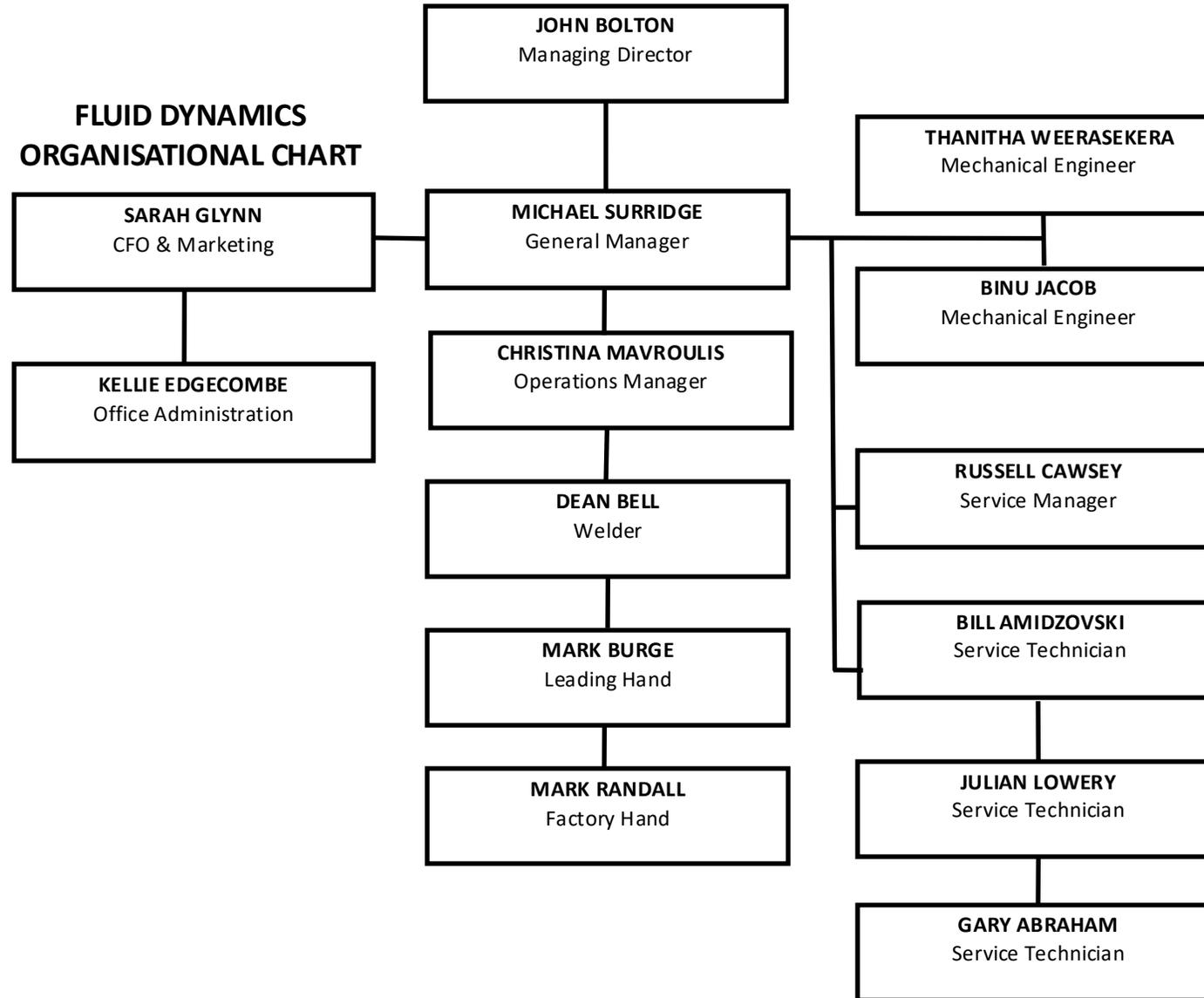
Contact Fluid Dynamics' and have our team of expert service technicians provide annual wet-end servicing of all APV Homogenisers and Buttermaker's including drive-end inspection and oil and oil filter replacement.

Services

- Service, Repairs, Overhauls, Refurbishment
- Maintenance - General & Planned
- Rotating & Spares Replacement
- Plant Management
- Plant Monitoring
- Training
- Sales



**FLUID DYNAMICS
ORGANISATIONAL CHART**



Some of our Valued Customers:



Fluid Dynamics Contacts



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Heat Exchange Solutions since 1981



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