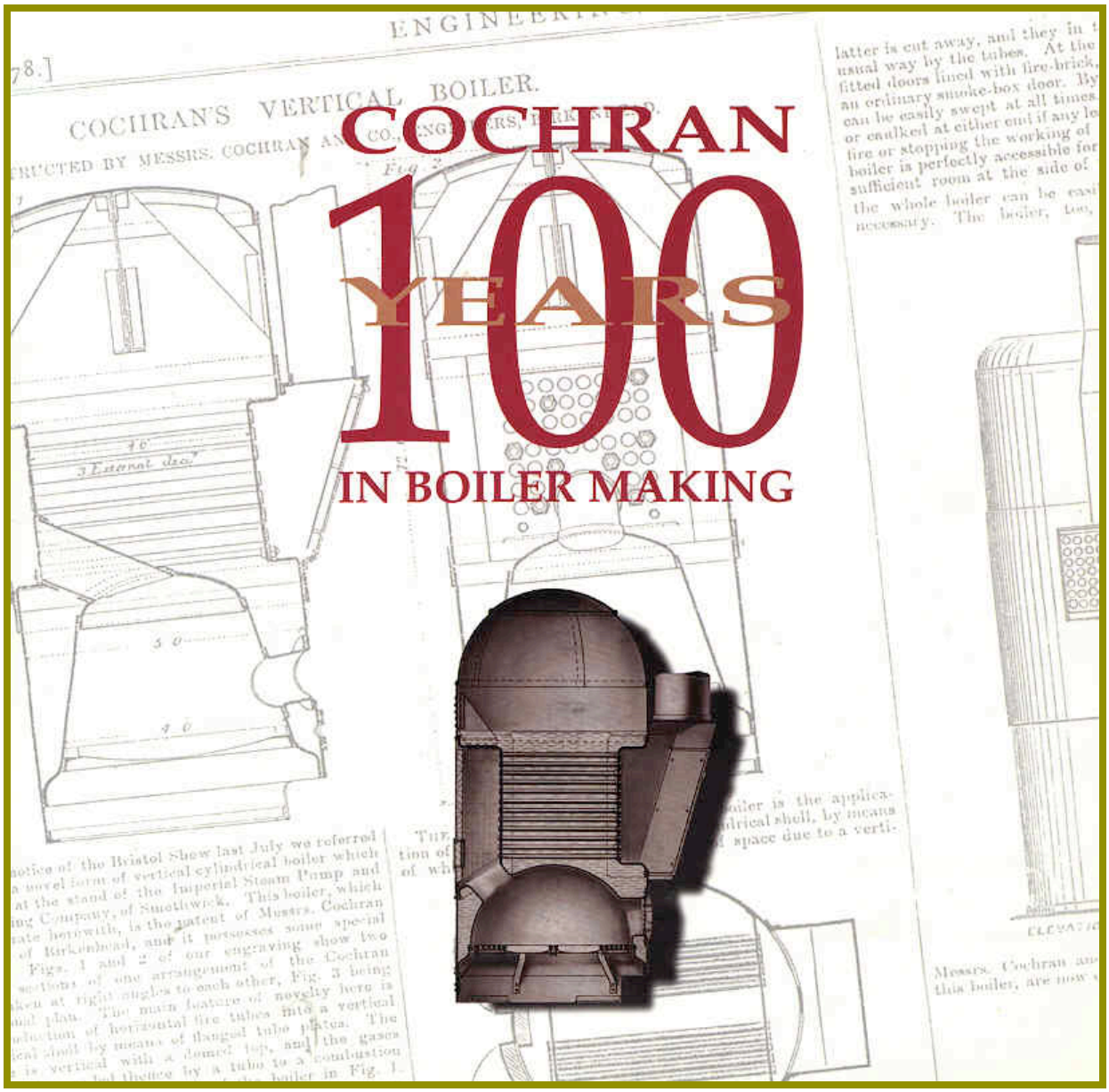


Centenary 1998

Cochran Boilers - providing heat and power for over a century

One hundred years ago in 1898 Cochran moved to Newbie, on the banks of the river Annan on the south west coast of Scotland, close to the border town of the same name. The move from the Company's original home at Birkenhead on Merseyside was due to the worldwide success of the company's vertical boiler design, first patented in 1878 and known as the 'Cochran boiler'. Annan was selected as it had room for expansion and was a prime riverside location, ideal for the building of small ships, an important part of the company's activities at the time.

The move of an established and prosperous business to a new district was a bold and courageous step. Cochran & Co Annan Limited was registered on 13 February 1898. The following year, 1899, the first Annan built Cochran boiler was completed and, during the autumn, the first hydraulic test on a boiler at the works was witnessed by the Lloyds' Register of Shipping Surveyor.

The company not only built a new factory, houses were built nearby for workers and, to ease travel, arrangements were made with the Glasgow & South-Western Railway for a train service morning and evening.

As Mr Jack Harkness, the then Managing Director, said to retired Cochran employees at a dinner in 1977, "Cochran, a name that will never disappear". His statement has certainly worn well over the years.

1898 to 1998, one hundred years that have seen technological change at an unprecedented rate and Cochran become a byword for packaged boilers the world over.

Formative Years

The Victorian entrepreneurs It was in 1878 that James Taylor Cochran established the Cochran & Co general engineering and shipbuilding works in Duke Street, Birkenhead with partner Edward Compton - inventor of what was to become the famous Cochran boiler.

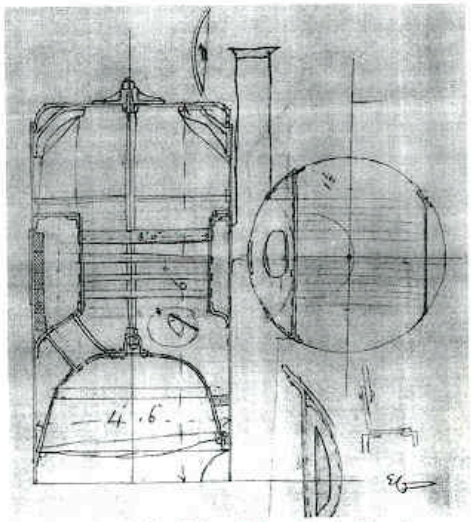
Edward Compton
Chairman 1898 - 1902

Compton's revolutionary domed design literally put boiler design on its head. The main novelty was ·e introduction of horizon fire-tu· unto · ver· cylindrical shell by m· of flanged tube pla· The design was firs· ibited at the Roy· gricultural Show, istol in July 1878, · reported in The Engine·· of 11 October ·at year.

James Taylor Cochra·
Director 1898 - 1902

As the boi· r was vertical, it co·bir· the advantages of comp·ess with the efficiency of a tubular boiler. The firebox was integral and, with a chimney simply bolted to the side, the unit was complete, giving the user potentially portable steam power. The price of a 7 foot diameter boiler was then £429.

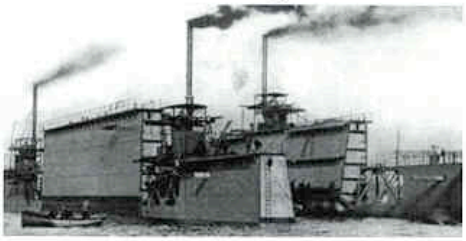
As early as 1880, tube-plates and the seamless hemispherical firebox crown were pressed from single plates. The Cochran boiler soon earned a reputation for its absolute reliability, adaptability and high quality of workmanship, proven by the number of repeat orders. In fact very few steamships afloat in the early 20th century did not



The original sketch of the Cochran Boiler, drawn by Edward Crompton circa 1876

have a Cochran boiler fitted as an auxiliary to the main boiler. The immediate success of the Cochran boiler was so great that by 1881, no fewer than four firms were manufacturing under licence: Clarke Chapman and Gurney of Gateshead, Newall and Ogilvie of Bristol, Ransomes Head & Jefferies of Ipswich, and The Tyneside Engine company of Cardiff.

Engine building and shipbuilding prospered too. Many types were made ranging from the simple Single Cylinder to the Compound and Triple Expansion Surface Condensing type. A standard product was a wall pump of the fly-wheel type, known as the Cochran Donkey.



Three Cochran Donkey Boilers power a floating dock in Trinidad at the turn of the century

Many ships were built. Cochran were the first British company to build light-draft stern wheel steamers for the South American rubber trade. One named "The Explorer", drawing only six inches of water and powered by a Cochran boiler, was employed in the navigation of the upper reaches of the Amazon. She went further up the river than any steamship in 1890. Cochran had an almost exclusive business in South America. In those days there were more small steamers plying the continent's rivers built by Cochran & Company, Birkenhead, than by anyone else.

A typical shallow draft paddle steamer

That man and his submarine

World leading developments Between 1878 and 1879, two submarines were built to Reverend George William Garrett's design. The first was a one-man boat driven by foot pedals and reportedly weighing 4½ tons. This effort was intended mainly to confirm Garrett's theories concerning the hydrodynamics of his hull design. The second was to become arguably the world's first powered submarine.

The 'Resurgam' displaced 30 tons, was forty-two feet long, conical shaped and steam powered.

The Resurgam and her designer George Garrett

With her three-man crew, including Garrett, the 'Resurgam' submerged off the Mersey and made her way to North Wales and into the history books in 1879. Most of the vessel was taken up with the huge boiler, which left little room for the very hot crew. However, 'Resurgam' sailed to a base at Rhyl Harbour, carrying out sea trials and experiments as they went.

The submarine's novel steam plant was based on the Lamm fireless locomotive, which used stored steam to power the engine after the boiler had been closed down.

'Resurgam' was reputed to be able to steam for 5 hours at between 2 and 3 knots submerged using this latent power. Unfortunately she was lost off the North Wales coast when under tow to Portsmouth on 25 February 1880. Fortunately none of the crew were aboard.

'Resurgam' was located on the sea bed in October 1995. Plans are now being made for her recovery and preservation. Prophetically Garrett's name 'Resurgam', meaning "I will rise again" may yet prove true.

The start of the Newbie tradition

Bold decisions With an expanding product line, in particular the Cochran Donkey boiler and growing repeat orders, it became more and more difficult for Cochran to meet the increasing demand from the works on the restricted Birkenhead site.
A new site had to be found to meet the demands

A Cochran powered crane unloading press-blocks at Newbie Pier 1899

of the twentieth century. The present 52 acre site in Dumfriesshire, Scotland, was selected in 1897 as it had suitable slipways for the small ships the company built.

The new company, Cochran & Co Annan Limited was registered in 1898, and the business successfully transferred. As the local 'Gallovidian' magazine reported in 1902:

"In addition to the works themselves, the company has erected a number of houses for those employed in the works, thus forming the nucleus of what is rapidly becoming a prosperous little community, as is evidenced by the establishment of a Co-operative Society, with which is connected a Co-operative Women's Guild and Library."

The construction staff that built the Annan works - circa 1901

In those early years at Annan shipbuilding and boilermaking continued side by side, with twenty vessels being launched, more than half of them destined for Africa and South America. Stern Wheel Steamers, like the "General Pando", 129 feet long with a 22 foot beam, were typical. Steam tugs, barges, launches, cutters, and the 700 ton twin-screw luggage steamer "Seacombe", for the River Mersey were all launched at Annan.

The General Pando on trials in the Solway Firth

However in 1901 the decision was taken to concentrate all the company's energies on the manufacture of Cochran boilers and the shipyard closed.

A vertical boiler is prepared for loading on-board ship.

The boiler shop in 1899.

Consolidation

Building a firm foundation 1902 saw the pioneering James Taylor Cochran and Edward Crompton retire from the Board and in 1904 the business was re-organised, with Harry Llewelyn Davies becoming Chairman and Managing Director. Charles Edward Crompton, son of the inventor, and John Hart Bell were the other board members.

Harry Llewelyn Davies Director/Chairman 1898 - 1923

For the next 20 years Cochran built its foundation, particularly in the shipping industry, where the Cochran boiler became firmly established as the Donkey boiler on cargo vessels, powering the lifting gear. The export market was vast, orders came from every part of the world. From 1913, the company undertook special oil firing trials to ensure optimum technical performance for its use in steam raising.

Charles Edward Crompton Secretary/Director 1898 - 1923, Chairman 1923 - 1939

Cochran Boilers provided temporary power for the SS Mauretania during her building and fitting out in 1906

Cochran monitored all fuels. Boilers were adapted to burn virtually any fuel, including coal, coke, wood and wood waste gas and bagasse (sugar cane refuse).

Cochran Boilers played their part in the war effort in a variety of applications.

A shipboard Cochran Donkey boiler

During the 1914-18 war, all Cochran production was controlled by the British Admiralty and units were allocated for a wide range of uses, many being installed on Boom Defence Vessels, guarding harbours around Britain's coast.

The Industrial Council

Advances in industrial relations The results of a meeting at Newbie on 3 December 1918 have passed into industrial history. A mass meeting of all employees agreed to form an Industrial Council for the works to:

- Promote good relations between firm and employees.
- Stimulate production and reduce waste of labour and material.
- Establish a system to enable all employees to participate in the benefits.

The first Works Industrial Council 1919

The Council was the brain child of Harry Llewelyn Davies who was its first Chairman. It was one of the first set up in the United Kingdom.

The Cochran stand at the Colliery Exhibition in London, 1904

Its first meeting was held on 3 February 1919. Although it could not be said there was confidence between the workers and the Directors at the start, by August 1919, such confidence had been established that the workers presented the Directors with an Illuminated Address, which spoke for itself. If the Council had done nothing more than establish that confidence, it was worthwhile. It went on to play a major role in airing grievances and the improvement of employee conditions, but there was never any barrier to Trade Union membership.

"Abandon rank all ye who enter here" wrote W Renton, referring to the Works Council, circa 1919.

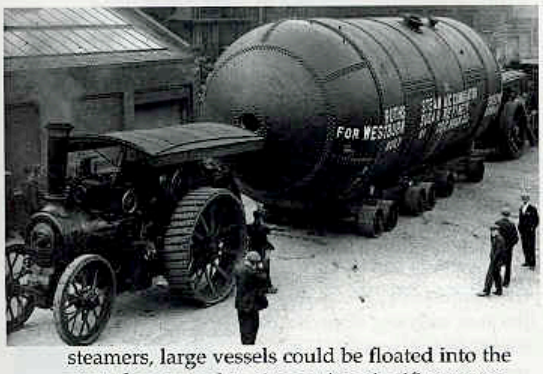
Donkey's help a Cochran Boiler cross the Veldt to a distillery in South Africa - circa 1927

In 1969 the Works Industrial Council came to an end. No pertinent subject had been barred, with complete freedom of speech and no fear of victimisation - all tenets embodied in the constitution. The system adopted back in 1919 may not apply today, but the principle of good communication it established, so essential for any successful business, remains alive and well at Newbie.

New products and technology

Pressure Vessels In 1928 pressure vessel manufacture commenced as Cochran responded to the market requirement for steam accumulators. The largest vessels made at that time were Ruths accumulators some 75 feet long, over 11 ft. in diameter and weighing over 100 tons. Working pressure at 250 psi was impressive. From these beginnings Cochran developed into one of the country's leading fabricators of pressure vessel for the petroleum, chemical, concrete production,

paper-making and associated industries. Because of the Newbie slipways last used to launch



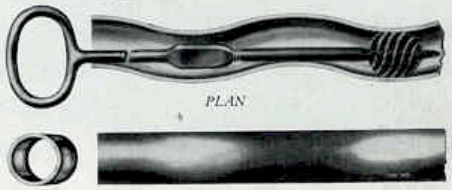
steamers, large vessels could be floated into the river then towed to site, saving significant cost. Large fabrications were delivered in one piece,

Above: The Newbie site was ideally positioned for shipping out the large pressure vessels

Left: One of the last pressure vessels to leave Newbie for a Mexican refinery.

eliminating site fabrication and the inevitable delays. Pressure vessel manufacture came to an end in 1970 to concentrate on boiler production.

The Sinuflo Tube improves boiler efficiencies Until the invention and patenting of the famous Sinuflo Tube by Percy St G Kirke, gas fired boilers were very inefficient, nothing better than a tin kettle on a gas ring. Taking its name from its sinuous form, the Sinuflu tube changed all that, allowing the hot gas to impinge on the whole length of the tube, with most of the heat passing into the water. In 1934 Cochran reached an agreement with Kirke and launched a

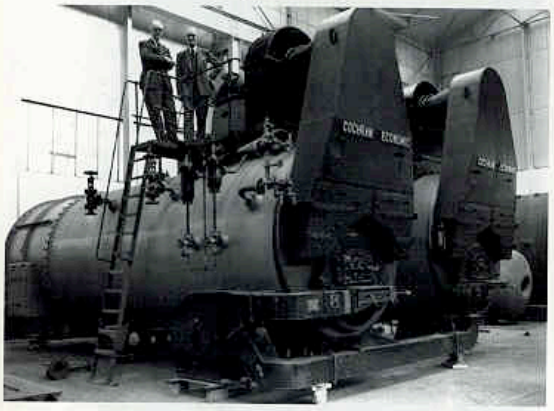


The Sinuflo tube achieved the heat transfer rate of a straight tube more than twice its length. As shown below, access was a prime feature.

range of horizontal shell-type, waste heat boilers. They were very successful, ideal for raising steam from the residual hot gases in gas and steel works.

The outstanding thermal efficiency of the Sinuflo tube meant it was later incorporated in all of the company's boilers, both vertical and horizontal. The Cochran Economic boiler launched in 1940; with induced draught fan, large

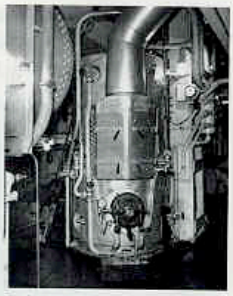
combustion chamber and exceptional internal accessibility, marked a step-change in boiler design. The largest unit built, capable of producing over 25,000 pounds of steam per hour, was still operating efficiently in 1950.



Above: A pair of Cochran Economic Boilers being installed at W.D. & H.O. Wills plant in New Zealand

The war effort At the outbreak of war Cochran policy was to supply from stock, and were able to meet the increase in demand for heating hastily built Military Camps, Aerodromes and Barracks. Between 1939 and 1945 the company supplied thousands of boilers for a variety of war-time needs.

Boilers of all shapes and sizes were built during World War 2.



Left: An oil burning Economic Boiler. Right: Donkey Boiler on-board MV Bruno.

Fabrication skills were put to good use making armour plating for tanks and some units for the famous Mulberry Harbour, put in place shortly after D Day in 1944 to aid the Allies' invasion of France.

Higher efficiencies

The Cochran "Series II" Boiler To meet government and industry demands for higher efficiencies, compactness and automatic operation, features required as the country's industries rebuilt after the war, ongoing research and development was vital. As a result the Cochran 'Series II' vertical boiler was launched in 1959, which met all the main criteria. It featured a thermal efficiency of over 80 per cent, a greater output than the standard Cochran boiler of the same shell diameter, fully

The versatile Series II boiler powered mills, dairies & factories including the Hoover works at High Wycombe

automatic operation and was delivered as a working unit able to operate on liquid or solid fuel. Large numbers were sold and installed, the majority of welded construction, the standard method of construction from 1960.

The Spheroid Boiler The Spheroid Packaged Vertical boiler was released in 1964 superseding the Series II boiler, which ceased production in 1966. It was of all welded construction, a modern version of the original 1878 Cochran Vertical boiler. The boiler got its name from its spherical furnace which meant higher steam outputs due to its larger radiant heating surface. For a given steam requirement the spheroid was smaller and lighter, with a lower capital cost than its competitors. It was supplied as a fully automatic package and was available in ten sizes with steam outputs up to 11,500 lb/hr.

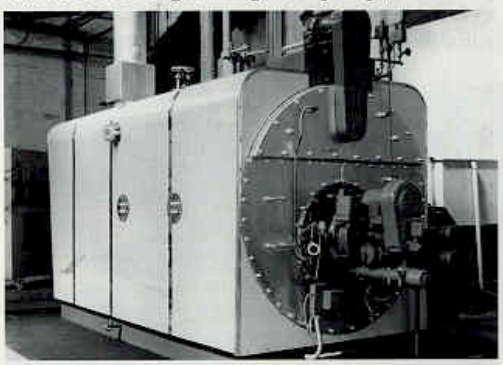
Burners added to the range The ability to offer a complete boiler package including a burner designed by Cochran was attractive. It would provide the opportunity to compete in a competitive market with the ability to customise a unit to suit the customer's own application. The burner design team, headed by Gordon Myatt was established in the mid 1970's.
First was the Simplex Pressure Jet Oil Burner for steam and hot water boilers followed by the more technically sophisticated Split Stream Spillback Burner for higher boiler ratings.

Cochran Burners were an exciting addition to the company's product line in 1976

Ongoing R&D lead to the introduction of the Triplex pressure jet type oil burner as recently as 1996. It is capable of operation in the high/mid/low mode and slotted in nicely to the established Cochran range of light, heavy oil, natural gas, LPG and towns gas burners. The familiar red Cochran burner is now a well proven, efficiently engineered part of the modern Cochran product range, designed to comply with international environmental standards.

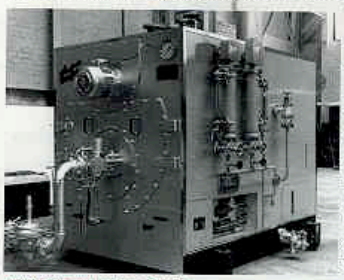
Packaged Boilers

The Chieftain arrives The "package" boiler concept arrived in the UK from America in the 1950's. It was a boiler complete with auxiliaries, a burner for oil or gas firing, feed pumps,



The first Cochran "Chieftan" in the R & D cell, 1963.

automatic controls, all mounted on a compact base frame as a transportable, factory assembled unit. The UK market liked the concept, but wanted the reassurance of more conservative designs. The Cochran offering was the Chieftain horizontal shell package boiler of three pass design and its smaller brother the Wee Chieftain. The name was suggested by employees and set the trend in 'Scottish' names for new boilers ever since. The Chieftain was introduced in the early 1960's, initially to produce steam, but high pressure hot water versions were soon available. It was an instant success and remained a market leader for some years. It incorporated a novel air supply to the burner that pre-heated the air for combustion, improving thermal efficiency and kept casing temperatures to a minimum.



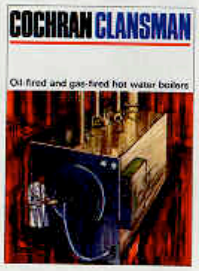
The first production Chieftan.

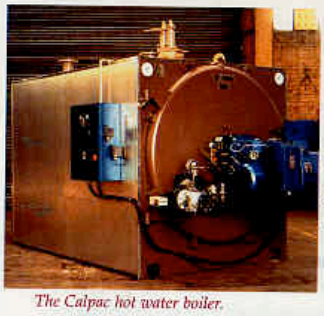
Chieftans lined up for despatch

The Wee Chieftan

The Clansman

In 1966 a new hot water boiler was launched - the Clansman, oil or gas fired. In many ways similar to the Chieftain, its design ensured a low back end temperature and avoided the risk of tube leakage. One particular innovation was a system of powder injection to minimise corrosion on the gas side at low operating temperatures. It remains a core Cochran product today with seventeen sizes available.





The Calpac hot water boiler.

The Thermax and Multipac

In the 1970's, the Thermax and Multipac steam boilers were added to the range of shell packaged units. They covered evaporation ranges similar to the Cochran Chieftain, but had the advantage of being less expensive to manufacture due to the simpler cylindrical wrapper plate design of the combustion chamber.

A Multipac Boiler on it's way to a distillery in 1964.

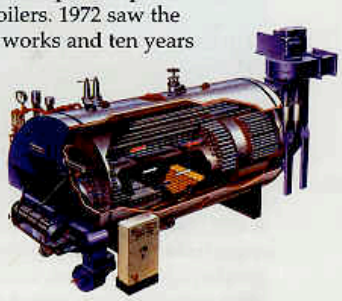
Both boilers were originally the "flagships" of other UK boiler manufacturers. Ruston and Hornsby of Lincoln, who made the Thermax was acquired by Cochran in 1968 and John Thompson of Glasgow, who acquired Cochran later the next year, manufactured the Multipac.

Thermax (above) & Multipac (below) boilers provide heat for a variety of applications, including hospitals, power stations and refinerys.

Change

John Thompson Cochran Formed in 1969 the John Thompson Cochran Group was Europe's leading manufacturer of shell boilers with factories at Glasgow, Lincoln and Annan's Newbie works. Then in 1970 Clarke Chapman Ltd, based on Tyneside, merged with John Thompson to form the Clarke Chapman John Thompson Group of companies, creating the Thompson Cochran Division. The oil crisis that came shortly afterwards helped shape a much different market for boilers. 1972 saw the closure of the Lincoln works and ten years later the Glasgow Carntyne Works closed. Of the three establishments who had sallied forth under the banner of the John Thompson Group in 1969, by 1982 only Cochran remained.

Aerial view of Newbie works 1977



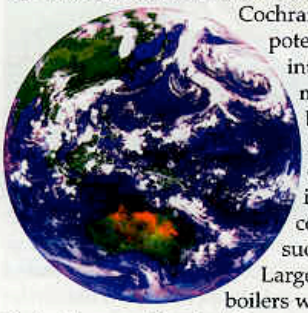
Cochran Coalmaster boiler with chain grate stoker

NEI and Rolls-Royce take over With the merger of Clarke Chapman Ltd and Reyrolle Parsons Ltd, Northern Engineering Industries plc (NEI) was formed in 1977, the Thompson Cochran Division becoming NEI Cochran Ltd. In 1982 it became part of Derby based NEI International Combustion Ltd, and with the merger of NEI and Rolls-Royce plc in 1989, Cochran became part of the Rolls-Royce Industrial Power Group.

Cochran - the exporter

Worldwide sales for over a century

Cochran Boilers are represented worldwide by agents, distributors and licensees. From day one, Cochran realised the potential of the international marketplace and became a truly international company, a vital ingredient in the company's success.



Large numbers of boilers were shipped to Cuba, Iran and South Africa, and an agreement with Algeria lead to the supply of numerous steam and hot water packaged boilers and training there.

Valuable experience was gained in dealing with overseas clients. As the product range and the company's manufacturing base increased, Cochran entered and nurtured new areas of the world, previously little touched by UK boiler manufacturers, the name Cochran becoming the generic word for boiler in many countries.

With approximately half of the Cochran boiler output destined for export, new markets are constantly being researched, then developed. China is a particular success story. Cochran has supplied over 600 gas and oil fired package boilers in the last 30 years and in 1995 became the first company in the world to be awarded the prestigious Chinese seal of approval for safety. From 1997 the licence was made mandatory for all boilers imported into China.