



Window into the south-west stairs, Chartres cathedral

## Design changes in 4 similar windows

Adapted from *The contractors of Chartres*, Wyong, ii vols. 1979-81.

When I wonder how the complex geometric systems used by the masters were evolved, I think of these four windows. In them a simple design became increasingly complex and was gradually integrated with major elements beyond the staircase it illuminated. We can see he was trying to link a small item with the greater parts, to create a web of connections that would bind the building into a whole. If he were eager to pursue this process in the small unit of a staircase window, then we should consider how he would approach the larger and more vital structural parts of the building.

There are four windows in the transept porches that look out from the stairs. They are easily accessible from the outside [a]. They were installed by the master Bronze in 1198. The slight 'improvements' to the geometry suggest they were designed in the following order: that into the SE stair was the first as its layout is the simplest, then the SW, followed by the NW and NE on the other side of the building. This order of construction is consistent with the order of other elements in the cathedral.

Generally, windows in medieval stairs are larger on the inside than out – possibly following the reasoning that the smaller the outside the more effectively it would keep out the rain, and the larger the inside the more light will be spread into the room.

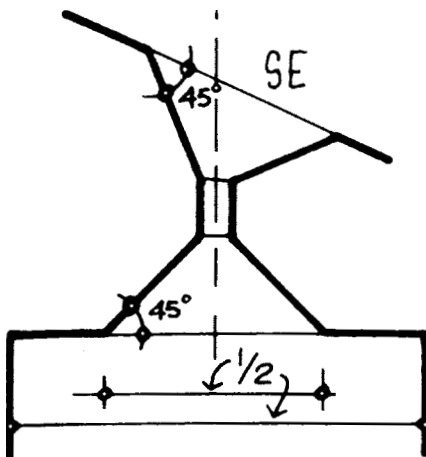
From the study of many items designed by Bronze at many levels of the cathedral, I calculated that his foot unit was 336mm, often referred to as the Teuton foot as its earliest known provenance was with the Aryan tribes of

the Iranian uplands. His unit seems to have been divided into sixteen digits rather than twelve inches.

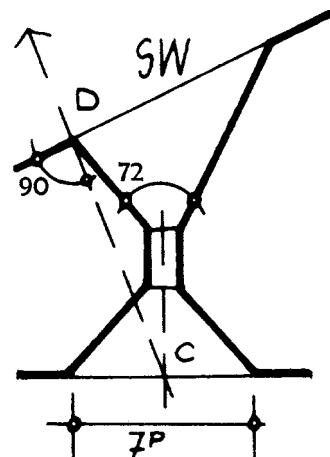
In the SE window [r1], Bronze made the external opening half the width of the wall recess, and placed it in the centre. The splays were set at an angle of 45° to the wall face, forming a triangle with the slot on the axis of the wall. It was 4 digits or one palm wide, 2 palms wide. On the inside he repeated the triangle he had used on the outside, and set it square to the angled wall of the passage which leads from the lobby to the circular stair. Simple.

In the next Bronze again started with the centre of the wall but reduced the width of the external opening to 7 palms with the same slot as before [r1]. On the interior he reduced the angle between the splays from the 90° used in the SE window to a pentagonal angle of 72°. This gave the window a more pleasant fuller feeling, with the outside (at the bottom of the drawing) significantly smaller than the inside.

One additional move was to avoid symmetrical alignment on the passage wall, but the sides were shifted so that the corner D lies on the line drawn from C perpendicular to the passage. CD is shown dashed on the drawing. However, this design relates to the rest of the porch only through the centre. It in no way reflects the thickness of the wall, the position of the stairs or any of the axes.



The window out of the south-east stair

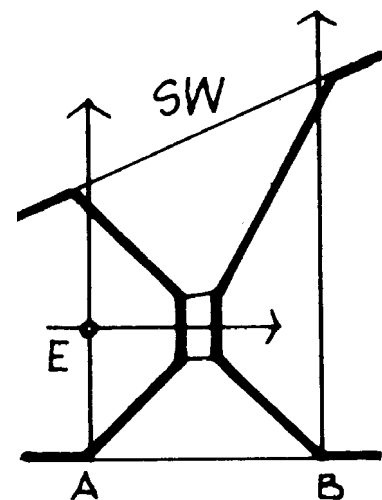


The window out of the south-west stair

He could have designed the window in a different way by drawing the line from A at right angles to the outside wall [r]. He then bisected the shorter line at E to locate the centre of the slot. He now had two equally valid ways to set out the window, from C he placed a square to the inside and from E placed a square to the outside. Then it was simple to use the 72° protractor to fix the internal splays.

Once he had cut that template he seems to have played further with the design (as I am sure he would in spare moments). Bronze would have noticed that the line on the other side drawn perpendicular to the outside at B almost met the inside corners, just as the line from A did. The purpose of A had been to locate the slot, and CD had located the inside splays. But now there was a third element in prospect, the box, that could provide another way to form the window. I would think he found the possible relationships between these three tantalising.

Bronze proceeded in the next window to see if he could bring all these elements together in one single statement. He moved the window more deeply into the wall, slightly widen the outside splays, and reduce the width



The window out of the south-west stair

