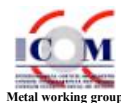


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METALCons-info



Bulletin of the Research On MEtal Conservation

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BROMECS2

Editorial

With some delay we send you the second issue of BROMECS. I have received some very positive feedback from the first issue and some colleagues have even mentioned that it was a real discovery for them to see that others worked on similar projects. Exchange of ideas is the first step to further collaboration.

Since February new correspondents have joined the existing team and we are very happy to welcome **Paul Mardikian**, senior conservator working at the Warren Lasch conservation centre in Charleston and who will represent USA ; **David Hallam**, senior objects conservator at the National Museum of Australia, Canberra who will represent Eastern Australia and **Emilio Cano**, conservation scientist and objects conservator working at the National Centre for Metallurgical Research (CENIM) of the Spanish Council for Scientific Research, Spain.

If the first bulletin was full of new research projects conducted in different institutions you might find that this second issue is quite short in comparison. Work is still in progress on the research presented before and as I mentioned in the first issue, I am giving you the information that I receive from the correspondents, not more. It might be that next time we have again a more thorough production of results. It is the way research works...

In the previous months some interesting events happened. Ankersmit and myself we attended in April a very interesting advanced course organised by the University College of London. 34 scientists and conservators from all European countries participated to this 2 weeks course presenting the more recent research in pollution monitoring and conservation of historic monuments. The programme of the course and the notes given to the participants will be soon on-line. It is one of the first time that such a general subject was presented to the new generation of scientists. The feedback from the participants was very positive but all participants agreed on the difficulty to be informed of the past and present research funded by the European Commission. Building a network between the 34 scientists present at the advanced course should help in being informed on the research conducted in the respective countries. Information is already exchanged between these scientists and we will add them to this bulletin when needed.

The 5th European Commission Conference, Cultural Heritage Research: a Pan-European Challenge took place between the 16-19 May in Cracow, Poland. Different topics were treated. I attended the section dealing with the place of research in training programmes for conservators. Problems presented by May Cassar and other specialists in the STOA document: Technological requirements for solutions in the conservation and protection of historical monuments and archaeological remains (address to charge the STOA document: www.europarl.eu.int/stoa/publi/default_en.htm with abstracts in different European languages) such as the lack of education in research were confirmed by the participant.s. For more information consult the web-site of the conference, www.heritage.ceti.pl or myself.

Note that in the section general information, more websites presenting European programmes have been added. New interesting seminars are mentioned as well.

I am happy to announce the creation of the ICOM-CC Finnish Metal Group. Like for the other national sections, the idea is to organise yearly meetings gathering professionals involved in the conservation of metal artefacts to inform them of the research programmes conducted in the field and of possible conservation problems that would need further research.


I hope that you will again enjoy the reading of this new issue of the bulletin.

The Editor


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Applied research projects

In-situ conservation of grey cast iron cannon (EVTEK Institute of Art and Design / MMF)

Based on the preliminary results obtained by Rami Kokko [1], previous student from the Marine Archaeological Conservation Course (Conservation Dept - EVTEK Institute of Art and Design, Vantaa) it appears that a possible way to repair the damages on the cannons from the *Gustav Adolf* wreck would be to apply during a certain time sacrificial anodes to form a preliminary oxide-sediment layer which should develop in the nearer future in a thicker and protective crust.

Rami Kokko succeeded in getting some funds from the Finnish Cultural Foundation to continue his work in collaboration with the Maritime Museum of Finland, Helsinki. During the 2002 summer season, it is planned to complete the survey of the cannons on the site, to get the first results of the E_{corr} and pH monitoring on some of the cannons and to choose the ones on which sacrificial anodes will be attached.

In parallel Tiina Andersson, student at the EVTEK Institute of Technology has been granted some funds by the EVTEK foundation to conduct a laboratory study on the conditions of formation of the preliminary oxide-sediment layer on grey cast iron protected with sacrificial anodes. Baltic sea, zinc anodes and modern cast iron samples are considered for these experiments. It is expected to study the influence of the sample surface and the size of the anodes on the formation of the protective layer.

Tiina Andersson results should be used by Rami Kokko to favour in real conditions the formation of an oxide-sediment layer on the *Gustav Adolf* cannons already damaged. It is expected at the end of summer 2002 to get some outcomes from both studies. Optimisation of the conditions of the formation of the protective layer should be the next step.

[1]: Kokko, R., Final thesis report, Marine Archaeological Conservation Course, 2002

Contacts: Christian Degriigny (EVTEK Institute of Art and Design), Rami Kokko (Maritime Museum of Finland) and Tiina Andersson (EVTEK Institute of Technology)

Funding: Finnish Cultural Foundation, MMF and EVTEK Institute of Art and Design

Ongoing research projects

Applying primer to iron objects using the vacuum painting technique (NMD)

The subject of this research was the vacuum painting technique, which has been developed and used in the last 20 years at the Conservation Department in the National Museum of Denmark for the protection of restored iron objects [1]. The research has been the subject of the final dissertation of Torben Holst from the School of Conservation, The Royal Danish Academy of Fine Arts.

In the research paper some general aspects of surface protection of iron with organic coatings are described and the vacuum painting technique for the primer is presented. The vacuum painting treatment has mostly been used on restored iron railings, gates and monuments, which were to be replaced outdoor in the often humid or wet Danish climate.

Some experiments were developed to compare paint penetration to explore the effect of the technique. Also a full-scale comparative experiment with old iron painted with different paints and applying techniques was launched. New primers on the market were compared to the old ones used. The vacuum technique was finally discussed and evaluated looking at the results of the experiments and of some earlier restoration works and suggestions for its improvement were presented.

[1]: Holm, K., Preprints, IIC Nordic Group - Danish Section XIII, Congress, Copenhagen, 1994, pp. 189-192

Contact: Torben Holst (Conservation Department, NMD)

Funding: School of Conservation, The Royal Danish Academy of Fine Arts and Conservation Department, NMD.

Ongoing research projects

Investigation of chemical patination of iron (VAK)

Historical weapons and armour made of iron have often surfaces with original patina colours. When oxidised, the removal of rust might conduct to some loss of patina. Therefore conservators have sometimes to reapply such patinas.

There are many old recipes for making colours on iron, especially brown ones, but there are no colour references that show the result of the recipes. Some of the chemical recipes are written in old-fashioned terms and their translation might be difficult. Furthermore, some of the chemicals are poisonous. Even though the search for recipes was concentrated to mainly Danish and German literature this work can very well illustrate the techniques used more widely in Europe because young craftsmen were known to travel all around the old continent.

The old recipes were translated into modern language. How the intended different patina colours can be chemically produced today was studied in a little series of tests once the safety legislations were checked. A collection of colour-references (portfolio) was produced from the workable recipes and a series of portfolio was passed on to some colleagues. The work is planned published in English, but already now it would be interesting to hear from others that have studied the colouring of iron surfaces.

Contact: Louis Lange Wollesen (VAK)

Funding: Vejle County

Ongoing research projects

+ Examination and stabilisation of a collection of lead medals from the National Museum of Finland (EVTEK Institute of Art and Design / HEAA, filière HES-CRAE / NMF)

Lead is normally regarded as a stable metal, which withstands corrosion very well in a large range of environments. However in storage and display corrosion of lead artefacts can often be observed due to the presence of organic acid vapours.

Several stabilisation techniques have been developed in the past. Consolidative electrolytic stabilisation treatments seem to work successfully for pure or almost pure lead artefacts. Stabilisation of Pb-Sn, Pb-Sb medals is more problematic and a solution is still needed. Another problem concerns the artefacts on which an organic protective coating has been once applied.

In this study we have decided to concentrate on this latter problem and to define a protocol to eliminate organic compounds and to preserve at the same time the corrosion layer underneath where surface information is preserved. Because of the powdery and loosely adherent corrosion products treatments involving mechanical contact with the surface should be minimal. The use of solvents at different states (liquid, vapour) and the use of atomic oxygen treatment will be evaluated.

For this work the lead medals from the collection of the Numismatic Department of the National Museum of Finland has been considered. A preliminary survey has been conducted that allowed us to classify the medals according to their presumed composition. Most of them are free of any protection. For those having one, analyses are planned in the near future.

The second task will be to reproduce the damage observed on real artefacts on modern lead coupons covered with different coatings and exposed to acetic vapours. A literature review concerning protective coatings for lead artefacts has been carried out and several products have been selected for the tests (natural resins, waxes, nitro-cellulose lacquers and acrylic copolymers). Cleaning protocols using different solvents will be developed to remove completely any organic coating. At the end electrolytic polarisation (consolidative reduction) will be applied to these coupons to stabilise the corrosion layer.

In a final stage the protocol defined should be tested on a real artefact.

Contacts: Christian Degriigny (EVTEK Institute of Art and Design), Martin Ledergerber (Haute Ecole d'Arts Appliqués du Canton de Neuchâtel, La Chaux-de-Fonds, Switzerland) & Pia Klaavu (NMF)

Funding: EVTEK Institute of Art and Design, NMF

New research projects



Curly Malachite (SABKS)

Malachite in form of tiny curls of bend individual fibres on copper alloy artefacts were so far rarely reported [1]. In this study programme samples are collected for investigation with optical microscopy, EDS-SEM, X-ray diffraction and FTIR. Although malachite curls could easily be misinterpreted as pseudomorphosis of textile, fur or organic materials, it can now be shown that they can occur on minerals without any organic material present.

[1]: Scott, D., Copper an bronze in Art, Los Angeles (2002) 105-106

Contact: Gerhard Eggert (SABKS)

Funding: SABKS

New research projects



Measurement of heavy metal run-off due to environmental corrosion (BSDHM)

The project has to be seen in connection with a series of previous and parallel national and international projects investigating the outdoor corrosion of copper and tin bronze with respect to the environmental situation. It will focus on the quantitative determination of the run-off of copper, lead and zinc under outdoor exposure in Germany. This project will run from the beginning of April 2002 to the end of December 2004.

Contact: Rolf Snethlage (BSDHM)

Funding: Umweltbundesamt, Berlin (Project 202 24 220/01)

New research projects

+ Electrolytic stabilisation of iron artefacts in neutral solution (*EVTEK Institute of Art and Design*)

Extraction of chlorides (stabilisation) from marine iron artefacts using electrolytic techniques is commonly applied in conservation laboratories. If the conditions of the process are well defined for isolated metal artefacts (cathodic polarisation at constant potential in alkaline solution), the stabilisation of iron-organic material composites needs further research.

Preliminary experiments have been conducted in France on waterlogged iron-wood rifles. A specific protocol was determined in non-buffered KNO_3 solution. This neutral solution was favoured to limit any damage of the organic part. But increase of pH was observed and neutralisation using some amounts of diluted HNO_3 solution was necessary.

The objective of our work has been to conduct a similar treatment on a complex painted iron-glass-rubber porthole from a 19th century wreck. The innovative part of this study was the complete monitoring of the pH and both the cathodic and anodic potentials during the cathodic polarisation of the artefacts.

At first iron nails simulating the behaviour of the iron part of the composite were used. General trends were obtained while modifying the cathodic (and anodic) potential to optimise the chloride extraction and the surface condition (polished and oxidised) of the nails. Our major concern was the behaviour of the whole system during the night where no control of the different parameters is possible. The stabilisation process lasts indeed several days, week-ends included.

Different results were observed on the composite porthole showing then the limits of our approach.

The different steps of our methodology will be highlighted during this presentation.

Contact: Christian Degriigny (EVTEK Institute of Art and Design) and Ilonne de Groot (ICN)

Funding: no external funding

General information

- Web-sites

Some sites offer interesting information on research applied to the conservation field. Studies on metals might be found.

- **5th Cultural Heritage Research: a Pan-European Challenge, Cracow (16-19 May 2002)**

<http://www.heritage.ceti.pl>

- **Laboratories on Science and Technology for the conservation of European Cultural Heritage**

<http://www.chm.unipg.it/chimngen/LabS-TECH.html>

- **Cost Action G8: Non destructive analysis and testing of museum objects**

<http://srs.dl.ac.uk/arch/cost-g8>

- **Cost Action G7: Artwork conservation by laser**

<http://alpha1.infim.ro/cost>

- Future seminars and conferences

- **ART2002** – Non destructive Testing and microanalysis for the diagnostics and conservation of the Cultural and Environmental Heritage (02-06 June 2002, Antwerpen, Belgium). For more information consult <http://chem-www.uia.ac.be/art2002/>

- **Summer course for conservators : Conservation of outdoor metal sculpture** (8-12 and 15-19 July 2002, La Chaux-de-Fonds, Switzerland) with Antoine Amarger. For more information contact Valentin Boissonnas (v.boissonnas@heaa-ne.ch)

- **Unesco Regional Conference on the Convention on the Protection of Underwater Cultural Heritage** (17-20 July 2002, Kingston, Jamaica). For more information contact Paul Mardikian (mardikian@hunley.org)

- **ICC2002** - 15th International Corrosion Congress (22-27 September 2002, Granada, Spain). For more information consult <http://www.15icc2002.com/intr.html>

- **ICOM-CC Triennial Meeting** (23-27 September 2002, Rio de Janeiro, Brazil). For more information consult www.icom-cc.org/rio2002

- **Introduction course on the use of lasers in art conservation** (4-6 September and 20-22 November 2002, Art Innovation, Hengelo, The Netherlands). For more information contact J.M. Teule (R.Teule@Art-Innovation.nl)

- **Cost action G7 meeting** + workshop: Conservators and the use of laser techniques in conservation (18 October 2002, Vantaa, Finland). For more information contact Christian Degrigny (Christian.degrigny@iad.evttek.fi)

- Abbreviations and acronyms

AAD: Amsterdam Archaeological Department
BSDHM: Bavarian State Department of Historical Monuments
CRAE: Conservation-restauration objets archeologiques et ethnographiques
DNM: Danish National Museum
EDS: Energy Dispersive Spectroscopy
EVTEK: Espoo-Vantaa Teknillinen Ammattikorkeakoulu
FTIR: Fourier Transform Infrared
HEAA: Haute Ecole d'Arts Appliqués
HES: Hautes Etudes Supérieures
ICN: the Netherlands Institute for Cultural Heritage
MMF: Maritime Museum of Finland
NMD: National Museum of Denmark
NMF: National Museum of Finland
SABKS: Staatliche Akademie der Bildenden Künste Stuttgart
SEM: Scanning Electron Microscope
XRF: X-Ray Fluorescence
VAK: Vejle Amts Konserveringsværksted

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