

Multiple contracting in the Saint-Denis chevet

Adapted from *Gesta*, xxxii 1993, 42-62

John James

It is often claimed that the chevet of the abbey church of Saint-Denis was the first coherent example of the Gothic style [r].¹ Yet when we search for contemporary buildings that might contain the same format, we are at a loss to find them. Jean Bony's comment is a recurring theme: "Is there no way of detecting something definite about the origins of the Saint-Denis master?"²

The chevet is isolated in its uniqueness: no other contemporary building possesses the qualities that have made this building so famous. It seems curious, if not astonishing, that those who created a work of such revolutionary nature did not repeat this design elsewhere. I will argue that we do not find the Saint-Denis design anywhere else because there was not one designer for the chevet, but two.³ The evidence suggests that each man interpreted Suger's requirements in his own way to produce a unique building that contained something of both of them, and was therefore in its whole of neither. Sumner Crosby sensed this when he complained that the design shows "no sequence of specific details, no major structural or aesthetic system betray training or experience in one particular geographical locality,"

The qualities that each espoused are of course found elsewhere, but the particulars that made this chevet so interesting to us arose from a unique combination of talents a combination that did not recur. The great contemporary buildings, or those built within a decade either side of Saint-Denis, like the apses of Ferté-Alais and Château-Landon, or the ambulatories of Senlis and Saint-Germer-de-Fly, do not have the same combination of lightness, geometric clarity and integrated vaults as Saint-Denis. It is not until the ambulatories of Notre-Dame in Paris and Saint-Remi in Reims in the 1160s that this is found again, over twenty years later.

The arguments in this article are based on changes to the templates and the architectural elements that were made part way through construction, not to documents that tell us nothing of the architects. Unlike Gervase of Canterbury, Suger is tantalizingly silent on this subject. He writes about his craftsmen, his mosaics and the furniture, but never mentions the master masons.

The plan of the Saint-Denis chevet shows an open, spacious layout of nine chapels with wide windows [r4]. The middle row of ambulatory columns can be seen as either separating two aisles or marking the boundary to chapels that would not otherwise have any significant depth. The lightness of the design, in both the aisles and the walls, is apparent in the plan. We will begin our analysis by examining six changes to the architecture and the profiles in the chevet,⁴ and will later seek confirmation for our conclusions in contemporary structures.

First, over the window shafts and responds the impost extends continuously around the wall like a frieze. However, the imposts over the transverse arch



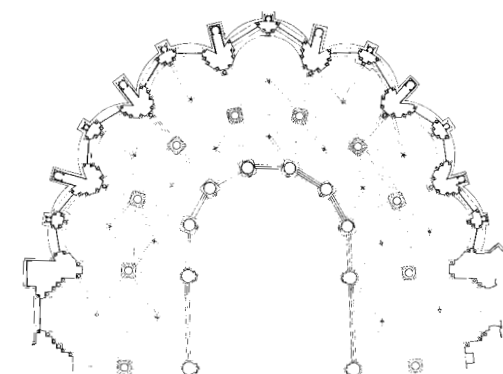
Saint-Denis choir from the east



Saint-Denis ambulatory



Saint-Denis crypt (above) and plan (below)



shafts have been raised so that they rest on top of the frieze [r1]. **Second**, both the profile and the height of the continuous impost left in [r2], are different from the upper impost, shown on the right.⁵ Different templates were therefore issued for these two courses, and the upper one was laid after the lower. **Third**, all the *en-délit* wall shafts flanking the windows and at the corners of the wall are made from two cylindrical stones with a slender band at the join like that in [r3]. Though rings carved like torus moulds and placed at a constant height are quite common in the Paris Basin, small bands set at different heights are rare. On the other hand, the six shafts under the transverse arches are exceptional in being turned and installed in one piece. They are also larger in diameter.⁶

Fourth, the ribs over the single shaft between the windows are supported on corbels which, like the transverse arch imposts, also sit on top of the continuous impost [r1]. Some of these corbels are simple and unadorned, as if finished in a hurry, for they were not carved with any of the delicate intricacy of the capitals underneath. **Fifth**, the face of the impost over this single shaft does not project beyond the curved wall plane, as an impost under a rib normally would. The rib, however, does project beyond this plane and, but for the corbel, would not have had support. A similar situation in the ambulatory of Sens cathedral was explained as being “because no provision was made for ribs in the first design of the ambulatory.”⁷ **Sixth**, the torus under the wall shafts is also continuous, like the impost. It passes behind the torus under the transverse arch shafts. It is significant that in some cases this continuous torus has been chiselled away to allow the transverse arch shaft to pass in front of it. **Seventh**, the bases and capitals of the transverse arch shaft are the only ones replaced or restored in the nineteenth century, suggesting they may have been carved in a hurry, like the corbels, or carved so badly that the restorers felt compelled to remake them.⁸

Taken together, these seven details, being the raised impost and their altered profiles, the bandless shafts, the corbels, the relationship between the wall shafts and the ribs, the cut back tori and the location of the restorations, suggest there had been a major change in the design just above the continuous impost level, in which the transverse arch shafts with their torus and impost blocks, and the corbels, were added.

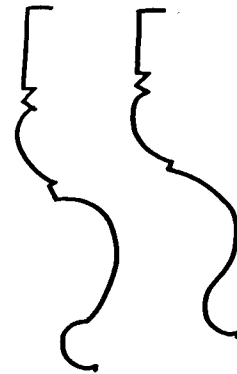
It was a natural place for such a change, for this is where the workmen would have set up the formwork for the voussoirs of the inner window arches. There is a major difference between laying stones in walls and laying voussoirs in arches: the mortar joints in the walls may contract without destabilising the structure, but this is not the case with arches. Any settlement in an arch would leave a gap between the arch and stonework supported on it. No stones could be placed on top of the arches until the voussoirs had settled into their final position, and this could only happen after the mortar had set and the formwork struck.

As medieval mortar was slow to dry, the formwork underneath every arch was left in place for three months or more after the voussoirs had been laid.⁹ Even in a great monastery like Saint-Denis where funds seem to have been abundant, the technical requirements of arch construction would have forced a pause in the works. The tasks the masons could have turned their hand to during the setting period would have been limited, and in small projects like the Saint-Denis chevet, men from other localities may have left the site and would not necessarily have returned after the setting period was over.

They could have continued to carve stones for use once the formwork was struck, but for carvers to be three months ahead of the layers would have caused intractable problems in the yard, such as where to store the finished stones and how to recognize where each was meant to go. If the masons were three months ahead of the layers after the crypt vaults, they would have been



Raised capital and impost by Rib Master



Impost profiles for shaft and along the wall.



Wall shafts with intermediate ring

six months ahead at this level and a year ahead of the erection gangs by the time the roof was reached. I do not believe it would have been a practical way to run a workshop.

The addition of six shafts under transverse arches implies a design change.

What was the new scheme?

The wall shafts lie within the plane of the wall, and their impostes project only slightly in front of that plane. They were therefore intended to support arches lying within the plane of the wall, not arches projecting beyond the wall. The face of nearly all vault cells, be they groin, domical or ribbed, were usually aligned with the wall. As ribs project below the cells, they also project in front of the wall [r1]. Therefore shafts supporting ribs must also be placed in front of the plane of the wall. Over the corner A [r2] the wall shaft can support the rib only because the adjacent cell has been twisted inwards. But the single shaft between the windows lies within the arc of the wall and, without the corbel, would have supported only the outer arches over the windows as can be inferred from their relative levels [r3].

This implies a radically different scheme from the ambulatory we see today. As the wall shafts were designed to support wall arches rather than ribs, rib vaults could not have been intended when the walls were being built. Rather, they would have supported half domes as used in nearly every contemporary apse in the Paris Basin, such as Saint-Martin des Champs, Saint-Pierre in Montmartre, Saint-Pierre in Chartres, Château-Landun and the destroyed Temple Church in Paris,¹⁰ as well as in the crypt of Saint-Denis itself. In changing the half dome into a rib vault the master had to add corbels so that the ribs would sit securely on the walls.

The corner shafts at A [r2] are the same diameter as those that flank the windows. Their function would therefore have been similar: to support arches that lay within the plane of the wall. The arches resting on these shafts would have covered passages between the chapels, and would have required matching shafts on a compound pier in the ambulatory. Clark was correct to comment that segment AA looked “more like a compound pier than a wall,” for that is precisely what the corner shafts were intended to be.¹¹

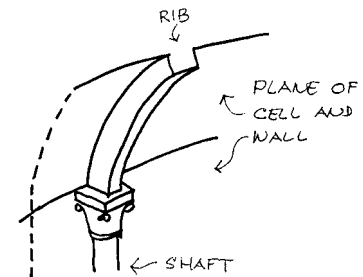
The arch resting on these shafts would probably have been the same width as AA is wider than a normal transverse arch. The pier would have had corner shafts CC opposite to and matching AA, and would have terminated in a cluster of larger shafts for the adjacent ambulatory vaults. The passage AC would have allowed the clergy to walk between the chapels without being crowded by the throng of pilgrims that Suger describes as filling the abbey [r4].¹² Passages supported on compound piers are found at Saint-Martin-des-Champs¹³ and Morienvall.¹⁴ When the contemporary Saint-Martin is compared to Saint-Denis, it is significant that even though a number of masters set out a varied collection of piers (some have curved backs, some are square, some have keel shafts and some chamfers) none chose drums.

The impostes over the Saint-Denis ambulatory *en delit* shafts and drums are higher than those over the windows [r4].¹⁵ Both drum and shaft impostes have similar complex profiles of roughly the same thickness [p.2, r2]. It looks like they were installed in the same campaign, after the walls. The process of erection in which the walls are built first, and the interior drums set up later, was a common construction strategy at this time.¹⁶

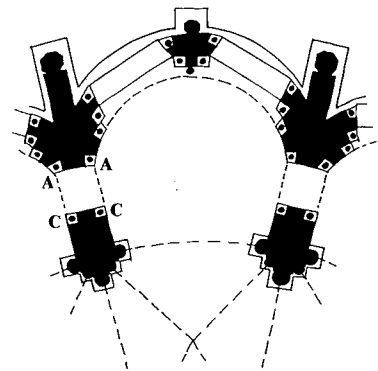
This construction strategy may have enabled Suger to preserve his earlier church a little longer. The latest moment for demolition would have been when the outer walls of the chapels had reached the impost height, during the pause



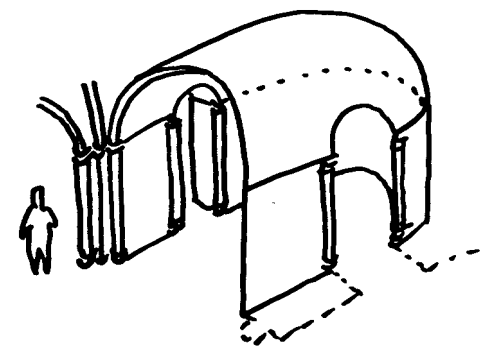
Corbel over wall shafts to support ribs



Relationship between wall and vault planes where there are ribs.



Suggested plan by the Window Master



Sketch to show the proposed massing



Impost over shaft higher than over windows

between those two campaigns, which would have been as soon as the mortar in the window arches would allow.

Taken together, the design change from domical to rib vaults, the introduction of transverse arch shafts and, the alteration of the moulding profiles and the location of the banded shafts suggest a major change in direction. That all these occurred during a pause in the construction of some months while the mortar set suggests there could well have been a major reassessment of the design during this time.

Whether Suger changed his masters and/or the brief is not clear from the evidence presented so far. However, whether Suger or the builder was responsible, the evidence given later suggests this is the more likely alternative. Therefore, I will call one the “Wall and Window Master” and his successor the “Rib Vault Master”, or Window and Rib Masters for short.

Imagine the process of construction at this point. The Window Master had built the curved walls of the chapels to the impost, including the banded shafts and the capitals that secure them. The impost course probably continued across the full thickness of the wall to protect the rubble infilling from the rain. The arches over the windows rest on this course. The Window Master would have set up the formwork for these window arches and laid the first row of voussoirs over them, and then left the site while the mortar set. Some three months later the next master, possibly stimulated by Suger himself, changed the plan by employing rib vaults. The Rib Master naturally sets his imposts and corbels over the stones already in place, which was much easier than hacking out the existing imposts just to keep the new ones at the same level.

This is as much as the present evidence will tell us. To discover more about how these changes happened we need to examine other buildings to see whether the characteristics of the Saint-Denis walls can be found without those of the vaults and, conversely, whether the characteristics of the vaults occur without elements from the walls. Subject to certain conditions, we can say that if we can find the Saint-Denis windows, wall shafts and attendant details occurring together as a group elsewhere they are all likely to have been erected by the same master. Similarly with the vaults, if we can find these templates and design concepts being used in other buildings they too may have been designed by one master. The crucial distinction that would allow us to separate the two stages of Saint-Denis into the work of two masters would be if the Window Master’s arrangement were seldom found in the same buildings as the Rib Master’s.

The Window Master

We know the Window Master from his generous windows, the shafts that flank them, his continuous tori and imposts and the men who carved his capitals. His dossier¹⁷ includes:

- wide windows with the low sills and flanking shafts
- sides of windows aligned towards the facing columns
- multiple shafts to articulate the wall surface
- shafts *en délit* with small bands at different heights
- continuous imposts and torus moulds¹⁸
- continuous external string course
- intricate capitals¹⁹
- external buttresses turned into octagonal shafts
- relieving arches outside and above the windows²⁰

The chevet windows at Saint-Denis average 2,017 mm clear width between jambs. Similar generous and shaft-flanked windows turn up in the chapels

of Saint-Leu-d'Esserent,²¹ and Senlis Cathedral²² [r1]. They also turn up on the north wall of Notre-Dame at Etampes,²³ in the Glennes apse and in the Sens Cathedral ambulatory. Some, such as those in the ambulatory of Sens cathedral, are wider than those in Saint-Denis.²⁴ The windows in the central apse at Château-Landun²⁵ are 1,600 mm wide and designed just like those at Saint-Denis, while those in the chapels of Saint-Lomer in Blois²⁶ are 1,700 mm wide but with much heavier flanking shafts.²⁷

As the Sens ambulatory, the Saint-Martin and Blois chapels, and the Château-Landun apse may all be earlier than Saint-Denis, builders were constructing wide windows before Suger began his. That groin vaults were built or implied in all of these earlier buildings shows it was consistent for groin vaults to have been planned for Saint-Denis. At Saint-Denis, Glennes and Senlis the side planes of the windows have been aligned in a most curious and individual way [r2]. Normally the sides would be parallel to one another or radial to the centre of the chapel, but here they are aligned towards the centres of the opposite piers. It is an idiosyncratic detail that bespeaks an individual and eccentric designer.

Low sills are rare, but are found in the chapels of Saint-Leu and Senlis. Also, all the bases of these window shafts rest within a recess just below the level of the sill, as in Saint-Denis. Continuous imposts were used in the Sens ambulatory, at Glennes and in the Ferté-Alais apse,²⁸ both of which have exceptionally wide windows. Sens also has a single shaft between the windows like Saint-Denis. Window and vaulting imposts are continuous inside and out in the Saint-Leu chapels, but only on the outside in the Senlis windows.

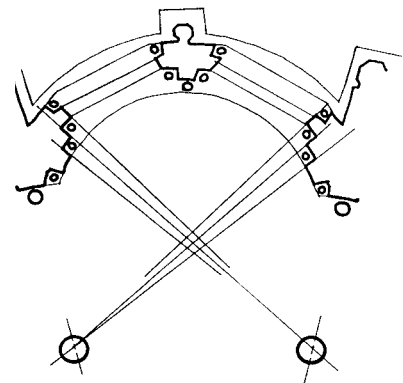
From the foliate style of the capitals I am inclined to place the vaults of Saint-Leu before those at Senlis, but after Saint-Denis.²⁹ In all of these chapels the vaulting imposts are at the same level as the window imposts.

Shafts in two lengths with slender bands at the join are rare in the Paris Basin, whereas rings formed from thick torus-like profiles were more common. Shafts with thin bands were installed at Saint-Leu, the Senlis choir and western doorway,³⁰ the Sens ambulatory wall, flanking the porches of Notre Dame in Etampes, and Saint-Ayoul in Provins, in the Villeneuve-sur-Verberie apse and the north arm of Jouy-le-Comte.

Many of the capitals in these buildings are similar to those carved below the continuous impost at Saint-Denis³¹ [b]. They comprise a group containing, in one part or another, characteristics from the Window Master's dossier.³² There are not always enough correspondences to show that this master definitely



Senlis cathedral ambulatory to same design



Inclined faces to window shaft plinths

Table 1. Buildings with characteristics found in the ambulatory walls of Saint-Denis.

	shafts flank		continuous imposts	bands on shafts	date from COGA
	wide windows	low sills			
Château-Landun, apse	X		X		1121
Provins, Saint-Ayoul	-	-	-	X	1130
Ferté-Alais, apse	X		X		1137
Sens Cathedral, ambulatory	X		X	X	1137
Etampes, Notre Dame, portal	-	-	X	X	1139
Etampes, Notre-Dame, north	X	X			1140
Saint-Denis, apse	X	X	X	X	1141
Blois, Saint-Lomer	X	X	-	-	1143
Saint-Leu-d'Esserent	X	X	X	X	1144
Jouy-le-Comte, transept		-	X	X	1154
Senlis Cathedral, chapels	X	X	X	X	1155
Villeneuve-sur-Verberie, apse				X	1162
Glennes, apse	X	X	X		1163

worked on them all, but what we have is indicative that he may have. The map [r] with the location and approximate construction order of these places, suggests that this master came to the Ile-de-France from the south, perhaps central France, and gradually worked his way northwards.

Now, compare the dossier for this master with the Rib Master who follows. Two more different ways of designing, two more different approaches to the interior of the chevet, could not be imagined.

The Rib Master

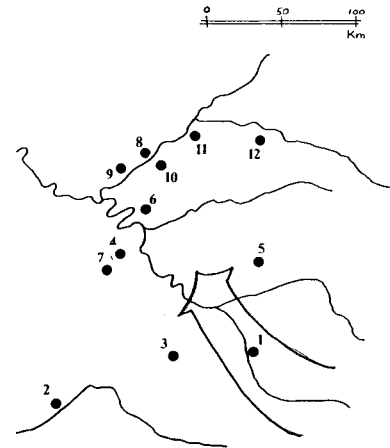
Turning now to the Rib Master, we know him mainly from his uncomplicated vault profiles and the boss with a small flower and a hole through the centre. His dossier includes:

- vault arches with simple, slender profiles
- ribs erected over semi circular formwork
- encasing arches pointed and stilted so that crowns are level
- arches set out from a radius of 2,070 mm³³
- boss with small hole drilled through it surrounded by tiny petals³⁴
- lightweight drum piers
- square plinths, with the edges of the corner chamfers maintained parallel along the inclined slopes.³⁵
- bottom corners of impostes over the drums chamfered
- tall torus moulds and impostes
- tops of capitals notched

Some of the Saint-Denis vaulting profiles are found in the south transept vaults of Saint-Etienne in Beauvais,³⁶ in the Cambronne nave aisles,³⁷ Saint-Christophe just north of Senlis,³⁸ the Senlis Cathedral chapels and ambulatory, the Jouy-le-Comte apse, the Condécourt north arm, the Coulanges aisles, the Marolles-en-Brie apse,³⁹ Airaines⁴⁰ north of Beauvais and the Saint-Germer-de-Fly choir.⁴¹ The miniature boss with a simple floral ring and a tiny hole drilled right through is a fairly rare item in the Paris Basin. It is found in the choir of Saint-Germer-de-Fly, at Saint-Christophe, Marolles and Condécourt, and in the Senlis ambulatory. Two rows of thin drums in ambulatories were repeated only twice in the next fifty years, suggesting that people were not comfortable with the idea. This reinforces Bony's suggestion that these drums reflected Suger's wish rather than the builder's.⁴² What pier type this master would have otherwise used cannot be ascertained from Saint-Denis alone. Similar capitals may be found in many of these buildings, and their foliage is generally unlike the more complex used by the Window Master. Also, nearly all the Rib Master's capitals have notched upper faces, called *énchancre*, which the other master almost never used [r].

Nearly all the places where we find the Wall and Window Master's dossier are different from those where we find the Rib Master's. Apart from a few peripatetic capital carvers who seem to move from master to master, only once do groups of items from the Wall and Window Master's dossier appear in buildings where we find the Rib Master's: in the Senlis Cathedral ambulatory.

The presence of both dossiers at Senlis occurred for the same reason as at Saint-Denis: the Window Master worked on the windows and the Rib Master, at a later stage, helped to build the vaults.⁴³ Elsewhere we seldom find both dossiers together. The windows at Beauvais, Saint-Christophe, Marolles and Condécourt are nothing like those in the Wall and Window Master's dossier, and vice versa. When comparing buildings such as Saint-Germer-de-Fly with Saint-Denis I have restricted my observations to the vaults. The ground plan



1	Sens Cathedral, ambulatory
2	Blois, Saint-Lomer
3	Château-Landun, apse
4	Ferté-Alais, apse
5	Saint-Denis, apse
6	Etampes, Notre Dame, portal
7	Provins, Saint-Ayoul
8	Saint-Leu-d'Esserent
9	Jouy-le-Comte, transept
10	Senlis Cathedral, chapels
11	Villeneuve-sur-Verberie, apse
12	Glennes, apse

Map of other sites with similar characteristics



Enchancre in the upper part of shaft capitals, in COGA this design is linked to Notre-Dame aisles from '45 and Bougival crossing in '36.

and the design of the piers have little in common, and it is only the vault zones which show similarities. Just as the Rib Master set the vaults of Saint-Denis over walls designed by the Window Master, so the same Rib Master may have built the vaults at Saint-Germer over piers and walls by some other crew.

Here is a group of buildings with some of the characteristics found in the Rib Master's dossier, though there are not always sufficient correspondences to indicate that he definitely worked on all of them. These buildings are listed with the major items that are also found at Saint-Denis noted [b]. The map [r] shows the location and approximate construction order of these buildings, and suggests that this master moved into the Paris Basin from Picardy, or maybe even further north from England.⁴⁴

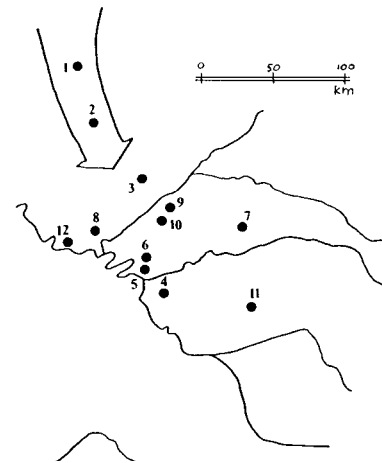


Table 2, Buildings with characteristics found in the ambulatory vaults of Saint-Denis

	vault profiles	boss	round ribs	COGA dates
Airaines, nave	X	X	X	1114
Marolles-en-Brie, apse	X	X	X	1120
Cambronne, nave aisles	X	X	X	1132
Saint-Martin-des-Champs		X	X	1133
Beauvais, St-Etienne, nave aisle	X	X	X	1136
Condecourt, north	X	X	X	1150
Saint-Germer-de-Fly, choir	X	X	X	1153
Jouy-le-Comte, apse	X		X	1154
Coulongues, nave aisles	X	X	X	1156
Senlis cathedral, chapels	X	X	X	1156
Saint-Christophe, choir	X	X	X	1159

1	Airaines, nave
2	Beauvais, St-Etienne, nave aisles
3	Cambronne, nave aisles
4	Marolles-en-Brie, apse
5	Saint-Martin-des-Champs
6	Saint-Denis, choir vaults
7	Coulongues, nave aisles
8	Jouy-le-Comte, apse
9	Saint-Christophe, choir
10	Senlis cathedral, chapels
11	Saint-Germer-de-Fly, choir
12	Condecourt, north

A word on this unexpected suggestion: The Saint-Denis profiles and the form of the vault with its almost level crown are not part of the Italian/west French tradition with their domical cells, nor are the profiles as complex as the majority of French Ribs. The Saint-Denis arch profiles are similar to those used in Durham and Peterborough prior to 1120 and in fifty percent of English Ribs before 1150. Only four percent of Paris Basin ribs are similar.

The technique of drilling holes through the boss originated at Durham in 1100 and occurs in 38 percent of English vaults compared to half that percentage in the Paris Basin. Of nine English buildings with similar rib profiles under construction before 1140 eight have drum piers rather than the compound piers almost universally used in France. Therefore, the Saint-Denis ambulatory drums and vaults are closer to the English vaulting tradition than any other. The details and profiles in the entry porch to the Bristol Cathedral Chapter House are so close to those at Saint-Denis that this may be the Rib Master's last English work before coming to France.

Returning to Saint-Denis

We have now isolated the junction between two campaigns at Saint-Denis, formed a dossier for each campaign, and found that each of these dossiers are separately present in other buildings.

Does this confirm the proposal that each campaign was the work of a separate master? Or is there some other interpretation? Before addressing this question, we should consider the interesting, if less convincing, evidence for three other junctions in the chevet crypt at Saint-Denis.

First, the crypt buttresses on the south are different from all the others,

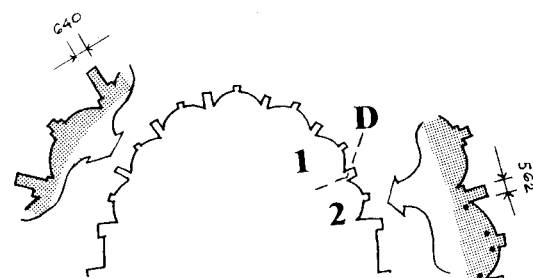
[b1,2]. Where the other buttresses are flanked by small pilasters to support the relieving arches over the windows, these buttresses have none [b3]. Instead the buttress is a plain rectangle, without any projections at all.⁴⁵ Furthermore, [b4], the axes through the northern buttresses are set toward two centres in the middle of the apse, whereas the axis through the southern buttress has been shifted to the east of both these centres. Lastly the width of the five northern buttresses is 650 mm, whereas the southern buttress has a width of only 560 mm: a noticeable difference of some four inches. The combination of width, altered axes and the omission of pilasters indicates there was a change in the templates used for this location. The omission of the pilasters was a major alteration, as without them there were no supports for the relieving arches.



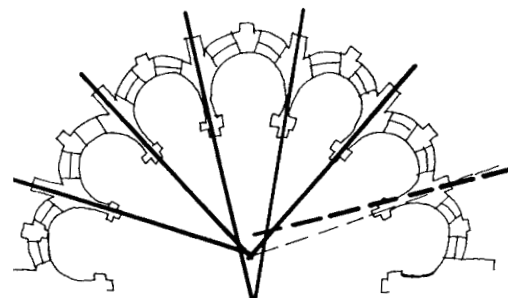
South-west crypt windows without pilasters



All the other crypt windows with flanking pilasters



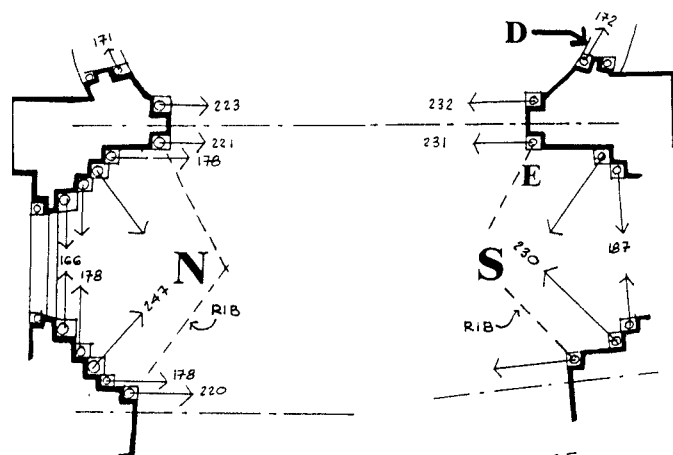
Location of changes to buttresses and windows



Direction of south-west buttress

Second, the reinstatement of the relieving arches over the pilaster less buttresses in the south suggests either the presence of someone who wanted to put them back, or a realization by the master that they were still an appropriate idea. As the corbels for these arches in the south coincide with the mortar drying pause that would have occurred over the crypt window arches, there may have been a change in masters at this level.

Third, the layout and dimensions of the wall shafts differ in the two upstairs lateral chapels to the west of the chevet. It was normal for the diameter of shafts to form a hierarchy from the largest under the transverse and arcade arches to the smallest under the formerets, and it is therefore tempting to presume that shafts of similar dimension and location were intended to support arches with a similar purpose. Different functions, be they in piers or in buttresses, are almost universally distinguished by being supported on shafts of different diameters. Rib shafts will almost never have the same diameter as formeret or transverse arch shafts. The direction of the arches that would have suited the sizes of these shafts is marked with arrowed lines [r]. Both lateral chapels have small respond and window shafts, and larger ones that were, presumably, for ribs. However, in the south chapel there are less respond shafts than in the north, and the sizes of the northern chapel shafts are markedly different from those in the southern chapel, marked on the figure.⁴⁶



Size, number and location of shafts in western chapels

Lastly, the bases are different in profile and in height [r1]. The base profile on the left is found under all the shafts to the northern and eastern chapels. The flatter but similar profile in the centre was used for the continuation of the torus profile along the wall. Both profiles are the same height. The profile on the right, on the other hand, applies only to the bases to the west of D [r2]. It is not as high as the profiles on the left, and has not been continued as a frieze along the wall, but is limited to the base of the shaft.

These changes of shaft layout and diameters, and of torus profiles indicate that the templates from which the stones were cut were changed at D. If the construction program in the northern end of the building was a little ahead of the southern, then the two lowest courses in the north and east would have been laid in the earlier campaign, and this crew would have proceeded no further in the south than the floor level.⁴⁷ The thick line in [r3] indicates the location of this break on the north and east. It lies just above the torus mould on the interior. On the exterior it coincides with the top of the keystone to the relieving arch over the crypt windows [r4]; a natural place to pause while the mortar between the voussoirs was setting.

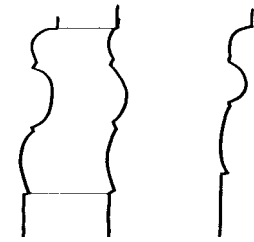
Was there a change in master masons?

It is now time to reconsider the earlier hypothesis that the major change in design between the walls and the vaults of the chevet and, to a lesser extent, the junctions underneath should be attributed to a change in master masons. With one exception, the campaign breaks coincide with arches over windows or under vaults just where the slow setting mortar would have imposed unavoidable breaks in the construction process. If changes had occurred in a random manner we could interpret them as evidence that the master modified his design as he went along. But with changes coinciding almost exclusively with pauses in the work while the mortar set we need to examine other possibilities.

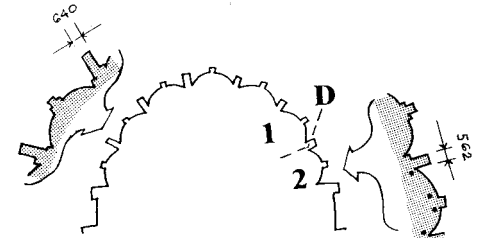
The role of the template maker is crucial for interpreting the evidence. Shelby and others have shown quite clearly that the master mason in charge of the works was also responsible for designing the templates.⁴⁸ If the profiles and details are changed, then it is certain that the templates from which they were cut were also changed. If those changes represent different aesthetic attitudes to design and different geometric processes, then it is likely that different template-makers were involved. However, this is not the same as saying that the master in charge also changed: it is not as simple as that, for there are alternative explanations. Let us examine some of these alternatives.

The evidence for two, and perhaps five, sets of discontinuities in a work that was completed in less than four years raises difficult questions about the control of the workmen and the input of ideas. All analysis is limited by the observation that the changes are not random, but occur in bands, and that they involved major alterations, not minor adjustments. Since the design of a major work like Saint-Denis could have been subject to many alterations, some of them radical, we need to consider which methods of employment and site control would involve breaks in construction and changes in design every six months or so.

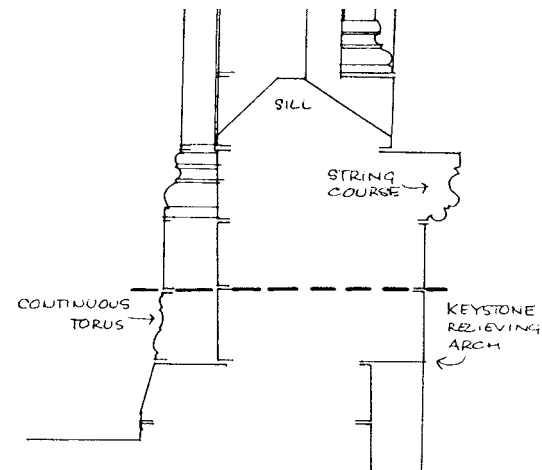
Either the master had absolute control over the templates, or those under him were able to issue their own, or something in between. In the first scenario where the master had absolute control over the templates, the changes must indicate either that one master was replaced by another, or there was a group of consultant masters who were all involved at one time or another. In the second case in which some, or many of the men under the master, could issue



Base profiles to the north and west of D



Location of the junction D



Location of construction break to north of D



Keystone to relieving arch over crypt windows

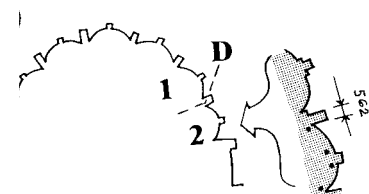
their own templates there are a number of possibilities: either each sub master template maker was changed from time to time, and usually during pauses in the construction, or there was a fairly liquid situation in which different gang foremen would issue templates to their men which might be put aside on departure, leaving the capo master in sole charge.

Suger was well travelled and observant, if conservative.⁴⁹ He selected his workmen carefully, and had the connections to bring people from afar. One interpretation of the evidence is that Suger may not have had the time to decide what he wanted until the work was waiting on his attention. He may have hired the Window Master to give him big windows, knowing this man was capable of building them,⁵⁰ and realizing that this master would have to leave the site once the window arches were in place, he may not have realized that he was preparing to build compound piers. When employing the next man for his acknowledged skill in vaulting, Suger told him why he wanted drums and then left him to solve the resulting building problems as best he could.⁵¹ Alternatively, the abbot may have retained a stable of masters and consulted them whenever a major decision had to be taken. If so, then the evidence suggests that the acknowledged favourite of the moment took charge, and from then on his templates sup-planted those of his predecessor. Or the abbot may have suddenly decided to change the brief and only thought through the problem during the quiet time when there were no workmen on the site.

One capo-master may have prepared a general overall plan, but he may have been absent most of the time leaving the day to day detailing and template making to either a subordinate or a subcontractor master.⁵² Or a master may have been a consultant with some influence over many stages of the design, but little input into the templates which may have been prepared by many men. Or, while the mortar was setting, some of the layers and masons may have stayed on while the master may have gone elsewhere, leaving them in control of the templates for a while.⁵³ There is evidence for all these possibilities. It is even possible that the site was divided between two masters according to the number of men in each crew, with the smaller crew constructing to the west of D [r]. This may explain the vertical junctions at D but not the horizontal junction at the impost level, nor the lack of communication between the two that permitted the 'misaligned' southern buttress and the changes to the lateral chapels. Buttresses and shafts have a structural function and it is doubtful that a master would be content to let a co- or sub-contractor alter their sizes and orientations at will, especially where the work was experimental.

This suggests a complex picture in which there was constant interaction between client and master, between both and visiting masters, and between masters and carvers. I have written that there was no architect at Chartres Cathedral, but only client and current builder, and that the role played by the modern architect was divided between them so that the client had an intimate control over the finances and the builder had sole control over the site work. As is evident here the situation was not so simple. Nevertheless the issue is crucial. As the Survey of the 1980s has shown, there is not one building among the 1,600 churches of the Paris Basin from the 1070-1240 period without similar changes. Even in the well funded Sainte Chapelle the profiles were created by a number of template makers, though there may have been a capo-master in charge of the overall design.⁵⁵

Whatever possibilities we examine, the discrepancies in the Saint-Denis choir show two things: first, that client and/or master mason altered the design a number of times and, second, that the template-makers were changed many times throughout these years. My personal opinion is that more than one master/contractor worked on the site, and that their authority and Suger's were both



Location of junction D

tempered through their interaction with one another and with the opinions of other masters, both outside consultants and those who had previously worked on the site. Together these factors resulted in the five distinct sets of design changes in the chevet, summarised in [r1]. There would have been a sixth between setting up the ribs and building the cells between them. This suggests that the foundations of the chevet were begun before the foundations stone was laid in 1140.⁵⁶

For clarity in discussion I shall continue to refer to each campaign as being the work of a different master, though with the reservations just discussed that decision-making was influenced by complex interactions.

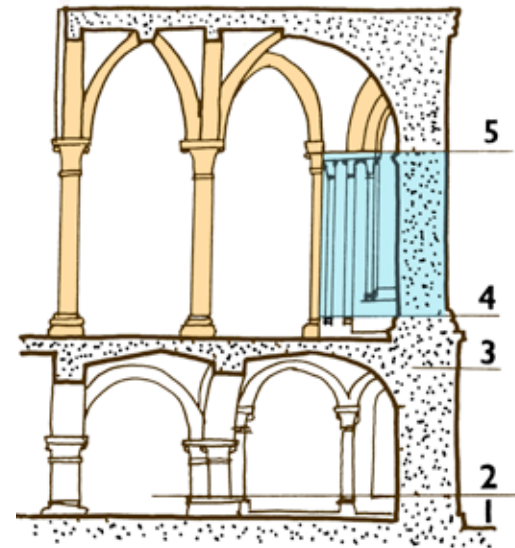
The first master laid out the foundations of the crypt, starting on the north interior with octagonal pilasters, and perhaps the Suger-inspired wide windows, which are three-fifths the width of those in the chevet.⁵⁷ He may have laid three or four courses above the pavement in the north, stepping down to ground level at D on the south⁵⁸ [r2]. The next master left out the pilasters for the relieving arches, continued the crypt walls, carved the capitals inside,⁵⁹ arched over the windows and began the arches for the groin vaults. If all these arches had been built together the crypt would have been a thicket of props and scaffolding: a sufficient inducement to leave the site, quite apart from the wet mortar.

After the mortar-setting pause over these crypt arches, there may have been a third master, because corbels were installed where the pilasters had been omitted to support the relieving arches, or the second may have realized his mistake in leaving the pilasters out. He completed the groin vaults and began the outer walls of the chevet. This included the layout for the northern lateral chapel and the torus bases as far as D. He did not start the string course or the sills and jambs of the upper chapel windows, for these follow the same template all around the chevet. [r3].

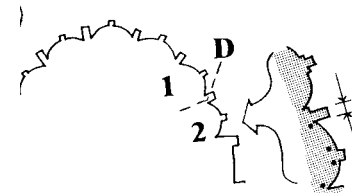
This master was succeeded by the Window Master [blue] who detailed the wide windows and their framing shafts, continued the walls up to the level of the frieze like impostes and probably built the first row of arches over these windows. He was in his turn succeeded by the Rib Master [orange] who inserted the transverse arch shafts, the drum piers and set up the ribs of the vault.⁶⁰ The final stage of the vaults, the cells and the uppermost courses of the wall to cornice level, may have been the work of one further master after a pause while the mortar in the ribs set.⁶¹

We have to conclude that the seminal originality of the Saint-Denis chevet lay not in the genius of one master, but in an accidental concatenation, a fluke of appointments and opinions that were influenced by Suger's passion for light and for re-creating the past.⁶² Though his choice of masters may have been deliberate, it seems more likely that masters were chosen from whatever pool of men were currently unoccupied. In this case the greatness of Saint-Denis stems from the happy conjunction of three men: the fourth master from the south who opened the walls with gigantic windows, the fifth from the north who lightened the spaces with drum columns and covered them with a unified system of Ribs, and their client, Abbot Suger.

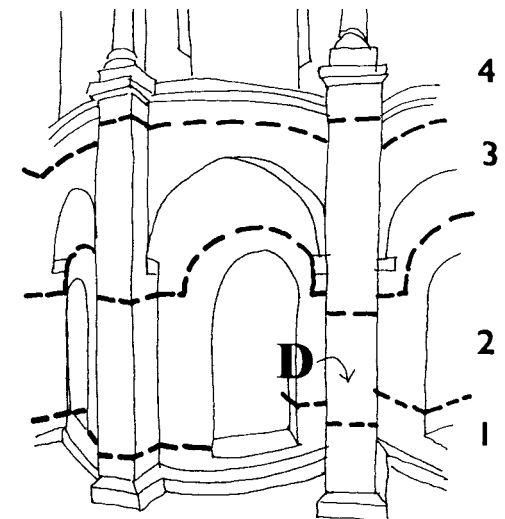
The intellectual clarity of the chevet, unlike the manifest confusion at Saint-Martin-des-Champs, comes in part from the horizontal location of the junction between these two crucial building campaigns. No such clarity existed at Saint-Martin, where vertical breaks in nearly every bay ensured that every pier would be evolved from different templates. At Saint-Denis, on the other hand, nearly the entire wall from north to south was the work of one team, and the whole of the interior space from drums to vaults was the work of another. Much of the satisfaction we feel in this building stems from the architectural integrity each master was able to retain within his own sphere of influence.



Five campaigns in the chevet, plus at least three more in the footings and vault cells.



Location of junction D



The step in the joints at buttress D that showed that the north was slightly in advance of the south.

The later works by these masters betray little of what they may have learned from their time at Saint-Denis or their interactions with Suger and his ideas. In the decades that followed Saint-Denis the Window Master's influence was negligible compared to his successor's, for windows became smaller in the 1160s and 1170s than they were in the 1140s.⁶³ It was his successor, the Rib Master, who introduced those space creating elements that we so admire the two rows of slender drum piers and the integrated ribbing. If any of the masters employed on the abbey can be called the first Gothic architect, it is he, though the windows that created its luminosity were the work of his predecessor. It is the Rib Master's rib forms, with their Anglo Norman level crowns and round ribs resting on drum columns that inspired the next generation of masons.

References

1. Sumner McK. Crosby, "Abbot Suger's St.-Denis. The new Gothic", *Acts of the twentieth congress of the history of art*, Princeton, 1963, 85-91; Sumner McK. Crosby, *The royal abbey of Saint-Denis, from its beginnings to the death of Suger, 475-1151*, ed. Pamela Blum, New Haven, 1987; William Clark, "Suger's church at Saint-Denis: the state of research", *Abbot Suger and Saint-Denis*, New York, 1986, 105-130 itemizes the scholarly work done to 1992. Note that with two exceptions I have left these references as they appeared in the 1992 article, even though many are now 30 years out of date. The main addition is the COGA site and its data on over 1,600 churches in the Paris Basin, <https://creationofgothic.org/COGA/synopsis.php?id=S-DEN-FR>. All the churches mentioned here may be examined in detail with their capitals, costed and with suggested chronologies in COGA.
2. Jean Bony, "What possible sources for the chevet of Saint-Denis?" *Abbot Suger and Saint-Denis*, ed. Paula Gerson.
3. Crosby, *Saint-Denis*, 252.
4. Some consider these alterations the natural consequences of an experimental era. For example, Jacques Henriot, "La cathédrale Saint-Etienne de Sens: le parti du premier maître et ses campagnes u XIIe siècle", *Bulletin Monumental*, cxl 1982, 152-212. Continuous impost 310 mm tall, transverse arch impost 350 mm high.
5. 201 mm average compared to 180 mm.
6. Clark, "Research", 123, n. 66. The question was first raised by Kenneth Severens, "The early campaigns at Sens 1140-1145", *Journal of the Society of Architectural Historians*, xxix 1970, 94-107.
7. For a similar case, see the Cerseuil apse shafts in James, *Template makers*, 226-28.
8. John James, "19 Medieval mortar", *In Search of the unknown in medieval architecture*, 2007, Pindar Press, London; J. Ashurst, *Mortar, plasters and renders in conservation*, London, 1983; Robert Mark, *Experiments in Gothic structure*, Cambridge MA, 1982, 77, notes 13-15.
9. J. Boussard, *Nouvelle histoire de Paris de la fin du sige de 885-886 la mort de Philippe Auguste*, Paris, 1976, 175-77; and Clark, *Saint-Denis*, 120, n. 34.
10. Clark, *Saint-Denis*, 112.
11. Erwin Panofsky, *Abbot Suger on the Abbey Church of St.-Denis and its art treasures*, Princeton, 1946, 87-89. A document suggests that the pilgrims were as uncomfortably crowded in the narrow spaces at Chartres as at Saint Denis: Etienne de Lepinois and Lucien Merlet, *Cartulaire de Notre-Dame de Chartres*, Chartres, iii vols. 1862, 260, which may be why the traditional deep chapels of the first plan were opened into a double ambulatory - James, *Contractors*, 166.
12. Saint Martin was begun perhaps ten years before Saint Denis: Eugène Lefèvre-Pontalis, "L'église de Saint-Martin-de-Champs à Paris", *Congrès Archéologique*, lxxvii 1919, 106-26; Jean B. Ache, "Le prieuré royal de Saint-Martin-des-Champs, ses rapports avec l'Angleterre et les débuts de l'architecture gothique", *Centre d'études romanes*, i 1963, 5-15. The concept of a necklace of connected radiating chapels was first manifested at Saint-Martin: Jean Bony, *French gothic architecture of the 12th and 13th centuries*, Berkeley, 1983, 49-52.
13. J. M. Berland, *Morienvall*, Paris, 1965.
14. The present drums do not sit directly over the piers in the crypt, but are offset some 700 mm to the interior. If the pier had been placed more directly above the crypt supports, AA and CC would have framed a narrow opening between the chapels. Calculated from the exquisite photogrammetric studies published in Crosby, *Royal abbey of Saint Denis*, 247 and 258.
15. Called "Add a Chapel" in John James, *The Template-makers of the Paris Basin*, Leura, 1989, 50-54. Examples within a decade or so of Saint-Denis are Notre-Dame, Paris with a ten-year pause, Noyon 15 years, Orbais more than 20 years and Saint-Leu-d'Esserent almost 30 years.
16. James, *Template-makers*, 143-44.
17. There is a subtle rhythm in its arrangement that may be a working procedure, Clark, *Saint Denis*, 112; Clark, *Saint-Germain-des-Prés*, 348-65.
18. Perhaps laid in pairs, Clark, *Saint Denis*, 122, n. 43.
19. Relieving arches are not common. Also at Courmelles. Perhaps a decorative device derived from castle gateways, Stephen Gardner, "The influence of castle-building on ecclesiastical architecture in the Paris Region, 1130-1150", *The medieval castle: romance and reality*, eds. K. Ryerson and F. Powe (Medieval studies at Minnesota, I), Mineapolis, 1984, 109-16.
20. P. Racinet, "Le prieuré clunisien de Saint-Leu-d'Esserent", *Group d'études des monuments et oeuvres d'art du Beauvaisis*, xiii 1982, 17-25.
21. Dominique Vermand, *La cathédrale Notre-Dame de Senlis au XIe siècle: étude historique et monumentale*, Paris 1987.
22. J. Houlet, *Les églises d'Etampes, pays d'Yvelines, de Hurepoix et de la Beauce*, i 1961.
23. For a list of large windows see James, *Template-makers*, 106, to which should be added the transept windows at Winchester which are 1,620 mm wide, the lateral chapel windows at Saint-Lomer, Blois which are 1,700 mm wide, and one of the chapel windows at Saint-Martin-des-Champs which is 2,100 mm wide.
24. François Deshoulières, "L'église Notre-Dame", *Congrès archéologique*, xciii 1930, 242-58.
25. Everett, *Blois*.
26. Some capitals in the Blois chapels are also like those in Saint Denis.
27. Marcel Aubert, "L'église de la Ferté-Alais", *Bulletin Monumental*, lxxv 1926, 367-8, probably started before Saint Denis.
28. Saint-Leu was an Add-a-Chapel scheme with walls of 1144±, while the Senlis walls were closer to 1155.

29. Men building the eastern chapels also worked in the western bays, John James, "La construction de la façade occidentale de la cathédrale de Senlis", *La Cathédrale Notre Dame de Senlis au XII^e Siècle*, Paris 1987, 109-118.
30. From close inspection I would aver that none of the Window Master's capitals have been recarved or replaced, which was Crosby's concern in *Saint-Denis*, 499, n. 8.
31. Table 1 includes only those parts of Saint-Denis where elements from this dossier occur. For a full dossier analysis the table would be broadened to include other zones such as vaults and footings, as in James, *Template-makers*, ch. 8. These 99 capitals can be viewed together in COGA: <https://creationofgothic.org/COGA/capitalphases.php?id=S-DEN-FR> under phase 22. Notice in particular the carvers identified as The Duke, Duchess, Fabian, Victoire III, Felix and Birdman, some of whom also carved capitals in the west portal ten years earlier.
32. This master may have used the Roman foot for this radius, which is also used in the crypt arches, is exactly 7 Roman feet: James, *Contractors*, 74-76.
33. This would allow the centring to be struck by pulling out wedges from above the ribs with a rope passing through this hole. Found in less than 12 percent of rib vaulted churches before 1150.
34. Normally, the chamfer gets wider as the stone gets larger, for they are set out radially from some point within the stone. But in these bases the corners of the chamfer along the splay are parallel as the chamfer has been measured from the outside of the stone. The geometric process is unusual, as is the mindset behind it.
35. David McGee, "The 'early vaults' of Saint-Etienne at Beauvais", *Journal of the Society of Architectural Historians*, xxxv 1986, 20-31.
36. Philippe Plaignieux, "Les campagnes de construction du XII^e siècle de l'église de Cambonne-lès-Clermont", *Masters Thesis*, Paris IV, 1985.
37. Racinet, *Picardie*, 199-230.
38. Stephen Gardner, "Two campaigns in Suger's western block at St.-Denis", *The Art Bulletin*, lxvi 1984, 574-587.
39. Bony, *French gothic*, 35-37.
40. Elie Lambert, "L'abbatiale de Saint-Germer et l'école de Saint-Denis", *Bulletin Monumental*, c 1941, 47-63.
41. To recreate the Constantinian basilica, Bony, *Saint-Denis*, 140, Suger even wanted to import marble columns from Rome - Panofsky, *Suger*, 213.
42. At Senlis various discrepancies in the choir suggest three campaigns in which the Window Master began the windows, carved some of the capitals and the banded window shafts, and the Rib Master built the vaults with the same bosses found at Saint-Denis.
43. Crosby, *Royal abbey of Saint Denis*, 252.
44. First noted by Crosby who thought they reflected the difficulties of aligning the centres of the ambulatory shafts with the offset centres of the chapels: Clark, *Saint Denis*, 120, n. 32 suggests these changes might have been necessitated by a nearby building.
45. On the north, the window and respond shafts are 166 and 178 mm in diameter, while the larger rib shafts are 247 mm, which is 40 percent larger than the former. In the south the former shafts measure 187 and 231 mm, only 24 percent larger. Compared to the north, the southern responds are larger and the rib shafts smaller. Variation in measurements of diameters ± 1.5 mm. Maximum range in chapel *en délit* shafts are 160-166 mm and, excluding a few mavericks, 174-184 mm.
46. Crosby, *Saint-Denis*, 248 and Clark, *Saint-Denis*, 112 both argue that the construction of the north side was more advanced than the south. If reversed there would be only minimal modification of these conclusions, except in the crypt where, if the southern buttress was an experiment that was altered in later buttresses, my first postulated break in the construction could be eliminated.
47. Lon Shelby, "Medieval mason's templates", *Journal of the Society of Architectural Historians*, xxx 1971, 140-152; and Lon Shelby, "The geometrical knowledge of mediaeval master masons", *Speculum*, xlvii, 1972, 395-421; François Bucher, "Medieval architectural design methods, 800-1560", *Gesta*, xi 1972, 37-51; John Harvey, "Some details and mouldings by Yvele", *Antiquaries Journal*, xxvii 1947, 51-60; and John Harvey, *The medieval architect*, London, 1972.
48. Van der Meulen suggests that Suger was an aesthetic conservative as the, "only reference to his actually influencing the design is his demand that a mosaic be placed in the northern tympanum", though contrary to modern custom. He then asks "was this uniquely conservative approach likely to have been instrumental in the genesis of a new style?" - Jan van der Meulen, "Sculpture and its architectural context at Chartres around 1200", *The year 1200: a background survey*, ed. F. Deuchler, New York, iii 1970, 531.
49. The unique wide windows in the crypt were unheard of before, and were probably installed on Suger's instructions.
50. "Conceptualisation and execution were largely independent. Planning was done by a learned adviser either the patron or head of a monastic or secular shop; realisation was the work of the craftsman": H. L. Kessler, "On the State of Medieval Art History," *Art Bulletin*, lxix 1988, 181.
51. At Chartres, Ruby may have been the master for the whole of the upper parts of the north transept including the rose, but employed as sub contractor a crude local team called Green to do the bulk walling. Green pleased himself about profiles for stair windows and drip moulds, but Ruby controlled the overall form and the details of the rose window: James, *Contractors*, 491-95.
52. This happened in the north porch at Chartres, James, *Contractors*, 44-45.
53. James, *Contractors*, 544-50. I am particularly grateful for the discussions with Caroline Bruzelius, François Bucher, Bill Clark, Michael Davis, Stephen Murray and Lon Shelby on this issue. See the pertinent arguments in Shelby, Chartres, 173-76, and in James, *Template-makers*, ch. 9.
54. James, *Template-makers*, ch. 4.
55. The low sills in the crypt, virtually set at floor level, were the work of restorer Jules Formigé in the 1850s. They may have been somewhat higher.
56. William Clark and Thomas Waldman, "Money, stone, liturgy and planning at the Royal Abbey of Saint-Denis", *New approaches to medieval architecture*, eds. Robert Bork *et al.*, Ashgate, Burlington, 2011, 63-75.
57. This master may have built the upper central chapel in the west narthex with its blocky capitals, for it was the last part constructed before the consecration that produced the holy water for the chevet footings. Gardner, *Saint-Denis*, 587, n. 44, lists some of the connections.
58. Heavily restored by Debret in the early nineteenth century. Clark may be correct in suggesting Merovingian sources, Clark, *Saint-Denis*, 121.
59. There are no bands on the external window shafts from the middle of the second southern chapel westwards, and internally from the middle of the first chapel westwards: lying over junction "D" this suggests that these were installed by the Rib Master.
60. Suger states that there was a time when neither the cells nor any scaffolding was in place, nor anything that could support the ribs, Panofsky, *Suger*, 109. Crosby, *Saint-Denis*, 257-58, suggests that "forms could be moved from bay to bay", but where mortar required months to harden reuse would be limited.
61. In keeping with Bony's suggestion for the origin of Gothic in Jean Bony, "The genesis of gothic: accident or necessity?" *Australian Journal of Art*, ii 1980, 17-31.
62. James, *Template-makers*, 107.