NEWTON HALL, HYDE, CHESHIRE

A CRUCK FRAME, *c.* A.D. 1380

Its Rescue and Restoration, with a Commentary on the mediaeval Practice of Oak-framed Building

By Tom L. Marsden

NEWTON HALL in Hyde is near the river Tame, where a shallow part was used as a ford in mediaeval times. Close by the Hall a Roman and mediaeval track runs up the hill from the river to the site of Melandra Castle. Melandra, a Roman station, is said to have a Latin name derived from the Greek word *melandryon*, signifying "Heart of Oak" or "The heart in the oak", and it is thought that the name was given to the fort on account of the great number of oak trees which once surrounded it.

This report on the reconstruction of Newton Hall is concerned with the structural use of oak in mediaeval times, and with an examination of the significant details and methods of assembly of a cruck-frame building.

Newton Hall was the home of the de Newtons, a family of gentry status. In the first half of the reign of Edward I the township of Hyde belonged to Robert de Newton, and in 1302 Thomas de Newton held it. The Hall is a fourteenth-century timber-framed building of great interest, for an unusually extensive part of the frame has survived. The restoration, initiated by George H. Kenyon, Esq., Chairman of William Kenyon and Sons, has been carried out in part as a research exercise into the process of building in the mediaeval period. Newton Hall is one of the earliest timber-framed structures in North Cheshire and has revealed the mediaeval method of constructing a large-scale cruck building. Fortunately it has been possible to preserve and stabilize the great cruck-trusses and the main section of the original oak wall at Newton Hall, in spite of the fact that complete demolition on this site seemed imminent in 1968. The

above firm intervened to rescue the building in 1968-69 and the work was completed in 1970.

There are few surviving cruck structures of really large dimensions where the cruck-blades spring direct from the ground sill and continue in one sweep to the ridge in the apex of the roof. Most cruck structures of this type are of relatively small scale. The larger ones, like the fine Leicester Guildhall, usually have blades which spring from the ground but these are truncated in their upper part, and the roof apex is supported by a subsidiary frame. In north-west England houses were commonly built of brick in the eighteenth century and had been preceded in the seventeenth century by houses with stone walls and stone mullioned windows. In the building period prior to this stone construction phase, houses were usually of oak and Newton Hall illustrates a building technique which had developed from pre-Conquest days. Man first built in timber and the Englishman's home in mediaeval times usually consisted of a large open hall, sometimes without sub-divisions, where the master, his family and his staff lived together. Newton Hall illustrates this type of house.

The reconstruction of the cruck-framed Hall at Hyde has helped to explain the technique used in England in the mediaeval period for rearing cruck-trusses and assembling their timber-framed walls. Unless the building is re-created with the original frame and trusses, the method of assembly is extremely difficult to unravel. Theoretical studies hitherto have not answered many questions on methods of building so in this field Newton Hall makes an important contribution.

Before the reconstruction at Newton Hall the surviving timber wall and cruck-trusses were carefully examined on the site, and notes and sketches were made showing the location of all the peg holes, mortices and tenons. The section of the wall which had survived on the east side served to show the arrangement of rails and posts, sills and wall plate, and from this information the reconstruction of the whole east section was possible. The construction of trusses and wall frames for the Monmouthshire region had been examined by archaeological methods in 1951 by Sir Cyril Fox and Lord Raglan, and they had drawn attention to the lack of organised research on traditional timber-building in England.

The mediaeval sequence of operations for constructing and assembling the Hyde building has been carefully followed in the 1969 restoration (Plate I).

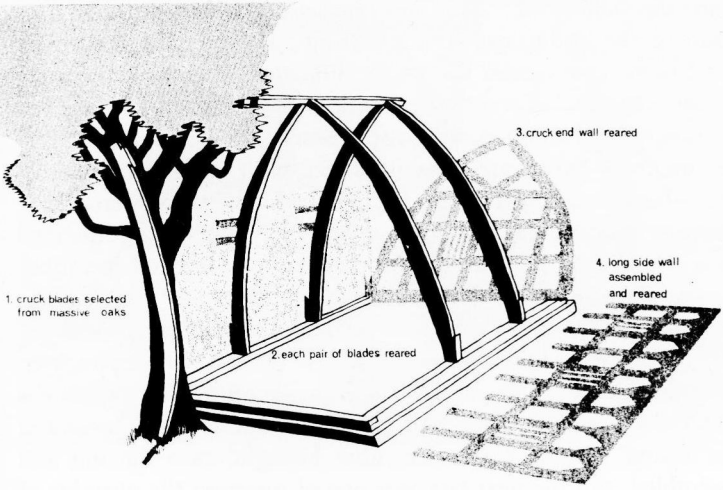

PLATE I. Newton Hall: the sequence of a cruck frame construction. (*Drawing by C. Woodhead*).

(a) The red sandstone sill walls which run the full extent of the perimeter of the building were repaired first, to form a base for the 11 × 11 in. oak sills which run under the cruck-trusses and support the oak walls. It became clear during the re-assembling process that the wooden sills to the *long* walls only must be inserted as a first operation after completion of the stonework. The oak sill at each gable end must be attached to the gable truss.

(b) The oak sills on the long walls were bedded in mortar to spread their load across the stonework in readiness to receive, in turn, the cruck-trusses erected in sequence. The cruck-truss at the north end was probably the first to be reared in the first build, and the others followed in order to the south end of the building. The end closed-truss would have been erected in mediaeval times with the timber sill attached to it, as it was also reared in March, 1969. This arrangement of the sill being built *into* an end truss

cleared up speculation about the mediaeval methods of attachment and assembly.

(c) To lift the cruck-truss end wall into position it was necessary to use a long-jib mobile crane, and gradually to lower the truss onto the stone wall. This end cruck-truss weighed nearly four tons, so the traditional "cruck-rearing" by gangs of men must have been a spectacular and rather difficult operation in the fourteenth century. To stay the cruck-truss temporarily, diagonal members were inserted and props secured to the ground. Surviving cruck-trusses are sometimes seen with wedge-shaped seatings about two-thirds of the full height of the trusses, and these seatings presumably served to secure the temporarily inclined props at an intermediate stage in the lifting or rearing operation

(d) The cruck-trusses having been fastened into position, the next operation, in early March, 1969, was the making, assembly and raising of the long timber side wall to the east, which presented some problems. The parts had been made off the site and all the members, posts, rails and wall plate had been carefully measured for fitting. These parts were now brought onto the site and assembled, and the next task was one of inserting the uprights of the completed wall, approximately 46 feet long, into the mortices of the oak sill. It was clear that all the uprights must drop together into the mortices so the contractor prepared the wall as a "long-line" frame of timber, and the tenons at the bottom of the wall posts were prevented by plugs from sinking into the mortices of the sill until the entire wall had been raised to an upright position. By 29 March, 1969, the reconstruction of the long east wall of oak was nearing completion, and it was clear that in mediaeval times this operation must have been one of the most difficult, requiring considerable patience and skill. In this instance it was necessary so to assemble the long wall that the panels were raised sufficiently high for the wall to be lowered as a continuous frame. It was then feasible to cant the timber wall into its correct position to connect with the cruck-spurs. Oak pegs were then driven in and the wall frame was securely locked onto the spurs and trusses.

The cruck-trusses of the Newton Hall timber frame (Plate II) have double cruck-spurs about 10 feet above the floor and these

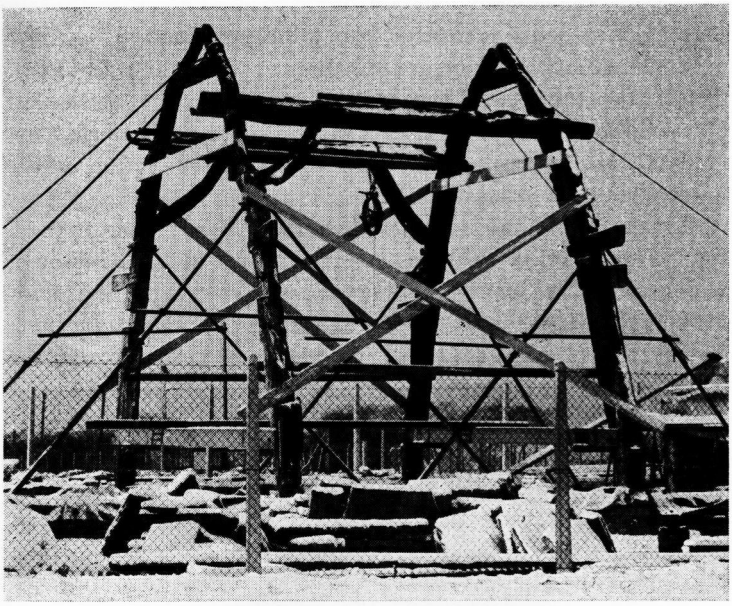

PLATE II. Newton Hall: the centre pair of cruck-blades after the removal of the oak frame walls and roof.

connect the oak wall frame to the wide cruck-blades. The silhouette of the truss can be seen in a strong light from the inside of the hall, illuminated by the new 20-ft. high window bay (see Plate IV) which has been added to the north end of the east wall to show the details of the wall frame and the lines of the trusses. At night the lighting is by spot lights and downlighter fittings arranged to emphasize the timber markings and the jointing of the wall frame. A section of the original wall timbers, with the surface of the oak untreated and "as found" when the building was uncovered, can be examined in the new viewing window bay. In this way a part of the original surface of the oak has been retained without fear of deterioration from further exposure. Timber-framed buildings in Cheshire which have survived from the sixteenth and seventeenth centuries are normally in the "black and white" tradition in which the oak has been painted with a bituminous black coating and the infill panels of wattle and daub

have been lime-washed. The strongly marked black and white effect is often believed to have been a long tradition in Cheshire but it would appear, after examination of the earliest examples, that in the fourteenth century structural frames like that of Newton Hall had had no surface treatment of the timbers. At Newton Hall the frame showed no trace of discoloration on the inside or outside surfaces.

In the restoration and repair work English oak has been used, framed together in the same manner as the original building, with mortices and tenon joints fastened with oak pegs. Approximately 35% of the wall timbers are from the original building and over 1,200 hand-made oak pegs were needed to secure the frame and its parts.

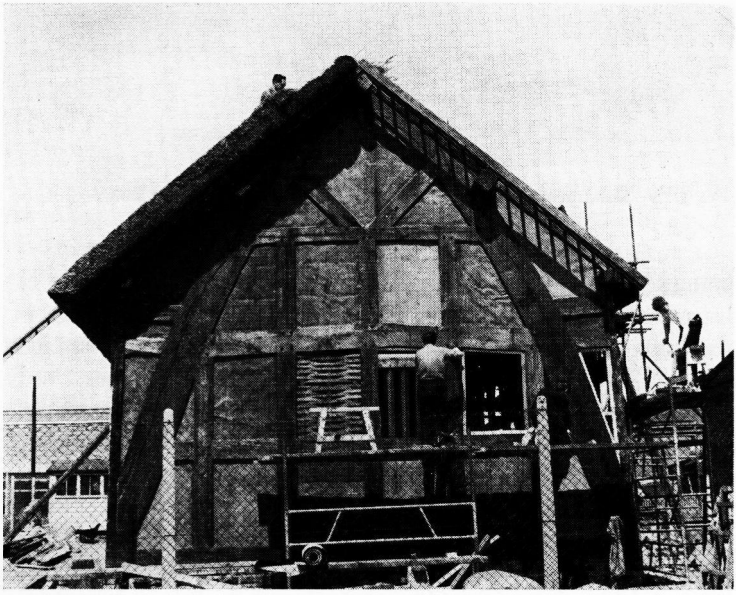

PLATE III. Newton Hall: the south gable end, showing a typical window and a wattle panel woven with riven oak laths.

The reconstructed cruck-frame for the south gable wall (Plate III) contains some original rails and posts but new blades were cut from a large oak tree located at Bury St. Edmunds. The difficulty

of finding an oak tree sufficiently large for the curved cruck-blades was not appreciated until a search in the north-west of England had proved fruitless. It would appear that the selection of timber for cruck-frames could not have been an easy task even in mediaeval times, for only a very large tree can produce the boomerang shape needed for a giant cruck-blade.

For reconstructing the oak frame some new curved wind braces to connect the back of the cruck-blades to the purlins had also to be made, and for these templates of hardboard were fashioned to follow the shape of the surviving wind braces.

In 1968, when Newton Hall was rescued from demolition, the building was found to be cased in a skin of 9-in. brickwork, probably added in the early part of the nineteenthc entury though some of the casing appeared to be of an earlier date. This brick outer wall had been roofed with blue slate which had provided weather protection and concealment for a long period; but although this brick shell round the Hall had protected the external east wall frame the west one was lost. Evidence for the seating of the walls and their connection with the frames survived in the spurs and the notches on the foot of the trusses. Visitors to Newton Hall can see through a glass panel in the west wall the inverted "V" notch which formerly carried a wall post and panels like those on the east side. These visitors, proceeding along the path from the door to the south gable, will note the curved line of the external wall, a curve which can readily be observed by comparison with the line of the cobbled path. Mediaeval timber-framed halls were frequently built with cambered external walls: Baguley Hall in Cheshire is another example. Visitors interested in the subtle features of stability and alignment in early oak framework will also note that the long oak-panelled wall on the east is inclined inwards approximately 4 ins. at the top of the wall, a feature most easily seen where the oak wall abuts on the large new window bay.

The massive oak purlins have a substantial overhang where they are seated on the end truss, and the jointing of these purlins is by scarf joints. Where new purlins have replaced the old, an identical cut has been made to follow the original line and form of connection. The oak spars which survived had been carefully

sawn and followed the usual mediaeval practice of being laid flatwise: they were approximately 5 inches wide where they rested on the purlins and approximately $2\frac{1}{2}$–$3\frac{1}{4}$ inches deep. The wall posts and rails showed evidence of being sophisticated and well developed in relation to timber-frame technique and craft skill. In the reconstruction, the door and door frame have been cut from mature oak and the jointing follows mediaeval practice. The door at Newton Hall weighs over five hundredweights. The fastenings and padlock have been designed to conform as closely as possible to mediaeval patterns.

The extensive use of cranked and curved oak members in the construction of early oak-framed buildings often raises the controversial question of the relationship (if any) between the craft techniques used in building ships and the methods adopted for constructing large timber houses. Between 1961 and 1970 a very active preservation department has worked on the *Wasa* Ship Project in Stockholm under the direction of Lars Barkman. The royal ship *Wasa* sank in 1628, the date of her completion and before she was fully commissioned, and she remained under water until 1961, a period of three hundred and thirty-three years. The first task was to make a study of the oak timbers, to find the best method of treatment after so long an immersion in sea water. The sources of the *Wasa*'s oak have not been completely ascertained but the records give some indication of the timber supplied to the royal dockyards in 1625 and 1626. Purchases were made of finished ship wood—mostly oak planking but also walling and cambered wood—and of oak to be cut by the shipworkers themselves. This latter was cut according to the shipwrights' requirements for curved parts such as knees (curved angles between deck and ribs), and for ribs, frames, etc. The selection of suitable oak trees for cruck-blades for houses presented similar problems, the cruck-blades being procured from trunk and branch as curved tree parts. The more acute angle between trunk and root was probably selected for the knee angle brace in ships.

The year 1628 is relatively late in the oak building period but the *Wasa* is the oldest complete wooden hull in the world and offers a useful large scale frame for comparative study. The joints in the longitudinal timbers of the *Wasa* are scarf joints and similar

to the roof purlin joints at Newton Hall. Scarf joints are found in early mediaeval frames and, as so often happens, practices continue for a very long period when simple jointing methods are required. The *Wasa* has a marked curvilinear form, somewhat archaic in shape, with planking and ribs demanding a high proportion of cranked timbers. Research in Stockholm has shown that the oak was used in its green state, and that the oak cut in 1624–26 was used in 1627 and 1628 for structural purposes and planking, but not for the ship's sculptures, the carving of which called for seasoned wood. Further studies have revealed that the oak used in 1626–27 for the heavier section members was about 350 years old. Taking a similar growth period for the cruck-blades at Newton Hall, these would probably have been young trees between A.D. 1050 and 1100.

The tools of the ship's carpenter found in the *Wasa* would serve satisfactorily for constructing a mediaeval framed house. Boring tools used to make holes for oak pegs (the *Wasa* was fastened together with oak pegs and iron bolts), and other cutting tools of metal show little change over the centuries. This continuity is confirmed by the eleventh-century tools in the Historiska Museet in Stockholm where implements and tools from Gotland include an adze (with iron head and wooden handle, *c.* A.D. 1050) similar to the mediaeval type used in Britain and to the types still used in the eighteenth and nineteenth centuries. This early collection of tools also includes a rather crude spoke shave, a gouge with a draw-handle, and tools for cutting scratch mouldings.

In a developed cruck-frame building such as Newton Hall, the long sides of the building are divided into bays by the cruck-trusses. The function of the crucks is to support the side purlins and the ridge purlin on their backs as well as to hold the side walls in position. Thus the constructional purpose is double from the outset. The longitudinal members, *viz.* the ridge, purlins and wall plates run without interruption from end to end of the building and the joints are scarfed together. Here lies a significant and fundamental difference from the south-east England "lowland" type structures where the purlins are butted against the principals in the structure and do not run through. The Newton Hall bays in the walls are approximately 16 feet wide and are

divided into three panels which carry an infill of woven oak laths. A specimen wattle panel in cut-away form in the south gable truss illustrates the construction of the fourteenth-century type of infill in these parts of Cheshire. The laths are of riven oak woven round uprights which fit into holes in the upper rail and slide horizontally into a groove at the bottom when being fixed into position. These woven laths provided stiffening and a key for the mud and straw plaster daub. This daub was usually plastered inside and outside as a finishing coat and protection from the weather. Professor Ian Richmond found that this basic form of construction had also been used by the Romans in Britain when constructing walls having oak uprights with rails and panels. There was considerable regional variation in the detail of the infill panels in Britain in the mediaeval period and also in post-mediaeval construction. The thirteenth-century timber-framed Scrivelsby Court in Lincolnshire (now demolished) had split oak panels about $\frac{3}{4} \times 10 \times 5$ inches driven down grooves in the vertical oak posts; and across the country from Kent to Gloucestershire variations are found which include early examples of cobbles mixed with clay (Leicestershire), and the more normal wattle infill with reinforcement of differing types of branches and brushwood.

Excavations at Sigtuma (near Uppsala in Sweden), a flourishing trading centre in the eleventh and twelfth centuries, uncovered some interesting wall constructions. The merchants of Sigtuma had connections with the Baltic centres and western Europe. In 1187 the town was devastated by raiders and the remains of houses from that period show that these were built with posts standing on wooden ground sills. Between the posts the walls were made of plaited sticks (branches) daubed with clay. The specimen excavated showed a sill of timber approximately 6×5 inches, and the upright members which received the woven branches measured about 9 inches, centre to centre.

In Britain mediaeval houses, whether isolated or built in groups in hamlets, villages or towns, were almost wholly of timber. They were well built or poorly constructed in this material according to the social status and means of the owner. Fortifications, castles and churches were commonly of stone. The houses of the poorer folk might be described as cabins or

hovels. They had floors of beaten earth, clay or natural rock, the walls were flimsily constructed of timber and mud from the road, and the dwellings were frequently shared with fowls, pigr and cattle, the latter merely partitioned off. Some families lived in the stables and outhouses of the great houses. It is regrettable that the number of surviving mediaeval timber houses in Britain is now small and rarely, if ever, have these escaped later modifications to the wall frames and panels. The majority of existing timber buildings belong, in fact, to the Tudor period. Research in the field has shown that there were several different forms of cruck construction in the period before 1560, but our present knowledge is not sufficient to establish clearly which particular forms represented regional practices and which forms were evolutionary. Some cruck members were nearly straight, others were curved or elbow-shaped. Some again, in and around Leicestershire, took the shape of an ogee arch, i.e. a bowed arch turning into a reverse curve at the apex. This latter type frequently supported the ridge on the tips of the two cruck-blades. Another form of support for the ridge timbers was a scissor-crossing of the cruck-blades. The majestic pair of cruck-blades at Newton Hall, located close to the new window bay, follows the line of a Gothic arch with a span and height of approximately 23 feet. The blades are finely matched and have timber marks about 14 feet above the floor level. The breadth of the oak cruck-blades at the elbow is 21 inches across, and the tops of these cruck-blades touch and support the ridge timbers. The date of these crucks by Carbon 14 tests is *c.* A.D. 1380.

The small windows giving natural light at Newton Hall are typical of the fourteenth century. Diagonally placed 4 × 4-inch oak posts gave protection and the openings were closed internally by wooden shutters, often described in fourteenth-century documents as "window doors" or "wooden windows".

At an early stage in the restoration William Kenyon and Sons decided to provide Newton Hall with modern lighting and heating, and these were planned with hidden wiring and electric under-floor heating. The Hall (Plate IV) now plays its part as a cultural centre for Hyde and is used for meetings and social gatherings. The ground round the building has been planted with

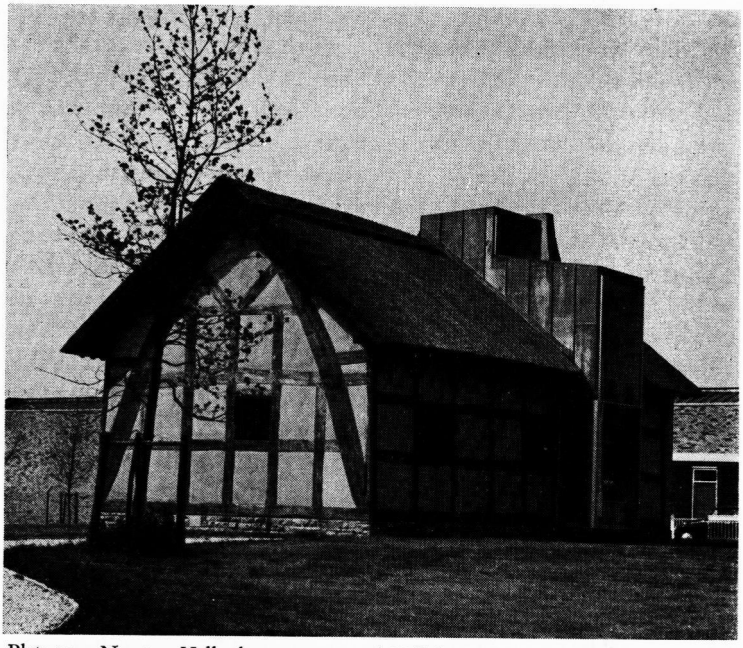

Plate IV. Newton Hall: the reconstructed Hall from the south-east, showing the new window bay.

forest trees such as oak and ash, and an informal garden is open for public recreation.

Acknowledgements

The late Professor R. A. Cordingley of the University of Manchester was largely responsible for initiating the study of mediaeval timber techniques in the north-west, and I am particularly indebted to Dr. Eric Gee for his valuable suggestions and comments. This paper on mediaeval building practices has, moreover, derived considerable assistance from members of the Vernacular Architecture Group through their discussions and conferences on regional domestic architecture.