Worcester Cathedral
Guild of Bellringers

The bells, clock and carillon of Worcester Cathedral.

Statement of Significance

General overview

The whole ensemble of clock, carillon and bells (these since recast) was very much a great Victorian showpiece - a wonder of the age. It cost £5000 (£566,000 today) and was paid for by the Earl of Dudley.

It was a hugely ambitious project - a co-ordinated inter-disciplinary scheme (new bells, clock and carillon all at the same time) and on an impressively large scale.

Everything was done to the very highest technical standards of the time - taking advantage of the latest innovations and at the same time breaking new ground in applying skills and knowledge to create an installation on a scale not previously contemplated or realised.

Installed as part of the great Victorian restoration of the Cathedral which took place chiefly between 1864 and 1874, the clock and bells scheme (with the carillon as an afterthought) was the brainchild of Canon Richard Cattley.

Cattley who undertook the fund-raising also steered the whole project through from inception to completion, drawing on the expertise of the leading authorities of the day and working with experienced and innovative bellfounders and clockmakers best qualified to undertake such a challenging commission.

The professionals and advisers involved were A E Perkins, the Cathedral Surveyor responsible for the tower restoration between 1863-9 and Sir Edmund Beckett Denison (later known as Lord Grimthorpe) who was regarded as the great expert on clocks and bells

The principal contractors and suppliers were Collins & Cullis of Tewkesbury (builders of the under framing or 'wigwam' supporting the bells), John Taylor & Co of Loughborough (bellfounders), Joyce of Whitchurch (clockmakers) and Gillett & Bland of Croydon (manufacturers of the carillon or chiming machinery)

The Worcester scheme was the precursor of and model for others - notably the clock, bell and carillon installation at Manchester Town Hall (which included a heavy ringing peal of ten bells), the chimes at Rochdale and Bradford Town Halls and the great ring of bells at St. Paul's Cathedral – all completed in the 1870s.

Both the clock and carillon machine have seen some degree of later modification and neither remains in its completely original state.

The bells

Worcester Cathedral bells are regarded as one of the finest rings in the world. Cast in the golden years of English bell founding at Loughborough in 1928, they replaced an earlier and unsatisfactory ring, cast in 1869. The 1870 bellframe, altered in 1875, was retained.

They are the fifth heaviest ring of bells in the world by total weight, exceeded only by those at the cathedrals of Liverpool, Exeter, St. Paul's and York. The largest ringing bell weighs 48 cwt (2444kgs). The bells are tuned to the scale of B natural

The large oak bellframe was designed by Lord Grimthorpe it was installed in 1870 for 12 ringing bells, a semitone bell and the bourdon bell. This bellframe is supported by a pitch pine frame which rises from the tower piers to the bottom of the louvres which is known as the 'wigwam'. It was designed by the Cathedral's Surveyor to the Fabric, A E Perkins. The bellframe is also keyed into the tower walls and between the wigwam and the bellframe there is a softwood subframe.

In 1875 the bellframe was extended to add two new bells, a 6b and a 9# required for the new Gillett and Bland carillon machine which was installed in the room below. Then they were not used as ringing bells and no thought was given to the position of their ropes relative to the other bells.

The wigwam and the massive oak bellframe are significant as they form an integral part of the Victorian restoration. Despite this significance, Grimthorpe's bellframe is poorly designed even by the standards of the time. The rope 'circle' is unusually large and the gaps between the ropes are very uneven.

The tower is strong but not stiff. This means that the torsional forces exerted when the bells ring cause the tower to move. This movement means the bells are extremely difficult to ring to a high standard. Contrary to popular belief the bellframe does not move independently of the tower.

The bells cast in 1869 to Lord Grimthorpe's specification were not a success. In 1928 Dean Moore-Ede had the bells cast again by the Loughborough foundry, John Taylor and Co. Much of the cost of casting the new bells was defrayed by clergy who had lost their sons in the Great War. The new bells were first rung on 11 November 1928.

There are now 16 ringing bells and the 1868 bourdon bell which survived the 1928 recasting. In 2018 a new bell was added to the Taylor ring. This bell was cast by the Westley Group, which took over the bell founding business from the Whitechapel Bellfoundry which closed in 2017.

The semi-tone bells are used to give other combinations (two rings of eight and one ring of ten) in a major key. Additionally, the use of two of the semitones gives Worcester a unique ring of ten bells in a harmonic minor key. This haunting combination of bells is rung on Good

Friday, Remembrance Sunday, for the Armistice, on New Year's Eve and other suitable occasions.

Clock

The entire design of the clock was entrusted to Edmund Beckett Denison (later Lord Grimthorpe).

The clock was manufactured by Joyce of Whitchurch and represented an early collaboration between James Joyce and his brother John Barnett Joyce who had left the family firm to set up an engineering works and toolmaking company at Bradford, Yorkshire. Apparently, part of the clock was made at Bradford, the whole being assembled at Whitchurch - hence the joint attribution

At the time of its installation is was regarded as the second largest clock of its type (i.e. after the Great Clock of the Palace of Westminster)

It is a large flatbed movement, equipped with Grimthorpe's double three-legged gravity escapement - apparently the first made by Joyce who, up to then, had used their own form of four-legged gravity escapement. The 13-foot pendulum swings every two seconds.

Grimthorpe devised what we know as Westminster (or Cambridge chimes) for bells 5#, 6, 7 and 10 of the ringing peal, for which the tonic note is a full octave above the hour bell. For reasons unknown bells 7, 8, 9 and 12 were used instead. In 1870 the note of the bourdon bell was 1 ½ tones below the tenor of the ringing peal. In 1928 the key of the new bells was changed to B. The bourdon bell was retuned to A. The chimes were set up in 1928 on the wrong bells. They should use bell 4, 5, 6b and 9 and the bourdon bell to produce Grimthorpe's Westminster chimes. The current sequence of bells used for the clock's chimes is incorrect.

The clock was kept to Greenwich time and proved to be a first-class timekeeper from the start

Unusually, the main clock has no external dials - owing to the stipulation made by the Earl of Dudley as a condition of his £5,000 donation for the tower restoration - but drives two slave dials, one in the ringing room and the other (decorated by Hardman of Birmingham) high up on the east wall of the north transept

In the 1960s the clock was fitted with an auto-winding mechanism. Fortunately, the 'going' train was not replaced with an electrical unit. All the trains were preserved, and electric motors wind new weights under the clock. Until then the clock was wound every day and carillon weights were wound every day.

The clock used to strike 24 hours a day until a night silencer was fitted in the 1960s. This was replaced by a more reliable mechanism by the Cumbria Clock Company in 2013.

The clock hammers are mechanically operated by the Joyce clock by linkages of wires and cranks. Until 2006 the clock hammers and carillon hammers were manually disengaged to

make it safe to ring the bells until the Cumbria Clock Company installed a safer and reliable system.

Carillon (or chiming machine)

The carillon machine is an early example - and at the time the largest - of carillons made in England using the Imhof patent system for raising the hammers ready for release by the pins on the revolving barrel.

The Imhof system was the latest technical development of the times, and a huge improvement on the old type of chimes where the barrel had to both raise and release the hammers in one action.

In 1870, Canon Cattley spoke of it being an opportune time to install a carillon as the technology had very recently been greatly improved - both for mechanical efficiency and for musical effect.

The Gillett and Bland Carillon machine was finally installed in 1872, operating on the thirteen 1869 bells. It was extended when two further semitone bells, a 6b and a 9# were added in 1875. It is not clear whether any of these semitone bells were hung for ringing.

The additional bells gave a wider range of musical options for a tune playing carillon using the Gillett and Bland machine. John Wheeley Lea gave the machine and his son Charles paid for the two extra bells. Both members of the Lea & Perrins family sauce business.

The Gillett and Bland machine is a massive musical box which plays a large range of Victorian tunes. Mahogany drums fitted with hundreds of pins rotate in the machine like a pianola. On top of the machine is a row of levers which are connected to long rods and wires to a bell hammer 15 feet above.

The pins trigger and release a spring which then moves the levers and rods causing the hammers to strike the bells. The hammers must lift, strike and then rest. The machine plays tunes on 15 of the 16 bells in the tower. There are 30 hammers and 30 sets of levers for the carillon.

The interchangeability of the barrels enabled a far greater range of tunes to be played - the Worcester machine being capable of playing 28 tunes from the start (although only seven were installed at first) and eventually having 49 tunes on seven barrels.

In the 1960s the carillon machine was altered by the addition of an electrical device which turned the barrels. This took away the need to use the hand-wound weights.

This type of pre-release carillon is unreliable and only three are working in the UK. All require considerable and far too frequent maintenance. The pins were easily damaged many are now worn or broken. The correct and accurate playing of tunes is dependent on the barrel pins being correctly placed and the levers, rods and wires being correctly adjusted. The number of hammers and length of the rods and wires make this extremely difficult. The ‘tunes’ played rarely matched the original score for the music.

The carillon has been repaired several times in the last 50 years. It was last played in the early 1990s after an expensive restoration paid for by the Friends. It soon failed and fell into disuse. Today the restoration and maintenance of the drums, rods, wire and levers would be prohibitively expensive.

Summary

By the end of the later 19th century everything at Worcester had been eclipsed by subsequent installations. Alterations in 1875, 1928 and subsequent works have reduced it to considerable significance.

The 1870 wigwam and bellframe (added to in 1875) is of considerable significance.

In 1928 the original ringing bells were replaced by an entirely new peal tuned on the "true-harmonic" system, introduced in England in 1896 after which Lord Grimthorpe's ideas on bells became largely discredited.

The clock has been altered and does not exist in its original state, nevertheless it is of exceptional significance.

The clock hammers, rods and levers have been repaired, replaced and altered many times. They are of little significance.

The clock's use of Westminster quarter chimes and the hour bell is of considerable significance and should use the correct bells.

The whole carillon set up has been repaired many times since it was installed. It was altered to accommodate the new bells installed in 1928. In the 1990s, after a major repair and maintenance programme funded by the Friends of the Cathedral, it failed again and has not been used since. The carillon hammers, rods and levers have been repaired, replaced and altered many times. They are of little significance.

The Gillett & Bland/Imhof machine is of considerable significance as a piece of Victorian engineering ingenuity despite not working to modern standards. The skills required to build new or to repair the existing chiming barrels (which play the tunes) do not exist today nor are their businesses who do this work. The Worcester Cathedral carillon machine no longer works.

The carillon machine is significant for the Cathedral. What is the significance of the sound of a carillon to the Cathedral and City of Worcester?

The sound of change ringing bells proclaiming the presence of the Cathedral in the heart of the City's community is exceptionally significant.

This comment is from Tim Keyes' recent review of the WCGoB commissioned by Chapter:

"A bellringing operation in a cathedral is the building's most public voice and form of communication. Many of the thousands of people who regularly hear the bells will seldom have been inside the building and will never have been to a service. The bells continually remind the people of Worcester that they have at their centre an historic and vibrant place of Christian worship that serves and enriches the community."

This paper is based on research and written work by Christopher J Pickford FSA, who helped the WCGoB submit a Statement of Significance to the Cathedral Chapter.

Mark Regan, FRSA
Ringing Master, Worcester Cathedral
On behalf of the Cathedral Guild of Bellringers
9 February 2020

Appendix

Details of all the bells in the tower and the cloister.

More information can be found at: www.worcesterbells.co.uk

Bell	Weight in cwts, qtrs and lbs	Weight in kgs	Nominal in Htz	Note	Diameter in inches	Date cast	Founder
1	6-3-10	348	1468	F#	28.88	1928	John Taylor & Co
2	7-1-16	376	1308	E	30.38	1928	John Taylor & Co
3	7-2-20	391	1235	D#	31	1928	John Taylor & Co
4	7-3-25	406	1099	C#	32.5	1928	John Taylor & Co
5	8-2-19	441	980.5	B	34.88	1928	John Taylor & Co
6	10-0-6	512	922	A#	36.5	1928	John Taylor & Co
7	12-0-1	611	823.5	G#	39.5	1928	John Taylor & Co
8	14-3-26	763	733	F#	43.5	1928	John Taylor & Co
9	20-0-6	1021	652.5	E	47.88	1928	John Taylor & Co
10	25-2-10	1303	616	D#	50.88	1928	John Taylor & Co
11	34-3-4	1771	548.5	C#	56.88	1928	John Taylor & Co
12	48-0-2	2445	488.8	B	63.88	1928	John Taylor & Co
2#	7-3-3	396	1385.6	E#	30.25	2017	The Westley Group
5#	8-0-15	414	1036	B#	33.5	1928	John Taylor & Co
6b	10-2-24	545	871	A	38	1928	John Taylor & Co
9#	16-1-16	835	692	E#	44.88	1928	John Taylor & Co
Bourdon	82-3-24	4224	437	A	76.38	1868	John Taylor & Co
In cloister				A	34.25	c1480	Worcester foundry
In cloister				Eb	25.75	1641	(unidentified)
In cloister				C	30.75	c1380	William Burford
In cloister				Bb	34.38	c1380	William Burford
In cloister				G	42.75	c1380	William Burford
In cloister				F	43.63	c1475	John Danyell?
In Teaching Centre	c.5-0-0	c 560	1092.5	C#	29.25	1615	Godwin Baker
In Teaching Centre	c.8-3-0	c 445	915.5	A#	33.5	1693	John II Martin
In Teaching Centre	0-1-25	24		A	11.63	2003	Petit & Fritsen
In Teaching Centre	0-2-1	26		G#	12.25	2003	Petit & Fritsen
In Teaching Centre	0-2-12	31		F#	13.13	2003	Petit & Fritsen

In Teaching Centre	0-2-26	37	E	14.13	2003	Petit & Fritsen
In Teaching Centre	0-3-13	44	D	15.13	2003	Petit & Fritsen
In Teaching Centre	0-3-22	48	C#	16	2003	Petit & Fritsen
In Teaching Centre	1-0-16	58	B	17.13	2003	Petit & Fritsen
In Teaching Centre	1-1-10	68	A	18.25	2003	Petit & Fritsen

Note:

Five of the bells in the cloister comprised part of the ring of eight bells removed in 1868. One bell came from St Michael's Bedwardine, now demolished. Canon Cattley sold them to the antiquary Amherst Tysson who lived in Didlington in Norfolk. These bells were rescued in 1968 and returned to the Cathedral.

The two bells in the Teaching Centre were formally hung in the tower of St Peter's Sidbury.

The bell chime in the Teaching Centre was the gift of the Hughes family in memory of their son Jonathan.