

Lewis & Hole Limited Dudbridge Foundry Stroud

By Christopher D Hole

The concept of Lewis and Hole Ltd. began during the time of the second world war. My father, Sidney Charles Hole and his two colleagues - brothers Jack and Lawrence Lewis decided that once the war was over with and my father became demobilised, having served his time in the Medical Corp. in the RAF, that they would start up their own foundry. They had, previously to the outbreak of the war, served an apprenticeship at Martyns foundry in Cheltenham, a foundry specialising in the art form e.g. statuettes and architectural works: highly skilled work, such castings sometimes individually taking many months to produce owing to the intricacies and complications of the work concerned. Lawrence Lewis remained working in Martyns during the war, my father because of his medical knowledge was called up. Martyns foundry finished trading many years ago. The idea was to carry on with the same type of work and the new team began to look around for suitable premises.

At that time there was, it seems, a plethora of empty premises formerly of the wool trade in the Stroud Valleys, and so it was in this area that they paid particular attention in their quest. They eventually decided to buy some premises next to the Brimscombe Meadow football field from a dapper gentleman who I recall frequently wore a bow tie and whose name was Jack Cousins. The Deeds and Memorandum were drawn up on August 14th 1946 and the foundry was to be called Lewis and Hole Limited, Lower Mills Foundry, Brimscombe. I remember the original sign, painted black with the lettering in gold, proudly advertising the fact that they were 'Art Metal Craftsmen'.

Immediately after the war things were difficult particularly with regard to starting up a business. Mr Jack Lewis regrettably died very early in the company's history. Just after the war the Cheltenham firm of Spirax Sarco was started and they required engineering castings for their new range of steam traps. Mr. Stanley Haines, one of the founder members of Spirax Sarco, approached Lewis and Hole with regard to the supply of castings. The enquiry meant a deviation from the foundry's originally intended path but soon trading began between the two companies and before long, Spirax Sarco began to grow progressively which meant that Spirax's requirement for castings also increased. The extra demand placed constraints on the foundry in its early days. Spirax recognised this, and because of the growing dependency for quality castings, provided Lewis & Hole with a financial loan to help it expand, in fact to more than double its size. When I joined the company at the age of 24 after the completion of my 2 years' National Service in October 1961 it employed 20 people and more than 90% of its production consisted of castings of a pressure type, e.g. valves, pump bodies, strainer bodies, caps and flanges, all requiring a strong homogeneous pressure tight wall, Spirax Sarco being by far its largest customer. Indirectly, the majority of its castings ultimately were exported to many parts of the globe.

At this time the foundry's melting plant consisted of a coke fired cupolette capable of melting 15 cwt. of molten cast iron an hour. The furnace was used alternate days and was hinged halfway up so that any relining work following burnback from the previous day's cast could

be carried out by means of the furnace operator bending over the hinged section in order to reach inside the furnace to carry out the necessary patching. The cupola was incorporated within a metal plated staging structure measuring some nine feet square and the operator would stand on this and would feed the appropriate amounts of coke and cast iron scrap metal by means of a large wide hand fork directly into the top of the furnace having previously wheel barrowed the coke some 60 yards from around the corner. The scrap iron and pig iron always had to be weighed before being physically thrown into the furnace top in order to obtain the correct metal to coke ratios. The furnace man on the foundry floor would tap out the molten metal when available, into a hand shank whereby two men on either end would carry molten metal to the respective mould and pour the metal in; alternatively, up to 5 cwt of molten metal could be poured and then transported by means of an overhead, totally manually operated, crane spanning some 15 feet and traversing the 40 foot length of the foundry moulding shop.

The office was previously an old garden shed measuring some 12 feet by 9 feet lying close to the main foundry door. It housed one telephone and it was deemed, in those days, not to be too much of an inconvenience to nip across from the foundry shop floor in order to answer the infrequent caller, I recall that my first job on joining the company was to reclad the office roof with felt in order to make it completely waterproof. During the latter days of 1961 Lewis and Hole began to get progressively busy - I suggested that perhaps we should cast every day instead of alternate, this was met with a certain amount of incredulity, nevertheless it was agreed to take this unusual and bold step once the inherent problems had been 'ironed out'. Gradually more staff were employed and longer overtime worked and despite the arduous nature of the work much joviality and tom foolery would take place in the shower rooms after casting. In those days the men would sing and whistle and joke whilst they worked, time somehow did not seem to matter quite so much, more particularly, to do a good job and not to be absent from work. Team work whilst casting would be carried out with the integration of skills aided by a quiet, definite command, a nod or a movement of the hand all under the watchful eye of the foundry foreman Mr. Keith Rogers, a foundry man through and through. Job satisfaction was prevalent without the same sort of pressures of current day working practices. It has always been my experience that the foundry man like the miner respected fully the potential dangers of his work, moving heavy objects and dealing with liquid metal, the men seemed to like dealing with the elements earth (sand), fire and water and the particular rapport that this seemed to engender.

By 1965 serious pressures were becoming apparent regarding our meeting of production schedules. Because we were melting for longer periods the cupolette began to suffer - it began to distort with the heat and frequently its outer skin would glow red hot and would sometimes have to be hosed down with water in order to prevent it from localised melting. Even so patches welded on was not entirely an unknown event. Around 1965, I learnt of the Dudbridge site being put on the market... it was huge in comparison to the Brimscombe site amounting to some 17,000 square feet. I was very active in pursuing and convincing my Directors that we should relocate in order to alleviate our production restrictions. After much deliberation and fuelled by my ambitions the decision to relocate was made. The Dudbridge site had mainly previously been occupied by The Whitfield Engineering Co who had rented out part of their building complex to Bloodworth Foundry - a small family foundry that had capacity to melt 2 to 3 tons per hour, as such they would melt cumulatively once or twice a week. A great deal of work had to be done before we could physically move. I remember that the old machine shop was full of antiquated machinery most of belt driven via pulleys. Such

machinery had little commercial value and so it was subsequently broken up for scrap and remelting in our own melting plant. I recall that it was excellent close grain iron. Some large wooden sheds in the front yard were renovated as offices and I myself was heavily involved with this, I recall only pausing for Christmas Day and to be back at work on Boxing Day.

We eventually moved, finishing casting at Brimscombe on a Friday and starting casting at the Dudbridge site on the Monday, such was the commitment to continuity. In 1972 my father died unexpectedly at the age of 59 and until that time I had spent the majority of my time working alongside the men in the foundry. Mr. Lewis who had been Joint Managing Director with my father said "I think you had better come over to the office... and from that time on I became fully engrossed with office activities. We quickly became involved with computers, causing much intrigue with visiting travelling representatives, some of whom had not seen a computer before. We were one of the first foundries to incorporate a computerised costing and estimating suite for the calculation of casting prices and weights and updating of our pricing and sales records - this was a derivative of the British Cast Iron Association (BCIRA).

I soon became a Director of the company and when the opportunity took place for the purchase of the Pye Transport warehouse immediately adjacent to the foundry I was instrumental in its acquisition; the company was already once again bulging at the seams and the extra 17,500 square feet available meant that effectively the foundry building footprint area would be doubled. The acquisition took place in 1976 just at the time when the government of the day by means of the Department of Trade and Industry (D.T.I.) encouraged industry to expand and modernise and the carrot it waved at the time was a series of strictly controlled grants. Such grants were particularly aimed at foundries who the D.T.I. felt needed 'to get ready for the next boom'.

At more or less at the same time the Bridge Inn and numbers 1 to 4 of Bridge cottages lying next to the Bridge Inn, and both separated from the foundry at that time by the River Frome, came on the market - such an opportunity I felt would only come once and so the additional property was purchased by the foundry. The foundry plan had to be completely revised to take advantage of the additional space, there were so very many permutations but at 3.00 am one night a plan came suddenly into my mind that seemed to work and so I got out of bed and drew up the 'master plan', took it to work the next morning, showed it to my immediate staff who all thought that it was just what we wanted as it took into account anticipation of future working practices.

In 1979 the final piece of the Lewis and Hole expansion and modernisation scheme slotted into place, namely that of our two new 5 tonne per hour coke fired cupolas complete with their weighing and charging arrangements and spark arrester systems. They were the highest profile of the foundry layout and on a windy day if one climbed up the various ladder and staging areas to the highest point (at about 60 feet) one could feel the whole structure very gently swaying in the wind, enormously heavy though they were, (this was a design feature of the construction), widespread bird's eye views could be enjoyed from this vantage point.

The cupolas were of the very latest design of the day, equipped with oxygen enrichment incorporating twin divided blast units for maximum efficiency. The majority of foundries operated their cupolas in pairs, the principle of working being that during the day's cast the lining of the cupola would be burnt back towards the 9" firebricks that lined the steel tube or outer wall of the furnace and whilst such relining and patching was being carried out on the

following day the second adjacent cupola would be fired early in the morning ready to commence its melting program just before midday. The patching of the cupola would be carried out by the furnace man who would climb up a series of ladders inside the cupola shell (by that time sufficiently cooled) applying gunning newcrete to the furnace walls as required using a heavy pressurised gun joined by a large pipe to the mixing vessel way below him.

The timing of their commission was due to take place immediately after our two week summer shutdown i.e. following the first week in August 1979 and up until that time we had been very busy indeed but now instead of the boon time that the government had promised we found that our sales, seemingly overnight, became only a fraction of what we had previously enjoyed - and what we needed... interest rates shot up to around 18% and we were left with a high borrowing facility. Our cash flow deteriorated as our customer's payments slowed even more. This was the start of the worst recession the trade had experienced since the war. It occurred frighteningly quickly with very little notice. It has been said that the foundry industry could often be looked upon as being the barometer of a manufacturing slow down and if we were to survive, very drastic 'battening down of the hatches' had to take place. As the recession bit harder, foundries began to close down at the rate of two a week for the next two years at least. We had our first experience of making redundancies - a very worrying and traumatic time indeed. By this time I was Managing Director and I had to make many very decisive decisions. We had so little work that it was uneconomic to run the cupolas with any less than 30 - five cwt. charges and so it meant that our furnace utilisation only took place once or twice a week (beforehand we had been melting every day at the rate of 70 to 80 charges per day). The company balance sheet became a nightmare but our anxious bank remained loyal to us and we survived... but so very many did not. It was especially important at this time that we kept our heads. I levelled with the men explaining our position and I could not have asked for a better response. Owing to the type of foundry that we were there were different production areas requiring specialised skills. Not all such areas had the same amount of work at any one time and so in order to keep men engaged they were asked to move from their own established working area to that of another where maybe it was less inviting to do so but the co-operation was always there. We had dispensed with unions some years before as it was my philosophy that we should be able to iron out any difficulties amongst ourselves quickly and fairly and so a number of works representatives were incorporated from different areas of the foundry and the whole thing seemed to work rather well particularly during difficult times. The grapevine of course was always active, one of the men might have heard a visiting lorry driver with 20 tonnes of furnace coke on board of how he had been diverted to us as the foundry he had originally been en-route to had suddenly gone out of business, and through such similar examples they would hear of redundancies, short time working and closures.

Sometimes we had to quickly re-source our foundry requisites due to closures of established suppliers. Things eventually and gradually began to pick up so that by 1986 we began to establish record sales. Through all the time of the recession we kept all of our customers, (except those unfortunate enough to go out of business). It would have been easy for them to bend to the carrot of lower prices as foundry representatives became desperate to 'buy' work. In 1985 we had recognised that in the future quality would be paramount and we decided to aim for the then quite new quality standard namely that of BS 5750 part 2. It involved a change in attitude and thinking with entirely new working concepts and procedures to follow and maintain. We attained its accreditation at the first attempt during 1987 and we were one of the very first foundries (of some 400 nation-wide) to obtain such certification. We became firmly established as a quality foundry. Each succeeding year we were inspected periodically in order

for us to keep our certificate - which we did successfully. We had a comprehensive metallurgy department able to carry out its own in house testing - test bars could be pulled to BS Standards, metals could be analysed and molecular structures ascertained and the appropriate certification of grades supplied to the customer could be documented and filed.

During 1989 we exceeded £2.5 million turnover and employed 79 staff in total but soon we were to hit the next recession and we had to call upon our experience of the previous recession and again to make cut-backs with our staffing levels. Early in 1991 we were approached by speculators who considered the island site (5.5 acres) of which Lewis and Hole comprised of 2.4 acres as ideal as a site for a future food retail chain. At first I was not interested but eventually I considered that it might well be a chance not to be missed - we had relocated once before and perhaps this might be our chance to relocate once again creating a modern foundry fit for the next millennium - a foundry by which others could continue to look up to. With the increasing legislation appertaining to the Environmental Protection Act 1990 as well as the Health and Safety at Work Act and associated Factory Acts getting tougher each year it meant that foundries generally had to budget more and more not only for the actual purchasing of associated environmental plant and equipment but the ongoing cost of maintaining and running such equipment much of it, like so much foundry plant, self destructive in a relatively short space of time. By this time it was necessary to obtain the equivalent of a licence to run the foundry on an annual basis with the local authority. Foundries were having to conform with increasing pressures environmentally related and being involved with a very competitive trade balance sheets were becoming adversely affected nationally. We were also aware that our cupolas, new in 1979, would soon need extensive renovation work which would not necessarily be cost effective. The answer was to change our melting practices now that new technology had come to the aid of electric furnace design enabling electric furnaces to be cleaner, with fast melting rates, and far better efficiencies and reliability - but such furnaces were expensive. It seemed to us at the time that the high ongoing cost of maintaining a modern foundry could be best funded by selling what was obviously a site ripe for re-development and relocating to a site within a 5 mile radius of our Dudbridge site. And so the die was cast and Lewis and Hole entered into an agreement with a food retail organisation whereby an option to buy was contracted for giving the foundry 9 months to move once the option was exercised. Unfortunately, as a result of much adverse publicity mainly by the local press, and planning complications with the retail organisation, it was not until August 1995 that the option entered into was finally exercised which meant that at last we could now earnestly look for an alternate site. 10 sites were looked at, three of them seriously. But it seems that ultimately no-one wanted a foundry for a neighbour and frustratingly, we ran out of time in a year in which we were to have celebrated our 50th anniversary. We were also very busy with a strong balance sheet. Many memories remain but what shines through most of all is the memory of a fine work force with whom it was my great privilege to work and to know, the glow of molten metal on whitewashed walls and character faces, the pride in our products and the fine reputation that together we had built up. As the epitaph heading of one newspaper said - "The end of an era as foundry closes... Artistic lure of honest toil..." From a 20 tonne lorry load of scrap metal tipped onto our back yard in a matter of a few days such metal became transformed into a multitude of accurate three dimensional shapes some of them individually more than a tonne in weight, meeting the exact dimensional tolerances an engineering drawing would dictate, with the right molecular structure and specific grade, despatched on time, destined sometimes to ultimately reach the far corners of the earth. There were 45 of us at the end ...

Appendix

Operational Facilities

The foundry was very versatile in what it could produce. The various production areas were basically self sufficient and operated as self run independent cost centres:

1. Shell Department

Comprising of both mould and core making facilities.

(a) Moulding facilities:

The cycle of each station took 3.14 minutes to produce 2 set (1 set equating to two mould halves, top and bottom) in shell sand. Shell sand was of a very fine dried consistency usually for most applications of 3 to 5% resin content. Such sand would be delivered by road tanker in 15 to 20 tonne lots, blown into 30 tonne capacity silos, the sand being previously graded, washed, dried and cooled. The working principle was that when such sand was subjected to heat, via the gas jets of the machine, the resin content in the sand would bond the sand grains together. The moulds were ejected off the gas-heated pattern plate once the sand had solidified whereupon the mould would be placed into a pin closure in order to aid the cementation of the applied glue to the mould mating surfaces (the moulds would still be hot at this juncture thereby aiding cementation). At this particular stage, any cores as necessary would be incorporated (by hand) into the moulds. Each work station could work independently of the other. A total of 320 moulds per day could be produced from each machine. The finished moulds would then be taken to the appropriate moulding area in the foundry, usually in large metal bins on 5000 lb. lift diesel fork lift trucks ready for their next stage. Usually a separate shell sand pouring cup or funnel, in order to assist the placing of metal into the mould, would be carefully pushed into the mould ingot and the shell moulds would be placed on long tracks with dry sand beds ready to accept metal from the pouring ladle. The resin in the sand mould would gradually break down on reaction from the heat of the poured metal having the effect of dissolving the once rigid mould. Once cooled, the castings in these moulds could then be extrapolated from the mould and then be bulk delivered to the fettling shop where any shot blasting and/or fettling as required could take place, prior to inspection and despatch. Castings produced by this method conformed greatly to drawing tolerances and dimensions and aesthetically the castings had surface finishes similar to castings produced by the Investment Process. Such shell castings could be produced in large quantities relatively quickly and conform to drawing to a large extent. Shell pattern equipment (usually in cast iron and fully machined all over) took a long time to produce relatively speaking and consequently was expensive. For this method of production to be viable quite large numbers off would be required ideally being kept on the moulding machine for several days, the minimum being 1 day's production. Castings produced by this method consisted of 33% of the foundry's ferrous production.

(b) Croaking facilities:

Various croaking machines were employed so that a multitude of core sizes could be produced dependant on the restrictions of the core plate size to which they would be attached and the consequent number of core boxes that could be accommodated on the core plate. Each core-blow would take about 3 minutes to produce from one to a multiple of cores dependant on the number of core impressions involved. Generally, the cores would be hollow, of thin walled construction but strong. Natural venting owing to the hollow construction was a definite advantage. Shell core boxes, fully machined, would have been generally made of cast

iron and would have a long working life. Shell cores would have an almost indefinite shelf life and would be impermeable to moisture and water.

2. Floor Moulded Section

Comprising of both mould and core making facilities.

(a) Moulding section:

Both facilities requiring craft skills. Types of castings varied greatly in size and complexity. Maximum weights up to 1.5 tonnes could be accommodated and as small as 1 kg. Quantities were usually small and could definitely be classed as jobbing work. Moulds were usually made in a resin bonded sand of the formaldehyde type where dried and cooled Chelfont Sand would have been mixed in a troughed screw mixer with specific amounts of resin just prior to the sand being fed onto the pattern within the mould. Such sand would air harden in a matter of minutes to a degree that was self supporting to the extent that when a mould was turned on its journals carried by a lifting beam by means of the overhead crane, the sand would remain absolutely intact and would therefore retain the intricacies of the pattern impression.

(b) Core making:

Cores were usually made in a resin bonded sand of the formaldehyde type or of the lesser used CO₂ process where sodium silicate was mixed with dried and cooled Chelfont Sand in a mixer following which CO₂ gas could randomly be passed through the mixed sand by means of a timed process. This effectively hardened the sand in both methods so that the retained shape could be self supporting.

In both the mould and core making departments, following the pouring of the molten metal into the mould, once the metal had solidified and had cooled (usually the day following the day of casting) the sand would be 'knocked out' of the mould and the sand would then be put through a grading reclamation process and would be pumped up to and into 30 tonne capacity silos whereupon it would be mixed with 10% of new sand prior to the whole process of sand distribution being repeated.

3. Machine Moulded section

Comprising of 4 'jolt squeeze' air-operated moulding machines working in pairs, each pair dealing separately with the cope and drag moulds. The section was self-supporting with its own metal pouring KBK distribution system. Some 300 moulds per working day could be accommodated on this section, the mould sizes being mainly 16" x 12" with some 16" x 14" and a few 18" x 16". The section was equipped with its own knock-out and reclamation system and able to redistribute reworked sand to hoppers adjacent to the moulding machines for the operator to fill the waiting moulds boxes on the moulding machines. The sand was basically a quarried red sand from the Midlands area, a sand with a natural clay content, essential for the moulding process. The sand would have a moisture content of approximate 3% sufficient for the necessary sand 'green strength' when the mould was ejected from the pattern plate on the moulding machine, in order for it to maintain its pattern form prior to the pouring of the molten metal. Up to 5 men would work the system accounting for the whole process of moulding, coring-up, metal pouring and knock-out followed by sand reclamation.

4. Non Ferrous section

Comprising of a floor moulded section making bronze castings up to about a 1/4 of a tonne in weight. Metal was melted by means of two oil fired tilting furnaces each capable of melting

600 lb. of Bronze or 200 lb. of Aluminium. Such metal would originally have been supplied in ingot form.

Metal range:

Ferrous - Cast Iron, grades 12, 14, 17 and 20 all to BS 1452 SG Spheroidal Graphite) Iron, grade 420/12

Non-ferrous - Gunmetal, grades LG2C, LG4 to BS 1400 Aluminium, grades LM4 and LM6 to BS 1420

5. Pattern Shop

A Master Pattern Shop employing 3 skilled craftsmen. All types of wooden pattern equipment was produced. Some metal pattern equipment was also produced where there was a requirement for repetition work.

6. Laboratory

Analysis of materials could be carried out and authenticated Certificates of Conformity issued on the basis of metallurgical tests.