

## Biochemical consolidation of soft and deteriorated wood

(Biokemisk konsolidering af blødt, udvendigt træ)

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Link til: Vadstrup, Søren (red.): *Træ tjære* Kulturstyrelsen: Information om Bygningsbevaring 2014.

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If the timber in a half-timbered building has started to rot, e.g. the foot strap as seen here, the most usual practice is to replace it with new, undamaged timber - either completely or partially (partially). But it often requires greater bracing as well as some or all of the brickwork being removed from the nearby slab - and much more. If the rot damage is only 'superficial', i.e. that you can stick a knife or awl approx. 1-1½ cm in, before it stops, this can be repaired with hot wood tar - through a 'biochemical consolidation'.

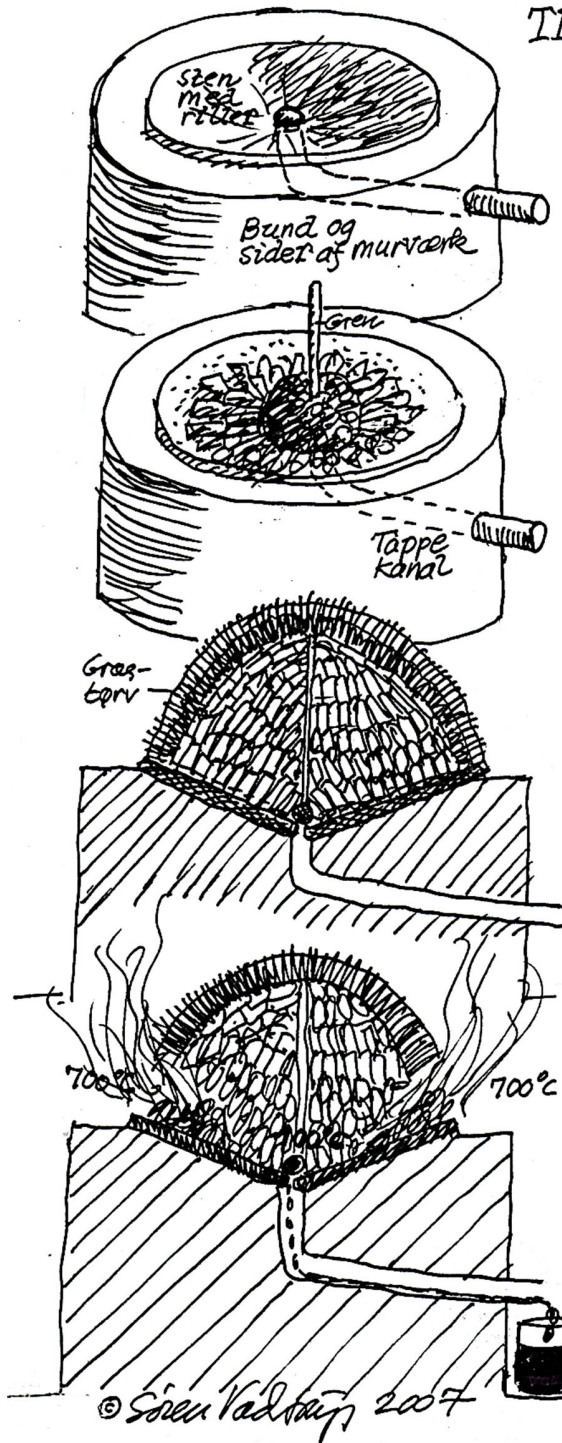


### Wood tar

Wood tar, which must not be confused with the toxic and carcinogenic 'coal tar' (Black Varnish), consists of the pine tree's own oil and resinous substances, which have been 'sweated' out of the most resinous part of the pine trunk, the heartwood in the lower 1½ metres, like with the roots. This liquid is very viscous and transparent light hum - and therefore not black, like the banned coal tar. Wood tar is therefore neither 'forbidden' nor particularly dangerous, but a 100% natural substance like linseed oil or whale oil.

It is a relatively newly discovered property of the wood tar that it is capable of rehardening, regenerating and consolidating soft wood, but it is quite logical that the soft wood is supplied with oil, resin substances and 'dry matter' through the liquid wood tar, which subsequently hardens to a solid inside and outside the wood. The effect can be enhanced by 'pigmenting' the hot wood tar, e.g. with oxide black pigment – but in principle all pigments, red, yellow, brown, etc.

## TRETJÆREMILE



Den tragtformede bund har et lille hul, en lille sten med riller og en afløbskanal i bunden

Milen kan se ud på mange måder.

Det kløvede, harpiksholdige fyrretøm stables op i en meget tæt, rund stabel - oven på et lag meget brændbart bark og tyndt tøm. Træstykkerne bankes sammen.

Når stablen fylder hele bunden, og er lige så høj, dækkes den med et tæt lag græstørv.

Nu tænder man milen i bunden, hele vejen rundt.

Brændingen tager 3 døgn

Milen skal brænde udefra og ind. Der må kun være små flammer for nede - øvrige flammer slukkes med græstørv eller sadsmuld.

I bunden af milen skal der være en lække for brænding på ca. 100°C - så presses varmen fyrresaften ud af tøm = Træ tjære

Wood tar is the pine tree's own resinous juices, which are 'sweated' out of the tree by heating it up in a tar mile, which can be seen here during the build-up. The wood is primarily split, resinous root pieces of pine. On the left you can see the principle of roasting and bottling. Wood tar, which is a natural material extracted from wood, should not be confused with coal tar, which is extracted from crude oil and is therefore very toxic. Wood tar is able to penetrate soft pine or oak, making it hard and solid again. This happens after curing in light and air for a month.



### **Tar putty**

If the hot wood tar is added to the pigment 'chalk' (fine chalk powder, called bad chalk) to a stiff, putty-like mass, you get a very sticky, light brown substance that can be used to fill out cracks, holes, edges or even 'lunch' with. The wood putty adheres well to the bottom (even on ship planks, under water), it never becomes rock hard like putty (linseed oil + chalk powder), it repels water and it connects firmly even to soft wood, and can therefore replace lost wood here.



*Wood tar can also be used to make a very effective putty for cracks in the timbers - a putty that works well with the wood because it doesn't get hard. The tar putty repels water and therefore also acts as a preventative against cracks, fissures or thressed wood.*

### **Methodology**

With biochemical consolidation, you do not fight the rot damage etc. that the wood has suffered, but you make the wood hard again. Thereby, the wood will, in a certain future, both repel water, fungi, bacteria and insects and regain its former hardness. Apart from hardness and water repellency, the wood will not regain its constructive tensile, compressive and bending strength at the damaged site in question through biochemical consolidation. Only wood that is not part of constructive contexts, where it has to support something other than itself, can be consolidated if the damage has critically weakened the constructive ability.

A mixture of wood tar and boiled linseed oil 1:1 is applied to the rot-damaged area. This is continued until saturation is achieved. The treatment cures for a week in ordinary light, after which it can be surface treated.

1. The wood is cleaned by hand of all loose lime, plaster, cement paint etc. with a scraper. Any type of heating, from hot air, paint burner or infra-red lamps should be avoided, as the heat dries out and destroys the wood.
2. All stuck-on old paint that has been scraped on, must *not* be removed. You can easily paint on old stuck-on layers - as on bare wood.
3. Decidedly loose wood is also carefully scraped off, but you must not scrape into solid wood. 10-12 mm of soft wood can be left on the surface.
4. If the wood is damp after cleaning, it is necessary to let the wood dry out for a week.

5. The detreated wood, which as mentioned is 'soft' to a depth of 5 -12 mm, is applied with a good layer of heated (app. 60 degrees Celsius) wood tar until the suction stops.
6. If the detreated wood is more than 5-6 mm deep, it is a good idea to mix e.g. black pigment into the wood tar, so that it gets a little more 'fullness'.
7. The wood tar must then harden for approx. 14 days in normal light (UV light), i.e. not in the dark.
8. After this you can smooth out cracks etc. in the wood tar treated with heated tar putty
9. Larger undercut 'holes', e.g. at the bottom of the timber, are filled with air lime mortar
10. After a week of curing, the timber can be surface treated with casein colour, linoleum paint or wood tar colour.



*Photo series of half-timbered facade restored through biochemical consolidation of the wood with wood tar color. Møllestangsvej 9 at Nyord in Denmark.*

1. The covering plaster is knocked off both on the brick boards and on the half-timbering. The timber is completely soft on the surface after being covered with cement plaster.
2. The timber is treated 2-3 times with wood tar color - with 2-3 week intervals until the surface is completely hard again. In this way, you completely avoid replacements or outbreaks in the wood. The boards are plastered and holes/cracks filled with air lime mortar
3. As the house is located on Møn (Nyord), where it is tradition for the timbering to be white washed, the surface of the wood is treated with a white casein glue colour that covers the black wood tar color after 1-2 layers.
4. Joinery and the plastered boards are whitewashed over sticks and stones.





*Heating the wood tar in a pot on an electric hob. Look at the brown color of the freshly spread, hot wood tar on the half-timbering behind.*

*The heating must always take place in the open air, as the tar will give off turpentine vapors when it heats up. You must wear gloves and a mask during work.*



*The light brown wood tar is slightly heated and brushed onto the soft areas of the timber with a brush. You can subsequently brush over all the timber, if this has been completely cleaned of paint, lime etc. You can also advantageously mix pigments in the hot wood tar, so that the wood becomes harder after hardening.*

### Further reading (in Danish)

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