

Carpentry in Early Dunster Houses



Carpentry in Early Dunster Houses

One of the major areas of focus for the Early Dunster Project is the various timber structures and styles to be found within roof spaces.

This is where some of the best preserved features of our mediaeval buildings are to be found. Whilst some buildings may have been altered extensively through the centuries, in many cases the heavy wooden trusses (crucks) and associated timbers which formed the frame of the building still survive intact.

Although at first glance one roof structure may look pretty much the same as another, there are subtle differences style and structure that may help us to date and unravel the history of the building.



Carpentry in Early Dunster Houses

These are the main timber components we find in a typical mediaeval roof

Principal rafters.

The 2 main
"blades" of the
truss

Purlins.

Longitudinal
timbers which
supported
rafters which in
turn supported
the roof
covering



Ridge Purlin

Longitudinal
timber
supporting the
ridge at the top
of the roof

Rafters and battens

Lighter timber
framework to
which the roof
covering is fixed

Collar.

Horizontal
timber bracing
between
principal rafters

Wind Braces

Elegantly curved timbers which helped to brace the structure lengthways. These tended to feature in larger or more prestigious buildings where they would have added some aesthetic value.

Arch Braces.

Additional bracing between collar and principal rafter to prevent distortion of the truss, particularly in larger buildings

Carpentry in Early Dunster Houses

Collar Joints

The principal rafters and collar are normally quite large timbers (typically 300mm deep x 200mm wide).

Substantial joints were needed to fix the collar and principals together.

The most common form of collar joint we encounter is a mortice and tenon joint, with tenons on the collar ends fitting into deep mortices in the principals and secured with 2 or more wooden pegs of about 25mm diameter.



Carpentry in Early Dunster Houses

Collar Joints

In one of the properties surveyed, we found an original 14th Century truss which has partly collapsed, giving us a rare insight into the shape of the collar tenon.



Carpentry in Early Dunster Houses

Collar Joints

In some later properties, the mortice and tenon form gave way to a notched lap joint form, where the collar is set into the face of the principal rafter, using a dovetail or similar shape to help prevent “spreading” of the truss.

We believe this example dates from the 17th century. Other joints of this form have been recorded in the area from the same period.



Carpentry in Early Dunster Houses

Apex Types

One of the ways in which roof structures vary is in the way that the 2 halves or “blades” of the main roof trusses are joined at the apex.

Drawn from surveys across the UK, researchers have catalogued and defined a number of common apex joint **types** ⁽¹⁾, which may give clues as to the age, style and purpose of the original building.

Here are some of these defined types which we have encountered in our surveys so far ...



“Type B” : Blades meet vertically with a diagonal-set timber forming the ridge



“Type E” : Blades jointed 90 degrees with a diagonal set ridge. (This seems to be the most common form we find in our Dunster surveys and occurs in roofs dated several centuries apart)



“Type L1” : Blades joined by a central “yoke” directly below the apex, with a diagonal-set ridge purlin above

CBA Research Report No. 42: Cruck Construction – An Introduction and Catalogue by NW Alcock : Council For British Archaeology 1981

Carpentry in Early Dunster Houses

Early Apex Examples

- Type C

We are particularly interested in some of the apex types we have found in earlier buildings.

Although the examples we have recorded actually show some deterioration we can use some digital reconstruction to represent how they would originally have looked.

Here is a *Type C* Apex found in a 13th century roof



“Type C” Blades joined by a central “yoke”. A longitudinal timber would have been set on top of the yoke to form the ridge. The left-hand blade has partly collapsed, but the right hand side remains intact showing the yoke



This digitally-manipulated image represents how the apex would have originally looked, (the collapsed left-hand side is replaced with a mirror image of the right-hand side.)

It appears the ridge timber may have been diagonally set, though this may be a result of subsequent alterations.



The yoke is missing from another truss in the same roof, showing an interestingly curved tenon.

Carpentry in Early Dunster Houses

Early Apex Examples

- Type H

Another example found in an early (circa 1300) roof is the *Type H* form.



“Type H” : Blades held by a yoke, with horizontally-set ridge plate clasped between the blades above.

This example, in which the left-hand blade has partly decayed, is from roof dated to around 1300. The top of the right-hand blade has also been over-cut, probably during later modifications.



Again using digital manipulation, we can rebuild the left-hand side and fill the over-cut on the right-hand blade, to give a reconstructed view of the original arrangement.

Carpentry in Early Dunster Houses

Early Apex Examples

- Type C Variant

In the same roof as the Type H example, and on a coeval truss, we also found a variant which doesn't exactly fit any of the defined types, but could perhaps be best described as a variant of *Type C*



This example is similar to Type C, with the truss blades joined into a yoke above, but the ridge timber was housed into the yoke rather than seated on top.

Again the left-hand side of the yoke and blade are missing as a result of decay and/or later modification.



This digital reconstruction shows how the original arrangement may have looked, though the yoke may have been deeper than current.

Not also the peg-hole in the underside. A peg would have been inserted through the ridge timber and into the yoke to secure the ridge

Carpentry in Early Dunster Houses

Purlin Joints

One area where we find a wide variety of techniques is the way in which purlins (longitudinal timbers) are jointed into the main trusses.

The techniques can be divided into 3 main types:

- Trenched
- Tenoned
- Threaded

Each of these types have some interesting variations which we'll take a look at next



Trenched purlins are perhaps the simplest form – the purlin is located into a matching “trench” cut into the upper side of the principal rafter.

Note the now vacant trench on the right hand blade of this truss



With tenoned purlins, a tenon is cut in the end of the purlin and housed into a matching mortice in the truss.

(In this illustration the purlin is a later replacement. The original would have filled the mortice.)



Threaded purlins are similar to tenoned, but the mortice in the principal is the full size of the purlin. The purlins on opposing sides may meet within the mortice in either a splayed (diagonal) or square (butted) arrangement

Carpentry in Early Dunster Houses

Trenched Purlins

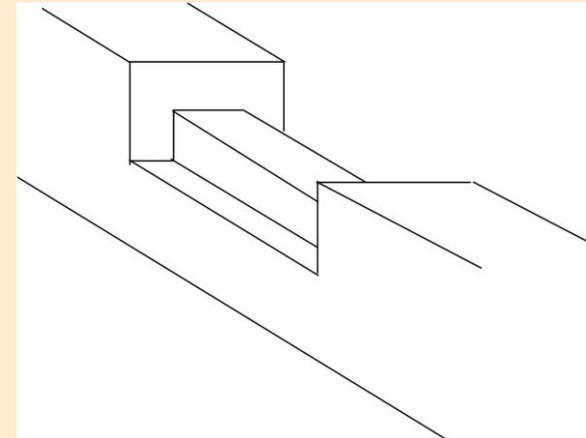
Trenched purlin joints had an advantage in that the purlins could be fitted once the trusses had been raised into position, whereas tenoned and threaded purlins would have had to be inserted as the trusses were being positioned.

As a refinement to the joint in its simplest form, the trench sometimes incorporated a “locking rib” and/or pegs to help stabilize the truss vertically



Here a former purlin trench has holes for 2 pegs which would have secured the purlin in place.

(The timber at the rear of the trench is a later addition)



This purlin trench incorporates a locking rib. The purlin would have been notched to locate onto the rib. The rib was quite broad and flat, and would have provided more strength and stability than simple pegs

Carpentry in Early Dunster Houses

Tenoned Purlins

With this type of joint a tenon at the end of the purlin locates into a matching mortice cut into the face of the principal rafter. On intermediate trusses the mortice often penetrated right through the rafter, housing opposing purlins on each side of the truss.

In the example shown here, the joint has partly withdrawn, revealing the shape of the tenon (highlighted in red)



Carpentry in Early Dunster Houses

Tenoned Purlins - Variations

The simple form of tenon had a disadvantage in that the strength of the purlin was limited to the size the tenon.

Various refinements have been found where the whole depth of the purlin was partly housed into the rafter. To avoid weakening of the rafter due to the larger mortice, one shoulder of the mortice was sometimes bevelled, reducing the amount of material that had to be cut away.



Here the joint has a bevelled shoulder above the mortice, enabling the full cross-section of the purlin, rather than just the tenon, to bear on the rafter



In this later example, a bevelled shoulder is cut below the mortice, providing a housing for the full purlin.

This form of “tusk” tenon is also used for jointing ceiling joists to beams

Carpentry in Early Dunster Houses

Tenoned Purlins - Variations

In some later roofs, the purlins on either side of an intermediate truss were positioned at different heights (“staggered”).

In some cases the tenon extended right through and projected beyond the far side of the rafter, and was secured with a “face-peg”



Note the staggered position of the purlins on either side, and although partly concealed by the ceiling and plaster, the wooden face-peg driven through the protruding tenon of the upper purlin.

Carpentry in Early Dunster Houses

Threaded Purlins

With threaded purlins, a mortice is cut right through the rafter to the full cross-section of the purlin.

Purlins may be either literally “threaded” right through the rafter, butted, or joined in some way within the mortice,

In the example here the purlin ends from either side were angled (“splayed”) and secured with pegs.



Note the splayed end of the far-side purlin seated in the rafter. The additional timber at top right is a later reinforcement but behind it the original peg which would have secured the near-side purlin (now removed) is still in place .

Carpentry in Early Dunster Houses

The Rolls-Royce of Purlin Joints?

Finally - the most elaborate form of purlin joint we have yet encountered...

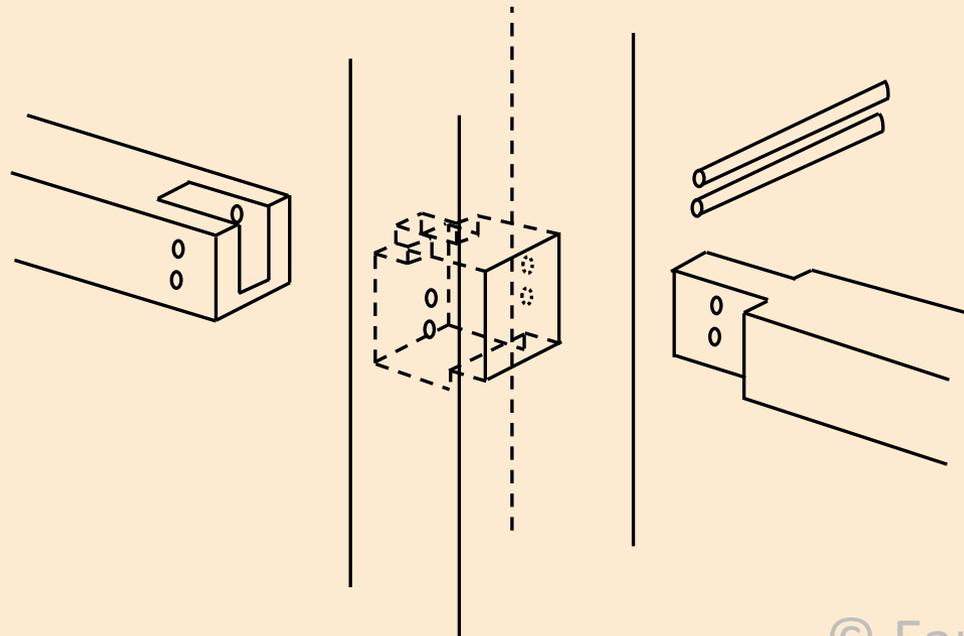
This was found in a relatively late roof, and although unable to inspect the internal joint, we believe it is what could be described as a part-staggered bridled scarf joint – with pegs.

This seems a very sophisticated form of joint for a relatively simple function. Perhaps the carpenter was something of an artisan, or just had some time on his hands?



The purlin joint as viewed from each side of the rafter.

Note the slight stagger, and the projecting tenon on the left hand side



Though unable to inspect in detail, we believe the internal structure of the joint may be of this form.

Carpentry in Early Dunster Houses

Carpenters' Assembly Marks

The timber frames and trusses which formed the “backbone” of our early buildings would have been cut and formed at a framing yard, then dismantled for transport and re-assembly on site.

The carpenter made a series of marks on joints – typically based on roman numerals - so that the builder on site would know the correct sequence of assembly.



In this early truss, the roman numeral III is used to identify matching halves of the collar joint.

In early work, the marks were typically scored into the surface of the timbers using a mediaeval tool known as a race-knife.



In this example, a few hundred years later, the same principle is being used, but the mark (I) is cut with a chisel rather than scored with a knife.

Carpentry in Early Dunster Houses

Marking-Out Lines

Though difficult to spot, we sometimes find perpendicular scribe lines made by the carpenter to mark out a joint before setting to work with his chisel.

These seem to carry a special mystique, as they provide a tangible connection with the carpenter and his craft, perhaps 600 or more years ago.



Although the upper side has since broken out, we can still see the perpendicular lines marking out the original purlin mortise in this 13th or 14th century truss

Carpentry in Early Dunster Houses

Saw Marks

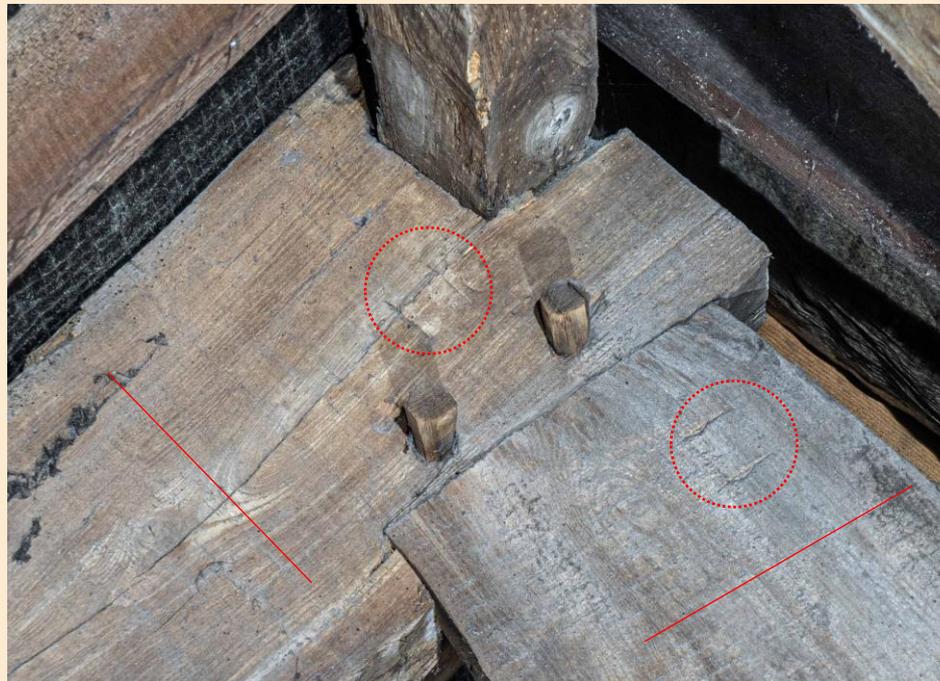
One indicator of the age of a building, or at least its timbers, is the nature of the saw marks resulting from the conversion of a felled tree into squared timbers.

Earlier methods used trestle sawing where one end of the log was raised on a trestle, and the saw was used horizontally. When the mid point was reached, the log was turned and cut from the opposite end. This resulted in opposing diagonal saw marks.

Trestle sawing was eventually superseded by pit-sawing, where the log was placed horizontally over a pit, and the saw used vertically, resulting in perpendicular saw-marks along the whole length.



Saw marks on this 13th century collar are diagonal, and are inclined in the opposite direction at each end of the collar, indicating that the piece was trestle sawn



Perpendicular saw-marks on this later truss indicate pit-sawing.

Note also the carpenters mark II on each half of the apex (circled)

Carpentry in Early Dunster Houses

Dating

One of the aims of the Early Dunster Project is to look for any patterns and correlations in these carpentry styles and techniques through the centuries and to see how this aligns with what we know from other sources about the age and history of our buildings.

This is an ongoing process, and will involve much more detailed analysis, but the table opposite gives just an early flavour of how things look so far, based on the few features we have looked at in this article.

(The table shows number of **individual properties** in which respective features have been recorded)

Feature	Century			
	13th	14th	15th	16 th & beyond
Apex style				
Type B		1	1	
Type C	1			
Type E		2	1	6
Type L1				1
Type H		1		
Collar Joint				
Mortice & Tenon	1	4	2	2
Notched / Lap				3
Purlin Joint				
Trenched	1	1	2	3
Tenoned	1	2	1	4
Threaded		1		2
Sawing				
Trestle		3	1	
Pit				

Carpentry in Early Dunster Houses

Dating

Whilst we've only got a limited amount of recorded survey data to work with at the moment, we can already see some trends that seem in keeping with findings from other surveys both locally and elsewhere.

We will continue this analysis as we gather information from further surveys. Perhaps we will even be able to find some pattern in the diverse range of purlin joints – though that looks a little more challenging!

Feature	Century			
	13th	14th	15th	16th & beyond
Apex style				
Type B		1	1	
Type C	1			
Type E		2	1	6
Type L1				1
Type H		1		
Collar Joint				
Mortice & Tenon	1	4	2	2
Notched / Lap				3
Purlin Joint				
Trenched	1	1	2	3
Tenoned	1	2	1	4
Threaded		1		2
Sawing				
Trestle		3	1	
Pit				3

The Type E apex appears to be the most common form, consistent with surveys of other properties, certainly in the West Somerset area, and this form has prevailed through many centuries.

Type C and H have been found in early (13th & 14th century) roofs.

Pit sawing took over from trestle sawing after the 15th century. Studies in Herefordshire show that the change appears to have occurred there in the mid-1500's.

Lap-jointed collars appear more prevalent from the 16th century onwards. Some of the later trusses use timbers that are thinner in section, so perhaps the mortice and tenon form would have compromised the strength of these lighter timbers.

Carpentry in Early Dunster Houses

Acknowledgements, References and further reading

Special thanks are due to the home owners of Dunster for allowing the project team into their homes to record and photograph.

Carpentry and jointing terminology used throughout this presentation is based on the publication "*Recording Timber-Framed Buildings: An Illustrated Glossary*" by NW Alcock, MW Barley, PW Dixon, RA Meeson : Council for British Archaeology 1996

The classification of apex types is based on *CBA Research Report No. 42: Cruck Construction – An Introduction and Catalogue* by NW Alcock : Council For British Archaeology 1981

Photographs by Tony Harding & Mary Ewing.

© All images and content are copyright "Early Dunster" 2020

Please note that every effort has been made to cover copyright issues in our on-line exhibition.