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Recreation of the medieval intarsia textile from Masku church, Finland

Krista Wright, Mervi Pasanen and Elina Sojonen

Abstract

A large medieval Finnish wool intarsia found in the belfry of Masku church in 1897, called the Masku intarsia textile, underwent close structural analysis and material characterisation in 2016. The aim was to make a recreation of the medieval intarsia textile, using plant-dyed wool, silver gilt membrane, cotton fabric, silk yarn, and seam structures that were identified in the original textile. The aim was to visualize the medieval textile as it was when new, and to showcase the medieval textile making processes in a museum context. The recreation project *The Griffin and Peacock* was hosted by textile enthusiasts in cooperation with the national Museum of Finland.

Keywords: Wool intarsia, antependium, cotton, silver glit membrane, medieval, Bridgettines

5.1. Introduction to the wool intarsia

The largest medieval textile found in Finland is the Masku wool intarsia (KM 12231:1), found during a 1871 archaeological survey in the belfry of Masku Church in southwestern Finland. When found, the textile was described as a pile of rags – but when opened it was identified as remains of a large (276 cm x 207 cm) colourful textile (Aspelin 1879: 177). Today, the textile belongs to the collections of the National Museum of Finland. Although the textile appears visually to be in a good condition, it is fragile at the fibre level and could not withstand exposure to light under exhibition conditions. The textile is on display in Finna, the electronic collections of the National Museum of Finland (Figure 1).

The Masku textile was made with intarsia and gilt membrane embroidery techniques, by cutting two different coloured fabrics simultaneously to two identical patterns. Using this technique, there are always two identical animal figures, decorative elements, roundels, etc., but in opposite colours.

Figure 1. Use QR code to visit Finna and see "villaintarsia" in the collections of the National Museum of Finland, H1223:1, https://museovirasto.finna.fi/Record/museovirasto.16587BF76861BC86C8BC6873D44B1CF4?imgid=5&lng=en-gb.

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Additional smaller details, such as flowers, were appliquéd on the textile in different colours. Gilt leather strips stitched with white thread are bordering the different coloured areas and are used as a decorative element on details.

Originally the Masku intarsia textile consisted of at least twelve square panels, each ca. 70 cm x 70 cm. Each panel has a colourful heraldic or mythical animal: griffin, unicorn, deer or peacock. They are encircled with religious texts (*AVE MARIA GRACIA PLENA DOMINUS TECUM/ HELP IHESUS MARIA SON HELP IHESU*) written with white majuscule letters in Latin and in Swedish. Some of the texts are misspelled, or the letters are mirrored. (Aspelin 1879; Nordman 1943: 186; Pylkkänen 1974b: 22). In addition, there might have been a border surrounding the squares, as that is the case in the Swedish textile parallels (Aspelin 1879; Neijman and Sundström 2021; Pylkkänen 1974b: 21–22).

The heraldic motifs, majuscule letters, and prayer texts in Latin and Swedish suggest that the Masku intarsia textile originates from the 15th century and was crafted by the Bridgettine nuns (Nordman 1943; Pylkkänen 1974a: 14). However, the textile has not been ^{14}C-dated, and the manufacturers and the original purpose of the textile are unknown. In medieval Sweden (of which Finland formed the kingdom's eastern part), an important religious factor was the O.Ss.S. (*Ordo Sanctissimi Salvatoris)*, which was a Catholic Bridgettine order. Its main monastery was in Vadstena in Sweden. In general, the Bridgettine nuns were famous for their textiles and handicraft skills (Nordman 1943: 187–188). It has been assumed that some medieval intarsia textiles of Sweden were made by Bridgettine nuns (Neijman and Sundström 2021).

While the original plan was to establish the monastery in Masku, where the nuns lived from 1438 to 1444, it was eventually established in Naantali where the monastery was active until the end of the 16th century (Hiekkanen 2014: 106–107). It is possible that the intarsia textile was made for the medieval wooden church of Masku, and was then transferred to the stone church of Masku in the 16th century, and finally left in the belfry when it became unnecessary or too worn out.

It has been suggested that the Masku intarsia textile was serving as an antependium, id est, altar frontal (Aspelin 1879), as a bridal canopy (Branting and Lindblom 1928), or as a funeral pall (Pylkkänen 1974c: 27). According to church inventories, the colourful medieval funeral palls with heraldic motifs were not replaced by simple black cloths until the 17th century (Pylkkänen 1974c: 29, 31). The Masku intarsia is not unique, as there is a parallel from Dalheim Church in Sweden, and two partially surviving fragments from Sauvo and Kiikala Churches in Finland (Pylkkänen 1974a: 11–19). Intarsia technique with gilt membrane was also applied in precious household textiles. Property accounts indicate that the Masku textile shared similarities with valuable furnishing textiles from medieval Finnish castles and manors, which included gilt membrane embroidered wallhangings, bench cushions, and pillows (Pylkkänen 1974b: 25).

5.2. Materials of the Masku textile

5.2.1. Samples and sample preparation

Microscopy and material analysis were applied to sixteen samples, each 1–4 millimetres long. These were cut from invisible places on the original Masku textile, and if possible, from the reverse side or seams. The samples were examined in the Aalto Nanomicroscopy Center in Finland using transmitted light microscopy (TLM) and scanning electron microscopy (SEM) with element analysis (EDX) and Fourier transform infrared spectroscopy (FTIR). Three samples were also sent to the Cultural heritage Agency of the Netherlands for UHPLC-PDA analysis to reveal their colourants.

In the sample preparation for TLM, a few fibres from each sample were mounted with Entellan New Rapid TM between the objective slides and covering slides. These samples were then imaged with a Leica 4500P transmitted light microscope, using a LasCore 4.5 program, and imaged with a 5-megapixel DFC420 camera. SEM-EDX samples were prepared on double-sided carbon tape which were placed on graphite stubs, and coated with a 12-nanometre thick layer of carbon (C) to increase the electrical conductivity. This analysis was performed with a Jeol JSM 7500 FA scanning electronmicroscope using a Jeol EDX detector. The samples were examined with an acceleration voltage of 15 kilovolts, using the COMPO mode of the software that makes the element densities clearly visible. FTIR measurements were done with a Nicolet Spectrum 100 instrument with EZ Omnic software.

5.2.2. Results of the analyses

As a result of a visual assessment, nine different wool fabrics and one plant fibre fabric were identified in the Masku textile. Most of the wool fabrics (the very dark blue, the dark blue, the green, the light green, the yellow-brown, the red, and the purple) were s/z tabby, but in different qualities. The white wool twills were z/z, and the plant fibre fabric z/z. The thread counts were 10–18/8–12 yarns per centimetre in wool tabby fabrics, 11/17 in wool twills, and 26/22 in the plant fibre fabrics.

The Masku textile's wool fabrics were of fine quality, with fibre diameters ranging from 15–35 micrometres, but typically ca. 20 µm. White wool was used frequently in all samples, except in the blue ones which consisted of white, black, and brown fibres (Figure 2). None of the fibres were medullated.

The blue fibres were very eroded (Figure 3), probably due to alkaline vat dyeing. The purple sample contained both blue and red fibres, suggesting a mix of two differently dyed wools before spinning. Aluminium (Al), potassium (K), and iron (Fe) were present in all colourful yarns, which refers to possible alum and iron mordants. In addition, all wool yarns contained sodium (Na) and silicon (Si), which may indicate some kind of contamination.

The sewing yarn sample was identified as silk (Figure 4), not linen as suggested in the previous research (Pylkkänen 1974a: 12). The fibres were 5–10 µm in diameter, with flat irregularities. The

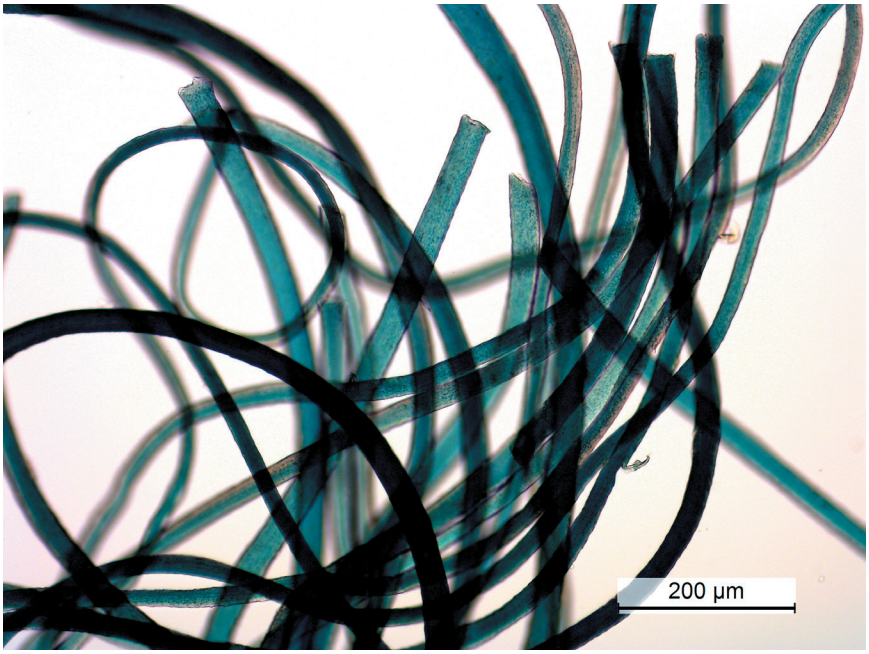

Figure 2. Black, brown and white wool of the very dark blue fabric of the Masku intarsia. (Image: K. Wright)

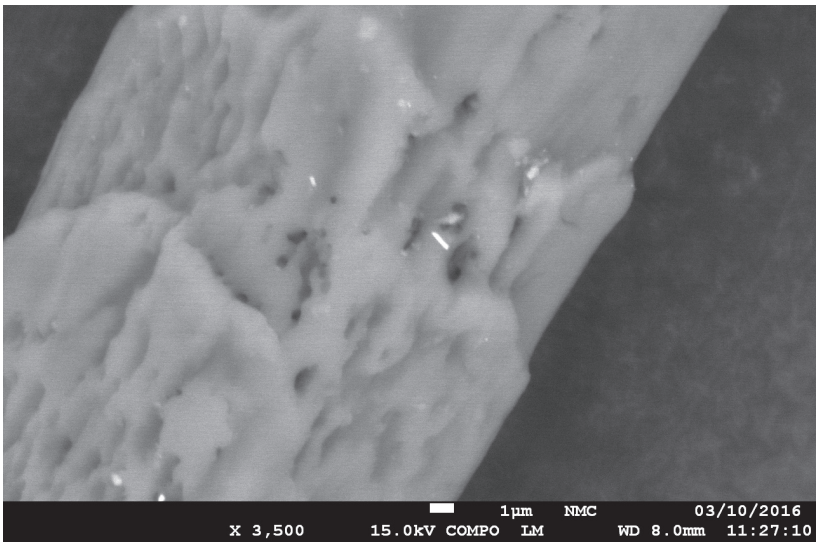

Figure 3. Eroded blue wool fibre. (Image: K. Wright)

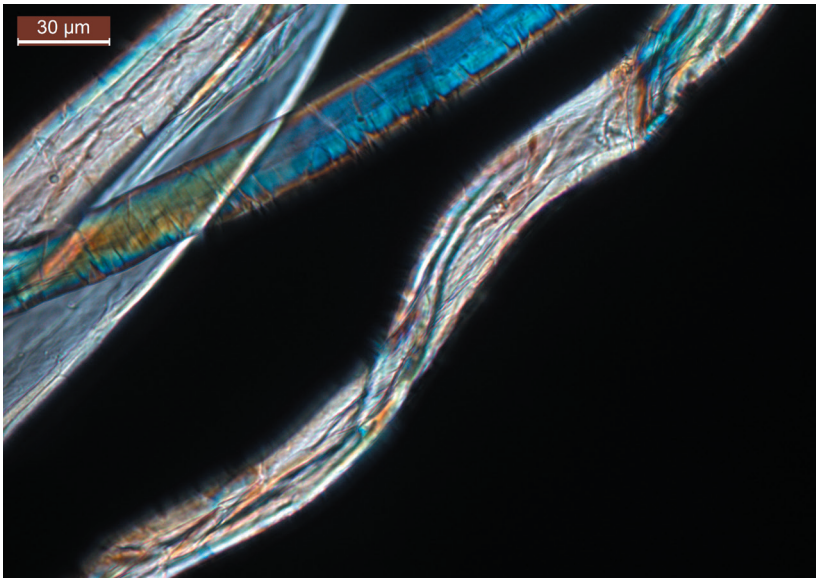

Figure 4. Silk fibres from the sewing yarn. (Image: K. Wright)

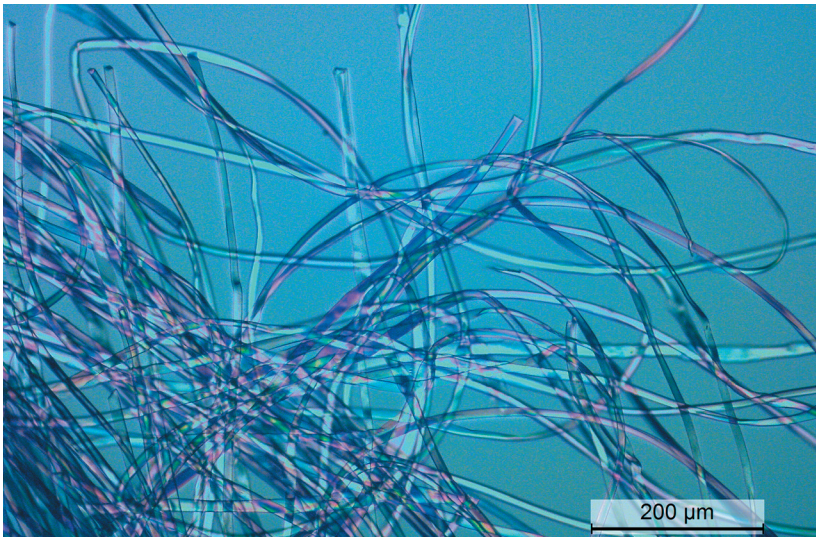

Figure 5. Cotton of the Masku intarsia with a hemp fibre. (Image: K. Wright)

white tabby fabric on the peacock figures' tails contained fibres with a flat and twisted structure with a diameter of 15-30 µm, and FTIR analysis identified them as cellulose material. Apparently, the fibres were cotton. Only a few other medieval Finnish cotton finds are known (Arponen 2011). While one yarn system consisted exclusively of cotton, there were individual hemp (*Cannabis sativa*) fibres among the cotton fibres in the second yarn system in the plant fibre tabby (Figure 5).

The guilt membrane sample contained only silver (Ag) (Figure 6), but no gold (Au) as assumed in prior research (Pylkkänen 1974a). Silver was detected also in two samples from the red fabrics, once with zinc (Zn). The yellow-brown, red, purple, and blue samples also contained iron (Fe) and alum (Al), possibly referring to dyeing, along with sodium (Na) and magnesium (Mg), maybe referring to some kind of contamination.

UHPLC-PDA analysis showed that the red yarn contained ruberythric acid, lucidin3-O-β-primeveroside, unknown anthraquinones, alizarin, and purpurin. It was most likely dyed with Dyer's madder (*Rubia tinctorum*). The dye analysis indicated that the purple yarn contained isatin, indigotin, and indirubin, which are typical of woad (*Isatis tinctoria*) and tropical indigo (*Indigofera tinctoria*), as well as alizarin and an unknown anthraquinone, which refers to Dyer's madder and bedstraws (*Galium* species). The yellow-brown yarn contained an unknown yellowish component, traces of alizarin and traces of indigotin. It remained unclear which dye plants were used to achieve the yellowish shade. The traces of alizarin and indigotin might be contamination from the surrounding textile (Proaño Gaibor 2017).

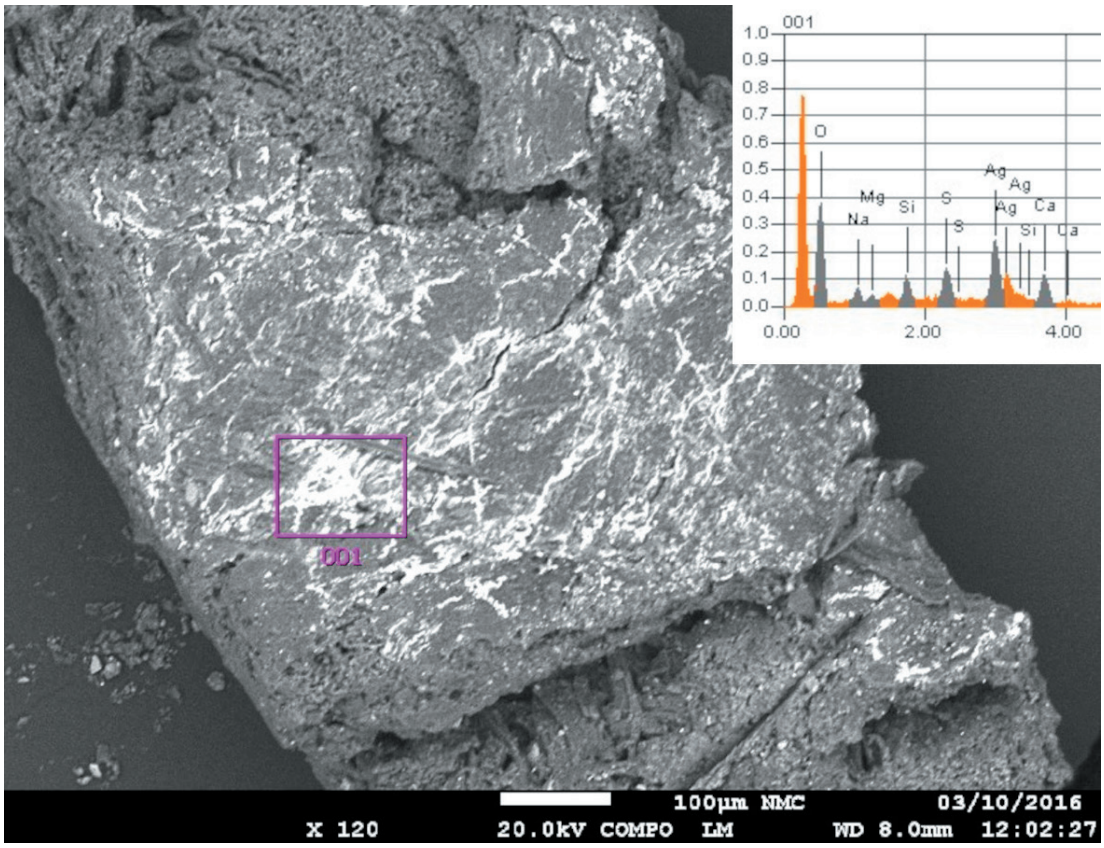

Figure 6. Silver (Ag) visible as white as a lace-like pattern on the gilt membrane, and in the EDX results. (Image: K. Wright)

5.3. *The Griffin and Peacock project*

5.3.1 Launching the project

In 2016, *The Griffin and Peacock,* a cooperative project between 16 historical textile enthusiasts and the National Museum of Finland, shed new light on the Masku intarsia textile. The aim of the intarsia project was to reproduce the fragile Masku textile with all the original structures, sewing techniques, and materials, and thus gain a deeper understanding of medieval textiles in Finland. Making as accurate reproduction as possible is a method used in experimental archaeology to open new perspectives on the original object (Andersson Strand 2010: 1). The replication process eventually took approximately 1600 working hours. The Finnish project was inspired by similar projects in Sweden where four intarsia coverlets and two pillows have been reconstructed (Neijman and Sundström 2021).

The intarsia project was part of the outreach program National Museum of Finland, which gave the project a schedule of nine months from start to finish. The deadlines affected the process, as the research and the reconstruction took place simultaneously. In a museum context, copies and replicas made it possible to showcase historical textiles and textile making processes in a textile and audience-friendly way.

5.3.2. Reconstruction process

The project began by careful observation of the textile, to understand what kind of materials the replica would require. Only eight squares were well enough preserved that it was possible to base a reproduction on them. To understand the missing parts of the damaged squares, the intarsia technique itself provided clues as to their original appearance, as was already suggested by Aspelin in 1879. The cutting was done by first printing 1:1 images of each panel found in the original textile. Then these paper prints were used as templates to cut the fabrics to form the heraldic animals, roundels, letters, and flowers and leaves.

For the reproduction, the very dark blue shade was dyed using tropical indigo (*Indigofera tinctoria*), the red with Dyer's madder (*Rubia tinctorum*), the yellow hue with weld (*Reseda tinctoria),* while the greens achieved using indigo and weld, and the purple hue was dyer's madder and indigo. These are

Figure 7. Sewing the Masku recreation textile with basting stitch and final stitching with silk thread and silver gilt membrane. (Photograph: M. Pasanen)

all typical colourants for medieval Europe, with the exception of tropical indigo. In medieval Europe, the most probable source for blue was woad (*Isatis tinctoria*) which also contains indigotin. The very dark blue and the green fabrics (and possibly the other other fabrics as well) originally had a soft, felted surface. Since the felted surface is currently only visible in random areas (as in places where letters are missing), this feature was not recreated in the reproduction.

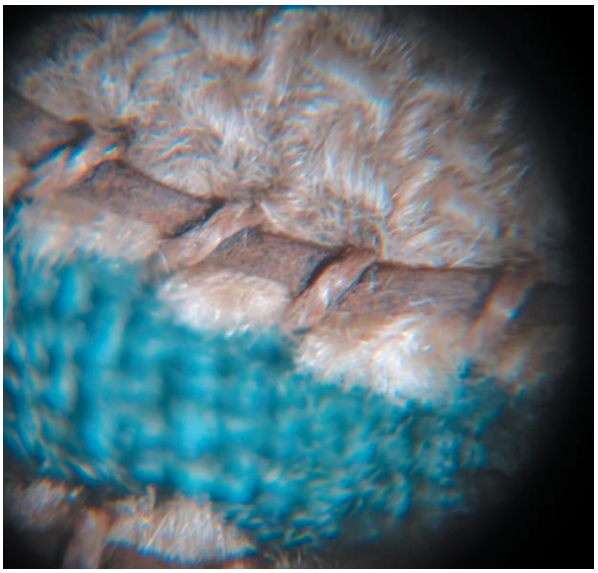

Figure 8. Seam of the Masku intarsia textile. (Photograph: M. Pasanen)

The seam structure that joined the different coloured fabrics and the gilt membrane was complicated to produce. According to the sewing experiments (Figure 7) performed prior to the actual construction of the intarsia reproduction, it seemed likely that the wool pieces were first based together with an assisting thread, then sewn together with the plied silk yarn that also held the gilt membrane strips on the seam (Figure 8). The basing thread was then removed from the finished textile.This seam structure that requires basting first has not been recognized in the Swedish intarsia textiles, and suggests that the Masku intarsia was made in Finland.

5.4. Discussion

The main outcomes of the project were that fruitful cooperation can be created between textile enthusiasts, museum authorities, and researchers (Ahl-Waris 2016). The recreated intarsia is hand-made proof of what can be achieved with volunteers who donate their skills and time on this scale.

Figure 9. Recreated intarsia textile. (Photograph: M. Pasanen)

On the other hand, when the National Museum of Finland opened its collections in this way, it gained variation in its annual program, including sewing days that attracted visitors, increased social media coverage, and new international followers. The special exhibition in January 2017, with both the real Masku intarsia and the reproduction, gained a lot of media interest (newspapers, tv, radio) and popularised science from a non-academic perspective (Figure 9).

The reconstruction project shed light on the handicraft processes of the original intarsia textile, too. All of the participants had a different stitching style which can be seen by careful observation of the final textile. However, when examining the stitches on the original, many different stitching styles can also be seen in it. This suggests that the original Masku intarsia was most likely done by several individuals.

The material analysis of the Masku intarsia revealed imported materials from distant areas of the Old World. Silk and cotton are clearly long-distance trade products, maybe from East-Asia or India. It can be assumed that long-distance trade increased the value of textiles.

Thus, it is logical that the small pieces of cotton used on the dots of the peacock tails were displayed so as to maximize the visibility of this precious material. The broadcloths' wool fibres were of fine quality. Theoretically they might be very carefully sorted underwool from the medieval Finnish sheep that had a double-coated fleece (Kirjavainen 2005). All of the imported materials ended up in one textile item, and were combined using pan-European religious and heraldic motifs. Especially the unique seam structure suggests that the Masku textile was produced in Finland.

The Finnish castle accounts and church inventories mention *guldskinn* (gold skin) decorated luxury textiles, including wall-hangings and coverlets (Pylkkänen 1974b: 20–26). The silver detected in the membrane introduces an interesting question on the coating of materials in general. In the Masku textile, all surviving membrane stripes seemed to have a dark purplish-brown hue. This strongly suggests a silver coated membrane over the entire textile instead of a gold leaf membrane – silver can create purplish oxides, while gold does not. The reproduction of the Masku intarsia shows that the visual effect of the silver can be striking, at least when new and not oxidised. Based on this, we suggest that maybe the word *guldskin* also referred to textiles with silver-leaf membrane decoration.

The reconstructed textile was large (280 cm x 140 cm) and quite heavy (ca. four kilograms). If the original Masku intarsia textile was used as a hearse cloth to cover a coffin, the maximum stress caused by the textile itself would have been on the textile's longitudinal centre seam. The large textile was also most likely folded along that seam, which would also have caused stress. That kind of wear might be the reason why the fabric was broken just after the second row of the animal squares.

5.5. Conclusions

The medieval Masku intarsia textile reconstruction project was completed through successful cooperation with textile enthusiasts, craft specialists, museum professionals, conservators, and researchers. As a conclusion to *The Griffin and Peacock* project, the reproduction and the original Masku textile were displayed side-by-side in a special exhibition at the National Museum in early 2017.

Different textile materials including colourful wools, silk, and cotton from different areas of the world ended up in the Masku intarsia textile, and were utilised with great skill according to local style. The unique seam structures suggest that the Masku textile was made locally in Finland, not in Sweden.

Feedback from the museum audience proved that the reproduction provided them with a different perspective on textile materials: it showed the visitors immediately how luxurious the medieval Masku

intarsia textile was in its time. Unlike the original, the textile reproduction can withstand being on display, and is permanently displayed at Häme Castle, showcasing important textile history.

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