Material Combinations and Degradation – a Challenge to the Conservation of Musical Instruments

Background

The data presented on this website support the conservation of musical instruments in museum collections. Contact corrosion is a well-known degradation phenomenon affecting musical instruments. This open database presents the results of a survey that systematically documents the range of contact corrosion. The survey started in 2022 and new data are continuously collected and updated on this website.

Contact corrosion is reported on various types of musical instruments in storage and on exhibition. Specific types of instruments and particular areas where contact corrosion is prone to occur are shown. The survey sheds light on the risk of material loss caused by reactions occurring at the contact point between two groups of materials: Metals and organic materials. The identified contact points can be a focus for further analysis and research. Subsequently, model experiments for further understanding and conservation methods can be developed to mitigate the observed degradation phenomena.

Most possible materials on instruments in museum collections should be preserved as evidence of historic music-related practices for the future. Since musical instrument parts were often exchanged as part of traditional maintenance throughout history, even more loss of still-existent historic material caused by degradation should be prevented.

About us

This website was developed in collaboration between the Department of Materials Science and Engineering, the IT FOCUS Section of the Norwegian University of Science and Technology (NTNU), and The Norwegian Museum of Music, Ringve and Rockheim (Museene i Sør-Trøndelag), all situated in Trondheim, Norway. Developing the database was supported through The Research Council of Norway for the project "Material Combinations and Degradation – a Challenge to the Conservation of Musical Instruments" under project number 336864 (https://prosjektbanken.forskningsradet.no).

How to contribute

We invite museums with musical instruments in their collection to contribute and help to expand this open database. To share your observations, you can easily fill in this questionnaire: https://nettskjema.no/a/467966#/page/1

Contact us

Get in touch with us – we are looking forward to collaborate with you!
Norwegian Museum of Music, Ringve and Rockheim, ringve.post@mist.no, https://ringve.no
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Use of this website

Exclusively, musical instruments with contact corrosion from museum collections are included in the data presented on this website. Details about the contact corrosion are shown in the graphs.

When no limitations are specified in the "**Search**" field, the total number of all investigated instruments included in the database is displayed in the graphs and the table.
To limit the search, specific collections which have contributed with their observations and specific instrument families can be chosen. Click on "**Reset Search**" to see all results collected in the database.By clicking on the arrow ▶ below "**Search results** Number of hits/instruments in search result", the selected data is displayed. The resulting data can be downloaded.

The musical instrument's identification

- Musical instruments investigated
- Date of production
- Place of production

The investigated instruments include examples of all five instrument families https://vocabulary.mimo-international.com/: keyboard instruments, stringed instruments, wind instruments, mechanical instruments, and percussion instruments. Available information, including the registration number, instrument name, production date, and provenance, is collected from the museum catalogues.

Description of the materials at the contact point

- Frequency of materials involved in contact corrosion
- Metals involved in contact corrosion
- Organic materials involved in contact corrosion

The graphs show the frequency of the type of materials observed on instruments meeting at a contact point with contact corrosion. The materials are grouped into broad umbrella terms after a simple macroscopic visual inspection. The number of involved metals and organic materials are shown in separate charts.

- The function of the materials involved in contact corrosion

The functions of materials observed on instruments meeting at a contact point with contact corrosion are grouped: The materials can be part of sound production (e.g. strings or reeds), of mechanical parts (e.g. springs or weights), of constructive parts (e.g. screws or nails) or of decorative parts. The assignment of the parts to one of these groups helps to range the condition of the parts according to the instrument's playability.

The condition of the materials at the contact point

- The condition of the materials at the contact point - Ratings
- Signs of degradation
- Color of corrosion on specific metal types

The condition of the materials at the contact point on the investigated instruments is rated. The rating is based on an estimate of their structural stability and aesthetic appearance.

The signs of degradation, such as discoloration, surface alteration or structural change, are grouped in separate charts for the organic material and the metal. The frequency of the type of degradation is visible in percentages of the investigated instruments.

Another chart shows the involved metals and the color of the observed corrosion products.

The instrument's condition

- Earlier treatments
- Earlier water impact

Earlier treatments and modifications made to the instruments have an impact on the historical value of the instrument. The graph gives an orientation about the amount of primary (original) material involved in the contact corrosion point on the investigated instruments. Thereby, the amount of either primary or later-added affected material can be estimated.

Corrosion observed on parts other than at the contact points hints at an earlier impact of water or high humidity. Water stains, swollen areas of wood or corrosion on metal surfaces independent of the contact point are typical. The graphs show the percentage of "Traces of earlier water impact" and "Corrosion independent to the contact point" found additionally to contact corrosion. The result provides an estimate of material combinations that may rather have corroded due to the impact of high humidity than due to the reaction between the contacting materials. It also provides an estimate of material combinations prone to contact corrosion in normal environmental conditions where traces of an earlier water impact were not observed.

The environmental situation

- The environmental situation

This graph ensures that the environmental situation of the investigated instruments was controlled at the time of observation.

How to refer to the database

Norwegian Museum of Music, Ringve and Rockheim (e.d.), Material Combinations and Degradation – a Challenge to the Conservation of Musical Instruments, 2025, https://instrumentcorrosion.com, (accessed [date]).

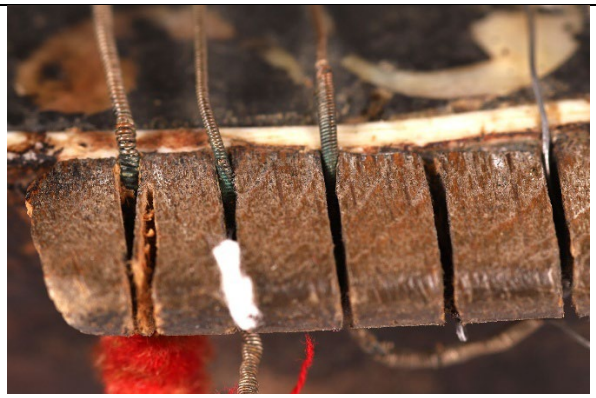
Examples

Examples of contact corrosion in the collections of the Norwegian Museum of Music:

RMT 2017-9, square piano, https://digitaltmuseum.no/021028353043/taffelpiano,
RMT 2020.07.01, zither, https://digitaltmuseum.no/021029237467/akkordciter,
RMT 327, cister, https://digitaltmuseum.no/011022846337/cister,
RMT 79/6, piano, https://digitaltmuseum.no/011022849263/piano,
RMT 611, flute, https://digitaltmuseum.no/011022847026/luttinstrument,
RMT 547, mandolin, https://digitaltmuseum.no/011022846898/mandolin.

RMT 2017-9, square piano. Steel strings in contact with felted fabric.

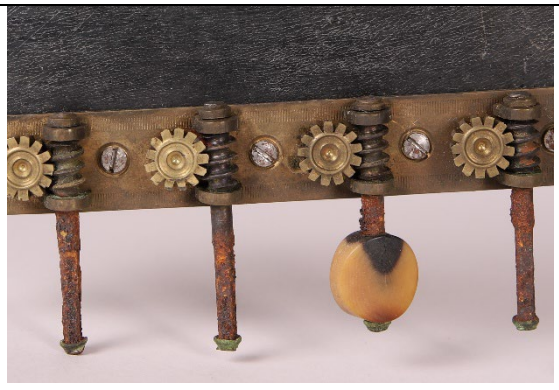
RMT 79-6, piano. Lead weight in contact with wooden keys.



RMT 327, cister. Copper wound strings in contact with wood.

RMT 611, luttinstrument. Steel string in contact with skin.

RMT 88-8, flute. New silver in contact with wood.



RMT 547, mandolin. Steel core of screw in contact with plastic.