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Exhibition article

Field Method for Characterization of Deciduous Wooden Shingles

ABSTRACT

In the Nordic countries, a major part of the built heritage is constructed of wood and on churches it is still common for the roofing to consist of shingles. In the 20th century, there was a paradigm shift when the heritage authorities made new standards where, for example, the variety of species used throughout history was replaced by pine with sapwood. Today, it is evident that the broken traditions have resulted in roofings with shorter life spans (Göllas & Lindblad, 2021). Further, changes in forestry during the last century made old mature pines, appropriate for shingles, a scarcity. Until last year, it was common that wood for shingles was imported from Russia and northern Finland, which is questionable from more than one perspective. In a project by the Craft Laboratory, the aim is to reclaim traditional know-how through craft research. Old built-in shingle roofs are examined, old forestry and building literature is inventoried and tradition bearers are interviewed. Several of these sources put forward oak and aspen as species well suited for long-lasting shingle roofing. The focus of the exhibition is the development of a field method in which we present features to define wood species on the weathered surfaces of shingles using sight and touch characterization. A built-in roof with both aspen and oak shingles in Tönnersjö church in Halland will serve as an example.

Keywords:

craft research, building craft, aspen, oak, shingles

INTRODUCTION

Wooden shingles have been a common roofing material for stone and wooden churches since the 11th century (Gustafsson, 2001; Skanser et al., 2020). In the 20th century, the techniques changed and the traditions in how to produce, use and maintain this material changed and were broken. The Craft Laboratory, together with the Church of Sweden, has a project to reclaim historical knowledge concerning the use of wood species, qualities and techniques that will result in roofs that last longer in combination with and with a contribution to more sustainable and diverse forestry. Craft scientific and forensic methods will be used in this project to identify built-in roofing, analyse used qualities and wood species, study historical sources and inventories concerning shingle roofs, interviewing tradition bearers and conducting experiments in producing shingles for long-time evaluation (Almevik, 2012; Almevik et al., 2022; Lindblad & Melin, in print; Melin, 2017; Westerlund, 2017; Westerlund et al., 2022).

The National Heritage Board stated in widespread guidelines that pine shingles are the historic norm but occasionally oak has been used (Riksantikvarieämbetet, 1981). We knew this general description was wrong for at least the diocese of Lund and probably for other regions as well (Melin, 2022). A built-in shingle roof in Tönnersjö church was documented in 2019 (Gullbrandsson et al., 2020). The roof was presumed to consist of oak shingles. However, the findings of stray shingles revealed that some were of another deciduous species, identified as likely to be aspen. Later, this could be confirmed with dendroanalysis. The oak shingles were dated with dendrochronology and archival information to be produced of trees felled after 1733, and the roof was built in 1855 (Ekström, 1985; Linderson, 2019).

This exhibition and extended abstract will focus on the question: Is it possible to define wood species on the weathered surfaces of shingles using sight and touch? Important tools in field were to use the senses of sight and touch along with raking light to enhance visual differences. The aim is to develop a method that can distinguish wood species by examining weathered surfaces.



FIGURES 1 AND 2. Built-in historic roofing in Tönnersjö church. To the left, the quite big built-in roof area is shown. The picture to the right shows an uneven spread of oak and aspen shingles on the roof. The built-in roof, about 4m², is a homogenous weathered wood surface, and the shingles appear to have the same age. The shingles are quite narrow and short, approximately 6,5–8 cm in width and 12,5–13 inches long and 20 mm thick in the bottom end. Most of the shingles were in a similar state of deterioration although some of the aspen shingles were in a worse state. Some shingles had very fragile bottom edges and could almost be swept apart.

Case study – Historic shingle roofing in Tönnersjö church, Halland, Gothenburg diocese

In the winter of 2023, the authors (re)visited Tönnersjö to document the built-in shingle roof. We quickly realised that even for a trained eye, it was difficult to distinguish the aspen and oak shingles from each other (figs. 1 and 2). We started to clean the surface carefully (with a soft brush in the direction of the wood fibres) from a thick layer of dirt. The most important tools were LED lamps with different

temperatures. With common light, and especially with raking light, we after a while begun to see the differences between the oak and aspen shingles. As important as sight was touching the surfaces to feel, scratch and *read* the surfaces with the fingertips. In photos, it is not possible to record the sensation of touch, but the photos can help the memory remember the feeling of a visited and examined object.



FIGURES 3 AND 4. Left: The length of the “bleke” (visible part) is 12–13 cm/5 inches. The bottom row of shingles, at the eaves, are cut rounded with axe while all the others are cut straight. Right: A handful of oak shingles seem to be of younger age and the result of repairs, as they are nailed on the visible part of the shingle. Differences noted in oak and aspen shingles are that the aspen shingles are insect infested. This feature was diagnostic in this case but is not a general indicator of aspen. When the aspen surface is damp, it peels off like wet cardboard if you rub it (not when the wood is dry). Cracks appear in the face of the aspen shingles. When raking light is used and moved over the surface, the aspen shingles appear to be slightly more silvery, shiny grey than the oak shingles. The oak shingles have narrow tree rings, but as the shingles’ top surfaces are weathered, it is not so easy to see (this feature is site specific). The oak was split radially with cracks, following medullary rays that are easy to interpret incorrectly as annual rings. The oak surface does not have a texture as soft as aspen’s.



FIGURE 5. One of the aspen shingles was confirmed with dendroanalysis and it contained 26 annual rings.

DEVELOPING A FIELD METHOD

During and after the onsite examination of the built-in shingle roof in Tönnersjö, we had to structure our observations. We wrote down characteristic features to develop a hypothesis and draw conclusions regarding wood species. The field investigation and development of a method did not end when we left the church. It continued when we wrote about features, when we re-examined photos and when we later visited other places. This process is still ongoing, and we continue to evaluate and calibrate the methods. It is essential to zoom in and out during an examination, first looking at the whole surface, then at single shingles, groups of shingles, and then at the whole surface again. It is also essential to touch the surfaces to feel eventual differences that are not visible. Using general light and then raking

light from different angles is a very helpful tool for finding almost invisible traces from production and/or small differences.

How to adjust the senses to see and feel what is not expected or pre-known

When we studied the mixed aspen–oak shingle roof in Tönnersjö, it initially seemed to be almost impossible to distinguish the species from each other (without removing them and looking at the unweathered backsides). However, by touching the surfaces, using raking light and searching for characteristics, we could, after a while, adjust our senses to see small differences and combine several observations to draw conclusions. Examples of important but subtle differences were the way the shingles felt to touch and the colour of the shingles. However, when we looked at the pictures some weeks later, from the field study, it was again very hard to distinguish the species. It was clearly a major disadvantage to not be able to move a lamp or touch the shingles.



FIGURES 6 AND 7. To the left is a 20-year-old display screen that shows pine and aspen shingles. The middle row is made of aspen and has a wavy and silvery character compared with the straight and more grey pine shingles. The test screen was made by co-author Börje Samuelsson. To the right, an old surface from Tönnersjö also has a wavy and silvery look.

We recognized how important our own long experience of working with craft research and wood-working is. Wood material is very heterogeneous, and the wooden surface is therefore complex. Variation exists among trees of the same species, depending on factors such as where they grew, the composition of the soil, and whether wood is used from the lower or upper part of the stem or branches. Further, the deterioration depends on the climate where the shingles have been exposed to weather, if they are laid on the north or south side of a roof, if they have been protected by thick layers of tar, and so on. During investigation, it is helpful to identify and list parameters, as shown below. However, for an untrained person, the list is far from sufficient to identify species. The diagnostic parameters vary too much from case to case and even differ on roof falls on the same building.

Noted visual and tactile characteristics of weathered wooden shingles:

Characteristics of green wood:

- Drying cracks
- Straightness in wood

Characteristics of tree properties:

- Heartwood/sapwood
- Growth pattern
- Tree ring width
- Wood structure
- Knots shape, size, occurrence and distance
- Medullary rays

Characteristics of production:

- Shape
- Tool marks
- Variation in measures
- How shingles were cut out from logs
- Orientation of tree rings and medullar rays

Characteristics of ageing:

- Material deterioration
- Desiccation cracks
- Colour and shades
- Erosion/weathering
- Water/moist discolouration
- Insect infestation/holes

Co-author Börje Samuelsson carried out experiments 20–25 years ago inspired by roofs in Finland and Russia (fig. 17 and 18). On a small well house, about 1,5 m x 1,5 m, with pyramidal roof he used aspen shingles. We examined this roof, which had never been repaired or tared. We identified some features in the deteriorated surface that were similar to what we saw in Tönnersjö. This helps us calibrate and understand our observations of historic roofs.



FIGURE 8 AND 9. To the left: The aspen roof is still in good condition even though it is shaded by vegetation. A few of the shingles have deteriorated. To the right: As in Tönnersjö, the shingles have a soft surface that can be peeled off. However, we saw no insect holes. Börje used aspen trees with few branches and a diameter of about 25 cm. The shiny silvery grey surface was obvious and reminded of photos of Russian aspen roofs from the Kizhi outdoor museum and roofs on churches in Åland.

DISCUSSION

Inventories and surveys of older aspen shingle roofs will continue. Old shingle roofs still in use are difficult to investigate, as they often have thick layers of tar. When visiting new objects, we noticed that it was occasionally hard to define the wood species and that we sometimes changed our opinion during the investigation. We also think it is essential to conduct proper dendroanalyses of samples to conclude whether we came to the correct conclusion. We have the experience that a combination of qualitative and quantitative research is essential to obtain a deeper understanding of craft norms from the past or other regions (Almevik et al., 2022). By using transdisciplinary methods, we can calibrate our craft scientific methods to be more precise.

CONCLUSION

By using craft scientific methods, where we combined our experience of woodworking techniques with sight and touch, we learnt to distinguish weathered aspen from oak. Our attempt to make a field method was successful. We will use it and tune it in during future field studies and with the help of dendrochronological analyses.

In Tönnersjö, we mainly observed a number of characteristics on the aspen and oak shingles and learnt to evaluate similarities and differences. However, some of these might be sight specific and not useful in other places. For example, the oak used in Tönnersjö have very narrow year rings compared with the aspen from the same roof, which was helpful for us to distinguish the species but cannot be expected to appear in other objects. In theory, we might find a roof where the aspen shingles have narrow year rings and the oak shingles have broad year rings. Therefore, we think it is necessary to look at several features before drawing conclusions.

When we re-examined the photos from Tönnersjö, we noticed it was much harder to observe some of the characteristics. We could then only use our eyes to evaluate the surfaces and not even be helped by moving our viewing point or the raking light. This further strengthens our observation of the advantages of field study over photo examination.

The characteristics we listed are not meant to be transformed into guidelines that can be used by anyone, as it takes years of practical training to build up the experience needed to be able to see. So, our field method is mainly useful for someone who is already skilled in craft and/or working with wood species as a craft researcher, dendrochronologist or wood conservator.

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