Forum Kunststoffgeschichte 2014

Plastics Heritage - Abstract book

22. - 24. Oktober 2014

Symposium on plastics history, heritage, conservation of and with polymers, collecting

including
Panel Discussion
“Bioplastics - Designing with an upcoming material”

Werner Aisslinger, Designer, Berlin
Christian Bonten, Universität Stuttgart, Germany
Moritz Grund, Sustainable Designer, Berlin
Susanne Lengyel, Engineering Design, Hamm-Lippstadt
Günter Lattermann, moderation, dgkg

HTW Hochschule für Technik und Wirtschaft
Campus Wilhelminenhof
Wilhelminenhofstraße 75-77
12459 Berlin

Building G
Lecture Hall: G002,
Panel Discussion and Posters: G007/008

Forum Kunststoffgeschichte 2014

Plastics Heritage

22. - 24. Oktober 2014

Abstract book

Hochschule für Technik
und Wirtschaft Berlin
University of Applied Sciences

Freunde des Studienganges
Restaurierung/ Grabungstechnik e. V.
an der HTW Berlin

dgkg
Deutsche Gesellschaft
für Kunststoffgeschichte e.V.

We thank our sponsors for their kind support:

Die Lackmanufaktur

www.conrads-lacke.de

Dr. A. Conrads Lacke GmbH & Co. KG
Viehhofstraße 206
42117 Wuppertal
Telephone: 0202 24256-0
Fax: 0202 24256-26
E-Mail: info@conrads-lacke.de
Internet: www.conrdads-lacke.de

Dry Cleaning & Restoration Supplies

Division of
DOG Deutsche Oelfabrik
Gesellschaft für chemische Erzeugnisse
mbH & Co. KG
Ellerholzdamm 50
20457 Hamburg
Germany
Telephone: +49 (0)40 31 18 05 0
Fax: +49 (0)40 31 18 05 88
E-Mail: info@dog-chemie.de
Internet: www.aka-art.de/en/about-us.html

Anton Siegl
Fachbuchhandlung GmbH
Kirchenstr. 7, 81675 München
Telephone: 089/475243
Fax: 089/4704934
E-Mail: service@siegl.de
Internet: www.siegl.de

FCI
FONDS DER
CHEMISCHEN
INDUSTRIE

Preface

Welcome to the **Forum Kunststoffgeschichte 2014**, including the Symposium **"Plastics Heritage"** and the Panel Discussion **"Bioplastics – designing with an upcoming material"**.

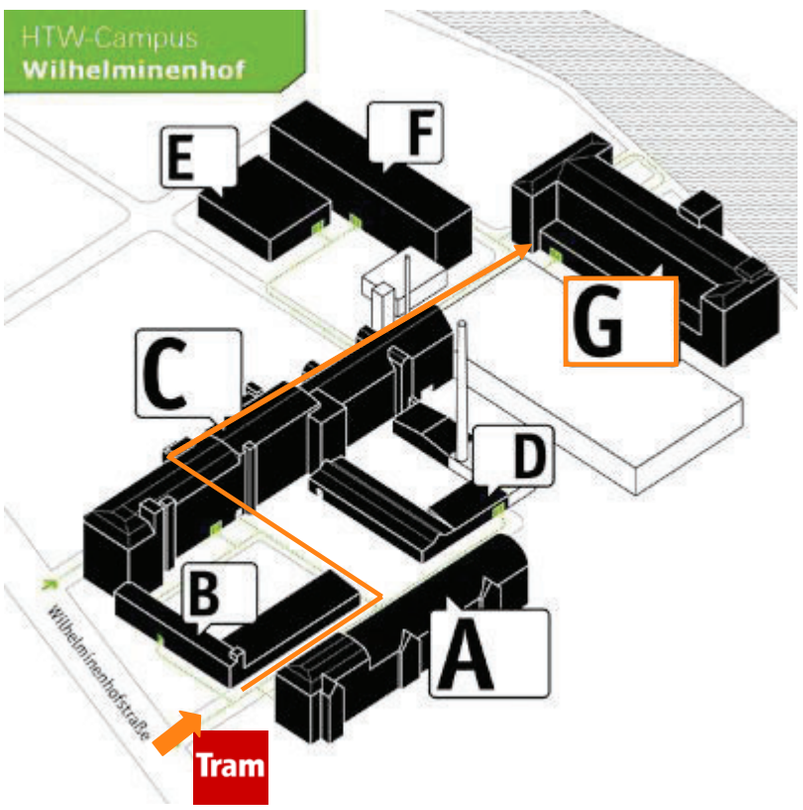
The **Symposium** provides an interdisciplinary forum for all aspects of our cultural heritage made of different plastic material or its precursors. Around 110 participants from 12 nations will be present at 26 lectures and 8 posters of international experts, which inform on their activities with respect to plastics history, plastics in art and design, collecting plastics heritage and its investigation, conservation and restoration. Three invited plenary lectures will introduce the different topics.

A last session on bioplastics precedes the final **Panel Discussion "Bioplastics – designing with an upcoming material"**. Competent panellists will discuss if and how the biopolymer renaissance may influence future design with respect to form, material choice, sustainability and environmental issues such as CO_2-footprint and biodegradation. The discussion builds a bridge from our plastics heritage – often made of biopolymers - to the role of modern bioplastics.

The aim of the Forum Kunststoffgeschichte is to bring together people from different countries and fields of activities in order to deliver and to obtain new insights in and from the different topics of our plastics heritage and intentionally to elucidate its significance also in possible modern developments.

We wish you an interesting conference, lively discussions, prosperous contacts and finally a pleasant stay in Berlin.

The Organising Committee:
Tatjana Held, Dipl. Rest., Berlin
Prof. Ruth Keller, HTW, Berlin
Dietmar Linke, Dipl. Rest., HTW, Berlin
Dr. Dr.h.c. Günter Lattermann, dgkg, Bayreuth
Prof. Jan Vietze, HTW, Berlin
Prof. Birgit Weller, HTW, Berlin



Hochschule für Technik und Wirtschaft HTW,
University of Applied Sciences, Campus Wilhelminenhof,
Wilhelminenhofstraße 75A, 12459 Berlin
A = Building A (Deanery, Department 5, study course Modern Materials and Technical Heritage)
G = Building G (registration, lecture hall, cantine (Mensa), cafeteria)

Hochschule für Technik und Wirtschaft Berlin
Campus Wilhelminenhof, Wilhelminenhofstraße 75-77, 12459 Berlin
Building G (cf. District and campus map),
Lecture Hall: G 002,
Panel Discussion and Posters: G 007/008

Programme Schedule

Wednesday, 22 October 2014

10:00 – 12:30 h	**Guided tour to the HTW Campus**
12:00 – 13:30 h	**Registration, Welcome coffee**
13:30 – 14:00 h	**Welcome addresses, Opening**
	Chair: Ruth Keller
14:00 – 14:45 h	**Plastics' Potential: the MoDiP Perspective** *Susan Lambert*, Museum of Design in Plastics (MoDiP), Arts University Bournemouth, UK
14:45 – 15:15 h	**Plastics as Cultural Heritage? The Deutsche Kunststoff Museum Düsseldorf** *Christian Bonten*, Universität Stuttgart, Germany
15:15 – 15:45 h	**The Kölsch-Collection** *Hans-Ulrich Kölsch*, Kölsch-Collection, Wörthsee-Steinebach, Germany
15:45 – 16:15 h	**Coffee break**
	Chair: Yvonne Shashoua
16:15 – 16:45 h	**Plastics in the Castle - The Museum for Urban and Industrial History Troisdorf (MUSIT)** *Pauline Liesen*, Museum f. Stadt- und Industriegeschichte, Troisdorf, Germany
16:45 – 17:15 h	**The Kunststoffschule Pattern Books for the Education and Advanced Training in the Plastics Processing Industry from the 1950s/1960s** *Susanne Brunner*, Technische Universität München, Germany
17:15 – 17:45 h	**The Control Labels of the Berlin-Dahlem Materials Testing Institute: Their Development and Significance for Synthetic Resin Mouldings** *Dietmar Linke*, Hochschule für Technik und Wirtschaft Berlin, Germany
18:00 – 19:00 h	**Guided visit to the HTW conservation laboratories**
19:15 h	"HTW": Ham, Treat and Wine

Thursday, 23 October 2014

Chair: Susan Lambert

09:00 – 09:45 h **Polymeric Materials in Art and Design: An Interdisciplinary Experience**
Cecilia Cecchini, Sapienza – Università di Roma, PLART Napoli, Italy

09:45 – 10:15 h **By-product Art**
Milica Stojanov, Beograd, Serbia

10:15 – 10:45 h **PMMA: Perceiving the Material in Museums and Artwork**
Sara Babo, Universidade Nova de Lisboa, Caparica, Portugal

10.45 – 11:15 h **Coffee break, Posters**

Chair: Jan Vietze

11:15 – 11:45 h **From plasticity to plastic: Morphing Uses of a Material and Concept in Contemporary Art**
Heather Davis, Institute of Arts and Humanities, Pennsylvania State University, University Park, USA

11:45 – 12:15 h **Design of Plastic Domestic Wares in Sweden 1950-75**
Thomas Lindblad, Sundbyberg, Sweden

12:15 – 12:45 h **Plastics on Models of the Collections in the TU Bergakademie Freiberg**
Hendrik Naumann, Techn. Universität Bergakademie Freiberg, Germany

12:45 h **Lunch**

Chair: Günter Lattermann

14:00 – 14:30 h **Non-Invasive Investigation of Aged Resins Using Unilateral NMR**
Cindie Kehlet, Pratt Institute, Brooklyn, USA

14:30 – 15:00 h **Polyurethane: the Fame and Decay**
Susana França de Sá, Universidade Nova de Lisboa, Caparica, Portugal

15:00 – 15:30 h **Translucent Filling Materials and Retouching Techniques on a Polyurethane Three Piece Suite of the Variopur Series**
Laura Urban, Hochschule für Technik und Wirtschaft Berlin, Germany

15:30 – 16:30 h **Coffee break, Posters**

Chair: Colin Williamson

16:30 – 17:00 h **A Blue, Red, Yellow Oilcloth Jumping Jack from the Time of the Second World War**
Anja Wagenknecht, Berlin, Germany

17:00 – 17:30 h **Connecting knowledge: Some not so well considered facts about ageing of plastics in audiovisual media**
Nadja Wallaszkovits, Österr. Akademie der Wissenschaften, Wien, Austria

17:30 – 18:00 h **Matt and Glossy Coatings on the Outer Surface of a Historic Delivery Van**
Nathalie Grusdew, Berlin, Germany

18:00 – 18:30 h **Preventive Conservation of Rubber Objects – Possibilities and Prospects**
Maxie Tafelski, Filmmuseum Potsdam, Germany

19:30 h **Evening Reception**

Friday, 24 October 2014

Chair: Christian Bonten

09:00 – 09:45 h **Conserving Plastics from our Past and Present for the Future**
Yvonne Shashoua, Nationalmuseet, København, Denmark

09:45 – 10:15 h **Water resistance by Protein Coating of Persian Manuscripts**
Ruth Keller, Hochschule für Technik und Wirtschaft Berlin, Germany

10:15 – 10:45 h **The History of the Use of Plastics in Conservation**
Maja Ossig, ProDenkmal GmbH/Technische Universität Berlin, Germany

10.45 – 11:15 h **Coffee break**

Chair: Birgit Weller

11:15 – 11:45 h **Bioplastics – Driving the Evolution of Plastics**
Constance Ißbrücker, European Bioplastics, Berlin, Germany

11:45 – 12:15 h **RE-Y-STONE Biocomposites – 100 % ecological and 100 % designed**
Gerd Ohlhauser, Edition Surface, Darmstadt, Germany

12:15 – 12:45 h **Green Agro-plastic Building Products with Improved Fireresistance**
Hanaa Dahy, Universität Stuttgart, Germany

12:45 h **Lunch**

14:00 – 14:30 h **Biopolymeric Materials: from Past to Present**
Günter Lattermann, Deutsche Ges. f. Kunststoffgeschichte, Bayreuth, Germany

14:30 – 16:30 h **Panel Discussion**
„Bioplastics – Designing with an Upcoming Material“
Werner Aisslinger, Designer, Berlin
Christian Bonten, Universität Stuttgart, Germany
Moritz Grund, Sustainable Designer, Berlin
Susanne Lengyel, Engineering Design, Hamm-Lippstadt
Günter Lattermann, moderation, dgkg

16:30 h **Closing remarks**

16:45 – 17:15 h **Farewell coffee**

17:15 h ***dgkg Member's Meeting (on special invitation)***

Posters

Thursday, 23 October 2014, 10.45 – 11:15 h, 15:30 – 16:30 h

1 **Fashioning Plastic: Elements in the Future History of Plastic**
Tom Fisher, Nottingham, UK

2 **Bringing Competences Together for the Conservation of Plastics**
Marisa Pamplona, Tim Bechthold, München, Germany

3 **Nanoindentation as an Innovative Technique to Assess the Mechanical Properties of Plastic Supports painted by László Moholy-Nagy**
Johanna Salvant Plisson, Evanston, USA

4 **Plastic Work of Art – Challenge of our Time. FTIR, RAMAN, NMR, XRF Analysis of Artworks by T. Kantor, A. Szapocznikow, P. Althamer and M. Bałka**
Monika Jadzinska, Warszawa, Poland

5 **Is Translucency an Indicator for Audio Tapes with Cellulose Acetate Carrier Layers?**
Simon Kunz, Berlin, Germany

6 **Stickiness in Magnetic Audio Tapes – an Insidious Form of Decay for Audio Carriers**
Katrin Abromeit, Berlin, Germany

7 **A Pattern Roller Consolidants as Aerosols for the Stabilisation of Degraded Rubber Foam**
Charlotte Klahold, Berlin, Germany

8 **The rudder of the Seaplane Supermarine S6B, S1595, Crack Closure in a CN-coated Fabric**
Anne-Kathrin Klatz, Gutenberg an der Raabklamm, Austria

Abstracts

Plastics Potential: the MoDiP Perspective

Susan Lambert
Museum of Design in Plastics, Arts University Bournemouth, United Kingdom
e-mail: slambert@aub.ac.uk

Keywords: documentation, design, ubiquity, rarity

Plastics have not been consistently collected by museums. My paper will explore some of the reasons that may explain this neglect including the value attached to the rare as opposed to the ubiquitous in the museum context. It will also demonstrate from the experience of the Museum of Design in Plastics (MoDiP), the only accredited UK museum in the UK with plastics as its focus, what a rich seam plastics are for curatorial attention. It will explain how plastics have led to the complete rethinking of the manufacturing process and elucidate how, contrary to their maligned reputation, their use in design contributes to a more rather than a less sustainable world, how their substitution for other materials can have positive results, and how combined with other materials they make what was formerly unachievable achievable.

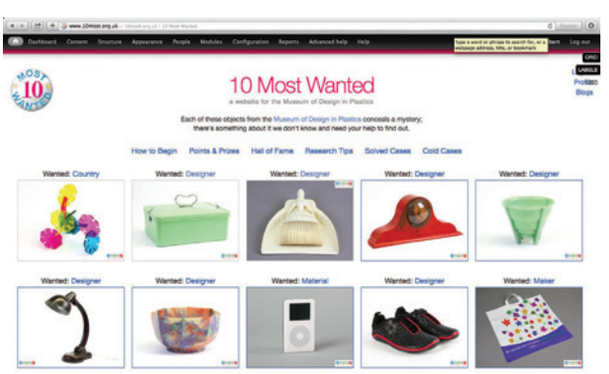


Fig. 1: Home page from the "10 Most Wanted" website: http://www.10most.org.uk

The paper will also share the findings of an externally funded research project "10 Most Wanted" (URL: http://www.10most.org.uk) which, inspired by the FBI's criminal initiative, has built on the shared ubiquity of plastics and criminals to explore the potential of the web, social media and gaming to engage the public in searching for information about objects in museum collections. By asking the public for help the museum is made less precious and more connected with its audience. It also helps curators to grow public interest around a collection and provides a framework for integrating user-generated content into curated collections. The paper will explain how the game works, what it has achieved, its strengths and weaknesses as a methodology and how it has enabled the public to act as curators and by so doing brought human narratives into the museum.

Notes:

Plastics as cultural heritage? The Deutsche Kunststoff Museum

Christian Bonten[a] Uta Scholten[b]
[a] Institut für Kunststofftechnik, Universität Stuttgart, Germany
e-mail: christian.bonten@ikt.uni-stuttgart.de
[b] Deutsches Kunststoffmuseum; Düsseldorf, Germany

Keywords: Kunststoff-Museums-Verein, plastics collection, virtual museum, travelling exhibition

It is hard to imagine a material that has influenced products of the 20th century and their design so significantly and which shapes that of the 21st century as much as modern plastics. However, the recognition of plastics products as a part of our culture and cultural history is still in its nascence. In public perception, plastics still retain a stigma of a cheap and substitute material. And, who wants to visit a museum and see e.g yoghurt containers?

Since 1986, the Kunststoff-Museums-Verein (Plastics Museum Association) has worked to compile the history of plastics, collect its relics and put them on exhibit. Today the association has around 300 members. Companies and organisations from the industry, scientific institutions, collectors of historical plastics and a multitude of other interested individuals support the idea of the German Plastics Museum. The association has been located in Dusseldorf since 1995, as Messe Düsseldorf, host of the most important plastics convention worldwide, became a supporter. The collection contains approximately 14,000 objects from the mid-nineteenth century to the present. It documents both precursor materials, such as shellac, casein plastics and celluloid, as well as numerous examples of today's dominant, fully-synthetic plastics. Industrial design classics as well as everyday mass-produced items, prototypes, material sam-ples, and plastic processing machines are part of this collection.

Eighty percent of the objects are inventoried and comprehensively documented with photographs in a computer database. This provides an outstanding research instrument in which objects can be browsed for various questions with regard to technology, design and everyday history. Travelling exhibitions are complemented by the "Virtual Museum" in the Internet. On the website of the association (www.deutsches-kunststoff-museum.de), more than 7,000 objects of the collection may be viewed in text and image.

Notes:

The Kölsch Collection

Hans Ulrich Kölsch
Kölsch Collection, Etterschlager Straße 46, 82237 Wörthsee-Steinebach, Germany
Tel.: +49 8153 887 1887

Keywords: Kölsch Collection, Ebena Objects

Hans Ulrich Kölsch is the doyen and one of the pioneers of plastics collection in Germany. He is playing a fundamental role in communicating and raising awareness for the importance of our plastics heritage.

He began – at that time together with his wife Ursula – collecting objects of plastics and their precursors as early as at the end of the 1970th. His 'portfolio' was so rapidly increasing that he could organise his first exhibition "Kunststoffobjekte 1860–1960" from 20 November 1983 until 1 April 1984 in the Folkwang Museum in Essen and afterwards from 7 June until 26 August in the Kunstgewerbe-Museum of Zürich, Museum für Gestaltung. Until the year 2000 he participated at least at ten further exhibitions in Germany, the Netherlands Belgium and France.

In most of the exhibition catalogues, Hans Ulrich Kölsch has presented objects from his collection not only as a loan, but has carefully described them with respect to historic, cultural and creative or artistic aspects. With the years, his collection became not only the largest private one all over the world but comprises carefully selected objects with respect to art, design and historic significance.

One of his great merits is that he revived a totally forgotten chapter of a material, object and company history which was completely buried in oblivion. It concerned objects of the Belgium trade mark Ebena. Manufactured in a very luxurious, french Art-Déco style, boxes, dishes, bowl, vases etc. have been produced between approximately 1921 bis 1931. At the beginning of Kölsch's collecting, it was not quite clear, if the objects were made from a synthetic resin. However, it turned out that they consist of a mixture of copal, a semi-fossil natural tree resin, chemically modified by glycerine. The forming process was very similar to that for moulded synthetic plastics. Many Ebena objects were additionally decorated with e.g. gold and silver leaves or dyes were worked in, obtaining wonderful decoration effects.

Hans Ulrich Kölsch, the honorary member of the Deutsche Gesellschaft für Kunststoffgeschichte e.V. dgkg will give a free report in German on this chapter of his activities.

Notes:

Plastics in the Castle – The Museum for Urban and Industrial History Troisdorf (MUSIT)

Pauline Liesen
Museum für Stadt- und Industriegeschichte Troisdorf MUSIT, Troisdorf, Germany
e-mail: liesen@troisdorf.de

Keywords: Troisdorf, museum for urban and industrial history, plastics collection, Dynamit-Actien-Gesellschaft

Wissem Castle is the unofficial landmark of Troisdorf. Since 1982, the well renowned picture book museum is hosted here. Supported by the "Regionale 2010", extensive conversions of an older building have been made possible. In consequence, eight additional institutions, among others the Museum for Urban and Industrial History Troisdorf (MUSIT), were established here.
The MUSIT is explaining the relationship between the development of the city and the industry of Troisdorf. The importance of specific companies and entrepreneurs is underlined as well as the social, architectural and infrastructural development of an industrial town using the example of Troisdorf.

The development of the plastics industry starting in 1905 is comprehensively described – numerous inventions started from here and went out into the world. On the basis of an enormous collection, the development of this branch of industry can be reenacted from the earliest beginnings to the present day. Visitors can experience the new possibilities initialized by the material "plastics" and its impact on present daily life.

An important part of the exhibition is the semi-finished and end products manufactured by the former "Rheinisch-Westfälische-Sprengstoff-Aktien-Gesellschaft" (RWS) – the company merged with "t" in the 1930s, operating under the name "Dynamit Nobel AG" since 1959. Starting with the production of explosives producers mastered the industrial chemistry of nitrocellulose, used as commodity for celluloid, producing for example dolls, spectacle frames, combs, soap baskets since 1905. It was also used for the coating of musical instruments and wooden slide rulers. Continually increasing and technologically advanced, the company from Troisdorf became the center of "IG Farben" for technological development in the 1930s.

At this time Trovidur (pipes and plates used for apparatus engineering) and Mipolam (at first used in the first place as flooring material – tiles and later lengths) were developed. In 1954 Mipolam was the basis for the first plastic window frame factory-made worldwide – a novelty attracting attention! Quite similar the development of Trosifol, a film used for laminated safety glass, until today used in the automobile industry and integrated into the cupola of the Reichstag in Berlin.

This list of technological developments and products from Troisdorf can be multiplied many times over – and a wide range of products are on show in the Museum for Urban and Industrial History Troisdorf. The museum wants to communicate the impact of the plastic industry in Troisdorf on the everyday life all over the world. Likewise the exhibits are providing an insight into the work of a company influencing the development of the city for more than a

hundred years. The close relationship between city and industry is reflected by the prefix “Tro” – used time and again labeling new products like Trocal, Trocellen or Trovidur.

Notes:

The Kunststoffschule – Pattern books for the education and advanced training in the plastics processing industry from the 1950s/1960s

Susanne Brunner[a], Susanne Rehn-Taube[b], Erwin Emmerling[a]
[a] Technische Universität München; Restoration, Art Technology and Conservation Sciences, Munich, Germany
[b] Deutsches Museum, Munich, Germany
e-mail: s.brunner@mytum.de, s.rehn@deutsches-museum.de, emmerling@tum.de

Keywords: Plastics processing industry, plastic products, history of plastics, plastic samples, manufacturing processes

Two almost similar issues of the Kunststoffschule from the Deutsches Museum München are objects for a cataloguing student project. By examining closely, describing, measuring and documenting with photographs and drafts, these fragile and seldom pattern books can now be presented and compared non-intrusively. The two eight-volume-pattern-books were edited by the AG Deutsche Kunststoffindustrie in 1955 and the 1960s and were followed by one enhanced issue consisting of ten volumes. They were distributed worldwide mainly to the plastics processing industry. In various countries modified or enhanced volumes derived, which are directly connected to these three German issues. Nowadays, copies of the Kunststoffschule are hard to find. Due to the reorganisation of the booming plastics industry or the bad condition of the books due to ageing and their intense usage, many copies were discarded.

Produced for the education of plastics technicians and engineers, the Kunststoffschule was designed to be opened, touched and worked with. The samples could be taken out and used in physical or chemical experiments. Each of the volumes presents one or two different groups of plastics: I. Regenerated Cellulose (vulkan fibre, cellulose film), II. Cellulose Ester (celluloid, cellulose acetate, cellulose acetate butyrate), III. Polyethylene, IV. Polystyrene, V. Polymethacrylate, VI. Phenoplastic, Aminoplasts and VII. New Plastics (Polyamides, Polyurethanes). Each volume is a cardboard-click-binder and presents on its inside diagrammes, photographies and various plastic samples.

The diagramme shows the manufacturing processes relevant for the respective plastic group. The samples are mounted to the cardboard in plastic tubes, with elastic straps, or glued onto the cardboard. Powders, granulates and fibres illustrate the manufacturing process.

Many products for household use (buttons, spoon, switch), children's toys (doll, locomotive), for craftsmenship, fabrics etc. present the typical use of plastics. An accompanying booklet gives additional information about the synthesis, manufacturing and trade marks of each plastic group. An additional poster diagramme depicts which basic materials were used for each plastic.

The Kunststoffschule visualises the high significance of plastics as new material for nearly everything after the Second World War. It is a contemporary witness of the booming plastics processing industry and gives us a unique overview over the product range in the 1950s and 60s.

Notes:

The Control Labels of the Berlin-Dahlem Materials Testing Institute: Their Development and Significance for Synthetic Resin Mouldings

Dietmar Linke
Conservation Studio Linke, Kernerstraße 16, 13125 Berlin, Germany
e-mail: 3480-9@online.de

Keywords: MPBD, control label, standardization, synthetic resin mouldings

The control label (fig. 1) was introduced in 1925 for the marking of synthetic resin mouldings and registered as a trademark at the patent office. Its signet combines the initials MPBD of the Staatliches Material Prüfungsamt Berlin-Dahlem (State Material Testing Institute Berlin-Dahlem).

Fig. 1: Control label (ETZ 46 (1925), p.865)

The background of the introduction of the quality label is based on the rapid development and significance of electrical engineering and its demand for reliable insulating materials. After the First World War the shortage of raw materials and the lack of skilled labour led to a reduction in the quality of the insulating moulding materials, which put the security of electrical plants and machines at risk and massively harmed the reputation and the sales of German products abroad. In addition, the confusingly large number of product and material names of the manufacturers complicated their use, as there was often no possibility of obtaining information about the composition and properties of the moulding materials.

On the advice of the Association of German Electrical Engineers (VDE) the manufacturers of “non-ceramic, pressed rubber free insulating materials” joined the Technical Association of the Manufacturers of Rubber-Free Materials. The members of the Technical Association committed themselves to have the parameters of their insulating materials tested by the State Materials Testing Institute, in order ensure the quality of the products. The first classification of insulating moulding masses into 10 groups took place in 1924. At this point the manufacturers could only agree on heat resistance and bending strength as test criteria. Economic problems due to strong competition, insufficient mastering of the production processes of the new materials, a lack of standardized tests and procedures as well as the question of the transferability of the test results of sample rods to the final product, all give an impression of the complexity that had to be overcome, until the introduction of a standardisation in 1928 and the first DIN standard (DIN 7701) for insulating material press masses in 1936. The manufacturer, the inspection period and thus the manufacturing period of the product, as well as its classification and standardisation can be determined from the numbers and letters which are pressed into the control label. The latter properties allow conclusions to be drawn about the base material, the fillers used and the tested properties of the press masses.

The lecture will present the historical development up to the end of the Second World War, as well as the work on an internet-based data base, which makes infor-

mation available without time-consuming research. The evaluated information that can be accessed will comprise the charts of the manufacturers published in magazines over a period of 20 years, period of registration, materials and properties, etc. The evaluation, the summary and the fast source access can be a valuable help for object research and material characterization for the conservator as well as the historian.

Notes:

Polymeric Materials in Art and Design: an Italian Interdisciplinary Experience

Cecilia Cecchini[a], Alice Hansen[b]

[a] "Sapienza" University of Rome, PLART Foundation (Plastics and Art Museum), Naples, Italy
e-mail: cecilia.cecchini@uniroma1.it
[b] Department of Research and Conservation, PLART Foundation (Plastics and Art Museum), Naples, Italy

Keywords: PLART Foundation, thematic museums, plastics art, plastics design, conservation of plastics heritage

Interdisciplinary synergy is indeed fruitful and successful, but only rarely exhibitions, research projects and educational activities merge in one institution. Even rarer is to manage to organize such events without the public involvement, in a fascinating but extremely difficult city such as Naples.

This is the case with the PLART Foundation, a private museum inaugurated in Naples in 2008 and entirely dedicated to polymeric materials. Although defining PLART with a static term such as "museum" is inappropriate and simplistic: it can be better described as multifunctional centre.
The main objectives of PLART are the diffusion of the history and of the contemporary culture of polymeric art and design, the promotion of a conscious use of plastics and the diffusion of conservation practices regarding plastic heritage.

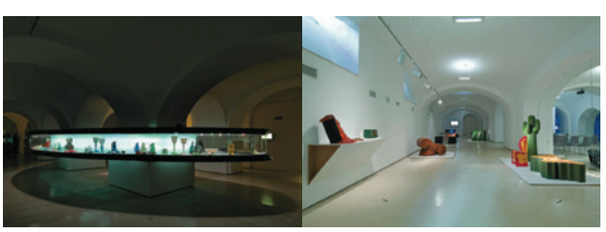


Fig. 1: PLART Foundation (Plastics and Art Museum, Naples), exhibition halls

The Foundation premises house a permanent exhibition of one of the richest collections of historical plastics - more than 1500 artefacts comprising jewellery, toys,

Fig. 2: PLART Foundation (Plastics and Art Museum, Naples), exhibition

electrical appliances, furnishings dating from the late XIXth Century up to contemporary design objects and artworks - collected in more than 30 years by Maria Pia Incutti, President of the PLART Foundation. The historical collection is flanked by contemporary displays showcasing designers and artists whose common denominator is the use of synthetic polymers. Essential for the contemporary collection is the scouting for new talents who employ synthetic and semi-synthetic polymers in an innovative way. The exhibition activities are accompanied by intense educational projects, where the chemistry of synthetic materials and the concept of eco-sustainability are explored through the use of advanced multimedia technologies. More specifically, a large area of the museum is based on interactive installations that illustrate the history of plastic from the early chemical experiments to the recently conceived bio plastics, using recreational methods that are suitable for both adults and children.

Furthermore, scientific research activities investigate the preservation and conservation of the historical and contemporary collections, by means of a scientific laboratory for the identification, the artificial ageing and the study of the degradation of polymers.

Also, PLART organises master classes about the conservation of plastics heritage, whose principal aims are the promotion of interdisciplinary debate between international experts and the development of a specialised professional figure capable of preserving plastic artefacts.

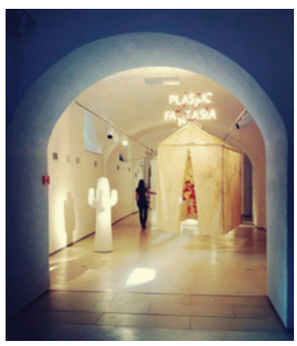


Fig. 3: PLART Foundation (Plastics and Art Museum, Naples), exhibition hall

In short, the PLART Foundation is a place where the complex and heterogeneous family of plastic materials is investigated extensively.

The array of these activities produces proper conditions for the dissemination of knowledge regarding plastics to an international and heterogeneous public: primary school children, university students, occasional visitors and scholars.

Within the course of a few years PLART managed to be included in the “Network of design fields” and listed as a Public Interest Museum by the Campania region. PLART’s particular exhibition and research approach allowed for the creation of an international network of collaborations, concerning diverse topics. Internationalization and exchange of knowledge are in fact the key objectives of this Institution.

Notes:

By-product Art. Museum of Childhood

Milica Stojanov[a], Vladimir Perić[b]
[a] Museum of Childhood, Belgrade, Serbia
e-mail: info@muzejdetinjstva.rs
[b] multimedia artist, Belgrade, Serbia

Keywords: Museum of Childhood, rubber toys, conservation, collection contexts

This paper discusses the use of discarded objects, collected within the project Museum of Childhood.
The Museum of Childhood is an on-going project developed by multimedia artist Vladimir Perić and art historian Milica Stojanov. It is based on extensive collection of objects related to childhood, mostly as a social category defined by the specific historical context of former Yugoslavia, but also with a universal value understood without knowledge on connotations related to specific territory, time and culture. The objects for the collection are mostly found abandoned and rejected on flea markets.

Fig. 1: Rubber toy of Mickey Mouse, ART 155, 1968. produced at Yugoslavian factory "Biserka", Zagreb under the official license of Walt Disney company

Fig. 2: 3D Wallpaper for Children's Room - pattern Mickey Mouse, 247 elements, 2007-2013, last exhibition: 55th Venice Biennale, National Pavilion of Serbia, exhibition "Nothing Between Us", 2013

Collected objects are a medium for the (re) construction of various narratives of childhood from multiple perspectives, but they also become elements of contemporary artworks which offer various interpretations of the past and present through personal, emotional and critical language.

The dual aspect of artistic contextualization and preservation of objects will be emphasized through the collection of rubber toys, produced in Yugoslavian factories, which reconstructs both private history and wider social frameworks of former Yugoslavia, but which also serves as a source for the creation of art installations. Within museological approach, various contexts of the collected toys are being interpreted – the production, purpose and function, the context of use, followed by abandonment and degradation in the environment of a flea market. Within the field of contemporary visual art, installations

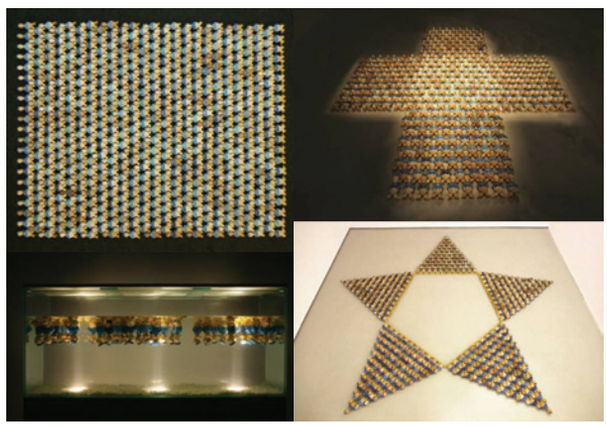
Fig. 3: Rubber toy of Donald Duck, ART 66, 1964. "Biserka", Zagreb, Walt Disney production

which use these toys as elements,carry ambivalent tension on visual and semantic levels, serving as a mute testimony to both innocent context of childhood and own reflections on turbulent past and complex identity of territory and time very much determined by experience and memory of war.
Artistic contextualization of heritage and memory objects provokes new engagements in the (re)construction of past narratives and identity, being aware that sometimes different interpretation, manipulation, critical or highly personal ob-servation, even deconstruction, can be

essential for new perceptions and understandings of the past, heritage, identity, oneself. On the other side, since the Museum of Childhood includes in its concept the museological aspect and reconstruction of diverse historical narratives which are absorbed in object and material, providing right conditions for slowing the process of deterioration of these rubber toys is of great importance. Private initiative doesn't allow systematic approach to preventive conservation of objects, but the knowledge on appropriate environment conditions and risk factors could provide a basic protection of material during storage, manipulating and presenting these objects.

Scrodge McDuck's Dream, installation, 50 elements, "History=Second-Hand Future", Musuem of Yugoslavian history, Belgrade, Serbia, 2013.

Repetitions and variations, pattern Donald Duck, floor installation, 525 elements, "Repetitions and variations" City Gallery of Požega, Serbia, 2010.



Death of a sailor, floor installation, 339 elements, "Disclosure-Underlined Memory", Museum of Byzantine culture, Thessaloniki, Greece, 2008-2010.

Donald Duck star of Disneyland, floor installation, 330 elements, "Disclosure-Underlined Memory", Museum of Modern Art, Saint Etienne, France, 2008-2010.

Notes:

PMMA: Perceiving the Material in Museums and Artworks

Sara Babo[a], Joana Lia Ferreira[a], Ana Maria Ramos[b], Maria João Melo[b]
[a] Departamento de Conservação e Restauro and REQUIMTE-CQFB, Faculdade de Ciências e Tecnologia - Universidade Nova de Lisboa, Campus de Caparica, Portugal
[b] Departamento de Química and REQUIMTE-CQFB, Faculdade de Ciências e Tecnologia - Universidade Nova de Lisboa, Campus de Caparica, Portugal
e-mail: sara.sbabo@gmail.com

Keywords: acrylic sheet, poly(methyl methacrylate), transformation process, survey, conservation

Acrylic sheet, i.e. poly(methyl methacrylate) (PMMA), is a twentieth century plastic material that found worldwide utilization, including in art. Photooxidation is the main ageing mechanism of PMMA and has been well studied [1,2], however, to our knowledge, no systematic studies have been undertaken to fully characterize acrylic sheet used in works of art, which correlate the chemical and physical changes over time with an understanding of the influence of manufacture, transformation processes and conservation procedures. The aim of our work is to study these correlations and influences.

Artworks produced in PMMA sheets during the 1960s by two different Portuguese artists – Ângelo de Sousa (1938-2011) and Lourdes Castro (1930-) – have been selected as case studies [3,4]. Both artists have worked with PMMA but in two completely different ways – Lourdes obtained the 2D shapes of her pieces by cutting with a electric saw and polishing the PMMA sheets, while Ângelo used heat to cut and mould them in 3D forms. The research on their works will include the study and reproduction of the artists process of construction; the material characterization; and chemical and physical degradation studies.
Furthermore, a survey concerning the presence of acrylic sheet in the main Portuguese museums and collections is being carried out and organized in a database using Filemaker Pro software, based on the model developed by the POPART project [5]. The data obtained will answer to questions such as: How many works are in/with acrylic sheet? By which authors and from when are they? What are the main problems observed? This broader approach will also contribute to establish and understand the relationship between the material transformation process and its condition.

The first outcomes of this project will be presented, aiming at contributing to the knowledge on the behaviour of this material and, therefore, its preservation.

References:

[1] O. Chiantore, L. Trossarelli, M. Lazzari, Photooxidative degradation of acrylic and methacrylic polymers. Polymer 41 (2000), 1657-1668.
[2] M.J. Melo, S. Bracci, M. Camaiti, O. Chiantore, F. Piacent, Photodegradation of acrylic resins used in the conservation of stone, Polymer Degradation and Stability 66 (1999), 23-30.
[3] J.L.Ferreira, Liaisons Dangereuses, Conservation of Modern and Contemporary Art: a study of the synthetic binding media in Portugal, PhD thesis Lisbon: FCT-UNL, 2011.

[4] J.L. Ferreira, M.J. Melo, M.J. Ávila, A.M. Ramos, The shadows by Lourdes Castro: a conservation study of PMMA in the 21st century, Preprints of the I.COM-CC 16th Triennial Conference. Lisbon: ICOM; 2012.

[5] Preservation Of Plastic ARTefacts in museum collections. POPART Project. 2012 [ONLINE];
URL: http://popart-highlights.mnhn.fr/index.html. [Accessed 30 April 14].

Notes:

From Plasticity to Plastic:
Morphing Uses of a Material and Concept in Contemporary Art

Heather Davis
Institute of Arts and Humanities, Pennsylvania State University, Montreal, Canada
e-mail: heathermargaret@gmail.com

Keywords: Plasticity, artifice, contemporary art, aesthetics, legacy

Until recently, artists held a virtual monopoly on artifice, re-making the natural world. With the rise of chemical engineering, this is no longer true. Plastic in particular marks this shift, as plastics, since their birth in the early twentieth century, have the unique ability to mimic and mould the natural world. Permeating our everyday lives, this seemingly ubiquitous material has a practical monopoly on artificiality. Plastic has long been linked to the 'plastic arts,' through the notion of plasticity, or malleability, and the wide use of plastic as an artists' material. Plastic itself has recently been taken up as a subject of inquiry by artists due to its importance within contemporary culture and questions of its legacy. Artists occupy a unique position to reflect on the heritage and movement of plastic in our lives. They invite us to reconsider this mundane and ubiquitous material, re-figuring it within the realm of aesthetics and asking audiences to reflect on the use of plastic and its life-cycle.

Responding to the question of the intertwinement of aesthetics, plasticity, and plastic, I will examine the work of four contemporary artists who examine the daily, mundane existence of plastic, and its magical qualities of shape-shifting and mimicry.

Marina Zurkow's The Petroleum Manga (2012) is a 'picture book' of oil-derived products. She created fifty banners made of Tyvek that display the wide array of mundane and extraordinary objects that are made from different kinds of plastics, coded according to their chemical composition. Choi Jeong Hwa has been using a wide variety of plastics in his sculptural work to transform sculpture mundane objects into arrangements that create an effect of intense beauty and vibrant joy. Katrin Hornek's Title Word on Plastic*s (2014) is an artist book composed of the title pages, in chronological order, of every book in the Los Angeles Public Library that

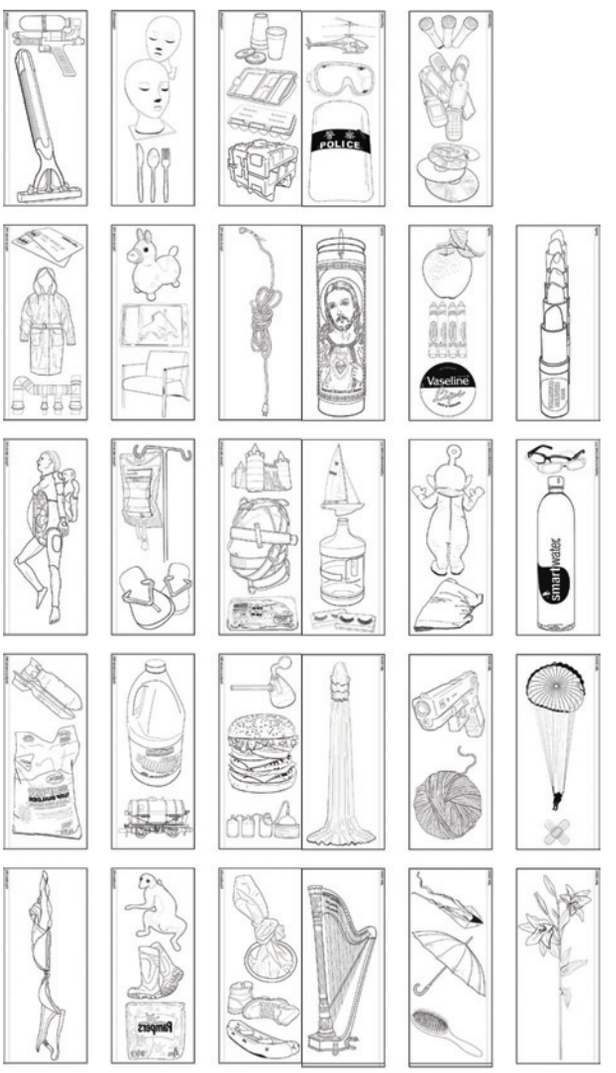


Fig. 1: Marina Zurkow The Petroleum Manga (2012)

contains the word plastic in its title. In this she documents the history and usage of plastic as both a material and a concept in contemporary culture. The last work I will consider is Lizzie Buckmaster Dove's 2013 piece Solastalgia. For over a year the artist collected plastic debris that washed up on the shores near her home in New South Wales, Australia, labeled them according to moon phases and catalogued them in a manner reminiscent of archival and museum practices.

Fig. 8: Lizzie Buckmaster Dove Solastalgia (2013)

All of these works respond to the wide use of plastic in our culture in order to think through the questions of its legacy and heritage in new, surprising and beautiful ways.

Fig. 2 (above): Choi Jeong Hwa Plastic Spring (1992)

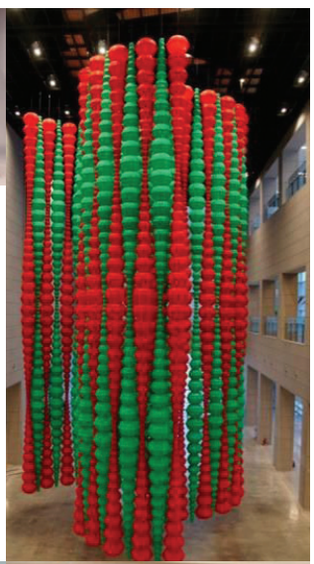


Fig. 3 (right): Kabbala (2013)

Fig. 4-7 (below): Katrin Hornek Title Word on Plastic*s (2014)

Notes:

Design of plastic domestic wares in Sweden 1950-75

Thomas Lindblad
Järnvägsgatan 68, 17235 Sundbyberg, Sweden
e-mail: barenthin.lindblad@swipnet.se

Keywords: Sweden, plastics design, swedish designers, plastics manufacturers

Rationalization of household work was a central issue for many feminists during the first half of the 20th century. Swedish writer Elin Wägner wrote: “It may seem unimportant, but one can start by rejecting a washing-up brush and liberate oneself from a whole form of civilization.” A young chemist at Swedish plastic producer Perstorp, Lorenz Kleiner, wrote an article on similar future goals in 1948. He spoke about rationalizing household chores and about the task of the plastics industry: to manufacture rational, cheap and beautiful everyday articles in forms that only plastics can provide. He listed examples of products: mugs and bowls made of ethylene plastic that children could not break, fruit presses, thimbles, salt shakers, trays for ice-cubes, egg cartons, washing-up racks, clothes pegs and so on. To him, plastic represented the future, modernity, a freer life.

The aim was that Swedes should become conscious consumers and should be able to distinguish between good and bad products. But in the production of plastic items there were no ideals or natural models. Manufacturers were cautious and in the beginning they kept to discrete and well-known forms and colours. Melamine tableware in pale blue or yellow from the early 50´s is well made, finely proportioned but very similar in design to porcelain. But the material encouraged the use of new forms and bold and surprising colours, and the market gradually overflowed with domestic wares in bright colours that had not previously been seen in the home, or at least very sparingly.

In Stockholm, Svenska Plastföreningen [Swedish Plastics Association] put on exhibitions in 1951 and 1956 showing new materials, products and machines. Much effort was expended in teaching manufacturers and consumers to distinguish between different sorts of plastic. The motto was “The right plastic for the right job”. Ing-Marie Berg, from Hemmens Forskningsinstitut [Home Research Institute], made a major contribution by lecturing and holding courses dealing with plastics and domestic wares.

The designs and colours of plastic wares were long considered by design critics to be vulgar and inferior. Arthur Hald, who was artistic director of the Gustavsberg Concern wrote in an article in 1957 that the plastics industry in general was “primitive”, that design was poorly developed and “the results often uncultivated”. In spite of the oddly brilliant product, this is probably an accurate view of the situation. This criticism did not apply to the serious manufacturers but was aimed at the second-rate mass products of less serious factories. But at the end of the 1950s the quality of plastic items improved and the material’s reputation rose.

At the newly built Konstfackskolan in Stockholm [University College of Arts, Crafts and Design], Slöjdföreningen organized a plastics exhibition in 1960. The focus was on design and the exhibition showed exclusively interesting and thoughtfully designed products. Calculating machines, telephones, plastic laminate, PVC-coated fabrics, a toilet seat and a letterbox, Plexiglas signs, packag-ing and kitchen wares.

This was a major event at which the leading Swedish designers were represented. In an article in the national daily Svenska Dagbladet, Ulf Hård af Segerstad reviewed the exhibition. He was positive, but stated: “Plastics can take almost any possible shape and the notion that we should ever be able to achieve an unequivocal ‘plastic design’ is surely illusory”.
Swedish manufacturers of plastics like Skaraplast, Hammarplast and Plastteknik in Gothenburg specialized in mass products that might really be termed “perishables”.

They made traditional household items, buckets, picnic plates and mixing bowls; cheap but well-made products that sold in large numbers. Other manufacturers were more design-conscious like Gustavsberg with designers like Stig Lindberg, Karin Björquist, Carl-Arne Breger and Husqvarna Borstfabrik with Sigvard Bernadotte. They sought to make new products that had not previously been available, and they developed the traditional types of items.

Notes:

Plastics on models of the collections in the TU Bergakademie Freiberg

Hendrik Naumann
TU Bergakademie Freiberg, Freiberg, Germany
e-mail: naumannh@mailserver.tu-freiberg.de

Keywords: Collections of universities; mathematical model; elastomer fibre; restoration technology; Rudolf Stoll KG

The curators of the TU Bergakademie take care of more than 30 collections. In 12 of them we find objects or parts of objects made of plastics. The earliest preserved object is part of the mining model collection, a model of a ball mill with a disc made of cellulose nitrate (fig. 1). In the gas installations collection we find for example sealing, elastic parts or non- corrosive gears (fig. 2). The technical chemistry collection deals with the resources, supplies necessary for producing plastics and the products itself (fig. 3).

Using the example of the mathematical collection the use of plastics on models and conservation treatments dealing with these materials will be presented. First, the benefits of the plastics comparing to traditional materials will be shown. The models were engineered and built by the Rudolf Stoll KG in Berlin since the late 1950s. On many of them coloured synthetic fibres with a core made of an elastomer were used to have an improved didactical, spatial view on a light but robust model.

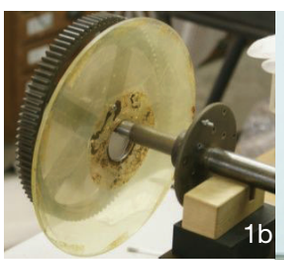


Fig. 1: A model of a ball mill built in 1912 (reg. no. TXB 76). The lucent disc enables an insight while milling.

Fig. 2: Inflatable rubber bags like these were used to fix gas pipes. (Photo: Dagmar Jänisch)

Fig. 3: Label of a barrel from the technical chemistry collection (reg. no. ol 165)

Fig. 4: Model with fibres (reg. no. 454), discovery state.

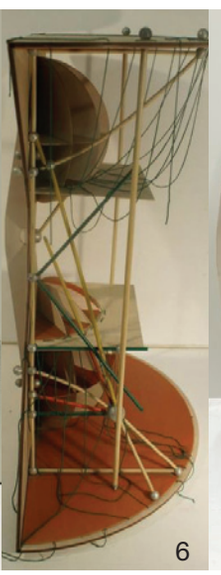


Fig. 5: Reg. no. 454 after the restoration treatment.

Fig. 6: Model with fibres (reg. no. 411), discovery state.

Fig. 7: Reg. no. 411 during the treatment.

Notes:

Non-invasive Investigation of Aged Resins using Unilateral NMR

Cindie Kehlet
Department of Mathematics and Science, Pratt Institute, 200 Willoughby Ave, Brooklyn, New York, USA
e-mail: ckehlet@pratt.edu

Keywords: Conservation, artificial aged resins, degradation in three dimensions, Profile NMR-MOUSE®

During the past decades conservators have experienced increasing problems with objects made of synthetic resin materials. Identification of the material and characterization of the degradation state of the artifact is a natural first step before conservation can take place. With advancements in technology potential new techniques arise that so far only have found limited use for the study of cultural heritage. Nuclear magnetic resonance (NMR) constitutes such a technique. It is an insensitive technique and relatively large sample sizes are therefore a requirement. At the same time samples need to be small enough to fit into a magnet with a typical bore diameter of only a few centimeters. Until the development of the non-invasive single-sided NMR instrument the technique was not suitable for cultural heritage applications. Here we present how the Profile NMR-MOUSE® can be used for monitoring and diagnostics of the degradation state of works of art made of resins. The advantage of the technique is that it can assess the degradation state of the material underneath the surface which is a limitation of most other non-invasive techniques such as Fourier transform infra red spectroscopy. The technique measures the mobility of protons and as materials degrade their mobility changes which is captured in the resulting relaxation decay. The technique is suitable for recording the degradation state of objects in three dimensions. We have applied this technique to a large set of test samples of various types of resins that have undergone artificial aging. The goal is a systematic study of the influence of aging on the materials and how the molecular changes are captured in the measured relaxation decays. We furthermore explore the applicability of the technique for assessment of the effect of conservation andhow treatments affect the material at different depths.

Notes:

Polyurethane: the fame and decay

Susana França de Sá[a,b,c], Maria Elvira Callapez[d], Joana Lia Ferreira[a,b], Ana Maria Ramos[b], Rita Macedo[e]
[a] Department of Conservation and Restoration, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 2829-516 Caparica, Portugal
[b] REQUIMTE/CQFB, Department of Chemistry, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 2829-516 Caparica, Portugal
[c] MUDE – Museu do Design e da Moda, Colecção Francisco Capelo, R. Augusta, 24, 1100-053 Lisboa, Portugal
[d] Centro Interuniversitário de História das Ciências e da Tecnologia (CIUHCT), Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisbon, Portugal
[e] Instituto de História da Arte, Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa, Avenida de Berna, 26-C, 1069-061 Lisboa, Portugal

Keywords: Polyurethane, design objects, industrial design factories, history, documentation

Polyurethane (PU) was invented in 1937 by Otto-Bayer (Germany) and it is known as one of the most versatile polymer families. The possible variety of its chemical structure can give place to many different material forms which have been attractive to artists and designers. In the design field, mostly since the sixties polyurethane has come into every living room and household in the form of comfortable, stylish and luxury furniture design.

Taking the polyurethane collection from MUDE as a case-study (the new design and fashion museum from Lisbon), we aim at establishing a bridge between the industry and the design world from the sixties and seventies on one hand. On the other hand, we intend to study the introduction of polyurethane-based materials in this field, identify the main reasons that led designers and industrials to use this material, the advantages and disadvantages as well as the relationship between designers and the industry.

In our research, we have identified some partnerships between Portuguese and International industrial design factories and learned how polyurethane-based materials are used in these two contexts.

Based on a multi and interdisciplinary approach, we have been assessing historical documentation from libraries and archives of the Portuguese plastics industry, visiting the industries of polyurethane foams and artificial leathers as well as carrying out interviews to workers, designers and industrial design factories. Although polyurethane-based materials face severe conservation problems it is our objective, not only to develop the national history polyurethane´s triumph but also to preserve its heritage.

Notes:

Translucent Filling Materials and Retouching Techniques on a Polyurethane Three-piece Suite of the Variopur Series

Laura Urban
Hochschule für Technik und Wirtschaft HTW Berlin, Berlin, Germany
e-mail: sisalda@aol.com

Keywords: airbrush retouching, GDR design, plastic furniture, polyurethane, Variopur series

This paper refers on the results of examinations regarding various retouching techniques on polyurethane furniture. The treatment was carried out on a three-piece suite from the so-called "Variopur" series, consisting of two chairs („Kangaroo chair", Z-chair; Model II) and a table. The work was performed between 2013 and 2014 within the conservation department at the University of Applied Sciences HTW Berlin (Hochschule für Technik und Wirtschaft).
The objects were first manufactured at the end of the 1960s by the Horn company in Rudersberg, Western Germany. The design is attributed to Ernst Moeckl, a designer who studied at the well-known Ulm Hochschule für Gestaltung. Later on in October 1972, the production was commissioned to the former PCK Schwedt (Petrochemisches Kombinat) in the German Democratic Republic, GDR, at that time.
With respect to the use of polyurethane in GDR furniture industry, the knowledge about manufacturing processes as well as technologies were adapted in cooperation with the western Germany company Horn. So, the Variopur series represents one of the first results of the industrial use of polyurethane in GDR. Its production in East Germany/GDR could be directly regarded as a consequence of the détente politics at that time, including also economic aspects. By this, the GDR furniture production, made up leeway in production technology and international design.
The object to be restored was previously owned privately and is now in possession of the Association ChemieFreunde Erkner e.V.. Presumably, it had been temporarily positioned outdoors. Thus, the object had been exposed to environmental influences such as weathering, ultraviolet radiation and fluctuations of temperature and humidity respectively. In addition, the usage by the owner led to characteristic signs of wear. Furthermore, inappropriate cleaning methods seem to have been applied. Therefore, the object showed several damages, primarily voids in the white lacquer as well as dark stains which both affected the visual appearance. Under these conditions, it was no longer possible to present the furniture suite in an exhibition, since the optical changes would have heavily attracted the attention of the visitors.
During restoration treatment, several filling and retouching techniques were evaluated. The examination focussed on two main aspects. First of all, it was necessary to find a filling material which offers translucent features, exhibiting at the same time good adhesion to the polyurethane surface. Furthermore, a retouching method and a material had to been found, which supports the translucent characteristics of the filling material, providing a surface similar to the industrial sprayed lacquer.
As a result, polyvinyl acetate Mowilith 20 in a solution of 10% in methyl ethyl ketone, mixed with Lycopodium as a filling material, showed the best properties as a filling material. As a retouching medium watercolours were applied using an airbrush gun as a retouching tool. This method allowed

to apply a thin, translucent layer of watercolours without visible brush strokes. To maintain reversibility and to protect the watercolour retouching, the acrylate Paraloid B 72 was applied on the polyurethane surface as well as on the retouched voids.

By implementation of the described methods, the furniture suite is now in a stable condition with a uniform surface appearance which does not deny history and use.

Notes:

A blue-red-yellow oilcloth jumping jack from the time of the Second World War: Crack closure and filling in of defects on oilcloth

Anja Wagenknecht
Zachertstr. 49b, 10315 Berlin, Germany
e-mail: anja.wagenknecht@yahoo.de

Keywords: oilcloth, jumping jack, conservation

The conspicuously coloured jointed doll from the Museum Europäischer Kulturen, Staatliche Museen zu Berlin, which is based on a jumping jack in a stylized form, was handmade in the 1940s of given oilcloth leftovers. Oilcloths are tissues with an appropriate oil paint coating. After 60 years, the little doll showed clear traces of use and aging. Especially the arms and legs were most affected, probably due to playing with the doll. They revealed numerous cracks and defects in the coating as well as in the textile backing fabric. To re-establish a uniform overall impression and thus the aesthetic value, a conservation treatment was required. Within the scope of a diploma-thesis at the HTW Berlin in 2009, the possibility arose to develop methods of crack closure and filling in of defects on oilcloth. The advantages and disadvantages of individual measures and their potential application on the jumping jack were examined. As result the cracks and defects in the textile support could be closed without tension by a polyamide gauze. Also the defects in the coating could be successfully complemented. Due to the very low layer thickness of the oil paint coating, the direct application of the acrylic resin dispersion 498 HV of Lascaux®, opposed to the possibility of using inlays, proved to be more suitable.

Notes:

Connecting knowledge: Some not so well considered facts about ageing of plastics in audiovisual media

Nadja Wallaszkovits[a], Peter Liepert[b]
[a] Phonogrammarchiv, Austrian Academy of Sciences, Vienna, Austria
[b] Research Institute for Chemistry and Technology, Vienna, Austria

Keywords: audiovisual media, magnetic tapes, film reels, ageing, “vinegar syndrome”, plasticiser loss

The chemical deterioration process called “vinegar syndrome” is a widely investigated topic in the world of audiovisual archiving. Until recently the “vinegar syndrome” has been considered as one single chemical reaction, causing molecular chain scission, thereby degrading magnetic audio tapes and film reels with a base of cellulose acetate. Retracing the mechanisms of physical and chemical ageing in plastics, some not so well considered facts come up, showing that the problem has been recognized already long time before the vinegar syndrome per se was detected and named. In parallel, it seems that the second chemical deterioration process of plasticiser loss has been severely underestimated in the world of audiovisual archiving and restoration.

The paper outlines details of physical and chemical ageing of plastics in audiovisual (AV) media, such as magnetic tapes and film reels, focusing on the phenomenon of plasticiser loss, and thereby connects knowledge of polymer chemistry and the world of AV archives. A new permanent refreshment method for highly deteriorated AV media suffering from “vinegar syndrome” and plasticiser loss is briefly presented and outlined in its basic mechanisms, and first results, discussing material properties and analysis results, are presented.

Notes:

Matt and glossy coatings on the outer surface of a historic delivery van

Nathalie Grusdew
Klarastraße 7, 12459 Berlin, Germany
e-mail: nathalie_grusdew@web.de

Keywords: Conservation/ Restoration, Alkyd resin lacquers, wartime production, shortage of raw materials

The carriage of an electrically powered delivery vehicle of the industrial bakery „Wittler-Brot" from 1942 was used specifically for advertising purposes and designed accordingly. My master´s thesis deals with the conservation treatment of the exterior surface of the vehicle.
In addition to the goal of preservation, the van´s design elements and historical dimension were to be put in proper balance. In this context, a further focus of the thesis lies on the question of how to deal with an over-cleaned surface. What condition has to be classified as over-cleaned within conservation criteria and how does one deal with such a condition? The result of these considerations is the theoretical and practical examination of varnishes for matting a paint surface.

In my contribution I would like to present an excerpt from my master´s thesis. The focus will be on the findings about the alkyd resin paints applied on the lorry. Besides the identification and analysis of a total of seven different topcoats on the Wittler- Brotwagen, I also want to give a brief introduction to the composition and characteristics of alkyd resins.

In the following I will survey the question to what extent war-related economic restrictions in the German paint production affected the choice of coating systems and their optical properties.

During Second World War it seems alkyd paints were perceived by manufacturers as a substitute, despite their technical advantages for automotive coatings over paints based on drying oils or cellulose nitrate. The increasing shortage of suitable resources for the production of adequate alkyd resin based lacquers and the resulting low quality products, reinforced this perception even further. The findings of the historical research directly impacted the approach towards preservation of the exterior surface of the Wittler- Brotwagen. I will conclude to show how the investigation results influenced the practical restoration, and present the applied methods as well as the final results of processing.

Notes:

Preventive conservation of rubber objects – possibilities and prospects. A study included in the project „Antiaging for cultural heritage objects containing elastomers" (2008-2011)[1]

Maxie Tafelski
Filmmuseum Potsdam, Breite Straße 1A, 14467 Potsdam, Germany
e-mail: maxie.tafelski@gmx.de

Keywords: Rubber ageing, degradation , conservation, preventive conservation, storage conditions

Environmental influences such as light, oxygen, ozone, heat and humidity as well as mechanical strain and decomposition by "rubber poisons" are the main causes for rapid ageing, deterioration and complete destruction of rubber. The underlying processes have been discussed previously (Kleemann 1963; Loadman 1993). The deterioration of rubber becomes visible on aged rubber surfaces through characteristic crack formations. This is paralleled with hardening of the material due to cross-linking and/or softening caused by scission of polymer chains and interconnections (Nagdi 2003).

In this project two main questions concerning the long-term storage were examined. The first question focuses on environmental conditions whereas the second question deals with the packaging of objects containing elastomers.

Oxygen is an important degradation factor. In restoration literature oxygen absorbers such as the "Ageless" or "RP-K" systems have been presented (Grieve 2008; Elert 2000; Shashoua 1999; Elert 1997). In these systems objects are sealed into oxygen-proof and gas-tight films together with indicator tablets and oxygen absorbers. Obviously there are more possibilities for the storage of small objects than for large ones and in addition most objects consist of many different materials. Furthermore, there are some technical problems related to these systems. Exemplarily, the quality of the films and their gas proofness over time are only rarely examined, objects cannot be accessed for analysis and research questions and that these preventive concepts are only suitable for smaller objects, such as balloons and bathing caps. Also, it should be kept in mind that absorbers can only reduce the amount of oxygen, but not completely remove it. Nonetheless, the oxidation processes of rubber can be slowed down by such storage. Therefore this relatively simple and practicable system was tested in this project. The storage of rubber in water is a concept that has not been studied in sample series (Loadman 1993: 72). Storage in water is an interesting option for rubber objects that was included into the test series. Of course such a form of storage is not suitable for composite objects and there are many questions and problems that come along. Examples are the risk of microorganism growth, the handling of objects and security questions. On the other hand there are interesting aspects for further investigation: Which components are drawn out of the rubber in the course of time? Is this technique of storage suitable for already degraded material? What could be the best drying method?

For the first main question different rubber samples - new and old pieces - were stored in different environments as oxygen-free storage, oxygen reduced storage, day-light storage, dark storage, water storage, respectively in room temperature

20°C or in cool atmosphere of 7°C in a refrigerator. For each environmental condition a reference material was assigned. After one year the first visual evaluation was undertaken.

The second main question was related to packaging question, which is an important element of preventive conservation, either for transports or long-term storage. The two main problems discussed in literature are the migration of ageing inhibitors from the rubber into plastics like polyethylene and polyvinylchloride and the risk of the rubber surface becoming sticky (Jentzsch 1994: 319; Shashoua 2008: 155, 156). Some material which has been suggested in literature as Teflon tape used for short-term stabilisation (Grieve 2008: 145f) or siliconised paper as an intermediate layer were also included in the test series. Therefore nineteen different and in conservation frequently used packaging materials were tested. They can be classified into five groups: paper, textiles, foam material like “Ethafoam”, different films like “Mylar” and non woven material like “Hollytex” or “Tyvek”.

Over one year the nineteen samples were inspected and any variation were noted once a month. Based on these monitoring study it is possible to conclude some recommendations for suitable packaging materials. The degradation processes described above also lead to the conclusion that when padding out an object, care must be taken to avoid mechanical stress by distension or compression.

[1] This project was supported by the Federal Cultural Foundation as part of the programme „KUR – Programm zur Konservierung und Restaurierung von mobilem Kulturgut“.

References:

Handbuch für die Gummi-Industrie, Bayer AG (ed.). Leverkusen1991.

B. Doležel, Die Beständigkeit von Kunststoffen und Gummi, Carl Hanser Verlag, München Wien 1978.

K. Elert, S. Meakawa, Projekt zur Schädlingsbekämpfung am GCI. Stickstoff und wiederverwendbare Begasungszelte’, Restauro (1997), 4260-4266.

K. Elert, S. Meakawa, 2000. Anwendung von Sauerstoffabsorbern in Museen. Lagerung sauerstoffempfindlicher Materialien, Schädlingsbekämpfung, Restauro (2000), 348-354.

S. Grieve, The Excavation, Conservation, Storage, and Display of Rubber Artifacts Recovered from the USS Monitor (1862), JAIC-Journal of the American Institute for Conservation; 47(2008), 139-148.

J. Jentzsch, Gummi – elastische Materialien aus Natur- und Synthesekautschuk’. Restauro (1994), 314-319.

W. Kleemann, Einführung in die Rezeptentwicklung der Gummiindustrie, VEB Verlag der Grundstoffindustrie, Leipzig 1963

M.J.R. Loadman, Rubber: Its History, Composition and Prospects for Conservation, in Saving the Twentieth Century: The Conservation of modern Materials, 1993

K. Nagdi, Gummiwerkstoffe für Anwender, 3rd edn.: Dr. Gupta Verlag, Ratingen2004

Y. Shashoua, Ageless; From Theory to Practice, 12th Triennial Meeting of ICOM-CC, Lyon, France (1999) vol. II, 881-887.

Notes:

Conserving Plastics from our Past and Present for the Future

Yvonne Shashoua
Senior Conservation Scientist, National Museum of Denmark, Copenhagen, Denmark
e-mail: yvonne.shashoua@natmus.dk

Keywords: conservation, semi-synthetic, synthetic, bioplastics, degradation

Plastics have had a significant influence on industrial, design, domestic and cultural aspects of everyday life in the 20th and 21st centuries and are therefore collected by museums and art galleries. Until the late 1970s, plastics were widely believed to be dream materials that would last forever. Today it is understood that industrial plastics are designed to function for a predetermined period, usually between 1 year (plastic carrier bag) and 30 years (plastic window frames) and also that while some artists intend their works in plastic to be ephemeral, others wish them to last for at least 400 years.

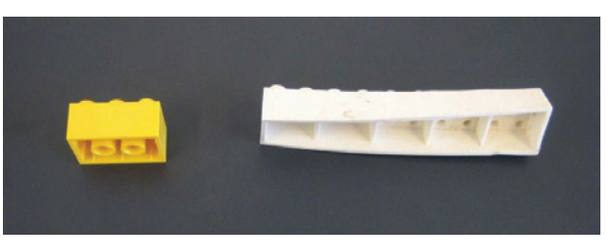


Fig. 1: Lego® bricks were made from cellulose acetate until the 1960s but loss of plasticizer caused them to shrink and distort (right side). Today they are made from more stable ABS plastic (left side)

The challenge for museums is that once objects or artworks are registered in their collections, they have a responsibility to conserve them to prolong their short, inbuilt lifetimes for future generations, at least 50 years. Research into real time degradation pathways in museums indicates that some plastics are less stable than others. These include cellulose nitrate, cellulose acetate, plasticized polyvinyl chloride (PVC) and polyurethane foam. In addition to these traditional plastics, new sustainable bioplastics synthesized from non-oil sources, recycled plastics and biodegradable plastics are being collected by museums in the form of architectural models, design prototypes formed by 3D printing, jewellery and others. Whereas their degradation rates in landfills is established, the first research into their stability in museum environments is being conducted by the author.

Once degradation of plastics is visible, it is also irreversible and can be slowed but not stopped. The rate of degradation for specific plastics can be inhibited by designing tailor-made microclimates for their storage and display based on their major degradation factors. Microclimates can be designed to exclude or minimize exposure to light, heat, oxygen, water and pollutants either separately or in combination. Low temperature storage in a freezer may be a more effective, long term approach.

Fig. 2: A PVC advertising figure by BASF in 1940s is cleaned using a bioplastic hydrogel

Although most condition surveys of plastics in museums conclude that approximately 75% of collections require cleaning because dirt either affects their chemical and physical properties or their significance, such intervening conservation practices are still poorly developed. This may be attributed to the high sensitivity of many plastics, especially when degraded, to organic liquids, aqueous solutions or pure water.

This presentation will discuss the degradation pathways for the plastics most frequently found in museum collections today and the options for conserving them for the future.

Notes:

Water resistance by protein coating of Persian manuscripts

Ruth Keller
Hochschule für Technik und Wirtschaft HTW Berlin, Berlin, Germany
e-mail: ruth.keller@htw-berlin.de

Keywords: paper, biopolymer layer, protein coating, alum, water resistance

Most of the verbal memory of humanity is kept written on organic, i.e. biopolymeric materials, such as papyrus, parchment and paper. There has always been a fear that these written documents could be damaged by fire and water, insects or by moulding and rotting processes. Thus, methods of prevention have been developed in many cultures.

Subject of this presentation will be precautions having been taken by Persian craftsmen to protect their manuscripts. Microscopic observations and some research have been made to try to answer the question of whether the water resistance of the surfaces of some Persian manuscripts in the National Museum of Herat, Afghanistan, results from the use of an early biopolymer as protective coating.

Water stains in historic manuscripts in the Herat collection demonstrate differences in the reaction of paper and writing in the books to water attack. After the primary production process, Islamic paper is generally coated by starch paste or other carbohydrates containing viscous agents. After the paper is polished, it offers a dense surface on which the water soluble ink is written with a reed pen.

This treatment tends to be highly vulnerable to water penetrating into the book. Contrary to that expectation, the ink applied to the polished surface of the manuscript pages in the Herat collection was blurred only in a few of the manuscripts. In quite a few examples, when water even penetrates through the gatherings of the books, spreading very far even to the other end of the closed books; there is mostly no ink rubbing off onto the contact page. These phenomena are unusual. The question thus arises as to what may have made this water resistance possible.

In literature based on the study of historic manuscript, which describes the technological processes of paper and bookmaking in the Islamic cultures, there are some hints to the use of alum in combination e.g. with skimmed milk to make the surface of calligraphy and paper water resistant. The presentation will include analytical and experimental results to show that a protective biopolymer layer of a protein coating in combination with alum is probable.

Notes:

The History of the Use of Plastics in Conservation

Maja Ossig
ProDenkmal GmbH Berlin, Technische Universität Berlin, Germany
e-mail: maja.ossig@gmx.de

Keywords: plastics, conservation, history, technology, industry

The conservation of historic objects is a very young discipline. So far, a comprehensive and uniform scientific theory is lacking. However, a well founded theory is essential for the scientific self understanding of the conservator, and for the recognition of conservation as a scientific discipline. This necessity is also of political relevance, since the profession of the conservator is not uniformly protected by law, and thus neither the working conditions nor the payment are regulated until today.
Due to the enormous heterogeneity of conservation methods, materials, and schools, it is a complex undertaking to formulate one history and theory of conservation. Therefore, it seems more reasonable to look intensively at particular fields of materials, objects, and periods of time.

Plastics are extensively in use in the conservation of all types of objects, especially since the 1950s. They are used in solvents for consolidating, gluing, coating, completing, and retouching, or, in solid state, for mounting, wrapping, and securing. There was a great hope, like popularly in society, that with the help of plastics all sorts of technical problems could be solved.

When looking back in history it becomes clear, that the treatment not always showed the desired result, but in the contrary often damaged the object irreversibly.

Despite advanced research and analysis the consequences for the object are often still incalculable. Therefore, further research in this field is strongly necessary.
First of all it has to be investigated, which industrially produced plastic was used for which purpose within a certain period of time.
A crucial question is why particular plastics were chosen for the use in conservation.
Why are industrial products used at all? Which criteria are valid concerning the choice, the mode of application, and the further development of plastics?
To what extent is there an own approach in the field of conservation – and is it in fact empiric or scientifically methodic?
In order to investigate these issues, an extensive study of sources will be carried out. Sources exist in the form of written evidence such as conservation reports, notes on record cards, papers in journals, and museum databases. Furthermore, interviews will be conducted with conservators who are retired or still actively working. Eventually, the treated object itself will be analyzed to identify the plastic and to characterize the condition of the (aged) product.

The results of this Ph.D. thesis will be put in the context of conservation history, the history of technology, and economic and social history.

Notes:

Bioplastics – driving the evolution of plastics

Constance Ißbrücker

Environmental Affairs Manager of European Bioplastics, Berlin, Germany
e-mail: issbruecker@european-bioplastics.org

Keywords: bioplastics, CO_2 reduction, renewability, resource efficiency, compostability

Bioplastics are biobased, biodegradable/compostable, or both. Around 1.4 million tonnes were produced in 2012 and estimations foresee a growth to about 6 million tonnes in 2017. Every material comprised in this material family – from biobased/non-biodegradable drop-in solutions to newer biobased and compostable materials - is building up capacities. The foremost growth drivers are biobased PET and biobased PE, but also PLA and PHA are gaining.

The presentation will showcase the development of bioplastics throughout the last 20 years – from first biodegradable products for agriculture (mulch film) and packaging to a broad variety of applications in every market where plastics are used. Product examples from the packaging, automotive and fibre industry will be presented. The special properties of the bioplastic materials used discussed. At the end, Constance Ißbrücker will give an outlook where the further evolution of the plastics market will develop – in terms oft he bioplastics branch of the industry.

Fig. 1: Toyota Prius, Yeti Dow Jacket, biowaste bag BASF, bio-PE bottle Pantene.

Notes:

RE-Y-STONE biocomposites – 100% ecological and 100% designed

Gerd Ohlhauser
Design und Produktentwicklung, Sandbergstraße 8, 64285 Darmstadt
e-mail: gerd@ohlhauser.de

Keywords: Resopal, laminate, biolaminate, bagasse resin, RE-Y-STONE, surface

The pioneer for synthetic polymer materials, Resopal - its East German counterpart was called Sprelachart - has been working on the development of a sustainable ecological alternative for several years. With the invention of Resopal (from the Latin resina pallida – pale resin) in 1930, the company originally founded by Hermann Römmler in Spremberg 150 years earlier (1867) and later renamed Resopal successfully modified the first polymer material ever synthesized, a brown-black material known as Bakelite and patented in 1907: a crystal-clear moulding compound which, for the first time, could be dyed in any colour.

Now, Resopal appears to have returned to its origins, albeit at a higher level, with the new RE-Y-STONE, a 100% ecological biocomposite based on bagasse, a residue from sugar production. The brown-black material comparably begs enlightenment. Or has Resopal paradoxically succeeded in creating acceptance for a genuinely ageing material? The prospects are not bad, considering the trend towards the authentic, the used, aged and vintage. However, the two materials could also coexist side by side as complementary forms.

While the Resopal board, which became THE material of the kidney table era in the 1950s, was made of paper webs (core, decor and overlay paper) soaked with phenolic and melamine resins before being compressed under high temperature and pressure, the RE-Y-STONE board is made from 100% recycled paper webs soaked with organic resin. This resin is obtained from bagasse, a residue remaining when sugar juice is pressed from the sugar cane during the production of sugar. Bagasse is a fibrous residue comprising between 40 and 60% cellulose, between 20 and 30% polysaccharides in a mixture occurring in vegetable biomass, and roughly 20% lignin, a substance which gives the plant strength and its woodlike character. Roughly 80 million tons of bagasse are produced globally every year and converted into animal feed, cardboard for packagings and basic chemicals; the macromolecular phenolic component of lignin can be converted into the organic resin mentioned above. As a very rigid and brittle material, lignin has the disadvantage of being brown - indeed, almost dark brown - like Bakelite; due to its isotropic nature, it absorbs UV light almost completely, along with a part of visible light, thus ageing visibly.

The advantage of this resin lies in its more favourable flow properties, which allows it to be compressed in order to produce far deeper surface textures than the classic Resopal. Indeed, the decisive advantage giving laminate board an even greater lead over chipboard with its direct covering of decor paper is its greater moulding depth. Particularly in regard of today's megatrend towards the tactile which has finally superseded the technically smooth.

Like the Resopal board and all other polymer materials, RE-Y-STONE does not have a form of its own, but merely expresses

whatever it is given from outside: the papers used and the form in which it was shaped. RE-Y-STONE is 100% designed. At present, its ecological quality is aesthetically expressed through core papers brown like packing paper or dusted black (with carbon / graphite) and moulded to represent structures found in nature: deeply moulded root fibres with a dry feel, highly viscous resin from trees, trapped air bubbles, leathery parchment, broken stones and many others. Minor differences between individual RE-Y-STONE boards are attributable to the product's natural origin, and are also its ecological hallmark.

In short, RE-Y-STONE is made entirely from recycled and renewable raw materials which are compressed to form a homogeneous, dimensionally stable biocomposite panel with extremely resistant surface. The panel is resistant to abrasion, non-slip, scratch-proof and impact resistant (IC 3) and can therefore even be used for commercial flooring (class 32). It is certified to be emission-free and fit for a healthy living environment; it has been awarded the German Sustainability Award 2012.

Notes:

Green agro-plastic building products with improved fire-resistance

M.Sc. Eng. Hanaa Dahy; Prof. Dr.-Ing. Jan Knippers
ITKE (Institute for Building Structures and Structural Design),
University of Stuttgart, Germany
e-mail: h.dahy@itke.uni-stuttgart.de

Keywords: Bioplastics, Green biocomposites, Agro-plastics, Fire-resistant composites, Eco-architecture

The advantages of applying pure bioplastics' applications in the architectural field are clear when considering the free-form design options, Figure (1), the safe indoor air quality with no VOC (Volatile Organic Compounds) emissions and the safer end-of-life disposal options.

plant residues 'fibres, can be applied as a main component in natural fibre composites, and in this case often referred to as agro-plastics, as here suggested and deployed.
The real potentials of cereal straws are their high contents of ash and silica, which

Thermoformed cellulose-lignin panel. Photo: Dahy, H.

Design of 'stream' panel, that can be thermoformed from green agro-plastic composite plates © Dahy, H.

Fig. 1: Illustration of different architectural options for thermoformed green agroplastic panels

However, applying pure bioplastics in architectural applications suffer from serious drawbacks concerning price and low flammability resistance. Accordingly, it was essential to search for a cheap available eco-filler that can reduce the final product price through filling and replacing the bioplastic and improving its fire-resistant behavior at the same time. This can be achieved through applying the worldwide available straw, which is loaded with natural flame-retardant silica contents, as an eco-filler replacing the expensive and un-healthy flame-retardants, available in the markets. Agro-fibres that refer to the agricultural

are of anti-flammable characteristics that can be well used in building ap- plications. In addition, silica works against rapid biodegradability which can be of much higher potentials when combined with biodegradable polymers, to increase the life time span as well as increasing fire resistance of the end product, that are of high importance in the building sector. In a research work applied at the ITKE-University of Stuttgart-Germany, this is proved and analyzed. In addition, possible product designs of the developed green biocomposites' applications in architecture are illustrated.

Notes:

Biopolymeric Materials: from Past to Present

Günter Lattermann
Deutsche Gesellschaft für Kunststoffgeschichte e.V. dgkg, Bayreuth, Germany
e-mail: guenter.lattermann@uni-bayreuth.de

Keywords: biopolymeric, bioplastics, history

Materials history is not possible without polymers. Early basic material used by mankind was not only inorganic (‘stone age’) but mostly of organic, i.e. biopolymeric origin. Without using it, human life would not have been possible.

Early biopolymeric materials were employed as e.g. protective coats, adhesives, fibres and moulding compositions. Their handling has a long history. Since the late Early Palaeolithic (ca. 220.000 BP), an astonishing knowledge had to be acquired with respect to obtaining, processing, application and trade.

Significant examples for the role of biopolymeric material from the dawn of mankind until the beginning of the industrial age will be presented, such as leather production by early tanning processes, birch pitch adhesive, rubber, protein masses and other biopolymeric materials.

With increasing scientific knowledge, development of the industrial age and its mass production, synthetic polymers i.e. plastics replaced the long standing biopolymeric materials entirely and in such a dominating extent that we can denominate the recent period as ‘Plastics Age’.

Due to the limited resources of fossil burnings (mineral oil and gas), sustainability and environmental reasons, we observe currently a remarkably increasing renaissance of biopolymeric materials in research and application. Comparable to the energy revolution (‘Energiewende’) in Germany we may forecast that we will have a ‘bioplastics transition’.

Therefore, some examples of modern bioplastics used today are presented.

As an introduction to the subsequent panel discussion on ‘Bioplastics – designing with an upcoming material’, short definitions of various terms i.e. natural polymers/ biopolymers, bio-based polymers, half-synthetic plastics, biodegradable plastics, bio-blends, bio-composites etc. will be given.

Notes:

Posters

Fashioning Plastic: Elements in the Future History of Plastic

Tom Fisher
Nottingham Trent University, NG1 4BU Nottingham, United Kingdom
e-mail: tom.fisher@ntu.ac.uk

Keywords: plastics, history of design, consumer culture

This poster builds on research over fifteen years into the contemporary cultural and social dimensions of plastics.

A brief review of the history of design in plastic is presented. This sets up a discussion of the materials' relationship to fashion and to popular culture since the Second World War, which points towards the curious relationship that the materials have to fashion.

While this relationship is dependent on the materials' physical properties, the work presented starts from the premise that physical properties do not alone determine the significance of the materials either to individual consumers or in culture more widely. Consequently, the work discusses the role that the concept of 'plasticity' has as an element in contemporary consumer culture, as well as where this points in terms of plastics' 'future history'. It bases this discussion on evidence from contemporary social media to delineate some of the ways in which plastic as an idea that is part of our collective 'imaginary' both influences contemporary consumption and culture, and is itself being 'fashioned' into new forms.

Notes:

Bringing Competences Together for the Conservation of Plastics

Marisa Pamplona[a], Tim Bechthold[b]
[a] Conservation Science Department, Deutsches Museum, München, Germany
e-mail: m.pamplona@deutsches-museum.de
[b] Conservation Department, Die Neue Sammlung, The International Design Museum Munich, Pinakothek der Moderne, München, Germany
e-mail: bechthold@die-neue-sammlung.de

Keywords: plastics collections, conservation

The challenge of researching and conserving plastics in collections is receiving growing attention since the last 20 years. Examples of efforts to achieve this aim have taken by establishing the ICOM-CC "Modern Materials and Contemporary Art" Working Group in 1996; establishing the condition of plastics in UK museum collections [1], organizing conferences on the degradation, conservation and technology of plastics [e.g. 2,3], organizing courses for conservators [4], running European projects [5] and podium discussions [6]. Shashoua mentioned in 2008 that "fewer than 20 conservators and conservation scientists are full-time specialists in plastics degradation and conservation in Europe" [1].

In Germany there are few museums with full-time specialists dealing with the research and conservation of plastics. At the Rathgen-Forschungslabor – Staatliche Museen zu Berlin there was a project dedicated to the assessment of the conservation state of magnetic tapes in archives [7]. The Conservation Department of Die Neue Sammlung, The International Design Museum Munich joins forces with the Conservation Science Department from the Deutsches Museum. The authors will identify plastics in their collections by means of Attenuated Total Reflectance – Fourier Transform Infrared Spectroscopy (ATR-FT-IR) and establish their condition as suggested by [5]. Results can lead to further steps as: 1) plan/ improve storage conditions by plastic families and their conservation state; b) plan/ improve exhibiting conditions by plastic families and their conservation state. The authors also are developing collaborative research projects to learn more about plastics conservation. Bringing together the competences of Museums' staff (conservators, craftspeople, curators and conservation scientists) is essential to manage collections [8]. Bringing together the competences of colleagues from The International Design Museum Munich and the Deutsches Museum will allow comparing and contrasting their working methods of collecting, managing and preserving plastic artifacts and their technological information.

References:

[1] Y. Shashoua, Conservation of plastics: materials science, degradation and preservation. Butterworth-Heinemann, Amsterdam 2008

[2] T. Bechthold, (ed), FUTURE TALKS 009: The conservation of modern materials in applied arts and design. Papers from the conference held at the Pinakothek der Moderne, Munich 22-23 October 2009. Die Neue Sammlung, The International Design Museum Munich 2009.

[3] B. Keneghan, L. Egan, Plastics: looking at the future and learning from the past. Papers from the conference held at the Victoria and Albert Museum, London, 23-25 May 2007. Victoria and Albert Museum, London 2008.

[4] T. van Oosten, A. Laganà,: Masterclass plastics: Identification, Degradation and Conservation of Plastics

[5] POPART project – the Preservation OfPlastic ARTefacts in museum collections.
URL: http://popart-highlights.mnhn.fr/index.html (accessed in 03.07.2014).

[6] The panel discussion 'Icons in Plastic' took place in January 2014 at the Getty Center. Tom Learner (Head of Science, GCI) talks with leading experts in the field, Thea van Oosten, Tim Bechthold and Roger Griffith; URL:http://www.getty.edu/conservation/publications_resources/public_programs/icons_plastic.html (accessed 03.07.2014).

[7] ILKAR: Current research towards the assessment of the conservation state of magnetic tapes in archives", E. Gómez-Sánchez, M. Mengel,; S. Simon, ICOM-CC 16th Triennial Meeting. In ICOM-CC 16th Triennial Conference Preprints, Lisbon, 19-23 September 2011, J. Bridgland (ed.), 12 p. Lisbon: Critério -Artes Gráficas, Lda.

[8] J. Romanos, A. Russel, A conservation management tool for functional objects. URL: http://www.sciencetech.technomuses.ca/english/whatson/pdf/A%20conservation%20management%20tool%20for%20functional%20objects_pptx.pdf (accessed 03.07.2014).

Notes:

Nanoindentation as an innovative technique to assess the mechanical properties of plastic supports painted by László Moholy-Nagy

Johanna Salvant Plisson, Francesca Casadio, Katherine Faber, Monica Ganio, Marc Walton
NU-ACCESS, Northwestern University/ Art Institute of Chicago, Evanston, IL 60208, USA
e-mail: jsalvant@northwestern.edu, fcasadio@artic.edu, k-faber@northwestern.edu, monica.ganio@northwestern.edu, marc.walton@northwestern.edu

Keywords: mechanical properties, nanoindentation, cellulose nitrate, poly(methyl methacrylate), Moholy-Nagy.

The state of preservation of an artwork is strongly correlated to the mechanical behavior of its constituent materials. How art materials change in the museum environment becoming more brittle, less elastic or less prone to creep is fundamental to assessing the condition of a work of art. Attempts to explore the mechanical properties of art materials are not new as indicated by the many previous studies that have investigated the influence of different parameters such as the type of fillers, aging, temperature, relative humidity and solvents on the mechanical properties of painting materials. However in each of these studies the macroscopic mechanical testing methods utilized, such as tensile stress-strain measurements, required specimens on the order of centimeters - dimensions outside the realm of possibility for sampling real works of art. Therefore only model systems have thus far been studied in depth. This can be problematic as it requires extrapolation over long time scales of the properties of samples that have been naturally aged only for a few decades at most, or use of artificially aged samples that do not accurately represent the conditions of century old works of art. The ability to measure the mechanical properties of microsamples extracted from actual works of art has opened up a wide range of new possibilities. Here we use nanoindentation to investigate the mechanical behavior of art materials with different formulations, manufacturing processes, ages, degradation states and/or environmental conditions with the ultimate aim to define new conservation strategies to reduce future mechanical damage.

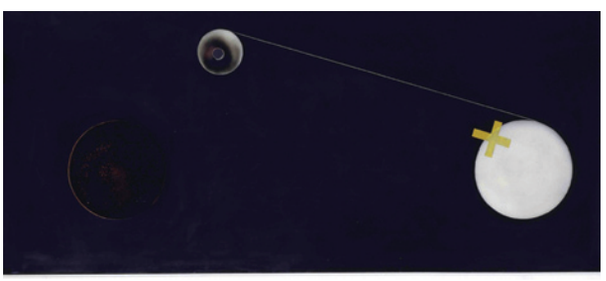


Fig. 1: László Moholy-Nagy, T1, 1926. Oil on cellulose nitrate, 55 1/16 × 24 5/16 inches (139.8 × 61.8 cm). Solomon R. Guggenheim Museum, New York, Solomon R. Guggenheim Founding Collection, By gift 37.354 © 2014 Artists Rights Society (ARS), New York / VG Bild-Kunst, Bonn

This research focuses on both samples from original works of art and vintage plastics objects, as well as comparable commercially available materials. Focusing on plastic supports painted by László Moholy-Nagy (1895-1946), microsamples were prepared as cross-sections and measured by nanoindentation to characterize reduced elastic modulus and hardness. Fourier transform Infrared spectroscopy (FTIR) and scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM-EDX) were performed to characterize the formulation and microstructure of the samples, while ion chromatography was used to estimate the state of degradation of the cellulose nitrate plastics. New industrial plastics

explored by Moholy-Nagy such as poly(methyl methacrylate) and cellulose nitrate demonstrate strong connections between their mechanical responses, formulations and ongoing conservation issues. The variety of benefits and applications that could arise from the innovative use of this technique in the conservation field will be explored and highlighted.

Notes:

Plastic Work of Art - Challenge of our Time: FTIR, Raman, NMR, XRF Analysis of Artworks by T. Kantor, A. Szapocznikow, P. Althamer and M. Bałka

Monika Jadzinska[a], Paweł Parzuchowski[b]
[a] Faculty of Conservation and Restoration of Works of Art, Academy of Fine Arts, Warsaw, Poland
[b] Faculty of Chemistry, Warsaw University of Technology, Warsaw. Poland
e-mail: monika.jadzinska@gmail.com

Keywords: plastics artwork, conservation, instrumental analysis, FTIR, Raman, NMR, XRF

Multiplicity of forms, ideas, tangible and intangible aspects of contemporary artworks force us to take a different approach in taking care of such work of art – detailed research to recognize the material, technique, concept, context; preventive, active conservation, conservation through the documentation (including interviews with artists and their associates), and many others.

The first project dedicated to complex care of the plastic legacy in Poland started in 2012: Innovations and new technologies devoted to the conservation of artworks made of plastic. Sustainability through building a knowledge for identification, research and methodologies of conservation in collections and public space. The aim of the project was to build a body of knowledge on plastics in works of art in Poland on the basis of interdisciplinary research for identification and establishing the methodology of maintenance, preservation and exhibition. The implementation through analytical tests is carried out in the form of case studies of leading Polish artists working with plastics in various periods: Paweł Althamer, Juliusz Antonisz, Mirosław Bałka, Włodzimierz Borowski, Stanisław Dróżdż, Tadeusz Kantor, Edward Krasiński, Zbigniew Libera, Alina Szapocznikow, Leon Tarasewicz, Jan Tarasin, Julita Wójcik, and Krzysztof Zarębski.

The main idea behind the project is to create a kind of “signpost”, taking from a broad recognition and identification of plastics used particularly in works of art in Poland, as well as their maintenance, to identify opportuni ties for their preservation. Identification of the plastic used in particular work of art is fundamental. FTIR, portable ATR-FTIR, RAMAN, NMR and XRF were used in identification of artworks. In addition to spectral analysis for all the objects, VIS, IR and UV photographs, microscopic, chemical and stratigraphic tests were performed. We have examined mannequins for Tadeusz Kantor’s production The Dead Class; both stage dummies and those created specifically for exhibition purposes. Multiple samples of two sets (22 mannequins): the original ones (1975) and the newer ones (1989) were collected. The FTIR spectroscopy revealed that the main construction material of original marionettes was a styrene-butadiene or natural rubber. Besides, polyether based polyurethanes, human hair and cotton-polyester (most probably poly(ethylene terephthalate)) fabrics were applied. In contrary, the newer set of marionettes was constructed of phthalate plasticized poly(vinyl chloride) - PVC. Other materials used for construction were similar to those used in the original set of marionettes. To determine the type of the plasticizer NMR spectroscopy was applied. The spectra confirmed that the plasticizer was dibuthyl phthalate in amount of 1 weight part per 1.6-1.8 weight parts of the polymer. Molecular weight of several samples of PVC varying with color (from colorless to slightly red) were investigated by means of GPC. The Mn varied from 41000 to 44000, the Mw from 89000 to 95000 with the PDI equal 2 to 2.3. No correlation between color of the samples and their molecular weight was found. No glass temperature was detected for investigated samples.

In the case of works by Alina Szapocznikow, we have examined Tors noyé (1968) and Tumours personified (1971). The Tors noyé samples were: two types of foams and colorless resin. In case of Tumour the set of samples consisted of printed paper, polymeric resin, gauze and fibers. Both groups of samples showed no solubility in common solvents. The first sample of Tors noyé (the pillow) was made of polyurethane. In the investigated case the strong absorption band at 1109 cm^{-1} suggests that a polyether based polyurethane was used. The second sample – a foam from inside the neck was most probably a mixture of two types of polymers: as mentioned above polyurethane and a polysiloxane. The spectrum was measured from the whole sample (average composition), so further investigations are necessary to determine, whether the PDMS was located on the outer surface or not. The material of the main body of the sculpture was a styrenic polyester resin. The materials used by Alina Szapocznikow for preparation of Tumour group of sculptures are in general very similar to those used for preparation of Tors noyé. They also showed similarities on DSC thermograms. Both samples showed small endothermic peaks (approx. 10 J/g) at 68°C. The Tumour samples showed a varying concentration of inorganic carbonate salt. Varying concentration of carbonate in different samples suggested that it was present mainly on the outer surface of the sculptures. Paweł Althamer has created his sculptures for years now, and they seem to gain more and more enthusiasm at home and abroad, for example at the Venice Biennial in 2012. Samples of two works Burłacy (2012) and Almech (2011) were obtained. Samples showed no solubility in common solvents. FTIR and Raman spectra revealed that the material of the sculptures was polyethylene. The Raman spectrum also suggested that the polymers contained a rutile filler. DSC thermograms of the samples showed strong endothermic peaks at 110 °C (186 J/g) which can be associated with melting of the crystalline phase of polyethylene. To determine the type of polyethylene, density of the polymer was investigated by means of helium pyknometer. However, due to the small amount of sample results were not reliable. It is clear that density of the samples was lower than 1g/cm3 but further investigations are necessary.

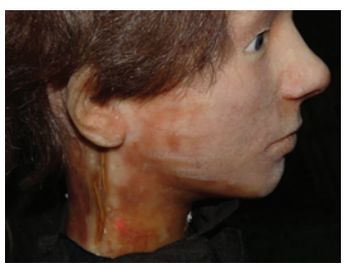


Fig. 1: T.Kantor, Mannequin, fragment, 1989.

Mirosław Bałka's Arbeitsplatz (2011) is a full figure sculpture; through interviews we have obtained very detailed information (confirmed in tests), thanks to which we can determine the method of preservation for the sculpture. Two samples: a resin and a fiber were obtained. Samples showed no solubility in common solvents. FTIR spectra revealed that the material of the sculpture was a polyester type polymer. The spectra taken from both sides of the sample showed high similarity. The polymer was identified as isophthalic polyester resin or unsaturated polyester resin. The fibers showed to be cotton or asbestos. However, due to the contamination of the fiber with the polymer this identification still needs confirmation.

The project: Innovations and new technologies devoted to the conservation of artworks of plastic. Sustainability through building, a knowledge for identification, research and methodologies of conservation in the collections and public space was financed from the resources of the National Center for Science allocated on the basis of decision No DEC-2011/01/B/HS2/1/06182.

Notes:

Is translucency an indicator for audio tapes with cellulose acetate carrier layers?

Simon Kunz, Elena Gómez-Sánchez, Ina Reiche
Rathgen Research Laboratory, National Museums Berlin, Berlin, Germany
e-mail: s.kunz@smb.spk-berlin.de

Keywords: Cellulose acetate, audio tapes, translucency, vinegar syndrome, risk assessment

Cellulose acetate (CA) materials, often found in magnetic tapes used for the storage of sound, are subject to the hydrolysis of the ester groups with concomitant release of acetic acid, hence the name 'vinegar syndrome', as the problem is known in the archival world. The process is triggered by ambient humidity and, once a critical concentration of acetic acid is reached, the reaction proceeds autocatalytically – ultimately rendering the material brittle and the tape unplayable. Since the acetic acid released by a certain tape is potentially able to accelerate the degradation process of a 'healthy' tape stored nearby, the prompt identification of (affected) cellulose acetate tapes is essential in archives.

Tape translucency has been proposed as a sign allowing to distinguish audio tapes with a cellulose acetate (CA) carrier layer among other carrier layers such as polyethylenetherephthalate (PET). It is common knowledge amongst audio technicians and archivists that CA tapes held against a light source appear translucent. To verify this issue, the translucency of several tapes was compared, whose carrier layers were analyzed with Attenuated Total Reflection – Fourier Transformation Infrared Analysis (ATR-FTIR). By comparing the translucent properties of CA and PET tapes it was discovered that this rule of thumb does not always apply. One translucent tape and several slightly translucent tapes were found with a PET carrier layer instead of CA. In order to understand the origin of the translucency, thin-sections of some of the tapes were prepared and compared.

The new working hypothesis is that translucency is not necessarily connected with materials nature, but rather with the thickness of the layers itself. Actually, all investigated thin-sections (5 CA, 1 PET), whether translucent or opaque macroscopically, were translucent under the microscope. Commercially, the trend was to reduce the thickness of carrier layers in order to increase the storage capacity of tapes for a given amount of material. This would explain the opaque appearance of younger materials such as PET, which can be produced in thinner layers, when held against the light.

Furthermore, a particular tape will be presented as a proof that, upon degradation, CA tapes can become opaque. While the outer part of the tape pack appeared to be opaque and showed an increased brittleness, the inner part close to the bobby still remained translucent with no sign of brittleness. This could be verified by preparing thin-sections of samples taken from the tape in which the increasing brittleness from inside to outside could be observed. Even a beginning brittleness seems to reduce translucency; its opacity is therefore a further indicator of the degradation of CA carrier layers.

Notes:

Stickiness in Magnetic Audio Tapes –
An Insidious Form of Decay for Audio Carriers

Katrin Abromeit[a], Elena Gómez-Sánchez[b]
[a] Hochschule für Technik und Wirtschaft HTW Berlin, Germany
e-mail: katrinabromeit@gmx.de
[b] Rathgen-Forschungslabor, Staatliche Museen zu Berlin, Germany
e-mail: e.gomez@smb.spk-berlin.de

Keywords: Audio tapes, polyesterurethane, Sticky Shed Syndrome, conservation, plastics heritage, technical heritage, characterisation

Sticky and decayed binder layers of magnetic tapes are a degradation phenomenon that is prevalently observed for tapes with polyesterurethane (PU-ES) as the incorporated binder material. The stickiness, also known as Sticky Shed Syndrome, is insidious in different aspects. Firstly, it is not visibly detectable before the playback of a tape. In most cases, it becomes audible during playback as a nasty squeal and frequency modulation of the recorded sound. Since playback of a tape affected with these symptoms can result in damage to the tape itself and/or to the playback device, it would be beneficial to be able to detect this phenomenon non-invasively.

Some tape brands and brand types are well-known for their tendency to turn sticky, but gradually more and more types are reported to show stickyness. Restoration practices are actively discussed in the audio community. Those treatment methods are mostly empirical and not well investigated since it is hard to find tapes of the same type and state for systematic, comparable testing. It seems clear, from the empirical information gathered by archivists on the treatment of different tapes, that different formulas may need different treatment conditions. Some tapes react upon heating, others on cooling or cool playback, some do well after resting in a dryer environment, some seem to have no solution for their damage at all. The efficacy of the treatment quite likely depends on the given formula present in the tape, which is a further complication since most of the times, especially regarding tapes from Germany, the tape type is not known.

With the help of Attenuated Total Reflection – Fourier Transform Infrared (ATR-FT-IR) analysis, PU-ES tape binders can be distinguished from other tape binder materials. Recent findings are outlined which show the progress in identifying stickiness with ATR-FTIR.

The poster presents the problem along with a case study of tapes (brand Agfa, type PE 39) from a collection of the Animal Sound Archive of the Natural History Museum Berlin. For the poster session audio samples of affected tapes will be prepared.

Notes:

A pattern roller – consolidation of degraded rubber foam by aerosols

Charlotte Klahold
Drorystraße 2, 12055 Berlin, Germany
e-mail: charlotte.klahold1@gmx.de

Keywords: pattern roll, elastomer, rubber foam, air pressure nebulizer, styrene-ethylen/butylene-styrene *Kraton M 1657*

Pattern roller 341 was produced in the second third of the 20th century and is part of the collection of the *Bayrisches Landesamt für Denkmalpflege Bauarchiv Thierhaupten*.

Fig. 1: Pattern roller 341, second third of the 20th century, collection of the Bayrisches Landesamt für Denkmalpflege, Bauarchiv Thierhaupten.

The pattern roller is composed of organic and inorganic materials: rubber foam, wood and metal. It was used by painters for the mechanical decoration of walls.
The rubber foam on this object is a modification of rubber foam, with closed outer skin. The floral patterns are appliqued to the outer skin. They consist of shapes made of rubber and cellulose sponge.

Due to degradation processes of the cellular rubber, the pattern roller was in a very fragile state of preservation. Parts of the rubber surfaces were already lost. The object couldn't be handled without powdering off.
In preparation for displaying the pattern roll in the Bauarchiv-*Thierhaupten* the object was treated as part of a Bachelor thesis at the *HTW Berlin University of Applied Sciences* that concerned the preservation of the pattern roller with focus on the contact free stabilization of the degraded rubber foam components.
The conservation of the rubber foam included: treatment with antioxidants and antiozonats, consolidation of the foam (with the thermoplastic elastomer *Kraton M 1657* applied with an air pressure nebulizer), surface cleaning, filling cracks in the foam body and the retouching of the fillings.
By the time the conference takes place, the object will have found a place in the *Bauarchiv* in *Thierhaupten*.

Notes:

The rudder of the seaplane Supermarine S6B, S1595, crack closure in a CN-coated fabric

Anne-Kathrin Klatz
Kleinsemmering 51, 8160 Gutenberg an der Raabklamm, Austria

Keywords: seaplane, Science Museum London, cellulose nitrate, restoration, crack closure

The seaplane Supermarine S6B S1595 exhibited at the Science Museum London was constructed in 1931. The textile covering of the rudder is impregnated with dope based on cellulose nitrate and had several cracks before conservation caused by aging and exhibition.

The CN-based impregnation of the fabric was particularly taken into account in the choice of materials and the development of an appropriate crack closure method. As a gentle technique of crack closure a partial doubling was combined with the contraction of the crack rims by a pre fabricated seam. The doubling had the function to distribute forces occurring at points on the surrounding material during contraction of the crack rims.

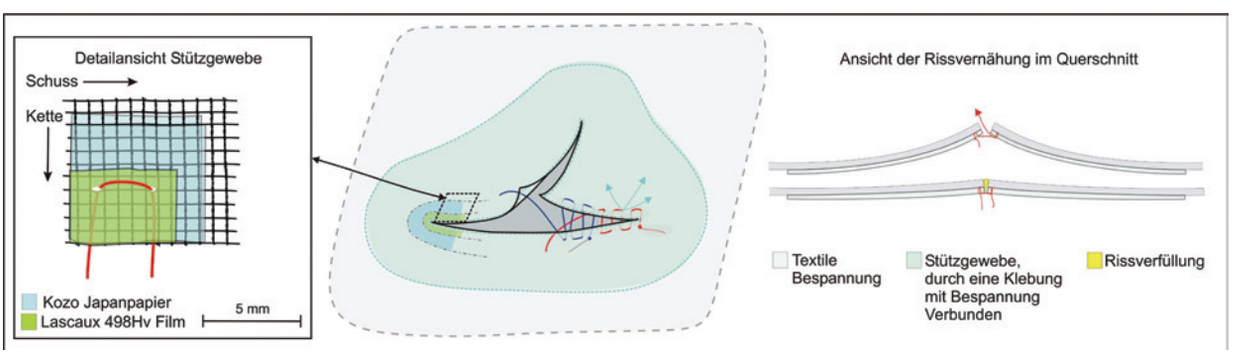


Fig. 1: Sketches on crack closure technique (Klatz 2004)

Notes:

Colophon:
Image source (title page): Responsive Surface Structure, © ICD Institut für Computerbasiertes Entwerfen, Universität Stuttgart
Design titlepage: Katja Lange
Design, editorial staff: Edda Aßel, Patrick Dettling
Print: Universitätsdruckerei Bayreuth
Year of publication: 2014