

**Announcement for ICOMOS SWEDENS seminar  
“Sustainable Management and Preservation of  
Stone in Masonry Buildings” 19th of March in  
Stockholm**

ICOMOS  
SWEDEN



International Council on  
Monuments and Sites  
Conseil International  
des Monuments et des Sites

*Under hösten 2009 gick detta "Announcement" ut till internationellt verksamma inom området. Vi vände oss till statliga och privata aktörer i Schweiz, Österrike, Danmark, Norge och Tyskland. Dagens seminarium är ett urval av de svar vi fick. Vi hoppas att ni får en inspirerande dag med internationella perspektiv på hållbar förvaltning av historiska stenbyggnader.*

Välkomna!

*ICOMOS Swedens arbetsgrupp för sten*

The national Committee for Stone of ICOMOS Sweden arranges an international seminar named "Sustainable Management and Preservation of Stone in Masonry Buildings" 19th March 2010.

The national Committee for Stone of ICOMOS Sweden would like to highlight examples from different countries in northern Europe where new approaches, technical methods and practical experiences have enabled sustainable management of Stone in Masonry Buildings. This seminar is arranged to retrieve an international perspective about preservation strategies for maintaining stone buildings. The main scope is to discuss preservation strategies that aim to achieve a sustainable management of stone in buildings. Recent discussions in Sweden have evolved about stone exchange versus conservation of stone buildings, both from a sustainability and management perspective. An example here for is the Royal Palace of Stockholm, which needs treatment in order to preserve the sandstone facades and its decorative stone elements.

We welcome speakers to contribute by recent experience in sustainable management aspects such as long lasting technical solutions, economical aspects to sustainable treatments. Some topics that will be elaborated are the relation between economy and immaterial values, conservation of existing material in combination with replacement of stones and the long-term economic and aesthetic consequence of different solutions.

Speakers (conservation scientist, architects, conservators and planners) from different European countries are invited to present their experience in contributing to sustainable management of stone in buildings that includes a balance between aesthetic, historical, economical, technical and environmental aspects. The one-day seminar will have speaker to elaborate on topics as:

- Methods for improvement of the quality and sustainability of stone treatments / quality of stone conservation treatments
- Sustainable management and the relation between economy and immaterial values
- Monitoring - a way to achieve cost efficiency and sustainability?
- Stone replacement versus conservation – aesthetics, environmental impact and economic consequences
- Examples of management of stone buildings in the past and in the future
- What to treat in the future original stone or replaces stone?

The organization committee will be delighted if you would be able to present at this seminar and that some of the topics above would suite your area of interest.

Yours sincerely,

The organization committee by national Committee for Stone, ICOMOS Sweden

Stockholm 10 November 2009

The organization of this Seminar is inspired by two recent international seminars held at the Raymond Lemaire International Centre for Conservation (RLICC) about *Preventive Conservation, Maintenance and Monitoring of Monuments and Sites* on March 24-25 2009 in Leuven, Belgium and in Fribourg, Switzerland about *Preventive Conservation: practice in the field of immovable heritage* on 3-4, September 2009 as well as the initial seminar on this topic the ICOMOS conference: *UNESCO World Cultural Heritage in Germany - perspectives in Preventive Conservation and Preservation 23/ 25 November 2006*

**Presentation of speakers at ICOMOS Sweden seminar  
“Sustainable Management and Preservation of Stone in Masonry  
Buildings“ 19th March 2010, Stockholm**

---

ICOMOS  
SWEDEN



International Council on  
Monuments and Sites  
Conseil International  
des Monuments et des Sites

---

**Introduction to the theme Sustainable Management and Preservation of  
Stone in Masonry Buildings**

Name: Prof. Jan Rosvall

Profession /Titel: Professor in Conservation, NMK Enterprising Research School GMV, Centre for Environment and Sustainability Conservation. CHALMERS UNIVERSITY OF TECHNOLOGY AND GÖTEBORG UNIVERSITY

Presentation of the speakers experience and background (specially in the field of Sustainable Management and Preservation of Stone in Masonry Buildings):

In 1978, Professor Jan Rosvall, jointly with Senior Lecturer Nanne Engelbrektsson, initiated the first interdisciplinary and cross-faculty Institute of Conservation at Göteborg University in Sweden. As the institute's Director for more than two decades, he was responsible for programs and research on both the Bachelor's, Master's and Ph.D. level.

Professor Rosvall has contributed to the establishment of core principles in conservation theory and to both theoretical and application-oriented research, including: ethics and principles of conservation; integrated socio-cultural planning; environmental pollution; stone conservation; methods of surveying, monitoring and documentation of cultural heritage and the built environment.

He has had numerous national and international commissions, including e.g. an instrumental role as Founding President of EURO CARE (1986-), i.e. the EUREKA “umbrella” for RTD in application-oriented conservation technology for the European industry, SME's, universities and related agencies, and as President of the Swedish strategically oriented and market-based non-profit foundation “*Save Historic Göteborg*”.

Through his long-term relationship with various institutions throughout Italy (mainly in Milan, Naples and Rome) he was responsible for preparing the first international conference on “*Air Pollution and Conservation*” in 1985, among many other engagements. In 1996 he was appointed the very first “Visiting Professorship in Conservation” ever offered at the Swedish Institute in Rome (i.e. Istituto Svedese di Studi Classici à Roma).

Since 2001, Professor Rosvall has a strategic position as “Professor in Conservation” at the interfaculty center GMV, Centre for Environment and Sustainability, Chalmers University of Technology and Göteborg University, where he is the co-founder of the post-graduate program *NMK Enterprising Research School - Natural, Sustainable and Conservation Materials*. He is also a recently appointed faculty member and Professor at the University of Malta.

## The Royal Palace, Stockholm – Problems Connected with the Maintenance of the Stone on its Façades

Name: Andreas Heymowski

Profession /Titel: Palace Architect, Professor

Presentation of the speakers experience and background (specially in the field of Sustainable Management and Preservation of Stone in Masonry Buildings):

Andreas Heymowski has a BA from Uppsala University and a MSc architect degree from The Royal Institute of Technology in Stockholm. He has worked all his professional life with architectural conservation, the first years as an employee at Ahlgren Olsson Silow Architects, with projects such as the underground Mediaeval Museum and the Postal Museum, both in Stockholm's Old Town. Since the mid 1980:ies Andreas Heymowski has worked within his part-owned architectural consultancy.

In 1993 he was appointed Palace Architect to one of the royal summer palaces, Rosersberg, close to Stockholm. In 2007 he became Palace Architect at the Royal Palace in central Stockholm.

Rosersberg and the Royal Palace, along with other projects, such as the Bååt Palace and Wrangel Palace, were all erected in the 17th and 18th centuries, and all have façades decorated with Gotland sandstone. So, without being a stone expert himself, Andreas Heymowski is familiar with this stone and its problems, and is presently chairing a group of experts, stone consultants and conservators, who work as advisors to the National Property Board concerning the natural stone of the façades of the Royal Palace.

---

### Doing less, more often

Name: Julian James      Profession /Titel: Wall paintings and stone conservator, dip. Cons.

Presentation of the speakers experience and background (specially in the field of Sustainable Management and Preservation of Stone in Masonry Buildings):

Obtained a post-graduate diploma in the conservation of wall paintings at Courtauld Institute in London in 1988. Has since been active in the conservation of stone and wall paintings in Switzerland and France; is based in Switzerland as director of a conservation workshop; works half-time as teacher of wall painting and stone conservation at *Scuola Universitaria Professionale della Svizzera Italiana (SUPSI)* in Lugano. Mr James has a special interest in the development and promotion of preventive strategies for the conservation of immoveable heritage in general and for stone and wall paintings in particular. Since 2001, he has written articles and lectured on the subject.

In 2009 he initiated and organised international conference in Fribourg (Switzerland) on the *preventive conservation of built and immoveable heritage*; edited published preprint volume. During 2007 he participated in a nationally funded research project on the preventive conservation of outdoor sculpture. At the moment Mr James is developing research project on the subject of the promotion of preventive conservation for immoveable heritage in Switzerland.

---

## **From emergency admission to home care: Current strategies of preservation at the cathedral of Bern**

Name: Annette Loeffel

Profession /Title: Dipl. Arch. EPF, Stv. Münsterarchitektin

### Presentation of the speakers experience and background (specially in the field of Sustainable Management and Preservation of Stone in Masonry Buildings):

Study of Architecture at the Ecole Polytechnique Fédérale of Lausanne (CH) and Newcastle University upon Tyne (GB). Closely involved into projects of continuous preservation of monuments especially the Cathedral of Berne for more than 10 years (Häberli-Architekten, Bern). Representative of Hermann Häberli, architect at the Cathedral of Berne and managing director of the Münsterbauhütte Bern.

Accompaniment of the change of paradigm on behalf of the Berner Münster-Stiftung since 1998. Participation and co-design within the reorientation process at the fabric of the Cathedral of Bern. Regular co-operation with various specialists such as CSC, Conservation Science Consulting Sàrl, Fribourg (scientific support within the restoration process).

Member of Dombaumeisterverein e.V (European association of cathedral building masters), Active co-organization of its annual Congress in September 2008 in Bern.

---

## **“Monuments glooming in new splendor“ – stone conservation or exchange**

Name: Dr. Esther von Plehwe-Leisen

Profession /Title: Conservation Scientist/Dipl.-Geol.

### Presentation of the speakers experience and background (specially in the field of Sustainable Management and Preservation of Stone in Masonry Buildings):

Geologist

Since 1990 projects in the field of conservation of stone and other porous mineralic building materials.

1990-1994 member of the University of Munich (WG of Prof. Dr. Rolf Snethlage)

In 1995 foundation of the Stone Conservation Laboratory LPL in Cologne:

Planning and execution of national and international projects for conservation, consultancy for conservation interventions, quality control. Member of various committees

Since 1998 adjunct professor at the Institute of Conservation Science of the Cologne University of Applied Sciences

---

## **Integrated Stone Projecting by ProDenkmal, Germany; Strategies for Planning and Methods for Controlling Quality and Sustainability**

Name: Wolfgang Frey,      Profession /Titel: Engineer for materials science and heritage

Name: Dr. Rupert Utz      Profession /Titel: Geologist /Conservation scientist

### Presentation of the speakers experience and background (specially in the field of Sustainable Management and Preservation of Stone in Masonry Buildings):

Mr Frey has a degree in Material Science and additional a master studies in Building Conservation. Science mid of 1990 he has worked in the field of conservation/restoration planning for Masonry Buildings at institutes and as a consultant. Since 1999 is he director for ProDenkmal in Berlin/Bamberg and is assigned for the long-term-restoration-projects Neues Museum and Vorderasiatisches Museum in Berlin. He has been active in some research projects in Germany, Rumania and China to find sustainable preservations strategies for the stone in masonry buildings.

Beside this Mr Frey is giving lectures in conservation planning and material science for the cultural heritage at different University in Germany.

Dr. Rupert Utz has a PhD in Geo Science / Conservation Science form Munich University. He have been employed as a conservation scientist at Munich Central Laboratory and before he became the head of conservation laboratory at ProDenkmal Bamberg he worked at private laboratories in Germany and as a freelance scientists in the field of preservation of stone buildings. Mr Utz is responsibly for the material testing in laboratory in Bamberg as well as proof of quality testing at site by projects of ProDenkmal.

Dr. Utz is beside this since 1996 active in different research projects related to in applied conservation in Germany as well as abroad for example the Terrakottaarmy in Shaanxi, VR China .

---

## **Lausanne Cathedral and Specific Substitutions: a Conservation Strategy**

Name: Christophe Amsler

Profession /Titel: architect EPF

### Presentation of the speakers experience and background (specially in the field of Sustainable Management and Preservation of Stone in Masonry Buildings):

Christophe Amsler, architect, and Eric-James Favre-Bulle, art conservator, both established in Lausanne-Switzerland, have been commissioned to several important restauations of medieval, baroque or neo-gothic monumental structures. The local and very fragile sandstone they had to deal with led them to develop various strategies of stone conservation, among which the so-called specific substitution: a conservation process allowing, by restricted stone replacements, large and original mineral surfaces to be extensively conserved, an approach that will be illustrated by the case of Lausanne cathedral.

## How to Evaluate Efficiency and Durability of Stone Conservation Treatments – A Methodology

Name: Stefan Simon

Profession /Titel: Director / Prof. Dr.

Presentation of the speakers experience and background (specially in the field of Sustainable Management and Preservation of Stone in Masonry Buildings):

Founder and director of the private laboratory KDC Konservierung & Denkmalpflege Cons. in Olching (Germany) since 1993, he is teaching conservation science at Munich Technical University since 1998. From 2001-2005 Stefan Simon was heading the "Building Materials" section at the Getty Conservation Institute, Los Angeles, before being appointed Director of the Rathgen Research Laboratory at the National Museums, Berlin in February 2005. Since 2009 he is Honorary Professor at X'ian Jiaotong University (PR China). Dr Stefan Simon is elected member of ICCROM council (2009-2013) and vice chair of the council until 2011, and since 2008 he is President of the ICOMOS International Scientific Committee Stone (ISCS).

# Abstract of oral presentations at ICOMOS Sweden seminar

## “Sustainable Management and Preservation of Stone in Masonry Buildings“ 19th March 2010, Stockholm

ICOMOS  
SWEDEN



International Council on  
Monuments and Sites  
Conseil International  
des Monuments et des Sites

### The Royal Palace, Stockholm – Problems Connected with the Maintenance of the Stone on its Façades

The Royal Palace in Stockholm was erected in the first half of the 18th century, after a devastating fire in 1697 had laid Stockholm's old, partly medieval partly renaissance castle in ashes. The architect, Nicodemus Tessin the younger, created a huge, uniform Roman Barocco building, and gave the façades lavish sculptural decorations in Gotland sandstone.

The exterior of the palace has retained its original architecture remarkably well and is the most magnificent example of Barocco architecture in Northern Europe. But today the beauty and integrity of its stone decorations are threatened. The Gotland sandstone is an extremely weak and vulnerable material. In protected positions it works all-right, but when exposed to the harsh Swedish climate, with moisture and repeated frost-thaw cycles, it quickly weathers and decays. These problems have been a constant concern, and damaged parts of the stone decorations were traditionally replaced by newly cut stone. In the 20th century the decay problems have been accelerating, along with a new conservation philosophy very much in favour of the authentic material and authentic traces of the artists and master craftsmen that once built the palace. Instead of replacing worn out stone with new, everything was done in order to save the original stone with the aid of new chemical products, aiming at conserving, strengthening and protecting the stone.

Today, after more than three decades of consolidating and mending the stone in this way, we must accept the fact that this was not a long term remedy. The stone thus repaired is now rapidly decaying again and its disintegration now poses a threat, not only to the artistic integrity and beauty of the monument, but also to people's lives as parts of the decorations fall down.

The difficult questions facing us who are responsible for the well-being and maintenance of the palace are:

- How much of the stone must be replaced and what can still be saved?
- What should we use for replacing stone? The weak Gotland one or more durable stone or perhaps something even more durable, like concrete?
- What can we do to at least to some extent protect both old and new stone? It used to be covered by linseed oil paint, but it was taken away around 1900. Should we cover it again, as this seems to have given it some protection?

Presently a group of experts on various aspects of stone are struggling with these and many other questions in order to present a programme containing their suggestions to the owner of the Palace, the National Property Board, by September. After that a small part of the façade will be treated according to the suggestions. The work will be evaluated and after adjustments according to the experience gained, the big works on the stone of the façades will commence and continue, façade by façade, for the next 20 or 30 years to come.

**Andreas Heymowski** Palace Architect at Royal Palace in Stockholm / Professor

## Doing less, more often

Looking after buildings and their immovable content is not a new concept: since Antiquity, builders and owners have been aware of the benefits of staving off decay by regular maintenance, inspection and monitoring. Despite this, for most of the 20th century, interventions on buildings have been periodic and curative, every thirty to forty years, with little or no care in between, and buildings have unnecessarily suffered as a consequence. Today however, spurred on by political preoccupations with making the best use of existing resources, there is increasing awareness among decision-makers that preventive strategies applied to monuments can reduce the frequency, the extent and the cost of restoration, with a consequent all-round benefit for heritage conservation.

What is going on in Switzerland and abroad to improve awareness of the preventive management of built heritage? And what in practice does preventive management mean for the conservation of stone facades and monumental sculpture? Like other European countries, Switzerland has not been idle in this domain. Large buildings like the cathedrals of Basel, Bern and Lausanne are representative of an evolution towards less stone replacement and more conservation, maintenance and monitoring. In 2007, the Swiss Federal Office of Culture published recommendations which reiterate principles of preventive conservation for built heritage, stating clearly that "maintenance is the most appropriate form of conservation" and that preventive measures can maintain the value of conservation work. This is at the heart of the economic sense of preventive strategies in conservation. More recently, an international congress entitled *Preventive Conservation: practice in the field of immovable heritage* was held in Fribourg in 2009 and brought together more than 150 conservation professionals on the subject; financial support from the canton enabled the proceedings to be published. A research initiative, with funding by the Federal Research Fund, is underway at the *Universitaria Professionale della Svizzera Italiana (SUPSI)*, concerning the preventive management of a collection of outdoor sculpture; and a further research project is being developed to evaluate the promotion of preventive conservation in Switzerland.

These developments echo an increasing number of Europe-wide initiatives, most notably in Belgium and the Netherlands (*Monumentenwacht*), in England with its research project *Putting it off* and the organisation *Maintain Our Heritage*, in Italy with its *Conservazione programmata*, in Germany with the recent implementation of a program of preventive conservation of outdoor sculpture in the city of Berlin. In 2009, a UNESCO Chair on *Preventive conservation, Maintenance and Monitoring of Monuments and Sites* was inaugurated at Louvain in Belgium; later the same year saw an international congress in Como on *Conservazione programmata per il patrimonio architettonico del XX secolo*. This year, in Bressanone, yet another international congress on the subject entitled *Pensare la prevenzione*. It can be hoped that all these initiatives will lead to an increasing mindset among decision makers of the importance of *doing less more often*.

**Julian James, conservator, Dip. Cons, SCR, ICON accredited**  
**Scuola Universitaria Professionale della Svizzera Italiana Svizzera**



## **“From emergency admission to home care” Current strategies of preservation at the cathedral of Berne**

Bis 1998 wurden am Berner Münster Geldmittel und Arbeitskräfte im Wesentlichen für den traditionellen Vollersatz ganzer Bauteile verwendet. In der Tradition der in den 1880er Jahren für die Turmaufstockung wieder ins Leben gerufenen Bauhütte wurden alle vier Fassaden des Turmvierecks und 8 von 14 Obergadenfenstern komplett rekonstruiert. Der heutige Bestand an originalen Bauteilen und Oberflächen am Äusseren des Münsters ist aufgrund der fortwährenden Renovation stark geschwunden.

Vor rund zehn Jahren begann am Berner Münster ein Paradigmenwechsel vom traditionellen Natursteinersatz ganzer Bauteile hin zu einer möglichst umfassenden Baupflege. Aufgrund der im letzten Jahrzehnt gesammelten Erfahrungen ist die Münsterbauhütte heute in der Lage, mittels Not- sicherungs- und Pflegemassnahmen an Ort und in Zusammenarbeit mit den entsprechenden Fachleuten möglichst viel des verbliebenen Bestandes der Nachwelt zu erhalten. Selbstverständlich gilt dies auch für die ganz jungen “Originale”, welche zum Baudenkmal mit seiner jahrhundertelangen Geschichte gehören.

Baupflege kann erfolgversprechend für das gesamte Baudenkmal und letztlich in allen Belangen auch rentabel angewandt werden, wenn sie umfassend und je nach Situation und Bedarf möglichst unverzüglich erbracht werden kann. Dies bedingt nebst den notwendigen Finanzen einen kontinuierlichen Unterhaltsservice mit dem dafür notwendigen speziellen Wissen und langjähriger Erfahrung. Die Berner Münster-Stiftung garantiert dies durch den ständigen Betrieb der Münsterbauhütte unter der Leitung des Münsterarchitekten. Verschiedene Fachkräfte werden je nach Problemlage beigezogen.

Es besteht nur ein kleiner Unterschied zwischen dem Unterhalt eines Baudenkmal und eines ganz gewöhnlichen Bauwerks. Es gilt aufzuzeigen, wie effizient das Unspektakuläre sein kann. Viele kleine Flick- und Unterhaltsarbeiten, die das tägliche Brot des Hausmeisters und des Strassenmeisters sind, sollen auch bei uns am Münster so selbstverständlich werden wie das Zähneputzen. Gegenüber den Verheissungen des Traums, Verfahren und Methoden zu entwickeln, welche keine Pflege benötigen und den Unterhalt auf Jahre hinaus rationalisieren und optimieren, gibt es bei einem solchen Vorgehen Unsicherheiten. Wir brauchen Strategien, diese Unsicherheiten einzugrenzen. Eine davon besteht darin, ein breites, anpassungsfähiges, in der Erfahrung verankertes Wissen zu sammeln und zu sichern.

Eine andere Strategie beruht auf der Disziplin, nur einfache, nachvollziehbare Massnahmen zu treffen, Lösungen zu suchen, welche komplexe Sachverhalte auf das Wesentliche reduzieren. In der Tradition begegnen wir Techniken, welche auf langen empirischen Erfahrungen basieren, und daher in diesem Zusammenhang interessant sind. Die Tauglichkeit einer einfachen Massnahme zeigt sich nicht in erster Linie in ihrer Machart, sondern in der Tragweite der Überlegungen, welche hinter ihr stehen. Daher sind viele Arbeitsschritte, welche zu nachhaltigen Strategien führen, ebenso unsichtbar wie die Arbeit, die bei der täglichen Pflege, bei der Reinigung und beim Unterhalt oft anfällt.

Wir versuchen, auf der konzeptionellen Ebene mit den vielen Arbeiten, die an der Front geleistet werden, Schritt zu halten und Synergien zu nutzen. Wir sind stolz darauf, wenn es uns gelingt, nach vielen Überlegungen zu einem Entscheid zu kommen, der gegebenenfalls den Verzicht auf eine Massnahme bedeutet. Eine solche Erkenntnis nach aussen transparent zu machen, ist schwierig, sind wir es doch gewohnt, den Wert einer Arbeit an ihrer Produktivität, also einem materiellen Resultat, zu messen.

**Hermann Häberli, Dipl. Arch. ETH/SIA, Münsterarchitekt**  
**Annette Löffel, Dipl. Arch. EPF, Stv. Münsterarchitektin (H. Häberli-Architekten)**  
**Christoph Schläppi, Architektursthistoriker (Mitglied Münsterbaukollegium und Stiftungsrat Berner Münster-Stiftung)**

## **“Monuments glooming in new splendor“ – stone conservation or exchange**

The appreciation of historic building stones lies far below that of sculptural materials. Nevertheless, they represent an important evidence of the history of stone use and the technology of construction. Besides the art historical information, monuments also pass on technological knowledge. Questions like: where did the stone come from, how was the quarrying and the transport organised, how were the economic relations of the stone producers and the consumers, how were the construction and the stone carving techniques, and many others can be answered by the authentic monuments.

As stone is subject to natural and man-made deterioration, restoration interventions become necessary during the lifetime of the monuments. In the history of building preservation the most common tool has been stone exchange. It is always combined with big loss of original stone material and consequently, with a lot of original information. For centuries stone conservation has only been known as preventive conservation like a treatment with linseed oil. But in the last century stone conservation techniques have been developed for re-strengthening deteriorated stone masonry. By around 50 years of experience and systematic investigation this modern way of preservation has proved to be a very useful and much less invasive alternative to the conventional stone exchange. Both methods require experienced specialists for the preparation and the planning of the intervention as well as capable practitioners for the execution. A wide knowledge in material science, in mineralogy, rock physics and chemistry is necessary for both options.

Examples of historic stone exchange often illustrate a clear increase in degradation velocity of the original stones. Examples from German monuments like Cologne Cathedral have been analysed. It is obvious that differing material properties are effective for the rapid destruction of the old stones. As sometimes stone exchange can be necessary because the degree of damage is already too high for conservation, the stone properties of both: the original and the new material have to be determined in order to protect the remaining substance. They play an important role and must be compatible for all materials. Stone exchange measures must not be led by mere aesthetical factors.

The same precondition applies to the modern scientifically based conservation technique. Conservation aims at the preservation of the original substance and the authenticity of the monument. But conservation treatments also bear the risk to cause subsequent damages. The situation of the monument and the materials has to be investigated and all conservation steps and materials have to be adapted to the properties of the stone.

Examples of systematic planning and execution of conservation interventions and stone exchange are shown from the Angkor Wat in Cambodia, Cologne Cathedral and other objects in Germany. The pros and cons are discussed. Information on the durability of different interventions: conservation and exchange are compiled and outlined. The quality of both preservation strategies is mainly due to a broad knowledge of the material properties of all materials used in the intervention.

To complete the evaluation a comparison is tried between the costs incurred by conservation and by stone exchange for some interventions. It can be shown that in the majority of the cases stone conservation is the more economic way to preserve monuments.

Conventional stone exchange and modern stone conservation are two possibilities of monument preservation. Careful preparation and good execution are the prerequisites for both methods. Following today's philosophy of monument preservation “Monuments glooming in new splendour” are not the aim of an intervention but the preservation of the authentic appearance with all the information stored by the monuments. This aim cannot be reached by large area stone exchange.

**Dr. Esther von Plehwe-Leisen Conservation Scientist/Dipl.-Geol. Untersuchungslabor für Fragen der Natursteinerhaltung (LPL), Köln**

**Prof. Dr. Hans Leisen Dipl. Geologist, Cologne University of Applied Sciences, Cologne Institute of Conservation Science.**

## **Integrated Stone Projecting by ProDenkmal, Germany; Strategies for Planning and Methods for Controlling Quality and Sustainability**

The questions of an appropriate scientific, technical and aesthetic approach, has kept conservators, scientists, architects and planners busy since the late 19th - Century. Planning of conservation projects is an interdisciplinary field of tension. This expert planning in restoration projects represents a separate discipline of architectural projecting in Germany since the 1990ies.

The initial point in the search for appropriate repair-, restoration- and preservation materials has to be the original structure at the historical object. For example, mortars for repair should be adjusted in their technical and visual properties to the original. These adaptations can be achieved on the one hand by the recreation of original historic mortar recipes, on the other hand by the use of modern products. The decision must be taken case by case, based on the object-specific requirements.

In addition to the material-point, the specific causes and processes of decay and deterioration (moisture, salts, environmental impact, neglected constructive protection...) have to be detecting in a differentiated way and taken into account for the whole planning. These requirements can only be met if a professional expert planning works step by step during the whole project, constantly considering technical requirements as well as the standards of preserving the national heritage. Only in this way a sustainable restoration work with the necessary budget control is feasible.

Since 1990 this art of planning became an integrated part in a conservation projects in Germany. In Germany today several firms and institute supply this to property owners. This specific planning is possible due to interdisciplinary team composition of conservators, scientists and architects. The bearing point of this kind of planning work is a sophisticated and well-founded expert planning for the restoration and repair of historical monuments throughout all steps within a project. The constant integration of scientific investigations is an essential part for the conception as for the quality management during execution.

This presentation will highlight cases carried out in the field of conservation expert planning for building materials as marble, sandstone, plaster, bricks and joints. This presentation exemplify conservation planning on objects such as the Marble Palace, Potsdam/ Berlin, New Museum in Berlin and The Magdeburg Cathedral. In these places sustainable solutions and verification of quality was achieved through technical and laboratory requirements designed for the particulate situation at the objects.

Applying this approach of project planning has revealed that cost control and quality of treatments can be reached. As a result long lasting treatments are achieved along with economical benefits as well as a respect to the original building material of our cultural heritage.

**Wolfgang Frey, Graduated engineer for materials science, and heritage studies, Managing director of ProDenkmal GmbH Bamberg - Berlin.**

**Dr. Rupert Utz, Geologist/ Conservation Scientis head of conservation laboratory at ProDenkmal GmbH Bamberg - Berlin**

## Lausanne Cathedral and Specific Substitutions: a Conservation Strategy

Lausanne cathedral (ca 1175 - ca 1235), built in a local and particularly fragile sandstone, offers weak resistance to climatic aggressions, making this important gothic structure a permanent object of conservation treatment.

Having come to the conclusion that modern consolidation techniques were unable to maintain either the mechanical properties of an altered Lausanne sandstone, nor its resistance to erosion, the present team Lausanne has developed for the last 15 years a conservation process using so-called specific substitutions of materials. Heavily degraded stones are substituted, but only in two specific circumstances: when alteration no longer allows them to fulfill neither their structural nor their protective functions. *Specific (or strategic) substitution* offers a degree of protection that allows a large majority of original stone surfaces to be extensively conserved, independently of the problematic effectiveness of consolidation products. In this sense, and despite any paradox, substitution can be qualified as conservative.

*Specific substitution* has been recently (2000-2009) applied to the conservation of the cathedral's nave. The treatment started in 2000 is now being monitored, to control and measure the long-term effects of such interventions according to technical, aesthetic and financial considerations.

**Christophe Amsler, architect EPF, AMSLER ARCHITECTE, Lausanne**

---

## How to Evaluate Efficiency and Durability of Stone Conservation Treatments – A Methodology

After an outline of the historical development of testing and evaluation methods for stone conservation treatments, the development of the field is discussed with particular regard to the parameters that are measured, the measuring methods and evaluation criteria. It will also discuss the weaknesses still existing in current methodologies, the aspects that should be investigated in greater depth and the increasing use of non-destructive testing methods to improve the evaluation of the long-term performance of treatments.

The modern approach to conservation acknowledges the necessity of scientific investigations preceding any restorative intervention as well as the monitoring and evaluation of its performance. Conservation scientists today have access to a range of methods to assess the efficiency and compatibility of consolidation treatments. These methods are applicable to samples (from monument or quarry) in the laboratory or in situ on test sites. In conservation praxis, however, financial and time constraints are often a limiting factor.

Therefore it is crucial to know, which parameters are the most meaningful in each case. Among the most important physico-mechanical properties are water storage and transport characteristics, in liquid or vapor form. Others, such as ultrasonic velocity, biaxial flexural strength or drilling resistance provide a direct or indirect indication of the material strength.

The presentation discusses general preconditions for the scientific evaluation of building materials, compares the available methods and ranks them according to their importance. It demonstrates that profile measurement methods (i.e. biaxial flexural strength, ultrasonic velocity) provide more valuable information than investigations of bulk parameters.

**Prof. Dr. Stefan Simon, Director at Rathgen Research Laboratory at the National Museums, Berlin**