

A PLACE TO PUT YOUR PINT. EXCAVATION OF THE BENNETT & SONS IRON FOUNDRY, ARDWICK, MANCHESTER.

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Abstract

The work involved in the manufacture of the Victorian pub furniture with which we are so familiar is not often recognised. This article examines the documentary evidence and physical remains of the Bennett & Sons Iron Foundry in the Ardwick area of Manchester that were subject to detailed excavation in 2023. Well-regarded producers of cast-iron furniture and fireplaces for commercial premises, Bennett & Sons utilised the sand-casting method to create ornate designs that were registered and traded under the acronym “BICLAM” (Bennett’s Iron Company Limited Ardwick Manchester). Archaeological investigations by Cura Terrae in advance of development of the area by Kellen Homes exposed well-preserved remains of the foundry building and recovered an accompanying finds assemblage, which provides a unique window into the processes involved in decorative cast-iron production in late 19th- and early 20th-century Manchester.

Introduction

The site of the Bennett & Sons Iron Foundry (centred on NGR SJ 86197 97047) is located on land to the north of Hyde Road in Ardwick, situated on the south-eastern fringe of Manchester city centre (Figure 1). The site was, until recently, occupied by a freight container yard, and has been subject to archaeological investigation to support a planning application for residential development. In the first instance, a series of trial trenches that targeted the footprint of the foundry buildings visible on late 19th-century Ordnance Survey maps and exposed significant remains deemed of sufficient importance by the Greater Manchester Archaeological Advisory Service (GMAAS) and Manchester City Council to merit further archaeological excavation of the full footprint of the foundry.

The excavation area was defined by the perimeter of the iron foundry building, as depicted on Ordnance Survey maps dating between c.1888 and 1915 (Figure 2). Over the course of four weeks during February and March 2023, the entire footprint of the building was exposed by machine with hand excavation conducted by a team of archaeologists. The principal aim was

to understand the internal layout of the foundry and recover any finds that could provide an understanding of the function of different areas of the building. It was clear that all machinery and items of value had been removed from the building prior to its demolition, leaving only empty machine bases, engine beds and truncated platforms to help elucidate methods of production employed at the site and the flow of this work in the foundry. Nevertheless, identifiable structural remains included bases for two furnaces; a cupola furnace and an air furnace with waste-heat boilers, a small furnace for smelting bronze/brass, the setting for a Cornish boiler and associated steam engine, two separate moulding shops and a large central area with rows of brick platforms, which held machinery to clean and finish the iron castings.

Notable artefacts recovered from the remains of the foundry included an assemblage of files for finishing, a two-person saw, ceramic tiles for the decoration of fireplace ‘cheeks’, marble offcuts, fragments of ornate terracotta forms for casting, and examples of fireplace backs and assorted refractory ceramic components.

Bennett’s Iron Foundry is currently a unique example of an excavated ornamental cast-iron foundry in the region, therefore little other evidence of this type of industry exists locally. However, knowledge of other contemporary Manchester-based foundries, when considered in conjunction with the evidence from the current work, has helped form an understanding of production zones and process flow at Bennett’s Foundry.

Historical background and context. Who was J.M. Bennett?

The company of J.M. Bennett & Sons was established in 1879 by the former Lord Mayor of Manchester (1863-65), John Marsland Bennett, who had prior investments in the timber and quarrying industries. In 1869, Alderman Bennett purchased the lands of ‘Upper and Lower Ardwick’ and began a programme of industrial and residential development centred on the land to the north of Hyde Road. This area was situated at the junction of the Manchester and Sheffield Railway, and the London and North Western Railway, a prime location for industrial manufacturers to take advantage of the rail infrastructure. The company’s foundry, seemingly together with a saw mill on the opposite side of the London and North Western Railway, were established c.1879 and became the latest addition to an area already booming with iron production, notably the substantial operations at the Gorton Foundry and Union Iron Works, which produced steam locomotives and machinery for the region’s ubiquitous cotton mills. The foundry was established next to W. & J. Galloway’s boiler works, which had opened in 1872

one of Manchester's leading firms of boiler makers and mechanical engineering. J.M. Bennett & Sons placed a notice in a local newspaper in March 1881 advertising the sale of seasoned timber for machinery from their saw mill together with builders' ironwork, grates, ranges and other castings from the foundry.¹

By 1894, Bennett & Sons had established their offices, a sawmill and a timber yard, and potentially a "new" iron foundry, all with associated sidings linking to the mainline rail networks. A series of streets (including the eponymous Bennett Street) and rows of terraced housing for workers were established by the Bennett family to the south of the industrial premises, as well as St. Benedict's Church, designed and built by architect Joseph Stretch Crowther and consecrated in 1880.

In addition to the two iron foundry buildings to the north of Bennett Street, Bennett & Sons established a third foundry in Heaton Moor, Stockport in 1906, 'to meet the increased demand for Light Castings', which also had associated rail infrastructure linking it to the London and North Western Railway.²

The company traded under the acronym "BICLAM", standing for Bennett's Iron Company Limited Ardwick Manchester and was evidently successful, being invited to exhibit at the Royal Jubilee exhibition, held in Old Trafford, Manchester in 1887. On display was a cast-iron Altar-piece and cast-iron High Altar-piece, showcasing Cast Ironwork and Enamelling technologies of the time.³ A 'Catalogue of Biclams Cast Iron Tables...Also Seats' published in 1897, suggests the focus of the business was producing decorative furniture for commercial premises (Figure 3).⁴

The original iron foundry building fell out of use in around 1906, when 'about 10,000 square yards [of land] now occupied by Messrs Bennett's Iron Foundry Co' was offered for let.⁵ The impending disuse of the foundry implied by the advertisement is corroborated by its absence on the Ordnance Survey map of 1915 to 1921. Operations had perhaps moved to the newest foundry in Heaton Moor from 1906, where production continued until the 1960s. The business was sold by the family c.1930, but production continued under the Bennett name as Bennett's Ironfoundry Co. Ltd until its closure.

Excavation Results

Remains pre-dating the Bennett & Sons iron foundry

Prior to the concentrated industrial development of Ardwick during the second part of the 19th century and construction of the Bennett & Sons Foundry, the site was occupied by a large plot labelled as 'Burgess Villa'. Entries in a register of private baptisms (1843-92) performed in the parish of St Silas, Ardwick, list William and Mary Rostron as residents of '7 Burgess Villa, Hyde Road', indicating that Burgess Villa was likely a block of terraced houses.⁶ This interpretation is supported by the division of land to the rear of the building into linear plots with outbuildings, as depicted on the Ordnance Survey map of 1848. An ornamental garden, potentially with an orchard, was appended to the southern side and an access track connected the residence to Hyde Road. Burgess Villa sat between two open branches of the Corn Brook, a watercourse that originated in Gorton, to the east of the site, and followed a meandering course to the west, through Chorlton and Hulme before discharging into the River Irwell. The land around Burgess Villa was given over to fields, with the beginnings of industry in the form of brick fields to the north and an agglomeration of chemical, bleach and dye works in Gorton, to the east.

The remains of this pre-industrial landscape were exposed during excavations in the form of levelled midden and ash heaps beneath the foundry, which included datable material that could tie their origin to the first half of the 19th century. These refuse deposits were sealed by a layer of yellow clay into which the foundations for the Bennett & Sons foundry building were cut, suggesting the land was prepared in advance of foundry construction. No structural evidence of the Burgess Villa survived; however, the dating of the refuse deposits coupled with census and baptism records indicates that demolition most likely occurred after 1868, around the time the land was purchased by J.M. Bennett.

Prior to the construction of the foundry building, the open course of Corn Brook was culverted. The brick vault of the culvert was revealed beneath the southern corner of the foundry during excavation (Figure 4). Plans for further diversion of Corn Brook, dated 1894, are held in Manchester Central library and demonstrate a semi-circular cross section, 2.7m in diameter

and 1.8m high, with a vault of red brick and paving of blue brick.⁷ It may be assumed that the span encountered under the Bennett & Sons foundry was similarly constructed.

The Bennett & Sons Iron Foundry

The excavated foundry building was roughly trapezoidal in plan, with square extensions to the north and the north-west and measured approximately 66m by 58m. It was orientated north-west to south-east, parallel to the viaduct of the Crewe and Manchester line of the London and North Western Railway, and had accompanying sidings which connected to the Manchester Sheffield & Lincolnshire Railway mainline to the north. The excavated remains corresponded accurately with the outline of the structure depicted on the Ordnance Survey map of 1888-1889. The later 1905 survey shows the enclosure of a larger area around the original building, particularly the area to the south-west, towards the railway viaduct. No evidence for the extension of the original footprint of the foundry building was encountered during the excavation, the areas around the presumed outer walls being paved with stone setts. It is plausible that the enlarged plot refers to outer wall lines defining the plot, which includes open, external areas, such as goods yards.

Within the building, two north-west to south-east load bearing walls (*1104* and *1215*) divided the internal footprint into three distinct ranges (Figure 5). The construction of walls *1104* and *1215* included brick piers with deep foundations, which presumably supported the roof. The piers were connected by partition walls of less substantial brick construction, with the coursing often footed directly upon compacted earthen surfaces. This may perhaps have been intentional, to allow easy reconfiguration of the internal layout of parts of the foundry. However, no evidence survived to suggest the internal area had been remodelled during the life of the building.

All the walls of the iron foundry were constructed of unfrogged and unstamped red brick, typically bonded with hard, dark-grey mortar. The bricks were undoubtedly locally produced; several brick fields and brick works, including large operations at Openshaw, were active in the locality and predominant on Ordnance Survey maps of the period.

The iron foundry appeared to be divided into eight distinct Areas (A–H). Each area represented a distinct process zone, and they are presented below to reflect process flow within the foundry.

Area A

Area A was a large, rectangular space in the southern corner of the foundry building. No floor surfaces or internal features survived within its confines, although stubs of perpendicular walls were evident which indicated the area had once been subdivided.

A large, ceramic drain measuring 0.6m in diameter ran along the inner face of each of the north-west/south-east walls. Brick buttresses positioned along the walls housed downpipes which fed into the drains, which then emptied into the Corn Brook culvert which ran below the southern corner of the foundry building.

To the south of Area A, and beyond what appeared to be an external wall, was a surface of square, stone setts paving what was potentially a goods yard. A branch of rail sidings is shown on the 1888-89 Ordnance Survey, looping around the footprint of the foundry building and terminating within this area, although this was not encountered during the excavation. An arch-shaped void and a series of square postholes potentially marked the location of removed machinery, possibly a crane, and an awning. A deposit of black, ashy material was removed from across the possible goods yard and was found to contain a large assemblage of refractory ceramics, primarily consisting of fire-backs, fire-cheeks and grate bases which would surround the grate within a fireplace.

Twenty-four distinct forms of these refractory ceramics were recovered from across the excavation area. All were made of the same yellow, gritty fireclay and were stamped with model numbers on the rear. A number of examples can be referenced to models depicted in the Bennetts literature, but the origin of their manufacture is at the current time undetermined.

Area B

Area B represented the main boiler house and was the site of a Cornish boiler and steam engine. A well-preserved brick platform, measuring 8m x 4m, was orientated north-east to south-west. Its base was slightly concave, potentially reflecting the tubular form of the boiler (Figure 6). A thick deposit of fine, grey ash was removed from the platform and contained four wedge-shaped chocks that would have acted as supports. A lower platform appended to the south-west was likely the charging platform where the boiler was fed and contained numerous fragments and handles from steel buckets. Two side-flues were excavated along the south-east edge of the boiler platform and a third flue, the “flame bed”, was observed running beneath its centre. The

flues connected to a chimney to the north-east of the platform. Excavation of deposits within the chimney revealed an accumulation of orange and grey ash lenses succeeded by a horizon of charcoal and a rubble deposit of crushed red brick and fire brick, potentially indicating a demolition event. Following the demolition of the chimney, the base had been capped with a surface of small stone setts (Figure 7).

The area to the north-west of the boiler platform had been heavily impacted by demolition of a modern office block. A square brick chamber, concave section of brickwork and a partial brick structure with small, rectangular chambers were all that could be discerned of a potential second boiler platform.

The smaller rectangular area to the south-east of the boiler platform was set at a lower level and measured 13m by 4m. It had a flagged floor and a large stone engine bed, 7m by 1m in size with anchor points for a steam engine. Around the engine bed was a surface made of loaf-shaped refractory fire-cheeks. Neither the tiles nor the engine bed displayed any signs of prolonged heat exposure, and it can be assumed that the tiles were repurposed as flooring for convenience, rather than necessity.

Area C

The boiler and steam engine would have powered machinery within the central range of the foundry (Area C), which comprised two large areas separated by a corridor.

To the north-west of the corridor was a large, rectangular space subdivided by brick walls into eight longitudinal bays, each c.1.5m wide. The areas between the bays had been infilled with a loose deposit of cinders/clinker that was up to 0.5m thick.

Two groups of rectangular brick bases were aligned along the bays to the west of the area and would have held belt-driven machinery connected to overhead line-shafting, powered by the neighbouring steam engine (Area B). All elements of machinery had been removed following decommissioning of the foundry, but it is likely the processes involved in the room included hammering, rolling, fettling and grinding. A large piece of iron, c.0.4m in length, with a square profile and rounded end, was found in association with one of the bases, which was potentially the end of a ram of a small steam hammer.

In the south-west corner of the room, a brick base was associated with a large block of sandstone, around which was a compacted floor surface of yellow clay (Figure 8). A sub-circular deposit of soot and ash had accumulated over the clay surface. A dump of three crucibles with adhesions of copper residue were recovered approximately 2m to the east and it is possible that this area was the site of a small furnace concerned with bronze/brass production.

The corridor to the south-east was long and narrow, accessed at its south-eastern corner and via a doorway mid-way along its north-western wall. Five pedestals, each consisting of two bricks, indicated that this room would have originally had a raised wooden floor concealing the course of an iron pipe and a cobble-capped drain. Overburden removed from the footprint of the room contained a substantial assemblage of decorated porcelain tiles, used to adorn ornate fire surrounds.

The majority of the tiles were transfer printed and were decorated with foliate, floral and figural motifs, many in a neo-classical or revival manner (Figure 9). A particular popular design was the Tudor rose, which was recorded in black, blue and sepia tones. Only one tile had a maker's mark of "E Smith & Co, Coalville", which can be dated to between 1883 and 1895. An embossed, glass-glazed tile was potentially produced by Malkin Edge & Co, active in Burslem, Stoke-on-Trent from 1870-1902.⁸

In addition to the porcelain tiles, thirteen fragments of terracotta forms were recovered from the corridor (Figure 10). Of the fragments that retained their designs, most are of a neo-classical ribbon-and-bouquet design with a single example depicting ivy leaves. These forms had the designs executed in raised relief and would be pressed into sand to create negative impressions into which molten iron was then poured as part of the sand-casting method. This technique was pivotal in producing the detailed cast-ironwork synonymous with BICLAM furniture.

A large open area measuring 16m by 12m was situated to the south-east of the corridor, which had been infilled with large fragments of slag, likely resulting from the levelling of nearby slag heaps following the demolition of the foundry. Removal of the slag deposit revealed a compacted earth floor surface and the vestiges of a brick wall running north-east to south-west, indicating that the area had previously been partitioned, prior to being infilled by foundry waste. Several fragments of decorative sandstone were recovered from the overburden, including three with rounded corners suggestive of a door jamb, along with a substantial

assemblage of painted window glass which likely originated from the façade of the building, suggesting the entrance to the foundry was located in the vicinity.

Areas D and E

The north-east range of the foundry building was dominated by a large rectangular area, c.20m by 11m, which had been infilled by a deposit of fine, bright orange sand. Deep sand beds are generally indicative of a foundry's moulding shop (7) and it may be assumed that this was the case here, although all evidence for casting pits and moulding frames had been removed.⁹ The sand-casting process was widely used in the production of ornamental cast iron products and would have utilised moulds and forms such as those recovered from the central corridor to cast intricate elements of the designs.

Appended to the northern corner of the moulding shop was an L-shaped room (Area E) as depicted on the 1888-89 Ordnance Survey map, which contained an interconnecting firebrick flue system that may have belonged to an air furnace and series of waste heat boilers to power a steam engine (Figure 11). An iron shutter was recorded between two of the interconnecting flues which would have been utilised to control the flow of gases. A flagged stone floor to the south-east of the furnace was coated with concretions of slag. The only find to be encountered around the furnace were fragments of an iron flywheel with a diameter of 0.91m.

The area directly to the south of the moulding shop was subdivided into three rooms. The southernmost was rectangular and would have been divided into four bays of unclear function. The central, square room was largely open plan, but housed a rectangular brick platform at its south-eastern corner with a square, central firebrick aperture and a broken sandstone slab, all surrounded by black burnt deposits. Adjoining the central room to the north-east was a triangular room with remnants of a heavily worn flagstone floor and a second firebrick structure, which comprised a square platform c.1m by 1m and a smaller square base c.0.5m by 0.5m with a central, circular aperture (Figure 12). Whilst Area E to the north of the moulding shop likely housed a large furnace for smelting significant quantities of cast iron, the rooms to the south potentially housed smaller crucible furnaces, represented by the firebrick bases, for the smelting of lesser quantities of metal, different metals such as bronze/brass or for enamel work on small, decorative components.

A second, triangular room to the south-east was potentially the location of a carpentry workshop. Removal of the rubble overburden across its footprint revealed an ashy deposit containing assemblage of wood-working tools including a large two-man cross cut saw and files of varying sizes and grades. Stone offcuts were also recovered from this area, including fragments of marble, which would have been offered as an alternative to wood for table-tops and mantles. Pieces of a stone grinding wheel were also recorded which could have been used in the fettling process, removing unwanted material from cast elements.

Area F

A large, rectangular area, marking the north-west extension of the foundry housed the path of a rail siding, as well as the potential site of a cupola furnace and second moulding shop.

Excavations exposed a 3m wide corridor along the north-west foundry wall that contained in situ wooden sleepers of the rail siding, shown running through the building on the 1888-89 Ordnance Survey map. The sleepers were preserved beneath a considerable deposit of slag and clinker, which also overlay a section of the north-west foundry wall where it had been intentionally dismantled, potentially to facilitate the removal of waste material and/or for ventilation.

To the south-east of the rail corridor was a rectangular room, 5m by 13m in area, which may have housed a cupola furnace (Figure 13). The surviving furnace structure consisted of brick platform 4m by 3m which had potentially been demarcated by a flue, indicated by a sunken deposit of firebrick rubble. A circular deposit of compacted, black ashy material had accumulated at the south-west end. In places, the structure survived to seven courses and the quantity of brick rubble removed during excavation indicated that it was originally substantial. A concrete slab was recorded at the south-east edge and a stone machine base with iron anchor points at the north-west. There is the potential that this housed blowing machinery which would facilitate air flow to the furnace.

A small, square sub-room with a flagged stone floor was located to the north of the furnace and had a doorway opening onto the rail corridor. A large, concrete base with anchor points at each corner potentially housed a crane for offloading raw materials, likely metals and coal/coke for the furnace which would be stored in the neighbouring sub-room.

The wider area making up the remainder of Area F was largely devoid of features, barring iron service pipes and drains. The entire area was overlain by a deposit of soot and slag from which a failed iron casting was recovered, suggesting that this open space to the south-east of the potential furnace had functioned as a second moulding shop, although lacking a sand bed. The casting was of a circular boss, with a domed profile and flared outer edge, decorated with a recessed tear-drop motif and topped with a flat, circular finial.

Area G

Area G included features in an area directly to the south of Area F and appended to the north-west corner of the boiler house (Area B). The area had experienced significant truncation from the construction of a modern office block, which was also the case in Area B.

Four brick bays were recorded, individually 1m to 1.5m in width and 1.75m to 2m in length. Each bay had a length of iron pipe protruding from the north-east corner, and a compacted floor of yellow clay-sand. A single in-situ flagstone indicated that the bays had once been paved. These bays may have represented individual cubicles within a toilet block, the iron pipes relating to the water supply. A comparable block was excavated in 2023 at Worrall Street, Ordsall, associated with a 19th century dye works.¹⁰

Behind the toilet block ran a large drain capped with a rectangular block of sandstone and a wooden sleeper. An additional large sandstone block lay to the north-east on a foundation of refractory tiles. The ready reuse of the refractory ceramic fireplace components across the foundry, such as in the floor surface within Area B, indicates that they were plentiful and considered a disposable commodity.

At the north-west corner of Area G was a rectangular brick platform measuring 2m by 4.5m, which was crossed by three flues, suggesting it was the base for a small boiler (Figure 14). This possible boiler platform flanked a cellar measuring 4m by 3m by 1.5m deep, which had a concrete engine base installed in the floor and likely housed steam-powered machinery. The north-west wall of the cellar had been intentionally demolished, presumably to facilitate the removal of the machinery housed within. A semi-circular adhesion remaining on the exterior wall indicated that the machinery was also linked to operations within Area F.

Decline and Demolition of Bennett's Iron Foundry

Historical mapping demonstrates that the outer footprint of the main foundry building remained largely consistent throughout its lifespan; however, it is likely that the internal layout was subject to some remodelling throughout that period, as production priorities and technologies changed. Truncation of the building remains above the original ground level, coupled with the absence of original building plans, means that determining potential phasing within the footprint of the iron foundry to pinpoint these changes was not possible.

The only obvious indication of a later phase of activity was the addition of a series of north-west to south-east drains connecting brick and concrete inspection chambers, their installation resulting in the demolition of segments of the original internal walls that had then been roughly patched up (Figure 15). In three instances, the inspection chambers were accompanied by a compacted layer of cobbles that may have acted as soakaways. The presence of these drains may imply that the changing nature of the processes carried out in these areas required additional drainage to that which was initially installed when the foundry was constructed.

A widespread black soot horizon was recorded across the footprint of the foundry building, lying below the demolition rubble and directly over the internal floor surfaces. It contained substantial quantities of broken window glass and indicated a significant burning event, which potentially coincided with the building falling out of use. The majority of the brick walls within the building also demonstrated signs of vitrification, which supports this hypothesis.

It was evident that a concerted effort had been made to remove all the machinery and accoutrements associated with the business, so that few diagnostic items remained within the demolition rubble aside from a scattered assemblage of tools, tiles and refractory ceramics, suggesting that an uncontrolled fire was not the cause of the building falling out of use and that the burning was deliberate and part of the demolition process.

The foundry building is absent on the Ordnance Survey map of 1915-21 and the timber yard, saw mills and offices also owned by Bennet & Sons to the south of the viaduct have been repurposed as a "Car Building & Repairing Shed" attached to the Hyde Road Tramway Depot (Figure 16). It is likely that operations moved to the newly established premises in Stockport, potentially corresponding to its opening in 1906.

Following demolition of the foundry, the site at Bennett Street was now solely occupied by the Hyde Road Stadium, the home ground of Manchester City Football Club between 1887 and 1922. As the land was owned by J.M Bennett an agreement must have been made to locate the stadium there, adjacent to the iron foundry. The early stadium had only a thousand seats and was not depicted on the 1888-89 Ordnance Survey map, however the increasing popularity and investment in the club meant that by 1904 the stadium had increased to a capacity of 40,000 with stands on three sides. The main stand was destroyed by fire in 1920 and the club eventually moved to a new stadium at Maine Road in 1923. Trench 6 of the evaluation was sited over the north-west corner of the Hyde Road stadium and encountered a layer of cinder bedding material into which had been cut a footing for three, square concrete pads that had likely formed the foundation for the western stand, the structure of which was most likely wooden (Figure 17). Additional trenches were excavated to explore the remains of the stadium, but no further evidence was present. Elements of a leather shoe were recovered from Trench 6, but unfortunately did not belong to a football boot.

Following the demolition of the Bennett & Sons Iron Foundry and the Hyde Road Stadium, the area was levelled and became the site of tramways and rail sidings associated with a large parcel depot. In situ sleepers, rail chairs and truncated sections of track relating to the north-east to south-west lines were encountered overlying the remains of the foundry and stadium and had to be removed during excavation to access the earlier foundry remains.

Discussion

The excavation at Bennett Street provided an excellent opportunity to archaeologically examine the surviving remains of a late 19th century iron foundry in Manchester. Several iron foundry sites have been excavated across Manchester in recent years, notably the Ashbury's Carriage Works directly to the north-east of Bennett's Iron Foundry, the Soho Iron Foundry on Pollard Street in Ancoats and the Louisa Street Foundry in Openshaw, which produced textile machinery.¹¹ While these premises produced industrial machinery and railway stock, the Bennett's Iron Foundry is the first known example excavated in the region that dealt specifically with ornamental cast iron production.

As with the foundry sites above, the preservation of Bennett's Iron Foundry building was good despite subsequent truncation by redevelopment and the layout of rooms could be clearly observed. Problems of interpretation arose due to the lack of evidence for the location of

identifiable machinery, or the definitive locations of furnaces and forges. In the case of the Bennett's site, it appeared that all the machinery, internal fittings and fixtures, and components utilised in the production process were comprehensively removed prior to the demolition of the foundry, leaving only machine bases, a dispersed assemblage of basic tools and widespread, mixed deposits of metal-working waste, which were unable to be linked definitively to specific processes.

The Bennett & Sons operation would have used air furnaces or cupola furnaces to melt significant quantities of iron for casting. To facilitate process flow, these furnaces were usually located adjacent to a moulding shop and towards the exterior of the building for ventilation purposes, as cupola furnaces required mechanical blowing to produce a forced draught.¹² Assuming the open areas within Areas D and F were moulding shops, Area E and the brick platform within Area F are plausible locations of furnaces attached to them. Smaller crucible furnaces are the likely interpretation of small, firebrick platforms recorded around the moulding shop in Area D and the brick and stone platform in Area C associated with broken crucibles. These small furnaces may have been concerned with brass production and possibly enamelling, of small decorative fixtures and fittings to be affixed to the main castings.

The locations of furnaces towards the exterior of the building also allowed for the easy supply of raw metals and fuel for the melting process. The foundry was connected to the mainline rail network by its own sidings, branches of which both Areas E and F were directly adjacent to. The sub rooms within these areas would have been storage rooms for the imported materials, notably cast-iron pigs and coke. A potential crane base in Area F indicates that this is where heavy goods were offloaded.

The boiler house within Area B was also located in close proximity to the Bennett's rail sidings, as a constant supply of fuel would be required to keep the boiler fed and the machinery running. The central range was undoubtedly the location of steam powered machinery within the foundry, potentially including steam hammers, rolling mills and grinding machines, situated on brick bases. The layout of the north-west room, with its longitudinal bays and clinker flooring was likely influenced by the transmission of power from the engine situated within Area B to the south-west, the machinery aligned in rows and belt-driven with power being transferred overhead via line shafts and pulleys.

The finds assemblage was also key to identifying distinct areas of production, notably the carpentry workshop within Area D indicated by a large saw and concentration of files, and the potential brass furnace associated with a dump of broken crucibles in Area C. The assemblage of porcelain tiles and terracotta forms present in the central range is also interesting, but likely relates to their storage rather than an area of production.

Documentary evidence

Little documentary evidence relating to the operations of the original Bennett & Sons foundry is known to survive, aside from scattered examples of furniture catalogues and the depiction of the building on Ordnance Survey maps of the late 19th and early 20th centuries. However, the surviving catalogues have been invaluable in detailing the items produced by the foundry, which in turn help identify what processes would have been required in their production. Along with the variation in materials offered, which includes wood, marble and bronze, and products enamelled in a variety of colours, we can assume that this process was also conducted within the foundry building.

No plans of the original foundry are known to survive; however, plans and elevations of a ‘New Foundry’ still exist in the archives of Manchester City Library, submitted by J.M. Bennett & Sons in 1894. The proposed location of the New Foundry was north-east of the original, to the east of Galloways Boiler Works, although it does not appear on any maps of the period, indicating that it was either never built, or that it was very short-lived. It may have operated between 1894 and 1905 before being demolished and the area taken over by residential streets. Built or not, the plans and elevations of the New Foundry can potentially tell us much about the appearance and operation of the original.

The elevations show stepped brick wall foundations, a number of which are established on concrete and stone blocks, as attested in the excavation. The roof was curved with bowstring-truss beams, aside from the cupola house, which had a pitched roof with a fink truss beam configuration, with probable adaptations made to aid ventilation of the furnace gases (Figure 18). The plan of the New Foundry is somewhat pared down in comparison to the excavated layout of the original, showing a large moulding shop with a cupola house, store, enamelling room, grinding shop and loading sheds arranged along its eastern edge, along with two rail sidings (Figure 19). The process flow was evidently designed to run in an anticlockwise direction; coke was deposited from inbound trains in the coke shed and raw materials such as

metal in the store. These were utilised in the cupola house and the molten metal transferred to the moulding shop. The finished castings would then be cleaned in the grinding shop and transferred to the enamelling room for coating and detailing before being taken to the loading sheds for export. There is no accompanying description for what was to be produced in the New Foundry, but its simple plan suggests that it was concerned with casting, finishing and enamelling with few ancillary processes, as appeared to be the case at the original foundry. An additional document details the provision of toilet facilities for 105 male staff and five female staff, a substantial on-site workforce, and we can assume similar, if not larger figures for the original Bennett's Iron Foundry.

Technology and Production

Waste residues in the form of indurated slag deposits were widespread across the foundry site, overlying the majority of the building's footprint, which needed to be removed by machine to access the underlying archaeological remains. It was therefore difficult to identify distinct concentrations of different materials pertaining to specific production methodology. The south-eastern area of Area C was entirely filled with substantial lumps of slag measuring over a metre thick, the sheer volume of smelting waste overlying the foundry structure implies that there were nearby slag heaps that were levelled over the site following the demolition of the building itself.

The only evidence for non-ferrous metal processing within the foundry came in the form of three crucibles containing copper residue and potential evidence for a small furnace that could have been used for bronze/brass production. It is likely that the foundry was producing bronze/brass on a small-scale for decorative bronzing of cast-iron elements, an additional extra listed in the surviving company product catalogues.

In terms of the foundry organisation, there appears to have been two moulding shops with attached furnace rooms, which were supplied by adjacent rail sidings. The moulding shops were arranged around a large central area (Area C) where machines organised in rows were presumably concerned with the cleaning and finishing of the cast iron components. The machines would have been powered by a Cornish boiler and steam engine to the south-west in Area B. The north-eastern range of rooms, Area D, contained a potential carpentry workshop that was likely concerned with ancillary production of wooden and marble components such as seats, shelves and table tops and is also potentially where the finished items were assembled

and stored. Based on the above, the flow of production would follow a roughly anticlockwise pattern, comparable with that outlined on the 1894 plan of the proposed 'New Foundry'.

Interpretation of Areas A and G was problematic due to the extensive truncation. Almost nothing survived within the footprint of Area A. More features survived within Area G, including a toilet block, potential boiler base and housing for a steam-powered machine.

Conclusion

Trial trenching and strip, map, record excavation allowed for full and comprehensive recording of the surviving Bennet & Sons foundry building, which would otherwise have been lost to development. Through comparison with other local excavated sites and contemporary documentation, and assessment of the recovered finds, it was possible to identify zones of activity and process flow within the foundry despite the absence of machinery and the often heavily truncated nature of the structural remains. The excavation has provided an important corpus of material to add to our understanding of industrial Manchester, particularly relating to regional research priorities concerning the iron founding industry, being the only example of an ornamental cast iron foundry yet excavated in the region.¹³

Although there is no further opportunity for excavation of the site, the site report along with the archive of retained finds, have the potential to inform further avenues of research for interested parties, particularly concerning the source of manufacture of the decorative tiles and refractory ceramics used in the production of the BICLAM fireplaces. The National Archives also hold a collection of design patents registered by J.M. Bennett & Sons which merit consultation to further add to the corpus of material known to have been produced by the business and how these may correspond with examples found during the excavation.

For now, the author will be content to hunt down pieces of Bennett & Sons furniture in their natural habitat. Preferably a public house (Figure 20).

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Dedicated to my late Father, Dave Drinkwater. He followed the project with great interest and loved an old foundry, having worked in several.

Disclosure Statement

No potential conflict of interest was reported by the author.

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