

Maintenance of a Masterpiece

St Fin Barres Cathedral, Cork

**A Paper by John Burgess,
B.A., BAI (Mech Eng), M.Des. Sc. (Building Services), C Eng.**

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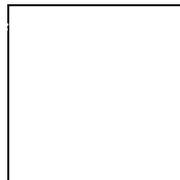
1. INTRODUCTION



Putting St Fin Barres Cathedral in context, it was built between 1860 and 1880 at a time when building was still very much a manual exercise. The machinery we have today to chisel stone to work at heights was not available back then. It is quite amazing then that not one, but 2 Cathedrals (St Colmans in Cobh being the other) of great architectural merit would be built in the same period. It is intriguing to note that while these 2 buildings looked to the past for their architectural excellence, another project of international acclaim to be built only 60 years later was to rely on totally different building materials and methods to achieve a design that was ahead of its time, Christ the King in Turners Cross.

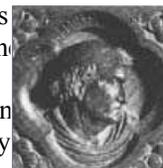
But this evening's story is about St Fin Barres and to that we turn our attention.

2. ST FIN BARRE



In the year 606, he moved to *Corcach Mór*, or the "great marsh", where he founded his monastic school on the site of the present cathedral. This site is known as *Corcach Mór* of Cork. He died in the year 623 and is remembered as the Patron Saint of Cork on the 11th of June.

The success of St Fin Barre's monastic settlement was instrumental in the founding of Cork, it being listed among the 5 principal schools up to the tenth century. In the ages, Christian worship has been maintained at this settlement through times thick and thin. More recently the medieval cathedral spire was to be the target of a 24lb shot during the siege of Cork in 1690, its



proximity to Elizabeth Fort being a little too close for comfort. However it wasn't until the demolition of the steeple in 1865 that this relic was found. The shot now hangs inside the Cathedral.

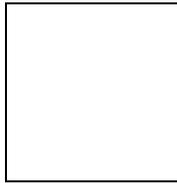
3. A NEW CATHEDRAL

In 1861, the Chapter of St Fin Barres decided that a new Cathedral would be built to replace what was perceived by all as a plain building. A competition was arranged, among the requirements of which was that the cost of the building should not exceed £15,000. The winning entry, out of a total of 68 entrants from across Europe, was inscribed "Non Mortuus Sed Virescit", ('He is not dead but flourishing'), the motto of William Burges. Burges was criticised by other architects because the cost of the towers, spires and sculptures was not included in his estimate. Times have not changed much in this regard!

The Bishop of the time, John Gregg, clearly understood that the design presented by William Burges was a vision worth pursuing. With the assistance of the local community and in particular from Crawford the brewer and Wise the distiller some £100,000 was spent on the building.

In 1865 the Bishop laid the foundation stone and on St. Andrew's Day, 1870, the building was consecrated. The towers and spires were not completed until 1879. It is difficult to estimate the value of the building in today's terms because, quite simply, it is irreplaceable.

4. THE ARCHITECT



William Burges was born 2nd December 1827. His father Alfred Burgess was a successful Civil / Marine engineer who was responsible for projects at Blackfriars Bridge, Westminster Embankment (the foundations for the Houses of Parliament, where William was to learn from A.W. Pugin), Docks in Belfast, Dover, Cardiff, among others.

Despite the exposure to large scale engineering development Burges grew up to be one of the most respected architects of his time. Somewhere along the line he dropped the second 'S' in his family name, perhaps as a means to distance himself from his engineering background! William Burges was a Gothic Revivalist and would have had his first exposure to Gothic design when his father presented him with a copy of A. Pugin's "Contrasts" at the tender age of fourteen!

At the age of sixteen Burges served his apprenticeship with the special architect to Queen Victoria, Edward Blore, in 1844 working on the Archbishop's private chapel in Lambeth Palace and later at Westminster Abbey where important 13th century structures were uncovered. And it was medieval architecture of the 13th century that formed the basis for the Gothic revivalist movement.

J. Mordaunt Crook noted in his research that the Victorian architectural profession was quite unimpressed with the new age of Iron. The Industrial Revolution had introduced a new material, and it was the subject of much debate. Edward Lacy Garbett in his 'Rudimentary Treatise on the Principles of Design in Architecture' identified 3 phases in architectural development – 'the Depressile, the Compressile and the Tensile methods' aligning with the Beam (Greek), the Arch (Gothic) and the Truss (being that of the Age of Steel). But the attempts to accept the new technology were frowned upon, Crystal Palace was not appreciated for its transparency and lack of

architectural style, instead the Victorian architects chose to return to the past for the basis of their designs.

And it was Burges who left no stone unturned in his quest to learn from past masters across the length and breadth of Europe. After some brief expeditions to Paris and Normandy, he set off on the Long Journey in 1853. He spent 2 years traveling mainland Europe, France (Beauvais, Rouen, Amiens, and southern regions), Italy (where Sicily & the mosaics of Monreale were of interest). He returned to Europe many times again and visited Constantinople (Istanbul) in Turkey (Galata, the mosques of Santa Sophia and Suleiman the Magnificent) and Greece to witness Athens. He studied oriental art from India to Japan, all the time drawing, measuring and preparing details for use in construction of later projects.

In 1855 Burges made a prize-winning design for Lille Cathedral and again he entered a winning design in 1856 for the competition to build the Crimea Memorial Church in Constantinople. But neither building was carried out; his first important ecclesiastical design to be realised being St Fin Barre's Cathedral, Cork, which he began in 1862.

During the design & construction of St Fin Barres Cathedral, Burges met the third Marquis of Bute in Cardiff, Wales in 1865. The Marquis was of a similar mind to Burges in relation to the gothic revival movement and with his wealth, Burges was able to undertake the restoration of Cardiff Castle and Castell Coch (pronounced 'Cork' and also located in Cardiff).

Burges continued with designs for many other projects, small and large, from furniture to large scale developments such as the design for Trinity College Hartford. He was an incredibly determined and focused individual. He maintained records of his life in small pocket sized diaries, writing, while wearing his myopic glasses, so small that one needs to use a magnifying glass to decipher his text. He had an interest in birds, keeping an aviary at his home, the Tower house in London. While an eccentric and idiosyncratic man, he had a sharp sense of humor, which quite often spilled over into his design.

Burges worked with the Marquis up until his death, probably from bronchitis and overwork, on 20th April 1881 at 53 years of age. He had never married, time was in scarce supply, 'a commodity that can never be regained' and art always had his first priority.

At a memorial service in the Cathedral, the Bishop delivered a fitting eulogy :

"It is a solemn thought that the creating mind ... of that gifted man – is now at rest, that no more work will be done by the genius who, before one stone of this magnificent Cathedral was laid, planned it all and saw it in his own mind."

The Resurrection Angel on the pinnacle of the sanctuary roof was a gift from Burges to the Cathedral.

5. THE CATHEDRAL BUILDING

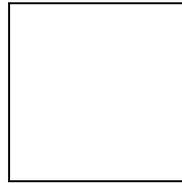
The building of St. Fin Barre's was a remarkable achievement in a time where the benefits of the industrial revolution had yet to offer any real relief to the meticulous detailing so evident in the masterpiece we see today. It took 3 different building contractors to complete it. First there was Robert Walker, whose withdrawal 2 years after the laying of the foundation stone delayed proceedings by 9 months. Then there was Gilbert Cockburn of Dublin who took over the helm from August 1867 to August 1873. And lastly Delany of Dublin completed the spires. Bishop Gregg laid the uppermost stones on the 2 western spires in April 1878, 2 months before his death. Topping out of the main central spire took place on 23 October 1879.

The Cathedral is built of Cork limestone, the interior of Bath stone and the walls are lined with red marble from Little Island on the south side and Fermoy puce on the North side. Burges maintained

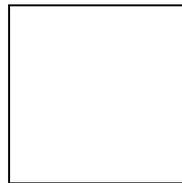
control over all the stages of the work. He designed all the sculpture, mosaics, furniture, stained glass and metalwork. Thus the Cathedral preserves a remarkable unity of style throughout.

One of the many features of this building is its size. For a cathedral, its footprint is quite small. Burges, in his attempts to overcome this shortfall, has successfully achieved a balance, externally through the design and location of the 3 spires and, internally through the expansive volume created by the vaulted ceilings of the nave, sanctuary and north / south transepts and befittingly the added 'headroom' beneath the central spire over the choir stalls.

What is most impressive about the building is the use of the different art forms to illustrate the story of Christianity in a most complete manner. One only has to take the time to 'read' the building to learn the biblical history that is so colorfully and masterfully displayed.

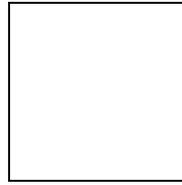


The stone-masonry is second to none. The western front, the entrance to the Cathedral, is fine sculpture on a massive scale. The rose window is 'held' in the frame by the symbols of the 4 evangelists, angel for Mathew, lion for Mark, ox for Luke and eagle for John. These were carved on site by C.W. Harrison of Dublin. The tympanum over the central door portrays the Day of Resurrection, the dead are seen rising from their graves, some being welcomed into heaven and others being turned away. Each portal has full scale figures on each side. The 4 shown here are located in the left portal are 4 of the 12 Apostles – Andrew, James, Thomas (patron saint of architects) and Matthias. In the soffit of the portal arches are representations of rural occupations, professions, and female occupations. Note the cooper, its link with the brewing and distilling industries. Over a door to the North Transept, St John is recording while an angel measures the New Jerusalem. The angel is holding a measuring stick which was the main form of measuring at the time of construction.

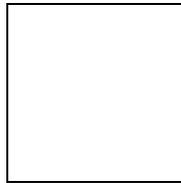


The steeple is 'supported' at each corner by 4 mystical beasts (mentioned in the book of Daniel). The north eastern side is also adorned with the rising turrets that accommodate the spiral stairs that lead up to the stormwater parapets and to the inside of the steeple itself. The steeple is an amazing feat of building engineering with 8 walls rising to meet at the apex 240 feet above ground.

In all, 1260 pieces of sculpture adorn the fabric of the Cathedral. Most were designed and modelled by Thomas Nicholls and carved in-situ by R.MacLeod and a team of local stonemasons.



The stained glass is no less impressive. The west rose window illustrates the story of creation according to the book of Genesis. The nave windows illustrate stories from the Old Testament while in the east end around the sanctuary are illustrations of the life, death and resurrection of Jesus. Burges drew up the overall iconographic scheme, the design of the windows was undertaken by Burges, Fred Weekes and H.W. Lonsdale. The clerestory windows in the Nave show the signs of the Zodiac. A series of birthday cards have been produced based on these images.



The mosaic flooring tells other stories. Composed of marble from the Pyrennees and laid by Italians from Udine, in the sanctuary or altar area, a net is shown tied down by stone at the foot of the brass railing and held up by corks bobbing in the water around the edge of the ambulatory. Different peoples are represented here - a farmer, a soldier, a child, amongst others. This story is taken from Mathew 13:47 “the kingdom of heaven is like a net let down into the sea, where fish of every kind were caught in it”.

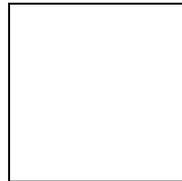
Woodwork presented another opportunity to display other messages. The Bishop’s throne, the work of Walden of London, shows the heads of former bishops at its base including that of St Fin Barre and contains a statue of the Saint in its pinnacle. The choir stalls have quaint carvings at the bench ends and also beneath the Canon stalls of small birds and animals.

Exquisite metalwork is shown in the brass railings and in the stupendous lectern, which was originally designed for Lille Cathedral, another competition which Burges won, but unfortunately was not invited to build.

6. MAINTENANCE OF ST FIN BARRES CATHEDRAL

The maintenance of St. Fin Barres Cathedral was always going to be a challenge for those who followed in the wake of Burges’s dream. The building has stood well the test of time but at 132 years old is in need of substantial restoration works. Indeed major works have already been undertaken under a programme headed “St Fin Barres Beyond 2000”.

Stained glass windows need to be protected. As part of works undertaken in the late 1990’s, the high-level stained glass windows were recamed and storm proof glazing with ventilated cavity installed. The vaulted timber ceilings were repaired and a new coat of varnish applied.



Repairs to the roof have also been completed. This work entailed the replacement of the slate and roof battens and repair to some rotting timbers in the roof structure. Lead flashings were repaired. Much credit is due to the team, supervised by Denis King and led by O'Sheas Builders, for the successful execution of a difficult repair project without incurring any damage to the Cathedral.

Marble walls have been assessed and remedial works are being undertaken by Lochplace Conservation under the watchful eye of Christopher Southgate. Re-gilding of the engraving is bringing out the memorials for all to read again, one example being that of Berthe Valentine Ducret who built the first leper colony in Burma.

7. UPGRADING OF THE HEATING SYSTEM

In the Spring of 2000 a serious leak developed which apart from threatening the integrity of the mosaic flooring, left the heating system in an inoperable state. Amazingly the system had survived 130 years of operation with only some minor changes. Approval was granted to proceed with the replacement of the heating system in August 2000. The project objectives were to replace the heating system, whilst respecting the preservation orders on the building and to deliver it in time for Christmas season of 2000, a period of only 4 months!

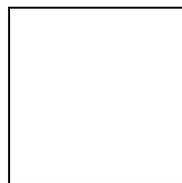
St. Fin Barre's Cathedral is a Grade 'A' listed building with the most onerous heritage and conservation requirements one could expect. These requirements apply, not only to the external facades of the building, but also to the internal fabric and layout. It is also daunting to anyone attempting a project of this nature that no matter what one aspires to, it is never going to match the original design by Burges himself.

So how does one undertake such a project?

7.1 Consultation

Following receipt of instruction to proceed by the client, the Select Vestry of St Fin Barres Union of Parishes (ably led by the Dean Michael Jackson, now Bishop of Clogher, Edwin Vincent and Marcus Calvert), final reviews of the scheme design were closed out and all comments taken on board.

Specialist conservation engineers (Christopher Southgate and Industrial Archaeologist Dr. Colin Rynne) were engaged to advise on the course of action to be taken with respect to the preservation, recording and or demolition of the original heating system. A Planning Application had to be lodged for review and approval by Cork City Conservation Department (Pat Ruane). One of the conditions of approval was to record the existing system photographically. Archaeologists (Sheila Lane and Associates) were engaged to advise on proposed routes and also to survey trenches for incoming gas mains.



Before any changes were made to the system, a full survey was carried out and a drawing of the original system produced. Indeed, it was central to Burges's design philosophy that one should "Measure much and for those who specialize in the preservation of the design and the materials in

old buildings, one literally has to get down, get dirty and understand the extent of what it is we are trying to conserve. Some of the original pipes and valves have been retained for record purposes. It was found that the piping to the pipe rack beneath the Chancel mosaic flooring had been rediverted at some stage and fed directly from the boiler house. This was probably needed to reduce the heat emitted from the highest part of system in the Chancel and provide some balance to the rest of the Cathedral.

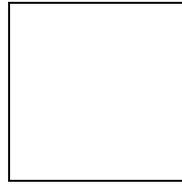


The original heating system consisted of a solid fuel boiler in an underground chamber, which circulated water using gravity circulation through banks of six-inch diameter cast iron pipes. All of these pipes were located in underground ducts and heat was circulated through floor grilles, which were strategically placed around the Cathedral.

Asbestos surveys were carried out and the insulation of part of the original heating pipes had to be removed under strict isolation and containment procedures. Specialists in video recording of drainage systems (Dynorod) were employed to inspect and record the inside of the existing chimney, as this had to be reused with a stainless steel lining acting as a flue to the new boiler system. It was evident from the videoscope that the mortar in the lining of the chimney had been eroded away from repeated brushing and reaction with the products of combustion.

8. DESIGN

The new system had to take account of existing services provisions (extremely limited, but what is so different about that today!). The boiler room is a well concealed 'hole in the ground' in which the new plant and equipment has been successfully accommodated. The most difficult architect this author has ever worked with has been dead for 120 years!!

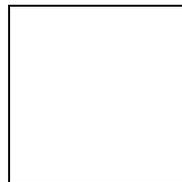


The design of the new system had to consider the method of installation as well as the system itself. In this regard, any hazards that could pose a fire risk were identified and excluded from the works. One example of this was in the selection of new pipe materials. Conventional welding methods were ruled out, and a relatively new technology employed whereby electro-fusion welding of polyethylene pipes could be undertaken without any fear of spark ignition of a fire. The flexible pipe material also provided much needed workability to enable it to be installed in the existing trenches with access only provided from the existing floor grilles.

Organ maintenance specialists were consulted and their advice taken on board. Any new heating system had to be installed such that any heating distribution network passing through the organ pit emitted no heat whatsoever. This was achieved by laying the pipes inside a reflective-foil lined 'coffin' filled with thermal insulation before having the lid screwed on.

9. PROGRAMME – (BEFORE AND AFTER)

It was imperative that the programme of works (including demolition) worked in with the operation of the Cathedral itself. Given the need for production of a design for issue to tender to obtain a competitive quote, and the need to allow for approval of the planning application, there was extreme pressure placed on the project team from the word GO.

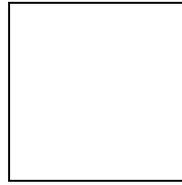


The successful contractor (Standard Piping Limited) was appointed by mid October providing just over 2 months to remove the original system, procure all major pieces of equipment and have the system installed and operating by Christmas.

Despite some minor hiccups in the last week, the system was put into operation just 4 hours before the first Carol service in Xmas of 2000 ! Visions of Burges's colorful display of Goliath's head in a dismembered state were kept in abeyance and this author lived to tell the tale.

10. UNDER FLOOR HEATING

While conservation issues always remained to the fore, the problem of heating a building with such high internal spaces and such large thermal inertia (limestone walls lined with marble panels) presented a major challenge to the design team. The solution has introduced the concept of providing 2 different heating principles, one to heat the air in a similar fashion to the original system, while the other provides a radiant effect close to the seated occupants through the use of underfloor heating. This radiant heat source helps to offset the chill of the surrounding walls and columns and provides considerable improvement to occupant comfort. The Cathedral is now being used more frequently for concerts, classical music and choral recitals, and has been used for conferring of graduates.

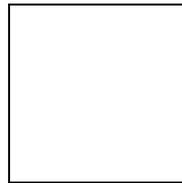


Wood scientists and timber drying specialists were consulted to determine the most appropriate method of drying the existing floorboards. It was important to identify the Equilibrium Moisture Content EMC at which the boards could be secured without having the prospect of significant shrinkage or expansion thereafter. In the end it was considered prudent to use the underfloor heating system itself to gently apply heat uniformly to the boards to reduce moisture content to acceptable levels of 14 %. This had been shown to result in considerable shrinkage and so it was decided to heat the boards while they were loose laid, with the securing of the boards only to be undertaken when moisture content was reduced to the target EMC level.

11. ENVIRONMENTALLY SUSTAINABLE DESIGN (ESD)

Of equal importance to all other aspects of the project, was the need to deliver a new system that benefited not only the Cathedral and its occupants, but also the environment. In this regard, all options available to St Fin Barres Cathedral were explored. Even the remote chance of securing a source of waste heat from the Beamish and Crawford brewery was followed up.

Eight independent heating zones were identified, 3 underfloor heating and 5 radiator. These zones facilitate heating of the Cathedral in areas when the need arises without having to heat the whole building. Outside air compensation control has been provided in a unique way to maximize low return water temperatures and in turn increase the efficiency of the boiler plant. This consists of 3 boilers, 2 of which are condensing. Primary / secondary pumping circuits have been provided.



A Building Management System has been implemented to facilitate ease of user interface and system monitoring. As well as temperature measurements, relative humidities are monitored in the Nave and in the Strongroom which houses the Burges Archive. This archive contains drawings of the Cathedral and cartoons of all stained glass windows.

An audit of fuel bills over the preceding years was undertaken to identify a benchmark performance indicator for the new system. Analysis of the first year's energy bills indicates that a reduction of 70 kWhr for every hour of operation is achieved with the new heating system. This is equivalent to a reduction of 30 tonnes of Carbon Dioxide emissions to the atmosphere over a typical heating season. Heaven will be a cleaner place!

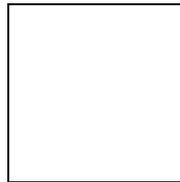
The new heating system installation is a state of the art system, which is highly energy efficient and environmentally friendly. The system was winner of the 2001 Boiler System Design Award, an annual competition promoted by the Sustainable Energy Ireland on behalf of the Department of the Environment. The heating system is quite responsive despite the large thermal inertia of the building. Further monitoring of the system will be undertaken to identify optimum zone control.

12. SUMMARY

St Fin Barres Cathedral is a special building that is of major national and international importance. Its location is synonymous with the birthplace of Cork city itself. Its design is a testament to the people of Cork in the late nineteenth century and to the architect William Burges. The architecture is one of the best examples of 19th century gothic revivalist design in the world. Despite being only 130 years old the style is distinctly medieval which reinforces the historical importance of the site.

Works planned to be undertaken in the near future include the following :

- Recaming of the stained glass windows on the lower levels,
- Restoration of the organ,
- Repair of marble panels,
- Repair of railings,
- Repair of bell tower frame,
- Recording of the Burges Archive,
- Upgrading of visitor amenities.



Maintenance of this Grade A listed building presents a challenge to all involved. City planners, conservation engineers, project managers, design engineers, contractors, archaeologists, the team involved in conservation of this building comes away with experience of working with the master craftsman himself.

The Cathedral continues its life as a place of worship, while at the same time contributing to the fabric of life in Cork City and the community at large. All are welcome to visit the Cathedral and witness the Christian story as told through the different forms of artistic expression - sculpture, mosaics, stained glass, wood carving, metalwork, painting and architectural form. Opening hours for visitors are from Monday to Saturday :

Winter 10.00am to 12.45pm and 2.00pm to 5.00pm
Summer 10.00am to 5.30pm

Cork is well endowed with a rich and colorful architectural and engineering heritage. It is important that with the success of the late 20th century in the development of so many large industrial and pharmaceutical complexes, the engineering community takes stock of its obligation to the maintenance of our rich heritage. It is with the help of projects like St Fin Barres, and other first class refurbishment works such as Fota House, that the people of Cork can look forward, with pride, to being citizens of the European City of Culture in 2005.

13. ABOUT THE AUTHOR

John Burgess graduated from Trinity College Dublin in 1984 as a mechanical engineer. He lived in Australia for 13 years, where he worked mainly in the building industry, specialising in the Design and Installation of Heating, Ventilation and Air Conditioning systems for a wide range of

commercial projects. He completed a Masters Degree in Building Services at the University of Sydney.

John has developed a wide range of experience and in particular in Environmentally Sustainable Design. Projects of significance in Sydney include the refurbishment of the old Commonwealth Bank in Martin Place (a major restoration project), the Royal Agricultural Showgrounds Exhibition Halls in Homebush (forming part of the Olympic facilities), the Department of Architecture and Design Science at the University of New South Wales (a naturally ventilated building relying on passive design principles to overcome the hot summer climate) and the Renzo Piano tower, Aurora Place. Experience in Ireland has continued unabated with work on projects such as St Fin Barres Cathedral, Crawford Art Gallery, the Millennium Hall in City Hall, Merchants Call Centre, Software Development Centre, health related projects and the UCC Art Gallery all providing a very active involvement in the Irish building industry.

John is an associate with Arup Consulting Engineers, based in the Cork office.