Canterbury Cathedral

Canterbury Cathedral in Canterbury, Kent, United Kingdom, is one of the oldest and most famous Christian structures in the world. It forms part of a World Heritage Site. It is the cathedral of the Archbishop of Canterbury, leader of the Church of England and symbolic leader of the worldwide Anglican Communion. Its formal title is the Cathedral and Metropolitical Church of Christ at Canterbury.

Founded in 597, the cathedral was completely rebuilt between 1070 and 1077. The east end was greatly enlarged at the beginning of the 12th century and largely rebuilt in the Gothic style following a fire in 1174, with significant eastward extensions to accommodate the flow of pilgrims visiting the shrine of Thomas Becket, the archbishop who was murdered in the cathedral in 1170.

Canterbury's role as one of the world's most important pilgrimage centres in Europe is inextricably linked to the murder of its most famous Archbishop, Thomas Becket. When, after a long lasting dispute, King Henry II is said to have exclaimed "Who will rid me of this turbulent priest?", four knights set off for Canterbury and murdered Thomas in his own cathedral. The sword stroke was so violent that it sliced the crown off his skull and shattered the blade's tip on the pavement. The murder took place in what is now known as The Martyrdom. When shortly afterwards, miracles were said to take place, Canterbury became one of Europe's most important pilgrimage centres.

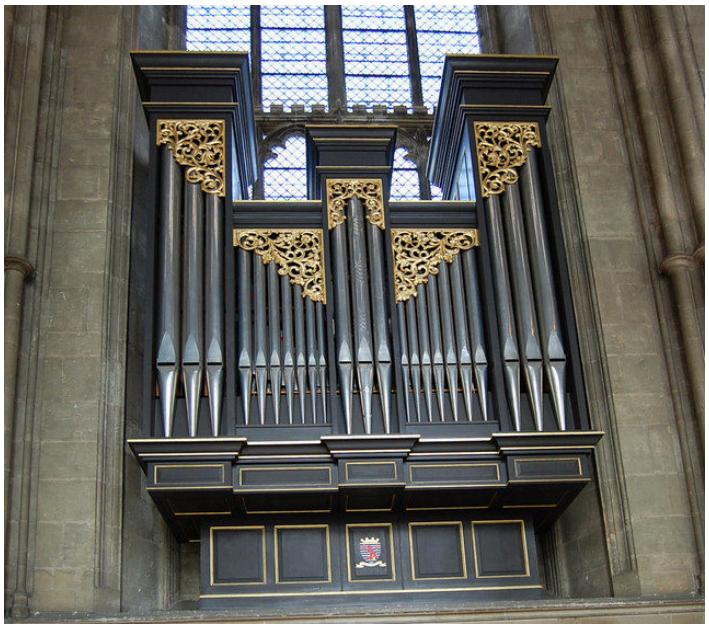
Before the English Reformation the cathedral was part of a Benedictine monastic community known as Christ Church, Canterbury, as well as being the seat of the archbishop. The Norman nave and transepts survived until the late 14th century when they were demolished to make way for the present structures.

Samuel Green built an organ on the pulpitum in 1784: that instrument was relocated to the south triforium of the quire in 1827, and it was here that Henry Willis built a four-manual instrument in 1886, with a pioneering form of electro-

pneumatic action. During the twentieth century, alterations were made by Norman & Beard and by Henry Willis & Sons.

In 1976 N P Mander carried out a more radical rebuild, which included removal of the Solo Organ and the addition of a Nave Organ with a handsome case in the north aisle. Much of Father Willis's pipework, including a few stops by Samuel Green, survived these interventions and forms the backbone of the new organ.

Surveys of the instrument were undertaken and they revealed that the main organ, housed in the Quire at the East end of the Cathedral, was in a poor condition and in urgent need of restoration. Air-tight seals were failing and some notes unplayable to such an extent that this once fine 'Father' Willis organ was a shadow of its former self.



The 1976 N P Mander nave organ

The Quire

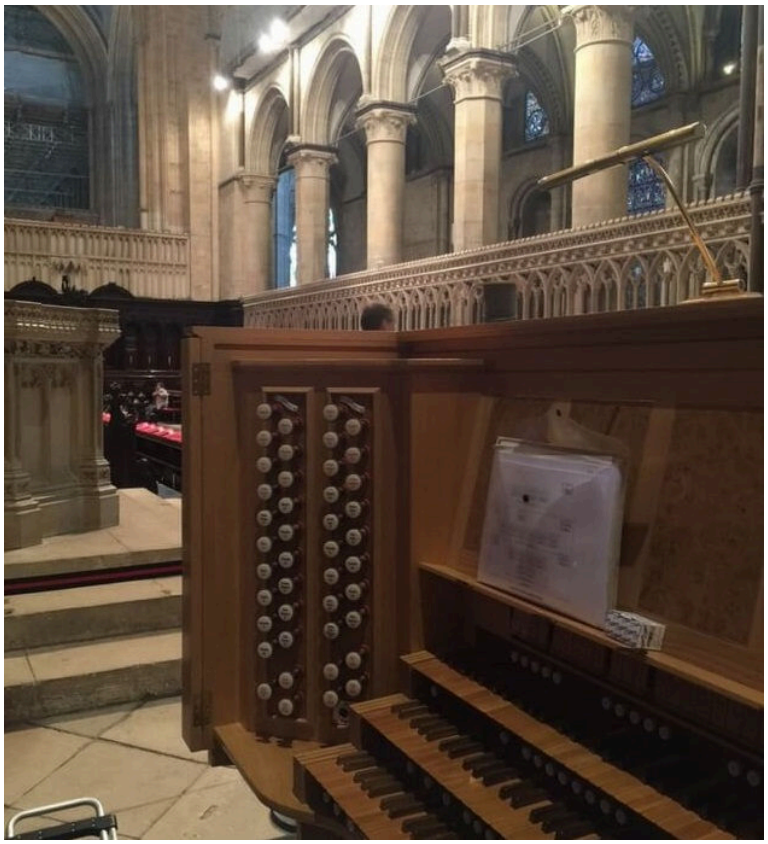
Working with celebrated organ builders Harrison & Harrison Ltd, the organ was restored and enhanced so that it can once again support the music which is at the very heart of life and worship in the Cathedral.

The organ had last been restored in the 1970s. At that time attempts were made to simplify the outdated electro-pneumatic mechanisms and complex configuration. As such, the instrument was greatly reduced in size (some have said indiscriminately) to try and free up space between the overcrowded pipes. This included the largest, 32ft pipes as well as solo voices which added 'orchestral' colour including Oboe, Horn and Flutes. A separate Nave organ was introduced, recognising the impossible task for one organ to provide music to the entire Cathedral. This was confirmed by a detailed acoustic audits in 2009 and 2015. Since its last restoration, and despite a series of patch repairs, the main organ had reached the end of its

performing life.

The Cathedral's Quinquennial Inspection (a survey of its condition required every five years) in 2017 also identified that large areas of the Quire were are in urgent need of repair. The access afforded by the removal of the organ's pipework present an unmissable chance to make these repairs before the new organ was installed.

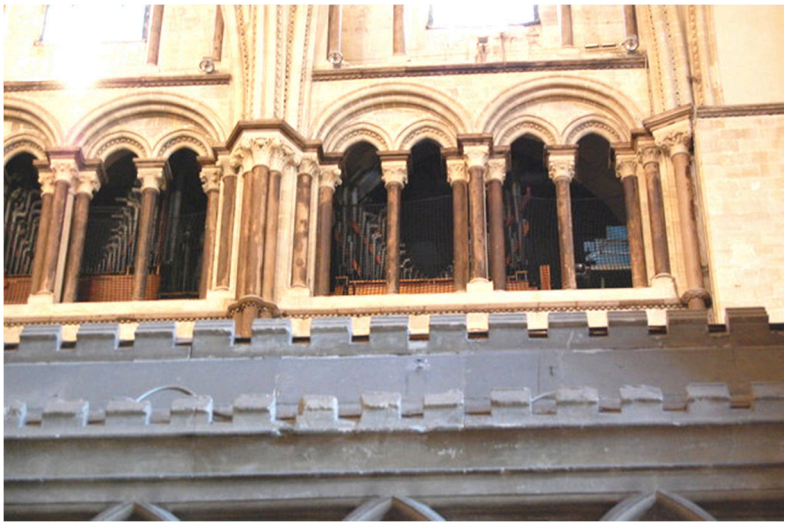
While the organ was being rebuilt a large Regent Classic digital organ was installed to provide music for the cathedral requirements. This organ assisted with acoustic studies and the eventual new organ layout.



The Regent Classic Organ console, located in the Choir as a temporary instrument during the major organ rebuild.

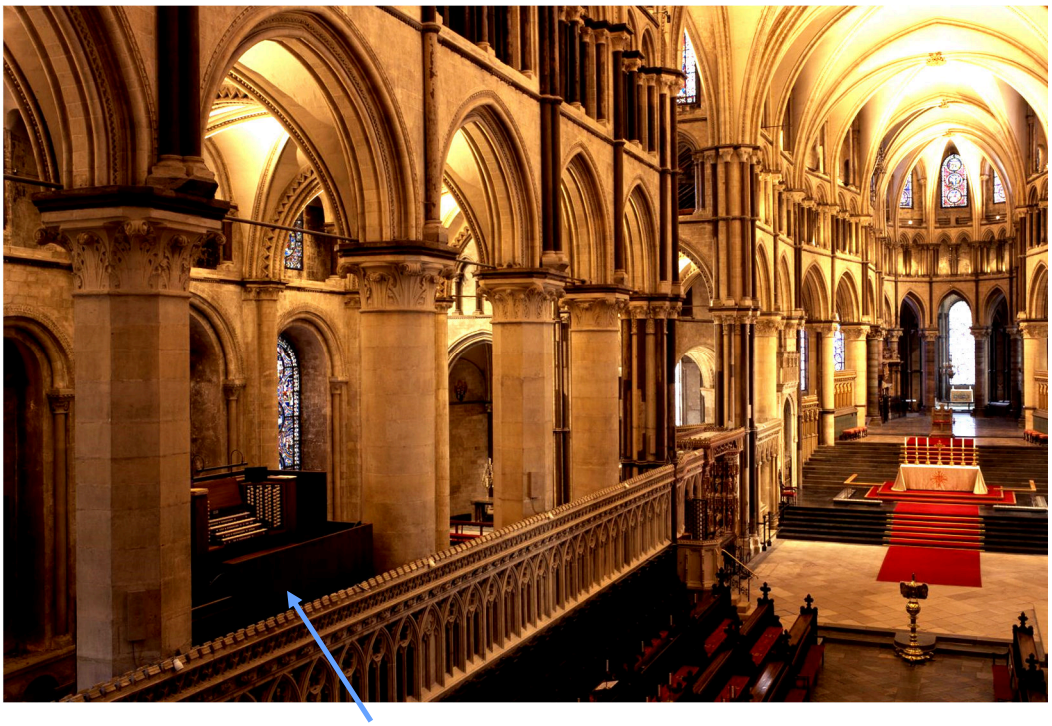
The work carried out in the rebuild was extensive. New longer pipes were made and existing pipes repaired and re-distributed, effectively doubling the size of the organ and enabling a richer, more sensitive and balanced sound Historic pipework by 'Father' Willis, which had been reduced to the South side of the Quire triforia was restored. New pipes on the North side, replacing material removed in the 1970s, was planned to provide a more nuanced, balanced sound in the Quire. Rain damage, leaks, lead damage and rotting timber was repaired, with new access hatches created to simplify future maintenance.

The organ console was rebuilt and moved from above the Pulpitum Screen, between the Quire and the Nave, to a new organ loft in the North Quire Aisle. This position is closer to the new pipework and the choir. In addition, the sight lines between the organist and conductor were greatly improved. Acoustic testing, coupled with assessments of physical and visual impact on the fabric, found the best location for the console to be in the North Quire aisle. Making use of a fibre-optic control system for the organ stops, a new organ loft was designed for this location. The Quire



Some organ pipes are just visible in the Triforium

Organ is unusual for its fully concealed location high in the quire triforia. While the sound of the instrument can readily be heard and indeed felt in the vibrations of the fabric, it is completely decoupled from the usual focal point of a visible console, forcing a disconnect between organist, instrument, choir and congregation.



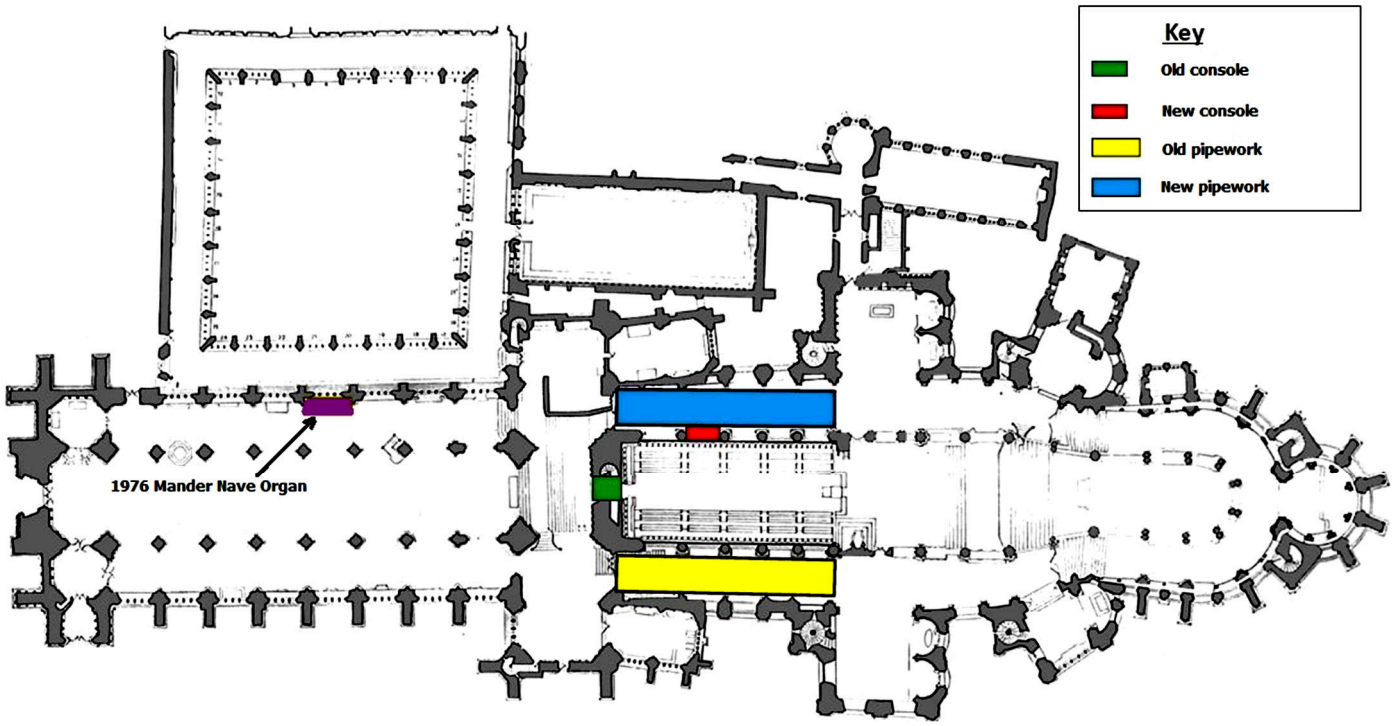
The new organ console is visible above the choir stalls

A complex series of statutory consents were required under the Care of Cathedral's Measure. This required a close working relationship with the cathedral architect, engineer, archaeologist and the Cathedral Fabric Advisory Committee. Successfully navigating the risk of 'design by committee', the architect and contractor have delivered on a strong concept, with a carefully crafted new addition to the cathedral's rich architecture.

Work on the organ also provides the opportunity to gain access to one of the oldest parts of the Cathedral, which are now in urgent need of repair due to damage by rain water and corrosion. The 12th Century Quire is home to some of the Cathedral's most precious fabric, including extensive historic timberwork, William of Sens' flying buttresses and precious 12th Century stained glass. As well as this work being necessary, it is important that it is done prior to the installation of the new organ pipework. By carrying out the organ's restoration and urgent fabric repairs in tandem, the finished instrument was returned to a secure environment and gives the opportunity to provide better access for future maintenance by dedicated craftsmen and women.

Canterbury Cathedral organ pipework is hidden in the Triforium, which is the third level of arches high up the walls below the beginning of the ceiling vaulting. The diagram on the following page describes the location of old and new features of the organ. The new organ has over 80 stops and more than 6,000 pipes. It is one of the largest Cathedral organs in Europe, formed of six organs - the Pedal, Choir, Great, Swell, Solo and Transept.

The Pedal, Great and Swell Organs and the Tubas are in the south quire



Triforium; the Choir, Solo and Transept Great Organs and the Open Woods in the north Triforium. The console, which had previously occupied different locations, is now in the North Quire aisle, behind the choir stalls.

The £4.2 million funding came from The Organ Project and donations from The Friends of Canterbury Cathedral.

Some of the oldest and most cherished pipes have been reused in the new organ. Those made by Samuel Green in the early 17th Century formed one of the main sounds in the centre of the original instrument and had done since they were first installed. Although some of the Samuel Green pipes were too fragile to be reused, these too have returned to the Cathedral and are on display at the entrance to the organ. The much missed 32 foot pipes, which give the organ a deeper, rumbling sound, have also returned.

For the new organ loft, a sleek, discreet and highly crafted intervention in the hallowed fabric of Canterbury Cathedral has been made. This requirement stemmed in the main from the sensitivity of the context, a Grade I-listed World Heritage Site. That the loft has been more than six years in the making since the original 2014 competition for its design, leading to a run-off contest at the beginning of 2016, gives an indication of the delicacy of this relatively small design project.

The repositioning of the organ console corrects a longstanding fault in the instrument's arrangements. Unlike in many churches, where a grand organ sits on high as part of the decorative schema, at Canterbury the original installation seems to have been more an exercise in concealment. In that original concept, as mentioned earlier, two sets of pipes were sited in galleries above the quire's south and north aisles behind stone arcades. The organist was seated perpendicular to these at some distance on a bridge above

CANTERBURY CATHEDRAL

PEDAL ORGAN

*	1. Double Open Wood	(from 3)	32
*	2. Sub Bourdon	(from 6)	32
*	3. Open Wood		16
	4. Open Diapason		16
	5. Violone		16
	6. Bourdon		16
	7. Lieblich Bourdon	(from 19)	16
*	8. Octave Wood	(from 3)	8
	9. Octave		8
	10. Flute		8
	11. Super Octave		4
	12. Open Flute		4
	13. Mixture	19.22.26.29	IV
	14. Contra Posaune		32
	15. Ophicleide		16
	16. Fagotto		16
	17. Posaune		8
	18. Clarion		4

I Choir to Pedal II Great to Pedal
III Swell to Pedal IV Solo to Pedal
V Pedal Divide

CHOIR ORGAN (Unenclosed)

*	19. Lieblich Bourdon		16
	20. Open Diapason		8
	21. Chimney Flute		8
*	22. Dulciana		8
	23. Principal		4
*	24. Stopped Flute	(wood)	4
	25. Nazard		$2^2/_3$
*	26. Fifteenth		2
	27. Block Flute		2
	28. Tierce		$1^3/_5$
*	29. Mixture	15.19.22	III
*	30. Trumpet		8
	31. Corno di Bassetto		8

VI Tremulant
VII Octave VIIII Unison Off IX Sub Octave
X Swell to Choir XI Solo to Choir

GREAT ORGAN

	32. Double Open Diapason		16
	33. Open Diapason I		8
*	34. Open Diapason II		8
*	35. Gamba		8
	36. Claribel Flute		8
	37. Stopped Diapason		8
	38. Principal		4
	39. Flûte Harmonique		4
	40. Twelfth		$2^2/_3$
	41. Fifteenth		2
	42. Harmonic Piccolo		2
	43. Mixture	15.17.19.22	IV
	44. Fourniture	19.22.26.29	IV
	45. Trombone		16
	46. Trumpet		8
	47. Clarion		4

XII Choir to Great XIII Swell to Great
XIV Solo to Great XV Manuals I & II exchange

SWELL ORGAN (Enclosed)

	48. Double Open Diapason		16
	49. Open Diapason		8
	50. Lieblich Gedact		8
	51. Salicional		8
	52. Vox Angelica	(tenor c)	8
	53. Principal		4
*	54. Lieblich Flute		4
	55. Flageolet		2
	56. Mixture	17.19.22	III
	57. Mixture	12.19.22.26.29	V
*	58. Contra Hautboy		16
	59. Hautboy		8
*	60. Vox Humana		8

XVI Tremulant

	61. Double Trumpet		16
	62. Trumpet		8
	63. Clarion		4

XVII Octave XVIII Unison Off XIX Sub Octave
XX Solo to Swell

SOLO ORGAN (Enclosed)

*	64. Viole d'Amour		8
*	65. Voix Céleste	(tenor c)	8
*	66. Flûte Harmonique		8
*	67. Celestina		4
*	68. Concert Flute		4
*	69. Piccolo Harmonique		2
*	70. Cor Anglais		16
*	71. Orchestral Oboe		8
*	72. Clarinet		8

XXI Tremulant

*	73. French Horn		8
*	74. Ophicleide		8
	75. Tuba		8
	76. Tuba Clarion		4

XXII Octave XXIII Unison Off XXIV Sub Octave
XXV Tuba Shutters On

TRANSEPT GREAT ORGAN

*	77. Bourdon	(wood and metal)	16
*	78. Open Diapason		8
*	79. Principal		4
*	80. Twelfth		$2^2/_3$
*	81. Fifteenth		2
*	82. Mixture	15.19.22.26	IV
*	83. Posaune		8

XXVI Transept on Solo XXVII Transept on Choir

* stops marked with an asterisk are new

The manual compass is 61 notes
The pedal compass is 32 notes

The actions are electro-pneumatic

Great, Swell, Pedal and Tuba in South Triforium
Transept Great, Choir, Solo and Open Wood 32ft in North Triforium

NAVE ORGAN

	84. Bourdon	(from 89)	16
	85. Open Diapason		8
	86. Principal		4
	87. Fifteenth		2
	88. Mixture	19.22.26.29	IV-V

XXVIII Nave on Great XXIX Nave on Solo

NAVE PEDAL ORGAN

	89. Bourdon		16

COMBINATION COUPLERS

XXX Generals on Swell Foot Pistons
XXXI Great and Pedal Combinations coupled

ACCESSORIES

Eight foot pistons to the Pedal Organ
Eight pistons to the Choir Organ
Eight pistons to the Great Organ
Eight pistons to the Swell Organ duplicated by foot pistons.
Eight pistons to the Solo Organ
Four pistons to the Nave Organ
Eight general pistons and general cancel
Reversible pistons : *I-IV, X, XI, XII, XIII, XIV, XX;* 1, 2, 14
Reversible foot pistons: *II, XIII;* 1, 2, 14
Two Coupler pistons
Stepper, operating general pistons in sequence
256 general and 16 divisional piston memory levels
Two balanced Swell pedals

HARRISON & HARRISON

the quire screen, the key sightline between organist and choirmaster in the stalls half-obscured by a stone balustrade. Over the years, the twin arrangement's sound became unbalanced, so the project's aim has been to rebalance and expand the intonation of the pipeworks and at the same time improve the organist's position.

Acoustics of the cathedral were checked by flooding it with white noise and measuring the reverberation levels. It identified two positions above the north and south side-aisles that offered acoustic 'sweet spots' for an organist relative to the two sets of pipes, while being much closer to the choir. This indicated that a new organ loft needed to be constructed in one of the aisles up against the back of the choir stalls, raising the organist up to allow visual connection down to the choir while minimising visual distraction from the high altar.

As the south aisle has a much higher footfall, a position in the north aisle was chosen. It is in one of the oldest parts of the building, dating to the 12th century and sitting over a vaulted crypt, up a flight of steps from the spot where Canterbury's most famous archbishop, Thomas à Becket, was murdered in 1170.

The designers wanted to make a little building that related to the very vertical and asymmetric Gothic style of the church. A certain Gothic verticality is achieved in any case by

the 3.5m height of the stand required to allow a seated organist to see over the choir stalls, while the dimensions of its small footprint in plan are generated by the size of the console, organist's seat, some storage space and the head of a small spiral stair, deemed a 'work-stair' and thus allowed to have a 700mm width of tread.

The new organ console

The loft's visual massing was tested from different viewpoints during the design process with a 1:1 scaffolding and plywood prototype. Sitting above a 12th century vault and directly on Medieval flagstones, the loft structure needed to be as light as possible and to spread its load, while remaining self-effacing visually, interfering minimally with the surrounding architecture.

The decision, therefore, to fabricate the stand from steel rather than timber seems a good one: the slenderest of zinc-coated, blackened steel elements, like spindly legs, meet a thicker-membered base which distributes the load around eight feet. The dark finish keeps it visually distinct from the pallor of the surrounding Caen stone arches, while the material finds precedents in the metal railings, grilles and cast-iron fretwork of tombs. A reference, too, can be made to the early steel structures of 19th century structural rationalism, in part inspired by the Gothic.

The delicacy of the steel frame is accentuated by its being constructed of bespoke, squared-off 50mm sections, rather than standard, round-cornered extrusions. Their precision is further enhanced by seamless fixing to one another without visible welds. This makes the whole read as a continuous abstracted framework, like a kind of attenuated vertical instrument or armature. Caruso St John (the architect) says a conceptual reference was Alberto Giacometti's 1932 sculpture The Palace at 4am, in which a series of objects float in skeletal frames.

A curving backbone-like element in the sculpture finds a faint echo in the vertical spiral of the loft's steel stair and its handrail. The positioning of the stair also serves to break any implied symmetry in the loft's stand. It is more subtly undermined by the irregularly spaced vertical 'legs', which shuffle out-of-sync with the more regularly spaced 'feet'. One vertical steel is also thicker than the others, enabling it to act as a conduit for services to the console above.

Bruce Duncan

Information and photographs from the following internet sources:

www.canterbury-cathedral.org
www.harrisonorgans.com
www.architectsjournal.co.uk