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DOI: 10.21427/D7RQ6j
A party of 17 Netherlands Burgomasters visited Ireland. They were guests of Wavin Pipes Ltd., Balbriggan, Co. Dublin.

On The Ball

Golf and soccer stories in this issue for the sports minded are the BTU golf outing, CIBS golf at Hermitage and the draw for the LPHW Perpetual Trophy, page 12.

Diesel — The Alternatives

Since the shortage of light crude oil has effectively cut off our supplies of diesel oil to the domestic and to a lesser extent the industrial market, the heating industry has had to look very closely at multi fueled boilers. Our review this month is on industrial and commercial boilers and covers all the options, page 28.

What Happened To Our Oil?

The story to date of the present oil shortage and it’s effects on the heating business, also a brief look at the alternatives, page 2.

Biomass — A Growing Energy Source

In the light of recent reports from various energy conferences this story is very timely as it gives information relative to the Irish market, page 59.

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After months of speculation the picture is becoming a little clearer and we can now understand some of the events that led up to our present oil shortage. No one doubts that politics at an international level are the root cause of our oil problems but it is how we react to the situation that is important. Coming as it did at the end of the heating season the shortage has given us time to plan for next season. This means that decisions on what to stock and what necessary alterations to systems will have to be made. Now is also the time for our many professional institutions and trade associations to take a lead and prepare technical papers for presentation or publication, to the trade and the general public to make sure that everyone involved in conversions, interlinking or installation of unfamiliar equipment are fully conversant with what they are doing.

Those in the trade should also be prepared to make the public aware of the dangers of "cowboys" cashing in on the publics confusion over the fuel crisis. If and where conversions may take place the general public must be put on their guard against installing potential bombs in their homes by these unskilled "cowboys".

To understand the present shortage we must first realise that all fossil fuels, meaning fuels that are preserved in the strata of the earth, are finite and have therefore only a limited life. Although all the fossil fuels are derived from solar energy it has taken many millions of years to develop to their present forms. If we could reduce the time of the development cycle to a very short period, say five to ten years, then we would not have the present crisis, but that is only possible with an energy source like biomass, which is still only in the development stage.

World oil consumption has increased dramatically especially in America where although they have their own sources of oil it has been cheaper to buy from other countries and so development of native fuels has been retarded. As volume sales went up so too did American dependence on imported oil and when the Iranian Islamic revolution came, anti-American feeling caused cuts in the supplies to the United States. The revolution appears to have caused a 4-10% reduction in the world supplies of crude oil and this has echoed throughout the western world by shortages ranging from 4% to 40%. The reason for this is that the new Iranian government decided to sell their oil to the highest bidder and not as previously at a fixed price thus causing the world price for crude oil to rise above that settled by OPEC, the organisation of oil producing nations. Many countries, including our own, were now faced by an unexpected rise in the cost of living upsetting the planned rate of inflation which is so important in the countries economy.

Governments all over the world ordered oil companies to do the impossible that was to buy oil at prices which were pre the Iranian revolution prices, in order to keep down inflation. This in practice was achieved by not allowing the Prices Commission to grant price rises to the oil companies thus giving us all the ingredients for an oil shortage. Countries like Germany and Sweden because of their low rates of inflation allowed the price of oil to float and therefore little or no shortages were experienced as they could get almost all their needs.

The slow reaction by governments can partly be blamed on the small percentage drop in supplies as this led many governments to believe that a mere cut back by users would solve the problem but as we know now the price of oil was the main difficulty and until that is sorted out we will still have shortages. Libya has recently set the world's highest official price for crude oil at 21.31 dollars a barrel, the OPEC base price is 14.55 dollars. This is typical of the increases brought about by the Iranian action and may continue until demand for oil is reduced.

When light crude oil is refined, about 22% of the output is diesel whereas heavier crude oil contains about 18%. The significance of that is that most of the world's light crude oil comes from the Middle East especially Iran.

In Ireland the worst hit oils were petrol, diesel and kerosene whose share of the market had increased more rapidly than any other of the oil fuels. The petrol saga is reported daily in the newspapers but the situation with the heating fuels is less clear. Difficulties in receiving supplies were experienced in early January and one oil company, Burmah Castrol (Irl) Ltd, admitted that it was unprofitable for their company to operate in Ireland at present prices, and at that time oil on the Rotterdam "spot market" was getting 270 dollars a tonne landed in Dublin and all they could expect for it in Ireland would be 190 dollars some 80 to 70% below cost. It would be very difficult to fault a business who decided to drastically cut its operations under such conditions, but it leaves many of it's customers in the position that they cannot get supplies from any source as other oil companies are not supplying new customers at the moment.

On March 26th of this year the Department of Industry, Commerce and Energy called a meeting of the various oil companies and representatives of the...
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A member of the Jefferson Smurfit Group
department, to announce a priority list of industries who were to get first preference with oil supplies. This list was issued as a Ministerial order, which is enforceable in law and would be effective until 30th June 1979, it listed the following as priority industries,

(a) Agriculture;
(b) Commerce;
(c) Fisheries;
(d) Hospitals and similar institutions;
(e) Industry
(f) Tourism.

As can be seen from the list heating, particularly domestic heating is not mentioned as the Department decided that this was one of the first areas that cut backs were to be enforced. On the 3rd of May the final blow hit the heating market when the Department of Industry, Commerce and Energy issued a directive, which is not enforceable in law, banning the oil companies from supplying domestic users of diesel oil from receiving supplies even when oil was left over after supplying priority needs. The ban would last indefinitely, but would be reviewed later.

**150,000 affected**

It is estimated that 150,000 house owners are affected by this directive and unlike petrol users house owners are unable to store central heating fuel, as they cannot get supplies in the first place. The ban has put the oil companies in the position that legally they are entitled to serve domestic users after priority needs are met but the directive prevents them from doing so. New customers are affected in the same way as existing customers and this has cut down the installation of new oil fired boilers dramatically.

Price increases will not ease this situation as the Department have decided to stockpile diesel supplies for next winter but this does not mean that new customers will be supplied as the Department expect to have some form of rationing even for existing domestic users. From what has happened up to now it looks like the oil companies will still be saying next winter "NO NEW CUSTOMERS".

If oil supplies do come back for new customers then they are sure to be in a limited form so that the oil fired boiler market will contract, leaving an opening for boilers fired by solid fuel gas as well as oil. With inflation rising, wages will have to follow and so the main consideration for heating will be availability of the fuel first and cost second, which means that gas, both towns and LPG, and solid fuel will have an opportunity to expand their markets.

Industrial heating is not affected as domestic because of the priority list and also because heavier fuel oil can be used in industrial boilers. There appears to be a far smaller oil shortage with heavy oil and some oil companies say they may take orders for heavy fuel oils in the near future.

**Priority list**

The oil shortage has caused many strange things to happen, there have been stories of central heating oil disappearing from storage tanks overnight, empty fuel tanks being used for the storage of petrol, and of course the "priority list" has caused the appearance of many urban "farmers" and B&B signs are going up everywhere.

Coal importers have never been so busy and at one stage a near riot situation was reported from the Coal Information Service. Apart from Coal Distributors Ltd another coal importer is importing coal in the Bard Mona have more problems at the moment than the fire which partially destroyed their new head office. While nobody at the Bord is prepared to admit that there will be a shortage ofpeat briquettes this winter the strain on coal supplies could reach record proportions and the problems for the heating industry seem to be piling up.

Finally there appears to be some hopes that an improvement in oil supplies will be seen in early 1980, when it is hoped that conservation and an increase in the output of crude oil will relieve the present shortage.
Space Power is Possible

The Institute of Electrical Engineers is meeting in London to discuss the feasibility of solar power satellite systems, as they may be a more acceptable answer than nuclear power to meeting increases in electrical demand.

The idea originated in the United States when a joint study by the Department of Energy and NASA explored the practicality of power from space.

A solar collector of several square kilometres would convert solar energy into microwaves which would then be received by a station on earth. This station would comprise of a large collecting aerial and a converter. It would have an output of around 5000 megawatts, the equivalent of five nuclear power stations.

The main advantage of the idea is that the technology is already developed and makes the idea feasible. The only hazard would be accidental exposure of people to the microwaves. The solar power station option is one of the few renewable sources of energy left to mankind.

BORD NA MONA BAD NEWS...

Bord na Mona's new head office which was partially gutted by the recent fire is not expected to be in full use again before next spring. Staff who had just settled into the new offices have returned to their former offices at Mount Street.

Good News

But good news for the Bord is that the Minister for Industry, Commerce and Energy, Mr O'Malley has announced that the Government has given their approval for the erection of a briquette factory at Ballyforan, Co Galway. The factory will be supplied with milled peat from the Derryfada group of bogs in counties Galway and Roscommon which are at present being acquired and developed. It is expected that the new project will create at least 500 new jobs.

With an annual output of 250,000 tonnes, the factory will be double the size of the briquette factory at present being built at Littlejohn, Co Tipperary, which will have a total output of 130,000 tonnes. It is expected that the Bord's total briquette production with the new factory will now rise to 750,000 tonnes per year.

Insulation a Must

The Department of the Environment has decided that all houses, after grant-aided improvement work, must comply with new insulation standards for attic insulation, draught proofing and lagging of hot water cylinders. This new requirement applies to work commenced on or after April 1, 1979, and the extra cost for the work must be included in the total amount when applying for the grant.

Insulation Reminder for Builders

From the 1st July 1979, new insulation standards apply to all grant type houses and houses for which reasonable value certificates or certificates of exemption are required. The new standards are a maximum whole building U value of 1.25 W/m²°C and maximum elemental U value in respect of external walls and parts of intermediate floors of 1.1 W/m²°C.

U values of 0.40 W/m²°C already applies to roofs and 0.60 W/m²°C to ground floors from previous orders. The U values have been calculated from the 1975 IHVE Guide Book A and details of the outline specification are available from the Government Publications Sales Office, GPO Arcade, Dublin 1.
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Dublin Gas Price

Increased By 14.4%

A recent price increase of 14.4% on Dublin gas will mean an extra 52p per week on gas fired domestic heating to the average consumer, according to the Dublin Gas company. The company originally sought a 23% increase and a company spokesman said that they were disappointing the percentage granted as it was not sufficient for their needs. It was also announced that the company would not now pay a final dividend to shareholders.

Consumers with four or more appliances or who have central heating will now pay 43.92p a therm, an increase of 6.72p.

Over the last 18 months, bottled gas has increased by 10% approx, coal by 18%, peat briquettes by 26% and we still do not know at what level oil will settle at.

Reconair Distribute

Savesco

Reconair Ltd have been appointed sole distributors for the Republic of Ireland for Seveso SPA of Milan Italy. Seveso manufacture burner boiler units, A/C equipment and refrigeration machines.

Reconair Ltd have recently appointed sales personnel to market the considerable range of burner boiler units, which include oil and gas fire burners coupled with sectional cast iron boilers suitable for domestic use, covering a range in oil fired units from 74,000 to 220,000 BTU/HR and in town or low pressure gas 40,000 BTU to 224,000 BTU/HR. Both of these ranges can be supplied with domestic hot water calorifier capable of supplying constant hot water at a temp of 40°C. In the commercial and industrial range Reconair market Seveso steam boilers with capacities of 1,000,000 to 12,000,000 BTU/HR steam generators with capacities from 960,000 to 14,400,000 BTU/HR. High and low pressure steel boilers ranging from 400,000 BTU to 20,000,000 BTU/HR and large tube boilers with capacities from 5,000,000 to 20,000,000 BTU/HR. This last range is adaptable for solid fuel applications. Design and construction of the Seveso burner boiler products has been given approval by the Italian ANCC according to the German DIN standard.

Reconair Ltd. who employ sixteen service engineers, fourteen of who are based in Dublin and one each in Limerick and Tuam offer a comprehensive back up service to the Seveso burner boiler range, their engineers being fully conversant with Seveso products.

For further details contact Reconair Ltd., Unit 4A Coolock Industrial Estate, Dublin 5. Phone: 470611/470113/470209. Telex: 31536.

CDL's New Ship Docks

Coal Distributors Ltd have a new 1600 ton bulk carrier the "Fastnet Rock" which arrived in Dublin recently on her maiden voyage. The first cargo was of anthracite peas from Rotterdam and was discharged at the CDL terminal berth at Ringsend. The outward trip took a cargo of slack to Britain.

Interconnecting High-Output Backboilers

Since the recent oil shortage many users of oil fired central heating have again been forced to consider using an alternative fuel for heating. Assuming they want to keep their existing radiator system, the idea of interconnecting a high-output backboiler with the system leaves the possibility that if oil becomes freely available again they can revert to oil, or if not they have a form of partial central heating from the solid fuel backboiler.

The following text and diagram briefly outline the system of interconnecting and a complete paper on the subject is available from Hugh C Maguire Consulting Engineer or Coal Information Services Ltd, 18 D'Olier Street, Dublin 2. Tel 776246.

Valves 'A' and 'B' should be inserted in the systems in positions shown on the diagram so that if all these valves are closed then both boilers can be lit without any harmful results. Either system can be used to heat the radiators by opening the valves on that particular system and closing the valves on the other system. Seperate pumps are used with each boiler to ensure total separation. A dual coil indirect cylinder must also be used. The customer should be advised that the backboiler system will...
Egypt Orders

Mr H.R. Holfeld and Mr D.P. McGonnell of the Holdfeld Group have just returned from a one-week mission to Egypt organised by Coras Trachtala. Along with seven other companies within the building trade the purpose of the mission was to make contact with potential end-users and specifiers and to determine at first hand the opportunities that will exist in the future for further possible exports.

Mr McGonnell, Sales Director for the Holdfeld Group told IHVN that as a result of the trip they had established an agent for the Holfpak Booster set and an initial order for five units was immediately placed. So keen was the interest in the Holfpak unit that Holfeld’s have decided to take part in next year Cario International Fair in March 1980.

New LP-Gas Terminal at Drogheda

A new LP-gas marine terminal for Flogas was officially opened at Drogheda by Padraig Faulkner, TD, Minister for Tourism & Transport and Minister for Posts & Telegraphs on May 28th.

Flogas Limited is a wholly Irish owned company formed in September 1977 with the objective of marketing LP-gas. It commenced trading in August of last year distributing to the domestic, industrial, agricultural, catering and automotive markets, initially within a 60 mile radius of Drogheda including Northern Ireland. At the new terminal, ships discharge gas (in liquid form) where it is held for distribution either by bulk road tankers or, after bottling, by cylinder trucks. "The new terminal will hold welcome additional reserves within the country," said Mr. Eugene Quigley, Chief Executive of Flogas Limited when speaking at the opening. "LP-gas is growing in importance as a source of power which, in the past, was largely wasted," he said. The terminal has a storage capacity of 700 tonnes at the moment and it is planned to expand by another 400 tonnes in the near future.

A distribution innovation being introduced by Flogas Ltd is the establishment of a chain of filling points at which cylinders will be filled from bulk tanks thus reducing the unnecessary and wasteful transportation of small cylinders to and from central filling points. This method will also contribute to the elimination of shortage of supply during peak usage periods which has been a feature of recent years.

LP-gas (liquefied petroleum gas) occurs both at oil wells and as part of the oil refining process. Although in gaseous form, it can be liquefied by the application of moderate pressures. This is the big advantage of the product which can be stored and transported as a liquid and used as a gas. The liquid occupies 1/270 the volume of the gas. Typically, but not exclusively, butane is used domestically and propane industrially.

The overriding characteristic of LP-gas is that it brings the advantages of a modern power source to even the most remote areas with the assurance of continuity of supply as reserves can be held at the point of use.

Flogas Ltd aims to serve five markets:
1. The domestic heating and cooking market.
2. The industrial process and space heating market.
3. Hotel and institutional catering.
4. Agricultural water heating and CO₂ production in glass houses.
5. Automotive, as an alternative to petrol in cars, vans and fork-lift trucks.

According to a company spokesman "The firms first year’s trading have been very satisfactory and volume targets were exceeded."

£1m ESB Order For Irish Firms

Two Irish firms, ABM Ltd, Rathcairn, Co Meath, and LMH Engineering of Arklow, are to share in a £1 million order which the ESB placed for peat handling plant to be installed at the extensions to Lanesboro' and Shannonbridge generating stations.

Dr J J Kelly, chief executive of the ESB, said that due to encouragement of the Board, Irish firms could get up to £200m in orders for the Moneypoint coal-fired station in Co Clare. This is due to the Boards policy of buying Irish where ever possible.

The Moneypoint station will cost in the region of £400 million and will give employment to approximately 1000 people during the construction. The development will be the biggest of its kind in this country and will essentially be a coal burning station but will have dual-fired capacity so that if oil is found off the west coast, the station can be converted.
Our Air Handling Units
Have Raised Quite A Few Eyebrows

And that's quite something, since companies and institutions like I.C.I., Leyland, Shell, Debenhams and the Royal Navy aren't usually taken by surprise. But then again, it's not every day that someone comes up with an air handling unit which meets their exacting demands right down to the last detail.

We did it for them and for many other famous names too. Because here at Matthews & Yates we've the facilities and the know-how to custom build air handling units to suit any customer's requirements. Apart from that, we also make a full range of standard units in 14 sizes with a comprehensive choice of extras and adaptations so they're suitable for all types of air conditioning systems.

Isn't it time you discovered more about Matthews & Yates? When you see how much we can do for you, it could be quite an eye-opener!

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Tel: 061-794 7311.

Published by ARROW @TU Dublin, 1979
SOLE IRISH ENTRY FROM HOL Feld

Ireland — France car ferry operators Irish Continental Line and H.R. Hol Feld Ltd., the engineering and pumping equipment group are to jointly sponsor the sole Irish entry in the forthcoming International 1000 Pistes car rally in Southern France.

The Irish Continental Line/H.R. Hol Feld entry, a highly tuned Volkswagen Beetle to Group 5 regulations, will be driven by Richard Hol Feld with Max McEvoy as co-driver.

One of the toughest loose surface rallies in Europe, the 1000 Pistes Rally takes place in the French Military Camp de Canjuers in the mountain area between Cannes and Grenoble. This years event, on July 7th and 8th has attracted a number of top British works drivers as well as those from the Continent and include last years winner Jean Luc Therier of France.

WHAT A WASTE!

Larnaca sewage plant to have a £300,000 waste disposal unit.

WHESOe (ireland) Ltd for the design, supply and erection of diesel oil bulk storage capacity at Riyadh Power Station. Erection material and specialist equipment has been shipped from Dublin and Whessoe Ireland’s erection crew flew to Riyadh in May to commence site erection. Work is due for completion in August next. Erection plant and material will be left in Riyadh for further contracts which are currently being negotiated.

Sanbra Fyffe Introduce New Deltaflow

Sanbra Fyffe Ltd and Deltaflow Ltd presented the Deltaflow range of taps, mixers, showers, wastes and accessories in the Gresham Hotel, Dublin, on May 3rd. In a well prepared presentation each item of the range was displayed and a descriptive commentary was given by Brendan Byrne of Sanbra Fyffe.

Most of the Deltaflow taps conform to BS 5412, 1972 which includes far more ‘performance’ requirements than the previous standard BS 1010, 1942. Features of design include the lubricated non rising spindle mechanism from which water is excluded while closing friction is virtually eliminated by the PTFE thrust washer. The new Deltaflow ‘performance’ ranges which have emerged from BS 5412 are the economical Fairline, the Alterna which will be popular with the large scale housing projects, and the Superspa which offers a wide variety of fittings and finishes.

The new Deltaflow catalogue called the Deltaflow File was also introduced. This is a very colourful and clearly presented catalogue which gives details of the dimensions and characteristics of all the fittings in the range.

At the same time, Sanbra Fyffe, who have been making fittings for bathrooms, kitchens etc. for many years in Dublin, also showed their range. Of particular interest was the Guaranteed Irish Saflo fittings which incorporate a diaphragm principle of operation which is a very distinct feature and is the first of its kind in Ireland.

Whessoe Goes Middle East

Esso Petroleum Company Ltd, London, have awarded an order on behalf of Esso Africa for Yusuf Bin Ahmed Kanoo Company, Jeddah, Saudi Arabia, to Whessoe (Ireland) Ltd for the design, supply and erection of aviation petroleum storage at Jeddah Airport. The order includes for three 750 ton storage tanks, fire water tank, all connecting pipework and distribution points. Material has been supplied from Dublin and Whessoe Ireland’s erect-
of using plant material as an energy feedstock, ie biomass conversion.

Conference topics included short rotation forestry techniques, results of combustion trials on large steam plant (ESB) and domestic heating boilers, land-use resources availability, alcohol and gas generation, tree cloning by tissue culture, and employment and technology transfer opportunities.

The EEC and the International Energy Agency have recognised Ireland's important role in biomass production and conversion, and speakers at the conference included scientists and technologists who are leading the research and development programmes supported by these agencies.

The conference attendance included representatives of State and semi-State organisations, universities, colleges of technology, farming and rural organisations, as well as engineering consultants and private forestry owners. A report on biomass appears in the Zone section of this issue.

Finheat Agents
For Mathew & Yeates

Matthew & Yates Ltd the north of England manufacturers of fans and air conditioning equipment have appointed Finheat Ltd as their new agents in the Republic of Ireland. Finheat's experience and local contacts will be used to seek a larger share of the expanding industrial market in Ireland. Previous contracts which Matthews & Yates have supplied equipment on were, UCD and the Abbey Theatre.

Neil Pollitt Marketing Manager of Matthews & Yeates said "Further industrial development in Ireland means the market for heating and air conditioning is growing and the appointment of a new agent will help to meet the demand".

Matthews & Yates based in Swinton, Manchester, have recently installed new machinery and have completely reorganised their factory.

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People in Glasshouses

The oil shortage hitting the heating industry has also hit the £20 million glasshouse industry causing massive increases in running costs. To help reduce costs the ESB in co-operation with other interested bodies have launched a new project which will make use of waste heat from power stations. This form of heating could cut fuel costs by £5,000 per acre and bring running costs down to a reasonable level.

The first five acre site to use this form of heating will be at Lanesboro' Power Station, Co Longford, with plans for another five acres later on.

Capital for setting up this kind of project would run to £80,000 per acre but the Bank of Ireland in financing this kind of project.

S suitably qualified horticulturists can apply to the Bank to participate in the scheme.

Power stations suitable to make use of this waste heat are sited at, Dublin, Cork, Wexford, Kerry, Kildare, Offaly, Longford, Donegal, Clare and Mayo.

Loan for Gas-Fired Power Station

The ESB announced that it had secured a further £10 million loan from the European Investment Bank towards the cost of completing the Aghada gas-fired power station under construction in Cork. This station is to utilise the natural gas off Kinsale to generate electricity but will not be operational until the mid-1980's.

Suitably qualified horticulturists can apply to the Bank to participate in the scheme.
CIBS Golf Outing At Hermitage

The Chartered Institute of Building Services held their most successful golf outing and dinner at Hermitage GC. 37 guests attended the dinner, his was a record attendance, with 73 golfers, 7 of which were ladies, all defying petrol shortages to drive out to Dunan on the 18th May.

Thanks are due to the golf sub-committee, John Doherty, McGratten & Kenny Ltd, Michael Buckley, Walker Air Conditioning Ltd, and Jim Rogers, McArdle McSweeney O'Malley, who did a great job arranging the outing and P J Clonan, P J Clonan Ltd, who was Master of Ceremonies.

Prizes were presented by CIBS Chairman Seamus Homan to the following winners:

**Chairman's Prize**: Paul McDonald, Brennan Group, (22) 37 points.

**Ladies Prize** - 1st: Joan Daly, (32) 29 points; 2nd: Theresa O'Brien, (23) 19; 3rd: Pat Egan, (30) 14 points.

**Class 1** - 1st: Brendan Sweeney, Sheetmetal Contracts, (5) 35 points; 2nd: Peter Johnston, A Johnston & Son, (5) 32 points; 3rd: T Bourke, T Bourke & Co, (9) 31 points.

**Class 2** - 1st: Eamonn McGratten, McGratten & Kenny, (12) 37 points; 2nd:


**Class 4** - 1st: John B Doherty, John B Doherty Ltd, (20) 32 points; 2nd: Tom Wheelan, VMRA, (18) 31 points; 3rd: Phillip Murphy, Jacob Int, (20) 30.

**Visitors Prize** - Frank Lawlor, C J Ryder, (19) 34 points; Pat Dunphy, Aer Rianta, (11) 34 points.

**Non Handicap** - Ben Kearney, Glowertham, (18) 18 points.

Liam Stenson, IBS, (12) 34 points; 3rd: John Doyle, VMRA, (14) 32 points.

BTU Golf News

Lister Tubes sponsored the latest BTU golf outing at the Howth Golf Club last month. 54 members teed off but owing to a few very heavy "summer showers" some of the less committed members retired to seek comfort and shelter at the 19th hole.

However, and depending on which way you look at it, the more determined struggled on against the elements and a very popular winner emerged in the figure of Teddy Bourke who scored a creditable 37 pts off a handicap of 9.

Teddy's cup of joy was spilling over as he told IHVN that this was the first time he had won a major award in golfing and to do it on a day when only the brave survived obviously will give Teddy plenty of bar-space for the future.

Later in the evening when everybody had dried out they sat down to a memorable meal and the presentation of the prizes was carried out by John English, Managing Director of Lister Tubes.

Liam Stenson, Captain of B.T.U. thanked Lister Tubes on behalf of all the members.

Full results were as follows:

**Overall Winner**

Teddy Bourke 37 pts.

**Class 1**

Overall Winner

Teddy Bourke 37 pts.

Some of the determined golfers at the BTU golf outing, Back (L-R), Bernard Sweeney, Peter Reynolds, John English, Peter Bourke, Liam Stenson, Victor Madden, Front (L-R), Charlie Goulde, Brian English, Liam Stenson, and Pat McGrudden.

Joan Daly who won the ladies prize, receives her prize from P J Clonan (right) and is congratulated by Seamus Homan.

Overall winner at the Howth golf outing, Teddy Bourke (left) receiving his award. Also in the picture are Liam Stenson, (centre) and John English.
T. Bourke & Co. Ltd. (9)  
Class 1  
Winner Brian Farrell 37 pts. Pump Services Ltd. (5)  
2nd Joe O'Reilly 34 pts. Pump Services Ltd (8)  
Class 2  
Winner John Hamilton 36 pts Mercon Supplies Ltd. (11)  
2nd Liam Stenson 32 pts. Irish Building Services Ltd (12) Won on last 9 holes  
Class 3  
Winner Charlie Goodie 36 pts. Goudie Boiler Services Ltd. (17)  
2nd Victor Madigan 33 pts. Coppercraft Ltd (18)  
Visitors  
1st Pat McGrudden 33 pts  
Listers (11)  
2nd Michael Banks 31 pts (11)  
3rd Peter Reynolds 30 pts. (16)  
1st 90 Bernard Sweeney 19 pts. Sweeney Sheet Metal Ltd. (57)  
2nd Garvin Evans 18 pts. Garvin Evans & Co. (21)  
Won on last six.  
2nd 9 Eddie Egan 17 pts. I.D.A. (14)  
2nd Eamon McGrattan 16 pts. McGrattan & Kenny (12)  
LPHW Trophy  
Revived  
The draw for the revived LPHW Perpetual Trophy was carried out recently in the presence of the soccer fraternity of the H and V business in O'Neill's emporium Andrew Street. Victor (Giles) Gibson headed out the draw, the teams being divided into two groups, A and B, all games to be played before the 15th July with the semi finals on the 18th July and the finals on the 25th July.

Teams A  
Teams B  
J J Doherty, J S Lister, T Bourke, Modern Plant, Hevac, BEMRA. What ever happened to the IHVN team Johnny, oh sorry I mean Victor? The trophy was kindly denoted by Quadrant Engineers.  

We Got IT Wrong!  
With all the photographs of the IHVex exhibition we only made one slip, the two pictures below got mixed up with their captions, we reprint them to put matters right.  

Deryk Hayward, Refrigeration Appliance, (L) and Tom Doolan, (R), Hall Thermostats.  

Harry Megahy (R), Megahy Engineering, Gerry Doonan (L).  

An open and shut case  
For quality British designed and manufactured steel doors. Sound proofed, double skinned, insulated, with cam principle handles. Left or right hand, inward or outward opening, five standard sizes, complete with frames, for immediate ex-stock  
delivery at competitive prices. Internal or external mountings, Ideal for plant rooms, acoustic enclosures, ductwork installations and air handling units.  

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British Steam Specialities(N.Ireland)  
Ballysillan Industrial Estate  
Ligoniel Road, Belfast BT14 SE2  
Tel: 740221 Telex: 74561
IIRS To Get £39,000 Energy Grant

The Institute for Industrial Research and Standards is to receive £39,284 in grants from the European Commission for two projects on energy research.

One of the projects, under Eamonn Kinsella of the Institute's Central Services Department, concerns the suitability of the heat pump for airconditioning.

The other project concerns the efficiency of industrial boilers in the 1 to 10 MW range. P J Fleming of the IIRS is in charge of this project which is principally concerned with the economical use of heavy fuel oil.

Irish Industry Orders Boilers From Danks

Boiler manufacturers, Danks of Metherton Ltd, have won orders from two major industries. Wexford Creamery has ordered an oil fired, three pass wet back Metric boiler providing 30,000 lbs of steam per hour from and at 100°C (212°F). A similar boiler has been ordered by Cadbury Ireland Ltd for its Dublin factory. In both cases the steam, which will be used for general process work, will be at a pressure of 250 psig.

Danks has been supplying boilers to Ireland for many years, and exhibited a 20,000 lbs per hour, oil fired, Metric package boiler of three pass wet back design on its stand at the IHVex exhibition last April.

Danks recently appointed General Industrial and Marine Boilers Ltd, Frankfort, Dundrum Rd, Dublin 14, Tel: 989433.

Cutting Corrosion Costs

the high cost of metal corrosion in industrial and transport engineering installations throughout Ireland can be significantly reduced by using a plastic coating process currently being introduced to the Irish market. The launching follows the announcement recently by Plastic Coatings Limited of agency agreements with Hamilton Berry Engineering Limited of Belfast and Irish Fencing and Products Ltd of Dublin.

Irish Fencing and Products Ltd, can be contacted at Killeen Road, Dublin 12, Tel: (01) 516622.

Burgomasters For Balbriggan

A party of 17 Burgomasters from the Netherlands who were guests of Wavin Pipes Ltd at Balbriggan.

Boys. The Burgomasters, by virtue of their office, are Water Board officials; water control and supply being an important function of Netherlands local authorities. The Dutch Water Boards were responsible for the setting up of Wavin Holland to supply water transport systems and to develop flexible pipe technology. The board owns 50 per cent of Wavin in the Netherlands.

At the signing of the agreement between Hamilton Berry Ltd of Belfast, Irish Fencing and Products of Dublin, and Plastic Coatings Ltd of Guildford, Surrey were:酒精, Tony McArdle, Abberton contractor, Hamilton Berry, Mr George Lawless, J V Tierney consultant. Plastic Coatings Ltd, (standing, left to right) Mr David Eshel, Mr Terry Hobdell, Mr Sean Devine, Irish Fencing, Mr Terry Hobdell, Irish Fencing.

PEOPLE

Mr Liam Rafter, newly appointed Manager, Industrial Division, H.R. Holfeld (Hydraulics) Ltd., Stillorgan, Dublin.

H.R. Holfeld (Hydraulics) Ltd, wish to confirm the appointment of Mr Liam Rafter he newly created post of Manager Industrial Division. The new division has a broad base of operation in mine de-watering pumps, mineral processing pumps, chemical and industrial process pumps, mixers and complete process plant.

Mr Liam Rafter, 30 years of age, has been previously employed with other pump suppliers in Ireland including Mono Pumps, P.W.S. Ltd and Harper and Fay Ltd. His experience has been gathered over 10 years involvement in the industry, four years of which he has been employed by H.R. Holfeld (Hydraulics) Ltd.

Jim Blatherwick has recently been appointed as Industrial Pump Sales Manager of Euro Pumps Ltd. A time served engineer, Jim has twenty years experience in the field of pumping technology and is fully familiar with the selection, application, operation and maintenance of all types of pumps. He is based in Dublin and is responsible for Dublin and the surrounding area.

Reconair Ltd announce the appointment of two area managers, Mr Brian Scully, based in Limerick and will cover the south and south west areas, while the north west, west and midlands will be covered by Mr A Walsh who is based in Tuam.

Sheffield Insulations (Ireland) Ltd. announce the appointment of Mr. Joe Mernock as Depot/Office Manager. Mr. Mernock was formerly Sales Administration Manager with Spratts Lucas.

Jim Blatherwick has recently been appointed as Industrial Pump Sales Manager of Euro Pumps Ltd.

Kevin O'Toole new Chief Production Engineer of Dublin Gas Co.

Mr Kevin O'Toole, BE, M Eng Sc, MBA, presently Development Engineer has been appointed Chief Production Engineer of Dublin Gas. Mr O'Toole succeeds Mr L F Higgins, C Eng, MI Mech E, FI Gas E, who has recently resigned from the Company to take up another position.

Stewart Roche (30) who has recently become Financial Director of Walker Air Conditioning Limited.

Reconair Ltd announce the appointment of two area managers, Mr Brian Scully, based in Limerick and will cover the south and south west areas, while the north west, west and midlands will be covered by Mr A Walsh who is based in Tuam.

LITERATURE

Package Pump Sets

New literature is available from Holden and Brooke Ltd, Manchester, for their range of Packaged Pump Sets. Presented by the Company, as individual lists for: Fire Hose-reels, Hydro-pneumatic, Hydro-pneumatic with compressor, Constant Running, and Direct Transfer sets, each list contains sufficient information to enable engineers to select sets to meet their individual requirements.

Copies of the new literature can be obtained from:— John Hind & Sons Ltd., Prince Regent Road, Belfast. BTR 6RS and Pillinger of Ireland, 20 Sycamore Street, Dublin.

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NEW PRODUCTS

Solid Fuel Home Heating
From Waterford

One of America's foremost energy experts Dr. Jay Shelton, was the guest speaker at a press conference held in Dublin (Wednesday 30th May) by Waterford Ironfounders Limited, a TMG company, which manufactured wood,
turf and briquette burning stoves for the domestic and export markets. The stoves have met with particular
success in the North American and Canadian markets and the company has now launched a
major sales drive at home.

Mr. J. Declan McCourt, Chief Operating Officer of the
TMG Group, attributes the
success of the stoves, which
are marketed under the
Waterford Reginald brand
name, to their efficiency and
economy. They operate on
wood, turf and briquettes
which is fast becoming the
most important selling point
for any home heating system.
The average open fire is
15% - 25% efficient depend­ing on draught control. Air­
tight stoves have an efficiency
of between 60% and 75%. The
cast iron Waterford Reginald
stove is air-tight and the sides
are ribbed to maximise radia­tion. The models available can
heat areas of 4,700 cu. ft. to
7,100 cu. ft. The Reginald 101
D.I.Y. unit, the smallest in the
range (25" high, 12½" wide
and 20" deep), has a remark­
able heating capacity of 37,000
BTU's and will burn
unattended for 12 hours. It
also incorporates a machined
hot plate which can be used
for boiling, frying and grilli

The complete range is readily available from hardware
merchants throughout the country,
retailing from £85 upwards.
These units are easy to install
and each one is accompanied
by comprehensive installation
and operating instructions.

LOW COST HEATING
EQUIPMENT SAVE
£000'S

Due to a major dismantling of our 4 acre nursery we have for
offer:

Approx 50,000 ft I.D. 47mm Thinline Steel Piping
2,400 67mm Thinline Steel Piping
1,200 77/87mm Thinline Steel Piping
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4 Honeywell Modutrol Motors each with 4" 3 way H.W.
Mixing valves + Thermostats.

4 Stork 3 phase H.W. Circulating pumps 4 million B.T.U.'s
rating.

10 5" H.W. H.W. valves.

1 L.P.H.W. Packaged Dansk boiler rated @ 6.3 million
B.T.U.'s complete with rotary burner suitable M.F.O.D.

1 L.P. Steam + L.P.H.W. Packaged Dansk boiler rated @
10 million B.T.U.'s.

Please telephone the Nursery Manager W. Dray
at Sligo 071-3597.

CENTRALE

For the past few years the ESB has been developing a central
heating system using water
radiators that would meet
customer's needs in perform­
ance, flexibility and running
cost. Several test prototypes
have been operating success­
fully for a number of years.
With the aid of an IDA
Research & Development
grant a manufacturing proto­
type was produced by Western
Tooling Ltd of Galway. A
limited number of units have
been produced and are being
installed throughout the
country. This is the final phase
in the present programme and
marketing of the system will
commence next year.

The basic operation is quite
NEW PRODUCTS

Simple. Very highly insulated tanks of water are heated at night using cheap-off peak electricity. The heat is stored until the following day. What is new is the control system. The heat output is continuously controlled to meet exact requirements — so there is never either overheating or lack of heat. The amount of heat required can be fairly accurately predicted so as to reduce cost. Deviations from prediction do not affect comfort because the system will compensate automatically. The design is such that, while very sophisticated control is used throughout, the customer will not have any difficulty in using the system.

New Multi Stage from W-S

Worthington Simpson Ltd have introduced to Ireland their new range of multi stage pumps, the Multi Line range. These units have in line pipe connections, all metal pressure casings with impeller and stage pieces in Noryl. The motors are standard TEFC either single or three phase. Multi Line pumps are ideal for a wide range of applications in the water, sewage, agriculture, industries, particularly suitable for boiler feed, pressure boosting, and high pressure washing duties.

Stocked at 6 Waterloo Rd, Dublin 4, Worthington Simpson have units from 1.1 Kw to 7.5 Kw and from 6 to 24 stages in 3 phase with single phase versions to follow shortly. Worthington Simpson can be contacted at Tel: 684779.
Mr Alan Whitten, a director of the Portadown firm of building and plumbing equipment suppliers, Messers T.A. Shillington & Son has been elected President of the Portadown Chamber of Commerce.

Professor Bernard Crossland, head of the mechanical and industrial engineering department of Queens University and an active participant in the educational and industrial life of the Province, has been elected a fellow of the Royal Society. The award is for his distinguished contribution to high pressure engineering and explosive welding in particular.

The Department of Commerce has announced that the second drilling for coal in Northern Ireland which was in the Agohill area has proved fruitless despite the considerable depth of the bore hole. The Department states that this drilling is part of an overall search for alternative energy resources in the Province.

The Northern Ireland Section of the Institute of Domestic Heating Engineers or as it is better known the IDHE has announced their programme of golf outings for 1979 as follows:

- **Helens Bay** - Sponsored by UDT and Carplant Ltd., 1st May 1979.
- **Clandeyboye** - Sponsored by Shell Marketing Ltd., 29th August 1979.

Further details of starting times etc. will be available on request from the Branch Secretary, Brian Page, 17 Erinvale Avenue, Belfast.

With the elevation of Tom McKee to the position of chairman, Stewart Industrial Services have appointed as their new managing director Mr A.C. Bradley. Mr Bradley was formerly in charge of the welding products division of the company which he joined in 1969.

At the same time company secretary and financial controller Mr J. Lawther has been appointed a director of the company.

The Master Plumbers Association of Ulster have elected as their chairman Mr James Moore, who was recently presented with his badge of office by the retiring chairman Mr Denis Stothers.

Bartol Plastics Ltd. has launched a new range of plastic pipe fittings in Ulster, made to connect to copper pipe of British Specification 2871. The fittings dispense if so desired with the need for copper capillary soldered or brass mechanical compression fittings.

Launched after much research and development the fittings operate on the “push fit” principle employed with other Bartol fittings. The bodies of the fittings are made from Polybutylene and the pipe is held in place by a stainless steel “grabring”.

Pictured at the annual dinner of the Northern Ireland section of the Institute of Energy were (left-right) Mr F R McBride, MBE Hon Secretary, Mr D Rossborough, Senior Vice President, Rt Hon Enoch Powell, MBE, Mr C J Monaghan, Chairman, Very Reverend S Crooks, Dean of Belfast.
Millars Lane at Dundonald on the outskirts of Belfast has been chosen as the site for an unusual experiment by the N.I. Housing Executive. Five of the houses in mews style complex have been purpose built, each with a different type of heating system, one provided by electric convectors, one by storage heaters, one with ceiling heating one with solid fuel heaters. Different types of insulation and external finishes have been included.

Tenants have agreed to co-operate in the monitoring of the systems and to co-operate with the interested bodies such as the National Coal Board, Electricity Services, the Executive, Building Research Association and the National Building Agency.

It is hoped that at the end of the experiment the Executive will be able to produce a set of figures which will enable them to draw from conclusions on the effectiveness of the various types of heating and insulation systems based on their own experience.

Practically 150 members and their guests gathered in the ballroom of the Culloden Hotel for the Annual Dinner of the Northern Ireland Section of the Institute of Energy.

Guests included the leaders of the coal, oil and electricity industries in the Province, together with the leaders of commerce, industry and education.

The highlight of the evening was the speech of the Principal Guest the Rt. Hon. Enoch Powell M.B.E., M.P. who attacked the Government’s attitude towards the energy supply in Northern Ireland stating that he was of the opinion the electrical and gas supplies should be linked by grid and pipeline to the U.K. and that such link ups should continue into the Republic of Ireland and Europe.

Mr Powell also spoke of the Government policy of propping up ailing sections of the energy industry instead of revitalising them and putting them on a commercial basis and using the knowledge and expertise of such bodies as the Institute of Energy.

Mr Dennis Rosborough, Senior Vice President who had travelled from London for the occasion conveyed the thanks of the Institute to Mr Powell for his speech.

The Chairman, Mr C.J. Monaghan who presided over the dinner with efficiency and informality proposed a toast to the guests. In proposing the toast Mr Monaghan spoke of the support the section has had over the year from the members and their guests particularly the Energy department of the N.I. Dept. of Commerce. Mr Monaghan also spoke of the success of the Sections joint lecture programme.

Mr S O Hicks, OBE, IES Industries Ltd, Mr R Murray, Queens University.

Crooks replied with a performance in story telling which would have been the envy of many professional entertainers.

During the evening the Chairman paid tribute to the immediate past chairman and hon. secretary F.R. McBride M.B.E. and requested Mr Dennis Rosborough to present him with his past chairman’s badge.

Bartol Plastics Ltd were hosts to a large number of representatives of the plumbing and heating trade at a recent reception in the Culloden Hotel Belfast.

Present at the function were Mr M Marsden, Managing Director of Bartol Plastics, Mr J Locke, Sales Director, Mr Tony Robson, Project Manager, Mr G Bamborough, past president of the Institute of Plumbing. The presentation of the Bartol products and the question time which followed was conducted by the well known personality Mr Cliff Michemore.

At the ceremony in the Belfast College of Technology having successfully completed the Diploma Course of the Institute of Energy Diplomas were presented by Mr C Wilson, Head of the Department of Applied Science to Roger Luke of the Southern Health Board; Wallace Bennett (Belfast Education Board); Trevor Mawhinney (BP); Mr R W Gillen (Northern Health Board); Mr L Holley (N.I.S.); and Mr H Wrigh (S.I. Combustion).

Worcester Engineering the domestic boiler manufacturers have appointed Richard McDonald as their Northern Ireland Sales Engineer.

Mr McDonald was formerly with Nu-Way.

Jack Harkness who was well known to many in Northern Ireland has left N.E.I. Thompson Cochran Ltd the manufacturers of the Thompson Cochran & Ruston range of boilers.

He is succeeded as managing director by F R Ball, previously director of Wellinan Cranes also part of the Clarke Chapman organisation.

Mr Jim Boyd who before coming to sales director of N.E.I. Thompson Cochran Boiler Division formerly represented the company in Ireland, has also left to take up a position as Sales Manager of Energy Equipment Ltd the Leighton Buzzard based engineering company.
WATER TREATMENT FOR COOLING SYSTEMS

The most commonly encountered system from an Air Conditioning Engineer's point of view would be the open Evaporative Refrigeration in these systems, the water is cooled by the evaporative process at the cooling tower, the water is continuously recycled and reused, thus the mineral content of the water increases due to the concentrating effect of evaporation. Industrial cooling systems lose cooling efficiency due to fouling and corrosion. In the case of evaporative recirculating cooling systems an effective programme of water treatment allows a greater degree of water conservation than would otherwise be possible.

In cooling water treatment we have five basic problems.

(1) Scale Formation
(2) Corrosion
(3) General Fouling
(4) Microbiological Fouling
(5) Control of waterside condition by the correct use of treatment.

SCALE FORMATION

The principal problems arising from the formation of scale, particularly in heat exchangers, are (1) the loss of heat transfer due to the insulating barrier formed by the scale, with subsequent reduction in operating efficiency, and (2) the increase in the pressure head across the heat exchanger (i.e. increased pumping cost or reduced flow rates). Calcium carbonate is probably the most common form of scale encountered in cooling water systems. Soluble bivalent carbonates in cooling water systems can form insoluble bi-carbonate salts if the pH is raised to above 9.8.

been shown to exhibit the same property of "threshold stabilisation" as the polyphosphates, but with none of the disadvantages already mentioned. They have now largely superseded the polyphosphates. The development of phosphonates has been mainly responsible for the adoption of the "High pH Approach" to the operation of cooling systems. The essence of the approach is to adjust the bleed off so that the cooling water is maintained at a non-corrosive condition, and to treat the water principally for scale. In association with organophosphorous compounds, dispersants are frequently used and these are often low molecular polymers. Their dispersant activity is principally due to their ability to impart like charges to the metal surface and to the particles in suspension, and thereby prevent their settlement on heat exchanger surfaces.

CORROSION

The factors leading to the development of corrosion in cooling water systems are many and diverse. However the principal ones are:—

(1) Dissolved Oxygen
(2) pH
(3) Temperature
(4) Dissolved Carbon Dioxide
(5) Dissimilar Metals
(6) Dissolved Solids
(7) Water Flow Rate
(8) Metal Composition
(9) Stability of the Oxide Film on the Metal Surface
(10) Stress.

CORROSION INHIBITORS

There are many and diversified classes of corrosion inhibitors such as chromates, polyphosphates, zinc, etc. However, some of these inhibitors while preventing corrosion cannot be discharged into lakes or rivers as they add to the problem of pollution. Therefore, special non-polluting inhibitors had to be invented to deal with this problem of pollution. Some of the most effective proprietary cooling water treatments for open recirculating cooling water systems are formulations which incorporate phosphonates and polymers (referred to in the section dealing with the control of scale), together with heterocyclic compounds such as Mercaptobenzothiazole and Benzothiazole. These non-toxic treatments eliminate the need for supplementary acid feed for pH control of water (cooling) and more importantly the need for post-treatment of the blow down water.

Pre-Commission Cleaning and Passivation

In order to provide a stable substrate to receive the inhibitor film, it is necessary to ensure that efficient pre-commission cleaning is carried out. Techniques for achieving this with minimum inconvenience are well established. Passivation is carried out by using initially high levels of inhibitor to ensure the rapid formation of a protective film, which is then maintained, repaired and replenished by the use of low-levels of inhibitor on a continuous basis. It is important that passivation is carried out correctly and effectively, otherwise severe corrosion can occur.

GENERAL FOULING

The principal problems occurring with fouling are:

(1) Reduced transfer
(2) Unexpected equipment shutdown
(3) Shortened equipment life
(4) Chemical or mechanical cleaning
(5) Increased pumping cost
(6) Increased corrosion.

We must distinguish between sedimentation fouling (presence of suspended solids in the cooling water) and bio-fouling (organic growth in the cooling water environment).

Sedimentation Fouling

Sedimentation fouling may be regarded as the deposition of suspended particulate matter in the cooling water of the surfaces of the cooling system. Constant recirculation of small suspended particles within the cooling system increases the statistical probability of mutual collision taking place, leading to agglomeration into larger and heavier particles which will then form a sediment on metal surfaces. Sedimentation fouling is likely to occur at points of semi-static water flow such as the sump of the cooling tower. Points of pressure and velocity reduction within the system for example at the end plates of heat exchangers) are also foulant traps.

Control is generally effected by the use of mechanical or chemical means. Mechanical — (1) Side Filtration: this is a particularly good way of improving water quality. The technique involves the filtration of between 1% and 5% of the recirculated water. (2)
Desludging Facilities: a few advanced cooling systems designs provide the cooling tower sump with an adequate depth to enhance its usefulness as a foulant trap. Incorporation of a de-sludging cock at the tower sump completes the scheme.

Anti-foulants fall into two basic categories: those that function by dispersion and those that function by flocculation. The principal role of a dispersant is to reduce the tendency for small particles to agglomerate, by imparting to them a minute electrical charge so that they repel each other and hence remain in a dispersed condition whilst passing through the heat exchangers. The Flocculant type anti-foulant is more geared to the once-through system.

Microbiological Fouling

Microbiological fouling of industrial cooling water systems results from the excessive growth and development of three of the lower forms of plant life — algae, fungi and bacteria.

(a) Algae:— types can be recognised by their colour and growth usually occurs in sections of the cooling tower exposed to the sunlight.

(b) Fungi:— include all simple plants not containing chlorophyll, usually encountered above the water line in the sump.

(c) Bacteria:— most prolific and troublesome forms of life encountered in cooling water systems. Under ideal circumstances, bacteria growth would be phenomenal but because of the supply of feed and nutrients becomes depleted, this incredible growth rate does not actually happen. Micro-organisms can be choked to death by the product of their own metabolism or by the products of other microbes living in close proximity. Microbiological growth in cooling systems can cause a number of problems such as plugging of lines and filters, corrosion and deterioration of cooling tower timber (however as most modern cooling towers are made from metals, the latter does not normally apply). Large masses of algae can become detached from their point of growth and plug screens, lines and heat exchangers. Algae deposits and slime masses promote corrosion of metal surfaces. The wide range of organisms and varying populations which can be present in any one system make it impractical to establish definite dosage figures for microbiocide treatments which will have universal application. In effect, microbiocide application is normally two-phased — initial and subsequent. The initial dosage is usually high (shock treatment) aimed at killing off existing biofouling organism. Once the system is clean, then a lower dosage at regular intervals will normally inhibit further growth.

Dosing and Control

Having selected a complete, balanced and effective water treatment programme for cooling water, it is vital to appreciate that the best performance can only be achieved if this programme is properly administered, monitored and controlled. Inhibitors, anti-foulants and biocides must be applied in the correct quantities in the right place and at the right time. Microbiological growth in cooling systems can cause a number of problems such as plugging of lines and filters, corrosion and deterioration of cooling tower timber (however as most modern cooling towers are made from metals, the latter does not normally apply). Large masses of algae can become detached from their point of growth and plug screens, lines and heat exchangers. Algae deposits and slime masses promote corrosion of metal surfaces. The wide range of organisms and varying populations which can be present in any one system make it impractical to establish definite dosage figures for microbiocide treatments which will have universal application. In effect, microbiocide application is normally two-phased — initial and subsequent. The initial dosage is usually high (shock treatment) aimed at killing off existing biofouling organism. Once the system is clean, then a lower dosage at regular intervals will normally inhibit further growth.

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The basic factors affecting the selection of dosing equipment together with some of the approaches commonly used are as follows:

(A) CHEMICAL DOSING

(1) Scale & Corrosion Inhibitors

It is essential that both scale and corrosion inhibitors are ALWAYS present in the system water at the correct concentration. It is bad practice to either overdose or underdose these materials. The ideal method of dosing is to use a chemical metering pump so that precise quantities can be injected. Continuously running dosing pumps may be acceptable on very large capacity systems, where loads are steady and system conditions change slowly. Adjustments in dosage rate on such systems are usually required infrequently and can be made by adjusting the dosing pump stroke or the treatment tank strength according to control tests. On smaller systems or circuits where the cooling duty is large in relation to the system water content, conditions can change very rapidly and it is essential that dosing be proportional to the system duty.

Part II to follow next month

This Is Not Our Weight Problem But... How Do You Measure Up? Times Are Changing To Davy Loadcell Weighing For Level Measurement

SOLE AGENTS

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et al., Irish H & V News
THE LAW AND BUILDING SERVICES DESIGN

SECTION IV

Boiler House Practice

The regulations dealt with in this section were designed primarily with a view to health and safety. They deal, essentially, with the safety aspects of steam boilers and with the danger of pollution from flue gases. The "Factories Act" of 1955 deals with steam boilers while the Atmospheric Pollution Regulations of 1970 set limits to the amount of smoke, dust, grit and fumes that may be emitted from premises other than dwellinghouses. The Draft Building Regulations, as far as this section is concerned, deal essentially with the construction and materials of chimney flues.

Factories Act 1955

Steam Boilers

The act defines a land steam boiler as "any closed vessel in which for any purpose steam is generated under pressure greater than atmospheric pressure and includes any economiser used to heat water being fed to any such vessel and any superheater used for heating steam". Three aspects of steam boilers are dealt with by the Factories Act and its Regulations there are:

(i) The act itself deals with boiler mountings and construction.
(ii) S.I. No 174 deals with preparation for examination by an inspector.
(iii) S.I. No 183 deals with the report of the inspector.

40-(1) Steam boilers are required to have the following mountings:
(a) a "suitable" safety valve set to blow off at the maximum permissible working pressure of the boiler, (the safety valve may be a lever valve if the weight is secured in the correct position).
(b) a stop valve on the steam draw-off pipe
(c) a pressure gauge connected to the steam space with a mark indicating the maximum permissible working pressure.
(d) a water level gauge made of transparent material and fitted with a guard where the working pressure exceeds 40 p.s.i. (2.75 bar) and the gauge is of tubular glass.
(e) a test point for attaching a pressure gauge
(f) a fusible plug or low water alarm (applies to internally fired boilers only).

In cases where the steam boiler is one of a range of steam boilers it must be isolated as follows:
(i) at the boiler feed water intake
(ii) at the steam discharge pipe
(iii) at the blow-down pipe where a manifold system is used or where a common blow-down pit is used.

In cases where a person is working on a down boiler it must be isolated at these three points. In particular the blow-down valve must be opened with a key which cannot be removed until the valve is closed; there being only one such key available for a range of boilers.

S.I. No 174 1956 Factories (Preparation of Steam Boilers for Examination) Regulations.

Steam boilers must be thoroughly examined by a competent person once in every 14 months. This instruction describes the
work required to be done in descaling, cleaning out and stripping down of the boiler and mountings and fittings prior to examination by the inspector.

S.I. No 183 1956 Factories (Report of Examination of Steam Boilers) Regulations.

These regulations set out the official form to be used by the examiner when inspecting a steam boiler. The form also sets out the report form above a

The regulations deal with atmospheric pollution from boilers dwelling houses.

S.I. No 184 to 186 of 1956 deal with the report of examination of Steam Receivers, Air Receivers and Gas Holders. In general the regulations which apply to steam boilers also apply to Economisers and Superheaters. A similar body of regulations govern preparation, examination, construction and mounting of Air Receivers and Gas Holders, (see Factories Act section 42 and section 44 respectively)

SI No 156 1970 Control of Atmospheric Pollution Regulations

These regulations were introduced to ensure that all possible measures are taken to reduce atmospheric pollution from boilers, incinerators and vehicles. A person charged under the regulation may provide a good defence by showing that "best practicable means have been taken to minimise the emission". The regulations deal with atmospheric pollution from boilers above a 16 kw rating which are installed in premises other than dwelling houses.

The method of measuring the degree of unburnt flue gas used in this regulation is the RINGELMANN CHART. These Charts may be consulted in B.S. 2742 1957 and B.S. 2742 1958 "Use of the Ringelmann Chart". The table which is reproduced below is taken from "An Introduction to the Study of Fuel" by J.C. Macrae.

**THE SHADERS OF THE RINGELMANN CHART**

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<th>Shade No</th>
<th>Description</th>
<th>Approximate proportion of Black Area on the chart %</th>
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<td>2</td>
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<td>4</td>
<td>Darker Grey</td>
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<tr>
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<td>Very Dark Grey</td>
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<td>Black</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Dense Black</td>
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The Regulations:

3-(1) The occupier of any premises other than a private dwelling house:
(a) shall not cause or permit to be emitted from such premises dark smoke (defined as Ringelmann shade 2) for a continuous period exceeding 4 minutes.
(b) shall not...cause or permit to be emitted from such premises dark smoke for more than 8 minutes in the aggregate in any period of 8 consecutive hours.
(c) shall not cause or permit to be emitted from such premises black smoke (defined as Ringelmann shade 4) for more than 2 minutes in the aggregate in any period of 30 minutes

In cases where a chimney serves two or more furnaces the maximum time for which a chimney may emit dark smoke (shade 2) is extended as follows:
(i) 16 minutes where a chimney serves 2 furnaces
(ii) 22 minutes where a chimney serves 3 furnaces
(iii) 27 minutes where a chimney serves 4 or more furnaces

(These times are the aggregate in any period of 8 consecutive

R 4-(l) The occupier of any premises other than a private dwelling house shall not cause or permit to be emitted from such premises, smoke, dust, grit, gas or fumes in such quantity or in such a manner as to be a nuisance to persons in any premises in the neighbourhood

This regulation has wide implications for incinerators. Most industrial wastes cannot be successfully combusted to meet the regulation without pre and after burners together with a grit arrestor or flue gas washing system of some sort. Even where waste is largely paper and cardboard some sort of grit arrestor will be required. The simple incinerator which is largely a steel box and flue does not produce a flue gas which meets the standard, although it is still in wide use.

Draft Building Regulations

This regulation deals with chimney flues, hearths and heating appliances; the reader is advised to consult the regulations for more accurate detail if it is required. These regulations apply to all buildings.

Oil Burning or Solid Fuel Appliances:

R 9(a) (b) A flue pipe which serves an appliance which is either a solid fuel appliance or an oil burning appliance, in which the temperature of the flue gas can normally exceed 260° C, both of which are less than 45 kw capacity shall be either a cast iron flue pipe to comply with BS 41: 1973 or mild steel of not less than 4.75 mm (3/16") thick.

R 14(1)(a) The top of any flue or chimney serving this type of appliance shall not be less than 1M from the point of contact with the roof.

R 31 (C)... no part of the flue shall make an angle with the horizontal of less than 60° except where necessary to connect the chimney to the appliance.

Oul Fired Appliances Only:— (output less than 45 kw)

Any chimney serving an oil fired appliance shall be constructed as follows:

R23 (1) lined with one of the following
(a) acid resistant titles embedded in and pointed with high alumina cement mortar
(b) pipes which comply with R25, mainly sheet metal flue pipes to BS 715:1970 coated with acid resistant vitreous enamel on the inside or stainless steel pipes to B.S. 1449 part 4 1967, not less than .032 mm thick.
(c) rebated and socketed clay flue linings which comply with BS 1181 : 1971 and which are jointed and pointed with high alumina cement mortar.

Flues serving these appliances shall have the following characteristics
(a) have a major dimension not more than five times the minor dimension
(b) have the major dimension not more than 1.5 times the minor dimension where the flue is a main flue
(c) ventilation flues (ducts) shall have major dimensions not more than twice the minor dimension
(d) have a cross sectional area not less than the total of the cross sectional areas of the outlets from the appliances.

Gas Appliances Only (not more than 45 kw)

R17(d) Sheet metal flue pipes from a gas appliance...shall comply with B.S. 715 : 1970 and be coated on the inside with acid resistant vitreous enamel.

R19(2) The cross sectional area of any flue...shall be not less than 12,000 mm² (125 mm diameter).

Incinerators

R35-(i) No incinerator whose refuse combustion chamber is between .03 and .08m³ shall be installed in a building unless an afterburner, or other means of smoke elimination is fitted.
Thompson Cochran's unrivalled position as Europe's biggest fire-tube steam boiler manufacturer is simple to explain. With manufacturing facilities on an unequalled scale, developed from decades of experience as master boilermakers to world industry, and a research commitment designed to maintain total leadership of the field, Thompson Cochran has built up a reputation for quality, service and reliability which has grown in step with its size. That's why we look forward to staying where we are!

**Steam packaged boilers from 71 to 19910 kW**
(250 to 70,000lb/h).

**Hot water packaged boilers from 146 to 20510 kW**
(500,000 to 70,000,000 Btu/h).

NEI Thompson Cochran Ltd.
Carnynne Works, 300 Myreside Street,
Glasgow G32 6BS.
Tel: 041-5565252. Telex: 77352.

TC 173
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<td>Pillinger of Ireland</td>
<td>20 Sycamore Street Dublin 2</td>
<td>777007</td>
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<td>Church Road Santry Dublin 9</td>
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Index compiled from information received from companies

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DOI: 10.21427/D7RQ6J
Allen Ygnis
Steam and Hot Water Packaged Boilers
Installed on some of the Most Prestigious Sites in Ireland Including—

Setanta Development, Dublin
Gandon House, Dublin
Cumberland House, Dublin
Dublin Corporation Swimming Pools, Dublin
I.X. Ltd., Tuam
A.I.B. Site, Dublin
Grassland Fertilizers, Limerick
Sligo Models Ltd, Sligo
Donegal Laundry, Dunloe

CHAPPEE
Cast Iron Section Boilers

For oil, solid fuel, or gas firing. Tried and tested for over 25 years in Ireland.
Heat exchangers for domestic hot water production up to 4 million btu's/hr also available.

All the above boilers are fitted with the famous Nu-Way burners for which Hevac Ltd are also agents.

Details available on request from B. Bracken or Tony Smith

Hevac Limited
Heating Ventilating and Air Conditioning

Lomond Avenue, Fairview, Dublin 3. Tel: 373796/7/8, 374646, 378884, 374533, 379673.
Anglesea Buildings, Anglesea Terrace, Cork. Tel: (021) 55988
'No new customers' that's what most oil companies say when asked about new business. This situation has both short and long term effects on the industrial boiler market. In the short term it means that if you have an oil fired installation almost completed and have not ordered the oil already, the chances are that you may not get any type of oil to fire the boiler. For future projects the type of boiler may have to be limited to the dual fired type of boiler, and this would have an effect on many installations such as rooftop boiler installations.

Oil fuels other than diesel or kerosene are also effected by the oil shortage, but not quite so badly. There may be some heavy fuel available for a limited number of projects, but the uncertainty of supply will almost certainly force most customers to use solid fuel or gas as an alternative fuel.

Town's gas has been used for many years on office block projects as it is relatively clean fuel and it requires no storage on site, but gas installations are limited to areas where gas has been piped to. In areas that are not piped for towns gas the alternatives are liquid petroleum gas (LPG) or solid fuel. At the moment the LPG business is not geared to supplying industrial boilers and do not envisage much expansion in this area, so we are left with solid fuel.

For those who find difficulty in getting diesel oil for a new installation, one solution to the problem may be to change the burner to a heavy oil type, but this change is not as easy as it seems. Most of the heavy oils require preheaters in storage tanks, feed lines or at the burner itself. If available a towns gas or LPG burner may suit the boiler and this might be another solution to the problem.

In the future it would appear that boilers suitable for oil, gas and solid fuel firing will be required for all types of heating installations. This usually means using boilers which were originally designed for solid fuel and converted later. Some efficiency may be lost in the operation of the solid fuel unit but may have to be accepted in the interests of keeping the options open. Multi fueled boilers also means a return to natural draught, as pressurised combustion is suitable only for oil and gas. If gas is readily available then an oil/gas pressurised boiler can be used giving flexibility in choice of fuel and almost instantaneous change over.

Looking at the change over from oil to gas to solid fuel, this change can not normally be made without dismantling the oil/gas burning equipment and building in the solid fuel handling parts, but some boilers are available where the change can be made by pivoting a door, on which the burner is mounted, out of the frame and swinging in the solid fuel fire door.

In Ireland turf has been the natural choice of solid fuel for use in boilers, numerous boilers have been supplied initially to be fired by oil but with fire bars, so that in an oil shortage, they could be fired with turf or coal. Many such boilers have already been converted and many more are planned before the winter. It would appear that solid fuel will be a major source of energy for a long time to come particularly in the light of recent meetings of the International Energy Agency who have decided that coal must be utilised far more for the generation of all types of energy.

Oil Gas And Solid Fuel
From HWL

The Pensott foundry has been manufacturing boilers since 1842 in Legnano Italy, the present managing director is a great, great grandson of the founder. Since 1950 major construction works have been adding new areas to the factory, the present area is 1 million sq ft, and these extensions have made the...
Pensoti factory one of the most modern foundries in Europe. Pensoti hold 80% of the cast iron sectional boiler market in Italy and now hope to expand its world wide export organisation into Ireland with the aid of Heating Wholesalers Ltd., their all Ireland agents.

It is intended to take a select party of specifiers to the foundry in Legano to study the manufacturing techniques at first hand sometime in the near future.

There are three basic industrial ranges, pressurised, natural draught, and multifuel, the latter being suitable for oil, gas and solid fuel.

Pressurised units are rated from 524,000 to 2,84,000 BTU/hr, natural draught from 560,000 to 2,328,000 BTU/hr, multifuel from 420,000 to 1,480,000 BTU/hr.

Heating Wholesalers Ltd also stock oil burners from Riello with ratings up to 4 million BTU/hr.

All the Pensoti range are suitable for firing by 200 sec oil burners.

Further details from Heating Wholesalers Ltd., Thomastown, Co Kilkenny. (Tel: 056-24171).

Ygnis Principal Of Combustion

The Ygnis principle of combustion, which is a key feature of the Allen Ygnis range of steam boilers, gives four advantages:

High efficiency from the excellent heat transfer; High output for a given volume and weight; Compactness saving space and reducing construction and installation costs; and quick starting from cold without thermal stress.

The large pressurised combustion chamber allows the first two passes to be made within the chamber itself and the reversing flame causes the gases to enter and re-enter the high temperature flame zone many times before making the third and final pass through the smoke tubes. The flame reversal results in almost perfect combustion with maximum fuel utilisation.

The Ygnis boiler is of Swiss origin but has, for the past fifteen years been manufactured in the UK by Allen Ygnis Boilers Ltd.

Production and full testing of the complete unit is carried out at the Allen Ygnis works at Tipton. The boiler incorporates in its design well tried and reliable burners and ancillaries.

Allen Ygnis, therefore, assume complete responsibility for the whole design including all the ancillaries which is in turn backed by a well trained service and after-sales organisation.

The boiler is of all welded construction, and consists of two concentric shells entirely closed at the rear end, the space between the two shells forming the water space in which large diameter flue tubes are fitted. The tubes are double banked at each side: the large area between the combustion chamber and the outer shell forms the steam space.

Spiral gas agitators are fitted in the flue tubes - by adjusting their overall length the flue gas temperature can be regulated.

BEAT THE OIL CRISIS WITH

DOMESTIC — COMMERCIAL MULTIFUEL CAST IRON BOILERS

M2 Series Domestic

Ratings

100,000 - 216,000 Btus Oil
72,000 - 144,000 Btus Coal

M3 Series Commercial

Ratings

224,000 - 352,000 Btus Oil
168,000 - 264,000 Btus Coal

Boilers latest models are supplied with double hinged doors for oil or solid fuel firing.

Solid fuel regulating thermostat available.

Units are available ex stock.

Enquiries:
Northern Area Mr C. Billings Tel: 01-517703
Southern Area Mr S. Doherty Tel: 056-24171
The front of the boiler is fitted with a hinged heat resistant refractory lined door, with the patent ‘Ygnis’ door seal. Due to the special wet-back construction expansion problems are eliminated. An anti-priming device is fitted beneath the boiler stop valve.

The cylindrical boiler shell is fully covered with insulation, consequently the radiation loss is very low. The complete boiler unit is enclosed in a sheet steel wrap round casing, plastic coated to provide a durable and lasting finish. The front door is painted in a heat resistant aluminium.

Forced draught pressure jet burners or forced draught rotary burners are supplied. These are designed to suit the Allen Ygnis boilers and after extensive tests to prove reliability. On/off, high/low and modulating types are available for the various sizes of boilers. The burners are fully automatic in operation, the oil and air controls being actuated by thermostats in the flow header, and again, depending on the size of the boiler, they are able to burn oils up to 3,500 secs Redwood No 1.

Ygnis steam and hot water boilers are available up to 26 million BTU/HR.

STANDARDS

Fully automatic controls are provided in accordance with the latest British Standard requirements, with photocell flame failure and electrical ignition, pre and post purge periods, etc.

Forced draught fully automatic enclosed gas burners can be supplied designed to suit the Allen Ygnis boiler. The gas burners are of the multiport pattern and are able to use normal town’s gas, bottled gas or natural gas.

Forced draught fully automatic dual fuel burners can also be supplied.

The electrical control gear is situated in an enamelled cabinet mounted on the burner head or the side of the boiler dependant on boiler size, and contains all the necessary switch gear, burner control equipment, fuses, indicator lights, lock-out reset and ignition test button. The whole unit is prewired.

An electrically driven centrifugal pump is fitted at the rear of the boiler. For further information contact, Hevac Limited, Head Office - Lomond Avenue, Fairview, Dublin 3. Phone: 373796/374464 Telex: 5827.

Bigger Chieftains

Northern Engineering Industries Ltd., is a major British engineering group of companies. The group is involved in the supply of mechanical products including shell boilers; water tube boilers; pressure vessels; cranes; marine equipment; road tankers and many others. The group also supplies electrical products including transformers; motors; generators and switchgear.

NEI Thompson Cochran Ltd, is a wholly owned subsidiary of NEI Ltd, and is primarily concerned with the manufacture of packaged shell type steam and hot water boilers. The company has been established for over 100 years and has an international reputation in its product field.

The shell type boilers manufactured by NEI Thompson Cochran cover the range of 115-30,000 kg/hr for steam boilers and 0.125-15.0 million Kcal/hr for hot water. The boilers can be operated on oil, oil/gas combination, or gas only, and the research and development section are hoping to have good news early next year on the development of fluid bed combustion method of firing with solid fuel.

In recent months the popular Chieftain boiler range has been extended from a maximum of 6,000 lb/hr to 9,000 lb/hr.

The maximum operating pressure for the steam boilers is 25 Bars and superheaters can be readily incorporated to suit particular requirements.

In addition to manufacturing the boilers themselves, the company also manufactures most of its own valves, fittings, and a substantial proportion of the combustion equipment. Their boilers are widely used in process industries; hotels; laundries; district heating schemes; hospitals and many other applications. The boilers are used in almost any circumstance where steam, or hot water is required for a manufacturing process, or for heating purposes.

The company operates a policy of continuous development and product improvement. The business of supplying energy in the form of hot water, or steam, is unlikely to change in basic concept in the near future. This does not mean that the company is in any way complacent, as it is always seeking better manufacturing methods and designs. To this end they maintain a research and development unit to ensure that NEI Thompson Cochran Ltd, remains at the forefront of shell boiler technology.

Further information is available from Clarke Chapman Ltd, Thompson Cochran Division, 42 Sundrive Rd, Dublin 12. (Tel: 971006).

Precision Offer

The Options

Amanda cast iron sectional boilers (500 series) has been on sale in Ireland since 1964. To the delight of many it is suitable for oil and solid fuel firing which is essential in these days of oil shortages. In common with all solid fuel boilers the location of the boiler must allow for gravity feed to the hot water cylinder and a good flue is essential.

When fired by oil the Amanda uses the Bentone oil burner which is suitable for diesel or kerosene, a further option is gas firing by the Bentone gas burner which is suitable for LPG.

For larger buildings Bentone offer oil burners as low as 600,000 BTU/hr on 200 sec oil which at the moment is more readily available than diesel, but diesel...
versions are of course available in all sizes. The Tasso Universal boiler, fired by diesel, 200 sec oil (the 200 sec version with Bentone burner suitable for the Tasso VH range 900,000 to 2,900,000 BTU/hr), gas, coal, anthracite or wood uses the reverse firing process and when fired by coke is direct fired. On reverse firing the solid fuel flue gases are kept down to temperature similar to that of oil firing and so gives a very high boiler efficiency for solid fuel firing. Oil or gas burners are mounted permanently on a pivoting door which means conversion to solid fuel is extremely easy. On the smallest Tasso Universal the firing door opening is 20" x 15" and it can take a 19" length of wood.

For details contact: Precision Heating Equipment Ltd., Church Road, Santry, Dublin 9. (Tel: 374300 or 374437).

**Chappée Up To 4.4 Million Cast Iron Sectional Boilers**

The tried and tested Chappée boilers have been supplied in this country for over 25 years and are still as successful as ever.

As well as the traditional solid fuel convertible to oil-fired boilers, Chappée manufacture natural draught and pressurised oil and gas fired boilers up to 4.4 million BTU’s/hr plus heat exchangers which can be mounted on top of any Chappée boiler.

The CM3P range of oil or gas fired boilers with outputs from 600,000 to 1.8 million BTU’s/hr is the most popular of the Chappée products and at least one of each size is kept in stock at all times. It is designed on the water-tube principle and has a working pressure of 8 bar and because of its relatively low water content and weight it is ideally suited for roof-top installation.

Cleaning is from the front to back having only to remove 4 doors and can be accomplished within 20 minutes of shutting down resulting in considerable labour saving and eliminating long shutdowns.

The corrugated cylindrical combustion chamber ensures a very high thermal exchange rate. The horizontal multi-pass arrangement allows a rational utilisation of the available pressure and the combustion chamber which essentially was designed around the flame ensures maximum efficiency throughout. The distribution and circulation of the water in the various section have been particularly studied and this ensures excellent irrigation of the exchange surfaces resulting in a high degree of homogeneity in heat transfer.


**Pal-Kristall Multifuel**

Pal-Kristall manufacture high quality cast iron section boilers for the domestic and industrial market, and their multifuel unit with a double hinged door for oil and solid fuel. The solid fuel arrangement has a thermostat controlling the air intake giving temperature control.

The M2 and M3 range covers from 100,000 BTU/hr (oil), 72,000 (solid fuel) to 352,000 BTU/hr (oil), 264,000 BTU/hr solid fuel and are ex stock from Heating Wholesalers Ltd, Thomastown, Co Kilkenny. (Tel: 056-24171).
DANKS AND SOLID FUEL

Danks of Netherton have been manufacturing boilers for a long time and with steady growth in knowledge, experience and technological skill are now said to be a leader in their field.

Danks oil and gas fired shell boilers range from 5,000 to 70,000 lbs/hr, of steam or the equivalent duty in hot water.

The company also believes that solid fuels have a vital and long lasting place in Europe's economy and have devoted their attention to the efficient use of coal, peat, wood and agricultural wastes in boiler plant. The range of solid fuels that Danks manufacture boilers that utilise a wide variety of fuels, so you can choose the one most suitable to your needs. Whatever the size of your Company, whatever your steam or hot water needs, you can still join the big names who rely on Danks of Netherton.

When it comes to providing steam efficiently and economically for industrial processes and commercial applications, Weetabix, Bass, Tara & Lyle, Dunlop, Rank Xerox and Trust House Forte are just a few of the big names who depend on Danks of Netherton. They appreciate that with over one hundred years' experience, Danks is the name to trust for quality boilers that provide greater efficiency, reliability and protection against hot water and steam system problems. Whenever the size of your Company, whatever your steam or hot water needs, you can still join the big names who rely on Danks of Netherton.

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Fuel fired shell boilers extend to 30,000 lbs/hr, and of particular interest to potential users in Ireland is the turf fired unit. A number of these are in operation in the country, mostly with health boards, so the customer can be assured that Danks has full knowledge of this fuel, its characteristics and the techniques to be employed.

With much attention being devoted to energy conservation, Danks are active in the two related fields, the use of waste materials and products as fuel and the conversion of heat energy in waste gases to usable energy in hot water or steam. Many waste materials are potentially valuable fuels, and they may be in the solid, liquid or gaseous state. Generally, each introduces a special problem either of handling or of pollution, but when this is overcome one has a cheap fuel to burn instead of an expensive one and often there is an additional saving from the elimination of waste disposal costs.

For outputs and pressures that are beyond the scope of the shell boiler Danks of Netherton have a range of packaged water tube boilers equally available for oil, solid fuel or gas firing and for waste heat applications. The boiler range details are as follows:

- Metric - 5,000-70,000 lbs/hr - 5-70 million Btu/hr - fuel: oil, gas or dual fuel;
- Metrical - 3,000-30,000 lbs/hr; 3-30 million Btu/hr - fuel: coal, turf, wood;
- Water tube - up to 150,000 lbs/hr;
- Pressure up to 90 psi - fuel: oil, coal, gas, wastes;
- Waste heat - Purpose designed for each application, shell or water tube.

Further information from the recently appointed agents for Danks of Netherton: General Industrial Marine Boilers Ltd, Frankfort, Dundrum, Dublin 14. (Tel: 989433).

ROBEY'S COALTHERM

In the middle of the 19th century Robey produced their first steam engines and as steam raising requires boilers, so Robey started to develop their own technology. So successful were they that they added boilers to their product range. Their early products were modelled on the Lancashire and Cornish boiler design, but they introduced a two pass return tube economic boiler as early as 1890 and gradually concentrated their production on these models after World War I.

The Robey Lincoln and Lintherm range cover duties from 3,000 lbs/hr up to 60,000 lbs/hr for the production of both steam and hot water. These units have been installed in companies that are
BEAUMONT

This is why hot water costs a lot less with BEAUMONT

1. Direct Firing Immersion tubes pass through the water to be used giving direct heat transfer.
2. Self Cleaning Natural expansion and contraction of the heat exchanger means that scale falls out of harm's way.
3. High Recovery Rate/Balanced System Water quickly re-heats to the required temperature which means reduced storage volumes.
4. Factory Insulation Heat losses are kept to an absolute minimum by the factory fitted insulation.
5. Right Size There are eleven models in the standard Beaumont range — from 200 to 500 gallons storage and with outputs from 300,000 to 1 million Btu/hr.

Simple sizing charts, proven in practice, ensure that the water heater selected is exactly right for the job.

FROM THE HEATING EXPERTS

D.W. PRODUCTS INTERNATIONAL

Office Suite No. 1 Donaghmede Shopping Centre, Raheny, Dublin 13. Tel: 315028/316016/315006. Telex: 37717 BEAT E1
Kiltonga Industrial Est., Belfast Road, Newtownards, Co. Down, Northern Ireland. Tel. 81-4449/4440. Telex: 747790.

ECONOMY HEATING BY

It's a proven system tested throughout Europe and already saving £'s every year for Irish users.

PASSAT

- The greatest name in fuel economy.

• Through over 600 installations, the Passat central heating unit comes backed by a 10 year guarantee.
• All boilers supplied with automatic damper control.
• Allows user to burn oil, gas, timber, turf, coal, waste, shaving etc.
• Passat has a boiler to suit any application for any situation.
• Passat now provide a full automatic stocking system for domestic industrial applications.
• Passat Hot Air Units available especially designed to suit joinery shops, furniture factories and green houses.

Importers & Distributors
M A VAUGHAN TRADING LTD
Phone: 046-31167/31302 Telex: 31825
Buderus Lollar 55 Complies
With All Requirements

The Buderus Lollar 55 sectional boilers are made of high grade cast iron, and suitable for pressurised operation with oil and gas burners. Their design and operating characteristics meet the requirements of the German Standard Specification DIN 4702. They have undergone extensive heating and performance tests and bear the DIN registration number on the boiler data label.

The combustion chamber gases are partly recirculated in the corrugated combustion chamber and allow a high CO2 content to be obtained. The gases from combustion pass through the secondary heating zone which has fins to increase the heat transfer and then into the smoke hood. Baffles are provided in the passages for even distribution of the gases.

Covers are provided at the front to facilitate cleaning. The hinged furnace door allows access to the combustion chamber. A steel insert plate is fitted in the hinged door for attachment of the burner. This plate is delivered undrilled. The hinged door is arranged to carry refractory which must be moulded to suit the burner head. Refractory tiles are placed below the burner head to help dispose of oil spillage.

The sections are jointed with a boiler cement which is spread in the inner sealing grooves. After the boiler sections have been assembled and hydraulically tested, a plastic over-pressure compound must be applied. All plate coverings must be sealed with asbestos rope.

Short tie bars facilitate assembly of the sections and assure good and lasting tight-
Danfoss supplies quality components for burners and boilers.

* Full range of Oil Nozzles in angles 30°/45°/60° and 80° in variations from 0.5 u.s. gals to 32 u.s. gals.

* Control Boxes and Photo Cells which give fully automatic control of single and three phase burner plants.

* Oil Pumps, Transformers and Boiler Thermostats in addition form a complete range for any burner.

J.J. Sampson & Son Ltd.
12a Wexford Street, Dublin 2  Phone: 752317

Quadrant Engineers Ltd

Buderus

* Domestic and Industrial Cast Iron Sectional Boilers.
* Ranging from * 60,000 Btu/h to 6.8 million Btu/h
* Models Available for
* Natural Draught
* Pressurised Firing
* and Dual Fuel operation.

Other Quadrant Products

* Buderus Calorifiers and Radiators
* Riello Burners
* Happel Convector

For Details Contact us at:
Green St, East, Dublin 2  Tel: 771411/2. Telex: 5283
Hendon Bros were the first in Ireland to introduce packaged steam boilers. Hendrons now market the Powermaster packaged steam boiler. A survey of the first Powermaster installations, which have been in use far longer than many other packaged boilers, proved them to be exceedingly dependable and highly efficient. The analysis confirms that the Powermaster maintains efficiencies in the order of 83% with the burner requiring only infrequent cleaning.

The ability of these units to maintain high efficiencies is obviously of paramount importance when one considers that on average a boiler, in one year alone, could burn fuel equivalent to approximately 50% of the original cost of the complete boiler and its installation.

The changing world fuel situation is a critical factor when selecting a boiler as seasonal demands, unforeseen increases in prices and even industrial disputes can stop production. Therefore, the type of burner used on the boiler must be capable of simple and immediate change from one fuel to another and be extremely efficient at all times. The Voriflow burner, which is integral with the Powermaster, is capable of all these things, being specifically designed to match the boiler.

One-source responsibility is given with Powermaster and Voriflow equipment, this guarantees the utmost satisfaction simply by the fact that they are completely designed, constructed and serviced from their factory.

Bradley steam boilers are also distributed by Hendrons, these are smaller steam boilers catering for bakeries, laundries and small factories. These boilers can be fired by oil or gas and require little attention or no elaborate water treatment. Boilers up to 10,000 lb/hr now kept in stock.

Further information is available from Hendron Bros Ltd, Glen Tolka, PO Box 298, 144 Richmond Rd., Dublin 3. (Tel: 376061).
REFRACTORIES Of Bailieborough

THE FIREBRICK SPECIALISTS

Manufacturers of Burner Quarls • Precast
Combustion Chambers for Sectional Boilers • Firebacks etc.

Official Stockists for G. R. Stein's Scottish Firebricks • Fireclays • Jointing Cements • Castables • Mouldables etc.

REFRACTORIES IRELAND LTD.

Stonewall, BAILIEBOROUGH, Co. Cavan, Eire. Telephone 042-65123/65150. Telex 33829

QUADRANT ENGINEERS LTD

RIELLO

In addition to the 35 seconds oil burners Quadrant now have available the Riello “N” type burners suitable for 200 seconds oil

MEC – 3K
The Popular MEC – 3K for Domestic Boilers. Over 15,000 already installed in Ireland.

Press N Type Outputs up to 12 million Btu/h

Other Quadrant Products

* Buderus Boilers and Radiators
* Buderus Thermoglaze Calorifiers
* Happel Convectors
* Euroflex Flexible Connections
* Wing and Andrews Heating Equipment
* Triple-E Fuel Additives

For Details Contact us at:

Green St, East, Dublin 2. Tel: 771411/2. Telex: 5283
adequate to raise the oil from cold to storage temperatures in a few hours if necessary.

As the heat losses from storage tanks vary considerably from summer to winter, the heating surface must be sized to cope with most severe conditions and also be capable of heating a cold tank to working temperature in a few hours. Thermostatic control of the heater is necessary to avoid overheating of the oil and consequent heavy sludge formation. The Midcom SLT heaters have Spirax Sarco steam thermostats fitted on to their header flanges, to minimise installation work. The fitting of multiple type SLT heaters to large bulk oil storage tanks will give adequate and even heating. An oil draw-off connection can be provided on the flange if required. With installations used for seasonal heating it may be necessary to install additional electric tank heating for start-up purposes. A suitable range of Midcom electric heaters are available.

The typical duplex steam/electric "Lineflo" unit has been designed to overcome the various problems of oil heating and pumping. It provides burner manufacturers with a fuel that is heated and pumped at the burning temperature and pressure, direct from the fuel storage tank(s).

The use of such a unit, pumping oil through small bore insulated and traced pipework to the burner, reduces very considerably installation costs, in fact, savings in excess of 50% are said to be possible. Extra space is available in the boilerhouse where normally oil heating and pumping equipment would previously have been installed.

With this system, any oil spillage during maintenance is confined to the oil storage compound, allowing extra clean boilerhouses, essential in food factories etc. The unit incorporates patented temperature control arrangements assuring even outlet temperatures even under widely varying load conditions. Single or duplex filters are fitted as standard on the suction side of the pumps and fine mesh strainers can be supplied on the oil outlet if required. All electric and steam heating surfaces are external to the oil storage tank and can easily be removed if necessary, without draining the storage tank(s).

Information on the entire Midcom range is available from Goudie Boiler Services Ltd., 129 Applewood Heights, Greystones, Co. Wicklow. (Tel: 875142), who act in the Republic on behalf of G W Monson & Sons who are the agents for the whole of Ireland.

The Cradley Package

The Cradley "Stempacket" boiler incorporates many well-known features.
Some people say we're old fashioned.

but if we were unscrupulous, cared more about the profit margin and cut a few corners, especially in the quality of materials we use, we could do better.

If we had more unskilled labour and fewer craftsmen we could join the big league.

But then we tend to think that the out-dated virtues of truthfulness, reliability and a job well done pay in the end - even in the boiler business.

It's certainly worth tuppence to find out why, when people say we're old fashioned...

We agree!

Cradley Boilers
Cradley Boiler Company Ltd, Wood Lane, Cradley Heath, Warley, West Midlands, B64 7AN
Telephone: Cradley Heath 66003/5 Telex 337024
Agents for Ireland: G.W. Monson & Sons, 18, Ballyblack Road, Newtownards, Co. Down, N. Ireland, Telephone: Newtownards 2350

Published by ARROW@TU Dublin, 1979
including simplicity, easy access to fire tubes and combustion zones, generous facilities for water side inspection, full complement of robust mountings, and safety controls complying with latest requirements.

The "Steam Packet" is manufactured in sizes up to 25,000 lbs steam per hour from and at 212 degrees Fahrenheit and is suitable for oil and gas firing. These units are also available for hot water operation, either as fully flooded or steam cushion units.

Sizes up to 1500 lbs per hour are built for a standard pressure of 100 lbs, per square inch, and larger sizes for 150 lbs per square inch. Higher pressures can be offered when required.

Riello
Suitable For
200 Sec Oil

Riello has been making burners for 50 years. Now, as regards both output and number of employees, the company deems to be the leading burner-maker in all Europe.

Riello has also reached the maximum level of integration, as in its factories are also produced most of the components and accessories of the burners, ie pumps, control boxes, thermostats, transformers, solenoid valves, and recently, electric motors (under AEG licence).

These components, every one of them intended for a particular type of burner, are studied by highly skilled designers and constructed according to the most up-to-date techniques.

Moreover, the rigorous choice of materials, the continuous, accurate checks carried out in all stages of production and the final tests, give the best guarantee of high quality of Riello burners.
More Industries rely on Fulton than any other boiler

- Simple and efficient
- Proved in over 35,000 installations
- Low capital cost
- Low installation cost
- Low running cost
- Low maintenance cost

Get all the facts... then get a FULTON

STEAM BOILERS

A.P.V. Desco Ireland Ltd
Galvone Industrial Est, Limerick. Tel: 061/45211. Telex: 6923

They are not new... but different

As one of the country's largest shell boiler manufacturers we have established a sound reputation for quality and reliability in design and workmanship.

The European and Windsor shell boiler ranges are offered for steam or hot water applications and, as part of our continuous research and development programme, both types of boiler embody unrivalled design standards including the following differences:-

- Low furnace combustion intensities—as low as 0.746 Kw/Cu. M (90,000 Btu/Cu. Hr.).
- Low furnace exit temperatures.
- Low pressure losses.
- Low H.P. consumptions and consequently lower electricity bills.
- Good access both internally and externally.

Great emphasis is placed upon our flexibility and willingness to meet our customers individual requirements. Once installed, back-up service by fully trained and qualified staff ensures efficiency and fuel saving is maintained. Send today for literature on full range.
To this high standard of production, Riello adds an efficient and widespread sales and service organisation, that has been well established in Italy for many years and is being extended more and more to cover foreign markets.

Within Riello a school has been in operation for the past 30 years, where technicians and those entrusted with installing the burners attend instruction and refresher courses, which are open not only to Italians but also to workers from abroad. There is, therefore, a continuous inflow of new and well trained engineers into the service organisations.

Riello burners, in addition to supplying more than half the Italian market, are at the present time exported to over 40 foreign countries.

The burners are designed and constructed according to the most up-to-date international standards and have been approved by all the leading institutes.

With the present diesel oil shortage Quadrant Engineers Ltd, the agents for Riello burners, have introduced the ‘N’ type burner suitable for 200 sec oil. This range is available ex stock in Ireland and although it is new in this country it has been successfully used on the continent for many years.

Further information is available from Quadrant Engineers Ltd, Green Street East, Dublin 2. (Tel: 771411).

**FUEL SAVING**

**WITH OIL ADDITIVES**

An additive called R 4000 which, by introducing into the oil selected chemical species which help to reduce the extent to which pyrolysis and polymerisation occurs in every burning oil droplet, allows the oil to be burnt in an essentially solid state combustion process. The rate of fouling and solids emission is thus reduced, and efficiency increased.

Triple-E additive can improve the operational performance of customer’s plant with no capital investment and show an almost immediate financial gain. A user ought to save anything from two to five times the cost of the additive in terms of oil saved.

Triple-E keeps a progressively up-dated record of the performance of its product over hundreds of test cases. The results show how consistently successful an effective chemical additive can be, even allowing for some inherent imprecision in measuring the operation efficiency of typical in-service boilers. The results from 486 individual case histories have been correlated and are presented in Figure 1. They show that the product meets its main claim, which is to more than cover its own cost (a 1.3% gross saving of oil pays for the additive) and that anything over this is money back in the pocket of the user.

From Figure 1 it can be seen that most of the results fall between a 2% and a 6% saving in fuel, with some much higher.

To make sure that the improvement is really caused by using the additive and not just by a little mechanical adjustment of the boiler, Triple-E insists on a most thoroughgoing check of current best performance of clients’ plant before the additive is tried.

**Less fouling**

Apart from the statistical results mentioned above, the company has compiled some highly interesting records from two of its most important clients which operate large water tube boilers. Both say that the additive has improved combustion efficiency by cutting down the extent to which oil pyrolyses during the combustion process itself, which means a better and probably accelerated energy release. Simultaneously there is less fouling of the heat transfer surfaces with deposits of carbon. This is confirmed by simple visual observation of the internals of the shell and tube boilers.

A more objective way of looking at these changes can be achieved with large water tube boilers which have a good deal of instrumentation down-stream heat transfer equipment such as superheaters, economisers or air preheaters. Deposits here can reduce efficiency to the extent that expensive soot blowing operations become necessary. Soot blowing, by cleaning the surfaces, lowers the final exit gas temperature. The greater the degree of fouling, the greater the fall in exit temperature after sootblowing, so that any improvement in combustion efficiency should show up as a reduction in the drop of outlet temperature after any individual blow. This is exactly what was found.

Further information available from Quadrant Engineers Ltd, Green Street East, Dublin 2. (Tel: 771411).

**The Elements And D. W. Products**

D. W. Products offered a combined package system of heating via water, air or gas, each system having its own special features.

The Beaumont system of storage heating, mainly industrial, involves the Beaumont Water Heater, which employs a concept of direct firing which is a great deal more efficient than any other method, it is claimed. The construction of the Beaumont Heater is based on a standard cylindrical steel module, 770 mm long and 1,050 mm in diameter with a capacity of approximately 455 litres. This is the widest component which means that assembly on-site is quite feasible and in most installations building work on existing boiler houses can be avoided.
The standard range utilises between two and five of these modules, the internal surfaces of which are treated with a protective plastic coating.

Each section is independently supported on adjustable legs which compensate for variations in floor level.

Heat is retained by a 50mm layer of insulating material under an easy-clad aluminium jacket. Twin gas burners - affording a 50% stand-by - are located at the front of the Beaumont for ease of access. The main control and indicator panel are also located at the front of the unit.

Being one unit the Beaumont not only saves space on-site but also a considerable amount of site labour, no interconnecting pipework being required.


Passat Combinations

Passat boiler systems are really a combination of two furnaces — an oil burner-boiler and one that takes solid fuel. They can be used together or separately and are equipped with double doors which make stoking easier.

Five sizes of Passat solid fuel furnace are available: the house size which supplies 72,000 BTU; the villa size with 152,000 BTU; plus models giving 120,000, 260,000 and 500,000 BTU. Surfaces in contact with smokes are made from Corten corrosion-resistant steel and the doors are constructed with insulating fire-proof material for longer life. All the boilers are insulated with 50 mm of rock wool and are covered with a galvanised outer hood.

Equipment available with the units includes a cleaning iron, draught regulator with double adjustment, cast-iron grate, fire tube with damper, insulated back plate, flame chamber and safety cut-out. The Passat systems come from Denmark and the latest design has been rated 87% efficient by the Danish Government Testing Bureau.

Further information from M. A. Vaughn Trading Ltd., Trim, Co. Meath (Tel: 046-31167).

Taney Gas Boilers

The new Corvec Flexiflame 70 and 105 modular boilers have been developed from the highly successful Corvec Flexiflame 35. These boilers are designed for installations where modulating output is a requirement and comprise two or three standard Flexiflame elements connected together in one casing.

Total boiler outputs are respectively 260,000 and 390,000 Btu/h (76 and 114 kw) derived from the standard element of 130,000 Btu/h (38 kw).

The Corvec Flexiflame 70 and 105 are provided with flanged water and gas manifolds to allow simple connection of a second or subsequent boilers. Each boiler has an integral common flue and is contained in a compact cabinet that allows easy access for installation and maintenance.

Two new features are incorporated to improve boiler efficiency at less than full loads, and to simplify design and installation procedures. Each element of the boiler is provided with its own pump and automatic valve, designed to minimise the flow of water through those elements not under fire.
B & E — From Oil To Turf

B & E Boilers design team has produced four separate and well established boiler ranges, the European steam and hot water and the Windsor steam and hot water, all noted for their advanced design features, and high quality of workmanship and materials.

An extensive pressure vessel and general fabrication manufacturing facility is also available constructing vessels to stringent standards, such as BS 1500, 1515, 5500 and ASME 8. Vessels of various sizes up to 4.5m (14' 9") diameter and 11m (36' 1") long can be handled adequately.

The B & E Boiler range extends from 200 Kw - 9,000 Kw (680,000 - 30,000,000 Btus/hr) for hot water and from 340 Kg - 13,600 Kg (750 - 30,000 lbs/hr) for steam. Burners of the pressure jet or rotary cup modulating type are offered for firing fuel oils from 35 secs. to 3,500 secs. Natural gas, town gas, coal, or turf fired designs are also available.

The European steam boiler — a three pass full wet-back economic packaged boiler suitable for firing all grades of fuel oil or natural gas. It incorporates the well-proven reverse flow furnace design principle. The range is complementary to the European steam boiler, embodying many of its user features and providing a compact and accessible design.

The Windsor steam boiler — a three pass treble pass boiler suitable for firing all grades of fuel and/or gas — a solid fuel fired series is also available. Designed for low, medium or high temperature hot water applications, the boiler is equipped with a special internal water circulation device which minimizes stratification and promotes the flow of water within the shell. Wide flow and return differentials are easily handled. Like the European steam boiler, it is also offered with varying heat transfers.

The Windsor hot water boiler — a low cost treble pass boiler suitable for firing all grades of fuel oil or natural gas. It incorporates the well-proven reverse flow furnace design principle. The range is complementary to the European steam boiler, embodying many of its user features and providing a compact and accessible design.

The Windsor hot water boiler — a low cost treble pass boiler, suitable for firing all grades of fuel oil or natural gas.

Further information is available from Mr. E. H. Siddall (assisted by Mr. P. Tiernan), 174 Ballinclea Heights, Killiney, Co. Dublin. (Tel: 852412), and Henry R. Ayerton Ltd., The Cutts, Derriaghy, Dunmurray, Belfast.
ASPECTS OF DOMESTIC SPACE HEATING

Domestic space heating has become a subject of great interest in the recent past. Since the mid-sixties, there has been a move towards radiator or warm air heating using various energy sources. This move, allied to the increase in the annual rate of construction of new houses, made home heating an area of increasing importance in the overall heating and ventilating market. By 1973, central heating had become the norm for new housing although there was dissatisfaction with some of the systems in use.

The rapid rise in oil prices in 1973-74 and in the prices of all other energy sources in the years immediately following turned a bright spotlight on the entire energy question. Home heating was seen as an area where considerable energy savings could be achieved. While some saving may have been achieved, it has not been as much as might have been expected. In this article and two following ones it is intended to outline some of the main factors governing energy use for space heating in housing. Results of some field studies carried out by An Foras Forbartha their implications for energy conservation prospects in the heating area will also be considered.

The thermal environment in housing should be such that the occupants can carry out the range of activities which are normally carried out in the home without experiencing thermal discomfort. This is a general statement of an ideal situation, and is not easily translated into practical guidelines for the designer of the building and its heating system. One can identify four major factors which influence the achievement of this objective: the external climate, the building structure, the heating system, and the building occupants.

External Climate: The major influencing factor of the external climate is the external air temperature. Wind speed and direction, solar radiation and external relative humidity also influence the external thermal environment to a significant extent. There can be important differences with regard to all of these factors between the typical climate of the area and the micro-climate, i.e. the climate in the immediate vicinity of the building. These arise from the degree of exposure of the building and the juxtaposition of the building with other features both natural and man-made in its immediate vicinity.

Building Fabric: The building fabric is the major means of modifying the external environment to provide an internal environment which is suitable for human habitation. This is true with regard to the thermal environment as it is with other aspects of the environment. The degree to which it modifies the external thermal environment depends, amongst other things, on:

(a) the area of external fabric elements relative to the overall floor area,
(b) the rate at which the various external elements allow heat to pass through them,
(c) the extent to which it allows the internal temperature to be increased by control radiators. In particular this is largely determined by the size, orientation and shading of windows,
(d) the amount of air infiltration that occurs through the external fabric particularly through joints and cracks around elements such as doors and windows and opening sections of windows, and
(e) the thermal mass of the fabric, i.e. the ability of the building fabric to take in heat from a warm environment, store it and give it back when the environment cools down.

Heating System: Just as the building fabric is seen as the major modifier of the external thermal environment, the heating system can be viewed as a secondary or back-up modification system required when, as is most frequently the case, the modification due to the building fabric is insufficient to satisfy the requirements for the internal thermal environment. Critical factors determining the heating system's ability to modify the thermal environment are:

(a) the overall output from the heating system,
(b) the nature of this output, e.g. the balance between the radiation and convection components,
(c) the distribution of temperature arising from the output, e.g. both between rooms and within rooms,
(d) the thermal response of the heating system, i.e. the speed at which the heating system will respond to a demand for heat, and
(e) the controllability/flexibility of the system.

Building Occupant: In the context of the general requirement for the thermal environment outlined earlier, the building occupant should be the key determinant of that environment. He should be free to decide on the utilisation of the house and the activities to be carried out therein. He should also be able to establish an environment free from thermal discomfort. The external climate, the building fabric and the heating system are but constraints on, or aids to, the achievement of this environment. Within the limits imposed by these constraints and aids, the degree to which the desired thermal environment is established by the building occupant depends on his ability to utilise the building and system provided and his ability to pay for the necessary energy input.

Of the four above mentioned factors, the climate and the occupant are largely, although not completely, outside the control of the designer. It is not possible for the designer to modify the microclimate and to influence the occupant's demand. He is also unable to educate the occupant in the use of the building and its heating system. The major factors within his control, however, are the building fabric and the heating system. In addition to the major requirement to provide user satisfaction, the designer must also ensure that the thermal environment is such that the building is protected from temperature related damage. He should also make sure that measures taken to ensure an appropriate thermal environment do not interfere with other aspects of building performance. Finally, he must see that this environment is achieved with the optimum efficiency in terms of resource use. It is this latter aspect which has brought the whole question of the thermal performance of housing to the fore in the past half-decade.

It is useful to consider the achievement of an appropriate thermal environment as embodying the following major requirements:

(a) the provision of a satisfactory environment under extreme conditions,
(b) satisfactorily meeting the complete range of demands made by the...
Aspects of Domestic Space Heating

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occupants,
(c) the optimum efficiency of energy use over the entire heating season, and
(d) non-interference with other aspects of building performance.

In the past, the first of these requirements has been emphasised at the expense of the others. This may be largely because it was felt that meeting the first requirement would automatically ensure the ability to meet the second. This did not always prove to be the case. The efficiency of energy use was not considered important because supplies were relatively cheap. The interaction of thermal performance with other aspects of performance was not adequately considered which lead to problems, particularly in areas of moisture control and condensation prevention.

This emphasis on providing a satisfactory environment under extreme conditions meant that, of the various influencing factors listed earlier, prominence was given to the external temperature, the heat loss characteristics of the structure, the maximum output of the heating system and the temperatures required for optimum comfort. These factors were well researched and documented, while many of the other factors were ignored. In addition, because of the importance attached to reducing construction costs rather than running costs, high levels of insulation were not adopted.

The rapid rise in energy prices in 1973 and succeeding years, and the realisation that world supplies of fossil fuels are limited, has forced a major rethink. Now the efficient use of energy has become a major requirement. This is much more dependent on the overall thermal performance for typical average demand conditions rather than the performance under extreme demand conditions. This means that attention must be paid to many more of the influencing factors already mentioned and, the dwelling user, or occupant, assumes a crucial importance. Clearly, he decides what the general level of demand is to be. While the emphasis was on ensuring adequate performance under extreme conditions, it was not necessary to consider the occupant's use pattern too closely. One could assume the maximum level of demand. However, when the emphasis switches to the efficiency of energy use, actual use patterns and demand levels must clearly be considered. It is surprising how little quantitative information was available in this area in 1973.

The major areas of development in the field of domestic thermal performance in recent years can be categorised under three headings:
(a) The establishment of basic data particularly on the typical thermal environment achieved and demanded.
(b) The development of models and associated design methods capable of reflecting the actual dynamic situation rather than a static extreme situation.

These attempts to take account of the influence of many of the major factors relevant to the establishment of the thermal environment.

Work, in Ireland and internationally, is being pursued under all these headings simultaneously. However, the first of these is of critical importance for the effectiveness of the other two areas. This is particularly true of this country since it has been shown that there are considerable differences between the typical domestic thermal environment maintained here and that maintained in many other countries. With the current state of knowledge, it is imperative that models, design methods, energy efficient buildings and heating systems be tested to ensure that the assumptions on which we are based reflect reality. Thus, proposals for energy conservation should be based, as far as possible, on measured results in the field. The next two articles will discuss the findings of some field surveys and measurements carried out by An Foras Forbartha and consider their implications for various possibilities of conserving energy in the space heating of domestic buildings.

PATRICK MINOGUE
Research Officer, An Foras Forbartha.

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**TABLE 1. Primary Energy Consumption in Ireland, 1973 - 1977**

<table>
<thead>
<tr>
<th></th>
<th>1973</th>
<th>1977</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TWh</td>
<td>TWh</td>
</tr>
<tr>
<td>Petrol</td>
<td>8.73</td>
<td>14.30</td>
</tr>
<tr>
<td>Coal</td>
<td>6.62</td>
<td>6.27</td>
</tr>
<tr>
<td>Oil</td>
<td>61.05</td>
<td>64.41</td>
</tr>
<tr>
<td>Hydro</td>
<td>3.09</td>
<td>3.17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>82.48</strong></td>
<td><strong>87.43</strong></td>
</tr>
</tbody>
</table>

Source: Energy in Ireland 1977, Department of Industry Commerce and Energy

<table>
<thead>
<tr>
<th></th>
<th>1973</th>
<th>1977</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(k)</td>
<td>(k)</td>
</tr>
<tr>
<td>Petrol</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>Coal</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>OIL (incl. LPG)</td>
<td>36</td>
<td>35</td>
</tr>
<tr>
<td>Electricity</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Oven Gas</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
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</table>

Source: (i) Energy in Ireland 1977
(ii) Energy Conservation Potential in Buildings

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**TABLE 3. Estimated Net Energy Use Allocation Per Household**

<table>
<thead>
<tr>
<th></th>
<th>1973</th>
<th>1977</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(kWh)</td>
<td></td>
</tr>
<tr>
<td>Space Heating</td>
<td>21,000</td>
<td>19,900</td>
</tr>
<tr>
<td>Hot Water Heating</td>
<td>2,300</td>
<td>2,300</td>
</tr>
<tr>
<td>Cooking</td>
<td>2,200</td>
<td>2,200</td>
</tr>
<tr>
<td>TV, Lighting, etc.</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>27,300</strong></td>
<td><strong>25,300</strong></td>
</tr>
</tbody>
</table>

---

Overall national energy consumption per annum has risen by just 6% between 1973 and 1977 (see Table 1). The domestic sector has maintained its share of national consumption at 33%. Thus, domestic consumption has also risen by just 6% in the same period. Since the housing stock increased by some 100,000 units (14%), in the period, this represents a reduction in energy consumption of some 7% per household. However, there was probably a similar reduction in the average number of occupants per household.

Table 2 shows that the proportions of domestic energy consumption enjoyed by the various fuels have changed very little over the period.

National statistics do not give the breakdown of energy consumption by end use within the domestic sector, and this is a serious lack. Table 3 shows an estimated breakdown for 1973 and 1977. The 1973 figure is based on estimates of the consumption pattern in the U.K. and extremely limited statistics for this country. For the 1977 figure, it is assumed that the drop in energy consumption per house is concentrated in space heating. The table shows a drop in average energy consumption per household of almost 10%.
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THE BEST NEW VENTILATION SYSTEM IN THE COUNTRY

Would you believe the number one industrial warm air heating manufacturer?
Think about it.
All that experience of industrial atmospheres. It's a good foundation for designing industrial ventilation.

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Please send me details.
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COMPANY ..................................................
ADDRESS ..................................................
TEL ..........................................................

powrmatic
Do business in the right atmosphere 29v.6.79

et al.: Irish H & V News
# Companies Supplying Grilles Louvres & Ducting

<table>
<thead>
<tr>
<th>Company Name</th>
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<th>Telex No</th>
<th>Brand Name</th>
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<td>618511</td>
<td>74618</td>
<td>Keith Blackman</td>
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<td>Armstrong Auto Parts (irl Ltd)</td>
<td>Camac Close Emmet Road Dublin 8</td>
<td>781700</td>
<td>30830</td>
<td>Vent Axia</td>
</tr>
<tr>
<td>Dan Chambers Ltd</td>
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<td>720448</td>
<td></td>
<td>Netaline</td>
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<td>Coolair Ltd</td>
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<td>Barber &amp; Colman</td>
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<td>Dublin Glass &amp; Paint Co Ltd</td>
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<td>D.P. Engert Ltd</td>
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<td>Europair (Irl Ltd)</td>
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<td>Hart &amp; Cooley</td>
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<td>William H Leech &amp; Son Ltd</td>
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<td>McCraight Collim Ltd</td>
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<td>P&amp;D MacFarlane Ltd</td>
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<td>5307</td>
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<td>4862</td>
<td>Carlyle</td>
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<tr>
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<td>Verrolec Zone</td>
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<tr>
<td>Hall Thermotank Ireland Ltd</td>
<td>19 North Cumberland Street Dublin 1</td>
<td>746054</td>
<td>30943</td>
<td>Hall Thermotank Products, Louvres, Spiral Ducting Linear Diffusers</td>
</tr>
</tbody>
</table>

Index compiled from information received from companies
FINHEAT LIMITED
Sole agents/stockists of MYSON Air Distribution Equipment.

DEFLECTO*
Grilles and registers, single and double row.

VARICORE*
Fixed core extract grilles and registers.

NON-VISION
Sightproof grilles for relief, transfer and circulation.

ADJUSTAVENT*
Square and circular diffusers with volume control.

VARIVENT* CIRCULAR
Fully adjustable circular diffusers

LINIAJUST*
Linear diffuser with adjustable air flow rate.

RIBBON LINE
Sturdy linear grilles for floor, ceiling, wall and sill mounting.

STYLOVENT*
Fixed deflection square diffusers for suspended ceilings.

You won't make a better choice of grilles, registers and diffusers than Myson.

The famous RCM range has a model to cover every ventilation and air conditioning application. Each is carefully designed for correct aerodynamic performance and minimum noise generation. And each is superbly made from extruded aluminium with mitred and welded corners — for a perfect finish. And for a more economical job there's our 'E' range, made from satin anodised extrusions. You need only ask.

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34 Watling Street, Dublin 8. Phone: 778109/778120 Telex: 30751
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OLD ANGLE IRON FLANGE

NEW LABYRINTH
Push on Airduct Connection

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* Air Leak Proof.
* No Welding.
* Minimal Drilling.
* No Weather Proofing.
* Simplicity of Assembly.
* Ease of Erection.
* Increases Duct Rigidity.
* Aesthetically Pleasing.
* Designed for use on change pieces, flexible connections, branches, reducers, square to rounds offsets etc.

Enquiries:— Northern Area Mr C. Billings
Tel: 01-517703

Enquiries:— Southern Area: Mr. S. Doherty
Tel: 056-24171

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A. Guinness & Co.
G.B. Services Ltd.
O’Gorman Engineering Ltd.
John Jackman Eng. Ltd.
G. O. Neill
Sharidan & Lynch Ltd.
Sheet Metal Industries
Sweeney Sheet Metals
Swift Sheet Metal
Thompson’s Air H & V Ltd.
Hoyne Heating Ltd.
O’Sullivan Darcy
Northvent Engineering Co Ltd

PROJECTS — INCLUDE
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Marino Point Cork
Regional Tech. Waterford
Maynooth Telephone Exch.
Village Inn Leisure
Complex Kilkenny
Bagenalstown Meat Packers
Allergan Westport
First National Building
Society — Boortmore
RTE Donnybrook
Superquinn — Sutton
Superquinn — Blanchardstown
Plus: Lounges-Bars Sports, Complexes etc.
Irish Naval Service Haulbowline
Athlone Telephone Exchange
Industrial Gases, Cork

HEATING WHOLESALERS LTD
Thomastown, Co. Kilkenny
Tel: 056-24171, 24172
WHAT IS A REGISTER?

All types of air inlet and outlet fittings although requiring specialised manufacturing processes are regarded as ancillary to air conditioning and ventilation equipment. It is common for manufacturers of fans and air handling units to manufacture grilles, louvres, etc., to complete the package.

There have been no recent technical innovations in the grille and louvre market but over the last ten years an increase in the use of flexible ducting was noticeable. This increase has been brought about by the demand for speedier installations. Far less bends, fittings and the associated sheet metal work are required when flexible ducting is used.

The economy in Ireland has seen many fluctuations in recent times but in the last year or so office and factory development has reached an all time high. This has had a beneficial effect on the sale of air conditioning and ancillary equipment as many of our latest factories are either chemical, processing or are allied to the food industry and require air conditioning.

There are a dozen or so stockists of grilles in Ireland and they have the lion's share of the market because delivery ex stock is required to meet the demand of the industry.

The manufacture of ducting, other than flexible, is either by the services contractor or a specialist sheet metal subcontractor. The latter is often the case as the smaller services contractor is not equipped to handle sheet metal work but the larger contractors have set up their own sheet metal divisions.

The terms grilles, registers and diffusers are often used indiscriminately so in order to avoid confusion the following definitions and descriptions are suggested.

Grille - A non adjustable device with a fixed set of bars, vanes or a perforated lattice. Versions are available with vanes of aerofoil section to assist in reducing pressure losses.

Register - A grille equipped with a damper for the user to adjust between an open and closed position.

Linear Diffuser - A supply outlet fitting used in side walls and floors. It may be fitted with fixed or adjustable guide vanes.

Ceiling Diffuser - Fixed Cone Type - Circular fitting with one or more fixed cones. These fittings provide good entrainment of air and allow large quantities of air to be diffused into a room without draughts. Normally suited for temperature differentials (supply air - room air) of about 10 degrees C.

Ceiling Diffuser - Adjustable Cone Type - Similar to the fixed cone type but with one or more adjustable cones to give air distribution between maximum radius of horizontal distribution and maximum downwards projection. Normally suited for temperature differentials of about 27 degrees C.
Myson also do a range of secondary duct dampers which are particularly useful for controlling air flow rates in small duct sections such as branch ducts or plenum connections. Types JOD and JRD can be used for controlling the air flow rate from terminal boxes positioned above a ventilated ceiling. All units, except JRD, can be supplied with fusible links to give a limited amount of fire protection.

Finheat's policy has always been to carry the maximum stock to suit demand and this policy has proven them right time and again which is mirrored by the response they are receiving from their customers, and on special specified contracts, they are fast gaining a name for themselves for speedy deliveries. These factors, together with the full support of Myson Group Marketing Ltd, ensure that Myson/RCM grilles will have an ever increasing demand in the future.

Further information is available from Finheat Ltd., 34 Watling Street, Dublin 8. (Tel: 778120).

### Simitka
#### For Simplicity

The Smitka duct flanging system is proving very popular with ducting manufacturers and contractors for branches, reducers, flexible connections etc., and in recent times has been used on prestige projects all over Ireland.

The main advantages in the system are the simplicity of assembly and the fact that no welding is required. HVCA approval is given under standard DW141, 1977.

Further information from: Heating Wholesalers Ltd, Thomastown, Co. Kilkenny. (Tel: 056-24171).

### Woodside Offer
#### A Complete Service

Being one of the largest ductwork manufacturers in the country Woodside Engineering are called upon to make ductwork for not only the airconditioning business but also the catering trade and industry in general. They now manufacture louvres, dampers and canopies as well as ductwork and are agents for flexible ducting, fire dampers, air volume control dampers and duct tape.

Further information is available from Woodside Engineering Ltd, Grand Canal Harbour, Dublin 8. (Tel: 780152).

### Longford Grilles
#### Ex-Stock

Longford Ventilators Ltd, is a company based in Longford town and is set solely for the purpose of manufacturing aluminium air distribution products, with James Goggin as production manager. The aims of the company are to produce a high quality product range at competitive prices, and short delivery, thus giving an efficient service to the Heating and Ventilation/Air Conditioning contractor. A large stock of grilles is being held at

### Woodside Engineering

**THE SPECIALISTS IN**

**Ductwork, Canopies and Copper Work**

**Tru-Flow Limited**

**Sheet Metal Works**

CHAPELIZOD INDUSTRIAL EST,
DUBLIN 20.
TEL: 365984 (3 lines)
Turbo Dynamics Ltd, offices at Cookstown Industrial Estate, Tallaght, Co Dublin, thus, delivery is ex-stock on most sizes, and due to the close liaison with Longford Ventilators, delivery on non-stock items can be as little as one week. Eyelash diffusers are also available in 1, 2, 3 and 4 way discharge patterns.

Architects will be interested to note that due to the flexibility of production, aesthetic and other architectural requirements can be catered for as non-standard items, providing reasonable production quantities can be assured. For further information contact John Jones, Sales Manager, Turbo Dynamics Ltd., Cookstown Industrial Estate, Tallaght, Co Dublin. (Tel: 511144).

Armstrong Autoparts offer a free design service to architects, consulting engineers and specifiers for ventilation problems. They also carry a very comprehensive range of ventilation units and accessories. These accessories complete the range of products and provide even greater flexibility in solving all kinds of ventilation problems.

Accessories ex-stock include: Roof plate assemblies (for flat or pitched roofs), soaker flange sheets to suit most profiles of corrugation, ceiling housings (for ceiling void or concealed ventilation), wall plates (fixed and removable types), egg crate grilles, non vision door grilles and external weather louvres, PVC flexible ducting in sizes 102 mm, 178 mm, 229 mm, 254 mm, 305 mm, and 406 mm and the corresponding worm drive clips.

Adaptor kits for splitting Vent-Axia fans to accommodate a large fixing thickness between the two are also available. Four core white PVC cable is supplied in minimum lengths of 5 m.

A comprehensive ventilation manual can be obtained from Vent-Axia Division, Armstrong Autoparts (Ire) Ltd., Camac Close, Emmet Road, Inchicore, Dublin 8. (Tel: 781700).
**Vent-Axia unit ventilation**

Plus Vent-Axia A-V-A
All the answers for economical ventilation

Now Vent-Axia AVA—Approved Ventilation Accessories—add extra flexibility to the world’s finest unit ventilation. Giving you economical ventilation from localised single unit installations to multi-unit, multi-duct configurations.

**Vent-Axia units**
Vent-Axia pioneered the concept of simple, reliable unit ventilation over forty years ago. Today Vent-Axia is the acknowledged leader in unit ventilation, with the widest choice of models and sizes.
The Vent-Axia Universal range offers four models (window, wall, roof and panel) in four sizes (6, 7, 9 and 12), all featuring the exclusive Autospring mechanical shutter.
The Vent-Axia Standard range offer the same choice of type and size, with optional shutters (either manual or airflow operated).

Both ranges offer three speeds and reversible or single direction of airflow, through the new Vent-Axia Rangemaster controllers.

**Vent-Axia AVA**
Vent-Axia AVA is a complete range of Approved Ventilation Accessories: ducting, grilles, louvres, roof plates, soaker flanges— in fact, everything you need to solve both simple and complex ventilation problems without the building disruption of central ducted systems. And at half the cost.

**Unit ventilation PLUS**
For further technical information and advice, write or phone: Vent-Axia Division (01) 781700
Modular Systems From Ventac

The Modular Airtrak 19 ceiling systems incorporates up-to-date technology involving air handling requirements for integrated environmental projects. Airtrak 19 can be used with supply or extract systems. It has fully adjustable air directional control vanes for horizontal or vertical deflection, including complete dampering facilities. The system is normally supplied in 1.2 or 1.5 metre square modules complete with patented snap together secret fix cruciform. Installation is of extreme simplicity and can be performed with great speed. Other modules are available ranging from 300 mm up to 4m in either direction. Finish is natural satin anodised aluminium body with matt black internals and blanking.

Airtrak 25 MK11 is an air terminal device with a multislot configuration of up to 8 slots in standard widths. This is a high performance system with air handling capability of up to 500 Litres/Sec. max. The standard unit is fitted with sets of air direction control blades which are adjustable from the face of the diffuser to provide horizontal left or right air patterns or vertical discharge. Dampering down to full shut off can also be obtained. A variation from standard, in the form of an additional sliding damper, may be used if independent volume control is required. All assemblies are supplied with suspension brackets. Co-ordinated components include engineered headers manufactured to suit different air conditioning duty requirements. Modular systems for cellular coffered ceiling applications are also produced. Standard finish is natural satin anodized aluminium with matt black internals. All the above diffusers can be used as individual units or integrated with ceiling grid systems.

Further details from Ventac & Co. Ltd., Grand Canal Quay, Dublin 2. Tel: 713499.
Barber and Colman Ltd, manufacturers of the world's most extensive range of air distribution equipment, offer revolutionary ceiling grille — the continuous line diffuser, Model CUD.

Launched on the Irish market by Coolair Ltd., distributors of Barber and Colman equipment in Ireland, the grille delivers the same volume of air per foot run as a conventional four slot grille and is designed to produce one way or two way air jets.

Ideally suited for use with variable air volume systems (VAV), a major advantage of the new CUD grille is that air flow can be throttled down to complete shut-off without dumping taking place — thereby avoiding uncomfortable environmental conditions.

The grille, which underwent extensive laboratory testing before release, is available in a variety of finishes including anodised aluminium and bronze with maximum widths of 76 mm for one way units and 121 mm for two way units.

Further information is available from Coolair Ltd., Unit C, Cookstown Industrial Estate, Tallaght, Co Dublin (Tel: 511244).
Noise In Duct Systems

Comfort conditions are related only to factors concerned with warmth, humidity and air movement, but a great deal of discomfort or annoyance may be caused by noise in an air distribution installation unless the designer takes the necessary precautions. ‘Noise’ means unwanted sound but a sound acceptable — or even not heard — by one listener may be a noise to another. It is because individuals differ quite widely in this respect it is unwise to treat information on noise tolerance in other than statistical terms.

Noise associated with air distribution systems may originate from a number of sources, these include the fan and motor a pressure pulsation, excessive air turbulence, a vibrating panel or section of duct, and so on. In general, however, the primary source of noise in warm air systems is found in the fan and motor. The pre-dominating noise in fan motors is usually of electromagnetic rather than mechanical origin, but fan noise may be due to a number of causes. Fan noise may be airborne through the fan inlet and discharge and mechanically transmitted through the fan casing and noise not dissipated or attenuated before it leaves the air heater may be transmitted via the duct to the rooms.

It is important in reducing fan noise that consideration be given to the following matters:

(1) The fan speed should be kept as low as possible consistent with the duty required;
(2) Where noise is traced to the fan impeller the maker should be consulted and the balance of the impeller checked;
(3) Mechanical vibration should be minimized by attaching the fan and motor to their supporting frames with efficient anti-vibration mountings (fitting a rubber or plastic washer between the component base and its support with a bolt through the washer is useless);
(4) Lining the chamber containing the fan with sound absorbing material;
(5) Provision of a plenum chamber following the fan discharge. An arrangement of plenum chamber to serve as a sound absorber is shown diagrammatically in

![FIGURE 1](https://example.com/figure1.png)

Plenum Chamber serving as sound Absorber and Attenuator

**FIGURE 1**

The effectiveness of a plenum chamber as a sound absorber depends on a number of geometrical features the most important of which is the relative position of the inlet and outlet ducts. The planes of these duct connections should be out of alignment as in Figure 1, where the ducts are shown entering and leaving the chamber at bottom and top opposite corners. It is important to avoid vibration in the walls of the chamber and lining with sound absorbing material will assist in avoiding this.

A metal duct, whether supply or return, should preferably be connected to the warm air heating unit by a flexible sleeve of woven asbestos or similar material fitted between the spigot or flange on the air heater and the ducting. If it is deemed necessary to reduce transmission of noise in the ducts this may be done by lining the duct with an acoustically absorbing material. An advantage of an inside duct lining is that it will also reduce heat transmission through the walls of the duct and may make outside lagging unnecessary. A disadvantage is that the resistance to air flow will be increased and the pressure drop through the duct will be greater.

Because the air velocities are comparatively low the noise arising from air turbulence is generally not a source of annoyance if care is taken in the design of the ductwork. Changes in duct section should be tapered sections and poor entries into grille and register boxes should be avoided. Any sharp edges are likely to produce turbulence and well finished fittings should be used. It is also important that any register dampers should provide a good seal otherwise 'whistling' may occur if small gaps are present when these dampers are in the closed position. Balancing dampers in ducts should be as far back from the supply outlets as is possibly consistent with accessibility for adjustment. In unlined straight ducts there is little sound attenuation, but where bends occur these act as attenuators. The most effective bends in this respect are those of minimum radius and here it is a case of one good design feature being at war with another because the pressure loss is greater in abrupt bends than in those of larger radius. Packaged attenuators, which are effective because of a high perimeter: are ratio obtained with an 'egg crate' type of construction, are commercially.

*Extract From Warm Air Heating By C. E. Knight*

**H&C Helps:—**

Hart and Cooley offer a large choice of grilles and diffusers in steel or aluminium helping the heating and ventilating engineer to solve his design problems. H&C also offer mixing and expansion boxes (with or without reheat oils, either with hot water or electric), and aluminium liner grilles and slot diffusers and a complete range of adjustable and multi pattern ceiling diffusers. The H&C factory in Lokeren Belgium is a very modern and adequately equipped production area with stocks to meet immediate demands.

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BIOMASS - A GROWING ENERGY SOURCE

Energy Supply
Recent difficulties with the availability of oil fuels have once again brought into focus the near-term insecurity of supply of these fuels and their eventual decline as the major world energy vector. The one certainty which emerges is that the trend of real price increases for oil products will continue, and this will result in its extensive substitution, where possible, by fuels whose availability is reasonably secure, at a competitive price.

The search for alternative fuels has already resulted in the adoption of nuclear energy, and a renewed interest in coal, principally for the production of electricity. The existence of abundant reserves of coal has encouraged a vigorous search for efficient methods for the production of high-grade liquid and gaseous fuels from coal. While the successful development of these alternative energy sources is of vital interest to Ireland, this dependence on external supplies has prompted a critical examination of the potential contribution of renewable energy sources.

The Role of Renewable Energy Sources

The renewable energy sources of greatest interest in Ireland are the direct use of solar energy "indirect" solar energy, particularly wind, wave and biomass energy. A common shortcoming of all but one of the above sources in their intermittency and the resulting need for some form of storage if an assured contribution to peak demand is required: alone among the renewable, biomass is, by definition, an energy storage process, and hence could provide a closely analogous substitute for the more traditional fuels.

Biomass can be defined as any plant tissue which is available for conversion to useful energy. Thus it can include agricultural and forestry wastes, purpose-grown "energy crops", animal waste, and some municipal and process wastes. Early assessments of the energy potential of these sources has focused attention on energy crops, specifically timber, and forestry wastes. However, the commitment of land, labour and capital to the production of forestry energy crops requires careful economic and technical justification, before such a development can be encouraged.

Forestry Biomass Production

The production of biomass immediately poses the question of the yield achievable per unit area, and the cost inputs necessary to achieve required yields. The long investment cycles associated with conventional forestry make it desirable that the time span between initial investment and positive cash flow should be as short as possible. Fortunately, the vigorous juvenile growing phase of some tree species, and the absence of any requirement on the quality both combine to make the concept of "short-rotation" forestry the most promising mode of biomass production. The ability of some species to regenerate from the cut stumps makes possible the subsequent harvesting over many rotations without the cost of re-planting. This production mode assumes very close spacings, application of fertilisers and cultivation techniques heretofore not considered in conventional forest management. Yields expected from such a regime are speculative, and better data must await the completion of ongoing R & D in this area. However results indicate that yields of 5 Tonnes of dry matter per acre per year can be expected from available species and techniques. A mid-term goal of 7.5 Tonnes per acre per year appears reasonable. To place this in the perspective of peat production, a biomass yield of about 10 Tonnes dry matter per acre per year would be required in order to match the cost of production of milled peat. Surveys have indicated that there could be up to three million acres of marginal land suitable for forestry biomass development in Ireland. Using the potential yield figure of 5 Tonnes of dry matter per acre, per year, and average calorific equivalence of 0.4 Tonnes of oil — equivalent per tonne of dry matter indicates a potential annual...
energy contribution of 6 million tonnes oil equivalent i.e. comparable with our total primary energy consumption in 1973!

**Conversion Processes**

The ultimate destiny of any fuel is to be converted to energy, either directly to heat energy, or by a series of steps, to electrical and mechanical energy. Some processes (e.g. the internal combustion engine) demand a fuel in liquid or gaseous form. Gasification and liquefaction of solid fuels are known technologies, and the production of liquid fuels and gas from biomass will require only adaptation of existing designs. It is probable that direct heat requirements in the domestic, industrial and institutional sectors would absorb all the biomass fuel which we could produce. Liquid fuels will certainly be necessary, but since we shall always have to import some fuel it might be more reasonable either to import our liquid fuels or import coal for liquefaction and gasification.

Biomass could be used in smaller installations — domestic cookers and space heaters, large central heating installations and medium-sized industrial boilers. One reason for this is that biomass is an inherently non-polluting fuel, containing little ash and negligible sulphur, and could therefore safely be used in small installations where expensive pollutant-suppressing plant would be inappropriate. The technology of burning peat fuel in large installations is already fairly well developed, and since the chemical properties of biomass differ only in a minor degree from those of turf, it could be used in plants of similar design.

All this is not to preclude liquefaction and gasification indefinitely. Yields may ultimately be such that there is biomass to spare for such processes. In the meantime, direct combustion would appear to be not only the easiest, but also the most useful route. An exception to this is wet biomass such as animal waste, which will not burn but which can be partially converted to liquid or gaseous fuels (alcohol and methane) by fermentation or microbial digestion. The contribution from this area would be small, but useful.

**Can we get there from here?**

The principal uncertainties underlying the development of biomass for energy are: 1. Can adequate biomass yields be sustained to justify the cost of investment? 2. What are the factors limiting land availability? 3. What are the factors which will influence the existence of a market for biomass fuel?

A national programme of research, development and demonstration is now in progress, which will provide information on these uncertainties. This programme has involved An Foras Taluntais, Bord na Mona, The Forest and Wildlife Service, the E.S.B. and the National Board for Science and Technology in sectoral research activities in the production and combustion of forestry biomass. The biomass will be produced on about 1500 acres of short-rotation forestry, and will also include the utilisation of conventional forestry residues. The biomass will be used in a special-purpose boiler and an output of about 5 MW is expected, based on comparable system load factors.

**Conclusion**

An important part of the national response to future costs and unavailability of conventional energy sources is the development of those renewable energy sources which indicate the potential for economic exploitation. Forestry Biomass Conversion offers such potential, and a national programme has been initiated which will permit the evaluation of this resource, and which will illuminate the consequences of the implementation of this technology.

The author is grateful to Mr. F. Lunny, Consultant with the National Board for Science and Technology for his assistance in the section on Conversion Processes.

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**Fig. 2. Possible Distribution of Biomass Energy Sources**

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A section of the audience at the Biomass Energy Conference, held at the Irish Management Institute.
### Pressurised

<table>
<thead>
<tr>
<th>Model</th>
<th>Rating Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>R4</td>
<td>524,000 Btuh to 1,280,000 Btuh</td>
</tr>
<tr>
<td>R5</td>
<td>1,440,000 Btuh to 2,840,000 Btuh</td>
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</table>

### Natural Draught

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<th>Rating Range</th>
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<tbody>
<tr>
<td>P4</td>
<td>560,000 Btuh to 1,328,000 Btuh</td>
</tr>
<tr>
<td>P5</td>
<td>1,336,000 Btuh to 2,328,000 Btuh</td>
</tr>
</tbody>
</table>

### Multifuel

- **Oil:** Gas: Solid Fuel

<table>
<thead>
<tr>
<th>Model</th>
<th>Rating Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4</td>
<td>420,000 Btuh to 896,000 Btuh</td>
</tr>
<tr>
<td>M5</td>
<td>780,000 Btuh to 1,480,000 Btuh</td>
</tr>
</tbody>
</table>

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