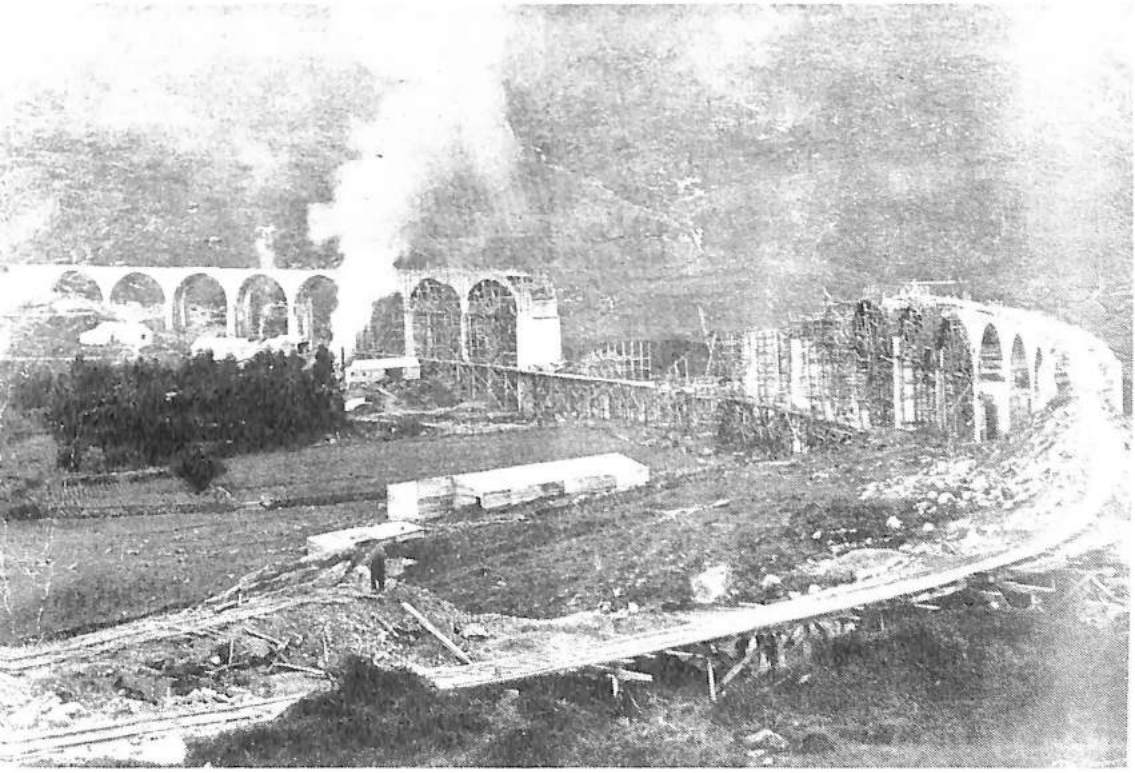
SCOTTISH INDUSTRIAL HISTORY



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Articles should be submitted in typescript to the Editors, Scottish Industrial History, The Archives, University of Glasgow G12 8QQ from whom further details may be obtained.

The front cover illustration is of Robert McAlpine & Sons' mass concrete viaduct at Glenfinnan, under construction in 1898. The viaduct was the largest and most spectacular built by McAlpine on the West Highland Railway's extension line from Banavie to Mallaig, The Engineer Vol LXXXVI, 16 Sep 1898.

The back cover illustration is an alchemists' laboratory, from H Waibits Petark's Trostspiegel from R J Forbes Short History of the Art of Distillation

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SOME NOTES ON 'CONCRETE BOB' McALPINE

by

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and
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In a recent article in The Scots Magazine on mass concrete buildings in Scotland, Lawrie Orr refers to 'Concrete Bob' McAlpine and his most famous work in Scotland, the construction of the Glenfinnan Viaduct.[1] In fact Sir Robert, who became one of Britain's leading contractors and was created a baronet in 1918, was a pioneer in the field of concrete construction. Many other monuments to his success have survived.

Robert McAlpine was born in Newarthill in Lanarkshire in 1847. He worked in local coal mines before becoming a bricklayer's apprentice, and in 1868 he set himself up in business in Motherwell as a jobbing brickbuilder.[2] Robert moved to Hamilton in 1873, and learned of ways of erecting concrete houses either from local builders or from the pages of building trade journals. He was soon at work erecting his own tenements in Hamilton, Burnbank, Stonefield and Motherwell, and he experimented by making concrete doorsteps, and lintels for the brick buildings.[3]

Robert's concrete was composed of three parts crushed sandstone to one part Portland cement, mixed together and 'slackened' in water. The concrete was poured into wooden boxes, along with broken stones as 'packing', to be moulded to the required shape.[4] He sometimes mixed granite with the aggregate, and discovered that 'granolithic' was an excellent hard-wearing concrete which was especially suitable for doorsteps.[5] Bricks and stone, as well as the services of bricklayers and masons, were expensive to obtain during the economic boom of the early- and mid-1870s.[6] As Robert discovered that he could make and build up

concrete for about one half the cost of carrying out the work in stone, and that it was cheaper to build in concrete than brick, he began to build tenement walls of concrete blocks.[7]

John Tainsh, who had been building in Hamilton for thirty years, began to erect houses in 1876 using a method of concrete construction patented by J C Sellars of Birkenhead.[8] The walls of the houses were built up of concrete shell blocks, and the hollow core of each wall was then filled with a mixture of rubble and concrete made from Arden lime and gravel.[9] Tainsh was one of Hamilton's best-known and most colourful entrepreneurs, and his adoption of the Sellar's method of building was reported in detail by the local newspapers. Robert must also have known that the erection of house walls by pouring concrete into temporary formwork was relatively common in England and finding favour with some Scottish builders.[10] Nevertheless, he experimented with neither of those methods of building in concrete and continued to make blocks. He must have felt justified in not adopting Sellars' technique, when one of Tainsh's concrete houses collapsed shortly before completion and a workman was killed. After the accident Tainsh was taken into custody on a charge of culpable homicide, but the case against him was dropped before it came to trial.[11]

Robert's houses in Lanarkshire have been demolished, and no nineteenth century accounts of the appearances of the buildings or the standards of comfort they offered to tenants have come to light. However, the stone tenements which Robert built for the Callander & Oban Railway Co in 1881, with their concrete doorsteps, quoins and lintels, still stand in what is now Alma Crescent in Oban.

In 1884 Robert won the first of four contracts to build the Lanarkshire

and Ayrshire Railway.[12] It took six years to complete the line from Barrmill to Ardrossan and the branches from Giffen to Kilbirnie and Kilwinning to Irvine. The railway company's consulting engineer was John Strain of the Glasgow firm Strain and Robertson.

Strain's talents were recognised during his lifetime, but his contribution to the development of British civil engineering has been overlooked since his death in 1931.[13] The engineer also played a part in establishing for Robert a reputation as a builder in concrete.

Concrete was accepted as a suitable material for foundations, dock walls, industrial buildings such as warehouses and cheap houses during the 1880s, but Jack Simmons found that, in general, British railway engineers were slow to adopt concrete.[14] Simmons could find only a few examples of concrete works, on a minor scale, in English railway construction during the nineteenth century, and he did not believe that it was used on a large scale in building British railways until the turn of the century. He overlooked the activities of John Strain.

Strain supervised the construction of the Dalmally-Oban Section of the Callander & Oban Railway between 1878 and 1880. He encouraged the contractors to build bridge abutments, retaining walls, culverts and engine sheds of concrete, and 12,000 cubic yards of the material were used in the construction of the line.[15] He supervised the construction of Britain's first concrete railway viaduct, built on rubble masonry piers to carry the Killin branch of the Callander & Oban Railway over the River Dochart in 1885.[16] Strain encouraged contractors to use concrete extensively on other railway sites, and Robert carried out many of the works on the Kilwinning-Ardrossan line and the Irvine and Kilbirnie branches using the material.

The concrete which Robert used on the Lanarkshire & Ayrshire Railway was mixed in the proportion five parts of crushed stone and sand to one part Portland cement. Some works on the Irvine branch were executed in concrete blocks,[17] but most of the concrete used on the other lines was poured in situ. To build a bridge abutment, for example, the navvies deposited a 6 inch layer of concrete within timber frames (shutters). Large stones, some of them weighing up to 2 tons, were placed on this bed at least 3 inches apart and 3 inches from the shutterboards. The spaces between the boulders were filled with concrete, and once it had set another 6 inch layer was poured on top and the process was repeated until the abutment was built up to the required height. Robert purchased at least two concrete mixers, a Jamieson and a McKinnel model, to speed up the work on the sites. With the aid of one of these machines and a crane, a squad of navvies could lay 20 to 25 cubic yards of concrete at an abutment each day. Robert calculated that he employed only half as many men on concreting as he would have required to maintain this rate of progress building in masonry.[18]

The Irvine branch was closed in 1939, and virtually no trace of it remains. The rest of the line now lies derelict, except for a short section serving a military establishment near Barrmill and another transformed into a public walkway in Saltcoats, but most of McAlpine's concrete bridge abutments survive, many with their steel superstructures intact.

Robert built the Singer Manufacturing Co's factory at Kilbowie, of brick, between 1882 and 1885. In 1891 he returned to the district to build fourteen semi-detached cottages of concrete.[19] He was well aware of a popular antipathy to cold grey concrete buildings, and he mixed iron oxide

with the aggregate to give the walls of the houses the hue of red sandstone. The results can still be seen as eight of the cottages survived the Clydebank Blitz and still stand at the western end of Montrose Street.

In 1892 Robert was awarded the contract to build the Buchanan Street - George's Cross section of the Glasgow District Subway. Rather than line the tunnel with brick or masonry, Robert asked if he could use concrete for the job. Robert Simpson, one of the consulting engineers for the subway, wrote later that:

> 'Only at a few points was the rock hard enough to stand being shorn, and the shale or "blaes", of which a large amount was met with, is friable and does not weather well. On this account almost all the rock tunnels have been lined, and this has been done with concrete - a method initiated by Mr Robert McAlpine and which, when well done, makes an admirable lining'.[20]

Robert's eldest sons, Robert Jnr and William, became partners in their father's firm in 1893. One of Robert McAlpine & Son's first contracts was for the Bowling-Dumbarton section of the Lanarkshire & Dumbartonshire Railway, and they were later awarded the contract to build the line from Old Kilpatrick to Bowling.[21] McAlpine were the only contractors of the Lanarkshire & Dumbartonshire Railway to build in concrete, and they used iron oxide as aggregate for the first time on one of their railway contracts. The most prominent features built in red concrete are the now-derelict stations at Bowling and Old Kilpatrick, the canal basin and the viaduct and swing bridge which cross it at Bowling Harbour and Dumbarton East and Dumbarton Central Stations. The face of the concrete was often

scored with horizontal groves, to add to the impression that sandstone blocks had been used in construction.

Red concrete piers were built by McAlpine in 1895 to support the superstructure of a bridge which carried the Glasgow Central Railway's branch line across the River Kelvin from Dawsholm Station to Temple Gasworks.[22] The bridge deck has been removed but the piers still stand a short distance downstream from the famous Forth and Clyde Canal aqueduct. McAlpine did not always mix iron oxide with their aggregate, and presumably left the decision on what colour the concrete should be to the consulting engineer and the client. There is no doubt that red concrete was not universally popular. It was used to build bridge abutments and three viaducts (one faced with brick) on the Lanarkshire & Ayrshire Railway's extension line from Giffen to Cathcart in Glasgow, 1898 to 1903. HA York, the Board of Trade's Railway Inspector, commented that:

> '... I see no objection to the use of concrete in this matter, provided that the materials of which it is composed are of the best quality and that it is mixed and used in a careful manner. For some reason the concrete on this line has been coloured pink, which in my opinion is a mistake. There is no advantage in trying to disguise the fact that concrete has been employed, nor is the present attempt successful or satisfactory to the eye'.[23]

McAlpine may have felt a little aggrieved at this criticism of their efforts to make concrete more pleasing to the eye. In any case, they seldom coloured their concrete red (or pink!) in later years.

The Glenfinnan Viaduct, on the West Highland's Mallaig Line, is McAlpine's most famous work in concrete. The viaduct is indeed spectacular, but so

too are others at Loch Morar, Loch Nan Uamh, Arieniskill and the Arnabol and Borrodale Burns. Even before the Mallaig Railway opened in May 1901 it was the Borrodale Viaduct which attracted admiring comment from British and foreign observer.[24] When he was told that the railway was to cross the burn on a concrete viaduct, the landowner insisted that the parapets and piers be faced in granite in order that the beauty of the glen should not be disfigured.[25] The railway company's directors were alarmed at the prospect of having to pay an enormous sum for granite to clad piers up to 80 feet in height, but McAlpine came to their rescue. They offered to build the viaduct with a central span 127 feet 6 inches in length, thereby avoiding having to build piers on the floor of the glen. It was said to be the longest unreinforced concrete bridge span in the world at that time, and was built for a mere £2107.[26]

In 1904 McAlpine returned to Clydebank to begin a series of extensions to the Singer factory. They built the floors of the new cabinet works of ferolithic concrete, consisting of slag from Siemens-Martin steel furnaces, some ground to 1.5 inch aggregate and some to powder, which was mixed with Portland cement.[27] The firm patented their method of building ferolithic floors, but rarely built in mass concrete thereafter. Although the construction of the monolith quay wall at Yorkhill in Glasgow and the huge Methil No 3 Dock's sea wall were two of several contracts on which they used mass concrete before the First World War, McAlpine began to take out licenses to build in reinforced concrete according to methods patented by Francois Hennebique and others. They also patented some of their own methods, developed by the partners and their engineers.[28] The firm's head office moved to London in 1916 and most of the monuments to McApline's expertise in reinforced concrete construction lie south of the border. Nevertheless, the firm's successes in completing Wembley Stadium,

the Dorchester Hotel in Park Lane and other reinforced concrete buildings were due in large measure to the expertise gained by 'McAlpine's Fusiliers' while building in mass concrete in Scotland.

FOOTNOTES

1. Lawrie Orr, 'Concrete Can Be Couthie', 'The Scots Magazine, (Dec 1985) p 249
2. Robert's examination as a bankrupt, 12 Jul 1880, in the sederunt book of Robert McAlpine, Scottish Record Office (hereinafter cited as SRO) CS/318/35/200
3. Hamilton Advertiser, 13 May and 3 Jun 1876, p 2
4. Ibid
5. Alec M Hardie, The Story of Robert McAlpine and His Family (unpublished MS, c1960) p 13
6. Hamilton Advertiser, 13 May and 3 Jun 1876, p 2
7. Ibid, 24 Jun, 9 Sept and 7 Oct, 1876, p 2
8. The Architect, 3 Mar 1877. Tainsh was the first builder to use Sellars' method of concrete construction for housebuilding, according to this advertisement.
9. Hamilton Advertiser, 3 Jun 1876, p 2
10. The Builder, XXIX, 5 Aug 1879, p 599. Stirling Journal, 21 Oct 1870, p 2
11. Hamilton Advertiser, 7 Dec 1878, 22 Mar, 26 Apr and 10 May 1879, p 2
12. SRO, Lanarkshire & Ayrshire Railway & Co: Minute Books, BR/LAR/1/1, 29 Feb and 3 Mar 1884
13. See The Bailie, 13 Sept 1899, p 1 and his obituary in the Glasgow Herald, 31 Mar 1931, p 11
14. Jack Simmons, The Railway in England and Wales, Vol 1, (Leicester, 1978) p 161

15. The Scotsman, 1 Mar 1880, p 6

16. W S Harvey, 'Mass Concrete: Some Scottish Applications of an Almost Forgotten Material', Industrial Archaeology, XV (1980) p 308. The viaduct is described in Engineering, 23 Jun 1893, p 861

17. J W Stevens, 'The Introduction of Rubble Blocks Into Concrete Structures' Minutes of the Proceedings of the Institute of Civil Engineers (hereinafter cited as Proceedings) CXIII, 1892-93, Part 3, p 229

18. SRO, The Lanarkshire & Ayrshire Railway: Ardrossan Contract, 8 Mar 1886, CS 96/2178 Item 74. W A P Tait, 'The Lanarkshire & Ayrshire Railway' Proceedings, CV, 1890-91, Part 3, p 298

19. Dumbarton Herald, 26 Aug 1891. The newspaper mistakenly refers to ten cottages, while the valuation rolls make it clear that there were fourteen.

20. Robert Simpson, ' On Tunnelling in Soft Materials', Transactions of the Institute of Engineers and Shipbuilders in Scotland, XXXIX, p 153. We are grateful to Nicholas J Morgan for drawing our attention to this article.

21. SRO, Lanarkshire and Dumbartonshire [sic] Railway Co: Minute Books, BR/LAD/1/1, 13 Jan 1893, 17 Jan 1894

22. SRO, Caledonian Railway Co: Board and Committee Minutes, BR/CAL/1/38, 9 Apr 1895

23. Public Record Office, Board of Trade Railway Inspectors' Report, MT 29/65

24. See, for example, Engineering News, XLI, 1899, No 6, p 84 and The Railway Herald, 23 Jun 1900

25. Hardie, op cit, p 38

26. W S Wilson, 'Some Concrete Viaducts on the West Highland Railway', Proceedings, CLXX, 1906-07, Part 4, p 304

27. Some Notes About Contracts Carried Out By Robert McAlpine & Sons (c1913), pp 34-9

28. For details of Malcolm McAlpine's patent for reinforced concrete caissons, see ibid, p 53. Patented methods of tunnelling in reinforced concrete are described in the same publication, pp 46-50, and in McAlpine Contracts (c.1920) p 137.

29. Descriptions of the work involved in completing nearly all the contracts undertaken by McAlpine 1884 to 1920, including many on which the firm built in mass concrete, are included in McAlpine Contracts.

THE KOSMOID ENIGMA

by

David I Harvie
Dumbarton

On 4 January 1906, the Daily Express in London published an article in its business pages which publicly alleged for the first time that a scandal was brewing involved the cream of the Scottish business establishment.

'COPPER MARKET ATTACKED

MYSTERIOUS DOCUMENT EXPOSED

> A new metal called Cuferal, a mixture of copper and iron, is being manufactured by Kosmoid Ltd. An ingenious attempt has been made by some unknown persons to make this manufacture the means of a raid on copper shares, with the object of driving them down in price. The process, which is a secret one, was invented by Dr Alexander Shiels of Glasgow and London, and it is carried out by Kosmoid Ltd, whose headquarters are at Glasgow'.

Not, you might think, a particularly unusual example of 'business creativity' but worse was to come.

> 'A mysterious-looking document, apparently of American origin, reached the Express office for publication yesterday. It stated that the secret of the Philosopher's Stone and the transmutation of metals had been discovered by a young Glasgow doctor, and that certain buildings on the bank of the Clyde near Dumbarton will soon see the transmutation of the baser into the more valuable metals.
>
> It is suggested that the real secret of Kosmoid was not the method of making Cuferal, but the transmutation of metals,

and declared that such eminent men as Lords Kelvin, Overtoun and Inverclyde, having had ocular demonstration of the manufacture of gold, silver and copper from lead and iron, had become shareholders.

"The initials of the names of the largest shareholders," said the document, "form the word KOSMOID. They are Lord Kelvin, Lord Overtoun, Dr Shiels, G G Millar, Lady Overtoun, Lord Inverclyde and Denny Brothers, of Dumbarton." '

The story went on to assert vaguely that the Government had been advised of the discovery, and were preparing to take the matter in hand as regards the manufacture of gold and silver. It stated further that it was rumoured in Glasgow that 'a large German firm has bought the rights of the making several metals, notably copper, for a sum of many millions sterling.'

The article in the Express went on to consider the possible effects on the market of such a situation and concluded with a guarded denial by Alexander Shiels, who attributed the story to 'a concoction of misstatements founded on one or two facts' by those who had reasons of their own to manipulate the markets.

The newspaper story was to be, however, the beginning of a scandal which embarrassed some of the wealthiest families in Scottish engineering, shipbuilding and commercial circles; hopes and ambitions in the West of Scotland were raised and dashed on a grand scale; a Parliamentary Commission into dramatic proposals by Dumbarton Burgh Council collapsed amid angry recrimination; their story was described by a bitter director in a novel which had a strange publishing history, and the whole episode

has percolated through the years as a half-baked, half-understood, half-legend.

This article attempts to sketch the main outlines of a peculiar aberration of commercial history at the turn of the century; the story is convoluted and colourful, and researching it has had the added difficulty of a number of red herrings, some due to the passage of time and others due to attempts to cover the traces of what was then - and is still perceived by some as - an embarrassing episode best forgotten.

The most intriguing factor undoubtedly lies in the character of Alexander Shiels. He was born in 1865 at Earlston in Berwickshire, the son of a tenant farmer, and spent his youth living with his mother Elizabeth - from photographs, a powerful-looking woman in the image of the Hollywood 'matriarch' - in John Street in Glasgow, from where he attended Glasgow University, graduating MB,CM in 1890, BSc in 1891.[1] His mother was related by marriage to William Elliot of Lanark, who was to make a fortune in livestock-dealing and to found the auctioneering firm of Lawrie and Symington of Lanark. (William Elliot's son, Walter, became Secretary of State for Scotland 1936-38, and Minister of Health 1938-40). While still at university, Shiels worked occasionally in a chemist's shop in the city and - more significantly - began to collaborate with his uncle, William Elliot, on the invention of milking machinery. This early partnership in mechanical engineering was to have a profound influence on Alexander Shiels and his future activities.[2]

By 1895 Shiels and Elliot were partners in the Thistle Mechanical Milking Machine Syndicate and formed, with others, a company of £50,000 share capital to develop patents and inventions owned by Shiels and Elliot; a small factory was built behind a tenement block in Gateside Street, off

Duke Street in Glasgow's East End. Their main product, the Thistle Mechanical Milking Machine - one can be seen at the Agricultural Museum at Ingliston, near Edinburgh - is regarded as having been of considerable significance. Between 1891 and 1902 Shiels registered nearly two dozen patents in Britain relating to milking machinery, and the Thistle Company registered patents, licences and trademarks in a dozen countries.[3]

By 1901, Shiels was living, still with his mother, in a pleasant, leased building at 190 Bath Street in the expanding, wealthy West End of Glasgow. Once established there, Shiels began to use two different letterheads, one describing himself as 'Physician' and the other as 'Consulting Engineer'. 1901 was a busy year for Shiels. He also leased premises at Endsleigh Gardens, off Euston Road in London, and also nearby in Gordon Square, both areas which at that time were popular with a variety of medical men.

He was not content to adopt the role of an ordinary general practitioner; his preference for wealthy patients was not perhaps unusual, and he was moving quickly up the ladder of prosperity, both as physician and as engineer. In quick succession he opened two nursing homes - one in the superb Nash-designed Park Crescent, near Regent's Park in London (where his next-door neighbour was Lord Lister), and the other at Claremont Terrace in Glasgow's West End where, oddly enough, Lord Inverclyde was a neighbour. He successfully appears to have cultivated his relationships with the wives of the wealthy patients who consulted him - to the extent that he earned a considerable degree of dislike and distrust among his professional colleagues, many of whom - both at the time and in later letters about him - regarded him as something of a devious charlatan. Indeed, these jaundiced opinions have been responsible for a number of tales about him which have suggested - incorrectly - that he practised

medicine without having the appropriate qualifications, 'the most polished humbug and trickster ever met or heard of - his capacity for fraud almost unlimited.'[4]

Letters written home by an American niece, Adelia, reflect a quite lavish life-style at Bath Street, describing the fine furniture, the employment by Shiels of a number of servants, carriages and even a private railway coach, which he used on his frequent visits to London.[5] It was naturally assumed by his mother and others in Glasgow that Alexander Shiels was, on those trips away, attending to his nursing home in London. In secret, however, on 18 December 1902, he married Georgina Clark at St Pancras Registry Office.[6] It is certain that Shiels continued to keep the marriage secret and there is no record of his wife ever having visited Scotland.

Despite his obvious success in the medical world, Shiels was not ignoring his alter ego. From his addresses in London, and using the service of professional patent agents, he was registering a large number of patents and licences over a very wide field of subjects - milking machinery; refrigeration plant; railway signalling and communications equipment; water, gas and oil pumps and valves; air conditioning plant; thermostats; generators; furnaces; gas lighting; locks; clocks; car wheels and gearing; engines; carburetters; brakes; radiators; and many more. Most of these patents were in his own name, but occasionally he collaborated with others, both in the UK and in America. In this country alone he registered well over a hundred patents, and he registered additionally in America, Canada, Norway, Sweden, Denmark, France, Germany, Switzerland, Belgium, Holland, Australia and New Zealand.[7] His secret personal life was compounded in October 1903 by the birth of a daughter, Alexandrina, at Endsleigh Gardens; the birth certificate gives the

father's occupation and address as 'Medical Practitioner, 14 Endsleigh Gardens, St Pancras'.[8]

Six weeks later, on 10 December 1903, Kosmoid Limited was incorporated as a £20,000 company (this capital was later substantially increased) 'to operate patents and licences'. Shiels immediately began to enter into a series of agreements with the company relating to his patent registration, and the company recorded Alexander Shiels', 'special facility to introduce patents'. The directors of the company were James Denny (the Dumbarton shipbuilder and engineer); Alexander Shiels; Charles W Fulton, of the prosperous Paisley textile firm; George Grandison Millar, a wealthy art publisher; and, at various times, a number of influential ironmasters, engineers and merchants.[9] A month later, in January 1904, Kosmoid Locks Limited was registered, as a result of an agreement between Alexander Shiels and John Smalley Campbell, a physician and dentist of Chancery Lane, London. Principal shareholders were Campbell, J S L Alexander of Philadelphia (a patent collaborator of Shiels), and Kosmoid Limited.[10]

At the end of the same year, December 1904, a third company was established, in many ways the most interesting of the three - Kosmoid Tubes Limited; initial share capital was £150,000 and, like the other two companies, its registered office was at 26 Renfield Street, Glasgow, the office of Carrick, Kellock and Barclay, stockbrokers. The first directors were Andrew Dunlop, merchant, London; Graham F Ross, iron merchant, Glasgow; James Denny, engineer, Dumbarton; William Neill Black, merchant, Liss, Hampshire; Charles W Fulton, dyer and finisher, Paisley; Robert James Black, merchant, London; George Grandison Millar, art publisher, Glasgow; and John Carrick, stockbroker, Glasgow. The list of those who were to become, in the next four years, directors or

principal shareholders reads like the West of Scotland's industrial roll of honour: Leslie, James, Peter, Archibald and John Denny - all of the great Dumbarton shipbuilding family; William Donaldson, ironmaster and chairman of J & G Thomson; Archibald Coats, of the Paisley threadmaking family; Arthur Daulby Wedgwood, forgemaster of Dumbarton and soon to be managing director of Cammel Laird's Cyclops, Grimesthorpe and Penistone Works, Sheffield; Alex Walker, Kilmarnock distiller; Walter Brock and Daniel Jackson, both important figures in marine engineering; and a number of other significant individuals in West of Scotland business.[11]

Also set up in December 1904 was the organisation which effectively controlled the operations of the three Kosmoid Companies - The Metallurgical Syndicate, sometimes known as The M S Syndicate. This was a private association of eighteen individuals, with an initial capital of £30,000, and the principal members were: Alexander Shiels; G G Millar; Charles W Fulton; Archibald Coats; William Donaldson; Archibald Denny; James Denny; Walter Brock; Peter Coats; and William Coats. Amongst the stated objects of this very private, yet apparently powerful group, was 'the commercial development of the products of certain secret processes of manufacture known to Alexander Shiels, known respectively as the Quicksilver Process and the Copper Process, by which quicksilver could be produced from lead and copper from iron.' Having thus far given their cash and backing to such a secretive but soon to be grandoise scheme, they now effectively gave up real control. £12,500 of the capital was to be paid over to Alexander Shiels, and on payment of the first instalment Shiels deposited a sealed packet, by arrangement, in the Syndicate's bank; this packet contained 'full information and instructions regarding the secret processes'.

It was agreed that Shiels was to have complete control of any manufactures, of any buildings which might be erected, and of any persons employed in the venture; the members of the Syndicate agreed that they would 'have no right of interference with or enquiry into the said process' and that they could not visit any of the premises to be built.[12] In addition, Shiels was to be paid £500 for 'superintendence'; a royalty of 20 per cent on the net invoiced prices of the manufactured articles as sold was to be paid to Shiels; a proportion of the profits remaining (to be decided by the parties) was to be set aside as a reserve, and one-third of the then balance was to be additionally paid to Shiels - the two-thirds to be paid to three trustees of the Syndicate for distribution as decided by them. Within three months, Alexander Shiels had improved his deal; his royalty was increased to 30 per cent; of the remainder, 10 per cent to be set aside, three-fifths of the balance to be paid to Shiels and the remaining two-fifths to be distributed among the members of the Syndicate - of whom Shiels was of course one.[13]

During the late summer and autumn of 1904, surveyors were seen on the Dunbuck Estate, beside the River Clyde just outside Dumbarton. The heir to the estate, the Marchese Chigi, was seen in the town, and speculation began in the press:

> 'The townspeople are pleasantly anticipating the erection of a proposed new work at Dumbuck, but up till now, all that has definitely transpired is that a large field of 15 or 16 acres of ground has been taken off...I hear it stated that the new works will be put down on the American principle; that its equipment of machinery will be as near perfection as it is possible to make it; in fact that the new concern will be quite novel and wonderful for these parts.'[14]

The Burgh Council of Dumbarton took an intense interest in these developments. The Provost, Robert McFarlan, was an experienced and flamboyant character - a senior town lawyer and councillor of long standing, he was intent on extending and improving the image of the town. He had been a promoter of a scheme to build a railway tunnel under the Clyde from Langbank to Milton, and was active in trying to improve the town's water, gas and electricity supplies. A new tramway system and improved railway services were being encouraged by the Provost and the Council as a means of making the town more attractive to industrial opportunities. The Kosmoid operation could not have come at a better time, and McFarlan became the main promoter of the hoped-for developments although, as the Lennox Herald pointed out on several occasions, 'so far, there has not been a single authoritative statement of the object, nor any word as to who is at the back of the concern.'

Those unknowns at the back of the concern responded to the local climate; plans were announced for the construction of a huge garden city on the slopes of Dumbuck Hill - 6,000 cottages, housing up to 30,000 thousand of the Kosmoid workers and their families; the garden city was to have its own school, library, shops, church, etc.

> '... their capital seems to be unlimited, and nothing but the very finest material and workmanship pleases those in charge. Besides the immensity of the erections, features of the work are the electric power station, and the erection of a huge Mond gas producer... . The operations of the Directors outside the works propper are also creating a great deal of interest...what may emerge out of this it is too soon to say, but it is a fact that the Company has largely extended its holding of ground and presumptive rights since they purchased their original site.'15

One of the 'operations of the Directors outside the works' was to inform the Council, through Provost McFarlan, that the huge factory would require up to three million gallons of water PER DAY, and persuade the Council to arrange this. The Council responded with some excitement to this kind of problem. The question of improvements to the water supply was already being examined, and before long, the Council decided to promote a Parliamentary Order which would, firstly, improve the Burgh boundaries to include the Ksomoid factory site, and, secondly, impound the waters of Loch Sloy, above Loch Lomond, and pipe the huge supply thereby obtained to Dumbarton - largely for the use of Kosmoid.

> 'The area of the present [water] scheme was 633 acres, while Loch Sloy had the enormous acreage of 4,000. Of course the loch itself was not able to contain all the water falling there, so the proposal was to build a 40ft embankment. The present scheme would provide for a normally increasing population, but then they had this wonderful works of Messrs Kosmoid (applause). Extensive provision must be made for it, though it was right to point out that any burden so imposed would fall on hundreds of taxpayers to whom the coming of the new works would mean nothing. While the cost of the new scheme was put at £150,000 he would not be astonished did it cost £200,000. At any rate, assuming the first figure, the estimate was that it would give them five million gallons of water per day.'[16]

Many members of the Burgh Council were undoubtedly excited by the prospect which they felt they could see, but others were more cautious, and speculation continued:

'... some aver that the principal part of the work will be the manufacturing of projectiles; others that a new motive power will be conserved that will revolutionise every existing energy, and will be bottled up in such a manner as will assure its transfer to any distance, and so make it available for the promotion of industry in every land.'[17]

In the autumn of 1904, Alexander Shiels' mother wrote to Alexander's half-brother, Thomas, who had a prosperous business in Commerce, Texas:

'My Dear Tom, I can scarcely understand all that is taking place - surely it is the work of the Lord. It is settled that you are to get the appointment; there is to be a meeting of the Directors on Tuesday first. Alex thinks you will be wanted at the works sometime in March, if so, you could come in February and have time to look about you before going into harness. I think I told you of the new works that were being started at Dumbarton. They are "Secret" patents and Alex being the only one in full possession of the Secrets must have a Nominee so he thought you were the right man to get the preference and no doubt The Lord in his great mercy and kindness has planned it for you. You will have no work, only to see orders carried out. The Company is composed of very wealthy Gentlemen such as the Dennys. A nice house and garden will be got for you at Dumbarton which as you know is only a few minutes from Glasgow. It seems all too great to grasp.'[18]

Thomas sold his business in Commerce and left his family in America, while he came to Scotland to take up the opportunity of being Alexander's representative, at a salary of £1,000, his family expecting to join him

later. However, Thomas must have had second thoughts; before long he had turned down the offer and decided to return to America. It is not known what brought about that decision, but Mrs Shiels later described Thomas as being 'too soft' and said that 'my heart bleeds for him'. Despite them all, however, Thomas was the one who did well; he rejoined his family in Texas and built up a new business in Dallas.

Alexander was undeterred by this, rather personal, vote of no confidence. Considerable progress was made towards 'opening for business'. The Glasgow architects firm of Dykes and Robertson were busy planning and erecting a number of large buildings on the Dumbuck site. The first building was a two-storey general engineering shop measuring 250 feet x 60 feet, followed by the tube mill, 250 feet x 150 feet; the electric power station, 300 feet x 45 feet and most impressive of all, the fireproof stores, four-storey, 210 feet x 45 feet; in addition, there was the gas plant, 150 feet x 120 feet and a small boiler house, 70 feet x 50 feet containing 4 boilers (28 more were ordered from Babcock & Wilcox Ltd). The various buildings on the site were linked together by about 8,000 feet of railway tracks, which also provided connection with the adjacent lines of the Caledonian and North British Railways.

The fireproof stores building was constructed to specifications which suggest that it was designed to be much more than simply either stores or fireproof; the walls were of 2 feet thick concrete, clad in places with armoured steel plate; the floors were of concrete, supported by curved steel plate, further supported by re-inforced steel beams of 18 inches x 7 inches section and 75 lbs/ft and in rows down the building every 10 feet there were cast-iron columns of 11 inches diameter and 2 inches thick iron. The fireproof stores, unlike the other buildings on the site, was

owned by the Metallurgical Syndicate; this was the building which was later known - according to legend - as the Transmutation Building.[19]

Although there was a great deal of construction taking place during late 1904 and into 1905, there was still little evidence of what was to be produced or indeed of the large numbers of workers who were to be employed; some members of the Burgh Council began to adopt a cynical approach to Kosmoid.

> '... then there was Kosmoid, this El Dorado which was going to make Dumbarton "boom". Dr Shiels had confided in Mr Brown that Kosmoid was going to require some 6,000 cottages. (laughter) He was sure they would all be delighted to see Kosmoid, and he hoped they were going to employ thousands of workmen, but they had just got to take Kosmoid as they found them, and judging by the show they were making at present, it would be a long time before they employed anybody. (laughter) It was through Kosmoid they had been compelled to go forward with the Loch Sloy water scheme. If he were in the Council, he would be very much inclined to have some guarantee from Kosmoid that they were going to take so much water...Kosmoid was a commercial concern and they would look after their own interests. They were not to be made a success at the expense of those who had already made Dumbarton what it was. (applause)'[20]

Despite all the controversy and the anxiety about what was planned for the factory, goods were indeed being produced. During the spring of 1904 Alexander Shiels had made agreements to acquire a licence to produce a series of Time Recorders - workmen's time clocks - according to a specific patent. Several hundred of these machines were made, the Dumbarton Burgh

Police Authority being one of the earliest purchasers, but the parties to the agreement fell out over the payment of royalties and Shiels was taken to the High Court of Justice in London. In fact he won his case, being able to show that the Patent was invalid and that therefore his obligation to pay royalties was negated.[21] Another agreement made by Shiels in the spring of 1904 was with the Dennystown Forge Company of Dumbarton and its controlling partners, Walter Brock, Arthur Daulby Wedgwood, James Denny, Peter Denny, and Arthur Wedgwood. Under this agreement, certain equipment was to be installed within the Forge and operated experimentally, producing, according to 'the Shiels-Davis group of Patents', 'cylinders, shell cases and the like, for which Letters Patent have been procured.' It was arranged and agreed that, if the experiment was successful, a new company would be formed which would buy out the Dennystown Forge.[22]

In January 1905 Alexander Shiels became a father again; this time the child - a son, Alexander - was born at the London nursing home at Park Crescent, and that address was also given as the domestic residence.[23] About the same time, the Kosmoid Companies moved their registered address to one of Glasgow's most prestigious office buildings - 'The Hatrack', a superb Art Nouveau design by James Salmon at 142 St Vincent Street. The building was owned by the Royal Bank of Scotland and suites were leased by accountants and shipping owners; the Kosmoid companies leased more office space in the building than any other company.[24]

Despite the efforts of Alexander Shiels to give a 'gloss' to developments, speculation and controversy still prevailed, particularly in relation to the proposals for Loch Sloy.

'Substantial progress continues to be made with the laying down of the big works at the east end of the burgh. Much of this progress is not obvious to the eye, thousands of pounds being sunk in the foundations alone, but there is ample demonstration of the fact that Kosmoid is a big thing.'[25]

However, there were those who doubted the sense of it all:

'But a rosy rumour reached us that Dumbarton was in luck.
That a host of pretty cottages would nestle round Dumbuck;
And a mammoth undertaking to which Denny's was a toy,
Was to gobble up the gallons of a damned Loch Sloy.

But men in cots and tenements, with ample water up to date,
Will get no better service and will pay a sweating rate;
Will it profit them to witness Kosmoid floating like a buoy;
On the water they have purchased from a damned Loch Sloy.'[26]

All sorts of people with axes to grind and cases to promote began to make their voices heard in Dumbarton, and talks and lectures were to be heard on a variety of subjects, from the management of public utilities to the sponsorship and maintenance of the fledgling garden city movement.

1906 was the year in which everything began to fall apart. The year started with the letter in the Daily Express, which Alexander Shiels was able partially to repudiate by denying the involvement of Kelvin, Overtoun and Inverclyde, although the false allegation that they were party to the affairs of the Kosmoid companies has survived in legend. During the first few months of the year, the directors became more and more nervous in the face of public speculation and demands by Shiels for increased bank loans and overdrafts. The companies moved registered office yet again,

this time close to the factory site, to Dumbuck House, Dumbarton (now extended as The Dumbuck Hotel).

In May, the Burgh Council's Bill went before a Parliamentary Commission. Chaos broke out when the matter of the water scheme, having been designed to benefit Kosmoid, was discussed; the works manager, Andrew Prentice (who had been Shiels' collaborator on patent applications some years earlier) denied that Kosmoid required any water from the Council, saying that they were drilling for water at the factory and expected to find all their own needs. Lord Overtoun - the supposed secret backer - spoke out against the proposals and made clear that, as a principal landowner, he would not assist in negotiating land acquisitions for the garden city. Its case in disarray, the Council withdrew from the hearing and the proposed Bill was thrown out, with great acrimony and fury surrounding those who had been sponsors.

> 'Provost McFarlan has been examined many times in the House of Commons on private bills, but this last must have been his most unfortunate experience; as I indicate, an experience which is pretty extensive, I take it myself, as having been present for some time at the inquiry, that this burdensome result to the Burgh of Dumbarton was mainly the work of Lord Overtoun; also to the composition of the Committee, one of whom seemed to me to be asleep for the greater part of the proceedings.'27

In June, Arthur Daulby Wedgwood wrote from the Dennystown Forge to James Denny complaining about the manner in which the agreed experiments were being carried out - his own staff and workmen were being 'poached' and no payments were being made for disruption to his own business; in addition, 'I say without fear of contradiction that our Friends are romancing.'

Denny replied agreeing that matters had not been carried out properly and regretting that there was little chance of any payments being made, 'but should the Company ultimately realise their original expectations and be a great financial success, your claim for rent will be considered.'[28]

Alexander Shiels tried desperately to consolidate his situation and to persuade his fellow directors to continue to support him. There is one slim piece of evidence which may link Shiels and Lord Kelvin; in the summer of 1906 there is an entry in a letterbook kept by Kelvin's secrertary:

> 'Lord Kelvin has received Mr. Shiels' letter of June 25. He thinks you should not go on with your project as no result could come from it.'

There is no certain evidence that the 'Mr Shiels' of the letter is Alexander Shiels, but the timing of the letter and the spelling of 'Shiels' make the assumption reasonable. The fact the 'Mr 'rather than 'Dr' is used would conform to Shiels' habit of using the title which suited the occasion.[29]

By September 1906, Shiels had had enough and simply disappeared, leaving the directors in embarrassed confusion. Despite their considerable efforts to find him and plead for his return, they failed. Unknown to them, Shiels had fled to England, where he set up a new home - this time with his wife and children - in a new house in the Northamptonshire village of Earl's Barton. During the next few months he again adopted the role of consulting engineer and collaborated with two engineers, Frederic Russell and Alfred Jung, who owned a company in Willesden, north London, where they specialised in developing patents for motor car engines, phonographs and medical equipment. Meanwhile, in Glasgow and

Dumbarton, confusion, anger and allegations were the order of the day; the family of Andrew Prentice even claimed that Shiels had tried to murder him by poisoning. By the summer of 1907, Kosmoid Ltd and Kosmoid Locks Ltd, had been wound up; the Metallurgical Syndicate was wound up in early 1908 and a sequestration order started against it. Kosmoid Tubes Ltd - which possessed considerable buildings and plant - was reorganised, with James Denny and Arthur Wedgwood (who had earlier left the board) returning to attempt a rescue.

Only a year after he disappeared, Alexander Shiels was dead. In the autumn of 1907, he collapsed on the platform of Willesden Station; he was taken home, having suffered a severe stroke, and died at Earl's Barton a few days later. The legend has had Shiels fleeing all over the world, pursued by his business enemies; existing in poverty selling patent medicines and, after death, being exhumed and secretly reburied. The truth is rather more ordinary, and even the suggestions of huge fraud are groundless. He certainly did not 'run off with the money' - he died intestate, and the value of his estate was only £5,500. Certainly a great deal of money was lost by investors. The popular version of this affair often suggests that the whole thing was a great fraud perpetuated by Shiels and supported by his backers. This is certainly not the case, although it has to be wondered what persuaded such eminent figures to invest in what so quickly was seen as a foolish venture.

The attempt to revive Kosmoid Tubes failed and the company was wound up in 1910 and assets transferred to the new Dumbarton Weldless Tube Company Ltd, under the control of James Denny and Daniel Jackson; the major shareholders were the Denny family, Archibald Coats, Frederic Russell and Alfred Jung, and the trustees of the late Walter Brock.30 Representatives from Babcock & Wilcox Ltd were consulted and joined the

board of the new company. In January 1912, the Glasgow Herald reported:

> 'The Dumbarton tube mills have never had an opportunity of demonstrating the possibilities of their patent manufacture. The machinery installed is of a novel pattern. It is said to be the patent of an American, and draws the tubes from a solid ingot. In the new start which is about to be made, a controlling interest...has been secured by Messrs Babcock & Wilcox, who own extensive boiler-works at Renfrew, and this firm will really direct operations. Their patent boiler is on the water-tube principle, and in its making in the course of a year they consume a vast quantity of tubes. If the Renfrew demand alone is to be met from the Dumbarton works, the new industry in that town will make a promising start.'

The start was promising and the new company was a success, to the extent that, by 1915, the influence of Babcock & Wilcox was complete and the Weldless Tube Co was taken over completely; the Dumbarton factory has been operated and expanded by Babcock & Wilcox and their subsidiaries since then.

It is difficult to conceive of those who backed Alexander Shiels unwittingly becoming involved in a fanciful project which resulted in allegations of alchemy; on the other hand, they seemed perfectly willing to allow their interests to be under the control of Shiels alone, and to give him unusually wide and rather secretive powers. Whether known to them or not, Shiels had associated himself with attempts to indulge in unconventional chemistry. Between 1903 and 1906 he had signed agreements and a deed of partnership with John Joseph Melville, a self-confessed alchemist who had a life-long career of controversial and scandalous

business dealings. Shiels employed Melville and installed him in the Dumbarton factory, with complete freedom to operate according to their own agreements relating to 'the secret quicksilver process' and without interference from any of the Kosmoid directors.[31]

Melville had first been involved in a scandal in Tottenham, north London in the early 1900s when, in premises supplied for him, he had tried to make tin and gold from lead. There was a further scandal in 1923 in Battersea, south London, where again in a specially equipped laboratory he was attempting to produce 'quicksilver' and gold; yet again, in Southend-on-sea, Essex, in 1928, the same thing happened. In 1924, Melville was publicly reported as saying, 'Gold can be made in large quantities, not only from mercury but also from antimony, lead, copper and silver, and I do not hesitate to positively affirm that with relatively simple plant, our debt to America can be wiped out in twelve months.'[32] Just before his death in 1928, he admitted that he had been trying to make gold in Dumbarton; there was a spectacular confirmation of his activities by Charles W Fulton (the wealthy Paisley dyer who had been a Kosmoid director and member of the Metallurgical Syndicate)who stated:

> 'A special concrete building of four floors was erected for Mr Melville's processes, the exact nature of which was kept secret. We in touch with him knew that he claimed to be able to produce copper from iron and quicksilver from lead, so say nothing of gold and silver.'[33]

This extraordinary account of what had been going on, by one of the principal backers, did not come for many years after the events. However, there had been an equally odd attempt to expose that same tale as early as 1910. In that year, a novel was published in London entitled, The Gold Makers by Nathaniel P McCoy. This rather bad novel tells the

story of an eccentric doctor, who is also an engineer, who persuades a number of influential businessmen to establish 'The US Multi-Patents Company'; this company builds a large factory, which becomes the scene of secret efforts to manufacture quicksilver and gold from base metals. The whole affair, as told in the novel, appears to mirror the scandal as perceived to surround the Kosmoid Company; only the names are changed, and the setting is Boston, USA. The poignant connection is that 'Nathaniel P McCoy' was apparently none other than George Grandison Millar, another Kosmoid director and Metallurgical Syndicate member. It was certainly the case that Millar had resigned his Kosmoid directorship and had succeeded in regaining some of his money, but it seems that a desire to expose the whole business had to be satisfied. It had further been claimed - and is yet to be disproved - that when his fellow directors learned of the publication of the novel, they bought up as many copies as possible and had them destroyed; certainly copies of the novel are rare.

Various accounts of these events have been offered by journalists and others over the years, but it is unfortunately the case that they have relied too heavily on transpositions from the novel into fact - sometimes to the extent of offering dialogue; likewise, the supposed involvement of Lord Kelvin, for example, has been described as both significant and detailed, yet no shred of evidence whatsoever has been produced. A more accurate account of The Kosmoid Enigma is long overdue; the affair is colourful and unusual enough without the invention of spurious and misleading fiction.

FOOTNOTES

1. W Innes Addison, A Roll of the Graduates of the University of Glasgow, 1727-1897 (James Maclehose & Sons 1898)

2. Shiels Family private letters
3. Scottish Record Office (hereinafter cited as SRO), BT2/2879
4. Glasgow University Archives, letter
5. Shiels Family private letters
6. General Register Office, London
7. Patents applications - Illustrated Offical Journal and Index
8. General Register Office, London
9. SRO, BT2/5495
10. SRO, BT2/5522
11. SRO, BT2/5748
12. SRO, CS 248/3289
13. 'Petitions under Joint Stock Companies Acts: Vol CLXXI'
14. Lennox Herald, Oct 1904
15. Ibid, Oct 1905
16. Ibid, Report of local election meeting, Oct 1905
17. Evening Citizen Glasgow, Feb 1906
18. Shiels Family private letters
19. Dumbarton Library, Dumbarton Dean of Guild Court records
20. Lennox Herald, Report of local election meeting, Nov 1905
21. 'Reports of Patents, Design & Trade Mark Cases', Henderson v Shiels, Dec 1906
22. Dumbarton Library, Dennystoun Forge papers
23. General Register Office, London
24. Glasgow Valuation Rolls
25. Lennox Herald, Oct 1905
26. Ibid, Apr 1906
27. The Weekly Mail, May 1906
28. Dumbarton Library, Dennystoun Forge papers
29. Cambridge University Library, Kelvin letterbooks

30. SRO, BT2/7500

31. SRO, Shiels Inventory

32. Daily Courier, Liverpool, Jul 1924

33. Daily Mail, London, Aug 1928

Alexander Shiels, MB CM 1890, BSc 1891: A Biographical Note

Derek A Dow, Archivist

Greater Glasgow Health Board

Alexander Shiels entered the University of Glasgow as a medical student in the autumn of 1883. In his first year he attended only Professor John "Soda" Ferguson's chemistry lectures, where he was awarded a 2nd class certificate of merit. Shiels did not matriculate in session 1884-5, although his attendance during the summer of 1884 gained him another 2nd class certificate, this time in Ferguson's practical chemistry class. He returned in October 1885 to study chemistry (yet again) and zoology. He was already, it seems, contemplating a career outwith the narrow confines of medicine, registering as a student in the faculties of both medicine and science. Shiels' persistence in this instance was rewarded with a 1st class certificate - in chemistry. This concentration of effort is significant in view of his later connection with John Joseph Melville, a self-confessed alchemist, for Professor Ferguson was an authority in this field and part of his superb collection of alchemical literature is now housed in the Glasgow University Library.

Alexander continued his medical education along fairly orthodox lines between October 1886 and his graduation as MB CM on 31 July 1890. In view of the later allegations that he was not properly qualified it is important to stress this point; although Shiels was not an outstanding student he was more than competent and, unlike many of his contemporaries, never suffered the indignity of resitting any professional examination.

Contemporaneously with his medical studies, Shiels acquired sufficient examination passes to qualify him for graduation with a BSc in biological sciences on 24 April 1891. His curriculum in this enterprise comprised

chemistry, anatomy, physiology, zoology, botany and natural philosophy (taught by William Thomson, later Lord Kelvin). This CV, very similar to that required for medical students in their early years of study, would seem to have offered little in the way of training for a man who was later to describe himself as a 'Consulting Engineer'. It would be interesting to learn if Shiels ever attended formal classes in an engineering faculty or technical college.

FISHER TENEMENT DESIGN

IN CELLARDYKE AND THE NORTH EAST FIFE COASTAL BURGHS 1862-1905

by

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The centuries old rivalry between Anstruther Easter and Kilrenny and Cellardyke harbours effectively ended in the early 1880s with the completion of Anstruther Union Harbour, which henceforth served as the dominant landing point for the north east Fife fishing fleets. In one important respect, however, the relationship between the burghs remained unaltered. As in earlier times the great majority of the fisher community continued to live in Cellardyke, a phenomenon commented upon in 1895, when it was noted that:

> '... it is mainly by the efforts of the Cellardyke fishermen that the town of Anstruther Easter is maintained, the inhabitants thereof being merchants, fishcurers, fishsalesmen, and others, who dispose of the catch made by the fishermen, none of whom reside in Anstruther Easter'.[1]

One consequence of this, particularly relevant to this article, was that a steady rise in the local population, beginning in the mid nineteenth century and stemming from the revival, after a period of prolonged depression, of the Fife fishing industry,[2] was unevenly distributed. In 1851 there was already an appreciable discrepancy in the size of the neighbouring populations, with 2,194 inhabitants recorded in the burgh of Kilrenny and Cellardyke and 1,146 in Anstruther Easter. Thirty years later their populations had increased to 3,198 and 1,248 respectively, a rise of 46 per cent as opposed to only 8 per cent.[3] The resultant

overcrowding of the Cellardyke housing stock was a source of repeated contemporary comment, an 1861 account describing how:

> 'There is scarcely requisite house accommodation for two thirds of the population, and the consequence is that many families are so huddled together that one room serves for the sleeping room of an entire family. One gentleman informs us that he this week visited a small room in which were four beds, each containing at least one occupant.'[4]

In the same year it was observed that in some houses 'there are to be found no less than eight individuals all living and sleeping in one apartment and these individuals composed of both sexes'.[5] As these accounts suggest, population densities appear to have peaked in the 1860s when it was estimated that 'three fourths of the families of the fishermen are each compelled to live in a single room'.[6] From the late 1860's onwards, however, the pressures brought to bear by a rising population were alleviated by a succession of house building programmes, the largest of which were sited on the previously unexploited farmlands extending northwards from Cellardyke's traditional landward boundaries. Proposals to develop this area had in fact been circulated as early as the late 1850s only to be thwarted by the 'flat refusal' of the relevant land superiors to release feus for building purposes.[7] The formation of a local co-operative venture, the Cellardyke Building Company, was followed by a significantly different outcome, the object of which was described in an East of Fife Record report of May 1862:

> 'The great necessity for additional house accommodation in Cellardyke is now about to be met ... in that a joint-stock company has been started to accomplish this desirable object. The company was formed in the course of the last week or two, and is composed principally of public spirited

> gentlemen both in Cellardyke and Anstruther. Their object is the humane desire to afford house-room to the very crowded and over-grown population of Cellardyke ... they propose to build a block of houses which will accommodate sixteen families... There cannot be a doubt but that the company will get them at once off their hands; for we learn that it is a fact that in Cellardyke there is not the requisite room for much more than half of the existing population'.[8]

Land was successfully negotiated several weeks later, and the ambitious nature of the undertaking confirmed by the identity of the 'competent party' commissioned to draw up plans; the St Andrews architect George Rae (1811-1869), whose proposals involved the creation of an entirely new thoroughfare, Ellice Street, running parallel to Toll Road and at right angles to the service road that would eventually constitute West Forth Street. The company's original intention was to 'dispose of the sites by sale to parties who (might) wish to buy them and erect the dwellings according to the plan laid down', with the qualification that 'in the event of no immediate sale the company will at once begin to build the houses and afterwards either let or sell them'.[9] No acceptable offers to purchase the plots seem to have been made for in December 1862 the company sought estimates for the building of numbers. 5 and 7 (Plate 1), which were to constitute the only dwellings erected as part of the original Ellice Street development.[10]

The failure to either sell the sites as building plots or to erect more than two of the projected sixteen houses on its own initiative, at a time when the demand for accommodation was considerable, suggests that the scheme, ironically, aimed to provide a standard of housing that the

fishermen of Cellardyke could not afford. Significantly the two houses, when completed in March 1863, were described as being 'of a much better class for fishermen than have hitherto been in existence'[11] drawing praise as having been 'planned by a skilled architect' who had 'carefully studied the convenience and comforts of the future occupants'.[12] 'Comfort' was catered for by the provision of five apartments, in addition to a large garret and cellarage space. The arrangement was greeted enthusiastically:

> 'Instead of a family, male and female, all crowding in one apartment, these houses are so designed as to supply several apartments to the same family, and may thus be the means of promoting better habits of decency and order than, we are sorry to learn have hitherto been in practice... '.[13]

While their spaciousness undoubtedly placed the houses beyond the means of the great majority of the fisher community, it was this very quality, coupled with an intelligent, and alternative, solution to the traditional problem of net and tackle storage, that established Rae's design as a model that was to determine the form of terraced fishermen's houses and tenements erected in Cellardyke throughout the ensuing quarter century.

Until the 1860s the great majority of fishermen's houses in Cellardyke had conformed to a low, barely two-storeyed arrangement dismissed by Gourlay (1879) as amounting to 'little more than a smoke begrimed cot'[14] that Whittingdon (1967) has suggested was a local modification of a 'basic single-storeyed, two roomed, two windowed' dwelling type, the Scottish 'but and ben'.[15] In such dwellings it was customary for the living space to be situated on the upper floor and reached by an external forestair, while the all important fishing gear was stored below in a basement cellar, a room half sunk below street level. The external and internal arrangement of the Ellice Street houses departed from this format in a

Plate 1. Numbers 5 and 7 (now 3 and 4) Ellice Street, Cellardyke

Plate 2. Fisher tenements, East Forth Street, Cellardyke, 1908
(Scottish Fisheries Museum)

number of important respects. Firstly, Rae's design exploited a higher quality of construction, with street elevations of squared as opposed to random rubble sandstone. It was also significantly taller, rising through two full storeys surmounted by a spacious attic, or more correctly, garret area. Each house was served by an internal stairway, thereby conforming to the policies of the Kilrenny and Cellardyke Police Commissioners, who had campaigned relentlessly against the provision of outside stairs.[16]

By far the most significant feature of Rae's design was, nevertheless, the prominent role, visual as well as utilitarian, assigned to the garret, which was now adapted for the repair and storage of fishing gear. Towards this end a gabled dormer was provided for each house, flush with the street elevation and serviced by a hoist.[17] The effect was to turn what had formerly comprised an irregularly occurring feature of north east Fife fishing dwellings into a standard element of design. With only a small number of exceptions, Cellardyke tenement arrangements of the post 1862 period made use of the idea which, when it re-emerged in the later 1860s and 1870s was in the hands, not of an architect, but members of the local building community.

Following the failure of the Ellice Street speculation, building activity focused instead on the neighbouring thoroughfares of East Forth Street (c1867-9)[18] and West Forth Street (1872-3).[19] Both developments adhered to Rae's two storey arrangement with garret, simplified dormer and sliding hoist, adding a small paved and walled area, sited at the front, for the temporary depositing of nets.[20] (Plate 2) In contrast to the Ellice Street houses these slightly later arrangements were designed to accommodate two families and therefore constituted tenements proper,[21] hence the introduction of a doored close, a traditional tenement feature, that had not figured in Rae's designs. Running through the entire depth

of the building this gave access to ground and, via a rear stairway, to first floor two roomed flats as well as permitting unobstructed access to the back courtyard area, where additional storage accommodation was provided.

Aimed at a broader sector of the Cellardyke population than their Ellice predecessors, the Forth Street tenements still constituted a distinctly superior level of working class accommodation, and were described as such in the local press.[22] The conventions of profit sharing adhered to by the north Fife herring boats are worth referring to at this point, notably the distinction drawn between full crew members contributing both labour and fishing gear and who received two shares in the catch profits, and those who contributed their labour only, and were thus restricted to a single share as 'half deals men'.[23] It was clearly the former group that the East and West Forth Street dwellings, with their generous provision of gear storage space, sought to attract. This contrasted with a smaller, if sizeable sequence, of three storey tenements erected a quarter of a mile to the east, along Dove Street (numbers 4-14, 1862-69) which, arranged on a one and two apartment basis, but lacking additional working areas, can be seen to have constituted the only serious nineteenth century attempt to meet the housing requirements of the least prosperous sector of the Cellardyke fishing community.[24]

Variations in dormer heights and window mouldings suggest that responsibility for the Forth Street tenements was shared between at least three builders. Only one of these can be identified with certainty, the monumental sculptor turned builder Alexander Wallace, who was active in both developments, subsequently repeating the formula in a number of gap site speculations, notably numbers 30-32 James Street (1885).[25] Wallace's

possibly vital contribution to the evolution of Cellardyke tenement design is suggested by his involvement in the much larger and more systematic exercise in the formula that followed before the end of the 1870s, eventually forming the Rodger Street/Fowler Street inter-connection, sited immediately to the north of the Ellice Street houses and developed piecemeal over a nine year period. Despite the time scale involved, these tenements constituted an exceptionally unified and coherent development, with each building conforming to the requirements of a common feuing plan drawn up by the Kirkcaldy civil engineer John Sang.[26] The plan itself, to which the public were given access in mid-December 1876, was augmented by a letter of January 1877 in which the land superior, Admiral Charles Henry Bethune, laid down the conditions that prospective vassals and housebuilders were bound to follow:

> '...the houses to be built with mutual gables and division walls, and placed 10' back from the line of the street and footpaths of channel and curb, and the roadway to be made by the feuars; the houses not to exceed two storeys in height, and to be built of stones with slates; and not to be used for any purpose other than dwelling houses and sale shops, the carrying on of any obnoxious trade being prohibited; drains to be submitted to Admiral Bethune, so as to ensure the erection of a good class of house'.[27]

The basic arrangement eventually adopted standardised the design type already introduced in the East and West Forth Street developments. When, in December 1876, it was first announced that Bethune was to feu land at the rate of £20 per acre, specific reference was made to just such a model: 'a feu for a fisherman's house such as those at present erected in East Forth Street, will only be about 30s a year'.[28]

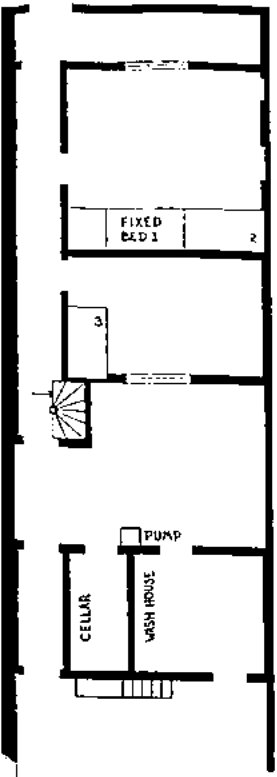
The sites eventually taken up formed only a proportion of those originally envisaged by Sang's plan, which made provision for seventy-four building plots, forty-four of which were subsequently developed. Construction began in March 1877 when the Cellardyke builder, Thomas Brown, commenced work on three plots, thus initiating the development of the west side of Rodger Street.[29] The first of these was assigned to a self-contained corner house, but the remainder were devoted to two family tenements, with two rooms to each family unit, a layout described by Gourlay (1879) who explained how:

> 'Each house is divided into two distinct properties, consisting of a ground floor and upper storey, with a lofty attic, specially designed for the repair and storage of sea gear. The section being 26' within the walls, is further divided into an inner and outer room for the accommodation of the family, who have the further convenience of a front area, 10' wide, fenced by a low wall, or parapet, with cellars in the rear, and a garden filling up the feu, which, in this way, is 20' in width by 150' in length. Here, then, on the once silent field a cheerful and busy street is seen to have a place, with groups of happy children dancing all day long in the sweetness and music of the sunbeam'.[30]

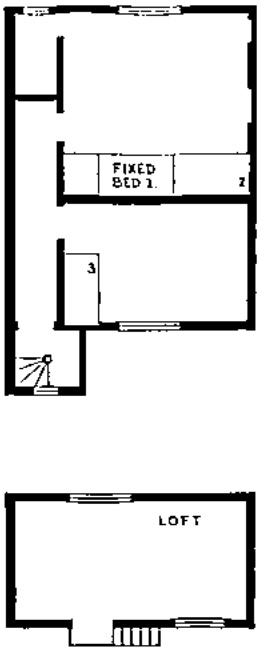
Garret dormers were inserted to front and rear. Although a small number of fixed external rear hoists were secured, the most favoured expedient was again found in sliding dormer beams, at least one of which survives (Plate 3). Water was secured via courtyard pumps, representing an advance on generally prevailing conditions in Cellardyke and the Anstruthers, where privately owned wells continued to meet the needs of the majority of the population until the early years of the new century. As in East and West Forth Streets a ground floor hallway led from front to

Plate 3. Sliding garret hoist, Number 4 Rodger Street, Cellardyke

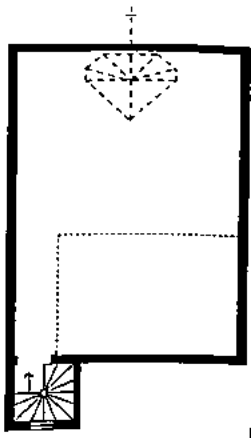
NO. 4 RODGER STREET, CELLARDYKE.



Ground Floor



First Floor



Garret

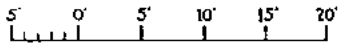


Plate 4. Plan, Number 4 Rodger Street, Cellardyke

rear, providing access to a courtyard and sheds. The latter, leading in turn to a shared garden area, was arranged on a two storey basis with the upper level assigned to gear storage, the lower to sinks, coal cellarage and back boiler (Plate 4). Contrasting with their Forth Street predecessors, and reflecting the local prosperity of the 1870s and early 1880s, the majority of the Rodger Street tenements operated as partial, as opposed to full, letting investments. In these circumstances the tenement owner invariably occupied the upper flat, which must have been quieter, possessed additional accommodation in the form of a front room closet, and frequently enjoyed the advantage of a bedroom extension into the garret area, to which the term 'attic' was exclusively reserved.[31]

On April 5, 1878 the Pittenweem plasterer, Robert Williamson, secured a feu for a 'double house' on the east side of Rodger Street.[32] The buildings subsequently erected on this side of the development (Plate 5) differed from Brown's tenements only in detail, with more elaborate window and door margins and gutters supported by ornate cast iron brackets. Their uniformity suggests that all were the work of one building firm, and it seems likely that Williamson was the responsible party.[33] Work on the remaining west side tenements developed at approximately the same time, involving Wallace, Williamson and probably Brown.[34] Slight variations in tenement heights, masonry bondings and internal arrangements confirm their uneven progression, never extending to more than four tenements at a time. The majority were completed by 1883 when a carved datestone was placed in the gable of the east side's northernmost building, a corner shop.[35]

Eleven tenements were erected in adjoining Fowler Street, completed in a relatively short period (1885-6) and shared between the Anstruther builder James Henderson and Robert Williamson, with the latter working in co-operation with his brother-in-law, the Pittenweem master joiner, William

Plate 5. Rodger Street, Cellardyke, viewed from the south, c1900 (Scottish Fisheries Museum)

Lumsden.[36] Prices secured ranged from £340 to £360, and all were sold to fishermen. The still ragged gable to number 2 Fowler Street confirms that a northern extension to Rodger Street was still projected in the mid 1880s. Although this part of Sang's plan was never in fact realised, a still impressive total of forty-two tenements were erected between 1877 and 1886, constituting by far the largest nineteenth century housing development in the north east Fife coastal burghs. Well before the latter date the now thoroughly standardised formula had found wider application, at first in St Monans (numbers 23-33 Forth Street, 1881),[37] slightly later in Pittenweem (numbers 55-65 Abbey Walk, 1884), the latter a speculation by James Henderson,[38] whose contribution to the Cellardyke Fowler Street programme has already been noted.

The years 1885 to 1894 constituted a period of virtually unrelieved depression for the north east Fife fishing fleets, the consequences of which were particularly acute in Cellardyke where a wholesale laying off of crews in the winter of 1885[39] was followed by the institution of soup kitchens, listed as serving five 'hungry and destitute' families in the winter of 1886-7.[40] A decline in population, from 3,198 in 1881 to 1,998 in 1891, was accompanied by a rise in the number of unoccupied dwellings, from 21 to 82.[41] By 1885 property prices had collapsed and domestic building starts had all but been brought to a halt.[42] Presumably in response to this situation Alexander Wallace, previously one of the burgh's most active building contractors, left Cellardyke in 1886, setting up in business in Kirkcaldy, where the building market remained buoyant.[43] Recovery, gradual at first, was more or less complete by 1899 when catches and prices rivalled the peak years of the late 1870s and early 1880s.[44] Although comparatively short-lived, ending with a catastrophic collapse in fish landings between 1908 and 1912, the boom was sufficiently deep-rooted

to sustain a further phase of tenement building which now focused on George Terrace, St Monans, where twenty-nine tenements based on a simplified version of the Cellardyke format were erected from 1900 onwards, promoted by a small group of local land holders working in association with the Lumsden/Williamson partnership and, introducing variations in the position of the great gable dormers, yet another Cellardyke builder, John Clark.[45]

More were undoubtedly planned. The vigorous promotion of a cottage terrace speculation on an adjoining site may, however, have constituted a significant inhibiting factor, particularly as the cottages sold well, representing a 'new departure' from what could now be described in unmistakably deregatory terms, as 'the stereotyped style of tenement fishermen's houses'.[46] Whatever the reason no attempt was made to perpetuate the formula, which ended in 1905 with the completion of the last of the George Terrace tenements and the decision, three years later, to assign the speculation's remaining plots to cottage units.[47]

FOOTNOTES

1. East of Fife Record, 22 Feb 1895, p 2
2. The consequences of which are described by Gourlay, 'in living memory only two fishermen dwelt in [James] Street to the westward of the Burgh Cross...or in a section of the town where more than one hundred sea faring families are accommodated today', G Gourlay, Fisher Life: or the Memorials of Cellardyke and the Fife Coast, (Cupar 1879) p 150
3. Census of Scotland - 1861, Population Tables and Report, Vol 1 (Edinburgh 1862), pp 44,46; the eighth Dicennial Census of the Population of Scotland, Vol 1 (Edinburgh 1882) pp 44,47
4. East of Fife Record, 5 Oct 1861, p 2

5. Ibid, 16 Nov 1861, p 2

6. Ibid, 8 Feb 1862, p 2. The same source continues, 'we are told sometimes that the state of morality is low in Cellardyke. However true this may be...we would ask how it can be otherwise, when families of seven and eight individuals, some of them grown up sons and daughters, are compelled to eat, live, and sleep in the same apartment'.

7. Ibid, 16 Nov 1861, p 2. For the advertisements of the Experience Investment Society of Edinburgh ('Let a new town engirdle the present old town...east, west and north, feus without limit can be obtained'). See ibid, 4 May 1857, p 2 and 3 Nov 1860, p 1

8. Ibid, 3 May 1862, p 2

9. Ibid, 3 May 1862, p 2 and 21 Mar 1863, p 2

10. Ibid, 20 Dec 1862, p 1

11. Ibid, 21 Mar 1863, p 2

12. Ibid, p 1

13. Ibid, p 2

14. Gourlay, op cit, p 150

15. G Whittington, 'The Impact of Former Occupations and the Improver Movement on House Types in Fife' Journal of the Society for Folk Life Studies, Vol 5 (1967) p 54

16. As many as fifty of which were removed as part of a process of civic improvement in the period leading up to 1879, (Gourlay, op cit, p 150). The Kilrenny and Cellardyke Police Commissioners Minutes for 1 Jun 1863 record the lengthy negotiations surrounding the removal of one such 'projection', dismantled at a cost of £25 compensation to the proprietor, a Mr Pringle.

17. Which survived in number 7 (now number 3) Ellice Street until 1985 when the interiors of the dwelling were stripped of their original furnishings.

18. The, 'great increase of carting traffic...brought along Forth Street' is noted in Kilrenny and Cellardyke Burgh Council Minutes, Vol 5, pp 22-30 (17 Feb 1868). See also the Kilrenny and Cellardyke Police Commissioners Minutes (10 Feb 1868). The buildings 'in course of erection' along East Forth Street are described in some detail in the East of Fife Record, 20 Mar 1868, p 2. Some at least of a sequence of front page advertisements in the same journal seeking tenders for unspecific areas of house building in Cellardyke, presumably relate to this programme. Seven appeared between 1867 and 1869, placed by James Morris (19 Apr 1867); 11 Oct 1867; 26 Feb 1869), Hugh Birrel & Son (5 Jun 1868; 29 Jan and 14 May 1869) and John Montadore (10 May 1867).

19. Numbers 34/36 and 28/30 West Forth Street being the dates 1872 and 1873 respectively. The progress of work is described in the East of Fife Record, 24 May 1872, p 2.

20. M Murray, In My Ain Words: An East Neuk Vocabulary (Dundee 1982), p 7

21. Eight, 'new houses...at present finishing' in West Forth Street were thus described as providing, 'additional accommodation...for 16 families', East of Fife Record, 24 May 1872, p 2. Their East Forth Street predecessors were similarly described as 'flatted', ibid, 20 Mar 1868, p 2.

22. As 'excellent and commodious houses', ibid, 4 Jun 1869, p 2, 'handsome building...constructed in the most approved style' possessing 'every household accommodation', ibid, 20 Mar 1868, p 2. Population densities nevertheless remained relatively high, with sixty-two occupants and twelve families recorded as inhabiting the six East Forth Street tenements in 1871, Census of Scotland 1871: Kilrenny Burgh, pp 44-7).

23. Described in P Anson, Fishing Boats and Fisher Folk in East Coast Scotland (London 1930) p 98. For the Scottish 'share' system in general, see P Thompson (with T Wailey and T Lummis), Living the Fishing (London 1983), pp 58, 61-2, 157, 231, 244-6

24. East of Fife Records, 21 Sep 1861, p 1; 7 May 1879, p 2; 4 Jun 1869, p 2

25. Wallace is described as 'at present finishing 4 new houses [in] West Forth Street' in the East of Fife Record, 24 May 1872, p 2. His contribution to both 'Forth Streets' is cited in his obituary, ibid, 1 Apr 1898, p 4. For his building contracting work in James Street, see ibid, 25 Sep 1885, p 2; 9 Oct 1885, p 1; 17 Sep 1886, p 2. See above footnote 18 for the possible identity of other builders involved.

26. East of Fife Record, 1 Sep 1876, p 2. Gourlay, op cit, p 151 refers incorrectly to him as 'Mr Saig'.

27. East of Fife Record, 15 Dec 1876, p 2; 12 Jan 1877, p 2

28. Ibid, 29 Dec 1876, p 2. One product of standardisation was the emergence of a descriptive vocabulary, restricted to the Forth/Rodger/Fowler Street tenements. Murray, op cit, p 7, lists two such terms: 'brick' (the walled and paved area to the front of the tenements) and 'through-gan' (passageway beneath the rear storage loft, leading from courtyard to garden). The word 'transe', denoting the ground floor hallway running from front to rear, was apparently employed by the inhabitants of Rodger Street alone.

29. East of Fife Record, 30 Mar 1877, p 2. The Kilrenny and Cellardyke Police Commissioners Minutes, 17 Apr 1877 record the decision 'to name the New Street...north of Ellice Street, now in progress of being built, Rodger Street'.

30. Gourlay, op cit, p 152

31. Murray, op cit, p 10; Record of the Register of Scotland (Sasines), Fife, Vol 22, p 12377. Ownership of the tenement number 22 East Forth Street (1869) was thus shared between John Martin, merchant, Robert Watson, grocer and Robert Brown, Fisherman (all of Cellardyke), none of whom is listed as an occupant in the 1871 census. Reaffirming the trend encapsulated by the Rodger Street properties, this tenement was purchased for his own occupancy by a fisherman, William Watson, in 1877, subsequently operating as a family house, with his son, James Watson (also a fisherman) residing in the lower flat, Register of Sasines, Fife, Vol 3, pp 2136-7. Self contained flats were sometimes purchased independently, as in the case of number 31 Rodger Street (1885) which was shared between James Dick, fisherman and Janet Boyter, spinster, necessitating a strict demarcation of the courtyard and cellarage areas (Register of Sasines, Fife, Vol 9, p 5729). Although the majority of Rodger Street properties now operate as one family units a sizeable minority continue to be divided along traditional lines, with the lower flat assigned to rented accommodation.

32. Title deeds in the possession of the present proprietor, number 10 Rodger Street, Cellardyke (Mr O Smith). Williamson's early negotiations with Bethune are described in the East of Fife Record, 8 Feb 1878, p 2.

33. He advertised a 'new house' in Rodger Street in, Ibid, 2 May 1884, p 1.

34. Wallace is described as one of the Rodger Street builders in ibid, 1 Apr 1898, p 4. Records of the Registers of Scotland (Sasines), Fife, Vol 9, p 5729

35. The Minutes of Kilrenny and Cellardyke Police Commissioners (Vol 6) provide an approximate guide to the progress of work, recording decisions relative to the provision of pavements (29 Apr 1878), main

drain and cess pools (1 Jun 1881) and final road surface (7 Feb 1884).

36. East of Fife Record, 11 Sept 1885, p 2; 2 Oct 1885, p 3; 30 Oct 1885, p 3; 13 Nov 1885, p 3

37. Title deeds in the possession of the present proprietor, number 25 Forth Street (Mrs B Neale). The speculation was George Sommers 'carter', and the purchaser William Gowans, 'fisherman'. The ground to the north, south and west of the new building 'was described as' still belonging to Sommers. The property on the site to the east (number 27 Forth Street) had already been sold, to a John Leslie.

38. Pittenweem Burgh Council Minute Book, Vol 9, pp 838–40, 842. East of Fife Record, 14 Mar 1884, p 3; 21 Mar 1884, p 3; 9 May 1884, p 3 and St Andrews Citizen, 6 Sep 1884, p 8. The contrasting cost of feus in north east Fife is commented upon by Gourlay, op cit, pp 151-2 who cites Cellardyke, West Anstruther and St Monans (£20 an acre) and the much cheaper Pittenweem (£12 an acre). Henderson's ground was secured in accordance with precisely this figure, amounting to £1.10.1d, Pittenweem Burgh Council Minute Book, Vol 9, p 845).

39. East of Fife Record, 1 Jan 1886, p 2; 22 Jul 1887, p 3; 30 Dec 1887, p 2

40. Ibid, 6 May, 1887, p 2

41. Ninth and tenth Decennial Census of the Population of Scotland, Vol 1 (Edinburgh 1882), p 211 and Vol 1 (1892), p 47

42. The East of Fife Record observing that it was 'impossible to sell houses at a reasonable rate...several properties are said to have changed hands at a discount of 50 per cent and more on the price not so long ago', 4 Oct 1889, p 2.

43. Ibid, 1 Apr 1893, p 4

44. The recovery of catches is described in ibid, 14 Feb 1902, p 4; 2 Jan 1903, p 2; 25 Dec 1903, p 2. The annual landings totals for Anstruther District between 1855 and 1904 are listed in ibid, 24 Feb 1905, p 5.

45. The relevant speculations are identified as Robert Marr, Andrew Scott, David Smith, Robert Tenat and 'Miss Sommers', presumably a relation of George Sommers, former proprietor of the neighbouring Forth Street site (see above footnote 37), Minute Book of St. Andrews District Committee of County Council, Vol 111, pp 42, 68,75, 214. The progress of work is recorded in the East of Fife Record, 22 Jun 1900, p 4; 27 Dec 1901, p 5; 5 Sep 1902, p 4; 18 Sep 1903, p 4. Extra information supplied by Mr George Cathcart, Cellardyke.

46. The cottages (twelve in all) comprise Miller Terrace. East of Fife Record, 21 Feb 1902, p 4; 26 Sep 1902, p 4; 4 Oct 1907, p 4

47. Ibid, 31 Dec 1908, p 1

A PROFILE OF THE SCOTTISH IRON FOUNDRY INDUSTRY 1969-1984

by

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This article seeks to profile the position of the Scottish Iron Foundry Industry during the period 1969 to 1984. This will be achieved by splitting the time period outlined into two. The first period will cover 1969-1977, whilst the second covers 1978 to 1984. For period one, a full analysis of the performance of the industry will be provided in order that a model can be set up and certain predictions made. These predictions can then be tested against the actual outcome seven years on by directly comparing the industry's profile at the last year of the two time periods ie 1977 and 1984.

The model postulated the criteria necessary for success in the business of producing ferrous castings and in particular iron castings. By so doing it identified both the most successful Scottish iron foundries and those most at risk during the present long running recession. It is clear from the research carried out for an earlier study,[1] and for this article, that while the industry is still contracting, it has within it a large number of efficient companies capable of supplying a wide range of ferrous castings and in particular iron and iron alloy castings. The continuance of this productive capability is of major importance to the engineering industry in Scotland.

The Scottish iron foundry industry is one which has not been well documented, at least in modern times, despite its strategic importance as a supplier of essential components to the Scottish engineering industry. The only regular publication on the industry which is specific to Scotland

is the Foundry and Forge Directory, published since 1975 by the Scottish Development Agency (SDA). This directory has the aim of helping to secure work for the companies listed. The only other consistent source of information is the papers published by the National Economic Development Office (NEDO) under the auspices of the Foundries Economic Development Committee (EDC). These papers are normally only available to the members of the EDC. From time to time, however, specific reports are given a general circulation; for example, the report on small craft foundries published in 1979[2]. However, given the relative size of the Scottish industry (in 1977, only 8 per cent of total UK iron foundries by number), information directly relating to the Scottish position is very seldom, if at all, highlighted.

A great deal of the information for the 1978 study on the industry in Scotland[3], therefore, had to be gathered as the result of primary research and in particular a detailed examination of the accounts of foundries lodged at Companies House in Edinburgh. The total number of ferrous foundries in Scotland in 1978 was seventy-three. A ferrous foundry is one which produces castings from iron or steel and their derivatives. Of the seventy-three, a total of sixty were deemed to be iron foundries. Of these thirty-seven produced only iron or iron alloy castings, with twenty-three of the sixty also producing steel castings and/or non-ferrous castings such as aluminium, zinc or bronze.[4] However, the sixty were classed as iron foundries because their main business was primarily that of producing iron castings. The first objective of this paper must be, therefore, to present a profile of the iron foundry industry for the first of the two time periods, namely 1973 to 1977, in terms of the numbers of foundries, people employed and the value of production, before turning to consider its position within the UK iron foundry industry as a whole and

the economic factors at work which have so devastated the industry both in Scotland and nationally.

There are two distinct types of foundry operation. Firstly, there are the foundry companies who are in business only to produce castings. In this case, all the products of the foundry, ie the castings, are sold to other companies. The second type of business is a foundry which is owned by another company, usually an engineering company. The foundry may be physically located inside or outside of the engineering company's premises. It may produce castings solely for the needs of the parent company and is therefore termed a captive foundry. Alternatively, some of the production may be sold on a commercial basis and the foundry is termed, in this case, a tied foundry.

Of the sixty iron foundries listed as operating commercially in 1977, forty-two were iron foundry only companies, whilst eighteen were either tied or captive.[5] It was not possible to delineate further the latter two categories. In terms of the geographical spread the foundries were located in seven Scottish regions. Table 1 provides a regional analysis by total and by numbers employed. The majority of Scottish iron foundries were, and still are, in private hands. This is primarily due to the degree of control still exercised by family groups, or by a few individuals who continue to own the majority of shares. In 1977, the ownership pattern saw thirty-eight in private hands, thirteen owned by parent companies registered in England, three in the US and six in Scotland.

TABLE 1

IRON FOUNDRIES and EMPLOYMENT PATTERNS by REGION

REGION	Iron Foundries	Numbers Employed
Strathclyde	24	2,350
Central	18	2,250
Lothian	4	270
Fife	5	190
Grampian	4	130
Tayside	3	110
Border	2	30
	60	5,330

Source: Derived from SDA, Foundry Capacity in Scotland, 1978

In 1976 an internal British Ironfounders Association report put the numbers involved in 'foundry processes' within Scotland at 5,500 for the iron foundry sector. By foundry processes the paper was referring to direct foundry employment. By comparison, the Department of Employment (DoE) Gazette for August 1976, listed employment in iron at 65,160. Employment numbers are difficult to determine accurately for two main reasons. Firstly, the problem of whether or not only foundry workers come within the iron and steel definition used by the DoE ie, people working in iron or steel. Secondly, the figures do not indicate whether they include in-house foundries in the total. By using the 1976 Minimum List Heading data produced by the DoE and the report on foundry capacity in Scotland, which gives employment range and direct contact with a large number of iron foundries, the level of employment in Scotland at August 1978 was, for iron foundries, approximately 5,330.

As outlined in Table 1, in 1978 Strathclyde and Central accounted for 85 per cent of the total number of people employed in the industry. By far

the largest grouping was of the companies employing between ten and fifty people in foundry work; there were in fact thirty-three iron foundries in this size range. At the other end of the scale those iron foundries employing more than 100 people numbered fifteen; of these only three had a workforce of more than 300 people.

To establish the turnover of the iron foundry industry in Scotland the annual returns of companies were analysed for the period 1973 to 1977. Because of the operational split outlined previously a problem arises with respect to turnover statistics. The engineering companies do not produce returns showing the turnover of their foundry operation; merely one for the company as a whole. It was therefore necessary to eliminate those engineering companies and concentrate on the forty-two 'foundry only' companies. The resulting information is given in Table 2. Returns were in fact available for forty-one out of the forty-two companies. The figures therefore provide a good indication of the turnover of this segment (ie foundry only companies), during the period in question. It should be noted that throughout the period covered in Table 2, the composition of both the top eight and the top three iron foundry companies remained unchanged.

TABLE 2

TURNOVER of COMPANIES ENGAGED SOLELY in IRON FOUNDRY WORK in SCOTLAND

(£'000S)

Year	Total Turnover	Turnover of Top 8 Cos	Turnover of Top 3 Cos	Turnover % Top 8	Top 3
1973	13,226	12,070	6,230	91	47
1974	21,810	15,870	8,750	73	40
1975	25,310	19,650	10,350	77	41
1976	30,520	18,940	11,250	62	37
1977	28,170	19,550	12,100	69	43

Source: Derived from company records lodged at Companies House in Edinburgh (not price deflated).

From Table 2 the following points emerge. The top three companies increased their turnover ahead of the other companies who comprised the top eight. However, the percentage of the total turnover enjoyed by the top eight declined markedly reflecting the problems a number of iron foundries were encountering in the period 1973 to 1977 as the result of a steep decline in orders received.

Any study of the UK iron foundry industry is by definition a study of an industry in decline. Table 3 presents a vivid picture of this decline. At the national level figures are available for output but the same cannot be said either for the total numbers of iron foundry establishments or for the people employed in them. This stems from the difficulties indicated earlier in this paper of defining what is an iron foundry company and to the numbers of people employed in iron foundry processes. The figures for these latter two categories are therefore estimated for the time period in question. Although at the time of writing an accurate picture of the numbers of iron foundries in the UK was not available, it is the

opinion of the Foundries EDC that the number of establishments has not declined as rapidly as production and employment.

TABLE 3

THE UNITED KINGDOM IRON FOUNDRY INDUSTRY 1969–1983

Year	Iron Foundries in Total (3)	Output of Castings '000 Tonnes (1)	Numbers Employed '000s (2) (3)
1969	920 (95)	3,816 (274)	1[illegible].2 (8.0)
1973	768 (75)	3,445 (226)	[illegible]4.7 (6.4)
1978	715 (60)	2,689 (175)	79 (5.2)
1983	n/a (49)*	1,435 n/a	45 (3.2)*

Sources: Derived from (1) Business Statistics Office (BSO) Business Monitor PQ321 and PQ3112; (2) Department of Employment; and (3) Council of Iron Founders Association estimates.

*SDA, Foundry and Forge Directory, 1984

The fall in tonnage produced during the period 1969 to 1983 represents a reduction of almost 63 per cent whilst the drop in employment nationally is almost 50 per cent. The comparable Scottish iron foundry figures are a drop of almost 50 per cent in foundry establishments and a drop of 60 per cent in number employed. This latter calculation can only be an estimate but contact with observers of the Scottish iron foundry industry does indicate that a severe shake out in employment has taken place well ahead, in percentage terms, of reductions in the numbers of iron foundries.

With the industry, both nationally and locally, in such a poor position, the causes need to be identified. There are in fact two main reasons for this position:

1. The continuing depressed state of manufacturing industry in the UK.

2. Technical development inside and outside of the foundry industry have meant that the same job can now be done by fewer and lighter castings and by other materials. For example, by December 1976, approximately 500,000 tonnes of plastic were being used per annum in the engineering industry.7

When iron casting tonnage figures are produced they are broken down into end user categories and industrial sectors. This breakdown gives a good representation of the fall in demand per sector and is shown in Table 4.

TABLE 4

OUTPUT of IRON CASTINGS PER SECTOR 1970-1983

'000 tonnes: figures in () are % of total

Year	1970	1973	1978	1981	1984
Automobile	1058 (27)	1110 (32)	906 (34)	522 (32)	377 (27)
Ingot Moulds	603 (16)	528 (15)	298 (11)	200 (12)	159 (11)
Pressure Pipers	460 (12)	350 (10)	278 (10)	230 (14)	227 (16)
Building and Domestic	458 (12)	407 (12)	297 (11)	215 (13)	184 (13)
Engineering	759 (20)	592 (17)	499 (19)	218 (13)	289 (21)
Miscellaneous	494 (13)	459 (13)	411 (15)	242 (15)	104 (7.5)
TOTAL	3832 (100)	3445 (100)	2689 (100)	1630 (100)	1376 (100)

Source, BSO, Business Monitor PQ 321 and PQ 3112

In the period 1970-1978 the two sectors which showed the greatest decline were ingot moulds, and building and domestic. Since 1978 the most striking trend has been the collapse in demand for automobile castings,

down by almost 60 per cent. Fortunately the upturn in orders for some of the main sectors of the engineering industry has resulted in an improved set of figures for that sector in 1984. The situation in the main customer sectors is shown below.

TABLE 5

MAIN CUSTOMER SECTORS FOR IRON CASTINGS 1979–1983

(Index of output 1980 = 100)

Year	Machine Tools	Instru-Engn.	Agricult-Machinery	Comp's Fluid Power	Cars	Com'l Vehicles
1979	104.4	108	134.8	108.2	116	105
1980	100	100	100	100	100	100
1981	67.3	102	86.4	81.6	103.3	59
1982	59.9	96	87.8	79.8	96.1	69
1983	53.5	94	92.8	74.6	113.1	62.8

Sources: BSO Business Monitor PQ 3221, PM 1000, PQ3211, PQ 3283, PM 3510

It is again clear from the statistics that the output from many of the main customer sectors has either been in sharp decline or has at best remained static. A recent study of the comparative performance of UK iron and steel foundries with their European counterparts, gives very little grounds for optimism concerning the industry's long term future.[8] The study examined twelve European countries including the UK and compared labour productivity, product development, marketing, foundry throughput, industry concentration and investment. For most of these measures of productive efficiency and commercial and technical success, the UK was near the bottom of the league. In none of them was the UK amongst the leaders. For example, in iron foundries, UK labour productivity has been almost two-thirds of that achieved by France and Germany. The average French and German iron foundry produces over 7,000 tonnes per annum

compared to 3,000 tonnes in the UK. Indeed, over the years 1979 to 1982 UK output per foundry has declined more rapidly than in most other European countries, with the UK now ranked only eighth out of twelve in output per foundry.

The problem facing the industry now and in 1978 is not just one of reducing capacity to equal demand; it is also the related problem of improving the industry's performance with investment and new techniques leading to increases in productivity and product profile.

The other major problem for foundries is the business efficiency of the industry. In the earlier research on which this paper is based the total value of iron castings production was compared to the rise in price of essential raw materials. From figures prepared by the Department of Industry in 1978 for the Council of Iron Foundry Associations (CFA), the following picture emerges. The price per tonne of iron castings rose from £105 in 1968 to £123 per tonne in 1977 (these figures were based on 1970 prices with the inflationary element taken out to give a direct comparison with 1970).9 However, iron founders' costs rose more steeply than the price of their products.10 Taking 1968 as 100, the index of wholesale castings prices for 1977 stood at 355. Comparable indices for the cost of essential raw materials were 472 for pig iron, 335 for scrap, and 533 for coke. The position with respect to the value of foundry production has not improved since 1977. Using the statistics from the Business Monitors PQ321 and PQ3112, iron foundry production value at constant 1975 prices has fallen from £698 million in 1978 to £364 million in 1983. A survey by NEDO in 1983, which is subject to restricted access, looked at items such as capacity utilisation and break-even point. It reinforces this picture of poor business efficiency nationally. Even amongst those foundries with high capacity utilisation this has not been

translated into a high ratio to break-even indicating that foundries continue to have profit problems deriving from price rather than volume. If iron castings are too cheap then low or non-existent profit margins mean that foundries cannot afford to invest adequately in new equipment.

It is at this stage that we can now look in detail, for the first time at the Scottish iron foundry industry and its financial and operational profile. Although the first time period seeks to cover the years 1969 to 1977, the principal focus of the analysis to come is on the years 1973 to 1977.

In order to be able to charge adequate prices for its products a foundry needs to produce its castings efficiently and to be able to manufacture not only grey iron castings but also spherodial graphite iron (SG) ni-resist and ni-hard alloy iron castings. Spherodial graphite castings are essentially lighter and more flexible than grey iron. They have a longer life and, in the case of ni-resist have anti-corrosive properties. These castings can command greater prices and thereby offer better profit margins to the producer, but they require investment in expensive electric furnaces.11 In 1978 such a furnace would have cost anything between £40,000 and £100,000, depending on the capacity required, whilst for operational needs, they are often installed in pairs. They also use chemically bonded sands. These sands often cost double the price per tonne of normal sand, and the installation (depending on the volume of chemical sand used) of expensive reclaimation plants costing £20,000 and upwards, to reprocess the sand.

In 1977 the product profile of Scottish iron foundries was therefore an important aspect in assessing the industry's future prospects. This

survey was carried out using principally two published sources of information. Firstly the details of capacity outlined in the 1978 SDA report,[12] and secondly, the NEDO report,[13] which looked at small craft castings foundries on a UK wide basis.

The information contained in the first study revealed that one in three of Scottish iron foundries could produce SG iron with 50 per cent of iron foundries either listing SG iron, or a high quality iron alloy, in their details of capacity.[14] As indicated, to produce the new range of iron alloys, either new technology in the form of electric furnaces, or better quality control for existing cupolas is required. One indication of the pace of change is to measure the level of investment in an industry. A lengthy questionnaire sent out by NEDO to all foundries employing less than 100 people threw up useful statistics, not only on investment, but also on markets served and customer profiles. This information, covering the period 1972 to 1977, was not broken down by geographical region. However, because of this research the author was fortunate to have access to the data to extract the Scottish respondents for comparison with the national picture.

The total number of questionnaires sent out was 540 and 356 usable replies were received. Of these, 238 qualified as a craft foundry.[15] Although the NEDO working party provisionally defined small foundries as those employing less than 100 people, thirty-one foundries who completed the questionnaire employed more than this number. These responses were retained because the foundries made a substantial contribution to the supply of craft castings.[16] As outlined earlier in this paper forty-five of the sixty iron foundries in Scotland employ 100 or fewer people. The number of Scottish respondents to the survey was thirty-four. They represent some 75 per cent of the total of Scottish foundries with 100 or

fewer employees. The NEDO survey is therefore an excellent vehicle from which to present a picture of Scottish iron foundries.

Summarising the results[17] for Scottish foundries suggests that investment spending in Scotland may have been actively ahead of the rest of the UK. The figures for investment spending at the top end of the scale (£120,000 and upwards) indicated a higher percentage of Scottish foundries in this group than the UK as a whole, ie 44 per cent of the Scottish sample as opposed to 23 per cent of the national sample. In 1977 to 1978, Scottish iron foundries produced approximately 6.5 per cent of all iron castings output. Yet from the NEDO returns it is obvious that they enjoyed a higher percentage share of the UK market, some 13 per cent to 15 per cent, for SG iron and for high quality iron alloy castings. This market share was and still is an important plus for Scotland. While the total tonnage produced is shrinking owing to falling demand, a part of this is due to the substitution of heavy grey iron castings for the iron castings indicated above. By retaining or enlarging on this market share Scottish iron foundries have a valuable cushion on which to remain both competitive and innovative.

The questionnaire responses on the markets served indicated that Scotland, with a few notable exceptions, mirrored the UK in the proportion of foundry work going to particular sectors in both engineering and non-engineering.[18] In the engineering sector, the basic differences between the UK and Scottish foundry answers on markets served were in machine tools - 67 per cent of the UK replies as opposed to 53 per cent of the Scottish. In the areas of ships engines and electrical engineering however Scotland is more involved - 44 per cent Scottish respondents in

each case as opposed to 26 per cent and 33 per cent of UK replies respectively.

In the non-engineering sector the principal difference in output were in the sectors of pressure pipes, and building and domestic, with Scottish foundries supplying a higher percentage of their output to these two sectors. One possible reason for this difference is the greater use of SG iron and iron alloy castings in the pressure pipe and building sectors. From the same NEDO questionnaire returns comparisons were extracted on customers served, importance of customers, and distance to customers. The figures show that Scottish foundries, in one year, supply on average 110 customers as opposed to the national figure of seventy-nine. Scottish foundries were less reliant on their top six customers for business and delivered less of their production within a 50 mile radius. However, the spread of the customer base was proving a mixed blessing for Scottish foundries in that from their returns the major problem facing the foundries was identified as customers ceasing to trade.

Given the greater level of investment, the wider spread of its customer base, and the greater proportional output of higher quality iron castings, the prospects for the Scottish iron foundry industry in 1978 were on the whole fairly optimistic. It is an important sector - iron foundries, and in particular, small craft iron foundries, provide a product on which the whole of the engineering industry depends; for example, one-off or short production run castings vital for prototype development, for original equipment manufacture, for special purpose custom built machinery, or for replacement parts where speed of response can be vital. Such a sector is one in which planned investment should take place. One particular scheme was introduced under Section 8 of the 1972 Industry Act. The closing date for applications was 31 December 1976 and expenditure on approved

projects had to be completed by 31 August 1980. In Scotland, thirty-four projects involving twenty-eight companies were approved and the total investment between government and the industry was put at £37 million. The figures for the UK were 400 projects, involving over 300 plus companies, with total spending put at £355 million. The aid scheme however ran into difficulties. The continuance of the recession beyond 1977 meant that companies were unable to take-up their allocation due to their inability to fund their own element of the total investment and by August 1978 only £14 million of the government total of £78 million had been paid out. However, for Scottish iron foundries one other source of investment exists - that provided by the Scottish Development Agency. Before the Agency, or any other investor, can provide investment funding, an appraisal of the business is a necessary first step in the process.

As outlined, the premise of the research carried out in 1978,19 was to form a model, or hypothetical profile, of what a modern and successful foundry should look like. The model could then be used as a yardstick against which any individual foundry could be judged thereby assisting investment decisions. The hypothesis was as follows:-

(i) that a successful foundry will have amongst its product range not only grey iron but also iron alloys;

(ii) that the foundry will have at some point in the last few years, and certainly in the 1970s, undergone a programme of investment in the necessary plant and techniques needed to improve the range and quality of its castings;

(iii) that this investment programme was on-going and aimed at upgrading the foundry.

The hypothesis can be presented in another way. The research discovered a number of variables which could be classed either as independent or dependent variables. To be successful in the long term a foundry has to be modern. Usually a foundry becomes modern as the result of a long period in which profits have been re-invested back into the business. The two variables here are:

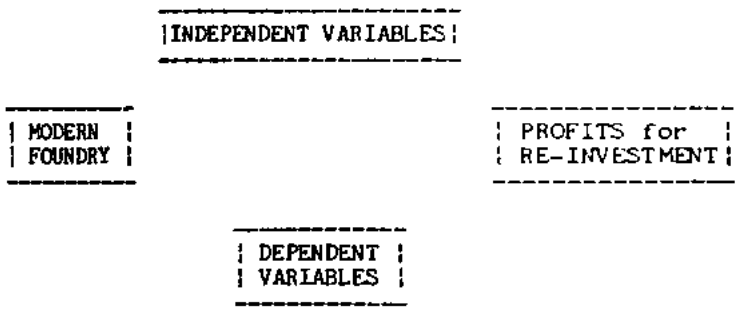
(i) a modern foundry;

(ii) profits for re-investment.

Essentially you cannot develop a modern foundry without capital investment. However, a conscious decision may have been taken not to re-invest the profits or alternatively profits can still be extracted from a foundry which has not been modernised. These two variables could therefore be classed as independent although without profits to re-invest a modernised foundry may not be possible.

Secondly, within a foundry there are other variables which can be identified. These are essentially based around: management, product range, technology and customer sector performance. These variables can be classed as dependent variables in that they have direct links with each other. For example, if a customer sector is experiencing a recession, good management would react to this by looking for alternative sources of business. However, without modern technology in the foundry to produce a wide range of high quality castings it would be an extremely difficult to change the customer base and thereby the range of catings produced.

It is recognised that such a classification, into independent and depending variables, is a somewhat arbitary exercise. However, it may help to further explain the basis of the model and can also be represented in diagramatic form.



(1) management
(2) product range
(3) technology
(4) customer sector performance

To test the hypothesis as outlined, all the available accounts of iron foundries operating in Scotland were analysed for the period 1973 to 1977. The period selected was one which clearly represented a reasonable span of time within which to make a judgement, despite the recession, of a company's performance. Of the sixty iron foundries, a total of forty-nine company accounts were available, a percentage figure of 82 per cent. The information gathered was very detailed, involving the use of seventeen measures or ratios.[20] For the purpose of summarising the results it was possible to select three measures which represented an effective guide to the operating efficiency of the companies under review.

The measures are:

(i) Profitability: profit before tax plus payments to directors expressed as a percentage of total assets. As many of the foundries are relatively small, payments to directors are frequently large relative to profits, and it is therefore appropriate to group them with profits;

(ii) Profit Margin: profit before tax plus payments to directors expressed as a percentage of turnover;

(iii) Capital Usage: turnover expressed as a ratio of total assets.
The Business Statistics Office at Newport, Gwent prepared, in 1978, operating ratios by Minimum List Heading (MLH 313 for iron castings) and these were published in Trade and Industry on a yearly basis and thereby offered a good comparison on a broad national basis. Such an analysis, relating to output and salaries per head, threw up a consistent pattern of results. Taking 1970 = 100, all the ratios relating to output and salary had reached, by 1977, almost identical indices.

Gross Output	161
Net Output	163
Gross Value Added	161
Wages per Operative	164

Whereas net capital expenditure = 213 in 1977.

It would appear that productivity in the UK iron foundry industry had not improved ahead of wages despite increasing investment in new plant. The record of the industry with respect to profit margins, was highlighted in a report prepared for the National Enterprise Board.[21] The majority of foundries averaged less than 10 per cent, with only one-fifth of companies with a profit margin approaching 20 per cent. The obvious result was the high closure rate of foundries throughout the 1970s.

The performance of the Scottish iron foundry industry should, therefore, be studied in the light of these national figures for productivity and profitability. The criterion by which a Scottish iron foundry was judged to be successful was if the company consistently achieved profitability and profit margins of 10 per cent or over. In 1978 inflation was running at between 8 per cent and 9 per cent, with the cost of borrowing at around 15 per cent. A situation not dissimilar to that of 1985. By applying the hypothesis as outlined and the criterion stated, sixteen Scottish iron foundries qualified for the classification of being successful. These

companies were from the total of forty-nine iron foundry companies for whom accounts were available. Of the eleven companies for which no accounts were available only one (R Taylor Ltd of Dunfermline) could, with any certainty, claim to be successful. This company is connected by family ties to three other foundries who are all successful. Excluding this company meant that a total of 16 or 26 per cent of iron foundries in Scotland could claim to be successful. By applying the same operational judgements, nine iron foundries could be classed as unsuccessful. In this case the reverse applies, in that the nine companies returned profit margins consistently well below 10 per cent. Tables 6 and 7 list both sets of foundries.

TABLE 6

Successful Scottish Iron Foundries 1973-1977

Name of Iron Foundry	Location Town	Region[x]	Employment Range	Specialism Castings (for)
Henry Balfour	Leven	F	16-50	Food Tanks
Bo'ness Iron*	Bo'ness	C	75-100	Manhole covers
Alex Couper*@	Denny	C	20-30	Alloy Irons
James Dickie	Ayr	S	101-200	n/a
Ferromac*@	Glasgow	S	20-30	Marine Castings
Forth Alloys	Cumbernauld	S	100-140	Complex Alloys
Giddings & Lewis Fraser	Arbraoth	T	50-100	Machine Tools
Geo Henderson@	Kelso	B	15-20	n/a
Wm Hunter*@	Wishaw	S	16-50	Alloy Irons
Lion Foundry*	Kirkintilloch	S	250-300	Duct Covers
John McFarlane@	Glasgow	S	15-20	Textile Machines
Wm McKinnon@	Aberdeen	G	10-15	n/a
Miller & Co*	Edinburgh	L	170-180	Iron Rolls
G Taylor Co*@	Hamilton	S	25-50	Crane Sheaves
R Taylor & Co*@	Lambert	C	180-200	+MOD Alloys
Wilson Pipe Ftgs*	Irvine	S	200-250	SG Pipe

Source: Derived from company records lodged in Companies House in Edinburgh

* iron foundry only companies

@ private limited company registered in Scotland

\+ MOD (Ministry of Defence)

x outline of region key: Strathclyde (S), Central (C), Fife (F), Grampian (G), Tayside (T), Borders (B), Lothian (L)

All of the companies listed above do have limited company status.

TABLE 7

UNSUCCESSFUL SCOTTISH IRON FOUNDRIES 1972-1977

Name of Iron Foundry	Location Town	Region[x]	Employment Range	Specialism Castings (for)
A Barclay	Kilmarnock	S	20-30	Colliery Gears
Bertrams	Edinburgh	L	40-75	Paper Machines
Cruikshanks*@	Denny	C	280-320	Agricultural Machines
Barry Henry & Cook	Aberdeen	G	25-30	Offshore Oil
Dawson & Downie@	Clydebank	S	15-20	Pumps
J Fyfe, Donald*	Johnstone	S	16-30	n/a
Maitlands*	Airdrie	S	30-50	Machine Tool
Merchison*@	Falkirk	C	75-80	n/a
Smith & Wellstood@	Bonnybridge	C	50-100	Gas & Electric Appliances

Source: Derived from company records lodged in Companies House in Edinburgh

* iron foundry only companies

@ private limited company registered in Scotland

x regional breakdown as above in Table 6

As explained earlier, if all the missing eleven company accounts had been available, the total of unsuccessful companies would have been much higher. This assertion is based on information gathered on these companies during the course of the research for the 1978 study.[22] For example, George Paul Ltd, and Clynwed Ltd, of Larbert, Central, two of the eleven closed in 1978. Their impending closure had been anticipated throughout the Scottish iron foundry industry.

The successful companies over the period 1973 to 1977 were in many cases extremely profitable. Table 8 presents a snapshot of just four of these companies measured against the three ratios highlighted.

TABLE 8

SUCCESSFUL COMPANIES: SUMMARY OF FINANCIAL RATIOS 1973-1977
(five year averages)

Name	Profitability %	Profit Margin %	Capital Usage Ratio
Ferromac	29	32.5 (1975)*	1.1
John McFarlane	36	10 (1973)*	2.6
Wm McKinnon	28	18.8	1.5
G Taylor	27	22.7	1.2

Source: Derived from company records lodged in Companies House in Edinburgh

* profit margin figure only available for the year indicated.

Any selection process will tend towards making somewhat arbitrary decisions; however the companies listed do allow the hypothesis to be tested.

Two methods of comparison were selected. Firstly, a financial similarities chart was compiled detailing growth in fixed assets, current assets, turnover, and ordinary shareholders funds, experienced by both sets of companies. The second strand of the analysis was the construction of a capacity profile for both groups. This profile was established with the aim of trying to list the operational characteristics of the companies in terms of - the size of operation, method of production, whether jobbing or repetition, the range of material from which castings were produced, and the facilities on offer. The comparisons were conducted to establish whether or not the two sets of companies differed not only in their financial characteristics but also in their operational characteristics[23] and finally whether or not the two were directly connected. This cross analysis was the key to the whole

exercise in that if the comparisons yielded a close correlation it would then be possible to construct an 'ideal' foundry profile.

The financial picture for the successful foundries revealed the following characteristics for the period 1973-1977.

1. Fixed Asset Growth. Ten out of the sixteen companies experienced increases of over 50 per cent.
2. Current Asset Growth. Fourteen out of the sixteen companies experienced increases of over 50 per cent, with seven companies doubling their asset base.
3. Turnover Growth. Thirteen out of the sixteen companies experienced increases of over 50 per cent, with nine companies doubling their turnover.
4. Ordinary Shareholders Funds. Twelve out of the sixteen companies experienced increases of over 50 per cent.

This analysis indicated that the top sixteen companies had been investing consistently throughout the period and had built up their level of activity in terms of debtors and work-in-progress.

Carrying out the same analysis for the nine unsuccessful companies revealed the following:

1. Fixed Asset Growth. Five out of the nine experienced increases of over 50 per cent. Three of the nine had negative growth.
2. Current Asset Growth. Four out of the nine had growth rates under 20 per cent. In the first group seven out of sixteen had growth rates over 100 per cent.
3. Turnover Growth. Only one out of the nine had doubled its turnover as against nine out of sixteen in the first group.

4. Ordinary Shareholders Funds. Only one out of the nine experienced a growth rate over 50 per cent, while four of the nine experienced negative growth.

In both 3 and 4 above, the unsuccessful company which had doubled its turnover and increased its ordinary shareholders funds by 50 per cent. was in fact, the same company.

The unsuccessful companies had therefore slower fixed asset growth rates and demonstrably inferior growth rates in current assets, turnover, and ordinary shareholders funds. In experiencing lower rates of turnover growth the companies were unable to build up reserves with which to finance investment and modernisation. The cycle then becomes self reinforcing. The comparative employee ratios reinforce the extent of the problems facing the unsuccessful companies. For turnover per employee the range was from £2,500 to £12,000 with a median of £4,700 (the successful median was £8,500). On assets per employee the range was from £1,500 to £10,000 with a median of £3,900 (the successful median was £6,300).

In terms of the capacity similarities, the following picture emerged. Amongst the companies identified as unsuccessful, only two out of the nine offered castings in SG iron as against eight out of the sixteen in the other group. Only one (Cruikshanks) out of the nine offered both SG iron and iron alloy castings, as against five out of sixteen in the other grouping. This lack of new technology is reinforced by the under provision of heat treatment facilities amongst the nine. Only two of them, Cruikshanks and Bertrams, listed this facility, the latter as the result of a recent investment.

As indicated in Table 6 a total of eleven out of the sixteen successful companies came within the strict definition of a foundry only company, in that a majority of the employees were directly employed in foundry processes. Whereas in the other group, only four out of the nine are foundry only companies. Many of the unsuccessful companies are engineering companies which have a foundry on their premises.

In trying to develop a profile into which a foundry should fall, if it is to be successful, two unavoidable additional factors enter into the causal process. These are - the ownership structure of the company and the managerial skills within the business. An analysis of the ownership structure of the companies under review pointed up the following factors as being important in determining success.

Nine out of the sixteen successful foundries were controlled by family groups. Their success may rest on the long term ability of a few individuals to maintain the progress of the business. Many of these individuals are directly related to one another. Looking back through the company records new blood was often a rare event brought about by death, or retiral amongst the directors. The second type of ownership structure is the foundry company which is part of a larger engineering group. The success of the foundry operation is in many cases directly related to, firstly, the managerial skills at the disposal of the parent company, and secondly, if the parent company is experiencing trading difficulties, then the foundry is likely to suffer as a direct consequence of lost orders and low liquidity within the overall business.

It is now possible to develop a success profile chart. This can be seen as Table 9.

TABLE 9

IRONFOUNDRY COMPANIES SUCCESS PROFILE CHART

Company Size by Numbers Employed in Foundry Processes(3)			Type of Foundry		Products			Technology				Specialism	Management Structure		Financial (1) Performance Yearly Average %		
10-50	51-100	101-300	Jobbing	Repetition	Grey Iron	S G Iron	Iron Alloys	Pattern Making	Shot Blast	Heat Treat -ment	Machine Shop		Family	Parent	Profit-ability	Profit Margin	Capital Usage(2)
*			*	x	*	x	x	*	*	x	x	*	*		25	15	1.3
	*		*	*	*			*	*	x	x	*		x	16	11	1.5
		*	*	*	*	x	=	*	*	x	x	*	=	*	19	13.6	1.45

KEY to Table: * Indicates a characteristic which is present in every case

x do. do. most cases

= do. do. a minority of cases

NOTES: (1) Financial performance figures are targets, based on 1973 to 1977 Annual Average figures for that group.

(2) Capital usage figure is a ratio.

(3) Of the sixteen successful companies, there are eight in the 10-15 range, two in the 51-100 range, six in the 101-300 range and none in the 301 range

Source: Derived from SDA, Foundry Capacity in Scotland, 1978, and from company accounts.

There are essentially two different types of foundry operation in Scotland. Firstly the foundry company employing between ten and fifty people and usually family owned. The second, a much larger operation, either family owned or part of a larger company owned in turn by an engineering group. There are certain operational characteristics common to each type. The size grouping of up to fifty employees can be taken as an example. The foundry will be a jobbing foundry, ie producing a wide range of castings for a large number of customers. It is also likely to have the ability to manufacture large numbers of a particular casting using automated processes. Within the foundry facilities such as a pattern making shop, shot blasting, machine shop and heat treatment are all likely to be available. In addition the company will specialise in a particular type of casting.

The application of the model was considered to have two functions. Firstly, to predict likely winners and losers, and secondly, as a test of investment potential. If a foundry approached a funding body such as the Scottish Development Agency, the model could be used in the following way. If, for example, the company employed forty people and produced grey iron castings, had no heat treatment or machine shop facilities, it is more than likely that the company had either not invested correctly in the past or had failed to find new markets. This company would require a great deal of re-structuring which may not, given the present situation, be an appropriate use of investment funds.

Turning now to winners and losers. Since the earlier study[24] was completed, a time period of almost seven years has elapsed. Of the nine iron foundry companies listed in Table 7 a total of eight have ceased to trade. Only Smith & Wellstood Ltd are continuing to operate as iron founders as of October 1985. Of the sixteen successful companies only

two have closed - Henry Balfour & Co Ltd and Lion Foundry Co Ltd. Since 1978 a total of twenty-three iron foundries have closed. This represents 38 per cent of the foundries listed in 1978. The general reasons for failure are:

(i) narrow customer base;

(ii) poor equipment;

(iii) poor marketing;

(iv) local and regional engineering base shrinking;

(v) captive or tied foundries unable to find work outwith the parent company.

To be successful, a foundry needs to:

(i) specialise in high grade castings;

(ii) be heavily automated;

(iii) be able to effectively market its products.

As a predicator the model has been effective. The fact that only two of the sixteen successful foundries have closed in the intervening period, is important. The statistics given in Table 1 indicate the scale of the tonnage reduction within the UK iron foundry industry as a whole (down by 51 per cent in the period 1978 to 1984). In the same period one in three Scottish iron foundries closed. However, what has not happened is the closure of foundries who are needed to maintain a strategic resource. They have not closed as a result of inefficient foundries under-cutting them through having lower overheads to cover. It may indeed be that they do not actively compete with each other in that the unsuccessful firms do not have the product range of their successful counterparts.

As indicated in Table 3 there were forty-nine iron foundries operating in Scotland in 1983/4, employing, in direct foundry processes, approximately

3,200 people. This number does not readily equate to the earlier figures of sixty foundries in 1977 to 1978 and the extent of the closures, a total of seventeen in all. In the 1984 Foundry and Forge Directory a number of new foundries are listed,[25] these foundries being new only to the directory. They were previously inside engineering establishments and were not actively looking for business outwith their own establishment and, therefore, did not seek a listing. It is a sign of the extent of the recession that this is happening. The figures given in Table 3 are themselves no longer accurate with the closure in October 1985 of Merchiston Foundry Ltd, and Cruikshanks & Co Ltd, two of the foundries listed as unsuccessful in Table 7. The position now is that there are forty-seven iron foundries operating in Scotland, employing approximately 3,000 people.

It is very clear that foundry closures will continue and that during the next five years the number of iron foundries operating in Scotland could be down to around thirty. However, such a shake-out is by no means a disaster and that 'leaner and fitter' will actually be an appropriate description for the Scottish iron foundry industry in the late 1980s.

FOOTNOTES

1. F Martin, 'A Study of the Scottish Ferrous Foundry Industry', MBA Degree submission, Strathclyde Business School, 1978 (unpublished). In collaboration with the Strategic Planning Unit of the Scottish Development Agency
2. National Economic Development Office (hereafter cited as NEDO), Small Craft Foundries - Their Role and Future Prospect (1979)
3. Martin, op cit

4. Scottish Development Agency (hereafter cited as SDA), Foundry Capacity in Scotland (1978) pp 2-7

5. Ibid, 8-27

6. Ibid, 8-27

7. Production Engineering Research Association, Replacement of Metals by Plastics (1977)

8. CAEF European Foundry Industry, (1982)

9. Martin, op cit, pp 19-20

10. Statistics given in 'Development in Iron Founding', Foundry Technology, Vol 40, No 1

11. SDA, Foundry Capacity in Scotland (1984) pp 2-27

12. Intex Executives (UK) Ltd An Evaluation of the UK Foundry Industry - A report for the National Enterprise Board (1976)

13. NEDO, op cit, pp 1-3

14. Ibid, pp 40-43

15. Ibid, pp 1-2

16. Ibid, pp 39

17. Martin, op cit, Appendix, pp 54-57 presents full details

18. Ibid, pp 49-53

19. Ibid, pp 54-71

20. Ibid, Appendix, pp 14-15

21. Intex Executives (UK) Ltd, op cit

22. Martin, op cit, pp 59-71 and Appendix, pp 58-67

23. DWN Hitchens, Business Efficiency in Iron Founding, PhD Thesis (Technocopy, 1977)

24. Martin, op cit

25. SDA, Foundry and Forge Directory (1984)

Archive Report Number Two:

THE LIBRARY AT LEADHILLS AND ITS ARCHIVE COLLECTION

The Allan Ramsay Library at Leadhills, Lanarkshire, or sometimes the Allan Ramsay Institute, is the oldest subscription library in Britain. It was founded in 1741 by a Reading Society whose original members, except for the minister and the schoolmaster, were all miners. From the first the Society was run by the men themselves, but it seems probable that the founding impetus came from James Stirling, manager for the Scots Mines Company, and the Society was part of a movement of social reform supported by the landowner, The Earl of Hopetoun.

The Library has long been associated with the name of the poet Allan Ramsay, who was born in Leadhills and who himself founded a circulating library in Edinburgh. The choice of title honours Ramsay's pioneering spirit, although there is nothing to connect him with the Reading Society. However, it may be noted that he saw his illfated theatre also in terms of social reform. As he put it - 'to mend our manners and reform the age'.

The library ceased to function as such in 1965, but is still open to visitors during summer weekends and by arrangement with the secretary. It is managed by a local committee who meet the Library's running costs by donations and fund raising.

The Library contains much of the original bookstock, and is also a depositary for a collection of MSS etc. Among over one hundred listed items is much material relating to the Library and dating from 1821; also, the Curling Club journal (1784 - 1864/1929); The Leadhills Friendly Society accounts (1908 - 15); and the Water Committee (1944 - 1961).

The major business archives are the journals and bargain books of the Scots Mines Company in forty-six volumes from 1739 to 1854. The archive is not complete but it is one of the largest collections of such records extant in the UK. The journals are the day books of the mine overseers, and the bargain books record the bargains, or contracts, made with the men. Although not exclusive to mining, bargain working was a form of subcontracting practised in all lead mining areas. In its simplest form, a group of men, referred to as a partnership, would negotiate a rate for a piece of work and would be paid a lump sum when this was completed to the overseer's satisfaction.

The books not only provide a wealth of detail on the history of the Company, but also of mining techniques and the miners' earnings and conditions of working. There is reference to the arrangement of engines and pumps, to smelting, and to the provision of timber and peat. There is also comment on such matters as dry summers and severe winters, the few holidays the times afforded, and on the visitors to the mines.

Such records, particularly when they encompass a century of activity, provide a great potential for research. However, virtually no record remains of the business of the other companies at Leadhills, so the weight of record of the Scots Mines Company tends to give a distorted picture of the history of mining operations around the village.

There is a hand list (currently being updated) in the Library of the various MSS, and a copy is available in the Scottish Record Office, ref NRA(S) 2052. The Scots Mines Company records are also on microfilm in the SRO; the bargain books under the reference 53/1 to 53/4, and the journals 53/5 to 53/8 inclusive.

Among recent acquisitions is the Gibson MSS, a collection of letters dated 1834 to 1845. Most are from one of the mine smelters, William Gibson, to his son Robert, who at first was a student at the University of Glasgow and was later ordained. The letters are currently being examined by the National Register of Archives.

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SUMMARY LISTS OF ARCHIVE SURVEYS AND DEPOSITS

1 National Register of Archives (Scotland)

Full details of the surveys are available from the National Register of Archives (Scotland). All enquiries and requests for access should be addressed to the Secretary, The National Register of Archives (Scotland), Scottish Record Office, HM General Register House, Edinburgh, EH1 3YY.

Agriculture, Estates, Forestry and Fishing

208 **Earl of Wemyss** Estate plans and architectural drawings, 18-20 cent, including estates, farms and lands in Perthshire, 1803-73, including Easter and Wester Rhynd, 1839-72, commonty of Grange 1788, confluence of the Earn and the Tay, 1803; estates and farms in Peeblesshire, 18-19 cent, including Henderland estate, 1791, surveys of farms by William Blackadder, 1821; estates and farms in East Lothian, including barony of Longniddry, 1778, Stonyhill colliery, 1829, Monktonhall, 1850-1930, Amisfield Park, gardens and farm, 18-19 cent; plan of estates in the Merse by G Grey, 1758; architectural plans and drawings relating to Gosford House by the Adam office, including plans, elevations and details of house, offices, lodge and gateways, 1790-2 and nd, approach to the house, 1853.

1871 **Orkney Library** Papers of Lieutenant-General Sir F Burroughs of Rousay and Wyre. Miscellaneous estate paper, c1830-1912, including: rentals, c1830-86; plans of farms and cottages, 1845-1912, and Sourin School, 1881.

2056 **Mr C G Spence, Biel** Biel estate plans and architectural drawings, 18-20 cent, including: plans and elevation of Biel House, conservatory, chapel, offices, stables, lodges and curling house by William Atkinson, Wardrop and Anderson, R Lorimer and Duncan & Harkness, 1804-1953 and nd; plans of farms and buildings of Biel estate, including Biel Mill, 1807-90, Beesknowe farm and cottages, 1824-1971 and nd; Stenton estate buildings including cottages, village hall and manse, and Stenton House, 19-20 cent.

2079 **Earl of Rosebery, Dalmeny House** Estate plans and architectural drawings, 17-20 cent, including: plans and elevations of Craighall House and Mount Leney temple by Sir William Bruce, Thomas Brown, William Burn, David Bryce and others, late 17-20 cent; Craighall estate plans, including farm offices, 18-19 cent; Barnbougle, Dalmeny, Newhall and Carrington estate plans, 1806-60; Norfolk estate plans, including plans of cottages at Postwick, 1860-1; plans of Blackwood House, Lesmahagow, 19 cent, miscellaneous architectural plans, including houses, 17-18 cent, Moffat tolbooth, 1695.

2709 **Mr and Mrs J Trotter, Inverness-shire** Trotter of Bush papers, 17-20 cent. Titles and inventories of titles of lands in Midlothian, East Lothian and Berwickshire, 17-18 cent. Miscellaneous legal and financial papers, 1728-1890.
Midlothian estate papers, including: rentals, accounts, valuations and measurements relating to estates of Bush, Easter Bush, Bilston, Dryden and Glencorse, 1703-1892; correspondence, 1752-1876, including purchase and sale of Glencorse estate, 1798-1807; accounts and output book of Greenlaw colliery, 1844-7; accounts of Greenlaw Mains farm, 1846-50; accounts for mason work

at the Bush 1791-9; household accounts, and inventories, 1805-93, including decoration of the Bush, 1852. Heritors' papers relating to Glencorse parish, 1754-1867, including: subscribers to and recipients of poor relief, 1800; militia papers, 1803; accounts and other papers relating to repairs to church, manse and school, 1794-1811, and to stipend, teinds, schoolmasters and statute work on the roads, 1750-1867; dismissal of schoolmaster, 1858-65.

Miscellaneous papers of Moubrays of Castlelaw, 1712-64, including accounts of outlays by Robert Moubray, H M Carpenter, at Holyroodhouse, Edinburgh Castle and Duart Castle, 1745-8. Miscellaneous genealogies of Trotters and related families, 18-20 cent.

Miscellaneous printed items, including regulations of Bengal Civil Service Annuity Fund and related disputes, 1825-43. Photographs of family, and of Dryden House and Bush House, 19 cent. Drawings and plans, c1791-1949, including: sketches of family and servants at the Bush, 19 cent; designs for the Bush by Robert Adam, 1791, and for Castlelaw by James Elliot, nd; plans for alterations and additions at the Bush, 19 cent; estate plans, 1773-1842; plans of St Peter's College, Kilmahew, 1949.

2715 **Lindsay, Duncan and Black, WS, Edinburgh** Papers relating to trust of John Chesser, architect, 19-20 cent, including: copy feu contracts relating to lands at Kirkbraehead and Coates, Edinburgh, 1807-76; papers relating to trust property in Edinburgh, 20 cent, plans relating to feuing of Morrison's lands at Whitehouse Toll, and at Maitland Street by Heriot's Hospital, 1790-9; architectural plans of Rutland Hotel, Edinburgh, 1875-95.

Papers relating to Taylers of Rothiemay, Banffshire, 1803-96, including: inventory of Rothiemay House and Castle Lodge, Aberdeen, 1854; Rothiemay estate papers, including household and estate accounts, 19 cent, roup rolls of furniture of house and home farm, 1887; miscellaneous trust papers, 1845-20 cent; plan of Bilbohall estate, Elgin, 1859.

Papers relating to J Balfour Paul, advocate, 19-20 cent, including: miscellaneous legal papers relating to Paul family and Edinburgh property, 1806-1920; correspondence relating to building of byres at Blackhall, Edinburgh, 1886-7; papers relating to lease of Tullibole Castle, 1885-1900.

Papers relating to Parkconon estate, Arbroath, 19-20 cent, including notes, valuations, inventory, leases and grieve's reports on farm, 1866-1902; accounts,, specifications and related plans for farmhouse, 1902-12; letters relating to sanitation of cottages, 1911; legal and estate correspondence, 1866-1929.

Papers of Sir William Forrest, Comiston, including: legal and estate papers, 1672-20 cent; inventories of titles of lands of Comiston, Edinburgh, 1885-1931; papers relating to lands of Oxgangs, Edinburgh, 1804-1924; accounts and papers relating to Comiston sand-pit, 1839-1915.

Papers relating to estates of Craigdarroch, Dumfresshire and Orroland, Kirkcudbright, including: legal papers and accounts, 18-20 cent, including bond for upkeep of school in Glencairn parish, 1765; titles and papers relating to lands of Neiss, Dumfriesshire, and Glenshalloch, Borness and Newlands, Kirkcudbright, 19 cent; factor's accounts, 1865-1915.

2717 **Gillespie, Macandrew & Co, WS, Edinburgh** Papers of Earl of Hopetoun. Titles of lands in Midlothian and East and West

Lothian, 16-19 cent, including Templelands of Torphichen, 16 cent, lands around South Queensferry, 17-18 cent; titles of lands in Lanarkshire, including Glendorch, 18-19 cent. Legal papers, including some relating to Livingstones of Bedlornie, 17-18 cent. Estate papers relating to Union Canal, 1815-67, Peaston Farm, East Lothian, 1852-3, clayworkings at Winchburgh, 1889-1905. Mining papers, 17-20 cent: mines at Waterhead alias Glengonnar, 17-19 cent; Leadhills Silver and Lead Mining Co Ltd, 1876-1959; Petroleum (Production) Bill, 1918-19; miscellaneous papers relating to Leadhills, 1695-1921. Church papers, 17-20 cent, including: presentations to parish of Wamphray, 17-19 cent; erection of Leadhills as quoad sacra parish, 1738, 1863-7; patronage of Dalmeny 1837-53; plans of churches by Spiers & Co, Glasgow, 1899, 1901. Miscellaneous papers, including: valuation and sale catalogue of contents of Niddry Lodge, Kensington, 1854-5; papers relating to West Lothian freeholders, 1789-1877; photographs of house and gardens at Muirhouse by A A Inglis, nd.

2724 **Mrs P Robertson, Gullane** Accounts relating to Mill of Whitehills, Sorbie, 1727-81.

2727 **Society of Advocates in Aberdeen** Writs of lands in Sheriffdoms of Aberdeen, Banff, Elgin and Forres, Fife, 1345-1789; copy charter of 1060 by Malcolm III to Ronald, earl of Caithness, for services against Macbeth, c1840.

2730 **Lady Leith-Buchanan, Gartocharn** Writs and legal papers concerning lands of Drymen and Gartocharn, 1657-1846; papers concerning Drymen and Dumbarton Road Trust, 1830-48; valuation of

Sherrifdom of Stirling, 1696; court book of regality of Lennox, 1678-81; note concerning arsenic poisoning, 1756; accounts relating to Drumakild estate, 1689-1793; photographs of life in the Yukon, 1906.

2737 **Flett & Sutherland, fish salesmen, Findochty** Accounting records, 1902-20; correspondence files, 1910-21. (Deposited in Aberdeen University Library)

2738 **Dudingston of Sandford.** Miscellaneous estate and related papers, 1539-1927, including: rentals, 1776-7; account of tubs and other goods supplied by cooper, 1771-7; muster roll of persons in east district of Fife Volunteers, 1799; indenture between Colin Reid, surgeon, apothecary in Elie, and John Dudingston, 1756; writs of lands of Luthrie, 16-18 cent.

Finance

2695 **The Royal Bank of Scotland plc** Accounting records and acts, orders, and resolutions relating to the Company of Scotland trading to Africa and the Indies, 1696-1707. Accounting records and papers concerning the Equivalent Company, 1706-98, including: list of Jacobite rebels, c1715; account of sums due to attainted persons, c1716; abstract of money melted down and received at mint in Edinburgh, 1707-78; inventory of furniture in the Equivalent Office, 1719. Index of governors, deputy governors and directors of the Royal Bank of Scotland, 1727-1922. Correspondence concerning the Commercial Bank of Scotland, 1858-1885, including: applications for post as architect to the bank, 1882. (Replaces Survey No 0266)

2712 **Cooper & McKenzie Ltd, tailors, Dundee** Minute book of Dundee Branch of National Federation of Merchant Tailors, 1916-9; measure book of J C McKenzie, tailor, 1918-29; photograph of shop front, c1946.

Health

2728 **Leith Benevolent Association, Edinburgh** Records of the Society for the Relief of the Destitute Sick in Leith, 1856-1953, including reports, 1865-1948, minutes, 1856-1953, accounting records, 1872-1953. Records of the Association for the Improvement of the Condition of the Poor in Leith and Leith Benevolent Association, 1872-1985, including: reports 1898-1985; minutes, 1872-1975; accounting records, 1925-70; subscriptions, 1907-74; applications for assistance, c1930-64; registers of lodgers and payments at House of Call, Leith, 1932-41; registers of Leith Day Nursery, 1921-42.

2745 **Mrs R M Masson Gulland, Edinburgh** Letter from Florence Nightingale to James Alexander Russell, Lord Provost of Edinburgh concerning Edinburgh Fever Hospital, 1893.

2746 **Society for the Relief of Destitute Sick, Edinburgh** Inventories of property belonging to Society, 1861-1944; accounting records, 1874-1962. (Formerly deposited in SRO GD1/781)

2693 **Dundee City District Archive and Record Centre** Dundee Children's Free Breakfast Mission: minutes, 1889-1902; accounting records, 1876-1914; monthly reports, 1904-35; annual reports, 1903-40;

roll books, 1882-1907; presidents' notebooks, 1882-1941; register of workers, 1952-77; lantern slides of holiday camps, c1930.

Miscellaneous

1843 **Strathclyde Regional Archives, Merchants' House of Glasgow** Minutes, 1930-48. Accounting records, 1800-1959, including: apprentice indentures, 1802-54; pension lists and vouchers, c1812-58. Correspondence, 1834-1948, subjects including Clyde navigation, trade and industry and reform of commercial law. Miscellaneous membership records, 1864-1926. Papers concerning Necropolis, 1828-1950, including: minutes, 1828-47; accounting records, 1831-1950, records relating to interment, 1853-81, certificates of burial rights, 1861-1939; plans, 1867-89; contracts and other papers relating to site, construction and maintenance of Necropolis, 1831-77. Accounting records and other papers relating to Ness Hall and other property, 1891-1951. Legal and financial papers relating to trusts and mortifications, including mortification book, 1602-1866, Samuel King Trust, 1848-90. Legal and other papers relating to educational endowments, bursaries, scholarships and apprenticeships, 1815-1942. Chartulary of Widows Fund of Physicians and Surgeons, 1810-1920. Merchants' House pension lists and accounts, 1754-1945. Papers relating to War Relief Fund including: minutes, 1928-38; accounts, 1918-28; correspondence and applications, c1911-48. Inverclyde Bequest Fund accounts, correspondence and related papers, 1902-50. Plans, 1865-88. Miscellaneous papers relating to Glasgow commercial affairs and trade, 18 cent-1919.

1870 **Orkney Library** Miscellaneous gifts and deposits. Film: 'Handba' at Kirkwall, Orkney', nd. Kirkwall aerodrome aircraft movement log-books, 1975-9. Minutes of Kirkwall Agricultural Society, 1912-71. Account of voyages and crew of the Orcadia, 1865. Correspondence and other papers relating to Captain James R Sinclair's affairs, including property in Samoa and New Zealand, 1848-1916. Papers of Stronsay War Memorial Fund, 1919-46, including: minutes, 1919-30; accounts and subscriptions, 1919-46; correspondence, 1919-24. Letter describing voyage from Greenock to Quebec, 1865. Printed account of Sinclair family, Stroma, Nether Scapa, St Ola and Westray, 18-20 cent. Copy notes by German naval staff on the 'Fuehrer conferences', relating to naval warfare and sinking of HMS Royal Oak, 1939.

2365 **Argyll and Bute District Council Archives** Miscellaneous accessions. Ardrishaig Public Hall and Literary Institute: minutes, 1896-1945; accounting records, 1897-1976. Buteshire Liberal Club Ltd: minutes, 1899-1923, accounting records, 1900-20; articles of association and inventory and valuation of furniture, 1900-1923. Dunoon Labour Party: minutes, 1950-65; cash book, 1950-65. The Salen (Mull) Pier Co Ltd: accounting records, 1903-46; plans of proposed pier, 1904. Rothesay District Nursing Association/Bute Nursing Benevolent Association: minutes, 1895-1968; accounting records, 1947-68; annual reports, 1894-1947. Machrihanish Aerodrome: aircraft movement log books, 1958-64. Papers relating to families and businesses in Argyllshire - including, letterbook of David MacKintosh, architect in Oban, 1888-91; regulations respecting Strachur Bay Pier, 1825; correspondence from Duncan Brown, Port Adelaide, Australia, 1863-

7; register of policies with Bute Insurance Co Ltd, 1873-82; photographs of buildings and individuals in Dalmally, Sandbank, Ardnadam and Dunoon, c1901-24; advertisement for the Dunoon Hydropathic Institution, c1850.

2709 **Mr and Mrs J Trotter, Inverness-shire** Miscellaneous correspondence and papers of Trotters of Bush, Castlelaw and Dreghorn, 1723-1916. Legal, business and personal papers of Archibald Trotter, merchant in Edinburgh and Glasgow, and his family, 1741-91, including; letters from his sons concerning life in the West Indies and America, 1770-3. Papers of Robert Trotter, deputy postmaster in Edinburgh, 1763-1807, including: accounts, 1774-1807; personal and official correspondence relating to the Post Office, 1763-1806, including letters of Sir Coutts Trotter, Earl and Countess of Minto concerning their son's disputed freehold vote, 1805-6, and correspondence with Sir Archibald Denham, 1768-95, concerning public and private business, including the collapse of the Ayr bank, 1772. Papers of Archibald Trotter, opium agent and superintendent of Salt Chokies at Behar, 1805-51, including: correspondence with the Board of Customs Salt and Opium, the Governor-General and others, concerning opium production and protection of the crop, the Post Office and trade, 1814-41; miscellaneous papers, including printed items and accounts, relating to opium and saltpetre trade, 1814-44; personal correspondence, 1807-51, including letters relating to life in India and the Bush estate, correspondence and accounts relating to executry of Earl of Minto, 1813-6; private journals of tour to Highlands, 1804, and voyages to and from India, 1807, 1818-9. Correspondence and papers relating to John Trotter, resident and opium agent in Benares, 1776-1852,

including: correspondence with Sir John Sinclair, Sir Coutts Trotter, and Robert Dundas concerning his post as a writer in India. Personal papers of Lt-Col Robert A Trotter, 1834-90, including: letters describing the occupation of Kandahar, 1839, tiger-hunting, 1851, and the Indian Mutiny, 1857.

2719 **Mr John G Gray, Edinburgh** Miscellaneous papers relating to the history of the south side of Edinburgh, 1769-1959, including: prescription by Professor James Y Simpson, 1855; minutes of Hope Park and Buccleuch Congregational Church women's guild, 1930-58; letter from private secretary to Lloyd George regarding Young Scots Society, nd.

2749 **Mr H L R MacNeal of Lossit** Legal papers concerning Campbeltown Coal Works, 1770-1853; correspondence relating to Captain Archibald McNeill and campaigns in India, 1774-1815; agreement between Captain John Bligh, RN, and French commanders concerning terms of surrender in Haiti, 1803; letter relating to colonisation of Carolina, 1739. Miscellaneous legal and genealogical papers concerning the MacNeal and Loring families, c1754-1840. (Replaces Survey No 52 and 2628)

2 National Register of Archives (Scotland): Register of Oral History Tapes

This Register provides a central body of information on taped material, based on data supplied by the custodians of the tapes and in most cases it also covers such matters as the quality of the recordings, the type of equipment used and particulars of any published work based on the tapes

concerned. The collections are listed under the name of their present custodians to whom requests for access should be directed. The presence of recordings on this Register must not be taken to imply any right of public access to them. Dates given in the entries refer to the date of recording or to the date to which the recordings relate.

1. **School of Scottish Studies, University of Edinburgh, 27 George Square, Edinburgh** Ring-net fishing. Interviews concerning fishing methods and lives of the fishermen.

3. **Motherwell District Libraries, 33 Hamilton Road, Motherwell, Lanarkshire** Social history of Motherwell. Interviews with retired steel worker, miner, servant, farmer, dentist and MP, c1920-c1939.

7. **Archivist, Scottish Film Council, 74 Victoria Crescent Road, Glasgow** History of the cinema industry. Interviews with cinema owners, managers and employees, 1900-current.

8. **Buteshire Natural History Society, Stuart Street, Rothesay, Isle of Bute** Social history of Bute. Interviews with a fisherman, c1880, and a mole catcher, c1920.

10. **Miss Eleanor Gordon, 19 St Vincent Crescent, Glasgow** Working women in Scotland, 1850-1914. Interviews with four women jute workers concerning their lives and work in Dundee, 1900-14.

11. **Curator, People's Palace Museum, Glasgow Green, Glasgow** Recording of foundation meeting of the Scottish Labour Party, 17 Jan 1976. Social history of Glasgow. Interviews concerning life and

work in Glasgow, including circus and cinema work, and the suffragette cause, 1908-75.

13. **Country Life Archive, National Museum of Antiquities, Queen Street, Edinburgh** History of country life in Scotland. Interviews with farm workers concerning their lives and work, 1910-c1959.

14. **Archivist, Orkney Library, Laing Street, Kirkwall, Orkney** Recording made by Ernest Walker Marwick, historian and journalist. Interviews, sound and radio recordings relating to life, literature and folk-lore in Orkney, Shetland and Norway, 1910-77.

15. **Scottish Record Office, HM General Register House, Edinburgh** Recordings of meetings of shop stewards and workers of Upper Clyde Shipbuilders during the 'work-in', 1971-2. (SRO reference: RH22/1)

16. **Dundee Museum and Art Gallery, Albert Square, Dundee** Social history of Dundee. Interviews concerning life and work, 1905-70, including jute and flax industry and its trade union organization, c1930-current; grocery and licensed trades, 1905-70; life during the Depression, c1930.

17. **Department of Libraries, Moray District Council, 21 Tycock, Elgin** Interviews concerning life in agriculture and fishing, nd.

19. **National Library of Scotland, George IV Bridge, Edinburgh** Recordings of BBC Radio Scotland series 'Almost Forgotten', 1974-6. Scotland's Record series: The office of Secretary of State for Scotland (Lord Campbell of Croy); the Ministry of Information in

Scotland, 1939-46 (John Dundas, MVO); Alexander Lindsay's rutter of the Scottish seas (George Fortune); the Scottish Board for Industry (Walter Dickson Scott); the Royal Observatory, Edinburgh, and fifty years of astronomy (Professor H A Bruck); General Assembly of the Church of Scotland, 1977-80; crofting and fishing life in the Isle of Lewis, 1899-1951; Scottish industrial publicity, 1960-74; growth of the Scottish electronics industry, 1940s-70s; recollections of crofting (James Shaw Grant); High Constables of Edinburgh; City of Edinburgh publicity and public relations, 1960-76; Newspeak, talking newspaper for the blind, 16-17 Jan 1979; nursing in Glasgow and East Lothian, 1922-6; air raids on Scotland, 1939-45; the Toothill Report on the Scottish economy, 1959-61 (Sir John Toothill and others); the Scottish Home Department, 1939-57; Scottish administration, 1935-72; Lewis shielings in 19 and 20 cents; Radio Clyde programme 'Towards 2000', 27 October 1977 (HRH The Duke of Edinburgh); oatmeal milling in north-east Scotland, 1917-70; poetical works of Helen Burness Cruickshank, 1967-79; the Scottish Land Court (Lord Birsay); the office of Secretary of Commissions for Scotland, 1972-8 (Sir Ronald Johnson); Scottish industrial policy in the 1930s; State management of the liquor trade in Scotland, 1916-71; Glasgow memories, 1900-14; Edinburgh's 266th Lord Provost, 1977-80 (Kenneth Borthwick); Scottish evacuation film scheme, 1939; a young lady of the 1890s; Scots grannies in the 1920s; 650th anniversary of Edinburgh's King Robert the Bruce charter of 1329; evacuation of Isle of Soay, June 1953; the Scottish press, 1930-80; eleven historical vignettes (Dr J B Barclay); the making of Strathclyde University, 1959-80; surgery in Edinburgh, 1937-77; a herrin' lassie of 1913; work of a head postmaster in Scotland, 1930-76; the National Fire Service in Scotland, 1941-5; recording of article 'Scottish Delight for the

Overseas Visitor', 1956; Aberdeen typhoid outbreak, 1964; introduction of postbuses in Scotland, 1968-72; Saturday morning cinema performances for schoolchildren in Edinburgh, c1930 (Dr J B Barclay); work of the Edinburgh Gaelic Schools Society, 19 cent; last months on St Kilda, 1930; applying the Distribution of Industries Act in Scotland, 1945-52; interviews with east coast fishermen and a fisherwoman, c1900-c39.

20. **National Maritime Museum, Romney Road, Greenwich, London** Interview with British merchant seamen of all ranks, 1895-1945.

21. **Mr Jurek Alexander Putter, Grafik Orzel Design Studio, 141 South Street, St Andrews** Interviews with inhabitants of St Andrews and east Fife, 1883-1950.

22. **University Television Service, School of Physical Sciences, University of St Andrews** Video recordings made in conjunction with tapes in No 21.

24. **British Steel Corporation, Scottish Regional Records Centre, 1300 Tollcross Road, Glasgow** Glengarnock conservation project - oral history. Interview with workers at Glengarnock Steel Works and their wives on all aspects of the work place, home and community at large, c1900-79.

25. **Mr P Weller, Principal Teacher of History, Peebles High School** Description by Luke Grant Ferguson, former naval officer, of his boyhood at Pirn House, Innerleithen, 1902-16.

26. **Mr Robert Little, Rayleigh 20, University of Essex, Colchester** Scottish migration to Corby, 1933-60. Interview with Scottish steelworkers and their families in Corby, Northamptonshire, regarding housing, leisure and work patterns in Scotland and in Corby, and the process of migration, 1933-60.

27. **Mr Donald Mackechnie, Bridge of Douglas, Inveraray** Description by unnamed retired nurse of her childhood at Kenmore, Loch Fyne, and education at one-teacher school at Bridge of Douglas, 1922-30.

28. **School of Scottish Studies, University of Edinburgh, 27 George Square, Edinburgh** Scottish place-name survey. Interview regarding use of place-names from oral tradition, mostly concerning Orkney, Shetland and the Gaelic-speaking areas of Scotland; Gaelic, with some English.

29. **Mr L C Crawford, Cumnock and Doon Valley District Library, Bank Glen, Cumnock, Ayrshire** History of mining in Doon Valley. Interview with unnamed retired miners regarding local mining, trade union and general history (including 1926 General Strike), technical mining methods, recreation, housing, childhood games etc, 1920-78.

30. **Clydebank District Libraries, Central Library, Dumbarton Road, Clydebank** Interviews with retired shipyard workers at John Brown's, Clydebank, on all aspects of social history of Clydebank, including working conditions, trade unions, politics, the Blitz, building of the Queens, formation of Upper Clyde, 1925-70.

31. **Dundee Museum and Art Gallery, Albert Square, Dundee** Interview with Miss Margaret Fenwick, retired secretary of Jute and Flax

Workers Union (now amalgamated with Dyers' and Bleachers' Union) regarding work in Dundee factories and history of union, c1930-current.

32. **Professor Nancy C Dorian, Bryn Mawr College, Bryn Mawr, Pensylvania 19010, USA** Interviews with descendants of fisherfolk from Brora, Golspie and Embo, Sutherland, on all aspects of fishing life, including much material on language use, c1900-40, with hearsay evidence on earlier periods; English and Gaelic.

33. **Keeper of Maritime History, Aberdeen Art Gallery, School Hill, Aberdeen** Interviews with retired great line fishing skippers concerning their trade, and life and work in coastal fishing villages, 1920-60.

Reviews

A large number of Reviews will appear in the next issue

Previous Publications

Back numbers of Scottish Industrial History are available at £2.70 each inclusive of postage and packing. Examples of articles in previous issues include:

Vanessa Habib — 'An Eighteenth Century Cotton Manufactory in Scotland: Elizabeth Scott in Musselburgh' (8.1 1985)

Brenda M White — 'The Ayrshire Boot and Shoe Industry 1839-1939' (7.2 1984)

Ronald C Michie — 'Investment and Railways in Nineteenth Century Scotland' (5.1 1982)

Brian D Osborne — 'Dumbarton Shipbuilders and Workers Housing 1850-1900' (3.1 1980)

Send orders and cheques (payable to 'Business Archives Council of Scotland') to Archives Department, University of Glasgow, Glasgow G12 8QQ