

Book reviews

Jarrit Smith's 1751 Newcomen engine by Steve Grudgings. *South Gloucestershire Mines Research Group, Bristol, 2012, 275 x215mm, 56pp, plates and figs, ISBN 978095723311, £9.99, p/b.*

In 1751 a Newcomen atmospheric pumping engine with a 42-inch diameter cylinder was erected at Coalpit Heath, Gloucestershire, to drain mine workings in the Bristol and South Gloucestershire coalfield. These were operated by a syndicate in which Jarrit Smith was a one-third partner. There was nothing unusual about the principle of operation of this engine, as the author shows by comparison with other 18th-century examples. What is unusual and instructive is the survival of accounts for construction, in the Ashton Court mss in Bristol Record Office and the Middleton papers in Nottingham University Library. Also, there is a map dating from 1772 in the Bristol records which not only locates but illustrates the engine house, one of four in the district. This shows a circular-plan engine house, whereas most recorded and existing examples – such as the survivor at Elsecar, Yorkshire – were built on rectangular plans.

The core of this brief but significant and well-illustrated study consists of a commentary on the surviving bills for construction. These bills are tabulated in outline in the first chapter, following brief outlines of the history of the coalfield, of the development of the Newcomen atmospheric engine and of the engine houses in which these engines were built. The second chapter sets out a narrative of the stages of construction, deduced from the bills submitted by craftsmen and suppliers. These stages comprise the selection of the site for the shaft and its sinking in 1749, planning the layout of the engine and pump, building the engine house in 1750, building the balance beam, installing the cylinder and piston, building the boiler and grate early in 1751, and testing in April of that year. By May of 1751 the engine was in an operable state. There is a brief note on the need for repair and modification in the years 1752-1754.

The third chapter provides analysis of the part played by those individuals whose bills survive. Charles Palmer, engineer, is shown to be the central figure in the construction of the engine. He was one of a family of 'engine wrights' and a summary of his work and that

of his relations is provided in Appendix 2. Each engine which Palmer produced would be individually fitted up, without interchangeability of parts between examples. Others involved in construction were Nathaniel Arthers, blacksmith, who made wrought-iron parts for the engine and the pit-work and fettled the castings supplied from Coalbrookdale, John Willetts and George Wilding, iron merchants, the latter supplying plates for the haystack boiler from Willetts forge at Wednesbury, James Malcott, brass merchant, Thomas Hills, lead merchant, William Ponsford, supplier of leather for clack-valves, William Tily, timber merchant supplying elm planks, Robert Taylor, haulier and, of particular significance, Thomas Goldney of Coalbrookdale, who was the agent for Coalbrookdale Company castings over the south west of England. It was he who supplied the engine cylinder and other specialised castings. Hillhouse Getley & Co are also of particular interest, for the author argues that they supplied parts after the initial completion of the engine, suggesting the need for modification. The final section analyses each of the suppliers' bills in detail. Most are reproduced as tables, although the size of Charles Palmer's bill has restricted treatment to a summary. Palmer's bills are significant for the inclusion of different steels: blister steel and German steel, presumably for making wearing parts. There is useful evidence for the boring of the cylinder and the pipes having been done by the Coalbrookdale Company before delivery, in the manner described by Angerstein after his visit to Coalbrookdale in 1754.

This is an appropriate time for this book to appear: The years 2013 and 2014 will see the stripping and re-erection of the Elsecar engine, and information from comparable and documented engines has to be of value for such work. The text is informative and the photographs of numerous extant and now-demolished examples are well chosen and well reproduced. Even though brief, this is a worthwhile addition to the literature, and valuable for both engineering and materials studies.

David Crossley

The World of Iron edited by J Humphris and T Rehren. *Archetype Publications, London, 2013, A4, xiv+482pp, some of the many figs in colour, ISBN 9781904982975, £75.00/\$150.00, p/b.*

This substantial volume contains the proceedings of the 2009 conference of the same name, which was organised by members of the UCL Institute of Archaeology and attracted around 150 participants. The book contains a representative selection of the vast range of topics covered in the conference presentations, with sections on Africa, the Indian sub-continent, West and Central Asia, East Asia, Theoretical approaches to technology, Invention, innovation and inspiration, Scientific approaches to technology, and Environmental considerations.

With over 50 papers, the great novelty of the book is its scope, encompassing ethnography, archaeology, history, experimentation and scientific analysis. This is a very welcome departure from the general tendency to departmentalise the aforementioned areas of study, which makes it ever more challenging to stay abreast of developments in these related disciplines, or to adopt a holistic approach. *The World of Iron* also provides a revealing snapshot of the research priorities in different parts of the world, which have largely determined the investigative methods currently favoured for that region. These methods include widespread programmes of field survey or radiocarbon dating, archaeological excavation or ethnographic research, geochemical analyses, archaeometallurgical and morphological studies of slag or metallographic analysis of artefacts.

It is impossible to discuss all of the contributions within the constraints of this review and the papers I have chosen to highlight here are obviously influenced by my own interests. A number of papers hinted at techniques or discoveries that appear to have great future potential, such as the application of Bayesian modelling by Fyfe *et al* to a series of radiocarbon dates for successive episodes of slag heap deposition, the compositional disparity of bloomery smelting slags from different parts of Norway and Sweden, eastern Denmark and northern France reported by Arne Jouttijärvi, or the Botswana ores analysed by Wilmsen *et al*.

The highlights from the section on Africa included Pamela Eze-Uzomaka's description of the extraordinary reuse of slag blocks for communal seating and monuments in the village of Otobo Dunoka. The post-built structures shown protecting smithies and smelting installations in the papers by Pole, Schmidt, and Nkirote also gave much food for thought, as did descriptions

of stone tools being used for removing slag from cold blooms prior to forging, in a similar way to the ore processing described in several papers. In the session on Theoretical approaches to technology, Robion-Brunner *et al* provided a considered and well-organised account of metallurgical diversity in a specific region of Mali.

Moving to India, Jake Keen's tale of iron smelting in Madhya Pradesh was entertaining and informative in equal measure, covering the distractions of tasty piglet sacrifices and the beneficial effects of constructing a bed of charcoal fines in the base of tapping furnaces. Jaikishan Sriperumbudur gave a nicely illustrated account of *Wootz* steel production. Similarly Peter Halkon's paper on the perceptions of smiths and metalworkers, in the section on Invention, innovation and inspiration, included wonderful smithing imagery, and photographs of spectacular archaeological finds.

From a technological point of view, the papers on Chinese artefacts were particularly thought-provoking because they covered a multitude of iron alloys and speculated on conversion processes. This is an issue that has relevance for archaeometallurgical studies in England as well, albeit for much later periods. The two papers by Han Rubin and Chen Jianli and another by Huang Quansheng and Li Yanxiang discussed the evidence for the varied decarburisation techniques used in ancient China.

It is a significant achievement that a book of this size and scope has appeared in a timely manner, ensuring that the contributions are still relevant. The volume also contains a large number of illustrations, some in colour. The effort required to include these, which was no-doubt considerable, is fully warranted as the photographs are especially informative from the point of view of trying to interpret archaeological remains. It is a pity though, that the quality and size of the illustrations is so variable, with some beautifully clear but others distorted, blurred or unexpectedly small. My main concern with 'The World of Iron', however, is the price, which is at the high end for a paperback, albeit a very weighty one. This may deter prospective purchasers, which would be a pity because the aim of the book, to encourage holistic and inter-disciplinary working in a global forum, is a worthy one.

Sarah Paynter