

Building *Asgard*: Structure and Materials

By John Kearon

Introduction

Colin Archer's 'Articles of Agreement and Specification' for *Asgard* is a precise and concise document that lays out clearly her structural form and the materials to be used in building that structure. After Erskine Childers received the 'Agreement' and the plans of *Asgard*, there followed intense discussion between the two men on every aspect of the proposed construction, including the materials to be used and in particular the internal layout of the vessel's accommodation and the nature and quality of the fittings.

At the time *Asgard* was built, small boatyards were in the later stages of a fundamental change that slowly but fundamentally altered the manner in which wooden boats were built, particularly in developed countries. The change was driven by the growing technology related to the principle material used -wood- and how a felled tree was converted into the component parts that form a boat.

Wood conversion

Traditionally, tree trunks were sawn into planks using a pit-saw. This in its more basic form was a rectangular pit dug in the ground, deeper than the height of a man, and over which the section of tree was placed. Using a two handed cross cut or pit saw, with one man in the pit, the other standing on top of the tree trunk, and with the saw held vertically between them, the tree would be cut into planks of whatever thickness was required. It was back-breaking work, as can be imagined, with the man in the pit having the worst of it.

There were some early examples of mechanisation, using windmill and even water wheel power, but it was the invention of the steam engine that really began to mechanise wood conversion, and later the electric motor.

It was the relentless move from such handcrafted wood conversion to mechanical conversion of trees into a broad variety of planks of precise sizes with perfectly sawn and planed surfaces that revolutionised wood conversion. Never was the change as fundamental as with wooden boats, the most complex of wooden objects, with their curved and swept symmetrical shape and with few component parts exactly alike. Wood for boatbuilding generally differed in its form and conversion to that of more conventional commercial demand. This is particularly so in relation to a vessel's centreline components and framing. For these, the more bent and curved branches, of oak in particular, were sought. Such branches were ideal for forming frames, and were sawn in a manner that made the most of the swept grain provided by the naturally-curved branches.

There is little information on whether Colin Archer's boatyard was mechanised or not.

However, *Asgard's* hull, and in particular her heavy double-framing, strongly indicate that a

large bevelling bandsaw was used in cutting the component parts that combine to form double-frames. Such bandsaws in particular were a boon to boatbuilders, with ability to saw curves. Even more importantly, they could saw over the length of cut, while steadily changing the bevel of the cut in the process, essential in the forming of sawn frames.

While Archer's yard may or may not have been mechanised, he had access to timber merchants with saw mills that could supply wood cut in any fashion required. The proof of this was found in a letter from a timber merchant in Scotland to Archer concerning the machining of the wood for *Asgard's* deck. The sawing of Kauri pine planks is discussed and the reference by the merchant to '*mouthing*' refers to the planks having tongue-and-grooved edges to form a tight join – as indeed have *Asgard's* Kauri pine deck planks. No doubt Archer also had contact with a number of timber merchants and saw mills in Norway, with its forests of slow-grown, tight-grained pine, which was extensively used in *Asgard's* construction.

Wooden boatbuilding – the most complex wood-related craft

In wooden boatbuilding, despite the benefits of large bandsaws and planer-thicknessers, both now virtually indispensable in frame and hull planking production, a great deal of hand-crafted work remained, even into the present time. This is largely because of the complex hull shapes involved and the fitting together of large sections of wood with curved edges, changing bevels and generally odd shapes. Furthermore, hull planking and bent timbers required steaming until pliable in order to coax them into position. The large component parts that form the centreline structure of a vessel can also be complex in form and difficult to machine, given their shape.

Despite increasing mechanisation, standard shipwrights' tools such as the adze and drawknife never lost their usefulness for chopping and teasing large pieces of wood into odd shapes – some of which no machine could achieve. In addition, the best 'tools' for shipwrights, then and now, are muscles and ingenuity. The 'hands-on' element is perhaps more intensely relevant in boatbuilding than in any other trade. In building *Asgard*, this would have involved a close-knit but relatively small team of shipwrights and some apprentices, working closely and intensely together in building the hull.

Lofting the vessel

Before construction could begin, *Asgard* would have been 'lofted', the process of drawing a vessel full size, which was usually done on a large loft-drawing floor. This process had two objectives: the proving of the correctness and fairness of the vessel's lines plan, and the making of precise templates of the vessel's centreline components and frames. Shipwrights who could also loft were known as Loftsmen, and were among the elite of the trade, with their fine eye for shape, fairness and symmetry, and their ability to take the building of a ship or boat from the lines plan through every stage to the launch of the vessel.

Building the Vessel

The templates would be used to mark out, on selected sections of wood, the many component parts that form a vessel's 'backbone', with the keel laid first, then the stem fitted to one end of the keel and the sternpost to the other, with connecting forefoot, knees, and deadwoods to complete the centreline structure. Then the large double frames would be formed on a grid after the many component parts were marked, sawn and assembled. These were then lifted into position on the keel, one after the other, working from forward to aft. This was heavy, backbreaking work for all concerned, but no doubt carried with it a sense of achievement at the growing boat being created.

With the frames in position and centred, they would have been viewed from all angles to ascertain that they were symmetrical along the centreline, in all probability with Colin Archer himself being asked to cast his eye over them. The hull planking would then begin, with the shape of each plank taken from the frames and marked on long wide fitches of pine or oak. The planks were cut to shape, their edges hand-planed fair and exact to width, then bevelled to fit to the adjoining plank edge, before being placed in a large steam box to make them pliable to wrap into position on the frames. The work would be heavy, with long lengths of shaped planks, steaming hot from the steam-box, carried hurriedly and clamped and hammered into place. They were then drilled by hand and fixed in place with large brass boat nails and wooden treenails, and hammered in with a maul, the shipwright's heavy hammer.

Only one Larvik Shipwright is known for certain to have worked on building *Asgard*. His name was found written faintly in pencil on the after side of a deck beam close to the

transom – and very difficult to access. It was: *Paul Gunlarson, 1905 Larwick* (the old spelling for Larvik).

With the hull formed, a massive cast-iron keel was fitted beneath the wooden keel. It was formed of two slabs of metal laid horizontally, one upon the other, and held in place with fourteen 30mm iron bolts. This metal keel acted as a counterbalance to the tall masts and the many sails that *Asgard* carried when at full sail.

Work on the interior then got underway, with the inner planks (strakes and beam-shelves) fitted firstly, followed by the deck-beams, carlings and deck. Laying out the interior cabins would often commence before the deck was laid, to take advantage of the better light and space provided, particularly in fitting vertically-planked bulkheads, as those in *Asgard*.

In addition, masts, booms and spars would be formed and a list of metal fittings of enormous variety – mast fittings, deck fittings, cabin fittings - would be ordered from specialist suppliers or made in the yard's own blacksmith forge. A sailmaker would be contracted to form the sails, and riggers to rig the vessel.

With all complete, and with the owner satisfied, he or she would make the final payment and take ownership of the yacht. Usually there would follow some complaints to the builder as the owner got used to the new vessel and perhaps found something or other not to their liking. Such would often be in the form of leaks through the deck, or some equipment not working properly. Erskine Childers would write to Colin Archer about the quality of the sails and leakage through the deck house companionway hatch. But all was resolved and he was more than happy with *Asgard*. Molly Childers was also more than pleased, and she too wrote to Archer saying that *Asgard* was a wonderful vessel.

