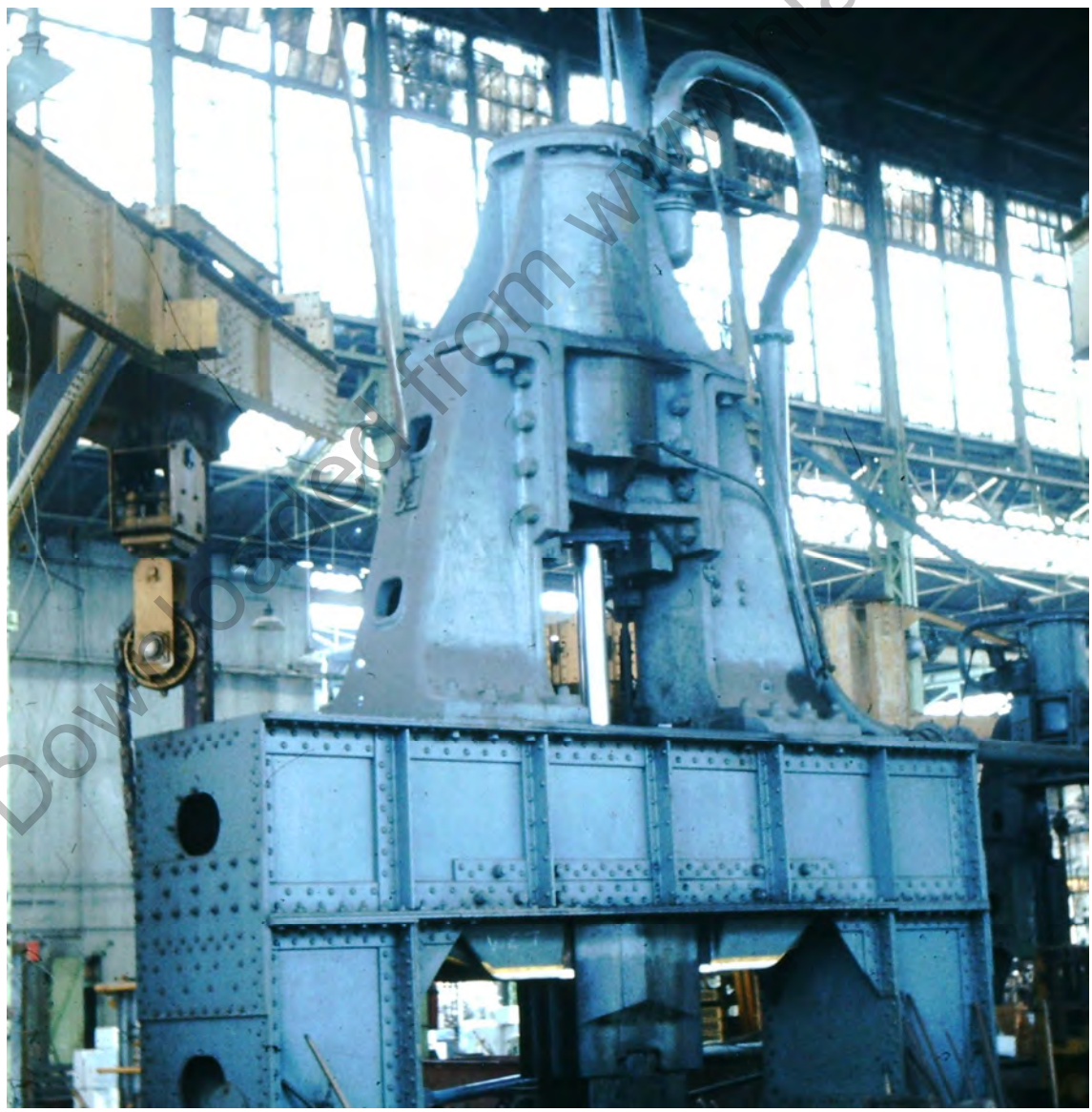
ISSN 2043-0663

Hampshire Industrial Archaeology Society

Journal No. 22

(2014)



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Front cover picture:

The large steam hammer at the centre of the Smithery of 1852. Note the crane at the left with a chain block for manipulating large forgings under the hammer. (Michael Holt, 1968)
[see page 6]

Back cover pictures:

Top left: Peterson's concrete tower at Sway in the New Forest. Note the mobile phone aerials around the top of the tower. (Paula Freeland)
[see page 23]

Top right: Moving the new pitwheel into Eling Tide Mill in 2013. Operating in sea water, tide mills suffer more corrosion than watermills in fresh water. (David Plunkett)
[see page 29]

Bottom: The east front of Wymering Manor today. (Michael Parry)
[see page 35]

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Hampshire Industrial Archaeology Society

(formerly Southampton University Industrial Archaeology Group)

Journal No. 22, 2014

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Editorial

Welcome to Issue **22** of our *Journal* as we continue on our third decade. As usual, we have tried to include articles on a variety of subject areas in Industrial Archaeology in Hampshire.

Our first two articles concern the Naval Dockyard in Portsmouth. As BAE shipbuilding in Portsmouth comes to an end, the first article illustrates some of the shipbuilding and repair facilities in the Dockyard which survived into the late twentieth century but are now mostly gone. On the hundredth anniversary of the outbreak of WW1, the second article looks at the jobs done by women in the dockyard during the Great War. Most of us will have been aware of Peterson's tower at Sway in the New Forest. Paula Freeland tells the story of Peterson's many constructions in concrete and of their maintenance and re-use in the twenty-first century. David Plunkett reports on the restoration of Beaulieu tide mill after the disastrous fire of 2006 and compares it with the tide mill at Eling which has operated as a working museum since 1980. Andy Mason recounts the history of Wymering Manor and describes a restoration project to make this important building usable again and put it at the centre of the community.

Martin Gregory
April 2014

Published by the Hampshire Industrial Archaeology Society, Registered Charity Number 276898
Edited and produced by Martin Gregory

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The Contributors

Celia Clark
Celia Clark (PhD MSc) is a writer, campaigner, photographer and academic who publishes widely on the architecture, post defence planning and futures of former naval and military sites. Her research into local communities' influence on the disposal process and on new land uses of historic naval sites in England and Venice was followed by a Europe-wide report on dockyards for the University of the West of England.in 2000. In 2012 she organised the first conference in Portsmouth to explore international experience of defence heritage sites. The next conference will be in Venice Arsenale from 17-19 September 2014. The transfer of ex-military sites to new civilian uses worldwide is the subject of her next book.

Paula Freeland
Paula has worked in the New Forest for over 25 years in the field of conservation and design. Qualified as a conservation specialist, Paula worked for New Forest District Council from 1988 to 2006 leading the conservation and design team. She joined New Forest National Park Authority in 2006 and has been responsible for the team providing specialist advice in respect of ecology, archaeology, landscape, conservation and design whilst maintaining a hands-on role in conservation and design field.

Andrew Mason
Andrew Mason is a Trustee of Wymering Manor Trust with responsibility for the building itself and is coordinating the project to repair and conserve the manor house. In 2012, Andrew completed an MSc in Historic Building Conservation at the University of Portsmouth and is presently working towards full membership of the Institute of Historic Building Conservation and the Royal Institution of Chartered Surveyors. In completing his Masters degree, Andrew produced a thesis which analysed the methods and phases of construction evident in another Brewninge house in Hambledon, and compared this with archival research to determine likely dates of construction relative to family circumstances.

David Plunkett
David was born and raised in Weymouth, Dorset. From college he was apprenticed as a stonemason at Portland in 1960. After many years as a journeyman mason he rose to Superintendent of Ancient Monuments for North Wales. His first contact with Eling Tide Mill was in 1975. Diverted into timber preservation, he served as Clerk of Works on restoration projects at Wilton House, Salisbury, 1988-91, and Windsor Castle, 1991-2004. The major fire there in 1992 led to a Fire Restoration Programme completed in 1997 under budget. Retired for the second time in 2008, his volunteer activities include Eling Tide Mill, Hampshire Mills Group (Vice Chairman 2014), MRG, MAT and related interests around the world. He is a regular speaker on 'Tide Mills' both here and abroad; a researcher and writer on the origins of the Tide Mill in collaboration with archaeologists and historians around the world.

Ray Riley
Professor Ray Riley taught human geography at the University of Portsmouth, specialising in the regional development of Belgium and Poland, where he worked for five years after retiring, urban history and industrial archaeology. He served on the Council of the Association for Industrial Archaeology for eight years and has been a member of Southampton University Industrial Archaeology Group, later Hampshire Industrial Archaeology Society, since 1968. He edited the first eight volumes of the *Transactions, Naval Dockyards Society.*

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Acknowledgements

My thanks are due to all who have contributed to this edition of the *HIAS Journal*. Acknowledgements and thanks for the provision of illustrations are made as follows:

Paula Freeland (Figs 64-72 & back cover); Michael Holt (Figs 1-6, front cover, 21, 22 & 27); Andrew Mason, Wymering Manor Trust (Figs 86-95); Michael Parry (Figs 96, 97, 98 & back cover); Andy Phillips, the Beaulieu Estate (Figs 75, 76, 81-85); David Plunkett and The Eling Experience (Figs 73, 74, 77, 78, 80 & back cover); Portsmouth Royal Dockyard Historical Trust (Figs 51, 52, 54-62); John Reynolds (Fig 79); Ray Riley (Figs 7, 10, 12-20, 23, 24, 26, 33-47, 49 & 50); John Sadden (Figs 53 & 63); Brian Sprunt (Figs 8, 9, 11, 25, 28-32 & 48).

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All is revealed? Equipment in some buildings in Portsmouth Dockyard

Ray Riley

An ongoing problem for industrial archaeology is that while external structures of buildings may have been recorded, this does not always apply to internal artefacts. This is partly the result of difficulty in gaining access and partly because the principal interest of architectural historians is in externalities rather than internalities, such as machinery. Moreover, in the case of listed buildings the structure may still remain, but re-use usually is synonymous with the removal of internal equipment. Should buildings, listed or otherwise, be located in establishments where national security is involved, such as naval dockyards, even entrance to the site itself is normally an issue. Fortunately the annual Navy Days provide unrestricted viewing of buildings, but never their contents. This paper reviews work undertaken to record internal equipment in buildings in the Dockyard (HM Naval Base Portsmouth since 1984) in surveys carried out since the late 1960s, the majority of photographs illustrated never having been subsequently published. Fortunately most of the work predated the Defence Review of 1980, which called for substantial rationalisation following the switch in emphasis from large surface vessels to nuclear submarines.



Fig 1. The Pulley Block Mill built in 1802 to house Marc Brunel's machinery. (1968)



Fig 2. Brunel's corner saw powered by belt from a layshaft above. At least the belting was enclosed, although very much a twentieth century addition. This machine was still operational, (1968)

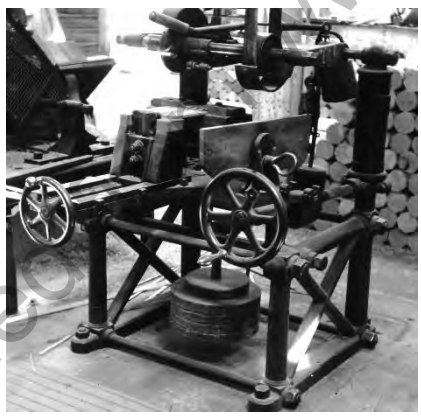


Fig 3. Brunel's scoring machine worked by belt drive visible at the top of the photograph. Judging by the number of pulley block shells stacked behind the machine, the Navy was still employing wooden pulleys. (1968)

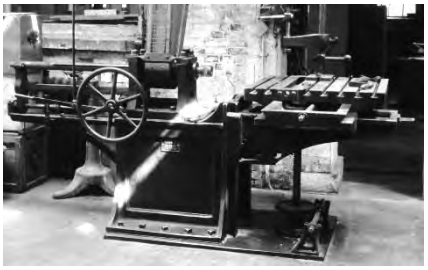


Fig 4. A boring machine, a much heavier structure than the light elegant designs made by Maudslay to Brunel's designs. It is said that this machine was exhibited at the Great Exhibition of 1851 and subsequently purchased by the Admiralty. Unfortunately, the machine lacked a maker's name. (1968)



Fig 5. A spile machine which produced wooden plugs by means of circular saws set at convergent angles. It post-dated Brunel's machines as may be seen from its heavier structure. (1968)

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Listed Buildings

With only a few exceptions, the listed buildings in the Georgian dockyard, now termed the Heritage Area, had lost their original function prior to surveys being undertaken. They had become storehouses, rendering it hardly worthwhile to gain access. One important exception was the Block Mill, a Grade I listed building, commenced in 1802, where several of Marc Brunel's pulley block-making machines remained (Fig 1). The machinery as a whole was a significant step forward in the evolution of production engineering and as a result has been the subject of considerable research. Some papers have included comment about the Block Mill within the Dockyard, [1] but others have focused on the Block Mill and its machinery. [2] It should be said that the earliest survey did contribute to knowledge by illustrating the position of some of Brunel's

machines, for instance the corner saw and the scoring machine (Figs 2 & 3). At the same time, this survey did reveal some machines which post-dated those of Brunel and which had not been recorded in the literature mentioned simply because they were not designed by the great man (Figs 4 & 5). Arguably they are elements in the evolution of wood-working machinery and should be regarded as important in their own right. A subsequent survey in 1973 revealed that Brunel's corner saw, the scoring machine and the later boring machine had been transferred from the Block Mill to No 6 Boat House, where they ended their working days.

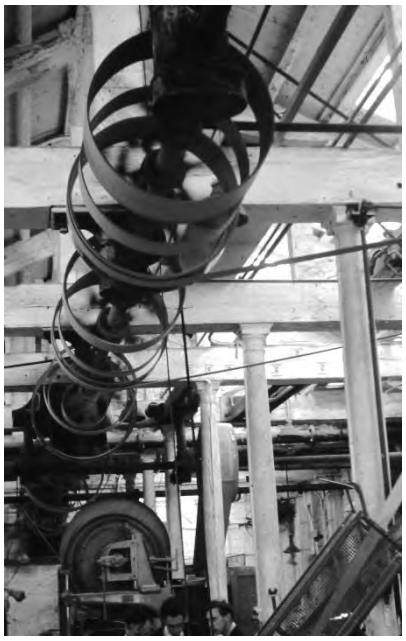




Fig 7. (centre) Line shafting, bevel wheel and supporting brackets in the Block Mill. (1974)

Fig 6. (left) The overhead layshafting in the Block Mill at the end of its working life. (1968)

Fig 8. (right) Line shafting illustrating various sized belt drive wheels and supporting bracket fixed to the wall of the Block Mill. (1975)

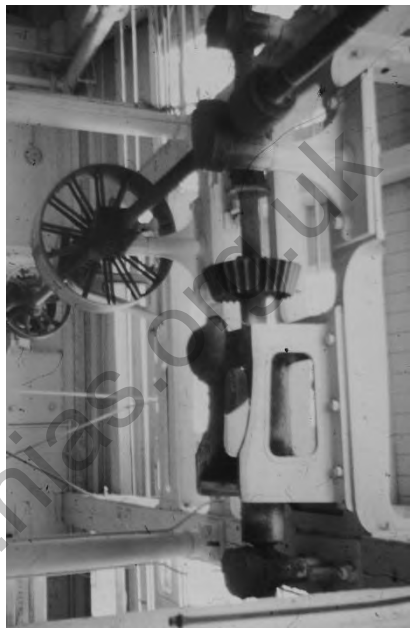
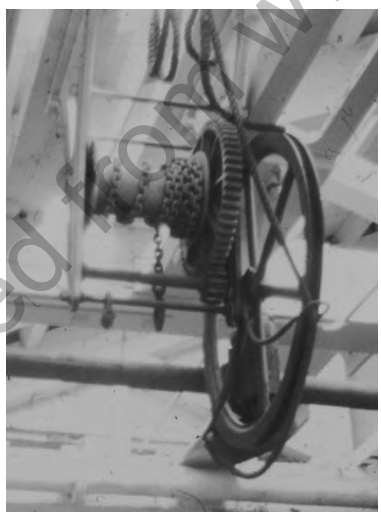




Fig 9. General interior view of the Block Mill, now a store. (1975)



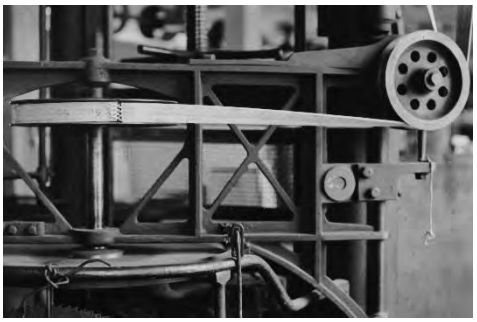


Fig 11. Brunel's swing arm circular saw where an ingenious but simple use of belting changes the direction of the drive from the vertical to the horizontal. (1975)

Fig 10. (centre) A manual chain hoist in the Block Mill. It is possible that this was an original piece of equipment. (1974)

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Admittedly not nearly so important as the machinery since it had been introduced into textile mills in the eighteenth century was the system in the Block Mill of overhead layshafts and belt drives, the need to change direction of the shaft being overcome by the use of bevel wheels. Since there were very few non-Brunel machines, which might have required more powerful belt drives, in the Mill, it is likely that the shafts, belt wheels and gearing at the time of the surveys were original. There were some heavy supporting brackets fixed to the walls; it is conceivable that they too were original. If this is the case, it is a pity that attention seems to have been placed on the machinery alone. At least the surveys caught the situation at the end of the block-making era (Figs 6, 7, 8 & 9). A further feature of the Mill is the timber framing which is original and now over two centuries old, again of significance *sui generis*. Close examination of the piers in Figure 9 will show that they are characterised by entasis, that is, tapering at top and bottom, since without this they would appear to be narrow in the middle section (alternatively, from an engineering standpoint, pillars need to be fatter in the middle than at the ends as that is where the maximum bending moment is, ED). A number of other features were noted in the 1975 survey: a chain driven hoist (Fig 10), Brunel's answer to the problem of changing the direction of drive through belting (Fig 11). Quite apart from the importance of Brunel's machinery, the Block

Mill represented an excellent time capsule which fortunately industrial archaeological surveys recorded before it was too late. At the time of writing the future of the building continues to be under discussion.



Fig 12. (upper left) The interior of the Chain Test House, chains much in evidence. (1970)



Fig 13. (upper right) Ballast block flooring in the Chain Test House. (1973)





Fig 14. (lower left) The hydraulically operated chain test mechanism in the Chain Test House. (1975)

Fig 15. (centre) The hydraulic accumulator engine by Greenwood and Batley, Leeds in the Chain Test House. (1975)

The Chain Test House, a Grade II listed building, was completed in 1843 at a time when metal chains were beginning to replace rope cables principally for anchors. It was operational until the late 1970s (Fig 12). Prior to this a survey revealed that much of the flooring was made of cast iron ballast blocks marked 'Po', indicating that eventually the blocks were to be returned to Portsmouth (Fig 13). The testing mechanism was powered hydraulically (Figs 14 & 15). The House is now empty, being entirely surplus to present-day naval requirements.



Fig 16. No 2 Ship Shop with No 2 Basin to the right. (1992)



Fig 17. The interior of No 2 Ship Shop showing the gantry crane, its supports and bracketing which held layshafts. (1974)

No 2 Ship Shop, or West Factory as it was originally known, was completed in 1848 and is Grade II listed (Fig 16). It was a response to the introduction of steam power into the Navy, the idea being that engines and boilers could be maintained in the Yard. The long narrow profile was determined by the need to have travelling gantry cranes throughout the length of the building, its width being set by the span of the gantries. The original functions had been lost by the time of the survey, so photographs of the ground floor merely show the supporting tracks of the gantries (Fig 17). However, part of the upper floor was being used as the Sailmakers' Machine Shop (Fig 18). Needless to say this activity no longer takes place. The building is now partitioned into a variety of offices, so at least it is being used. Adjacent to the north end of the Ship Shop the deck of the original caisson at the entrance to the Steam Basin was briefly revealed during road repairs in 1984. The original entrance was found to be

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insufficiently wide to accommodate the new warships of the 1870s, so the caisson was sunk in position and walled off in 1876 (Fig 19).



Fig 18. The Sailmakers' Machine Shop on the upper floor of No 2 Ship Shop. Prominent are the revolving machine tables made by the Singer Manufacturing Co. in 1929. (1983)



Fig 19. The deck of the original caisson at the entrance to No 2 Basin. Its boat-shaped structure is evident, as are the supports for the decking at the bow / stern of the caisson. This is the oldest caisson in the yard, albeit invisible. (1984)

An integral part of the use of steam power in the Navy was the construction in 1852 of the Smithery, a Grade II listed building (Fig 20). The initial design incorporated similar architectural flourishes to No 2 Ship Shop, but on cost grounds the present functional building was preferred. Since there was only minimal need for walls to support internal equipment, a light framework was all that was required, so girders from the Great Exhibition were used. The heaviest work involved the forging of large anchors by means of a substantial steam hammer, but at the time of the visit this had been converted to air operation (Front cover). The size of these anchors and the cranes employed to lift them may be seen in Figure 21. Other equipment included a small steam hammer and a wall-mounted crane, one of the limited occasions on which the Smithery walls were so employed (Fig 22). The photographs certainly underline the fact that, with the exception of Devonport, the Smithery was the most substantial industrial building on the south coast of England. It is now given over to stores, mess-rooms and a squash court.



Fig 20. (left) The Smithery with brick corners which originally housed chimneys. Noticeable is the light metal walling with generous fenestration. (1970) Another view appears in Fig 27.



Fig 21. (right upper) The heavy lift crane used to move anchors and other large forgings to and from the steam hammer which is just visible on the left of the photograph. The structure behind the crane is the central chimney. (1968)



Fig 22. (right lower) A wall-mounted crane secured to the brick wall in the Smithery. (1968)

The construction of the Steam Basin and No 2 Ship Shop in 1848 gave rise to the belief that the Yard should be protected from an attack from the north-east, that is, from within the Harbour itself, by the establishment of a conventional masonry fortification, Frederick's Battery, in the same year. However, shortly after this, the further extension of the Yard subsumed the battery, so the Round Tower at the north end, together with the casemates linked to the Square Tower at the southern end were rebuilt in 1871 (Fig 23). In

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1886 a gas meter was inserted next to the Square Tower, almost certainly making it the only such meter in the UK to be within a Grade II quasi-medieval fortification.



Fig 23. The relocated Frederick's Battery. The gap between the Round Tower and the casemates to its south was created to give a railway line access to the Floating Dock c1911. The entrance to the gasmeter may be seen adjacent to the Square Tower. (1984)

There were several listed industrial buildings, such as the Iron Foundry of 1854 and the Armour Plate Workshop of 1867 to which regrettably access was not secured prior to their switch to essentially non-industrial functions. However, a visit to No 25 Storehouse, a Grade II* listed building of 1786, originally comprising small workshops round a central court, revealed that in 1893 its upper floor had been converted to use as a Mould Loft where full scale templates of steel plates were constructed on the floor (Fig 24). It is presumed that the Mould Loft is listed as part of the building. The Loft is now empty since such functions are located elsewhere.



Fig 24. The Mould Loft above No 25 Store. The two essential features of a mould loft – the absence of pillars and the presence of natural light – are much in evidence. (1984)

Such was the speed of technical advance in naval technology that only a decade after its commissioning the Steam Basin was seen to be inadequate, giving rise to the so-called Great Extension undertaken between 1867 and 1881. The six docks of the new No 3 Basin were serviced by No 1 Pumping Station, completed in 1878, now Grade II listed (Fig 25). Its triple expansion engines were capable of dealing with 18 000 tons of water per hour; it also housed air compressors and hydraulic accumulators. Unfortunately, photographs of the machinery at the time of the visit proved to be unsatisfactory, but a shot taken in 1901 at least gives an impression of the equipment within (Fig 26). The machinery was stripped out in 1992 and the building is now used as a store by BAE Systems, the private firm which operates building and repair in the Yard.



Fig 25. No 1 Pumping Station with its distinctive porthole windows. The flat roof originally supported a safety water tank. The boiler house is to the left of the photograph. (1975)

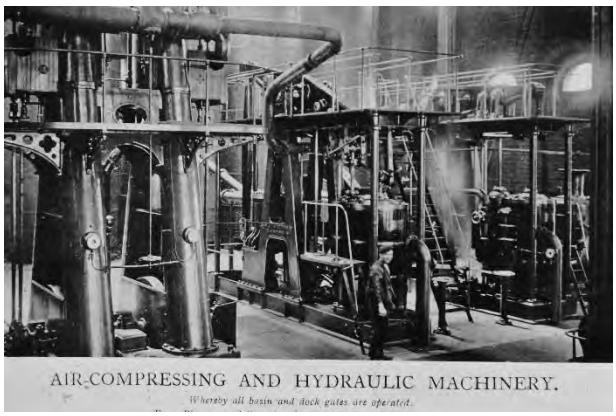


Fig 26. An interior view of No 1 Pumping Station. Navy and Army Illustrated, 1901.

Demolished Structures

It is fortunate that in a few instances surveys were undertaken before demolition of unlisted structures, although sometimes destruction was already in progress. The case of No 3/4 Ship Shop was a contentious issue, for the roofs of these structures originally covered two adjacent building slips put up in 1843; each was thought to have had the greatest span in Britain at the time. Arguably the roofs were of significance in construction history (Figs 27 & 28). As wooden vessels were phased out and replaced by metal ships, which did not need protection from the elements during construction, coupled with the need for much larger facilities, the slips lost their use

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and c.1900 were filled in, their seaward ends being blocked off from the Harbour. Despite their importance, the roofs were never listed on the grounds that better examples existed at Chatham Dockyard, allowing their demolition in 1980, but not without a vociferous campaign to secure listing. While the campaign was raging the Admiralty took action before listing could be effected. The equipment within the Ship Shops was by no means unique: the shearer, press, scarfing machine and hydraulic accumulator (Figs 29, 30, 31 & 32) could be found in many heavy engineering works, so in this instance the value of the survey rested upon the internal framework.

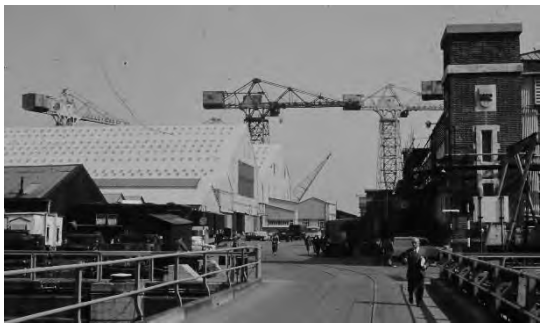


Fig 27. (left) The roofs of No 3/4 Ship Shop may be seen centre left. Beyond them are the cranes of No 5 Building Slip. In the foreground right is the Smithery. (1968)



Fig 28. (right) The light metal frame of No 3/4 Ship Shop contrasts with the later and much heavier gantry crane support. (1975)

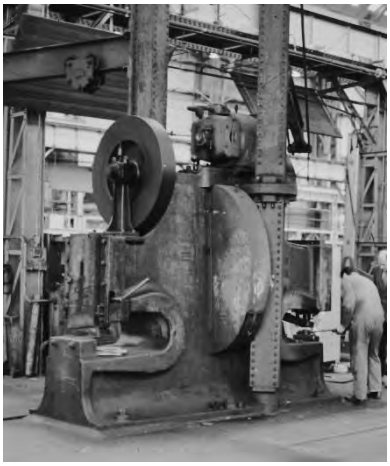


Fig 29. The Scrivens shearing and punching machine, No 3/4 Ship Shop. (1975)

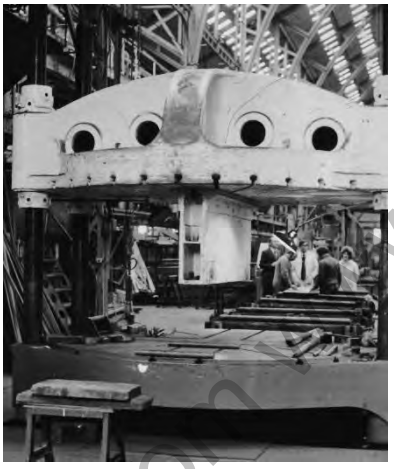


Fig 30. The hydraulic press in No 3/4 Ship Shop. (1975)

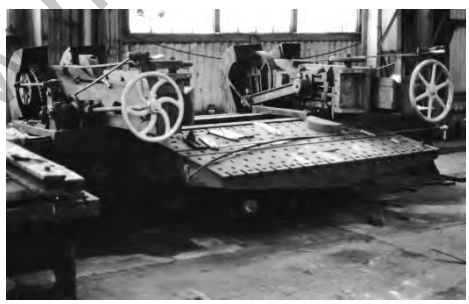


Fig 31. (above) The scarfing machine in No 3/4 Ship Shop. (1975)

Fig 32. (below) The gearing of the hydraulic accumulator pump by Hugh Smith, Glasgow. (1975)



On each side of No 3/4 Ship Shop were No 2 and No 5 Slips, similarly facing the Harbour, but retained as building and repair slips until the 1970s. No 2 Slip was first laid down in 1764; at the end of the nineteenth century it was used for hauling up torpedo destroyers for refit rather than building, a winding engine being located at the head of the Slip. The engine house was a mean corrugated iron affair and as such never appears in any of the work by architectural historians (Figs 33 & 34). On the north side of No 3/4 Ship Shop was No 5 Slip, on which some of the most iconic battleships such as HMS



Fig 33. (left) No 2 Slip in the process of demolition. The tracks for the cradle are visible; between them is the toothed rail for the cradle ratchet acting as a brake. On the left is No 3/4 Ship Shop, in the background right is the Smithery. (1979)

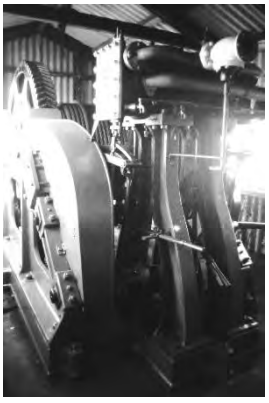


Fig 34. (right) The steam winding engine by Cowans Sheldon, 1896, at the head of No 2 Slip. The winding drum is just visible to the right of the toothed gear wheel at the back of the photograph. (1979)

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Dreadnought were built. It was 666 ft (203 m) in length and roofless, protection for workers not being considered important. The head of the Slip was the same height as the roof of No 2 Ship Shop, making it one of the most imposing features in the Yard (Fig 35).



Fig 35. The remnants of No 5 Slip. The most notable feature illustrated is the amount of wood in the structure. A few days after the photograph was taken the Slip was no more. A colony of feral cats lost their home. (13 September 1979)

Certainly not unique to naval dockyards were clocking-in stations, and lacking in particular architectural merit they have attracted little attention. That at the Victory Gate at Portsmouth dated from 1949, but was demolished in 1993 to allow the construction of the present Visitor Centre. The interior with its venerable design featured a clock with a card timer by The Gledhill-Brook Time Recorders, Huddersfield, Halifax and Birmingham.

Buildings Not Listed and Not Demolished

It is somewhat surprising that the small Iron and Brass Foundry, latterly the Steel Trimming Shop, of 1848, has not been accorded listed status since architecturally it is similar to both the West Factory and the Foundry, of the same construction era. In fact, Captain William Denison RE designed all three (Fig 36). The interior of the building features a gantry crane dated 1860. It is now used as a store.



Fig 36. The small Iron and Brass Foundry, its decorative appearance exhibiting the importance accorded to buildings associated with the early steam Navy. (1983)



Fig 37. The Weapons Equipment Shop, one of the last buildings in the Yard to be graced with aesthetic architecture. The rail track and the size of the entrance hints at the nature of the guns being handled. (1983)



Fig 38. The gunpit in the Weapons Equipment Shop. (1983)

Inevitably the buildings which have been retained for ship repairing (until early this century, when BAE Systems began work on an aircraft carrier, no ships had actually been built in the yard since 1962) are located in the eastern, newer end of the Yard. They are suitable for internal movement of heavy materials and modern machinery. None is listed. Access to two was sanctioned. The first, No 1 Weapons Equipment Shop constructed in 1896, contained modern machinery, although the gantry crane is dated 1913 (Fig 37). Much more unusual is a circular structure termed the gunpit, in which large guns on their rotating bases could be worked upon; it is dated 1913 – very much in the era of sizeable weaponry (Fig 38). The second is The Factory, completed in 1905, a huge structure some 580 ft (177 m) in length with five bays, thought to have had the largest floor space of any building in the country at the time of its construction (Fig 39). It was so large that its electric power requirements called for a dedicated adjacent power station, completed in 1903. Figures 40 - 45 represent a sample of the wide range of machinery and activities pursued in this huge engineering undertaking. Its manufacturing functions became superfluous after the Falklands War in 1982 and it is now merely No 100 Store.

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Fig 39. Four of the five bays of The Factory, built to meet the requirements of battleships of the Dreadnought class being constructed as part of the rearmament programme. (1983)



Fig 40. No 2 Bay in The Factory. The scale of the workshop is clear. (1983)



Fig 41. (left) The size of this lathe, by Craven, gives some idea of the operations undertaken in The Factory. (1983)



Fig 42. (right) A lathe in No 4 Bay in The Factory with a submarine propeller shaft in place. (1983)



Fig 43. (left) No 1 Bay in The factory included the Bottle Shop for high pressure gas containers. In order to reduce the risk of breakages the floor was originally made of wooden blocks. (1983)

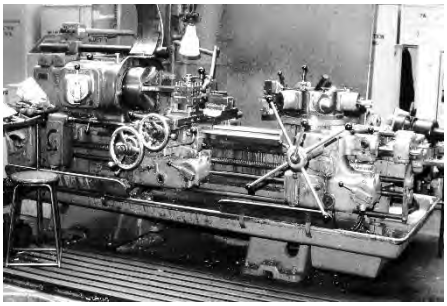


Fig 44. (right) The lease-lend scheme with the USA not only provided cash but also machinery. This lathe in No 1 Bay in The Factory was manufactured by Lamson & Jones, Springfield, Vermont. (1983)



Fig 46. The Yard's largest floating crane, part of the German reparations after the First World War, moored on the north wall of Fountain Lake Jetty prior to disposal. (1988)



Fig 45. Standard gauge wagons were used for internal transport in The Factory. The structure of that shown suggests that it is of the same vintage of The Factory itself. (1983)

Individual Artefacts no Longer in Place

So far, with the exception of the building slips, the equipment described has been located within buildings, but there are some free-standing artefacts which the industrial archaeologist, if not the architectural historian, will consider to be of interest. In the centre of Figure 46 may be seen the Dockyard's 200 ton capacity floating crane made from sections produced in Germany and assembled in Portsmouth by Cowans Sheldon in 1923. From time to time during a ship's refit it was necessary to provide a source of steam when vessels were unable to do so themselves. The solution was to generate steam from portable boilers on the quayside. That illustrated in Figure 47 has



Fig 47. (upper right) An oil-fired portable steam engine with an unusually long chimney. To its right is the modest locomotive shed and to its left is a rail mounted crane of inter-war vintage. (1984)

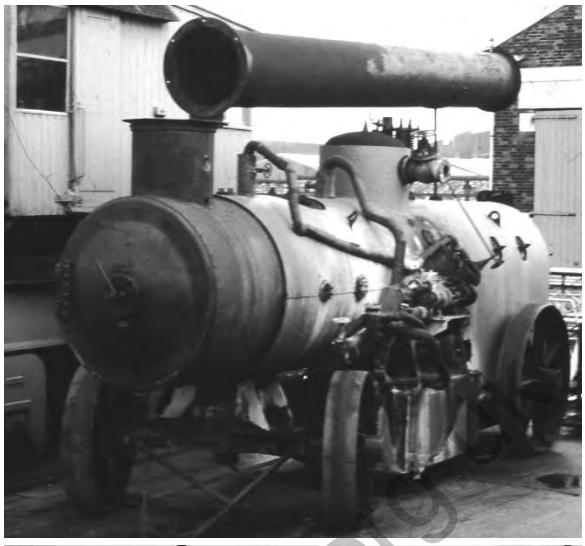


Fig 48. (upper left) Detail of a railway turntable by the Kilmarnock Engineering Co. (1975)



Fig 49. (lower left) A fine example of a Victorian lamp column dated 1882 in College Road with the 1732 Academy behind. (1976)



Fig 50. (lower right) The Dockyard branch line railway level crossing at Edinburgh Road. The signalman's hut to the right of the signal column has a most unmilitary chimney. (1970)

flangeless wheels enabling it to be towed to any desired location. The advent of standard gauge railway in 1849 greatly eased the movement of heavy items; at the system's peak there were 25 miles of track in the Yard. In many instances buildings could be served by tightly curved track, but where this was impossible turntables were employed (Fig 48). These were operated by steam capstans, themselves worked from the Yard ring main. Prior to the introduction of electricity, lighting was provided by coal gas made by the Portsea Island Gaslight Co. As befitted an important government establishment, ornate gas lamp columns were the rule (Fig 49). The dedicated railway branch line into the Dockyard from Portsmouth and Southsea station had level crossings and signals at Alfred and Edinburgh Roads; the signal at the latter was not only unusual in being a slotted semaphore, but also in that it was worked manually by a lever at the base of the column (Fig 50).

At one time during the Second World War Portsmouth Dockyard employed 22 000 people, who worked in a far greater number of buildings and locations than have been described. However much it is regrettable that it was never possible to survey all of these, at least the interior of some was visited, arguably making a contribution to artefacts which had received only modest attention.

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Women at Work in Portsmouth Dockyard 1914-19

Ray Riley and Celia Clark

"Of all the changes wrought by the War, none has been greater than the change in status of women, yet it is not so much that woman herself has changed as that men's conception of her has changed".[1]

That women were widely employed in factories producing munitions and naval vessels in the 1914-18 War raises the question of whether and why they had not earlier been so employed. Previous wars in the nineteenth century, such as the Crimea and in the early twentieth century such as the Boer War, had been fought using only elements of the regular forces, whereas the Great War involved millions of men, eventually in 1916 leading to conscription. At the same time it was thought that a massive Navy was required to prosecute the war, resulting in naval shipbuilding being emphasised. There ensued a major shortfall in male industrial workers as military recruitment expanded dramatically. By July 1918 some 891 000 women were working in 'industrial occupations'.[2] As an album of commemorative photographs records, 1750 women were drafted into Portsmouth Dockyard to undertake tasks hitherto filled by men.[3]

The Photographs

The photographs represent the first of two sources of information for this article; the second is the recordings of women who actually worked in the Yard in the First World War. Their employment was not the first instance of women working in factories for they had long been employed in textile mills, match factories, clothing workshops (particularly corset factories in Portsmouth), and indeed in flag-making and hemp spinning in naval ropewalks, but arguably it was novel for them to be employed in the so-called heavy industries.



Fig 51. A group of women repairing a small collapsible boat.

No doubt it was assumed that women could be put to the lighter aspects of shipbuilding, but the reality as depicted in the photographs was rather different. The portraits are as much of the machinery they are operating as of the female workforce. On the one hand women can be seen repairing and painting small boats and liferafts, making mattresses, issuing paint, painting lifebelts and sewing canvas, but on the other far more photographs illustrate much heavier work. It is reasonable to suppose that this skewed sample reflected a similar imbalance in women's work. Women are shown working wood-working machines such as vertical and horizontal drills, cutting substantial planking and working band saws. Needless to say safety guards did not exist in those days. In one photograph women are fitting canvas hosepipes onto the metal unions; this required considerable strength which was beyond some of them, but at least women and not men undertook this task.



Fig 52. A woman operating a drill. Her 'On War Service' badge can be seen on her left lapel.

Rather more photographs depict women operating metal-shaping machines, cutting and positioning plating, working substantial lathes, punching and shearing machines, shaping armour plating and working chain-testing equipment in the Chain Test House. Women were even entrusted to work the then state of the art equipment – oxyacetylene torches, wearing protective eyeshields. Lest it be thought that women were to be found in all Dockyard jobs, it should be said that they were absent from tasks where sheer strength was at a premium, that is, in the Iron Foundry, Smithery, Armour Plate Shop and in the process of shipbuilding itself. Arguably women

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could match men when skill alone was the issue, such as coil winding in the Electrical Shop, even if a few photographs show an elderly man striking a supervisory stance; equally in other shots it is an older woman who appears to be in charge.



Fig 53. Women wiring electrical components. Note the male supervisor in the background.

Unlike male workers, who were normally clad in a variety of overalls, women wore a brown long-skirted uniform or trousers with caps and badges bearing the words 'On War Service'. Some wore lacy blouses under their overalls and rather elegant low heeled shoes (were they standard issue?), but many wore boots to protect them from cobbled and concrete floors. Some protection from the cold was afforded by wooden duck-boarding underfoot, although this also applied to men. But after all their efforts and pride in doing their bit for the war effort, as soon as the men came back from the war, all these women became redundant. It was too soon for society to accept gender equality.

Oral History

As useful as the photographs are, an oral history project undertaken in 1984 by Celia Clark of a number of former Dockyard employees offers valuable insights into the female wartime work experience in WWI. Digital copies of the interviews are held in the Portsmouth History Centre in Portsmouth Central Library.[4] Human memory being what it is, allowance should be made for the age of the interviewed ladies, who were nonagenarians, but since long-term memory is known to be superior to that of the short-term, it is justifiable to believe that their statements must be close to the truth. The question as to whether a small sample of three is large enough from which to draw generalisations about the experience of over a thousand women certainly has validity, but equally it may be argued that we are fortunate in having any oral historical material at all.

Background of the Three Women

Those with relatives in the Dockyard and war widows were the two main categories of women recruited, although the two groups could overlap. Beatrice Hobby, born in 1891, married very young, but lost her first husband Bill Penfold, who was gassed in Flanders, leaving her with a six week old baby, so she had to work to support the child. With experience of cardboard box assembly in one of Leethem's corset factories from the age of 13, she was used to manual work.



Fig 54. A studio portrait of Beatrice Hobby wearing her uniform, including the 'On War Service' badge.

Maudie Ralph's grandfather, father and brothers all worked in the yard. She was born Maud Emily Bower on 20 March 1890. Her husband, who was in the Grenadier Guards, was posted missing, though his death was not confirmed for seven months; she did however receive a widow's pension as soon as he was declared missing. She had two little girls to support, so she asked to go into the Yard and was accepted, since she assumed that the recruiters knew she had relatives there. Before her marriage she had worked making corsets.

Daisy Pervin volunteered in the early part of 1916, after her father had died, his pension with him. He had worked at HMS *Vernon* and her brother was an apprentice in the Yard, studying at the Dockyard school. She entered the Yard as soon as she could, at the minimum age of 18. Prior to that she was skilled as a dressmaker.

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Their Work

The practice for men going into the Yard was to instruct them in a wide range of skills during an apprenticeship. Since it was assumed that the use of women was purely an emergency measure, a broad training was dispensed with, and they were allocated to a particular task at the outset and learnt on the job. Said Beatrice Hobby "we had to go into a place and they kit you out for what you had to do. Some had to go to the Paint Shop, some to the Hose Shop and some to the Block Mills". As Daisy Pervin remarked "women never did anything like that before". Maudie Ralph was asked by her instructor "You know what drilling is?" She replied "No, but my father's in the Dockyard and my husband talks sometimes". She ended up drilling hammock hooks on ships such as HMS *Edinburgh Castle* and *Resolution*, having to lug the drill on board with her. Beatrice Hobby was allocated to the Block Mills and was able to offer an impressive description of her work, given that it had taken place over 60 years earlier.



Fig 55. Women working in the Block Mills. The one on the right is painting a pulley block.



Fig 56. A group of women repairing Carley floats.

Beatrice shaped and painted pulley blocks in the Block Mills. There were 12 women working in a team, a separate photograph of which exists.[5] She operated a bandsaw. "There was a lignum vitae wood we used to use [to make pulley wheels] and they used to dry it. They used to keep it underground, you see, and if it was cracked they used to put something through to see how far it was cracked. It was the hardest wood you can get. The saw used to go off BANG sometimes; I used to take the band saw down and have it repaired right by Unicorn Gate". The machinery was belt driven: "you used to move a handle [of the fast and loose pulley] and you started. I was on the second floor [probably the first], the men worked downstairs". Beatrice was also involved in smoothing pulley block [shell] surfaces with carborundum stones "so the rope could go round it" and for removing the corners from the shell. The shell was held "with a bit of leather, or something like that" and in the case of larger shells "you had to use both hands. It was tedious work". The shells were painted grey, but something previously not known, at least to the present authors, was that "the recorder used to come up the stairs and weigh all the stuff that you took from the other room". Perhaps a method of ensuring quantity. Sawdust, on the other hand, was swept up, placed in a wheelbarrow and transferred to a chute "where they had a big cart outside".

When there was a fire in the Block Mills Beatrice was put to work in a Shop near Unicorn Gate on what were termed Carley floats "for people if they fell off the ship and they used to hang on to them for help. We used to take the canvas off and then we had to clear it all out and fit all the cork in again, put the canvas on again and paint it grey". For a time Beatrice also worked on the production of canvas hose pipes which involved not only measuring out the canvas but also securing it to the metal unions. This was achieved by wires which had to be wound tightly to prevent leaks, a task requiring some strength. "Where I'd worked before I had to work hard and there was one girl there, she was at the *Sailors' Rest*, a waitress or something, and she couldn't pull hard enough". Should the pipe fail "old [Mr] Denters used to throw them at you and say 'that won't do'". Daisy Pervin's work winding copper wire for armatures was rather more delicate. "If the very fine wire we were coiling had a break in it – and you wouldn't

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know until it was tested – you had to unwind it and do it again". In the photograph of her team there were eight women, seven men and two apprentices. The men worked on the large armatures.

In addition to doing men's work, Beatrice also carried out a traditional woman's task. "Sometimes I used to make the tea and all that for the men. They used to put you on the job to make the tea. You see them run up and they'd say 'is the tea ready?' There used to be an old coat over the big urn, you know, to get it to boil. I used to get worried over them because they were trying to have their breakfast before time. It was very nice there though. We used to have an old cat who used to catch the rats. They had sewer rats there".

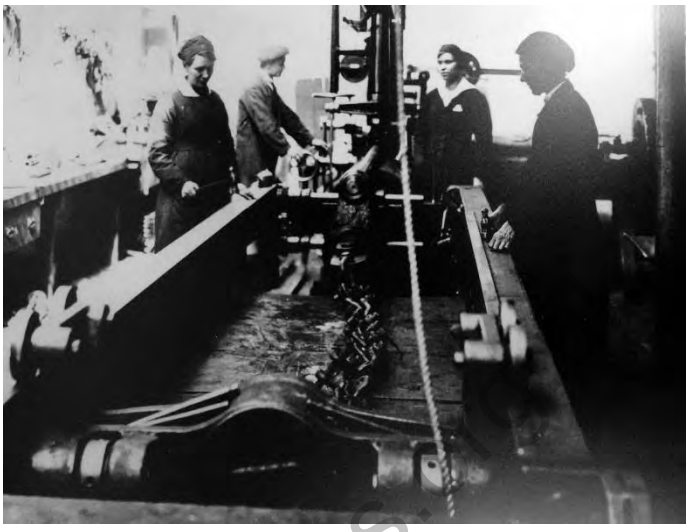


Fig 57. A posed photograph of women in the chain test house.

Accidents

It was inevitable that accidents should occur in an industrial environment such as the Dockyard. Beatrice Hobby's memory provides some idea of unfortunate events. When polishing lignum vitae wood for pulley block sheaves or wheels, "a piece might fly out and I knew one man, a piece flew out and went into his eye. Very dangerous work it was". She herself suffered while polishing a pulley shell. "I had a poison finger through it once, a blister came and all the brass got underneath. I had to go to hospital and they cut it, freezed it. I was out sick for a few days. Had blood poisoning you see. I had to go to the surgery. It didn't hurt you because they freezed it"; certainly an interesting development in medical practice. Safety measures were limited, but at least in the Block Mills "we used to have a thing fitted to our nose so the barley grease would not go up our noses. We never had a mask on".

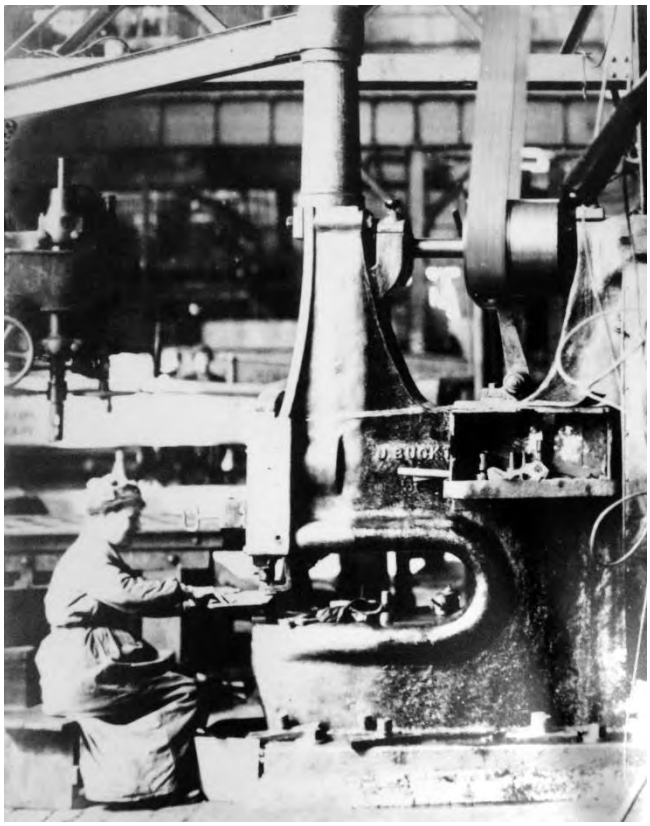


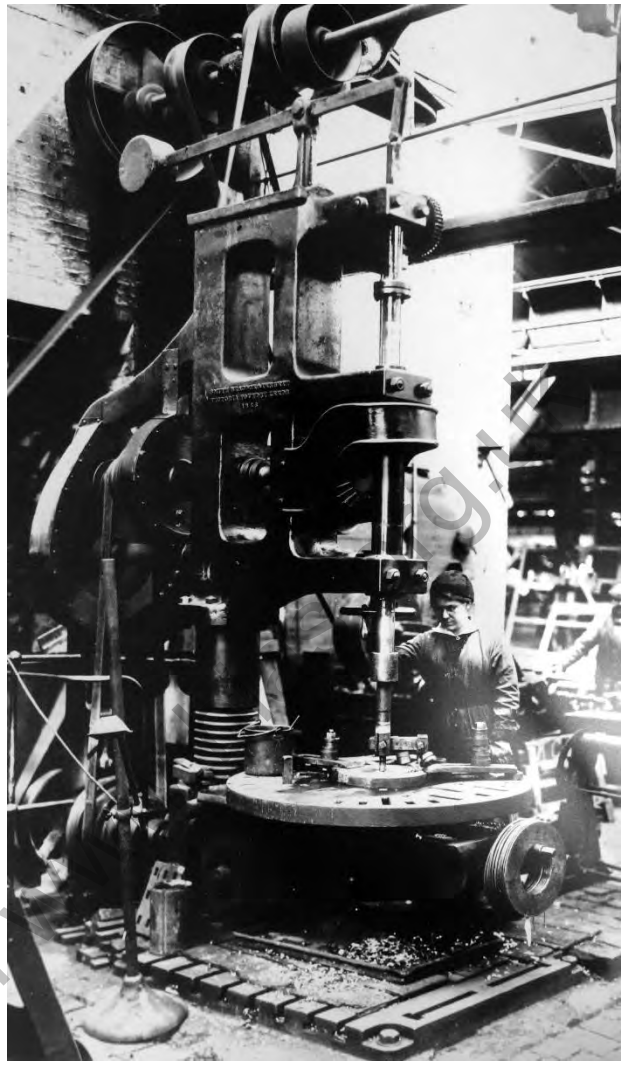
Fig 58. A detail from another photograph of a woman working in the chain test house.

Uniforms

Beatrice Hobby had to have lace-up boots made by Stead and Simpson in Commercial Road. "We had to wear boots, because you see, when you went through the Dockyard the cobblestones used to hurt your feet. I couldn't walk with shoes". Daisy Pervin wore shoes and high lace-up boots for the winter. Many of the women in the photographs are wearing ankle length overalls and caps over their hair, but in the studio portraits of Beatrice Hobby and her colleagues they are wearing much more practical trousers. Skirts had their disadvantages. "We had open drawers years ago, with two legs". She once heard a male voice making a presumably obscene remark as she walked over a culvert, so "we had to wear trousers afterwards". Maudie Ralph always wore trousers because she was going up ladders. Daisy Pervin in the Electrical Shop wore a very long skirt; she made her own blouses.

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Women using heavy machinery in the Dockyard

Fig 59. (above) A woman operating a punching and shearing machine in No. 3/4 Ship Shop.

Fig 60. (right) A woman operating a vertical boring machine in No. 3/4 Ship Shop.



Fig 61. Women attaching brass unions to the ends of reels of hose. A male supervisor can be seen in the background.

Hours and Pay

Beatrice Hobby reported for work in the Block Mills by 7am, using the workmen's tram. "If they rang the [Dockyard] bell you went in, but if the buzzer went you lost sixpence, but I was always very good at the time because my Dad worked there and I used to go down with him". But she had to go home in her lunch break to her mother's house in Duke Street to feed her baby, have her meal, and then get all the way back via the Hard to Block Mills. "Quite a rush". Sometimes she used to work till 8 o'clock at night on overtime sweeping up the sawdust. On Sundays she had the day off.

Daisy Pervin also started work at 7am and often did overtime until 7pm. She used to meet up with friends from the Yard and walk to work. "There were not a lot of trams, and the ones there were filled with Dockyard workers". Living in Milton, they gave themselves half an hour to get to work on time and pick up their ticket. Maudie Ralph said all the workers were on shifts, although this is not supported by the other two interviewees.

They had three breaks during the day: a cup of tea in the morning, one and a half hours for lunch and an afternoon break. Daisy Pervin used to go out of the Dockyard at lunchtime with her friends to get a snack near the station, or Aggie Weston's or the Denmead Café for a pot of tea and a bun. They would then sit in the [Victoria] Park. As they left for lunch and after work the porters (Dockyard Police) would carry out random searches for stolen government property. Should they be singled out for searching they would miss their tram home at lunchtime. Beatrice Hobby used to tease the porters. "Do you think I'll come out with a [pulley] block?"

Regarding pay, in 1915 the Treasury ruled that dilutees, that is, women carrying out tasks formerly the province of men, were to be paid "the usual rate of the district for particular class of work", but the following year pay differentials were related to gender.[6] Beatrice Hobby was attracted by the superior rate of pay offered by the Dockyard compared with what she had been earning in the corset industry, but asked if men in the Yard earned more than women, she replied "I expect they did, I don't know what the Dockyard men got, but they had wives, didn't they, to pay. I only had the baby to look after". A nothing if not magnanimous view. She did comment that she never worked on piece work in the Yard.

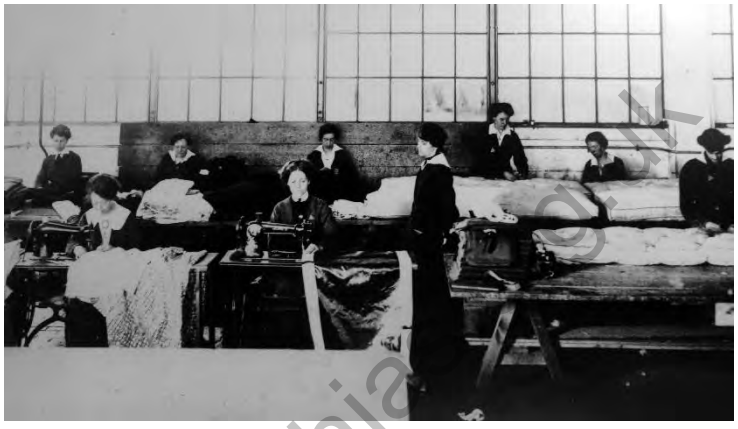


Fig 62. Mattress making was probably regarded as suitable women's work

The Attitude of Men to Women Workers

The widely held view at the time of the war was that man was the breadwinner and woman's place was in the home. The arrival of numbers of women in the Dockyard inevitably generated hostility among many men. "Oh yes, we had an awful time with them, they didn't like it because women were in there. A few of them used to say 'you ought never to be there. Stop outside. Get out of it.' " said Beatrice Hobby. When she asked a man to lift the heaviest pulley blocks which weighed a hundredweight, he replied 'You come in here to do a man's work, you do it'". But Beatrice did stand up for herself and recalled replying "You ought to be where my husband is, not stand in the Dockyard and tell us we ought to be out of it. He was killed in the trenches, he was gassed". Other girls gave as good as they got. Women were routinely sworn at; on one occasion Beatrice complained about the use of offensive language to the chargeman, who then told the offender 'In the future, just use your mouth a bit more cleaner'", suggesting that some invective was tolerable. More kindly men did exist, one telling Beatrice that she should take care lifting heavy equipment otherwise she might suffer from a rupture. Maudie Ralph commented that "the men used to laugh at me because I was only little", but it must have been good natured banter for "they used to make me laugh".

Pride and Camaraderie

Despite their treatment by male workers, there was a commendable degree of job satisfaction by the women. Beatrice Hobby enthused "We used to enjoy ourselves, and we got more money". Of her war service badge, she commented "I was proud of it, to wear a badge for doing war work. I used to think it was wonderful that women could go and do such hard work". Daisy Pervin reiterated: "You knew you were doing something useful for the war effort". Pride in their work extended beyond their own jobs; as Beatrice Hobby said "Sometimes we used to hurry up and have our tea and walk right round the Dockyard and have a look at all the Shops. They had a big steam hammer there [the Smithery] and we used to watch it work and it was very nice". Doubtless the sight of a captured German U-boat coming into the Harbour, viewed from the top of the Flag Loft, must have afforded them considerable pleasure. Beatrice Hobby simply remembered that "It was a nice sight to see". Perhaps buttressed by these sentiments and by gender solidarity, real camaraderie developed. Maudie Ralph said it all: "A better lot you could never wish for. They used to do anything for you", while Daisy Pervin expressed the belief slightly differently: "All very decent types, all classes, some were quite posh".

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The conclusion of the war might have seen the end of recruitment of women for the Dockyard, but their experiences helped to set in motion new expectations of life, certainly an unlooked for result of the First World War.



Fig 63. A group photograph of women munition workers in the Electrical Engineer's Department.

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The concrete buildings of Sway, Hampshire

Paula Freeland

I was first introduced to the early concrete buildings of Sway in the New Forest in the late 1980s at a time when they faced some significant challenges. This article tells a little of the history of the buildings and some of the challenges they faced.

The buildings were designed and constructed by Andrew Thomas Turton Peterson. Peterson was born in Wakefield in 1813 and started life by running away from school and becoming a sailor. He did well and rose rapidly, but after an illness in India, returned to England and studied for the Bar. He became a successful lawyer and, returning to India to practice, for a time was a Judge of the High Court in Calcutta. Whilst in India it seems Peterson developed two particular areas of interest: spiritualism and psychology, and buildings, their materials and methods of construction. These came together in his exploits when he returned to England.

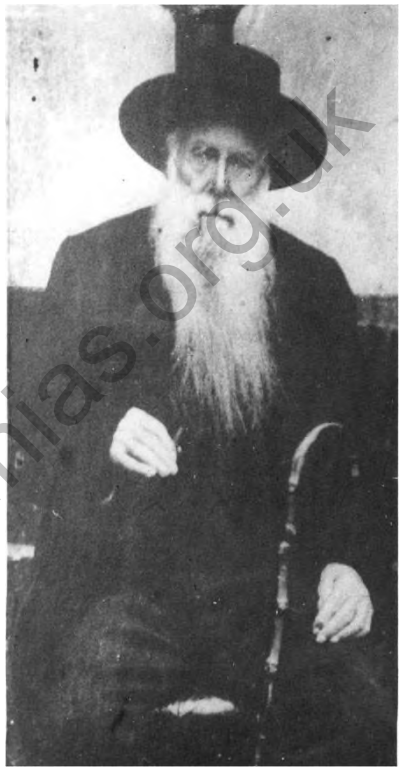


Fig 64. Andrew Thomas Turton Peterson

1868 he sought a rural location for his retirement and bought a property called Drumduan off Barrows Lane in Sway together with 100 acres of farmland. He set about experimenting with mass concrete construction. In England mass concrete was a building material in its infancy during the nineteenth century. The technology was largely untried and builders were apt to stick to the skills and materials familiar to them. Concrete buildings from this time are therefore comparatively rare. It seems that Peterson, however, foresaw the great part Portland cement and concrete would play in the future of the world's buildings.

In 1872 Peterson's life was changed by the arrival of Mary Ann Girling and her followers who became known as the New Forest Shakers. It was through them that Peterson's researches into spiritualism developed. He met and sat frequently with a medium in London, and his spiritual account says that he had, by 1885, nearly 1000 spiritual communications and 150 spirit drawings. He recorded everything that was said to him. He claimed that many well known people had spoken to him through this medium and it was against this backdrop that he conceived the building of a big tower, claiming to have received direction, through his medium, from Sir Christopher Wren.

So construction of a home, the tower and a range of other buildings started in this rural backwater. The 1867 OS map of Sway shows Barrows Lane before Peterson's arrival, scarcely populated, with only a handful of properties.



Fig 65. The entrance to 'The Towers' showing the concrete gate posts and boundary wall.

Peterson's first experiment in concrete was a large house for himself and his family. By 1881 the census shows Peterson in residence at 'The Towers' with his wife, married daughter and her husband and their child, and various staff. The building today is known as Arnewood Court. At 'The Towers', Peterson built a high boundary wall and new road from Flexwood Lane to the front entrance of the house and a lodge to the south at the entrance to the grounds. Behind, to the north he built a coach house and stable range and another lodge.

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Images caught in a casual visit to the area are dominated by the enormity of the tower. However, Peterson was equally interested in all the structures on his estate and constructed numerous buildings all using concrete. These included extensive lengths of boundary walls, an extension to Drumduan Farmhouse together with an attached outbuilding which served as a dairy and a model pig farm, as was popular in the day. He also constructed a number of other houses known to include Tower Lodge, at the entrance to the main tower, The Orchard, Hollywood and Hollywood Cottages close to the tower, and Stud Farmhouse with its outbuildings and walls a short distance away at Mead End.



Fig 66. An old postcard view of the concrete buildings with the small trial tower on the left and the main tower on the right

The area was very poor with high levels of unemployment and with local families on poor relief. Peterson was a philanthropist and employed forty of these poor unemployed people on his building project, paying higher wages than the local farms. The project allowed Peterson to experiment with concrete and at the same time relieved hardship in the area; almost a nineteenth century job creation scheme.

The story goes that when his own house was complete he was concerned about the labour force he had developed, having soon become the largest employer of labour in the area. He sought spiritual advice regarding finding work for the unemployed.

In 1875, before work commenced on the main tower, Peterson experimented with a smaller tower in the grounds of The Towers. He started work on the main tower in 1879 and is believed to have finished it in 1885. The appearance of the area must have changed dramatically with Peterson's arrival, captured on the 1909 OS map and brought to life in the adjacent picture (Fig 66). The high walls and the towers, dominating the soft rural landscape, must have had quite an austere and remarkably different appearance. One wonders what the locals must have thought!

During the twentieth century there was very little new building undertaken in the settlement other than one or two infill properties and new agricultural buildings, so Peterson's buildings have remained the focus of the area. Sadly many of the buildings fell out of use and into disrepair in the latter half of the twentieth century and therefore faced some significant challenges.

The tower has to be one of the most striking landmarks in Hampshire. In the form of an Indian style campanile; the whole building has an Indian air about it, from the surfaces, domed roof, bold cornices and slender lancet arches. To the north a hexagonal form is built onto the main structure containing a spiral staircase inscribed in a 9 ft (2.75 m) circle with about 330 steps. The tower is 198 ft (60 m) high to the start of the domed roofed octagonal observatory, with a full height of 218 ft (66 m). At the time of construction it was the tallest concrete building in the world. It has thirteen storeys. At the base the walls are about 24 in (60 cm) thick, and in the higher storeys between the cornices, 18 in (46 cm) and 12 in (30 cm). The foundations are believed to be just under three metres deep. Two porticos one on the east and one on the west extend from the base of the building.

The method of building was entirely new, built from the inside without scaffolding. When the foundations were complete, wooden frames were fitted in place bolted to vertical battens on each side of the walls and then filled with concrete. Three rows of frames were used each 18 in (46 cm) high. By the time the topmost frames were filled and rammed, the concrete in the bottom one had set and it could be removed and placed on top of the other two ready for a fresh course. So the tower grew floor by floor. It took two days to raise the form and then two days to fill it. This climbing shuttering used by Peterson was known as 'Tall's patent apparatus'. Each 'lift' can clearly be seen in the walls today.

The aggregate for the concrete came from nearby gravel pits at Hordle and apparently also from Milford-on-Sea beach when supply from the gravel pits became difficult. The mix was five parts gravel, one part sand and one part Portland cement. It was mixed on the ground and raised in buckets by a method which was

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common in India and which Peterson would have observed. A horse was harnessed to a rope at the bottom of the tower and a derrick and pulley system used to hoist the bucket as the horse walked away.

The concrete for the floors was poured into formwork made as shallow vaults at each floor level. Each concrete floor was supported on a series of iron joists with the ends turned and built into the walls, partly acting as ties, the floor slab abutting the walls with a vertical joint.

Peterson designed the building, planned and supervised the build himself. He recorded his day to day instructions to the building foreman in notebooks titled "Order books for the tower" now held in Hampshire County Record Office in Winchester. The writings are very detailed and on occasions they record Peterson's frustrations with the workforce *"I am afraid that this book, if read at all, is chucked aside and nothing thought of it ... I find that either my orders are not read, or if read, are never attended to."* Architects and surveyors can relate to this I'm sure!

Precast concrete was used in the form of building blocks for the steps of the spiral staircase, landings and the newel post and also the cornices. These were formed in moulding boards of different sizes, work taking place on the lowest four floors. An iron oxide was used to tint the concrete for the details which can be clearly seen today in the lancet mouldings and details around the windows.

Through seven years of building, in his order book Peterson continues to records frustrations with progress *"According to the rate at which we are working we will never finish." "After winter I will come to (the) horse run even if I attach 28lbs to the rope. I must have it. The boy who drives must ease the rope bottom pulley and the man who takes must hand up. I cannot listen to any suggestion it cannot be done."* Nevertheless, by 1885 construction was complete.

In 1924 Concrete Magazine featured an article about the tower, and extolled the virtue of the material and the condition of the building. *"The tower stands practically as perfect as it was 50 years ago, human neglect does not affect it; no painting is required to preserve it; the rolled iron joists have been preserved by the concrete and are perfectly sound."*

However, it wasn't long before the situation began to change. The tower left the hands of the Peterson family in 1957. By 1966 the condition of the structure was evidently giving cause for concern. A complaint from a member of the public to the New Forest Rural District Council records that dangerous cracks had appeared in the structure of the tower. So began a string of communications between the owner and the Council about the need for remedial work.

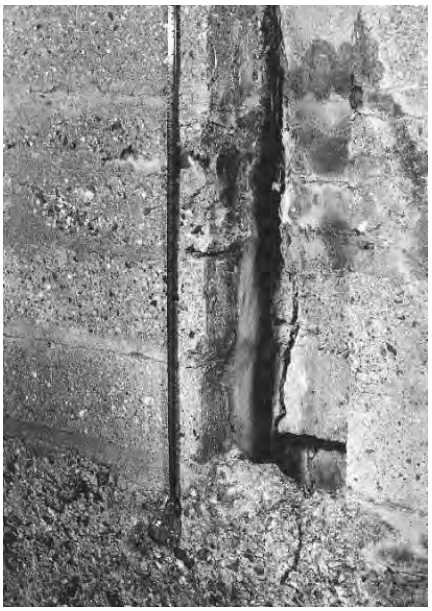


Fig 67. Cracks developing in the 1960s (East wall at the 11th floor)

In 1967 Giffords structural engineers were asked to provide a report on the condition of the tower. The report indicated that cracks were not due to foundation movement but that the structural condition was none the less a cause for concern. The report stated that action was needed to prevent the south face of the building from collapsing. It was accompanied by a drawing and photographs plotting and showing the cracking.

Immediate remedial action was recommended, including strengthening the floors by connecting steel sections to the ironwork and the walls, the addition of tie bars to prevent detachment and collapse of the external walls (particularly the south wall), securing broken cornices as well as the provision of a stout door to the staircase entrance and regular maintenance and inspection of the structure.

Communications continued with the New Forest Rural District Council writing to the owner, pointing out the condition of the structure and asking him to put remedial works in hand, but without success. In 1973 the building changed hands again, still in need of repair; but now firm plans began to be made for the work and its funding.

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Fig 68. The tower in the 1980s with cracks clearly evident

Much of the failure was due to water ingress and gradual rusting of the embedded ironwork in the floors, particularly at the beam ends. This was leading to both cracking and the loss of sections of concrete. By the mid-1980s, the extent of deterioration was threatening the structural integrity of the building, dividing the once integrated box-like structure into a series of independent elements. Extensive vertical cracking was occurring right through the thickness of the walls and floor slabs were cracked above the lines of supporting ironwork. Large sections of concrete had been lost adjacent to window openings. Ironwork throughout the building had suffered from the loss of section due to surface rusting, weakening the floors. A critical situation was reached: The ninth floor had to be propped and bracing and shoring was installed in the worst affected areas. Also at a lower level the asphalt covering the barrel vaulted roofs to the porticos was showing signs of weather penetration.

During the mid to late 1980s a major programme of repair was embarked on, funded by the new owner, with support from New Forest District Council, Hampshire County Council and English Heritage, to restore the structural integrity of the building. Work started internally with the worst affected ninth floor. Loose and weak concrete was cut out from around the edges of the floor, the steelwork examined and severely corroded areas cut away and re-welded with new sections with fish plates. New supporting steelwork was fixed below the slab and concrete shuttered and poured to complete the repair. The top of the floor slab was then made good. Inspections followed for each floor, either necessitating similar work or, where the cracking was less severe, concrete left intact and cracks grouted.

In the walls, resin repairs were carried out to the smaller voids and formwork constructed for concrete repairs and grouting to larger cracks and voids. New diagonal steel tie bars were inserted, threaded through plastic sleeves fixed in the repairs, with steel plates bolted on the external face of the concrete and turn buckles used to tension the bars internally.

Externally, working from the top down, loose material was trimmed out from the voids; small cracks filled to a depth of an inch. Larger cracks and voids required grouting, formwork and concrete replacement. Repairs to mouldings around the windows were built up in successive layers. Replacement ties were also added around the cupola.

With works complete, the building now needed a use. Generally, of course, the best way of securing the upkeep of historic buildings and areas is to keep them in active use. For the great majority this must mean an economically viable use. New, and even continuing, uses will often necessitate some degree of adaptation.

Judging the best use is one of the most important and sensitive assessments that local planning authorities and other bodies involved in conservation have to make. It requires balancing the economic viability of possible uses against the effect of any changes they entail in the special architectural and historic interest of the building or area.

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In principle the aim should be to identify the optimum viable use that is compatible with the fabric, interior and setting of the historic building. This may not necessarily be the most profitable use if that would entail more destructive alterations.

The best use will very often be the use for which the building was originally designed, and the continuation or reinstatement of that use should certainly be the first option. But not all original uses will be viable or even necessarily appropriate so finding new uses for some historic buildings can be challenging, as of course was the case here. So, what do you do when your building is 218 feet tall and consists of 13 storeys each served by a narrow spiral staircase?

Building and fire regulations are the first challenge when a building was not constructed with these in mind. Solutions to upgrade the structure to meet requirements such as insulation can be more straightforward than the issue of access and means of escape. At the tower this meant that only the lower storeys (essentially those up to which a fire engine might access) could be used properly.

In 1991, with the extensive repair programme complete, the owner put forward plans for the use of the building as a restaurant with accommodation. There were rooms for eight guests to sleep and the ground floor could accommodate 18 diners. The conversion used the ground floor as dining and kitchen areas and the first four floors to provide double bedrooms with en-suite facilities. New windows were designed and the building fitted out to provide a high standard of accommodation, all within the existing fabric and therefore all essentially reversible if one wanted to do something different in the future.

This was a good plan, but the project was short lived and in 1994 this part of the tower became a private home. The adaptation from restaurant to home was relatively straight forward in building terms and whilst it was at odds with general planning policies in essentially forming a new independent house, it was acceptable as an exception in securing the future of this important listed building.

In the higher storeys, the development of new technologies has also resulted in a use. The height of the building has attracted the mobile telephone operators and their telecommunications equipment. Consequently, a number of operators have equipment installed on the tower. They cannot mast share, which is unfortunate, as equipment has specific requirements in respect of lines of sight and separation, hence the locations. Views may differ as to whether these detract from the appearance of the tower or are incidental to it.

Returning to Mr Peterson, he intended that two oblong tables placed in the basement of the tower would be the final resting place for him and his wife. Mrs Peterson however refused her consent and was laid to rest in Sway parish churchyard in 1889. Peterson died in 1906 at the age of 96 and his ashes were placed in an urn on one of the tables. They remained there until the tower was put up for sale in 1957 when they were removed with the permission of the Home Office and buried with his wife in her grave in Sway parish churchyard.

Finally, to touch on how these buildings and the area are protected for the future. A number of the buildings are listed buildings given their special historic and architectural value. Indeed, the tower itself was listed grade II* in 1975, recognising its importance to the nation's built heritage – only about 6% of listed buildings are grade I or II*. The small tower, Arnewood Court, the coach house and north and south lodges, Drumduan Farmhouse, the piggeries and Stud Farmhouse were all grade II listed in 1987. Concrete boundary walls to any of these structures are protected too as curtilage to listed structures.



Fig 69. 'Arnewood Court' today

Arnewood Court (The Towers) was the Peterson family home until 1939 when it was the used for a time as a hostel for children evacuated from the Southern Grammar School for Boys in Portsmouth. The boys' education

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was able to continue at the county school building. The house was subsequently subdivided into apartments as it exists today with the surrounding gardens intact and therefore retaining the building in its setting.

The south lodge to The Towers now has an independent residential use. The original form of the small single storey entrance lodge is still discernible, but, typical of what has frequently happened to this type of building when separated from its original estate with the intention of becoming an independent private residence, it has been extended to form a larger house.



Fig 70. 'Tower Hall' in the late 1980s showing the balustraded parapet and the small trial tower behind at the right.

It is interesting that in the latter part of the twentieth century, when the condition of the tower was such a cause for concern, the condition of some of the other buildings designed and built by Peterson also deteriorated. This included Tower Hall as it is known today, formerly the coach house and stables, the north lodge to the Towers, and the small trial tower in its grounds. In the late 1980s the buildings had limited use in connection with the adjoining agricultural enterprise, a turkey farm. Although in deteriorating condition, the substance of the coach house and stables remained, as a result of their substantial concrete form and key features, particularly the moulded cornice topped with a balustraded parapet. The north lodge, not dissimilar to that to the south, and the small tower were key features in their own right.

The site was vacated and planning permission sought for new uses. The planning position advocated a mixed business use on the site in a combination of these and the other more modern buildings. However a case was made for residential use in the historic concrete buildings in relation to both the cost of restoration and minimising the impact on the historic fabric. The lodge itself already had, of course, domestic features and similarly the coach house in respect of spaces and window openings, particularly at the upper level where the building had originally provided accommodation. Conversion in such circumstances was a practical proposition. Essentially, the scheme was able to fit largely within existing spaces and indeed had to, as the internal subdividing walls and floors are also of concrete and an integral part of the structure. Here, whilst new windows and doors in particular required careful detailing so that they did not appear at odds with the building, the strength of the form of building and its materials meant that the scheme would not impact adversely whilst accommodating this new use. In 2004 consent granted for conversion to a house.



Fig 71. 'Tower Farm' in the late 1980s showing the barrel-vaulted concrete roofs

Perhaps more controversial as part of this scheme, was the decision to link the small tower to the coach house with a glazed structure which also skirts around the base of the tower. The tower was in need of major repairs, not dissimilar to the main tower, with cracking clearly evident. A viable and sustainable use was needed to secure the long term future of the building and this was realised by linking it to the other buildings on the site.

At Tower Farm, the model farm complex showed a similar deteriorating condition at around the same time. As well as the range of two bay farm buildings, the complex also included a two storey farmhouse in which,

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unusually, the vaulted roof was uncovered. With the exception of outbuildings, all the other Peterson buildings were at some time roofed with more conventional slate pitched roofs over the original vaulted form. In 2002 planning permission and listed building consent was granted for a change of use of the buildings to support a mixed use of office, light industrial and house with ancillary storage and garaging. This linked to the ornamental fish rearing activities which had already developed on part of the site and so secured a future for the buildings.

As mentioned earlier, a little way away from the Barrows Lane group is another of Peterson's buildings, Stud Farm House, a substantial tall house, elegant despite its typical Peterson austerity. Once again, in the late 1990s, the condition of the building was cause for concern. As with all historic buildings the need to heat and ventilate the building adequately and ensure surfaces are able to breathe was particularly evident. The open fires were no longer used and the chimneys presumably blocked. A large house, only the parts used had local heating, with windows firmly close to conserve heat. The then elderly owner had, at some time previously, been encouraged to coat the exterior in a waterproof plastic type paint which no doubt has been sold to him as the cure for any damp problems. The result; the walls internally were very damp and condensation was a significant problem. Water ingress from sources needing to be investigated was all too apparent.



Fig 72. 'Stud Farm House' today. A pitched slated roof covers the concrete barrel-vaulted roof

A little later, when a new owner took on the challenge of the building, it was possible to address many of the problems, not dissimilar to other historic buildings. Fireplaces were opened, walls were repaired with lime plaster, heat and ventilation was provided throughout the building and rainwater ingress addressed. The possibility of drylining the walls was considered but the house retained its original joinery so it was decided against this. It would have been a great shame to lose such features as the building was essentially intact as built.

Services provide a challenge too of course and in these buildings – lighting for example – the vaulted ceilings and solid concrete floors provide no opportunity for ceiling lighting. Wall lights were possible but involved much heavy duty chasing, with the alternative of good old fashioned freestanding lamps.

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Eling & Beaulieu Tidemills: Restoring and Learning from the Past

David Plunkett

Eling Tide Mill was restored to working order between 1976 and 1980. Since then it has been open to the public and has operated as a working tide mill museum, requiring regular major repairs and much maintenance. Beaulieu Tide Mill has, from its closure until 2006, been unoccupied. The fire of February 2006 resulted in an appraisal and plan for its re-use. Restoration between 2010 and early 2014 will result in occupation by a tenant. Its future will incorporate commercial use with a static display of the machinery.

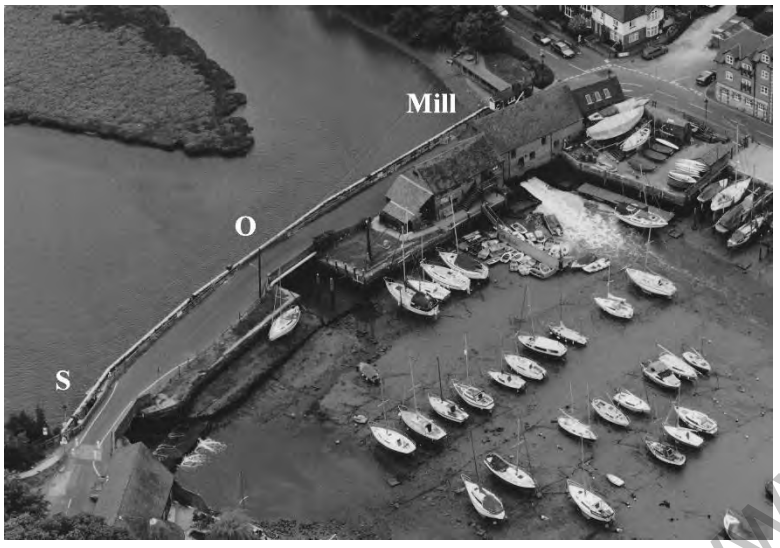


Fig 73. An aerial view of Eling Tide Mill on its causeway. The tidal pond is on the left. It is low water and the Mill (top right) is operating. The 'Sea Gates' (S) (bottom left) are closed. The 'Tumbling Bay' or overflow weir (O) is in the centre.



Fig 74. Eling Tide Mill viewed across the tidal pond

The early history of the two mills

Eling, as an early manor, was owned by the Crown in Saxon and Norman times. It was at a strategic crossing place of the lower River Test with Southampton Water and the Eling Creek crossing to the New Forest. The earliest Eling Creek crossing was probably a 'wadeway' in Roman times which developed into a raised causeway and mill dam.

Following the Black Death, the Bishop of Winchester (William of Wykeham) gave much of Eling Creek as an endowment to found his College of St. Mary at Winchester in 1382. The College farmed it out, usually to wealthy merchants who incorporated the Toll Bridge fees over the mill causeway, in return for an annual rent. Tenant millers were installed who also collected the Tolls.

The mill slowly became less commercial and was largely unused by 1940. It had ceased operation by 1941. It stayed much that way until 1975 when Winchester College sold it to New Forest District Council for a 'peppercorn sum'. During the following five years, with support from many sources, the mill was returned to full working order and opened to the public in May 1980. The Eling Restoration programme has been documented in various publications [1-6].

Beaulieu Abbey was an early monastic foundation at the tidal head of the Beaulieu River. As it grew in wealth and size, the river crossing became more important and the causeway and an earlier mill developed just west of the current old gatehouse to Palace House. A village community developed on the south side of the causeway.

Following the Dissolution of the Monasteries, the causeway needed to be maintained but the old mill fell into disuse and was replaced by a new tidal mill on the causeway with improved water control to the existing pond. This structure was added to (and developed) over the years by the Beaulieu Estate, to include an enclosed courtyard and substantial miller's house. This is largely as the site remains today with the central core of the mill the oldest timber structure. The various rear stores, dock and extensions also remain largely as built. When the last tenant miller left in 1942, the building was simply closed up, used as temporary stores and maintained generally weatherproof by the Estate. By the year 2000, it was on the 'English Heritage Register of Buildings at Risk.' Although the Estate had a programme of repairs, it had not advanced very far when an arsonist set fire to the property in March 2006.

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Similarities at each site

Both mills have ancient mill construction below, or adjacent, to the present buildings. Both were early river crossings near early ports or landing places at the head of different river systems. Both were associated with New Forest trade, in particular local shipbuilding, and coastal trading and transportation by sailing barge and smaller merchant vessels. Both, fortunately, missed out on later major industrial development by the Port of Southampton.



Fig 75. The collapsed roof of Beaulieu Tide Mill after the fire

Our earliest record of an English Tide Mill is dated to AD 692 for Ebbsfleet Mill in the Thames Estuary at Northfleet. The debate still progresses on a possible Roman Tide Mill on the River Fleet in London. There is a long history of developing tide mills in the Solent and the Isle of Wight from 12th century onwards. The Solent has a favourable tidal amplitude in the range of 3.5 to 5.0 metres with sheltered estuaries and rivers. In the 18th & 19th centuries in particular, the demand for good flour increased considerably in line with population growth and with the expansion of the British Navy and merchant shipping.

The demise of the tide mill

Of the total recorded tide mills (22) in Hampshire and Isle of Wight, only six survive as any significant mill structure; only six have control of a tidal pond; and only two retain any mill gearing or machinery. These last two mills are Eling and Beaulieu. No one cause, it is fair to say, is responsible for their loss over many centuries. This account cannot cover all the tide mills of Hampshire and the Isle of Wight, so is restricted to the facts surrounding the two mills in question, and a few more chosen examples. Only where the historical documentation is extensive can one make a good comparison.

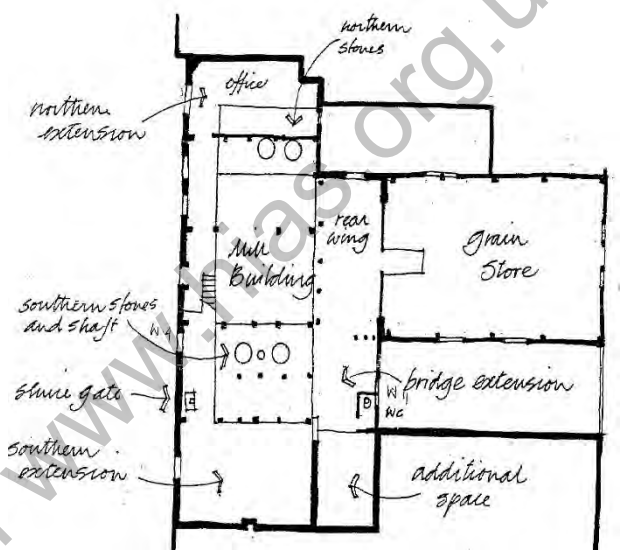


Fig 76. Ground floor plan of Beaulieu Tide Mill

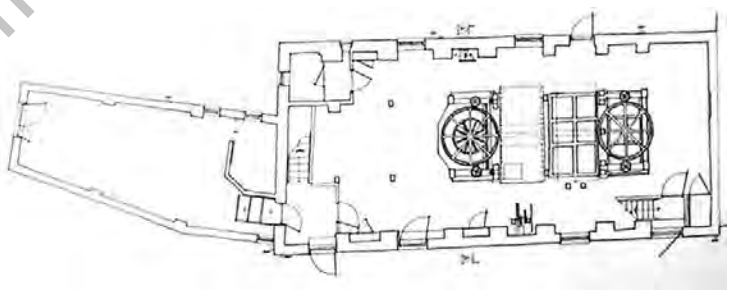


Fig 77. Ground floor plan of Eling Tide Mill

Revenue from renting out wind or watermills, was considered good business between the mid-17th century to the mid-19th century but became increasingly difficult by 1900 in many parts of Southern England. The Industrial Revolution played its part as all forms of industry struggled for greater efficiency and greater productivity. The standard rural mill, with two to four pairs of millstones, became un-economic and the addition of extra machinery to increase productivity hardly helped in most cases. The efficiency of water turbines played its part in extending the life of many mills – including tide mills, such as Ashlett Mill (rebuilt 1816), at Ashlett Creek. Beaulieu attempted to use this route to greater efficiency but only replaced one water wheel with a turbine, leaving one water wheel with an improved iron hurst frame. This turbine was not commercially successful for very long and went out of use, to be replaced by two pairs of stones driven by an 8 hp (6 kW) electric motor. This remained in use until around 1942.

Meanwhile, by the mid-1890s at Eling, the tenant miller struggled and chose not to update to turbines but to modernise the water wheel and gearing with the assistance of Joseph J. Armfield & Company, Engineers, Vale of Avon Iron Works, Ringwood. Armfield's were one of the leading millwrights and engineers with their own foundry, serving all of England and Wales. They were renowned for their "British Empire" turbine. By 1900, very few mill owners kept to waterwheels when the engineering industry had opted for the latest ironwork, turbine installation, roller milling or electric power.

The two Eling 'improved' waterwheels and main gearing, installed about two years apart, were of iron with Poncelet floats (or curved paddle blades) with the latest water control. This new lease of life only lasted about twenty five years before it was necessary to change gradually to producing only animal feed stock in order to maintain the business. Most

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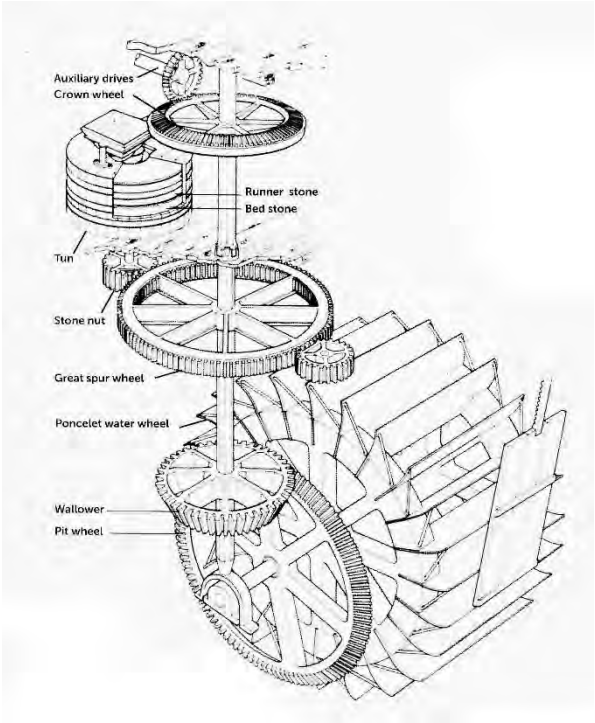


Fig 78. The machinery layout at Eling Tide Mill

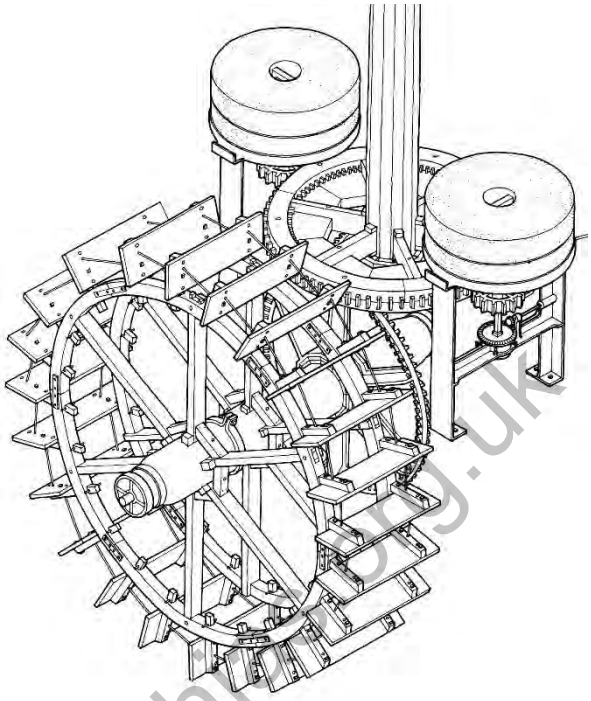


Fig 79. The machinery layout at Beaulieu Tide Mill

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of the bulk flour production in the Solent area was, by then, handled by the Rank Flour Mills in Southampton Docks and most of the grain came from overseas. Then, in 1936, with worn out waterwheels and main gearing, Eling entered the final phase of producing only animal and poultry feeds using a Blackstone 10 hp (7 kW) oil engine at the eastern end as the power source. Line shafting was installed to drive a series of ancillary machines, consisting of the following: a 'Dreadnought' plate mill, a roller crusher and a vertical meal mixing cylinder. Beaulieu had probably installed its animal feed plant and additional sack hoist at the same period.

Water supply and control

Most people understand the process of delivering water to a water wheel and using the power extracted to run machinery. With a tide mill this process is a little more complicated. Tide mills were built on sheltered tidal estuaries or creeks by forming a dam or causeway to impound the high tide. The bigger the tidal range, the taller the dam needed to be. The size of the tidal pond varied enormously but was generally in the range of one to five acres (0.4 to 2 hectares). Some ponds had added fresh water to supplement the sea water. Many did not. Both Eling and Beaulieu were fortunate in having additional fresh water input with both impoundments of similar size, and a similar tidal range.

Water levels in the pond were controlled by traditional, top hung 'Sea Gates' with automatic flap valves or 'hatches' in the upper half to admit the incoming tide (under pressure) and hold back water at a predetermined level, to allow operation of the mill machinery when the tide ebbs. This would normally allow the mill to operate over a period of 4 to 6 hours per tide, twice in each lunar day. This has been revised in modern times at Beaulieu where the Environment Agency operate different modern sluice gates and no water flows through the mill.

At Eling, the water control was restored to the early 20th century model under the full operational control of the mill. The large 'Sea Gates', powered electrically by 'Rotork' actuators, were renewed in 2006. However, the conditions of water impoundment are set by the Environment Agency who have digital tidal gauges installed, with remote sensing, at the inlets to the penstock and to the tailrace from the mill. When the ebbing tide drops below the waterwheel axle there is sufficient head of water to run the mill. As time passes, the low tide turns and floods slowly back in, eventually slowing the waterwheel. This milling period, can be as short as one hour (at neaps) or greater than seven hours at spring tides.

Were it not for the mid-18th century rebuilding at Eling, the building construction and facades may have been rather similar to those at Beaulieu. Much of the brickwork elevations at Beaulieu are about fifty years younger than at Eling but more core timber framing survives at Beaulieu. There are, in effect, numerous differences between these two mills but also subtle historical similarities in parts of their core mill construction.

Conservation and restoration

Eling had been through a major restoration to working order between 1976 and 1980 when it first opened to the public as an operational tide mill and museum in May 1980. It has generally been open for five days per week, every month of the

year, but this was extended to seven days per week in the main summer months. More recently, it has closed from late December until mid-January each year to ensure staff annual holiday leave is used. This downtime also assists with maintenance and repairs.



Fig 80.The wallower and pitwheel at Eling. The Poncelet floats on the waterwheel can be seen at the top left of the picture. The pitwheel was replaced in 2013.

By being the only fully operational tide mill, all year round, maintenance requirements are high and repairs are frequent. Over the last ten years many operational parts have required repair or replacement. Over the past fifteen years the frequency of ground floor flooding has increased with inundation levels of over 200 mm not unusual. Flooding is not simply a matter of an extra high tide but depends on a combination of factors. These range from abnormal spring tides, sea surge due to gale or wind factors, low barometric pressure, up-river rainfall, to fallen trees and river debris.

Beaulieu is fortunate in, usually, not having all of these adverse factors; it is rather more sheltered in respect of sea surge at least. The fresh water catchment areas of both mills are similar in size. In fact the highest drainage point of both the Beaulieu and the Bartley water systems are only about a mile apart in the New Forest. Ground floor flooding at Beaulieu has been rare in the past, but times are changing as we write. The roadway outside is over 350 mm higher than the floor inside, while at Eling the roadway outside is about 260 mm above the floor level inside.

The dreadful fire at Beaulieu in March 2006 was a major blow to the preservation and repair programme being prepared at that time. The Hampshire Mills Group provided volunteers to screen the burnt floor debris to salvage any mill parts and fittings. These were carefully placed in store and are available for reuse or display in the future.

Restoration at Beaulieu

The Beaulieu Estate managed the restoration with their Clerk of Works, Andy Phillips, as a time controlled financial project, owing to the low insurance payout in relation to the costs of the project as a whole. A forest of steel shoring and scaffolding was inserted internally, while the public saw only the very visible external scaffolding and temporary over-roofing. The foundations and sub-tidal consolidation around the penstock and former sluice gate were the first stages to be completed.



Fig 81. Following the tides down and working mainly around spring tides, meant that over a period of a year and a half, the below ground structure was rebuilt and capable of supporting the 'yet to be started' mill above.

A prospective tenant was sought to provide future revenue which would allow the core mill area to be restored to a high heritage standard while the peripheral areas beyond could be tailored in some way for the use of the new tenant. With good architectural detailing and with planning consent in hand, the work progressed month by month, often with only two or three local craftsmen contracted to progress the major timber framing, floors and roof. By early 2013, the old mill core structure was largely complete, including much insulation and areas of the boarded internal roof and the wall lining. The right and rear wings of the former mill became the centre of refurbishment, on two floors, as office accommodation with a new external door, lobby and staircase from the Courtyard and with the provision of toilets and modern services.

By the spring of 2014 the project will be largely complete. Later, limited access to HMG members and the local public may be permitted under controlled conditions. It is hoped to make the central core of the mill accessible to local amenity bodies in the future. At the time of my last visit, the Courtyard was being re-graded and paved, leaving much decoration to be undertaken both externally and internally. This has been a task of great importance for the Beaulieu Estate and it is hoped that the long term outcome will be financially sustainable in retaining this historic building into the future.

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Fig 82. Rebuilding of the foundations has got back to ground level.



Fig 83. Remnants of the old machinery in the rebuilt mill.



Fig 84. (left) The rebuilt bin-floor level of Beaulieu Tide Mill



Fig 85. (above) A plaque commemorating an earlier restoration of the mill sluice gates in 2001 by the Beaulieu Estate.

Acknowledgements:
My grateful thanks are due to the Beaulieu Estate and Andy Phillips, for allowing me regular access and for pictures used in preparing this article, and to the Eling Experience and Totton and Eling Town Council as managers of Eling Tide Mill.

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Wymering Manor

Andrew Mason

The amorphous suburban sprawl which now comprises the north-western part of Portsmouth seemingly has little to entice the visitor away from the celebrated attractions of Southsea and the Historic Dockyard further south within the city. There are today few, if any, remaining clues that until the middle years of the 20th century this was an area of agricultural land, beneath the slopes of Portsdown Hill, stretching from Bedhampton in the east to Fareham in the west. The village of Wymering could be found between the two, "just about mid-way along the foot of the hill",[1] within an area noted by Cobbett in his *Rural Rides* as producing the earliest and the finest corn in England. The Victoria County History states that "at the time of the Domesday survey, Wymering was ancient demesne of the crown", however, mankind has occupied the site since at least the Roman period [2] and indeed the place name itself derives from the Anglo-Saxon meaning "place of the people of Wigamaer" [3]. The extension of the Portsmouth city boundary in 1920 did much to alter the rural nature of Wymering. Indeed, the construction of Wymering Garden Suburb shortly after, saw modern housing encroach westwards from Cosham, stopping just short of the old village. Wymering Manor is located immediately to the west of the parish church of Saint Peter and Saint Paul, just a few yards up the lane from the old Portsmouth to Southampton turnpike. The manor house and the church, which with the vicarage and remaining buildings of South Wymering farm comprise the nucleus of Portsmouth's only mainland conservation area, also reflect the heart of the old village.



Fig 86. Wymering Manor from the north-west, in happier times. The Elizabethan block with its massive chimney for the central hall is centre left, with the 1860 chapel, now the music room, at the right.

The manor of Wymering is frequently confused with the manor house at Wymering; the existence of the former at the time of the Domesday survey used to justify the contemporaneous existence of the latter. The land area which formed the manor of Wymering stretched to Farlington in the east, and extended onto Portsea Island to the south. The Portsmouth to Southampton railway line passes through Wymering alongside the old sea shore with much of this area marshland up until the land reclamation programme of the 20th century. The agricultural nature of the land is confirmed in the *Inquisitions Post Mortem* of the long since passed manorial landlords, the principle activity being arable farming although there is also evidence of small scale salt panning and

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livestock farming. The *Inquisition Post Mortem* of John Le Botillier from 1310 [4] is the first to mention a manor house at Wymering. Since Le Botillier acquired the manor in 1285, we can surmise that the original manor house on the site was built within this twenty five year period.

The owner of the present manor house at Wymering is the Wymering Manor Trust, a registered charity established to repair and conserve the house, which purchased the property from Portsmouth City Council in January 2013. Sir Arthur Conan Doyle is known to have been a regular visitor to the house, which was for a time the home of Harris Bigg-Wither. Harris's proposal of marriage was initial accepted by Jane Austen, but rejected the following day. Jane Austen's brother and veteran of Trafalgar, Admiral Sir Francis Austen, was churchwarden at Wymering and is buried in the churchyard opposite the house. Queen Mary is known to have visited the house during the 1930s whilst King George V was convalescing at Bognor, and is said to have enjoyed a cigarette in the music room.



Fig 87. Wymering Manor east front. The gables mark the north and south wings of the old house with the Georgian infill hall in between.



Fig 88. Wymering Manor from the south. The gable facing is the end of the original hall block

In her will of 1592, (proved January 1593), Ellenor Brewninge mentions her "manor house at Wimmeringe".[5] This is the house which we know today as Wymering Manor, (although the structure now has a large Victorian wing to the rear as well as a number of Georgian additions and alterations). Despite the probable existence of a manor house on the site since the 13th century, the present structure dates from 1581 or shortly thereafter. Dendrochronological dating of the timbers of the house has confirmed that this is the case, and is further substantiated by surviving records at the National Archives and the Hampshire Record Office. The process of dating buildings dendrochronologically involves removing core samples from the timbers, which are subsequently analysed to reveal the growth pattern of the trees from which they were cut. Dendro-dating is commonly better known as tree ring dating since the growth rings of the tree are compared with a database which (should there be a sufficient number of rings) can be used to determine the period of history during which the growth cycle took place. The dendro-dating at Wymering was successful since a sample taken from a purlin contained bark, which when taken in conjunction with the growth rings, provides a defined point when the tree was felled. In many cases it is possible to determine a time period for felling where a heartwood/sapwood boundary can be identified. Since an oak tree rarely has sapwood that is more than thirty to forty years old, if a date can be ascertained for the heartwood/sapwood boundary of a timber, it is highly probable that the same was felled within forty years of the boundary date. The purlin at Wymering gave a felling date of Spring 1581, backed up by core samples from other areas of the building which provided a heartwood/sapwood boundary from thirty to forty years earlier. Since the frame of Wymering Manor is formed from oak, and given that oak must be worked whilst still green, (within about two years of felling), we can confidently date the building to the period around 1581/1582. We know something of the Brewninge family during this period, however it is their refusal to surrender their Catholic faith which defines their lives at this time, and also lends weight to explain the two supposed priest holes within the house.

Ellenor Brewninge's manor house at Wymering was a timber framed structure with a central hall range aligned on a north south axis. At the north and south ends of the central range were two wings emerging to the east to form a letter C shape. A large side stack constructed at the same time as the timber frame, formed principally of knapped flints and ashlar dressings, was placed centrally against the western elevation of the building.

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Packing beneath some of the ashlars suggests that they may have been reused from an earlier structure, however this example of thrift is not shared by the expense lavished elsewhere in the building. The north wing of the building is thought to have been the "high" end of the house which formed the family accommodation, with the south wing (beneath which is the cellar) forming the service accommodation. Within each wing are chimney stacks inserted at a time after the house was built, both of which contain voids, with one thought to contain a priest hole (and another priest hole alleged to have been within the side stack at the rear of the building). It is considered likely that for a time at least, the kitchens of the house would have been located separately to the south of the building to guard against the spread of fire within the main structure. The cellar beneath the south wing is formed of flint rubble, squared up with brick at its corners, and with further brick piers sunk into the walls to carry the weight of the structural timbers forming the floor of the rooms above. The quality of the masonry in the more westerly walls of the cellar is much better than those to the east, although it appears that at some time the cellar walls have all been rendered with lime plaster. The area of the cellar to the east contains a number of reused ashlars and also evidence of possible robbed out Roman material, (which is sometimes erroneously taken as evidence to suggest a substantial Saxon or earlier house on the site). Recent works have been undertaken to remove asbestos from the building prior to commencing a programme of repairs to the house, with the result that the surface that formed the courtyard between the central range and wings of the house has been exposed. In addition, a portion of brick and flintwork was observed beneath the south face of the north wing suggesting that the timber frame of the house was seated on a brick and flint plinth. The structure of the suspended timber floor of the Victorian music room is formed of timbers salvaged from the demolition of elements of the older house. Unfortunately by reusing these timbers, the builders have transferred the infestation of death watch beetle into the new build with this area now requiring substantial repair. The house as built comprised a fully floored ground floor hall with principal chamber above; first floor rooms in both the north and south wings; a cellar and further accommodation within the garrets.



Fig 89. The oldest photograph in the Trust's archives shows the chapel in the background behind the Reverend gentleman and his family.

The house sits beneath pitched roofs with gables at both the north and south ends of the central range as well as at the east ends of both wings. The roofs are constructed of paired principal rafters, supported by two runs of butt purlins on each pitch, onto which are laid common rafters. Further stability is provided by straight wind braces, commonly used during the later part of the 16th century, which also helps to confirm the period of construction. Support is provided to the principal rafters by tie beams. Void mortices in a number of the principal rafters suggest that the roof was originally further strengthened by timber collars which have since been removed. Inspection of the eaves of the garrets has revealed the ends of broad oak boards onto which new floor boards have been laid (the same is true in many areas of the house where battens have been placed to level older floors and modern boards laid to form a new floor). Two substantial jowelled posts remain in the southern corners of the hall where it adjoins the wing, with the possible remains of a further post at first floor level only in the north east corner of the hall. In the north western corner of the house are the remains of a further jowelled post. This post has been underbuilt in brick to provide support where it has rotted, yet the timber itself is hollow where it has been devoured by beetle infestation (Fig 90).

In 1959, despite having recently been listed, the condition of Wymering Manor was so poor that, combined with the attitude to conservation of the period and the urgent need for new housing, the house was marketed for sale and scheduled for demolition. Pressure from local residents however, saw a deal struck whereby much of the land immediately to the rear of the house was sold to a developer for housing, but the house itself was purchased by Portsmouth City Council and an indefinite lease given to the Youth Hostels Association. The YHA remained in occupation until 2006 when a collapse in the northwest corner of the structure rendered the

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Fig 90. Rotten post underpinned with brickwork in the lounge



Fig 91. Remains of iron strap reinforcement at junction of a rotten post in the lounge



Fig 92. Deflection of a main beam has led to the opening of the joints with the floor beams

building no longer operable as a hostel. The collapse however, resulted in the exposure of previously unseen elements of the timber frame forming the north elevation, leading directly to the upward revision of the building's listing to Grade II*. Within the area exposed can be seen a number of large mortices for close centred timber studs as well as smaller mortices that would have held timbers forming window jambs and further mortices to take mullions. The round holes between the same would have held the iron glazing bars onto which were fixed leaded lights. The area of the wall plate that held this Elizabethan window is carved on its exterior face to provide a decorative moulding above the window, with the outline of the moulded jamb still in evidence on the plate also. A further large void mortice on the post suggests a mid-rail along the northern elevation, however the insertion of a double height Georgian bow window has destroyed any evidence that might have been seen in the northern part of the western elevation. Much excellent work has been undertaken by Edward Roberts and Bill Fergie who have produced a full report and drawings into the timber frame of the house in this area, with a drawing of how they believe that this area of the house would have looked as built. The report and drawings draw parallels in the constructions methods employed at both Wymering and Sevington (near to Titchbourne) manor houses, with both buildings being from a similar period.



Fig 93. An example of the ravages of death watch beetle, a complex joint totally eaten away

That only empty mortices and the echo of a window remain is regrettable, however it is sufficient to demonstrate that the house was not only erected to serve as a family home, but also to illustrate the status of the builder. Close studding was not necessary for structural strength, but instead demonstrated the wealth and social standing of the landowner since they could afford to lavish money on elements that served no purpose other than decoration. Wymering Manor was a grand house and a showy house, built by a family of some status. Despite its fine timber frame, the early 18th century saw Wymering manor faced in brick and much of the timber frame removed. A number of timbers were reused (some of which form the floor of the lounge as can be seen from their chamfer). However, poor quality brickwork and a failure to tie the same to the now weakened structure has led to instability and deflection of the timbers. With the house now plastered internally onto laths, as well as faced in brick, the perfect moist environment was created for death watch beetle to flourish. The post in the south east corner of the hall has been exposed at first floor level to reveal the top of its jowel. It is at this point that a number of structural elements meet with the combined weight borne by them transferred to the ground via the timber post. A repair has been carried out using a bracket formed from what appears to be part of a cart tyre, however the repair is now useless since the ends of the timbers and the joint that they would have formed are missing, having been destroyed by beetle attack (Fig 91).

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The condition of the Elizabethan house is such that its repair is likely to take a number of years. To the rear of the house however, the Victorian wing is in relatively good repair, having been built in the 1860s at the time that the Reverend George Nugee was vicar of Wymering and lived at the manor. During this period the house was operated as a seminary for missionary priests and was seen by Nugee as the successor to the priory of Southwick which had been dissolved at the time of the reformation. The Reverend Nugee's chapel was constructed on an east west axis, immediately to the rear of the house in the south west corner. Adjoining the chapel to the south was the refectory, aligned north to south with a kitchen and service range to its eastern side. The service range was demolished during the 1950s, however the chapel and refectory survive. When Thomas Knollys Parr occupied the house from 1900 to his death in 1938, he converted the chapel into a music room and brought with him a number of fixtures from Giacomo Leoni's Bold Hall (near St Helens in Lancashire) which had recently been demolished. It is thought that the two very fine neo-classical door cases situated in the now infilled courtyard at the front of the building were brought by Mr Parr (Fig 95), as indeed were the neo-Jacobean barley sugar twist stair cases in the main hall. A substantial diagonally braced door survives in the south elevation of the dining room of the house which is thought to be the re-sited original front door. The method of construction is contemporary with the style of the Elizabethan period, and confirmed by the large surviving wrought iron strap hinges and ironmongery. The original paneling from the house was removed towards the end of the 19th century and relocated to East Wymering farm and its fate is now unknown. However, a 16th century doorcase in Portsmouth city museum, attributed to the farm, may actually have come first from the manor house.



Fig 94. A prop in the dining room. A prop to support the beam in the ceiling, requires a suitable beam in the floor to carry the load, and this floor beam must be propped from the cellar.



Fig 95. One of the neo-classical door cases brought in by Mr Parr.



Fig 96. The 19th century buildings today, with the refectory in the foreground and the music room behind

As Wymering Manor is one of four surviving houses in Hampshire owned by the Brewninge family during the 16th and 17th centuries, the Trust is committed to ensuring that it is understood in both its architectural and historical context. A sympathetic scheme of repair and conservation will see the house reinvigorated at the heart of the community. Repairs to the Victorian wing are underway, with a scheme for the entire building in preparation. The Trust has opened discussions with the Heritage Lottery Fund with a bid for funding to be submitted in due course. There is much work to be done, and doubtless the house still has many secrets which it is yet to yield up. However, a thorough

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understanding of the building and its history is critical to the success of the project. Wymering Manor Trust is very grateful for the backing of the local community, and the support that it has received from individuals and organisations; in particular, the Architectural Heritage Fund and English Heritage for providing funding, advice and support, the University of Portsmouth, Highbury College of Further Education and of course Portsmouth City Council for their generosity in facilitating the transfer of Wymering Manor to the Trust and their continued support of the project.

Fig 97. The west side of the Elizabethan building today, with the added Georgian bow window alongside the original massive chimney



Fig 98. The south side today with the Elizabethan house on the right and the 19th century additions on the left.

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Hampshire Industrial Archaeology Society was founded as the Southampton University Industrial Archaeology Group in the 1960s from members of the University Extra-Mural classes who wished to continue their studies in industrial archaeology. Recording has included surveys of mills, breweries, brickworks, roads and farm buildings. Restoration work is undertaken by associated groups such as the Tram 57 Project, the Hampshire Mills Group and the Twyford Waterworks Trust. In addition to the *Journal*, the Society publishes a newsletter (*Focus*) twice a year and lecture meetings are held every month throughout the year.

To join, contact the Membership Secretary:
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