Backbarrow Ironworks – Electricity

This article looks at the generation and use of electrical power at the ironworks.

Electricity for the ironworks was generated by water-powered turbines located in the building at the north end of the site that became known as the Pugmill, but which had been a forge until the 1850s. Two vortex type turbines from Williamsons were installed there in the 1860's – one of 8.5hp in 1866, followed by one of 40hp in 1869. These were replaced in 1920 by two Francis type turbines from James Gordon – one of 12hp, the other of 49hp. In 1927 the 49hp turbine was replaced by another more powerful Francis type turbine of 120hp from Gilbert, Gilkes & Gordon. The 2004 archaeological report (1) states that "these were to provide electrical power for the site."

A valuation of the ironworks in 1941 gives us some useful information as to what this power was used for. The table below is derived from the listings and plan drawn up by the valuer. (2)

1941 valuation – electric power use

location	equipment	hp	notes
Block shop (along road past the cupola)	motor	5	For mixer
Cupola area	fan	?	
	Motor (for air blast?)	"28" (call it 10?)	Do the speech marks indicate a works number rather than hp?
	Motor (for crane)	7	
	Motor (for travelling gear)	3	
Blower house	blowers	3x75	One as spare?
Pump house	pumps	2x6.5	One on standby?
Steam engine house	motors	2x6.5	With 2 lift pumps. Doing what? One on standby?
Furnace hoist (not the main hoist)	motor	2.5	Where? Doing what?
Old dynamo house (between furnace and pugmill – used as a store))	pump	10	A spare, not in use
Pugmill	motor	9.5	For drilling and grinding machines
Bottom shop (bottom floor of pugmill)	motor	8	For generating plant
Foundry area (casting beds)	Motor (for crane)	2.6	
Bridge loft	Motor (for hoist)	14.25	
Crusher house (between casting beds and river)	Motor (for crusher)	10	For crushing slag
	Motor (for gear)	20	
Ore crusher (by the storehouse)	Motor	?	
Sidings	Motor (for winch)	?	
Site lighting	?	?	

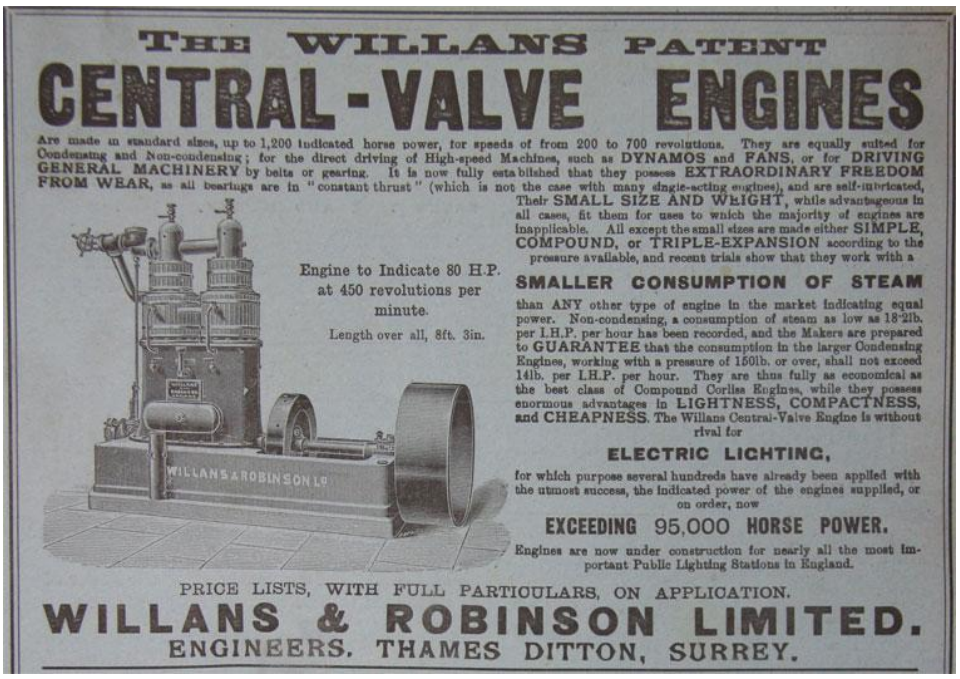
To work out from this table the total power demand it is important to note that

- some of this equipment may have been redundant by the time of the valuation, although left in situ
- some will be out of use but ready for when needed, e.g to replace its twin when that was switched off for maintenance
- some were not in constant use, e.g. the casting beds crane.

Nevertheless, even allowing for some of these exemptions leaves us with the impression that – using these figures – power demand outstripped supply. The 'culprit' would appear to be the 3x75hp blowers used for the crucial job of supplying the blast of air for the furnace at this time. Two solutions spring to mind..

1. perhaps only one of the three blowers was in use at any one time, with another on standby if needed, and another on maintenance – to ensure they could perform their crucial role at all times
2. the blowers had their own power supply rather than relying on the turbines

The first solution (only one blower in use) would just about keep the power demand within the limit of supply from the turbines, but the other is a more interesting solution. On the plan that accompanied the 1941 valuation, the room next to the Blower House is called the Willans Engine House. (This is now the empty room with the imposing basement). The accompanying text in the valuation lists in this room "The Willans-Robinson engines (*plural*), with plant condensors (*plural*) … as two separate units housed in the one engine house, and steam jet condenser in basement pit. The whole as complete installation."



Willans & Robinson Ltd, of Rugby, were manufacturers of "engines for electricity generation, especially steam turbines." (3) An example of their engines is shown above. Electric power for industrial use was developed in the 1880s, and to drive the generating equipment Willans vertical

high speed steam engines were preferred for their smooth running. Although tall, they occupied a small floor area. (4) The valuer certainly found them there in 1941, presumably generating power for the blowers in the room next door, and supplied with steam by the steam engine on the other side.

One of the questions that remains concerns the use to which the turbines installed in the Pugmill prior to the 1920s upgrade were put. Did they generate electricity then, at least in the early 1900s when hydro-electric power was commonplace? If so, what was it used for?

The equipment that remained in the Pugmill at the time of the 2004 survey which was associated with the production of electricity – governor, generator, switchgear etc. – all dated from the modern, post 1920s period. Nothing physical remains to confirm or deny the possibility of electricity being generated in the earlier period. It would have found a use by the machinery in the Pugmill, the ore crusher, the sidings winch, and for lighting.

The only evidence we do have is in the correspondence between the manager and the owners in the 1910s (5), such as …

- Mr Wilson sent his accumulators up to be charged this evening… (June 27th, 1910)
- Please send an electrician up … to have a look at the dynamo and batteries .. (Dec 12th, 1911)
- If they do not come soon the batteries might be ruined … (Jan 3rd, 1912)

Were the turbines being used to generate electricity that was then stored in batteries for use as required, by both the ironworks and the local community?

Sources of information

1. Backbarrrow Pug Mill, Haverthwaite, by Oxford Archaeology North, 2004
2. Backbarrow Furnace, Valuation of the property, 1941 at Barrow Archive Centre (BDB 2/8/4)
3. Graces Guide to British Industrial History at www.gracesguide.co.uk
4. Dictionary of Industrial Archaeology by William Jones, Sutton Publishing, 2006
5. Letters from Yakob Tornblad to Mr C E Ray of Harrison Ainslie (BDB2/3 at the Barrow Archive Centre)

Roger Baker
Backbarrow Ironworks Heritage Trust

November 2025