

Caulking in the traditional way

Traditional caulking is a skill any practical boat owner should be able to master with practice. Richard Johnstone-Bryden visits expert John Greenaway to see how it's done

Caulking is a traditional technique used on wooden vessels, whether carvel-built (butted planks) or clinker-built (overlapping planks), to fill the gaps between the planks while still allowing the wood to flex and move.

This involves driving a fibrous material, usually cotton or oakum (hemp), deep into the gaps. Specialist tools are required because it's vital to drive the material evenly, gently so as not to damage the wood, yet firmly enough to stick fast without passing right through the seam.

Once the caulking material has been driven in, filling the seam to approximately half its depth, a stopping compound will be used to fill the remainder. Traditionally this was red lead putty applied with a pallet knife, but some boatbuilders now use modern polyurethane mastics such as Sikaflex squeezed straight from the tube.

Caulking of seams between planks is an essential task still required to keep traditionally-built boats watertight, vessels as diverse as a Laurent Giles Vertue to HMS *Victory*.

The caulker's toolbox

When Suffolk-based John Greenaway took on the refurbishment of his 10.7m (35ft) converted Scottish fishing boat *Sweet Promise* he found it virtually impossible to get hold of the tools he required.

During some research John tracked down an Admiralty book containing illustrations of 84 different types of caulking iron, though subsequent discussions with shipwrights revealed that just five main caulking irons would be enough for the average sailor or

boatbuilder to carry out routine caulking tasks such as repairing a leaking seam or re-caulking a deck on a small wooden boat.

John decided to turn the problem of acquiring tools into an opportunity by producing his own, leading to the establishment of his successful mail-order business Traditional Boat Supplies. He is now one of the leading suppliers of these traditional tools.

RAKING TOOL Unless you are building a boat from scratch, your first task will be to rake out the old caulking. Historically, bent file tangs were used but they were not specifically designed for the purpose and massaged the edges of the planking either side of the seam if not used very carefully. To eliminate this problem John devised a new raking tool that can be struck with a hammer and extracts the cotton or oakum without damaging the neighbouring planks.

CAULKING Mallet The size of the mallet depends on the size of the job to be done. Cotton is used for smaller seams, which in turn requires a lower level of force



The caulker's toolbox consists of caulking irons, raking tool, mallets, cotton, hemp and stopping materials

to drive it into position. John uses a 9in (230mm) mallet when caulking with cotton. The next size up is a 14in (356mm) caulking mallet, used mainly for caulking with oakum, while for ships even larger tools are needed. To tackle seams with a width of up to 1½in on a wooden ship such as HMS *Victory* requires a mallet of around 4lb (2kg) in weight.

On all the mallets the top end of the stale (handle) is tapered so it can be detached from the head for

easier storage at the end of the day. The head is made from Lignum Vera, which comes from Central and South America and is one of the hardest woods known



RAKING TOOL A raking tool is used to rake old caulking from between planks. This one can be struck with a hammer to help it along the seam



CAULKING Mallet The size of mallet depends on the the job being undertaken – the wider the seam the more force required so the bigger the mallet



John Greenaway shows the technique of driving caulking cotton into the seams of a carvel-planked hull

to man. The two darts (two holes joined by a slot) either side of the stale act as a shock absorber for the head. Before a mallet is used for the first time it should be soaked in water for 24-48 hours so that the Lignum swells enough to hold the nickel bronze rings in place – they'll burr over later during use to hold themselves fast.

CAULKING IRONS The five irons necessary for effective caulking are the standard making iron, a bent making iron, a king plank iron, a hardening iron for cotton and a hardening iron for oakum.

The standard making iron (it has different names around the country such as starting iron or putting iron) is the one for putting either the



CAULKING IRONS The five irons to cover a spectrum of jobs are (from left) the standard making iron, the bent making iron, the king plank iron, the hardening iron for cotton and the hardening iron for oakum

cotton or oakum into the seam. When using it your angle of attack has to match the seam, which can be a problem when caulking difficult-to-reach seams such as those beside the garboard plank at the bottom of the hull. This is where the bent making iron comes in – it enables the hitting angle to be offset while still delivering the force into the seam where it is required.

The king plank iron is used for narrow planking, or when the joggles (joints) between deck planks are too wide for a standard making iron.

A hardening iron is used to finish the seam by firmly compressing the cotton or oakum. A groove along the edge of its blade helps grip the caulking material firmly. →

CAULKING WITH COTTON Cotton is easy to split into smaller sizes to suit the narrow seams usually found



1 For the best results you should buy the softest available cotton to follow the shape of the seam as closely as possible. The cotton acts like a magnet for sawdust and other grime, however, so needs to be kept in a clean container.



2 A 0.5kg ball of cotton comes in 8-ply (strands). The depth of the seam dictates the size of the cotton to be used, so you may need to divide the cotton into fewer strands. Deeper seams may require more than one layer of cotton – for instance, a 3-ply length of cotton followed by a 4-ply length to cater for the seam's V-shaped cross section. When sizing up the amount of cotton to be used it is important to remember that half the overall depth of the seam should be filled with the hammered cotton, leaving the outer half to be filled with stopping compound.



3 Once you have teased out the required number of cotton strands, it needs to be twisted up. Simply tie one end to a fixed object and place the other end in the chuck of a battery drill. Be careful not to twist the cotton too hard, because once the boat is re-launched the wooden planking will expand as its moisture content increases. You need the cotton to be able to adapt in sympathy to this movement while preserving the watertight integrity of the seal. So be gentle on the drill trigger and wind the cotton slowly.



6 Here, the end of the cotton has been put into the seam and the rest is left to hang down the side of the hull. John picks up about an inch (25mm) of cotton with the making iron and moves it up the plank to the seam.



7 John now forces the cotton into the seam using the making iron and 9in (230mm) mallet



8 The cotton is now held sufficiently in the seam for the hardening iron to be used.

CAULKING WITH OAKUM Oakum is ideal for caulking wider seams



1 Oakum is one of the oldest caulking materials in the world, and is made from the stalk of the hemp or marijuana plant. The stalks are dried and flayed before soaking in Stockholm tar.



2 Separate the oakum into the required size ready for rolling. Like cotton, oakum will pick up debris very easily so make sure that the separated oakum goes straight into a clean box.



3 John rolls the oakum on a hessian mat laid over his thigh, with a cloth beneath to protect his clothes from the tar. Hessian is used as the rolling surface because it offers a high level of grip which helps to speed up the rolling process.



4 Like the cotton, pick up the oakum with the making iron a short length at a time, trapping it into the seam.

on small wooden boats


4 Once you remove the cotton from the chuck it will start to unravel unevenly. To ensure an even twist, take hold of the cotton in the middle and allow the ends to fall, taking care to ensure neither end touches the dusty ground. Run your fingers gently along the two lengths, and as it unravels the cotton will recapture a natural level of twist, which is the right consistency for caulking.



5 Hold the caulking iron in the middle with your fingers and thumb – you will find it has a natural balancing point which ensures that the iron takes the full force of the mallet. Grab the iron the wrong way and it could be your hand that takes the mallet, with painful results.



9 The hardening iron has a rounded edge which contains a 1/8in (3mm) groove.



10 While working along the seam with the hardening iron, rock the iron backwards and forwards to ensure the outer profile of cotton has little nibs created by the groove. This provides the best bonding surface for the stopping material later.



5 Drive it into the seam, this time using the 14in (356mm) mallet. Sound plays a useful role while caulking. When you hear a steady thud, thud, thud you know all is well, but a change of note highlights a weak point in either a frame or plank. It pays to keep a piece of chalk in your pocket to mark areas for further investigation.



6 The oakum hardening iron has a rounded edge with a 3/8in (4.5mm) groove. Rock the iron from left to right to ensure the outer profile of the oakum has the correct profile to bond with the stopping material.

STOPPING MATERIALS

There are two traditional materials for stopping the seam once caulked – **black pudding mix and red lead putty.**

Black pudding mix was devised by Scottish fishermen as a stopping material to be applied over the oakum-filled seams of their workboats. The main benefits are that it's cheap, easy to fair, and totally waterproof. The outer surface will go hard whereas the black pudding between the planks remains soft and pliable, so it moves in sympathy with the natural expansion or contraction of the wood.

Once you've finished applying the mix with a pallette knife, dip the knife in linseed oil, shake off the excess and rub it along the seam to shine it up. The next day apply a coat of chlorinated rubber primer such as Metaclor C.R. Primer to seal the seam.



Although black pudding mix has been successfully used above and below the waterline, John only recommends it as an underwater stopping material. Red lead putty, which consists of red lead, chalk, linseed oil and soap, is his compound of choice above the waterline.

The putty becomes very pliable and easy to use once warmed up, and the most effective way to do this is to simply put the tub in a bucket of hot water for about 20 minutes before use.

ALTERNATIVE CAULKING METHODS


The method of inserting cotton into a seam can differ according to local custom. Some Cornish boatbuilders loop the cotton before it is driven into the seam. However, it makes no difference whether you adopt this technique or the straight method – the important thing is to ensure that you get the cotton into the seam and hardened down.

TOP TIPS FOR CAULKING

■ Only rake out the seams you can re-caulk in a day. Raking out too many will allow the planks to dry out and shrink. Ideally, tackle one seam at a time and never rake out the whole hull in one go.

■ Try to protect the wood as much as possible from drying out by covering the hull with a

taraulin and keeping direct sunlight off the seams.

■ Like all metal tools the hardening iron will wear with frequent use over many years. When the edge of the groove eventually dulls, take a hacksaw and go over the groove carefully to regain the correct profile.

Where to buy caulking equipment

John Greenaway, Traditional Boat Supplies, tel: 01502 712311, www.tradboats.com