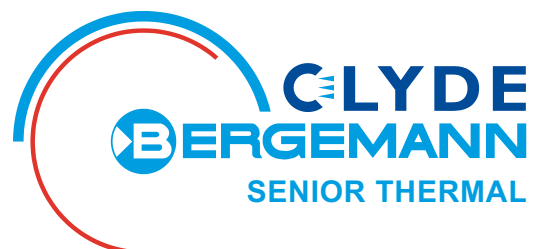




SENIOR ECONOMISERS

Recovering heat from waste gas





Recovering waste heat from boiler and flue gas streams



Since the early 1960's, Clyde Bergemann Senior Thermal Pty Ltd have built a reputation as experienced thermal engineers in the field of heat recovery. Senior Steel 'H' and Double 'H' economisers have been adapted to a wide variety of technologies.

Applications include:

- heat recovery as feed water and steam reheaters in coal-fired supercritical boilers
- industrial steam raising plants
- chemical processes
- marine and land cogeneration plant
- many other fouling flue gas stream applications

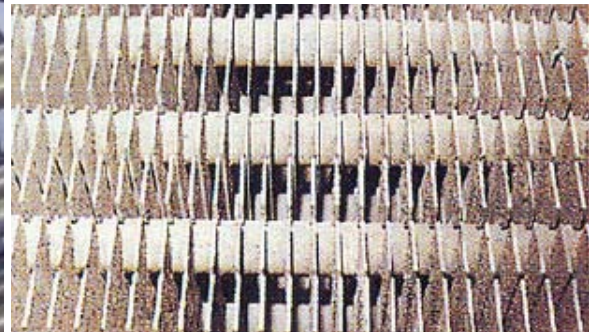
Reliable and proven economiser designs

Clyde Bergemann Senior Thermal provides waste heat recovery solutions with extended surface Steel 'H' and Double 'H' economisers. Senior economisers are operating efficiently on many modern supercritical boilers throughout the world. Efficient heat recovery from flue gas streams on boilers fired with PF, coal and biomass fuels is maintained with on-load cleaning. Correctly designed sootblowing equipment ensures effective on-load boiler cleaning avoiding costly forced outages. Also Double 'H' finned surface is robust and adaptable as cost effective heating surface in cogeneration plant.

With over 10,000 installations generating in excess of 300,000 MWe in 25 countries worldwide Clyde Bergemann Senior Thermal Steel 'H' and Double 'H' economisers have proven technology for reliable performance in waste heat recovery.



Helical finned tube after 4,000 hours operation



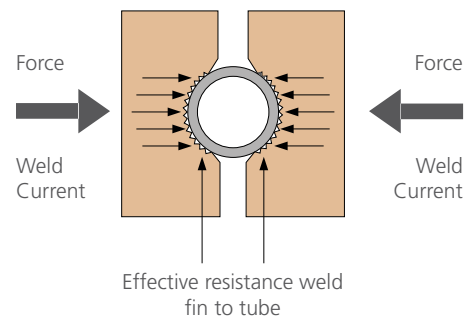
Steel 'H' after 70,000 hours operation

Our design is the key

Steel 'H' and Double 'H' Design

The Steel 'H' economiser has a unique combination of features providing a compact, low cost design. Steel 'H' fins are resistance welded with precise indexing over the entire length of the tube surface to ensure reliable heat transfer.

Double 'H' economiser tubes are produced using the same resistance welded technology. Steel fins are welded onto two tubes instead of one thereby producing a more compact economiser tube with greater rigidity, reduced number of supports and further reducing costs.



Double 'H' versus Plain tube economisers (based on a 700 MW black coal-fired supercritical power plant)		
Description	Double 'H'	Plain tube
No. of tubes	6944	23,808
Weight - Dry	630 tonnes	830 tonnes
Weight - Wet	660 tonnes	930 tonnes
Total height of economiser	2,600 mm	9,900 mm
No. of sootblowers if required	6 traversing rake or space prov' only	30 rotating element blowers
No. of banks to be cleaned	3	7
Steam erosion	Nil, no sootblowers required	Potentially serious erosion
Cost of steam	Nil	8,000 kg/blow
Draught loss	26 mm WG	50 mm WG
Extra draft loss vs ID fan power		393 kw extra
Extra power consumed per year (based on 8,000 hrs/year)		3,144,000 kw/hrs



Quality solutions with proven advantages



Compact size

With around 9 times more heating surface than plain tube, Steel 'H' requires fewer tubes to achieve the same heat duty.

Up to 50% less space is required for the economiser therefore potential savings in boiler costs.

Power savings

A substantial reduction in pressure loss results in reduced Combustion Air and Induced Draught fan parasitic loads. The saving in power consumption can be passed on as increased saleable power to the customer thereby improving revenue.

Isolated bends

Bends are isolated from the flue gas stream to avoid gas by-passing and excessive erosion. Baffle plates direct flue gas flow over the economiser matrix to maximise heating surface performance.

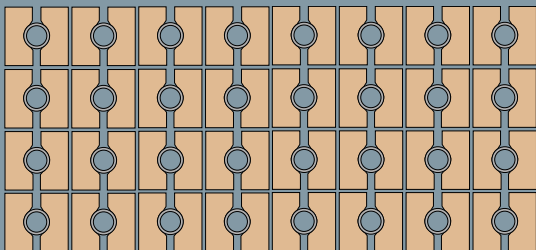
On a typical 450 MWe super-critical sliding pressure black bituminous coal fired station, the increase in revenue can be as much as \$10 Mil. over the operating life of the plant.

Our fuel range includes:

- Bituminous and lignite coal
- Biomass (wood, bagasse, straw, rice husks, etc)
- Heavy fuel oils, asphalt
- Natural gas, blast furnace gas

Other applications include:

- Cement plant, acid gas streams
- HRSG's and general waste heat recovery
- Bubbling, circulating, pressurised fluid bed boilers



Compact size and shallow bank ensure effective cleaning



Special fin shapes can be made to suit any application.

Easy to clean

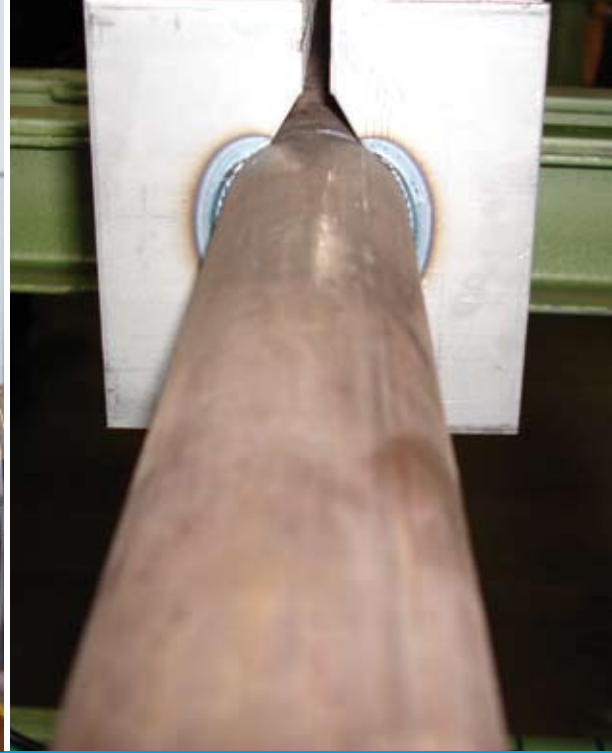
Straight gas passages provide a direct route for the flue gases to pass through reducing fouling to a minimum. Any occurrence of fouling can be cleaned on-load with steam jets which are able to penetrate deep into the tube bank.

Flexible design

The flexible design provides a customised economiser suitable all types of boiler plant.

Cost savings

A smaller and lighter economiser (up to 40% less weight) means savings in steel work and installation. Low pressure drops also result in lower operational costs due to less motor power required for fans and pumps.



Specialised manufacturing



Our manufacturing facility in Smithfield, Australia is configured to ensure efficient processes throughout and contains purpose built machinery designed to produce the highest quality output.

- Our specialised resistance welded finning machine ensures the finished product meets quality and performance requirements.
- Throughout the manufacturing process modern welding equipment is used to meet regulatory standards.
- Manual metal arc and automatic submerged arc welding is used for strict code header assembly.
- Special hydraulic forming machines ensure tube ends are produced to exact requirements.

Quality assurance

We are quality assured to ISO.9001 and ASME 'S' Stamp. Regular audits from international assessment organisations ensure we are producing high quality output at every level of production.

Our products are also designed and manufactured to the following Pressure Vessel codes and rules:

- AS1228
- ASME Codes Section I and VIII Div.1 'S'
- ASME 'S' Stamp
- Lloyds Register of Shipping
- BS.1113 / BS.5500 / BS.2690
- N Approvals pending

“Our purpose built machinery guarantees high quality output”



Aftersales services from experienced engineers



Economiser after firing on coal (water washed)

Aftersales Services

We understand the importance of extending the life of boiler plant technology in order to reduce long-term costs.

Our team of experienced engineers provides on-site services and maintenance on any type of waste heat recovery unit.

On-site assessments will establish the most effective solution for improving the performance of your waste heat recovery system. Our engineers will review your technology and recommend the most suitable solution to increase the efficiency of your plant.

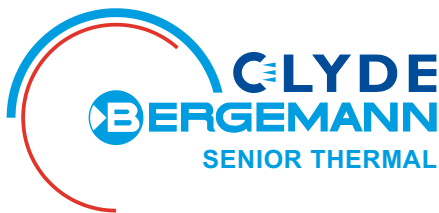
Our site services include:

- heat transfer and thermal balances
- erosion protection solutions
- boiler cleaning to maximise efficiency
- external corrosion reduction
- internal corrosion and feed water solutions
- waste heat recovery solutions with biomass fuel

Clyde Bergemann is represented in over 40 countries worldwide



- Clyde Bergemann Companies
- Clyde Bergemann Associates



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Front page image: Bayswater Power Station
compliments of Macquarie Generation