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RGM at Waltham Abbey
Norman Paul

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A Gunpowder plot: The Royal Gunpowder Mills at Waltham Abbey

by Norman Paul *Grad.R.I.C.*

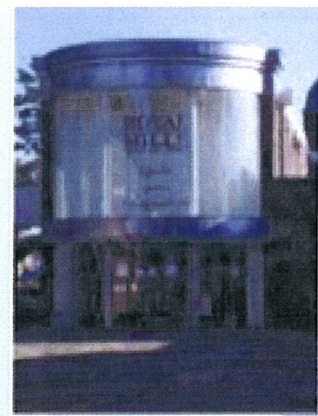
The site at Waltham Abbey has been involved in the manufacture and development of explosives for over 300 years. The first definitive reference to gunpowder mills at Waltham Abbey is contained in Thomas Fuller's "History of the Worthies of England" published in 1662. He was a curate at the Waltham Abbey Church and wrote that "there is more gunpowder made by mills of late erected on the River Ley, betwixt Waltham and London, than in all England besides." Initially in private hands from the middle of the 17th century it was purchased by the Crown in 1787, becoming the Royal Gunpowder Factory under the leadership of Lt. General Sir William Congreve and later, under his son, also named William, of Congreve rocket fame.

In the late 18th century the government was determined to control its own production of gunpowder and there was concern over the quality of powder from the various commercial suppliers. Continuous refurbishment and expansion took place and the Royal Gunpowder Mills became the standard-setter for the production of gunpowder. Under the Congreves the application of scientific methods and innovation meant that the factory was at the forefront of the gunpowder industry. Congreve the elder arranged a shoot-out on Marlborough Downs in 1810 and demonstrated that powder from the "King's Mills" was vastly superior to that of commercial competitors. In addition to this legacy of innovation and scientific application the twin goals of safety and product quality became a trademark of the Mills and continued throughout its long life. For over 100 years the sole output of the factory was gunpowder until, in the late 19th century, it was superseded by other new and more powerful explosives.

A pilot plant was set up.....and produced the RDX used in the filling of the Barnes Wallis 'Bouncing Bomb'.

Early explosives developed were gunpowder, nitroglycerine, tetryl and picrite. It was at Waltham Abbey that Sir Frederick Abel made improvements in the manufacture of gunpowder introducing a stabilisation stage which made the material stable on storage. He also led the field in the development of the gunpowder/nitroglycerine combination to produce cordite that became the main output of the factory and resulted in the gradual phasing out of gunpowder. Although the main warhead explosive (TNT) was not in production at Waltham Abbey a pilot plant was set up to prove a continuous manufacturing process which was then transferred to other ordnance factories. TNT was deemed to be the explosive of the First World War. The explosive of the Second World War was RDX (cyclo-1,3,5-trimethylene-2,4,6-trinitramine). Once again, a pilot plant was set up at Waltham Abbey and produced the RDX used in the filling of the Barnes Wallis 'Bouncing Bomb'.

Despite these changes the name remained until the end of the Second World War when it became a research and development



Main Exhibition building.



Fallow deer on open meadow area.



Hydraulic cordite press.



Exhibition Centre at Royal Gunpowder Mills, Waltham Abbey.

establishment working on modern explosive compositions and rocket propellant development. Most of the early solid propellant rocket motors used compositions developed at the establishment. This work continued until 1991 when the site was closed with most of the staff and facilities relocated to the Royal Armaments Research & Development Establishment at Fort Halstead in Kent.

Two thirds of the site (have been declared) to Ancient Monument of important industrial heritage.....

Prior to closure the site was surveyed by the Royal Commission of Historic Buildings in England (now a part of English Heritage) who declared two thirds of the site to be an Ancient Monument of important industrial heritage with 21 listed buildings as well as an area designated as a Site of Special Scientific Interest. Due partly to local pressure, ownership was vested in a charitable trust charged with maintaining the site in perpetuity. This was followed by the establishment of a charitable Operating Company to develop and run the site as a national interpretive centre and visitor attraction. Thanks to a MoD endowment of £5M and a Heritage Lottery Grant of £6.5M the first phase of an ongoing development was completed and the site was formally opened in May 2001 by His Grace the Duke of Gloucester.

In what is now a tranquil parkland setting extending over 170 acres, facilities include an exhibition centre with interactive displays, a cinema, specialist exhibitions and a café. There is an impressive range of Victorian gunpowder buildings, over 200 other buildings and structures and a canal system used for early internal transport that is a unique surviving example of an



Steam powered incorporating mill.

internal industrial canal system. The Mills also had a narrow gauge railway system and work is currently in hand to recreate a part of this with original working locomotives. One of the locos, *The Woolwich* originally came from the Woolwich Arsenal and is identical to that used at Waltham Abbey. This is currently being renovated and is on display.

Entrance to the site is through an old mounded cordite drying store and now contains the ticketing office, orientation display and shop. Visitors are then directed to the main exhibition building, housed in what was the research establishment library. The ground floor exhibition details the history of the site from the early 17th century to closure in 1991. Upstairs is a modern lecture theatre featuring an audio-visual presentation. Adjacent to the exhibition are the two oldest buildings on site; a saltpetre melting house and a mixing house. Opposite is Walton House; a two-storey building used as administration offices when the government purchased the Mills in 1787.

The "Incorporating Mills" (grinding) of gunpowder were originally powered by water wheels but, with expansion, these were replaced in the 19th century by steam-powered mills. The first of these, the Group A mills were built in 1857 but in 1861 an explosion destroyed the incorporating bays which were not rebuilt. However, the Engine House and Boiler House remain and both have been renovated with the Boiler House now being the visitors' café and the Engine House holding a display of fire safety and large transport exhibits. This includes a salvaged powder boat used in the early canal transport days and a narrow gauge railway engine. A further series of steam-powered incorporating mills were subsequently built and these remain today. With the replacement of gunpowder by cordite from the end of the 19th century these buildings were converted to cordite manufacture and then, when the research establishment was set up in 1945, further conversion into laboratories took place. During the necessary decontamination exercise after closure it was discovered that much of the original under-floor power train machinery from the beam engine to the incorporating bays was still in place and in one building this has been uncovered to show the original shaft and gearing. This was a revelation to many of the scientists who had worked in these laboratories.

Only a small proportion of buildings have been put in use in this first phase of development although all listed buildings have been put into good repair. Future development and exhibitions are being planned to build on what has been achieved successfully so far.

There is an established herd of fallow and muntjac deer, badgers, otters and numerous bird life.....(and) the largest herony in Essex....

Visitors are free to walk around the southern half of the site that contains most of the original steam-powered gunpowder mills built in the 19th century. The northern wooded 'wilderness' area is set aside as a nature reserve. This is to minimise disturbance to the abundant wildlife in that area. There is an established herd of fallow deer, muntjac deer, badgers, otters and numerous bird life that have established themselves over the years. In particular, the site contains the largest herony in Essex that must be undisturbed, especially in the nesting season. Visitors can tour the area by land train with a guided commentary. Of significant interest on the tour is the hydraulic powered Gunpowder Press House within the wooded area. This unique example has a surviving water wheel that powered the hydraulic pump machinery separated from the press by a large earth-filled brick traverse.

Each year a programme of special events take place, such as Civil War re-enactments, Military Vehicles Show, Steam Fair, VE Day celebration and Guy Fawkes experience. These are staged on the central meadow area. Additional exhibitions on specific topics throughout the season are also staged and these have included, "The Blitz", "WW1" and "Rocketry".

The Mills provide something for everyone from families wanting an enjoyable day out in a peaceful setting with much to interest the younger generation and those with a more academic and industrial archaeological interest.

The Royal Gunpowder Mills are also an unique educational resource. An extensive and popular programme of school visits takes place throughout the year with special activities for children. There is an extensive collection of archive material representing a significant resource for academic research with maps, papers, letters, technical treatises, pictures and illustrations available for study together with a large collection of unique artefacts.

There is only a small number of permanent staff and the site relies heavily on volunteer effort for its operation. Prior to opening a Friends Association was set up to assist the company and was largely made up of ex-employees who, with their knowledge and expertise were vital in the planning stage. The Association has since grown to include many other interested people and in addition to general volunteering undertakes the conception, planning, building and funding of special projects on site.

Being an open-air site the visitor season extends from Spring until late Autumn and is only open to the general public at weekends. Special group visits can be accommodated during the week throughout the year and the lecture theatre and other facilities are available for meetings and corporate events.

The author belongs to the Friends Association. Further information on all aspects of the site can be found on www.royalgunpowdermills.com