Forum Kunststoffgeschichte - Abstract Book

Symposium on plastics history, heritage, conservation of and with polymers, collecting, 27 - 29 October 2016, Berlin



Forum Kunststoffgeschichte

27 - 29 October 2016, Berlin

Abstract book





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Preface

The Organising Committee is glad to welcome you cordially to the international conference 'Plastics Heritage' Forum Kunststoffgeschichte 2016 at the University of Applied Science for Technics and Economy, HTW Berlin.

It is the meanwhile 4th conference Forum Kunststoffgeschichte and the 2nd which takes place in Berlin.

'Plastics Heritage' Forum Kunststoffgeschichte 2016 provides an interdisciplinary forum for all aspects of our cultural heritage made of natural and synthetic organic polymeric material, derivatives and their time-honoured precursors, which all are so important but to a large extent still highly underestimated with respect to human cultural history.

Around 100 participants from 15 nations will be present at 24 oral and 9 poster contributions of international experts, which inform on their activities with respect to plastics history, history of plastics in art and design, collecting plastics heritage and its investigation, conservation and restoration. 4 Invited Lectures will give keynotes to different topics.

'Plastics Heritage' Forum Kunststoffgeschichte 2016 brings together people from 15 countries and different 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, stimulating discussions, manifold fruitful personal contacts and finally also a pleasant stay in wonderful and dynamic Berlin.

<u>The Organising Committee:</u> Dr. Dr.h.c. Günter Lattermann, dgkg, Bayreuth, HTW Berlin Prof. Ruth Keller, HTW Berlin

Lisa Graf, HTW Berlin Tatjana Held, Dipl. Rest., KOREGT e.V., Berlin Prof. Dr. Susanne Kähler, HTW Berlin Charlotte Klahold, HTW Berlin Dietmar Linke, Dipl. Rest.,M.A., HTW Berlin Maja Ossig, M.A., HTW Berlin Prof. Jan Vietze, HTW Berlin Anne Wolfrum, HTW Berlin



A = Building A (Deanery, Department 5, study course Modern Materials and Technical Heritage)

B = Building B with Exhibition Hall B 004

G = Building G (registration G 007, conference hall G 002, posters G 008, cantine (Mensa), cafeteria)

Forum Kunststoffgeschichte '16, 27 - 29 October 2016, Berlin, Germanyr

Programme Schedule Thursday, 27 October 2016

08:30 - 09:45 h Registration, Welcome coffee/tea, Hall G007

09:45 – 10:30 h Welcome addresses, Opening, Lecture Hall G002 Ruth Keller, Jan Raue (President VDR), Günter Lattermann

Chair: Günter Lattermann

- 10:30 11:15 h 1st Invited Talk: Plastics and Contempory Art: the Exploration of a New Aesthetic S. G arcia Fernandez-Villa, Universidad Complutense Madrid Madrid, Spain
- 11:15 11:45 h Spree River Side: Group Foto

Hall G 007: Coffee/tea break

Chair: Jan Vietze

- 11:45 12:15 h Collectors's Choice Plastic Objects in the Design Department of the Museum of Applied Arts Cologne Romana Breuer, Museum für Angewandte Kunst Köln Köln, Germany
- 12:15 12:45 h Style forming Plastics The Matrix Design in Form and Ornament Günter Lattermann Bayreuth, Germany
- 12:45 13:45 h Hall G 007/008: Lunch buffet
- 14:00 15:00 h Hall B 004: Vernissage 'Plastic Vanitas' Exhibition of Photo artwork of Mariele Neudecker
- 15:00 15:45 h Hall B 004: Break

Forum Kunststoffgeschichte '16, 27 - 29 October 2016, Berlin, Germany

Programme Schedule Thursday, 27 October 2016

Chair: Ulrich Rüdel

16:00 – 16:45 h 2nd Invited Talk: The Museum of Comb and Plastics Processing Industry in Oyonnax - a Museum dedicated to Art and Industry Virginie Kollman-Caillet, Musée du Peigne et de la Plasturgie Oyonnax, France

16:45 – 17:15 h Examples of the Use of Plastics Objects from University and College Collections in Teaching Hendrik Naumann, Technische Universität Bergakademie Freiberg, Kustodie Freiberg, Germany

17:15 – 17:45 h Plastics at the National Archives, UK: A Survey of Plastic Materials in the Collection and Historical Sources Elke Cwiertnia, National Archives Collection Care Department Richmond, UK

17:45 – 18:15 h Exhibit at all Cost? Christina H. Tengér Armémuseum Stockholm Stockholm, Sweden

Evening Reception, Industriesalon Oberschöneweide

19:00 h

Forum Kunststoffgeschichte '16, 27 - 29 October 2016, Berlin, Germany

Programme Schedule Friday, 28 October 2016

Chair: Marisa Pamplona Bartsch

- 09:00 09:45 h 3rd Invited Talk: Past, Present and Future in Plastics Conservation Thea van Oosten Amsterdam, Netherlands
- 09:45 10:15 h The Triumph of Bakelite Contributions for a History of Plastics in Portugal Maria Elvira Callapez, Centro Interuniversitário de História das Ciências e da Tecnologia Universidade de Lisboa Lissabon, Portugal
- 10:15 10:45 h Phenol Formaldehyde Resins as Insulation in Electric Machines -Technical, Historical and Socio-Economic Aspects Elena Helerea, Beatrice Moaşa, Universitatea Transilvania Departamentul de Inginerie Electrică și Fizică Aplicată Brasov, Romania
- 10.45 11:15 h Hall G 007: Coffee/tea break

Chair: Tatjana Held

- 11:15 11:45 h Performance and Stability of Historic Casein Plastics Jake Kaner, Florin Ioras, Buckinghamshire New University Faculty of Design, Media Management, High Wycombe, UK Jega Ratnasingam, Putra University Malaysia
- 11:45 12:15 h Die Kunststoffschule a Unique Collection. Identification of Plastics and their Ageing Phenomena Susanne Brunner, Technische Universität München Lehrstuhl für Restaurierung, Kunsttechnologie und Konservierungswissenschaft Thorsten Alscher, Bayerische Staatsbibliothek, Institut für Bestandserhaltung und Restaurierung München, Germany

12:15 – 12:45 h Plastic Items - Mass Objects Characterized as a Historical Document Aleksandra Papis, Margrit Bormann, Auschwitz-Birkenau State Museum Conservation Laboratories Oświęcim, Poland

12:45 – 14:00 h Hall G 007: Lunch buffet

Forum Kunststoffgeschichte '16, 27 - 29 October 2016, Berlin, Germany

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Program	mme Schedule	
Friday, 28 October 2016		
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	Chair: Eva Rieß	
14:00 – 14:45 h	A Story about Statics and Stability - The Conservation and Reconstruction of the Majolica Ring at the Staatsbilbiothek zu Berlin, Unter den Linden Maja Ossig, Hochschule für Technik und Wirtschaft HTW Berlin Berlin, Germany	
14:45 – 1 <mark>5:</mark> 15 h	Shaping the Built Environment. The Production of Laminated Boards in the GDR, 1950s - 1980 s. Stefan Poser, Helmut-Schmidt Universität Hamburg Neuere Sozial- Wirtschafts- und Technikgeschichte Hamburg, Germany	
15:15 – 15:45 h	Preserving the Material Culture of Consumer Electronics: Hardware Issues Marisa Pamplona Bartsch, Ulf Hashagen, Deutsches Museum, Restaurierungs-Department Tim Bechthold, Die Neue Sammlung – The International Design Museum Munich	
	Erwin Emmerling, Christina Elsässer, Technische Universität München Lehrstuhl für Restaurierung, Kunsttechnologie und Konservierungswissenschaft Bernhard Rieger, Technische Universität München, Wacker-Lehrstuhl für Makromolekulare Chemie München, Germany	
15:45 – 16:4 <mark>5 h</mark>	Hall G 007: Coffee/tea break	
	Chair: Maja Ossig	
16:45 – 17:15 h	Prediction of the Durability of Plastics in Contemporary Artworks Massimo Lazzari, Universidad de Santiago de Compostela Centre for Research in Biological Chemistry and Molecular Materials CiQUS Santiago de Compostela, Spain	

- 17:15 17:45 h Polymers in conservation of gilded textile Aldona Jędrusik, Academy of Fine Arts and Design Bratislava, Slovakia
- 17:45 18:15 h Nano to Macro: Nanostructured Liquids and Tailored Gels for the surface Cleaning of a Plastic Sculpture at Tate Lora V. Angelova, Bronwyn Ormsby, Gates Sofer, Tate Britain, Conservation Department London, UK

18:15 - 19:30 h Guided visits

19:30 – 21:45 h Hall G 007/008: **Postersession** + "HTW" (Ham, Treats and Wine) **Mandatory attendance for authors at their posters.**

Forum Kunststoffgeschichte '16, 27 - 29 October 2016, Berlin, Germany

Poster Session Friday, 28 October 2016

- 1 Analysis and Conservation of Modern Modeling Materials Found on Auguste Rodin's Sculptures <u>Hélène Bluzat</u>, Agnès Cascio, Guylaine Mary, Paris Nathalie Balcar, Juliette Langlois, Yannick Vandenberghe, Centre de Recherche et de Restauration des Musées de France, Paris Marine Cotte, European Synchrotron Radiation Facility, Grenoble, France
- 2 Studies and Conservation of Venus with Red Nails, Arman's Sculpture in Transparent Mass Casting Resin <u>Hélène Bluzat</u>, Sylvie Ramel, Paris Alain Colombini, Vincent Mercurio, Centre Interrégionale de Conservation et Restauration du Patrimoine, Marseille, France
- 3 "Grigio" by Carla Accardi: Restoration of a Cellulose Acetate Artwork with Alkyd Paints Melissa David, Università di Torino, CCR "La Venaria Reale" Settimo Torinese, Italy
- 4 Graphic Design Realized in an Epoxy Resin Work of Art. Conservation Treatment and Introduction to a Mounting System Natalie Kesik, Berlin, Germany
- 5 Plastic Items Mass Objects Characterized as a Historical Document Aleksandra Papis, Auschwitz-Birkenau State Museum, Conservation Laboratories Oświęcim, Poland
- 6 Polyester Resin Windows <u>Susanne Carp</u>, Norbert Engels, LVR-Amt für Denkmalpflege im Rheinland Pulheim, Germany
- 7 Parylene Coatings Possibilities Conservation as Protection against Anthropogene Environmental Damages Jonas Jückstock. Technische Universität München, Lehrstuhl für Restaurierung, Kunsttechnologie und Konservierungswissenschaft, München, Germany
- 8 Multianalytical Aproach for the Characterization of Polymeric Materials Applied in Cultural Heritage <u>Ruth Chércoles</u>, Margarita San Andrés, Jose Manuel de la Roja, Universidad Complutense Marisa Gomez, Instituto de Patrimonio Cultural de España Spain, Madrid, Spain
- 9 The Indapt-System and the Oil Crisis Alexander Davidson, Hochschule Anhalt Dessau, Germany

Forum Kunststoffgeschichte '16, 27 - 29 October 2016, Berlin, Germany

Programme Schedule Saturday, 29 October 2016

Chair: Susanne Kähler

- 09:00 09:45 h 4th Invited Talk: Early Plastics: Parkesine, Celluloid and Legacy Susan Mossman, Science Museum London, UK
- 09:45 10:15 h The Royal Sparkle of Tortoiseshell Conservation of an Experimental Imitation Material Thijs Janssen, Amsterdam, Netherlands
- 10:15 10:45 h Investigation of White Bloom on PVC Dolls <u>Clara Bratt Lauridsen</u>, Konserveringscentret i Veijle Iola Wøhlk Hansen, Glud Museum Juelsminde, Theis Brock-Nannestad, Jesper Bednix Kemisk Institut, Københavns Universitet, Kim Pilkjær Simonsen, Konservatorenskolen, KADK Denmark
- 10.45 11:15 h Hall G 007: Coffee/tea break

Chair: Ruth Keller

11:15 – 11:4 <mark>5 h</mark>	Image-Boost vs. Greenwashing?
	Communicating the Chances and Challenges of Innovative Bioplastics
	<u>Julia Maria Blesin, Mariam Jaspersen</u> , Hochschule Hannover, Fakultät III
	Abteilung Information und Kommunkation
	Wiebke Möhring, Institut für Journalistik, TU Dortmund
	Germany
11:45 – 12:15 h	The Power of Plastic Flowers
	Kirsten Hardie, Arts University Bournemouth
	Poole, UK
12:15 – 12:30 h	Closing remarks: Ruth Keller, Günter Lattermann
12:30 h	Hall G 007: Farewell coffee/tea
10.151	
12:45 h	Guided visits to historical industrial sites of the former AEG
10:00 h	Hell 2000, data Mambar's Masting (on anapial in itation)
13:30 1	Hall Gooz: ugkg wernber's weeting (on special invitation)

Invited Lectures: Maximum 35 minutes + 10 minutes discussion

Abstracts

Plastics and contemporary art: The exploration of a new aesthetic

Silvia García Fernández-Villa Faculty of Fine Arts, Complutense University, Madrid, Spain E-mail: sgfv@ucm.es

Keywords: Plastics, Contemporary Art, Conservation, Replica, Polymers

As is well known, the 20th century art has been influenced by technological, scientific and industrial advances of its time. Significant developments in the plastics industry and its huge cultural and historical impact have turned plastic into one of the most relevant artistic materials in recent decades. Improved accessibility, low cost, more speed in the artistic process, enhanced properties and new aesthetic qualities are circumstances that have not gone unnoticed by contemporary artists.

The broad artistic use of plastics in 20th century art begins with some of the early Duchamp's ready-mades -which incorporates plastics by chance- and continues with some of the constructivist sculptures by Naum Gabo (1890-1977) or Antoine Pevsner (1886-1962) [fig. 1] and the Bauhaus-influenced artist Charles Biederman (1906-2004), deeply interested in the aesthetic of these new materials.

After World War II (especially, in the 50s and 60s) plastics bursts with his own éclat: at this moment a lot of artists are working with these synthetic materials, specially in the context of the Pop Art [fig. 2], Abstract Expressionism and Minimalism [fig. 3] amongst others. In addition to the aesthetic, these artists explored also the new meaning and concept of the plastic materials, considered as a new mass-media material. In the following decades the artistic use of plastic becomes massive, especially in the field of art installation and the hyperrealist sculpture, as those of Duane Hanson (1925-

1996) and John de Andrea (1941-).

The use of these materials in the field of art presents some conditioning factors, given that they are not originally designed for this purpose, and consequently their useful life time do not exceed several years or decades. In other cases the main problem is the artists lack of knowledge about the polymers use



Fig. 1: Antoine Pevsner: Head, 1923-4 Cellulose Nitrate, 770 x 590 x 920 mm Tate Gallery of Modern Art ©ADAGP





Fig. 2: View of the exhibition Disposables (1967) by Les Levine Courtesy Centre for Contemporary Canadian Art.

Fig. 3: Donald Judd: Untitled (8 March 1965), 1965 Stainless steel and Plexiglas, 50x 121 x 86 cm. © Judd Foundation and characteristics, which leads to a wrong preparation and application and subsequently, the acceleration of their degradation.

Unfortunately, nowadays a lot of contemporary art works made of plastics have significantly modify their original appearance and even some of them have been completely collapsed [fig.4]. This fact raises relevant questions about their potential conservation treatment and in some cases indicate the need of making a authorized replica in order to show to the public its primitive appearance and safeguard its original artistic intention.



Fig. 4: Chemical Breakdown of Model for Construction in Space: Two Cones (1927) by Naum Gabo © Luke Barley

Collector's Choice Plastic objects in the Design-Department of the Museum of Applied Arts Cologne

Romana Breuer Curator at the Museum of Applied Arts Cologne, Cologne, Germany E-mail: romana.breuer@makk.de

Keywords: Museum of Applied Arts Cologne, Collection Winkler, American Industrial Design, Radio casings, Telephone casings

In 2005 Prof. Dr. R. G. Winkler, a German architect, who lives and works also in the USA, donated about 700 pieces of art and design to the Museum of Applied Arts in Cologne. Winkler's collection was a very important enlargement of the Museum's own collection - also in quality. The main focus is on European and North American fine art and design. Among the design objects there is an impressive number of plastic items: mainly chairs, radios, telephones and tableware, but also office supplies, accessories and miscellaneous from the beginning of the twentieth century up to the 1990ies. While the chairs are mainly well known icons of the plastic era from the 1960ies and -70ies - such as Verner Panton's stackable cantilever chair (design 1960), Eero Aarnio's "Pastil Chair" (design 1968) or Luigi Colani's "Zocker" chair for children (design 1971/72) -, especially the radios and telephones are in Europe rare

collectibles. Amazingly, it was Prof. Winkler's passion to get all varieties (in color) of each model. The collection comprises Norman Bel Geddes' famous Emerson radio model 400: the "Patriot" in Red, White, Blue; the "Aristocrat" in Brown with Butterscotch marble effect (design 1940). There are four versions of the legendary RCA Victor "Tuna Boat" casing (design 1946) as well as six versions of an Addison radio (design 1946) and eight versions of the iconic Crosley "Center Bullseye" (design 1951). The lecture will introduce the plastic collection of Prof. Winkler in general. It'll focus on the "golden age of radio" (1930ies to the end of the 1940ies) and the development of telephone casings up to the 1990ies. In addition, some extraordinary items - such as two Catalin cocktail bowls (design 1940ies) or the stackable picnic set "La Bomba" (Helen von Boch and Federigo Fabbrini, design 1970) will be shown.



Fig. 1: Norman Bel Geddes' famous Emerson radio model 400: the "Patriot"

Style forming Plastics - The 'Matrix Design' in Form and Ornament [1]

Günter Lattermann Bayreuth, Germany E-mail: guenter.lattermann@uni-bayreuth.de

Keywords: Design history, Matrix Design, plastics, ribbon, round corner, synthetic resins

In 1993, the architect and pioneering plastics collector Hans-Ulrich Kölsch coined the term 'matrix style' in the attempt to describe "a new style" in the 1920s and 30s, which (translated) "evolved from the construction of moulds for moulding material".[2] Until now, the term 'matrix style' has not really been adopted by design history, though it was used in 1997 and 2002 by Gerda Breuer, referring to Kölsch, describing the plastics design of that time. [3,4] Furthermore, the exhibition "Comparably simple - plastics, technology, architecture", organised by the Bauhaus-University in Weimar, picked out as a central theme the "early plastics design and architecture", the "matrix style", and "Bauhaus without plastics" etc.[5]

We will point to possible reasons for that hidden history of the term 'matrix style'. In consequence, we like to establish a new, related term, i.e. 'Matrix Design'.

The simultaneous development of both the modern industrial product and the plastics design occurred in a time phase, where new challenges had emerged: the increase in population called for simple, more radical solutions to social problems. Mass production, faster transportation of goods and new materials had been available at that time or had to be developed.

Since Leo Hendrik Baekeland's industrial production of Bakelite' in 1909/10, first in

Germany and then in the USA, the new synthetic material found its way to the consumers. In the third decade of the 20th century, in addition to the phenolics, the urea resins with their unlimited chromaticity strongly extended the possible uses and the acceptance and hence the mass distribution in the societies of different countries in Europe and the USA.

Just at the end of the 1920s, both mass production and the emerging industrial product design influenced each other due to economical reasons. In the winter of 1929/30, Germany had been dragged much more strongly than many other countries into the whirlpool of the world economic crisis, originated by the big Wall Street Crash. Thus, the young German plastics industry had been forced to look for new ways of presenting and selling its products, using for the first time on a large scale the effectiveness of design in selling manifold articles, or in terms of today: using product design as a component of marketing.[6] In consequence, from 1929/30 onward, the largest companies of the German plastics industry engaged different artists such as Christian Dell, Ludwig König, Friedrich Adler, Walter Maria Kersting and others. In 1933, most of them were removed by the Nazis from their positions at that time. And their products were only manufactured at the latest until 1939, the end of civil production. After World War II, these pioneers of plastic design and hence of modern industrial product design have been more or less forgotten until our days.

So, in Germany at least as early as 1929 to 1933 the basics of plastics design had to be established in close cooperation with engineers, to construct the complex moulds for the compression moulding process. In the USA, similar activities began four years later in 1933, when the Bakelite Company on her part engaged prominent American designers for the same purpose.

Principles of compression moulding techniques using matrices as form giving elements of objects made of phenolic and urea resins result amongst others in the 'round corner form' and often ribbed but sometimes also fluted ornaments. These principles are termed here as 'Matrix Design'. They were not only embedded in typical architectural forms in Germany since the middle of the 1920s, but had a subsequent strong influence on objects of other material groups during the late 1930s. Worldwide, many artists, often working in early plastics design, transferred the form and ornamental language to non-plastics products. This was done with moulding (matrix using) processes, e.g. pressed glass or cast iron. But the same design language was then also found in wooden objects or in architecture, where moulding/matrix techniques did not play any role.

The here chosen term 'Matrix-Design' seems to be much more causal, illustrative and explanatory than the 'Form around 1930' and ,Technodesign', coined by Selle [7] only with respect to German design history and the misleading "minor or nonfunctional streamlining", used by Van Doren in the USA. [8], all introduced for the same phenomena.

In summary, the short period between the middle of the 1920s until the end of the 1930s were - among other movements – widespread, substantially and internationally characterised by the 'Matrix Design' in form and ornament.

References:

[1] Günter Lattermann, The Matrix Design, e-plastory (2016), No. 1, p. 1-25

[2] Hans-Ulrich Kölsch, Bakelit und Design -Formgebung und frühe Interpreten, in Ulrich Löber (ed.), "Bakelit - Ein Werkstoff mit Zukunft", Begleit-publikation zur gleichnamigen Aus-stellung, Landesmuseum Koblenz, Koblenz 1993, p. 81-93

[3] Gerda Breuer, Design und Material exemplarisch – Einblicke in eine reibungsvolle Allianz, in Gerda Breuer, Kerstin Plüm (eds.), "Stiftung Design-Sammlung Schriefers", Wienand Verlag, Köln 1997, S. 101-118

[4] Gerda Breuer, Der Bauhaus-Drücker, in Ursula Kleefisch-Jobst, Ingbeorg Flagge (eds.), "Architektur zum Anfassen. FSB Greifen und Griffe", Anabas Verlag Günter Kämpf GmbH & Co. KG, Frankfurt am Main 2002, p. 57-68

[5] der bogen, Journal der Bauhaus-Universität Weimar 5 (2002), p. 6

[6] Günter Lattermann, Resopal – Weit mehr als Laminat/ Much more than a laminate, in Romana Schneider, Ingeborg Flagge (eds.), "Original Resopal – Die Ästhetik der Oberfläche/The Aesthetics of Surface", jovis Verlag GmbH, Berlin 2006, p. 10-19

[7] Gert Selle, Geschichte des Design in Deutschland, Campus Verlag GmbH, Frankfurt am Main 2007, p. 182-191

[8] Harold Van Doren, Industrial Design, a practical guide, McGraw-Hill Book Company Inc. New York etc. 1940, 12th edition, p. 139-145

The museum of the comb and the plastic processing industry A museum dedicated to art and industry

Virginie Kollmann-Caillet Curator at Musée du Peigne et de la Plasturgie, Oyonnax, France E-mail: virginie.kollmann-caillet@oyonnax.fr

Keywords: comb, glasses, celluloid, Oyonnax, plastic

Based in the Plastics Valley, in Oyonnax, Ain, at the center of an innovative industry, the Museum of the comb and the plastic processing industry boasts an important collection of 16 000 artistic or industrial items, dating back to 1928.

You will see the history of Oyonnax, from the ancient comb to the plastic industry of tomorrow. Opened in 1977 and renovated in 2011, the museum puts on display a part of its collection, a real testimony of an original industrial activity. It's more than a local industry: it's a national treasure. Today, Oyonnax is the second most populated town of the Ain department, with 23 500 inhabitants.

Yet, at the end of the eighteenth century, there were only 800 inhabitants, chiefly farmers. Winters were cold and harsh, forcing them to find other work. So as a livelihood, they started making wood combs that they sold as hawkers along their way. In the eighteenth century, Diderot and Dalembert, in their Encyclopedia, described the tools and the work of the craftsman who created small usual objects in horn or wood.

Due to important boxwood tree exploitation, the resource started to become scarce. Around 1820, boxwood was replaced by horn. This change gave a new impulsion to the comb production during the nineteenth century. Boxwood and horn were shaped using the same manufacturing processes and the same tools, except for the preparation of horn which must be flattened. This action gave birth to the "flattener" job, the one who flattened the horn. Very early, the inhabitants of the valley took into account the outside world. In the twentieth century, an export trade was set up with European countries and the rest of the world. The biggest comb factories had a showroom: a real exhibition of the most beautiful items with the intention of charming retailers.

During the "Art Nouveau " period, at the beginning of the twentieth century, combs and hairpins were viewed as jewels by artists like Lalique, Vever and Sandoz. In Oyonnax, manufacturers like Auguste Bonaz, Clément Joyard created some masterpieces. Celluloid was discovered due to a material shortage such as for tortoiseshell or ivory. Celluloid, the first artificial material, presented attractive properties, close to natural materials.

In 1920s, the new wave of short hair for women causes a big crisis in the comb industry, urging the Oyonnaxian industrials to diversify their production. Some of them chose to create glasses, which were produced in Morez, gaining the monopoly of glasses production, specialized in metal spectacle frames. The creative mind of the manufacturers enabled the production of thousands of patterns, styles, forms and colors for glasses, from classical to eccentric forms.

At the beginning of the twentieth century, lots of innovations had been tested in the field of art and industry : welcome to the new age of industrial design and mass-production. Design came in France in 1960s. Designers took great pleasure in using synthetic plastic which can be molded with different forms and colors. Chairs, a very common object, especially in our daily life, became an exercise which can't be ignored by designers.

Plastic is seen as a popular cheap material.

Nevertheless, well-known creators use plastic for its qualities and its innovative nature: plastic is used in art, design, fashion design such as Paco Rabanne's dresses or Melissa shoes.

Examples of the use of plastic objects from university and college collections in teaching

Hendrik Naumann

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Keywords: Collections of universities and colleges, use of collections, teaching, museology

During the 250 years of existence of the TU Bergakademie Freiberg more than 40 collections have been originated. The main reason for assembling these collections has been to use them in teaching. In the majority of cases they will not be used in teaching anymore. The curators of the TU Bergakademie take care of most of them. In addition to preserve and show these collections, the curators offer courses to students of industrial archaeology and aim to enable the collections to be used in teaching again. The two semester course "preservation of cultural goods" is based on the courses for restorers at the HTW Berlin.



Fig. 1: "Induktivwegabnehmer", Reg. No. 2011 0008. The polyurethane foam is sticky and corrosive. Should we remove it?

It is an example of a way of using the collections in teaching. It starts with a semester of materials science focussed on the chemical and historical dimension of specific materials like "wood" or "iron", and possibilities to preserve the material that will be introduced and discussed. In the second semester the students get an object made of these materials to record, describe and develop an idea to preserve it. Prior aims of the lessons are to make the students sensible to the issues and needs of conservation and motivate them to act carefully and scheduled with the objects and collections.

The symposium "Plastics Heritage" in October 2014 was an important and fruitful impulse for our course. It encouraged us to focus on objects made of plastic. Many pieces in the collections date from the 20th century. Therefore it is not astonishing that parts of the objects or whole objects belong to this category. The paper includes examples of objects done by students in this course. Finally, I will also show some of our limits to use objects in collections at universities and colleges.



Fig. 1: How can we preserve and use showcases like these?

Plastics at The National Archives, UK: A survey of plastic materials in the collection and historical sources

Elke Cwiertnia Collection Care Department at The National Archives, Richmond, UK E-mail: elke.cwiertnia@nationalarchives.gsi.gov.uk

Keywords: archives, preservation management, survey, history of plastics, UK trade policy

The National Archives holds a fascinating collection of documents which give insight into the history of plastics, including information about raw materials as well as research and development in the production of plastics in the United Kingdom and abroad. However, many of the materials still need to be identified, in order to assess their conditions and store them in appropriate environment to ensure their preservation for generations to come.

The history of the plastics is partly influenced by the political and economic environment such as access to raw materials and prices. The National Archives holds a number of documents which reflect control over these materials, for example during the Second World War. "The necessity for controlling Plastics became apparent in August 1940 through the shortage of methanol which is basic to the production of an important class of moulding powders as the material for formaldehyde production." [BT 131/106] There are various accounts and policies in the records about the import, use and export of various chemicals necessary for the production of plastics, and plastic products themselves in the United Kingdom. This includes documents from the Department of Scientific and Industrial Research. Board of Trade and successors. and the National Economic Development Council and Office. Reports about tests, production (e.g. production plants), patents, exhibitions, production companies as well as plastic designers in Britain and other countries are also accessible.

Another important aspect for the collection is the concern about long time preservation of several plastic materials. During accessioning and cataloguing in the last century, individual materials were not described and therefore information about the kind of material housed in thousands of boxes is very general. A current survey aims to provide an overview about the modern materials in the collection, of which one group is 'plastics'. A methodology was developed to capture the materials in relevant and manageable groups as well as their condition. The approach, methodology and first results of the statistical valid survey will be presented.

The paper will provide an overview of the research opportunities using The National Archives' rich collection and it will highlight the challenges for the collection care department in terms of preservation management.



Exhibit at all cost?

Christina H. Tengnér

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Keywords: Natural rubber, heat re-shaping, polymer adhesives, exhibiting degraded materials

A case study of a highly invasive conservation procedure and an ethical perspective on preserving and displaying natural rubber objects.

Rubber objects are often industrially produced in large series. This is especially true for categories like military and scientific equipment or parts for vehicles. When these categories eventually are acquired by museums the number of individuals is just a fraction of the original amount produced. When the museum wishes to display a rubber object that is in a state of severe deterioration, shape distorted and the material hard and brittle to a degree where it nearly cannot be handled, the discussion about finding the right level of preservation, conservation or even restoration begins. Reshaping and partial reconstruction is in some cases possible but at what cost? When should we leave these objects in deep storage and when do we consider it relevant to be more invasive for the sake of attention

to a specific group or category? Last but not least, what does the decision process that lead to treatment look like and what methods are available?

Case: Conservation of a rubber gas mask from the First World War.

What are the ethical complications of treating an object in a state of severe deterioration that will go on display? Can invasive conservation treatment, or restoration even, be beneficial for the object or a category of objects or is less always more? When dealing with an object made from natural rubber that is deformed and brittle almost beyond handling, what is acceptable for the sake of displaying? Bringing attention to an object by exhibiting it gives positive side effects for preservation practice in general by deeming the object important but in the case of the individual rubber object this is a balancing act where the cost may be losing the object over time.



Fig. 1: Before



Fig. 2: After

For some images of the conservation process, see the short stop motion film on Youtube: https://www.youtube.com/watch?v=-6RiCJljmtw

Past, Present and Future in Plastics Conservation

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Keywords: Plastics conservation, education, plastics workshops, conservation science

One of the issues identified at the conference Modern Art, Who Cares?; a conference devoted to the problems with modern and contemporary art, held in Amsterdam, the Netherlands in 1997, was the lack of education in the conservation of plastics. As a follow-up a five day plastics workshop was planned and implemented at the Netherlands Institute of Cultural Heritage (ICN) in Amsterdam, the Netherlands in 2003. The workshop (in Dutch) aimed to level up the knowledge of conservators by introducing the history, manufacturing, and degradation phenomena of plastics as well as the chemical and physical aspects of polymers.

Other conservation training Institutes and Universities specialised in conservation all around the world have set up curricula dedicated to modern and contemporary art and some of them included plastics conservation.

The first international plastics workshop in English organized by the ICN was held in

England in 2005; since then several workshops have been organized in Australia, America, England, France, Italy, Portugal, Spain and Czech Republic. The Cultural Heritage Agency of the Netherlands (RCE, former ICN) continued holding workshops, but the content evolved from a more theoretical oriented workshop (given by a conservation scientist) to a more practical approach including cleaning, adhering and consolidation of plastics taught by a modern materials conservator and researcher. More and more case studies have been included over the years, reflecting the fact that research into the conservation of plastics in modern and contemporary art and design has increased substantially. Since 2012 the now called Masterclass Plastics is hosted by the University of Amsterdam (UVA) every year in autumn and it is open for conservators from all over the world. This masterclass aims to acquaint conservators, restorers and conservation scientists with the current state of knowledge regarding the identification, degradation, curative and preventive conservation of plastics in cultural heritage.





It can be concluded that the state of the art of teaching plastics conservation has evolved from a more theoretical content (history and manufacturing of plastics) to a more practical composed workshop, due to the increase in practical knowledge on conservation of plastics acquired in the last ten years. However, not everything is solved - the need for knowledge on plastics and its conservation is still there, and ever growing since more and more

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objects are produced with plastics and new manufacturing technologies are introduced. Education into synthetic polymers is nowadays common practice in training programs in the conservation of cultural heritage. Actually, basic plastics materials knowledge should be part of all conservation programs regardless the discipline because plastics are abundantly everywhere in our cultural heritage and plastics production will only keep growing.

The triumph of Bakelite - Contributions for a history of plastics in Portugal

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Keywords: History of Plastics, Conservation of Plastics, Entrepreneurship, Material Culture, Museum of Plastics

This paper aims to present an interdisciplinary project on aspects of the history of plastics in Portugal, by basing itself on technicalscientific, industrial, social-historical studies, as well as studies pertaining to the history of science and technology and material culture.

The project intends to perform a full history of plastics, in order to bring to light : the techno-scientific aspects of plastics (and its communication to the general public); the need to preserve plastic objects; the role of plastics in the development of the industrial design, not just as corporate strategy but also in everyday life; the relationship of the plastic industry with their bodies (local workers and elite) and other industries (electrical and glass); energy and environmental issues related to plastics. We plan to set up a museum, to carry out studies on conservation, historical, technological and scientific research of plastics.

One of the purposes of this project is to study the impact of plastics in the Portuguese society, since its arrival in the mid-1930's, through Bakelite, the first true plastic, in an agricultural country, without chemical research and technology nor an industrial tradition, in contrast with the more advanced industrial nations, where plastic had already assumed its position as an emblem of modernity. Starting with Baquelite Liz, a company located in Leiriacentre of Portugal- that has worked in plastics since 1940, our intent is to carry out tasks such as the surveying and cataloguing of its estate, respective manufacturing methods, in addition to its impact on the social and cultural life of the region, and expand this work to other similar businesses. Leiria will probably be the first place in which this investigation is going to start because it was the birthplace of the plastics manufacturing industry. There is a great possibility to become a space to safeguard the memory of plastic, bearing in mind a decentralized perspective, where a future museum will probably be established.

Phenol Formaldehyde Resins as Insulation in Electrical Machines - Technical, Historical and Socio-Economic Aspects

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Keywords: Phenol Formaldehyde Resin, Baekeland, Romania

In the late nineteenth and early twentieth century, for the electrical industry, the design and the manufacture of electro-insulation systems with advanced characteristics were a necessity, because the natural materials did not meet the requests of higher and higher intensity of thermal and electrical stresses.

The research into electric insulation has been intensified. Many efforts were to obtain electro-insulating materials with high volume and surface resistivity, large breakdown voltage and stability to operation in different environments.

An example is the Romanian physicist Dragomir Hurmuzescu (1865-1954), who developed in 1894, for his electroscope - a precise electric charge measurement instrument - in the frame of his doctoral thesis in Paris, in the laboratory of Gabriel Lippmann, a new material consists of a mixture of paraffin and sulphur - dielectrine, possessing very remarkable insulating properties.

But the material that has revolutionized the market of electro-insulating materials was bakelite, invented in 1907 and patented in 1909 by Leo Baekeland (1863- 1944), which was very quickly assimilated by the plastics manufacturing companies in America and Europe.

Thus, for over 100 years, the phenolformaldehyde resins have remained a pillar for the insulating the electric machines and the lighting equipment – coils protection, sockets, sockets, rigid contacts et al. Nowadays, phenol-formaldehyde lacquers for coating and protection are yet used in the construction of electric machines of small, medium and high power.

This paper deals with an analysis of the main researches undertaken after the Second World War on improving physical and technological characteristics of the lacquers for coating and protection used in the construction of electric machines.

Based on data from archives, new evidences are brought on transfer of technology from Western Europe in Romania regarding the manufacture of plastics reliance on phenolformaldehyde resins. The increasing and decreasing the production of indigenous plastics are motivated by phases of excessive industrialization in Romania and desindustrialization that followed after 1989.

There is highlighted the impact that the improving this category of plastics has had on the efficiency and lifetime of electrical machines, as complex issue of recycling and environmental protection, and as economic and social vector of development.

Performance and stability of historic casein plastics

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Keywords: Casein formaldehyde, Relative humidity, plasticisers, CR Mackintosh, Plastics conservation

This paper examines the material casein formaldehyde, better known in the UK as Erinoid TM and in Germany as Galalith TM that was manufactured in the early part of the twentieth century up until the 1970s in Europe and Japan.

The research is based upon experimentation conducted on the material to improve understanding of its long term performance and stability in heritage objects. As a polymer which does not fit exactly into a definition of thermo plastic or thermo set it is an interesting material that has a certain amount of flexibility, treatment potential and reversibility. The experimental work examines effects of accelerated ageing through a range of RH environments in standard test conditions using a control sample. Historical manufacturing literature is used as reference to establish a possible range of treatments for the reversibility of distorted casein formaldehyde.

Examples of extant heritage objects are examined being currently held in the Victoria and Albert Museum London, the Hunterian Museum Glasgow, the Mackintosh House Northampton and The Brighton Art Gallery and Museum. These artefacts employed casein as a decorative material, in particular as part of the furniture and interior objects designed by the Scottish architect Charles Rennie Mackintosh in the period 1916 to 1921.

Die Kunststoffschule – a Unique Collection Identification of Plastics and their Ageing Phenomena

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Keywords: Plastic samples, FTIR-spectroscopy, reflectance, attenuated total reflectance, degradation of plastics

Literature dealing with FTIR-measurements in the conservation field of plastics concentrates on single materials or practical questions. This work provides on one spot the main plastic groups, their ageing mechanisms, their identification via FTIR spectroscopy and the markers for deterioration in the spectra.

The oldest of the more than 170 samples date back to the 1950s and are taken from a unique collection, Die Kunststoffschule, edited by AG Dt. Kunststoff-Industrie [1,2]. For consistent measurements, samples were taken from the subsequent editions of the Kunststoffschule (1960s), the Probensammlung ZUL Kunststoffkunde (1985) and the Kunststoff-Probensammlung (2004 and 2015) as well as further samples. All samples were photographed and catalogued providing information about texture, colour, signs of FTIR deterioration. date. measurement and plastic species. A database of spectra for naturally aged plastics and polymers of different ages and structures was established using the Bruker Alpha FTIR spectrometer (equipped with either an attenuated total reflectance (ATR, diamond cell) or an external reflectance module (ER)).

Measurements were mainly taken with the ATR unit, if the samples could be clamped taut. Fragile and degraded objects from the Cellulose derivates were measured with the

reflectance module, which barely touches the sample.

The chemical composition of some samples was unknown, but could be identified by comparing their spectra with reference databases [3-5]. The assignment of peaks to their respective molecular unit in a polymer's spectrum was documented and resulted in an elaborate work of reference.

FTIR spectra of the same plastic sort were grouped: Cellulose derivates, phenolic plastic, aminoplast, polyacrylate, polyamide, polyester, polycarbonate, polyethylene, polypropylene, polystyrene, polyurethane, polyvinyl chloride, polytetrafluor ethylene and silicone. Spectra within the groups were compared referring to their ageing. Structural changes in the spectra of differently aged polymers were detected and designed to ageing processes within the chemical structure of the polymers. In some plastic groups prominent markers were found for ageing.

This project gives an overview over FTIR analysis and identification of polymers. Furthermore, the markers, which show significant changes in the signals due to ageing, were detected. This way, detailed records about the most common plastic groups, their chemical composition, their ageing reactions, identification using FTIR and their ageing phenomenas in the spectra were kept.
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Plastic items - mass objects characterized as a historical document

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Keywords: collection, polymers, semi-synthetic plastics, mass objects, everyday items

The collections at the Auschwitz-Birkenau State Museum include mainly property stolen from victims of the extermination site. The items are the last testimony of deportees existence. The collections contain mainly mass objects, often measured in m3 or kilograms, due to their quantity. These are mainly items of everyday usage, such as suitcases, shoes, toiletries (brushes, combs and shaving brushes) and other small pieces like buttons.

The huge majority of plastics in the collections represent those made of polymers developed between the 30s and 40s of the twentieth century, such as semi-synthetic plastics nitrate and cellulose acetate and vulcanized rubber and fiber. These materials are found in different objects, in various combinations. In most cases their state of preservation is bad. This is partially due to their mass production and heavy usage before they were taken from the owners and the varying storage conditions in the camp. It is also a result of the early methods of exhibition and storage, once taken into the museum's care. The initial museum exhibitions displayed the mass objects together, to show the vast scale of death caused at the camp. This exacerbated the deterioration of the preservation state. A good example of typical problems that have to be dealt with is the collection of cellulose nitrate toothbrushes. All stages of polymer degradation can be observed on a group of five thousand toothbrushes. It gradually leads to their disintegration.







Conservation treatment of mass objects of such historical significance requires a different approach, comparing to collections of other characteristics. The main goal is, as always, their preservation. The choice of the best method of treatment demands decision making and results from varied properties of plastics and the fact that their condition can degrade rapidly. It is important to interfere as little as possible with the objects' authenticity. The most desirable result is the 'archival' appearance, understood as that from the time when the camp was operating. Another crucial aspect is the investigation of all the historic layers as well as deformations and structural deterioration of the objects. A compromise has to be reached here between the need of researching object's history and providing its consistency.

Plastics with the components used in the 30s and 40s are no longer produced and the field for research on their deterioration is limited. The problem of preservation of plastic objects is still highly demanding and awaits new solutions.

A Story about Statics and Stability – The Conservation and Reconstruction of the Majolica Ring at the Staatsbibliothek zu Berlin Unter den Linden

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Keywords: conservation, architectural ceramics, epoxy resin, statics, reconstruction

Currently, the Staatsbibliothek Unter den Linden, opened in 1914, is being restored and reconstructed. The huge building consists of several parts, amongst others the vestibule, a dome structure with a headroom of approximately 20 m. After World War II, a suspended ceiling was built into the dome. When the ceiling was withdrawn, the richly decorated roof light became visible. Historic photos show a central, presumably translucent medallion which is now lost. Surrounding the centre, there were 102 majolica elements, forming four rings – 92 of them are still preserved. The architectural ceramics are glazed colourfully and ornamented with fruit and flowers.Despite of the heavy destruction it was decided to restore the majolica ring.

Therefore it was necessary to deconstruct the inner three rings; the outer ring, appr. 4 meters in diameter, was still firmly hold by the historic mortar. Elements that are completely destroyed are being reconstructed by a ceramicist. The main challenge was to find conservation materials and a system of reassembly which met the requirements of the inspecting structural engineer. As a result, a suspending system made from stainless steel wire was designed; for joining the ceramics, epoxy resin and in places stainless steel dowels were used.

Shaping the Built Environment. The Production of Laminated Boards in the GDR, 1950s - 1980s

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Keywords: Plastic history, plastic heritage, technology and society, GDR, laminated boards

Laminated boards shaped the man made environment of the second half of the 20th century to a high degree: they were used for interior decoration of houses and for furniture as well as for the interior of public busses, railway coaches and private cars. A paper layer below a strong transparent layer of the boards enabled the producers to offer their product in various designs and intensive colours. Especially plastics items in orange or red mediated modernity to the users of the mid 1960s until the early 1970s.

Artefacts made from plastics contributed to the development of the post war (more or less) consumer societies. Although the laminated boards in question were made from resins and thus represent an old fashioned route of the production of plastics, they gained an important role in this process and in shaping the environment.

What's about the technological background of this development? Was the technological and economic development influenced or even shaped by the political aim to promote the development of a consumer society? The paper deals with the example of a company in the GDR, which produced laminated boards and moulded plastic compounds. It is named "Sprela-Werke" and situated 150 km in the south-east of Berlin in a small town called Spremberg. The company had been the one of the most important producers of plastic items in the GDR. It still exists today and produces laminated boards in modern design. The paper is based mainly on studying the ancient artefacts of production, the company's multilayer presses, in situ and on research in the German State Archive in Berlin.

In a first part of my paper, I want to give a short summary on the history of the company. The second part will focus on producing laminated board and on the enlargement of the plant in the 1960s in order to produce a greater amount of these boards. In doing so, it will become clear that technological decisions are often determined by circumstances outside of a technological frame. I want to discuss the role of the company's product for the society of the GDR. Laminated boards - and other products made form plastics - might have been more important for the Eastern German society than for their Western counterpart especially from the 1950s until the beginning of the oil crisis in the early 1970s.

Preserving the Material Culture of Consumer Electronics: Hardware Issues

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Keywords: Consumer Electronic Artefacts, production history, preservation strategies

A research project, initiated by the Deutsches Museum, The Design Museum Munich, the Department for Restoration, Art Technology and Conservation Science, TUM and the WACKER Department for Macromolecular Chemistry, TUM was recently submitting to the Leibniz Research Foundation. It aims at deepening our historical understanding and developing strategies for the preservation of Consumer Electronics Artefacts (CEA).



То begin with, historians, curators, conservators, and chemists will collaborate closely in order to increase our understanding of the interplay between materials and design, use and function as well as path dependencies and technological innovations in the development of CEA. A specific focus is to study which resources and technologies were available during a certain period and how the costs and numbers of production influenced the resulting artefacts, particularly its design. The project also aims to examine the inextricably interwoven technological, historical, and cultural contexts of the production and consumption of CEA, based on the in-depth examination of 300 historically remarkable artefacts from 1945 to present day. This will ultimately help curators to better understand and promote values from CEA. In addition, strategies for the preservation of CEA shall be developed after surveying

deteriorated objects in ten international leading museums: the Computer History Museum, the National Museum of American History -Smithsonian Institution, the Science Museum London, the Victoria & Albert Museum, the Conservatoire National des Arts et Métiers, the Technisches Museum Wien, the Norwegian

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Museum of Science and Technology, the Radio Museum Fürth, The Design Museum Munich and the Deutsches Museum. From 1945 till present day a large variety of modern materials were used for the construction of CEA. Which periods of construction, production technology, or constructing elements (e.g. housings, power cables, packaging) are more prone to deterioration? Which material/combination of materials is deteriorating faster? Which degradation mechanisms are affecting more strongly specific material properties? Which treatment. packaging. and conditioning environment can prolong the life-time of CEA in a sustainable way? Which general guidelines can be suggested for the preservation of CEA, and which specific ones have to be developed that consider certain materials or combination of materials? Treatments will be tested on selected case studies, and best practices will be suggested. Finally, results from interdisciplinary research and guidelines for the preservation of CEA will be accessible via an online portal providing best practice solutions to other museums.

Preliminary research in selected consumer electronic artefacts will be presented and discussed.

Prediction of the durability of plastics in contemporary artworks

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Keywords: contemporary art, industrial plastics, polymer ageing, FTIR spectroscopy, sculptures

The interest in issues relating to the durability of modern and contemporary artworks, especially installations, sculptures and other artworks completely or partially realized in mixed materials is rather recent. In fact, only in the last decades have museums, conservators and material scientists focused their efforts on the evaluation of the actual state of conservation and on the study of the degradation of the constituent materials, with the aim of predicting their evolution and producing conservation and management strategies for collections.

In the framework of a comprehensive project aimed to develop a multi-analytical approach for evaluating the degradability of polymeric materials in contemporary works of art, herein we present and discuss the results of our efforts on the evaluation of the actual state of conservation and the prediction of the long term stability of several sculptures of the museum of contemporary art of Santiago de Compostela, considered as examples of critical issues concerning the inappropriate use of industrial polymers.

We applied a recently developed analytical methodology which consists of the following formal steps: compositional analysis of the artworks, with particular attention to components which may have a negative effect on the overall ageing; evaluation of its actual state of conservation; investigation of the accelerated ageing of reference polymer samples, to confirm the hypotheses made in the previous step and to analyse thoroughly processes, mechanisms and the kinetics governing the material degradation; and monitoring of the natural ageing of the artworks. A first systematic visual inspection of the sculptures can both offer a first indication of their constituent composition and often unveils critical situations. In contrast to the case of old artworks where the use of non-destructive analytical techniques is almost compulsory, contemporary works of art and especially sculptures may sometime be investigated by microdestructive techniques. Samples in form of debris could, indeed, be collected from the storage cases of many sculptures, whereas in other cases the materials could be sampled from the artwork, eventually even during its fabrication. As a matter of fact, spectroscopic techniques usually allowed the identification of sculpture components.

As the overall durability of artworks strongly depends on the ageing of critical components, in order to have some indications of the changes occurring in the long term under museum conditions, accelerated ageing tests of reference materials are commonly carried out. On such bases, it was possible to propose a mechanism of deterioration for the critical components. Moreover, as the natural ageing of some plastic components under common display/storage conditions is so fast that is possible to follow it even in few years, it was possible to compare the results of our ageing trials with those resulting from the monitoring of the natural ageing of the artworks in the museum.

Notwithstanding ageing of polymers in sculptures usually consists in an irreversible process of oxidation that turns the restoration practice into a combination of cautious cleaning and preventive conservation, the physical and chemical understanding of the processes behind the deterioration of the specific artworks permitted to developed active conservation

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measures. In particular, a minimization of the exposure to environmental factors which would accelerate oxidation has been planned, avoiding the display in outdoor conditions, limiting the exhibition of the sculptures also in the museum rooms, and providing stable conditions (mainly low temperatures) such as those find in the museum's storehouse.

Polymers in conservation of gilded fabrics

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Keywords: textile, gilding, substrate, polymers, metal

This paper summarises the findings of the study executed on 18th-century chasuble. The study revealed the characteristics of the original gilding technique and previous conservation treatments with polymers. Therefore, it reports the use and ageing of the modern materials applied as adhesives in conservation of gilded fabrics.

Because of their ageing properties, previous treatments were visually and technically separated from the original substrate.

Inpainted areas were slightly darker and more yellow than original parts due to the different colour of metals used and the oxidation of metal particles. Their overall condition was poor although visual unity of the structure was maintained.

The sample was taken from a place which, as shown by UV light, must have been added later and examined under microscope. It was a brittle yellowish-white transparent film/laquer which seemed to be cellulose nitrate film. Therefore, the approaches to confirm or deny this assumption were applied. Unfortunately the sampling of the last identified treatment was impossible to be conducted carefully, respecting the integrity of the work of art.



Fig. 1: An overall view of the gilded chasuble





Fig. 2: Microscopic view on the sample taken from previous treatment. 200x



The last sample could be a great example of a technique developed by conservators for compensating gilt surfaces with the use of synthetic adhesives. However, only pale blue fluorescence in UV light provided supported the idea that the layer of inpainting was indeed an aged synthetic. This substitution of a soft synthetic adhesive for the reactive drying size could insure both ease of application and a degree of reversibility.

On the basis of analysis results several attempts to imitate the technique were

carried out. The objective was to bring to light differences between the materials used for the decoration and therefore reveal the characteristics of gilded surface. All the tests were performed on silk fabrics with various structures. Than the gilding was applied using traditional and modern materials.

The research results show why the modern materials were chosen for the application in order to compensate the losses in original layers.

Nano to Macro: Nanostructured liquids and tailored gels for the surface cleaning of a plastic sculpture at Tate

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Keywords: conservation, surface cleaning, PMMA, microemulsions, gel cleaning

As a part of the Nanorestart project - a multinational, interdisciplinary approach to the development of advanced materials for the conservation of modern and contemporary art - Tate has undertaken the challenge of analysing novel cleaning strategies through three case studies on artworks in our collection. The first detailed investigation is currently being conducted on Op Structure, a plastic sculpture by Michael Dillon created in 1967 from transparent and coloured poly(methyl methacrylate) (PMMA), a.k.a. Perspex[™]. Having completed an extensive review of the scientific and conservation literature on the surface degradation and cleaning of plastic objects, our team has begun preparing mockup PMMA samples to mimic the sculpture to the best approximation. These simulated sculptural elements will be artificially aged and soiled in preparation for detailed cleaning tests to be carried out in late summer and early autumn 2016 by scientists and conservators involved in the project. Our study aims to employ novel microemulsions (nanostructured liquids) and tailored gels with limited residue-deposition risk, both developed by NanoRestArt project leaders CSGI in Florence, Italy, as well as established and other novel conservation cleaning strategies to find the safest and most effective solution to treating Op Structure.

Initial results from the cleaning trials will be presented, highlighting the effects of the different methods on the plastic mock-up samples, both at the surface and bulk levels. Our aim is to employ cleaning systems which have minimal chemical and physical impact on PMMA, whilst removing a wide variety of materials from the surface including soil, degraded paper-tape residues, and adhesive residues. Gloss, surface roughness and scratching, solvent penetration, residue evaluation, and soil- or adhesive-removal ability of a range of cleaning strategies will be offered. Analysis of the material composition of the sculpture and the substances to be removed by the cleaning treatment will also be presented. The timeline of the project dictates the completion of our first case study treatment by the end of 2016; therefore, we will also present our decision on which cleaning strategy has been selected for Op Structure and the process leading to this decision.

The research for this study received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646063.

Early plastics: Parkesine, Celluloid and legacy

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Keywords: Parkesine, Celluloid, semi-synthetic, thermoplastic, conservation

The mid-nineteenth century was a time of active development in new materials, particularly in the area of semi-synthetic plastics. In Britain, Victorian inventors were developing and exploring a range of materials ranging from vulcanised rubber, gutta percha and shellac to what later was to become known as Celluloid.

Although Celluloid is well known as an early semi-synthetic plastic, Parkesine – its direct precursor – is less familiar. The story of the British inventor, Alexander Parkes, and his eponymous material, Parkesine, its development during the mid-nineteenth century and ongoing legacy merits further consideration.

The perception of early plastics as items of value compared to more modern plastics, which are frequently deemed to be cheap and of low worth, is also a matter for reflection and discussion. Parkesine, Celluloid and other early semi-synthetics such as casein are now regarded as among the treasures of plastic collections. Their use in decorative goods such as handbags, hair ornaments and jewellery supports this perception of them as items of value.

London's Science Museum has a collection of plastics which includes an extensive collection of nineteenth century Parkesine as well as significant twentieth century and contemporary plastics. Collecting, preserving and conserving these "precious" early materials and the wide range of later and more modern plastics also present their own challenges to museum curators and conservators. Early cellulosic plastics, in particular those based on cellulose nitrate and cellulose acetate are particularly vulnerable. Preserving them for the long term future may not be possible. However the swift degradability of cellulosic plastics is proving helpful when used in modern applications where a short service life and biodegradability are of value.

The royal sparkle of tortoiseshell. Conservation of an experimental imitation material

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Keywords: early plastics, craquelure, faux tortoiseshell, gelatine, reconstruction

One of the most fascinating pieces from the collection of Royal Palace Het Loo in Apeldoorn, The Netherlands, is a silverware cabinet from the 1840's with a tortoiseshell finish. The finish was in a poor condition: it was dull, cracked, distorted and fragments were missing. Before a treatment method could be devised, extensive research into it's composition, manufacture and material properties was performed.



Fig. 1: The cabinet before conservation

Earlier analysis from the 1990's suggested that the tortoiseshell finish was an imitation made out of casein-formaldehyde. But this material wasn't produced untill around 1900. It also couldn't be horn, because it was soluble in water. The author found one nineteenth century source on the production of faux tortoiseshell with casein and animal glues. Pyrolysis-GCMS analysis of a new sample proved it to be made out of animal glue, which is likely to have been treated with the hardening agent alum. The finish is a precursor of casein-formaldehyde, of which no other examples are known.

A treatment methodology was devised on the basis of an interdisciplinary study of conservation literature and a series of experiments.



Fig.2: Table for casting gelatine plates (Lehner 1883)

First the distorted parts were plasticized and levelled with a mixture of water and ethanol (1:1). After that the finish was consolidated with a mixture of fish and hide glue (1:1). Then the missing fragments were reconstructed with new epoxy casts. And finally the gloss was evened out with wax and a low molecular varnish.



Fig. 3: Reconstruction of the missing finish

Investigation of white bloom on PVC dolls

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Keywords: PVC dolls, storage conditions, migration, stearyl alcohol, stearic acid

This study [1] investigates white bloom found on polyvinyl chloride (PVC) dolls stored in The Shared Facility of the Centre for Preservation of Cultural Heritage in Vejle, Denmark. The facility of 5.500 m2 provides storage for several museums and archives and is based on passive climate control with low temperatures and a stable RH during the year. In 2014 Glud museum found that a great part of their collection of PVC DanDolls were partly covered by a white waxy material on their plastic parts. The dolls had been stored in the facility for about 10 years and the bloom was not present on the dolls before storage. Three other PVC dolls from Vejle Museum are covered by huge, spectacular white crystals. In contrast to the DanDolls the storage history of these dolls is not known, since they were handed over to the facility only after the bloom was discovered.

The findings of different blooming phenomena on PVC dolls raises important questions such as: Is the bloom due to degradation of the PVC compound? Is it possible to remove the bloom without causing or promoting degradation? Are the dolls dangerous to handle? And important concerning the DanDolls: Is the low temperature storage in the facility causing the bloom?





To answer these questions, the material composition of the dolls and the bloom was investigated by FTIR (Fourier Transform Infrared Spectroscopy) and GC-MS (Gas chromatography-mass spectrometry) which showed stearyl alcohol bloom on the DanDolls and stearic acid on the other dolls. Both substances are used in minor quantities as lubricants in PVC compounds [2]. Exposing

the DanDolls for varying temperatures indeed showed a dependence between the temperature and the bloom. Thus the bloom was reabsorbed into the dolls at room-temperature and reemerging at storage temperatures. It is proposed that the low temperatures decrease the compatibility between the stearyl alcohol and the PVC compound thereby promoting the bloom.

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Image-Boost vs. Greenwashing? Communicating the Chances and Challenges of innovative Bioplastics

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Keywords: bioplastics, plastics communication, perceived image, public discourse, stakeholder communication

»I sometimes think that there is a malign force loose in the universe that is the social equivalent of cancer, and it's plastic.« [1] Over thirty years ago Norman Mailer (1983) criticized modern society's fixation on the material in question with these words. In the fifties plastic had been celebrated as a revolutionary new material that would replace all others, but by the seventies this petro-based substance had already begun to receive a negative image due to the ongoing public discussion of related environmental issues. Increasing indications of health problems linked to the use of plastic further compounded the image loss. [2]

At the same time, however, demand for this inexpensive, extremely versatile synthetic material remains high – roughly 300 million tons of plastic are produced each year – while the fossil-based resources used to manufacture plastic continue to disappear at an alarming rate. For this reason bioplastics would appear to present a twofold solution: They are based on renewable resources, and they are also associated with positively perceived attributes such as biodegradability and environmental consciousness due to their organic origin.

But are bioplastics really able to overcome the negative image and drawbacks associated with petro-based plastics? Analysis of media coverage and information found on the Internet shows widely varying evaluations of bioplastics from different stakeholders such as the bioplastics industry, scientific and political actors, environmental NGOs and the waste management industry. [3,4]

Image-Boost versus Greenwashing? The proposed lecture intends to discuss (various) aspects of communicating the chances and challenges of bioplastic to the public.

The findings will be based on the analysis of qualitative research models such as literature reviews, focus groups and guided interviews as well as a representative online survey of the public's associations and attitudes towards bioplastics. First results already indicate that not only professional stakeholders discuss bioplastics from different perspectives; focus groups made up of consumers reveal skeptical views on topics related to bioplastics such as land use and genetic engineering as well as a general lack of knowledge about bioplastics. The submitted abstract is derived from two research projects at the Hochschule Hannover which are funded by BMBF and BMEL. [5,6] These projects are currently surveying the public perception of bioplastics as well as the input into the public discourse and specific product communication patterns exhibited by bioplastics stakeholders.

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[5] Neue" Wege, Strategien, Geschäfts- und Kommunikationsmodelle für Biokunststoffe als Baustein einer Nachhaltigen Wirtschaft (BiNa)

[6] Forschernachwuchsgruppe "Systematische Identifizierung sowie praktische Umsetzung von Synergien im Bereich der Biopolymere, Biopolymerfasern und Verbundwerkstoffe"

The Power of the Plastic Flowers

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Keywords: fake / faux, collecting, taste, value, kitsch

This paper considers plastic flowers: their evolution, form and function and their status and value across time and across different countries and cultures. It questions their inherent worth and their social and cultural value and considers why their enduring and ubiquitous existence draws both delight and scorn from audiences/consumers.

In particular, the study considers why plastic flowers are collected; why they are proudly displayed and cherished by various people and companies. For example the purchase of plastic flowers by individual collectors and celebrities is considered in relation to the use of plastic flowers by hotels, florists and town councils. The discussion explores why plastic flowers may bloom within private and public spaces and at key events and considers what particular functions these plastic objects serve. Importantly the paper explores why plastic flowers are not readily showcased in museum collections and why their histories appear to be so elusive. In this way the paper presents an important documentation, evaluation and re-evaluation of the plastic flower as an important historical and contemporary object that deserves balanced scrutiny.

The paper examines the design of plastic flowers and considers their evolution within the wider fake/faux flower market. Historical examples (and the manufacturing processes) of plastic flowers are compared with contemporary examples to provide consideration of the complexities of the designs and the changing plastic materials and contexts that have created diverse and colourful objects that are appealing to some.



Fig. 1: Plastic rose, date unknown, Image: Hardie, 2015



Fig. 2: Phuang maalai (flower garland), Thailand, 2015, Image: Hardie, 2015



Fig. 3: Plastic rose candle holder centrepiece, date and manufacturer unknown, Image: Hardie, 2015



Fig. 4: Artificial orchds, c. 2015 manufacturer unknown, Image: Hardie, 2015

The paper considers the plastic flower, and in particular the plastic red rose, in relation to the concept of kitsch [1,2,3,4]. The paper's findings, informed by the author's empirical research and her extensive plastic flowers collection, reveal that whilst opinions vary regarding the aesthetic value of plastic flowers, the flowers' use and appeal remain diverse and wide ranging.... and occasionally plastic flowers' design and presence can be particularly surprising.

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Posters

Analysis and conservation of modern modeling materials found on Auguste Rodin's sculptures

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Keywords: Rodin, Sculpture conservation, Modern modeling material (MMMs), Plastiline, Laser cleaning

Prior to the exhibition Portrait-making, Rodin and his models, the Rodin museum wanted to restore two busts of Hanako and Clemenceau. These works of art, which Rodin probably considered as models, offer great insight into the creative process of the sculptor and the quite personal techniques Rodin could sometimes use. Interestingly, these two sculptures contain pieces of modern modeling materials (MMMs) invented at the end of the nineteenth century as alternative to clay or waxes. The very poor condition of the two portraits made any handling and exhibition impossible. Accordingly, the purpose of this poster is twofold: to contribute to technical art history and conservation. Elemental and chemical analyses were done on samples

from 12 sculptures (SEM-EDS, FTIR, GC-MS, GC-FID, XRD, synchrotron-based µXRF, µXANES and µFTIR), aimed at identifying the composition of MMMs used by Rodin on plaster sculptures and establishing hypotheses about the origins of their degradation. This thorough study of their composition and degradation was necessary to implement an appropriate restoration plan. The development of conservation protocols adapted to such materials is rarely documented. Different tests were performed on mock-ups (pH, solubility, adhesion, consolidation and cleaning). In particular, a protocol based on laser cleaning was developed and successfully applied to remove the superficial dust and crust so that the sculptures regained their original aspect.



Fig. 1: Hanako (S.02242, Musée Rodin, height: 53.5cm, length: 41.6cm, width: 37.9cm) A) Before conservation; B) Detail showing finger print and alterations of modeling material in form of hard and rough black crust; C) After conservation.



Fig. 2: Clemenceau, bust (S.01982, Musée Rodin, height: 50cm, length: 34cm, width: 32cm) A) Before conservation; B) Detail showing cracks and dirty surface of modeling material; C) After conservation.

Studies and conservation of Venus with Red Nails (Vénus aux Ongles Rouge), Arman's sculpture in transparent mass casting resin

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Keywords: Sculpture conservation, Research, Transparent mass casting resin, Polyester, Epoxy

Venus with Red Nails (Venus aux Ongles Rouge) is the work of "Nouveaux Réalistes" sculptor Arman (French movement close to Pop Art) back in 1967. The sculpture is an accumulation of red nailed taylor's dummy hands embedded in a transparent resin made feminine torso. It is one of Nice's Modern & Contemporary Art Museum (aka MAMAC) highlights. preserve and display this endangered piece of art, led to a joint study and conservation project between two art conservators specialised in contemporary sculptures and CICRP (Centre interégional de Conservation et Restauration du Patrimoine).



Fig. 1: Venus with Red Nails (Vénus aux ongles rouges)

Sadly, many cracks running through the resin meant its structural integrity was too compromised to allow Venus to be displayed to the public. Nice's MAMAC willingness to



Fig. 2: Typical damages

The main objective was to assure this sculpture's structural integrity. This extremely delicate and almost irreversible consolidation process demands specialised knowhow of this compound and strict adherence to the conservation protocol. The preliminary study's first phase enabled to analyse the materials used to shape the Venus and understand how they were degrading with time. In a second phase, the conservation protocol has been established based on experiments, especially with regards to the type of resin to be used and then injected in the many cracks of the torso. In the process, a replica of the Venus with Red Nails has been made.

The illustrations here-below will help you to follow this unprecedented conservation process, step by step.

Fig. 3: Scientific imaging (UV, Radiography X)

Talyester		Epuny		V enus	Polyester
		UV 170h		sample	LV 120b
325 Degraded Venus sample	425	515 515 Epoxy	NT-SECTOR		\$92

Fig. 4: Vickers values, comparative results between unaged and UV artificially aged polyester and epoxy resin (Arman sculpture samples)

"Grigio" by Carla Accardi: restoration of a cellulose acetate artwork with alkyd paints

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Keywords: restoration, cellulose acetate, alkyd, acrylic adhesive, Accardi

The topic of this study is the restoration of the contemporary artwork "Grigio" (1975), by Italian abstract artist Carla Accardi.

The artwork belongs to a phase of Accardi's artistic journey in which she used to paint on clear, transparent sheets of cellulose acetate, produced by the Italian company Mazzucchelli and sold under the brand name "Sicofoil". The plastic foils were then stretched and stapled on a wooden frame, with the painted side on the verso. The conservation of this kind of transparent works of art presents several difficulties, especially concerning adhesion of paint layers, consolidation and color retouching. Any form of intervention on the work is in fact easily visible and unaesthetic.

Initially the thesis work has been devoted to the survey of the art piece with the aim of obtaining complete knowledge of its history, technique and state of conservation. Multi-spectral (UV, VIS-transillumination) and spectroscopic analyses (FTIR, XRF) have been carried out in order to characterize the constituent materials and define the conservative action.

Restoration materials and methodologies have been selected on the base of experimental work made on mock-ups and subsequent tests on the artwork.

Particular focus was given to the restoration of the acetate structural continuity, which was compromised by several cuts and fractures due to shrinking of the acetate, mechanical stress caused by the stretching and incorrect handling.

Other conservative problems involved the cleaning of the acetate, the adhesion of flaking paint and colour retouching as well as the design of a new system to correctly stretching the acetate sheets on the wooden frame.



Fig. 1: "Grigio" by Carla Accardi (1975) - Front of the artwork

Graphic design realized in an epoxy resin work of art. Conservation treatment and introduction to a mounting system.

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Keywords: epoxy resin, mural, mounting system, cleaning method, Duroplast reforming

Detalj fra Kosmos was designed as a graphic work of art, realized with the help of threedimensional structures. Constructed on the basis of an aluminium honeycomb plate, each womb filled with coloured epoxy resin, a pixel like or mosaic structure of a certain fragment of space is interpreted by the artist.

The intention was to create a flat mural, transferring depth with the material immanent characteristics of a highly glossy finish in variation of the individual colouring of the patterns.

For manufacturing the plates, the aluminium honeycomb plates were attached to a special built light table. Here, design and colour of the plates have been chosen with the help of an underlying drawing on transparent paper. Above the paper, a polyurethane foil was strapped to avoid resin spills during curing of the wombs. Finally the wombs could be filled with the epoxy resin from the later background of the plate. Naturally the foil stayed fixed to the cured epoxy resin which didn't seem to disturb the glossy effect of the surface in the first place.

In the course over the years, until October 2015, the foil started to turn brittle and peel off locally from the epoxy surface. This phenomena though gave first impressions of the actual brilliance of the surface, which appeared underneath the aged foil.

Another aspect on the condition of the plates gave reason for a conservation treatment. Installed without any backing support, the rather instable plates disformed in dimension due to current climate conditions. The whole work is installed on the inner side of an outside wall. This wall is build up by concrete slabs, the joints being sealed by a rubber like mixture. The construction allowed a certain draft and climate instabilities on the inside of the wall, affecting dimensional differencies in the structure of the plates. In order to close the resulting gaps on the edges of the single plates, a common and fast hardening product was chosen for sealeage.



Fig. 1: Detalj fra Kosmos by John Nordhuus at the Oslo kommune kulturetaten

Additionally, to increase the brightness of the plates, the plates were cleaned from time to time with household products, which residues could still be seen on the surface as traces of smears. Since the work is hanging in the canteen of a school, it was also discovered as a "communication board" for the students, resulting in minor mechanical damage. This conglomerate of 35 years of treatment and hanging history led to a disturbing appearence of the image. The intention of the work was interrupted by these many facts of discontinuities.

After consultation and discussion with the involved restorers from the Kulturetaten Oslo, it was decided to remove the brittle foil and all disturbing residues from later reparations and to deal with the disformed plates.

Solvent testing on the surface gave no sufficient result when using common solvents known in restoration practice. In order to find the adequate solvent for removing the foil without effecting the epoxy resin, samples were taken of certain areas of the whole surface package. FTIR as the chosen analyzing method, identified the foil, the upmost layer, as a polyurethane material.

The use of DMSO alone or as a part of a solvent mixture, could be recommended as treatment. Several mixtures were then tested, since DMSO alone seemed to cause

superficial swelling on the epoxy resin. It was soon clear to use the advantages of a gel, in order to lengthen penetration time and the high extraction rate of the foil into the gel system during drying. The slightly dried gel could nearly be stripped off the surface after covering the gel for 20 minutes. This cleaning method was possible due to the very flat and nearly even surface, allowing to handle with larger areas on the plate.

Missing inlays in the wombs were replaced in epoxy resin according to the surrounding colouring of the wombs. The inlays were then levelled and the whole plate was treated with a slight polishing finish in order to diminish all dried up residues from cleaning and other soilings, which couldn't be removed by the gel. For the disformation of a number of plates reforming methods with Infrared treatment was tested (this is a forthcoming information). All plates were provided with a backing of honeycomb carton to stabilize the single plates from further movements due to climate fluctuations. Additionally a subconstruction was designed for hanging the work of art for proper ventilation on the backside.

As a result of these supporting methods such as backing and subconstruction, the work is aproxiamately 4,5 cm thicker than before. The visible edges will be closed by a circumferential aluminium profile.

Plastic items - mass objects characterized as a historical document – problems in their storage.

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Keywords: collection, polymers, semi-synthetic plastics, mass objects, everyday items

The mass objects composed from nitrate and acetate cellulose, rubber, fiber and other semi syntetic materials

Suitcases, shoes, toothbrushes - changes to the storage way

Aims:

- slowing down degradation processes
- to improve the storage conditions
- preparation of exhibition facilities
- easy to control preventive care

The storage problems of mass objects:

- a large number of objects
- bad state of preservation
- ensuring proper storage conditions
- the ability to quickly monitor objects and easy
- to control preventive care
- cost reduction

Action taken:

- individual treatment facilities
- selection and segregation
- choice of packaging
- changes in the infrastructure






Notes:

Polyester resin windows Christi Auferstehung (Köln) and Viktoriabad (Bonn)

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Keywords: Christi Auferstehung, Köln, Viktoriabad, Bonn, polyester resin, windows

Between 1968 and 1970 the architect Gottfried Böhm developed the outstanding windows of his church Christi Auferstehung in Köln.

These windows are made from polyester resin panels. Developed by Gottfried Böhm and made by Botz&Miesen in Köln. The design of the windows result of an intensive red colour, embedded nails and little objects. The windows consist in two panels.

The windows are in relativ stable condition, but the fact that they are in contact with light, temperature fluctuations and humidity has caused visible damages. On the surface of the windows, due to aging and embrittlement, is a fine craquele, so that the window appears opaque. Another damage is probably caused by the heating just below and the stress caused by termal expansion. Here are fractures which start from floor to half of the window. Humidity has already penetrated and caused corrosion of the nails.

Until now there has been made a monitoring of the damage and a study of the material. Further steps should be an emprovement of the protecting glass from the outside. with an IR – and UV protection.



Another example of windows made from polester resin is the big window of a public swimming pool in Bonn, the Viktoriabad. Build in the 1960's the window was designed by a employee from Gottfried Böhm, Wilhelm Jungherz, and made by the same studio Botz&Miesen as the windows of Christi Auferstehung. The window has the impressive dimension of 30x8 meters, divided into 296 single panels and an aluminium framework.

The window has been made in several layers of polyester, but it is much thicker than the windos in Köln and reinforced by fibreglass mats.

The design – called "Geysirlandschaft mit roter Sonne" – is made by different colors, embedded between two layers of polyester.

The material is rather yellowing on the external part and also bulging. On the surface a fine craquele is visible and the window appears opaque.

Because the public swimming pool is already closed and eventually shall be demolished, it has to be found a new location for the window. Another example of windows made from polester resin is the big window of a public swimming pool in Bonn, the Viktoriabad. Build in the 1960's the window was designed by a employee from Gottfried Böhm, Wilhelm Jungherz, and made by the same studio Botz&Miesen as the windows of Christi Auferstehung. The window has the impressive dimension of 30x8 meters, divided into 296 single panels and an aluminium framework.

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Parylene Coatings - Possibilities Conservation as Protection against Anthropogene Environmental Damages

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Keywords: Parylene Coatings, vapor deposition process,

Materials of the last 150 years, like pictureand sound carriers as well as polymers, who are decomposing or whose sensitive layers suffer mechanical damage are endangered by direct harm due to the rapid technological development since the beginning of the industrial age to the digital age. Airy pollutants like ozone, nitrous gases and sulphur oxides etc. but as well aggressive dust, harmful UVradiation, fluctuations in temperature and relative humidity jeopardize such objects acutely. Profound damages on works of art are the consequence. Keeping those fundamental problems in mind, parylene coatings are methodological and materially based examined. Id est countering by securing matter in a restoring meaning as well as preserving and conserving such from further environmental damages. The work investigates if and how parylene coatings are capable to protect art from those harmful factors and how to preserve them. Further it will be examined how parylene coatings work for consolidation.

Own preliminary studies on that topic showed that parylene coatings have the potential to solve some very tricky problems occurring in conservation and restoration.

Especially in fields which exclude preventive measures to conserve or in fields where such solutions are not financeable, parylene coatings pose a fortunate and sustainable solution to protect the artefacts. The needed high professional expertise is justified by the exceptional results of the method, whose are currently a unique characteristic in conservation in Europe.

Parylene coatings are polymer coatings which are applied at room temperature under low vacuum. Starting products are granules of the polymer [2.2]Paracylcophan. This polymer is introduced in a machine, that was designed for this particular process, it is vaporized and pyrolized. Radical monomers are formed by thermal cleavage and as soon as they



Fig. 1: Unterschiede beim Kantenverlauf einer Lackierung (oben) und einer Parylenbeschichtung (unten). aus: Mertz, Klaus: Vakuum mit Vorteilen, in: Magazin für Oberflächentechnik, Jahrg. 57, Heft 7/8, München 2003, S.36

cool down to room temperature they are polymerized to a linear ultrathin polymer film. Skipping the liquid phase during condensation a firm film is formed. Parylene is not harmful for its user and proves to be inert, meaning it does not react with the coated surfaces. A prior or post-treatment is not necessary. By using the vapor deposition a conformal layer is applied without contact or the use of solvents. Thus the thickness of the layer is conformal too particularly objects that are sensitive to

Notes:

solvents can be conserved and consolidated. (s. graphic 1).

Content of the presentation will be the development and history of parylenes that are a curiosity amongst polymers. Further the vapor deposition process will explained including a presentation of coated samples. An open end of the presentation by a round of questions including discussion the technical, conservational and ethical topics offers interaction to the auditory.

Multianalytical aproach for the characterization of polymeric materials applied in Cultural Heritage.

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Keywords: characterization, physical and chemical properties, microscopical analysis, mechanical and thermal tests, artificial accelerated aging process, ATR-FTIR, Pyr-GC-MS, SEM-SE, OM, DSC, SEC

Polymeric materials have experimented a great evolution in the last decades due to the growing investigations around synthesis of new materials and the progress made in technologies related to its manufacturing. Those circumstances have led to the outcome of a wide range of products that show a great potential in several sectors: packaging (food and pharmaceutical industry, and chemical products), building, design, shoemaking, textil and, of course, in the Artworks Field. In the Artworks Field polymers can be used for the artistic production itself (painting, sculpture, installations, etc.), for preventive conservation or in restoration treatments. In relation with its use in preventive conservation, they are regularly used in the ambit of manipulation,

exhibition, storage, to fit the materials for packaging and transport, support, isolation and protection systems as well. For the restoration treatments, they are typically used as adhesives, consolidants, coatings and supports. However, at the beginning, these materials have not been developed for a specific use in the field of the Conservation and Restoration of Cultural Heritage but for industrial uses. For these reason is necessary to perform a previous assessment in order to understand the composition, properties and long term behavior of these polymers to be able to determine a set of recommendations for its use and establish the compatibility of the material with the work of art.

This paper presents the experimental



methodology used in our research group for the study of polymeric materials used in conservation and restoration. The most appropriate techniques are given to determine the physical and chemical properties of the materials as well as physical and chemical modifications that the material suffered after being subjected to artificial aging.

The employed methodology had been based on the systematic performance of chemical, physical, microscopical analysis and mechanical and thermal tests to characterize the polymeric materials previously selected. These same materials had been subjected to an artificial accelerated aging process under controlled conditions of electromagnetic radiations, temperature and the combined action of humidity and temperature. When the aging process finished this group of samples were analyzed once again with the same control conditions and the results had been compared for each material before and after the aging process in order to figure out its behavior.

The analytical techniques used to determine the compositions of materials (polymeric matrix, additives and fillers) are: Fourier Transform Infrared Spectroscopy with Attenuated Total Reflection (ATR-FTIR) and Pyrolysis-Gas Chromatography-Mass Spectrometry (Pyr-GC-MS). For the morphological analysis: Scanning Electron Microscopy - Secondary Electron (SEM-SE), Optical Microscopy (OM) and Stereoscopic Light Microscopy. The thermal properties have been determined by Differential Scanning Calorimetry (DSC) and colorimetric properties have been evaluated through Spectrophotocolorimetric techniques. Additionally, traction test have been performed for the study of mechanical properties and Size Exclusion Chromatography (SEC) to obtain information about the polymer medium molecular mass.

This research had been supported by the research project HAR2015-68680-P

Notes:

The Indapt-System and the Oil Crisis

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Keywords: BASF, oil crisis, Schüler-Witte, plastic housing, Indapt-System

Late last year, Ursulina Schüler-Witte published a memoir which described a long held interest in plastics architecture that began in 1967 and culminated in research commissioned by BASF to design an experimental, modular plastics housing scheme for West Betlin, the Indapt-System. Witte has claimed, both in interview and in the book, that it's failure to be realised was due to the oil crisis of 1973. Complicating matters, Werner Abelshauser's corporate history of the company has shown that BASF actually had a year of record turnover in 1974. Although turnover is not to be confused with profits or faith in the future, it will be the purpose of this paper to interrogate Schüler-Witte's claim, and ascertain whether this was a rubber-stamped decision from within BASF or whether enthusiasm simply dried up on both sides. In the process, we should

be able to glimpse the internal mechanics of the Indapt-System working group. Company records and archival research ought to reveal whether this was a unique example at BASF or whether other research projects were similarly dropped in 1973/4. Therefore, this paper would offer broader implications as to the impact of the oil crisis for plastics architecture. The oil crisis means, in popular memory, the end of experiments into plastic housing, made clear by newspaper reports on the International Plastic House of the World Exhibition at Lüdenscheid-Hoh, 1971-73. Through a single case study, this assumption will be found to either have a grounding in the material and mental effects of the oil crisis, or, equally, it might suggest that, as plastics historians, a greater level of nuance is required when discussing the legacy of the oil crisis for plastics.

Notes:

Colophon:

Design Title Page: Jan Vietze Design, editorial staff: Lisa Graf, Anne Wolfrum Print: Universitätsdruckerei Bayreuth Year of Publication: 2016