

Treatment and Prevention of Tears in Historical Drumheads Using BEVA 371 Film with Spun-bonded Textiles and Japanese Kurotani Tissue as Lining Materials

Introduction: The conservation of drumheads presents a unique challenge when compared to other skin artifacts as drumheads are under constant tension. This is because the rawhide is stretched on the wooden hoops. All materials change dimensionally when exposed to a fluctuating environment. The objective of the experiments was to assess the potential longevity and re-treatability of conserving rawhide drumheads with BEVA 371 film. The project also determined the most appropriate backing material by testing two spun-bonded textiles, Reemay and Hollitex, and also Japanese paper, materials traditionally used in the conservation of skin objects.



New Jersey Volunteer Drumhead. Circa 1812: Museum of New Brunswick

Sample Preparation: 98 samples of deer rawhide were cut according to the ASTM's "Standard Test Method for Tensile Strength of Leather". Half the samples were lined and half were cut in two and then lined. The lining materials were Reemay, Hollitex, Kurotani paper and a control group had no lining.

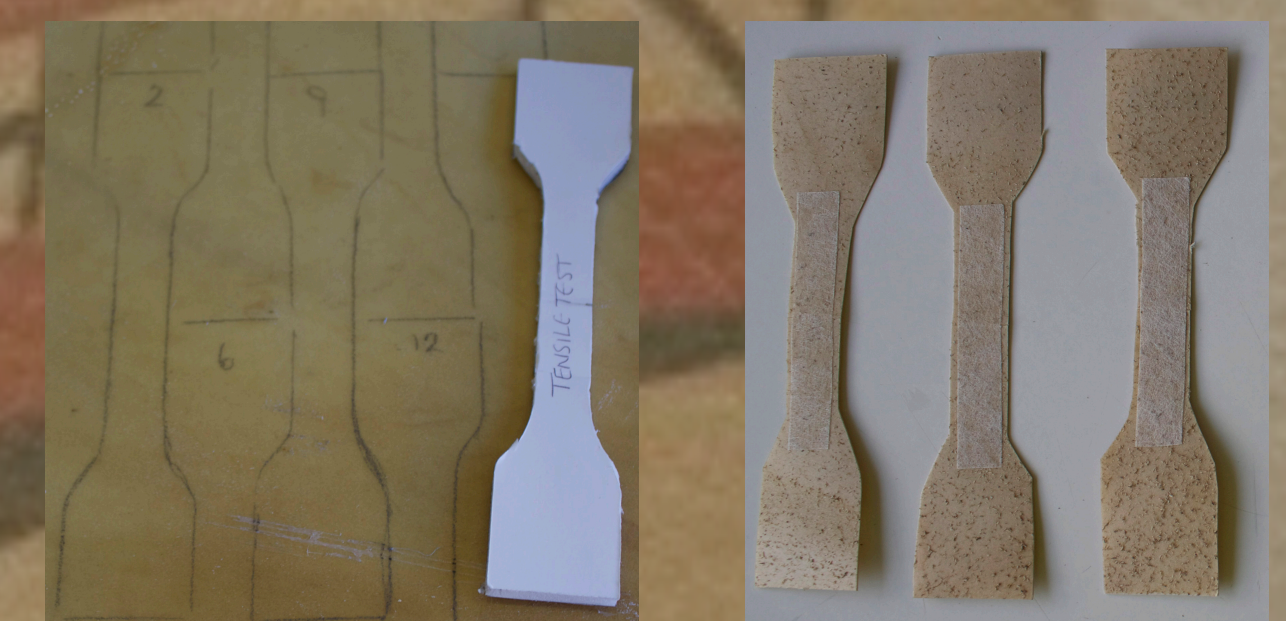
Accelerated Aging: After lining all of the samples were placed in a Despatch LEA 1-69 Environmental Testing Chamber at 80°C and 55% relative humidity for seven days. The pH of the samples was measured before and after aging to see if this would contribute to the acidification of the samples.

Testing: Tensile strength testing was performed on all of the samples using the Instron instrument with a 1000lb load cell. The rate of extension was 0.5 inches/minute. The samples were observed while testing and afterwards to determine how the linings behave under stress. The table below illustrates the expected results, the actual outcome observed, as well as how many samples failed during testing.

Sample types	Expected results	Observed results	# failed samples
No lining	Samples breaking in the centre	The skin showed areas of stress other than at the final breaking point.	4 of 7
Reemay	A small amount of resistance due to the elasticity of the samples.	The lining showed a small amount of resistance and less elasticity than predicted. Some stress points other than at the final breaking point. Sample lining tore evenly.	12 of 14
Hollitex	A larger amount of resistance due to the inelasticity of the lining	The lining of some of the samples remained intact slightly after the breaking point of the skin. More elasticity to the sample than predicted. Sample lining tore unevenly.	13 of 14
Paper	The paper tearing at the same time as the skin.	Failure of the majority of the samples occurred before tensile strength testing could be performed. Some linings fell off completely during testing. The paper does not seem to impart any strength to the sample.	12 of 14

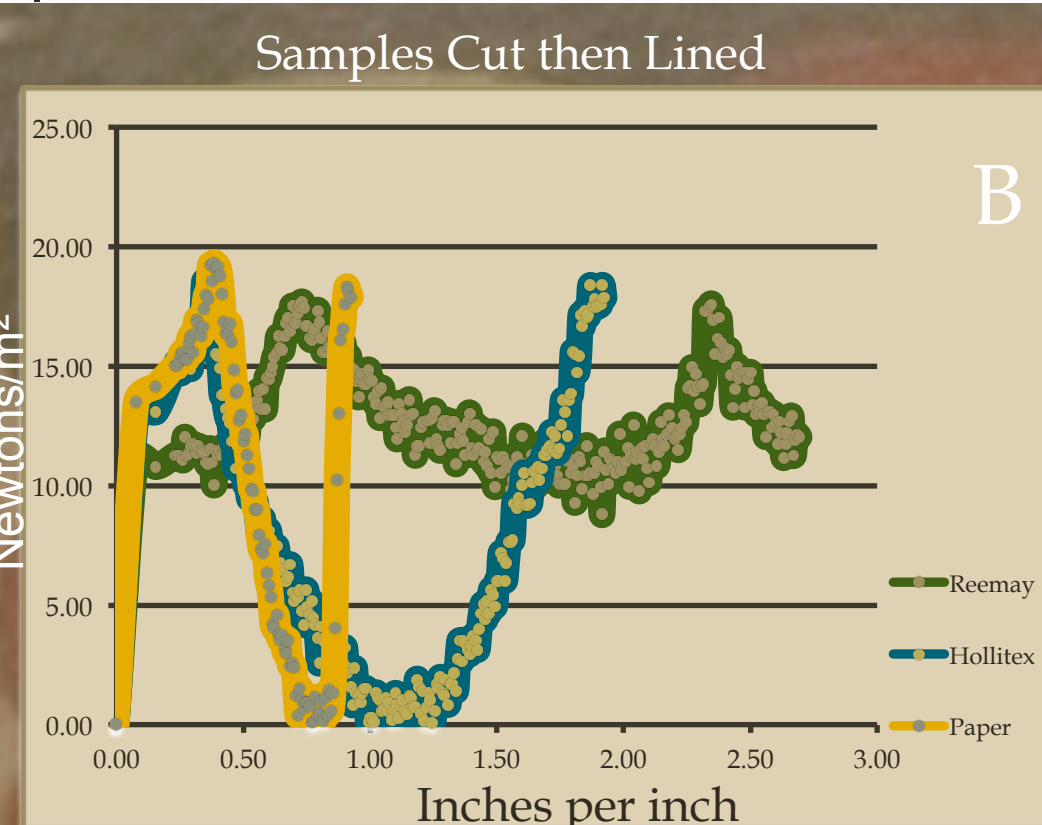
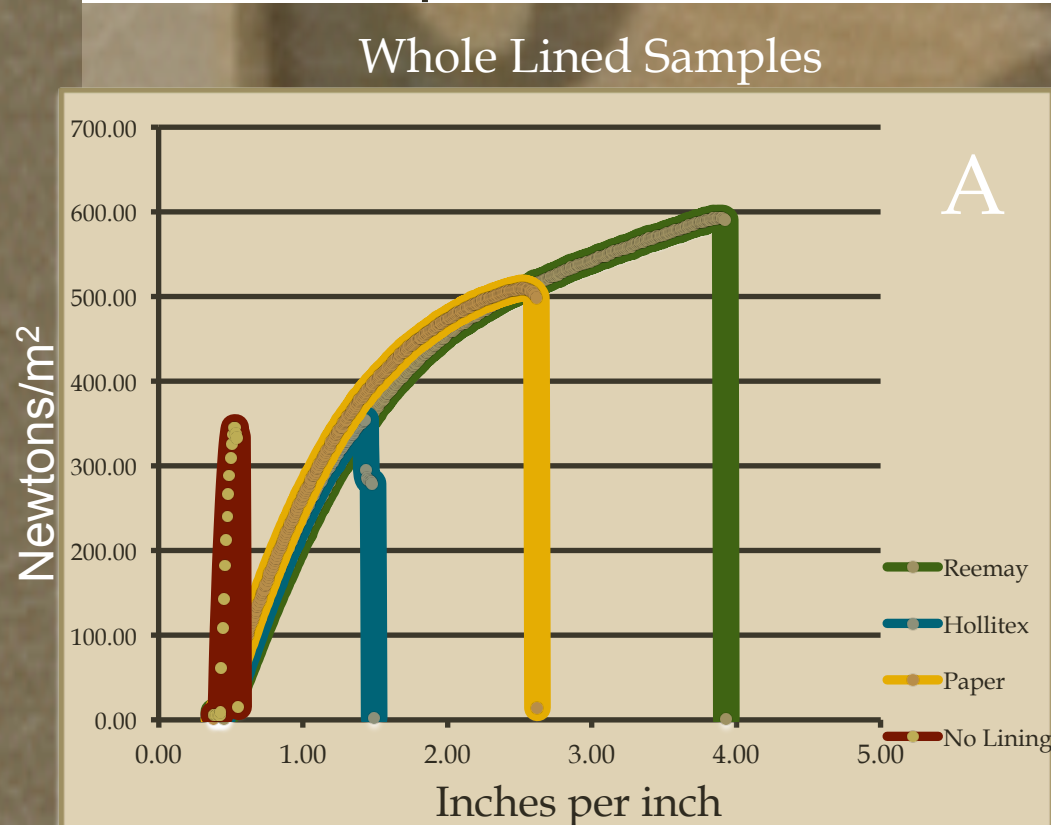


Whole deer rawhide being flattened



Drawn samples and template

Reemay lined samples



Graphs were created to illustrate the differing strengths of the materials. Graph A shows that all linings improved the strength of the samples. The Reemay-lined samples in particular withstood more tension than the rest.

Graph B shows the data from the samples that were cut and repaired with the lining materials. Again, the Reemay withstood more tension than the rest of the lining materials.

Removal and Re-treatability:

The removability of the linings is important to consider when choosing between treatment options. A tenacious treatment may need to be removed in the future. Each type of sample was tested using a tacking iron and acetone. Observations were made to decide which method was most effective.

Samples	Heat Removal at 50°C	Solvent Removal
Reemay	<ul style="list-style-type: none"> Time: 2 minutes. Easy removal. Left adhesive residue on the surface – further treatment required. 	<ul style="list-style-type: none"> Time: 1 ½ minutes. Very easy removal Left minimal adhesive residue. Solvent wicked into the skin – not recommended for painted areas.
Hollitex	<ul style="list-style-type: none"> Time: 1 ½ minutes. Easy removal Left minimal adhesive residue –further treatment required. 	<ul style="list-style-type: none"> Time: 3 minutes. Difficult removal Left minimal adhesive residue. Solvent wicked into the skin – not recommended for painted areas.
Paper	<ul style="list-style-type: none"> Time: less than a minute. Very easy removal No adhesive residue. 	<ul style="list-style-type: none"> Time: less than a minute. Very easy removal. No adhesive residue.

Conclusion: Reemay as a lining is the most advantageous treatment solution for torn drumheads. While it is advantageous to have the paper fail, before causing further damage to the object, the Reemay better stabilizes the rawhide while still having some stretch, allowing slight movement of the skin. Hollitex is similar to Reemay; however, it may hold the skin too well, causing difficulties in removal and leading to tearing in other areas of the drumhead. The Hollitex lining stayed well adhered to the substrate when compared to the others linings, but created transparency in the sample. Reemay will give support but fail at a certain point, whereas paper and Hollitex were too weak to give the proper support and too strong when the backing should fail before the skin.