

Studies in Conservation



- 145** Development of a physical model of a typical nineteenth-century English canvas painting D.J. CARR, C.R.T. YOUNG, A. PHENIX and R.D. HIBBERD
- 155** Les laques de brésil dans l'enluminure médiévale: reconstitution à partir de recettes anciennes PATRICIA ROGER, INÈS VILLELA-PETIT et SOLÈNE VANDROY
- 171** Lime blue – a mediaeval pigment for wall paintings? CHRISTOPH KREKEL and KURT POLBORN
- 183** Siderite as a corrosion product on archaeological iron from a waterlogged environment H. MATTHIESEN, L.R. HILBERT and D.J. GREGORY
- 195** Micro-XRF investigations of chlorine-containing wood preservatives in art objects JENS BARTOLL, ACHIM UNGER, KARSTEN PUSCHNER and HEIKE STEGE
- 203** Method for stabilization of leaded bronzes affected by corrosion of lead V.C. SHARMA, UMA SHANKAR LAL and TEJ SINGH
- 210** Notes and reviews



THE JOURNAL OF
THE INTERNATIONAL INSTITUTE FOR
CONSERVATION OF HISTORIC AND
ARTISTIC WORKS

Modern Museums: The Architect's Triumph, the Conservator's Nightmare?

Andreas Burmester is Director of the Doerner-Institut, Munich and a member of the Scientific Consulting Group of the National Gallery, London. In a talk given at IIC's Annual General Meeting in January 2003, he describes some technical aspects of the Pinakothek der Moderne, Munich's acclaimed new modern art museum which opened to the public in September 2002.

To approach my topic we have to go back to the year 1836 when the Alte Pinakothek was opened in Munich (Figure 1). The Alte Pinakothek was built to house the superb collection of the Bavarian king Ludwig I. As we know from letters between Ludwig and his architect Leo von Klenze, special emphasis was laid on – as we would say today – preventive conservation. Their correspondence mentions dust, noise and fire, which were all of great concern to the king. The height of the largest room was defined by the format of Rubens's great *Last Judgment*. Big lanterns on top of the roof allowed the daylight to pass through lay-

lights and the light was diffused by stucco ceilings. Eleven large furnaces in the cellar allowed the galleries to be heated gently. The heated air was distributed through a tube system built inside the walls, which prevented the distribution of sparks. This project began a long tradition of building museums in Munich, museums that – at least in the case of the Alte Pinakothek – have been models for many later museum buildings.

In 1853, a second building, the Neue Pinakothek, was opened to house 'contemporary art' (Figure 2). Its architecture was close to that of the Alte Pinakothek.

Again, its layout was defined by a cycle of landscape paintings, this time by the German nineteenth-century painter Carl Rottmann. The history of this building is only partly recorded, and little is known about the technical details of the building. However, the lighting conditions were described as being unsatisfactory.

Both buildings were destroyed by the British and American air forces in April and July 1944. It was only due to the determination of a few citizens that the Alte Pinakothek was not demolished and replaced by a modern, 'better' architecture. After reconstruction it reopened in 1956 [1]



Figure 1 Alte Pinakothek, northern façade in a photograph from 1926.



Figure 2 Neue Pinakothek, from the north east, in a photograph from before 1900.

after electric light and simple air-humidification had been installed. The longest T-bars ever used at this time in Germany served to close the huge bomb crater in the roof and bricks from the nearby ruins of military barracks were used in the walls. Among the many difficulties, its architect Hans Döllgast and his office expended much effort to find an appropriate daylight solution. A model with the different roof types under discussion has survived. A solution of the 1950s was finally adopted: a flat roof with oversized roof-lights made of clear glass, which, as a contemporary of Döllgast said, should allow every possible use of the gallery in the future. The limited resources for the reconstruction work in the 1950s, a small fire behind the textile wall coverings in one of the galleries, unsatisfactory climatic conditions, and light flooding the rooms every day, finally resulted in two further renovation campaigns in 1977 and 1998. Improved security, new glazing, UV protection, air conditioning and shading screens under the roof-lights were installed to satisfy the conservator's needs. However, the reconstruction of 1956, and the renovations in the 1970s and '90s, did not improve the building to the extent expected, they just made it different.

The poorly regarded Neue Pinakothek, which dated from 1853, disappeared in 1949. More damaged than the Alte Pinakothek, its ruins were taken away and the bricks used for the reconstruction of the

nearby Technical University. In 1981, a new Neue Pinakothek was opened (Figure 3). Its architect, Alexander Freiherr von Brouca, again explicitly followed Klenze's concepts concerning the room shape and illumination. For the first time in the history of Munich's museums, full air conditioning allowed the climate to be kept within so-called international standards, the ICOM recommendations of 1961. Christian Wolters, the first director of the Doerner-Institut after the war, praised the new building as a 'conservation machine museum' (*Konservierungsmaschine Museum*). I think Wolters took this term from Garry Thomson, and in his later years he told me that the term's originally positive meaning lost its glamour, due to growing doubts about modern museum architecture – the first symptoms of a nightmare?

In 1992, the long-held vision of a modern art museum started to become a reality. On a huge site east of the Alte Pinakothek, where the barracks mentioned above were once located, and which had served as a parking area since the war, the foundation stones for the Pinakothek der Moderne were laid. Again, thousands of citizens supported this third Pinakothek generously with small and large donations. The building work took 10 years and this new museum, opened in September 2002, is now a main attraction for visitors from all over the world (Figure 4). Within the first eight months more than one million visitors

have seen this building, which has four major collections presenting paintings, works on paper, architecture, and design of the twentieth and twenty-first centuries. Its architect, Stephan Braunfels, stayed firmly within the 150 years of tradition established by the Alte Pinakothek: we recognize the huge staircase of the Alte Pinakothek and the open space between entrance hall and galleries adapted from the Neue Pinakothek. In contrast to the two other buildings, a walk through the galleries no longer follows the art historical sketch of a sequential development of art. The parallel development of very different styles is reflected in the way the galleries are accessible. Here, I would like to focus on two key aspects where I have been involved, lighting and climate.

During the planning there was a broad consensus about the lighting concept for the top floor galleries. This consensus focused on three points:

- (1) The galleries with paintings, sculptures and installations should use daylight wherever possible.
- (2) The period of a mixture of daylight and artificial light should be limited.
- (3) The light distribution should be as even as possible, so that shadows of frames, etc., could be avoided.

Due to careful engineering the first and the last goals were reached to a great extent



Figure 3 Main entrance of the new Neue Pinakothek from the south.



Figure 4 Pinakothek der Moderne, from the north west.



Figure 5 First floor galleries in the Pinakothek der Moderne (photograph 2002).



Figure 6 Model of the Rubens Gallery in the Alte Pinakothek before destruction (model: Johannes Baumstark, 1999).

(Figure 5). The museum has a reputation for being beautifully lit and all the critics praise its light. However, there is a price to be paid: the proportion of the lay-lights has grown constantly over the last 150 years. Whereas in the Alte Pinakothek the original lay-lights covered only 24% of the gallery's floor plan, in the 1956 reconstruction this figure was increased to 38%. With 40%, the Neue Pinakothek shows a similar proportion, but in the new museum this proportion grew to nearly 100%. As a consequence, and far more than in the two older buildings, we have to face permanent radiation (light and heat) input from the roof. This necessitated technically sophisticated daylight controls and heavy air conditioning.

In the original design of the Alte Pinakothek, the elegant light lanterns had an intelligent energy control: when the sun was at its highest position, a copper-plated roof on top of the lantern hindered the entry of heat and light [2]. Light measurements in a recently built model (Figure 6) allowed us to conclude that the lighting levels in the gallery were highly satisfactory. This, however, may only be true from our modern point of view, as contemporary critics complained about winter light levels being too low for copyists working in the galleries. In the Pinakothek der Moderne

(Figure 5), the shading task is taken over by a double set of textile screens, one being semi-transparent white and the other opaque white. Whereas the latter allows exclusion of light outside the opening hours, the first screen controls the amount of daylight entering. Light sensors in the galleries and an intelligent computer-based light control allow the system to stay within the light levels given by the conservator. An exhibition of paintings at around 300 lux under daylight is as easily achieved as the presentation of Beuys's sensitive objects at around 70 lux. Fluorescent lamps above the lay-lights simulate daylight illumination in the evenings. UV-films in the lay-lights round off this conservation concept. Once the light has passed the lay-lights it is diffused by a coffered ceiling. The resulting illumination is even, cool, and covers all the walls and corners homogeneously. However, to stay within the tight light levels demanded is a complex technical task. Due to the slow mechanics of the textile screens, a buffering with artificial light is frequently necessary to compensate for a short-term lack of light in the gallery. As a result of a careful selection of the fluorescent tubes, the mixture of daylight and artificial light is invisible to the untrained eye.

In the Alte Pinakothek the famous huge staircase from the 1950s serves as a climate buffer, stabilizing the climate in the galleries, in combination with the first floor doors. In contrast, the concept of the 1980s resulted in an open entrance hall without any separation of the hall from the galleries. In the new museum, the air conditioning system has not only to compensate for the energy passing through the skylights, but also from visitors, a huge rotunda and the open staircases. Again, the galleries are not separated from the staircases and the rotunda by doors. To our surprise, and due to the air conditioning system chosen, the climatic situation seems not to be much affected by these factors. Compared to the 11 historic ovens of the Alte Pinakothek, the air conditioning concept of the new museum is far more complex. The most challenging point was to fit any technical solution into the architect's concept of invisible services, leaving the coffered ceiling as far as possible untouched. The architect also had the idea to create a trench at the wall/floor connection on the first floor. In the beginning, this trench had only an aesthetic function, but we slowly realized that the way in which we could use the lower part of the walls would be strongly affected by its

presence. How to place paintings during hanging? How to prevent visitors from stumbling into the trench, or using it as a rubbish bin? How to transform the trench into something of technical use for the gallery? The last of these questions has been solved by the implementation of an upward displacement air conditioning system, which has been selected because it is not possible to glaze most modern and contemporary art. In my experience, some of the main disadvantages of classic air conditioning are the transport of dust, electrostatic charging, and the well-known dirtying of all surfaces. The upward displacement system uses only about one-tenth of the air velocity of conventional air conditioning systems (about 10–18 cm per second). However, tests in a gallery model room showed that an additional 15% of air had to be added from the coffered ceiling to mix the air in the room properly and to prevent layering of the slow moving, upward displaced air. The remaining 85% of the air slowly permeates out of the trench into the gallery. Because the incoming air is slightly cooler than the air in the room, a lake of cool air is formed, which through heat input from the room slowly warms up and disappears through the coffered ceiling under the lay-lights. In spite of the high energy input from the roof-lights, the very many visitors and the open entrance areas, the upward displacement system seems to work, against conventional museum air conditioning wisdom. According to the control sensors placed in each room, the resulting climate seems to be satisfactory, although any layering of the air cannot be monitored in this way. The whole air conditioning system seems to work pretty slowly, with a small number of changes per hour (3–4 times) and within narrow temperature ($\pm 2^\circ\text{C}$) and relative humidity ($\pm 3\%$) bands. I may add that it remains difficult to place paintings during hanging, that visitors frequently stumble into the trench, especially close to the entrances, and that the trench is used as a rubbish bin. All my observations may be discussed in more detail at the IIC confer-

ence in Bilbao in 2004, which has New Museums as one of its topics.

The title of my presentation suggests that there is something wrong with the building. It suggests that the unexpected success of the Pinakothek der Moderne, the beauty of the building, its stable climate, its homogeneous illumination, and the architect's triumph are only one side. Is the other side really the conservator's nightmare? At this point, I will follow Perry Smith's maternal advice strictly: do not complain! She is right, the architect's triumph is not necessarily the conservator's nightmare. As a result of close involvement by the conservators, scientists and engineers, the open architecture of the Pinakothek der Moderne has been transformed into a beautiful place suitable for the exhibition of modern and contemporary art. As my colleagues Bruno Heimberg and Susanne Willisch – who both dedicated years of their professional lives to this project – and I might tell you, this transformation was not easy; it was a process of steady effort, frequently against the architect, and it is still a process of practical, daily involvement.

My concerns are of a more general nature. Is this museum a 'conservation machine' as the Neue Pinakothek has been praised for being, and, if so, is the 'contemporary conservation machine' not a cul-de-sac? From my few talks with Christian Wolters in his last years, I know that he shared my doubts. The clearer the philosophy of conservation has become over the last few decades, the less modern architectural concepts seem to serve our conservation goals. Whereas Leo von Klenze and his Alte Pinakothek were unwittingly close to our modern approach of preventive conservation, von Branca combined the spacious open architecture of the Neue Pinakothek with an overkill of air conditioning. Only this, and not the architecture itself, allowed the Neue Pinakothek to serve as a 'conservation machine'. In other words, the Neue Pinakothek without its machinery would not be a 'conservation machine' at all, which makes it so different from the Alte Pinakothek in its original 1836 design.

Since the 1970s, the idea of the purpose a museum should serve has changed radically. My experience is that this change has taken place on the genetic level; to be slightly sarcastic, most modern architects usually have no idea what a museum should be, except a place of public excitement and personal vanity. In particular, the architect's role as an artist conflicts with our practical conservation needs. And there is another problem: the longer I am involved with museum building as a genuine professional task, the more my doubts grow whether the formulation of 'international standards' for climate, light and pollutants really leads to a safer museum? All these specifications did not lead to a different architecture – as they should have – but to the 'conservation machine' in its worst sense: over-equipped, expensive and, last but not least, unsustainable. This is where Christian Wolters's and my doubts meet. For this tragedy, we should not only blame the architects! As conservators, we clearly contributed to this development, for example with the idea of unlimited use of daylight and the parallel demand to stay within tight international climate standards regardless of the architecture and the local climate. In the case of the Pinakothek der Moderne both these demands contribute considerably to the complexity of the technical solution, to the high – and in the near future unaffordable – energy consumption and the low sustainability of the building.

When I started my professional career, the classical idea of the museum as a location where our society exhibits, collects, stores and investigates its collective memories was still valid. Around three years ago I read Gregory Benford's book on 'Deep Time' messages [3]. This book simply turned my mind upside down, and my steadily growing doubts about the things we are doing were further nourished [4, 5]. I think we all agree that the classical idea of a museum has clearly been supported – maybe even modelled – by the Alte Pinakothek during its long history. The architects of the two other Pinakotheken would state firmly that their buildings serve

art to the same extent, I confess that all three architects created wonderful places to present the most precious objects. But do they serve as containers for Deep Time messages? Do they transport the substance of the objects and their content unchanged into the future? Is the 'metastable' conservation machine of the 1970s really an appropriate tool for this? I fear that this will turn out to be an expensive illusion. Only seemingly inexhaustible resources create the feeling of sustainability. But we should not mix up this effort with our Deep Time message. The engineers' efforts only transform an inhospitable building into an area where art can be exhibited; it is simply the common attempt to compensate 'wrong' architecture by heavy engineering. Frequent technical accidents teach us that this concept works on a day-to-day basis but is not sustainable in the longer term. This open architecture, dedicated to light, events, amusement and vanity, is not the Deep Time message we should all work for. Should our resources be exhausted, the original building of the

Alte Pinakothek could be closed and not too much would happen to the valuable collection over months, but the climate of the Pinakothek der Moderne would drift away within a few hours. In the worst case of a long-term energy failure, the wisdom of evacuating the objects into the depositories, which are located six metres under ground-water level, is also questionable. The experience in Dresden in the summer of 2002 taught us to consider the engineers' worst case scenarios as a part of our reality. But even if this worst case never happens, the continuous squandering of energy in all these buildings should be an ecological concern. How long can we afford to continue with this, and when we cannot, is our Deep Time message not in danger? Modern Museums: The Architect's Triumph, the Conservator's Nightmare? In the short term, I should not complain. I should praise this architect, this building and this success. But in the long term there are legitimate doubts that should finally lead to another type of museum architecture.

REFERENCES

- 1 Altenhöfer, E., 'Die Alte Pinakothek in den Nachkriegsjahren. Die Rettung vor Abbruch und Verfall – Der Wiederaufbau durch Hans Döllgast 1952–1957' in *Ihm, welcher der Andacht Tempel baut, Ludwig I. und die Alte Pinakothek*, ed. K. Renger, Munich (1986) 205–235.
- 2 Burmester, A., 'Da derselbe Saal bey nur 200 schön erleuchtet ist, Zur Lichtsituation in der Alten Pinakothek' in *Jahresbericht der Bayerischen Staatsgemäldesammlungen* (1989/90) 64–69.
- 3 Benford, G., *Deep Time – How Humanity Communicates Across Millennia*, New York (1999).
- 4 Burmester, A., 'Deep Time: Ausstellen als Risiko und Notwendigkeit' in *Kunst des Ausstellens, Beiträge, Statements, Diskussionen*, ed. H.D. Huber, H. Locher and K. Schulte, Hatje Cantz Verlag, Ostfildern-Ruit (2002) 71–83.
- 5 Burmester, A., 'Der moderne Museumsbau: Konzept des Überlebens oder überlebtes Konzept' in *Museum heute* 13 (1997) 19–29; and in *Zeitschrift für Kunsttechnologie und Konservierung* 11 (1997) 192–200.