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REF: TC/73/1

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N E W S L E T T E R No. 2

1. GENERAL POINTS

1.1. Definitions

There seems to be a need to define some of our terminology better. This is certainly the case regarding "double-glazing" but other terms such as "stained glass" and "grisaille" may deserve consideration.

1.1.1. Double glazings

(a) It would seem that the term "double glazing" should be restricted to the cases where the air space between the panes is intended to be completely sealed, and remain substantially so for a long time. The space is expected to remain dry.

(b) There are at least two kinds of "external protective glazing" where modern glass (or clear plastics material) is placed outside the ancient glass in order to exclude weathering agents and/or prevent damage by stones. The air space is not sealed (so that expansion of the air should not buckle the ancient leaded glass) and rain (from outside) or condensation (from inside) may enter the space. When such protective glazing is placed outside the building, the term "external protective glazing" is perhaps a suitable one, and is certainly better than "double glazing".

(c) The other type of protective glazing is that used in Switzerland and at Nuremberg (and no doubt in many other places) where the ancient glass is removed from the glazing grooves and rehung inside the building. The modern glass is then placed in the glazing grooves and made watertight. There is a substantial space (2 cm to 5 cm) between the ancient glass and the modern glass through which the (warmed) air of the building may circulate and the intention is to create nearly isothermal conditions for the ancient glass so that condensation should not occur (Dr. Frenzel's "museum" conditions for the glass). Might this be called "isothermal protective glazing"? Or can any reader suggest a better name?

(d) Yet other kinds of external protective glazings are those where an anti-solar or "heat-resisting" glazing may be added but these are essentially similar to (b) and it is probably not necessary to invent special names for them.

(e) A special form of double glazing is that which is already well-known as "plating".

1.1.2. "Stained glass"

It has been suggested to me that the English term "stained glass" is really an unsuitable one and it would be better to call it "painted glass", thus corresponding with "Glasmalerei". There may be a possible confusion with "Hinterglasmalerei" although I should think that this is very slight.

1.1.3. Grisaille

There seem to be a variety of definitions, from glass which is grey in colour, through white glass with a grey design on it, to (apparently) any paint which is not completely opaque. Do art-historians feel that there is any ambiguity and, if so, would anyone like to send me their definition of grisaille?

1.2. Recent developments

1.2.1. Non-destructive analysis

The non-dispersive X-ray fluorescence equipment at Oxford (called the "Isoprobe" and mentioned in item 1.2.3. of News Letter No. 1) is now being calibrated in "absolute" terms using two samples of 12th century glass (one pink and one green) kindly provided by the Dean and Chapter of York Minster, and the synthetic glass No. 1. It seems that the 12th century glass at York can be analysed almost completely at a rate of about ten samples per hour without removing it from the panel, because it contains remarkably little soda and alumina (about 1% of each) and no magnesia. An improvement of the technique (by using helium) will enable any early medieval glass to be analysed, providing it does not contain too much soda.

1.2.2. Documents from the British Technical Sub Committee

Professor Hahnloser has suggested that all reports from the British Technical Sub Committee should be made available to all the Technical Committees, and this has been agreed by the British Committee of the CVMA. I hope to hear from those persons who want papers.

1.2.3. Cost of conserving painted glass

Enquiries have shown that the total cost in the UK of conserving medieval painted glass may lie between £25 and £50 per square foot according to the problems encountered, although the cost could be much more if special difficulties are met and it can sometimes be as low as £10. The corresponding figure might be 2000 to 4000 DM per square metre, similar to that quoted, on page 4 of News Letter No. 1, for the Jacobi process.

1.2.4. Constitution of the Technical Sub Committee of the British Committee

Dr. Brill has now accepted nomination as a Corresponding Member, bringing the total to 14 (3 appointed, 5 coopted, and 6 corresponding members).

2. RESULTS FROM THE RESEARCH PROGRAMME

The new Research Programme has been agreed and will shortly be available as TC/73/2.

A. Tests on protective coatings

The synthetic medieval glass (glass No. 1) mentioned on page 3 of News Letter No. 1 proved to be somewhat more durable to water than had been hoped, and a second synthetic glass (glass No. 2) is being melted.

A.1. Organic coatings. Tests have been made on two coating materials; a polyvinyl chloride (VYCOAT ACA 60) and a polymethylmethacrylate (ACRYLEK). Vycoat is twice as good as Acrylek in stopping the extraction of potassium from glass No. 1 by hot water (about 80°C) but it becomes opaque on prolonged exposure to water. Acrylek has remained unchanged after exposure to the weather for seven months (July 1972 to February 1973 and to hot water for many hours, but the extractability of potassium from the glass by this hot water through the Acrylek coating shows that caution is needed before recommending it as a protective agent on the outside of cleaned glass.

Other organic coatings which will be tested are:-

Viacryl VC 363, Polyvinyl fluoride, polyvinylidene fluoride, siliconised polyesters, and thermoplastic acrylics. Does any reader wish to suggest other types which should be included?

A.2. Inorganic coatings. Coatings made by the "dip" process (for example dipped in silicon tetrachloride and then converted by heat to silica) are considered to be unsatisfactory for outdoor exposure because sodium chloride crystals may form pinholes in the coating; they have, of course, been satisfactory in museum conditions in Mainz. Does anyone have any information to the contrary?

Radio-frequency sputtered inorganic coatings are being investigated but they are expected to cost about £100 per square foot (perhaps four times the total cost of conservation of an "easy" window, quoted in 1.2.3 above, making the conservation work five times as expensive). Vacuum-deposited coatings will also be investigated but they are expected to be similar in cost and to have two additional objections:- it may not be easy to coat the edges of the glass, and the medieval glass will need to be heated to about 250°C before the coating will adhere well.

It is understood that Professor Schröder in Mainz will investigate various inorganic coatings, in collaboration with Dr. Eva Frodl-Kraft, using the synthetic glass No. 2 as the substrate, and there will be much interest in following these results.

B. Examination of medieval glasses

B.1. Full chemical analyses. Discussions with Professor Douglas have led to the suggestion that the compositions of medieval glasses might be represented on ternary diagrams, provided some

gross simplifications are tolerated. The scheme has been applied to the analyses of glasses supplied by Dr. Brill, Dr. Eva Frodl-Kraft, and Mrs. Olin of the Smithsonian, with rather interesting results. Briefly, all oxide compositions are reduced to a molar basis; all the alkalis are then added together to give R_2O, all the alkaline earths are added to give RO, the silica is then the third coordinate. Special adjustments to the SiO_2 and the R_2O are made for the alumina; a report will be issued after consultation with those who supplied the basic information about the glasses.

B.2. Rapid partial analyses. Experiments to identify early medieval glass, by making use of the natural radioactivity of the potassium and measuring it with personal monitoring-badges, have shown promise under laboratory conditions and consideration is being given to testing the technique in a building.

C. Environmental studies

Consideration is being given to the possibility of making theoretical studies of the optimum spacing between the panels when using "isothermal protective glazing" (see 1.1.1. (c) above), and use is being made of humidity-sensing papers to monitor the humidity in the space behind the external protective glazing at York Minster.

D. Effects of abrading

The Airbrasive equipment has not yet been delivered at York.

E. Effects of paint

The technique for recovering lost painted images, using the optical technique described at the York Colloquium in September 1972, is greatly dependent on reducing reflections from the back surface of the glass. This can be helped by sticking black paper to the back of the glass using a liquid with a "matching" refractive index. Glycerine (glycerol) has been found to work well even though its refractive index is as low as 1.47. It has also been found possible to photograph "lost" inscriptions in buildings without removing the glass.

F. Accelerated post-war corrosion

Information has now been obtained about the conditions of war-time storage of the glass from Canterbury Cathedral. The glass was in unlined wooden boxes on an earthen floor and openings in the walls were closed in order to reduce bomb blast. The walls of the crypt became so wet that ancient murals peeled from them and it seems that the glass is likely to have become wet. Thus we cannot ignore the possibility that these storage conditions may have contributed to the post-war corrosion. The earthen floor has now been covered with cement and tiles; thus it is not possible to monitor the old conditions.

Some of the glass in York Minster was placed in a cavity under the City walls, and some still remains there. Steps are being taken to "monitor" this storage environment by using humidity-sensing test papers and by placing clean new glass at points where it might deteriorate.

G. Cleaning

A study is being made of the effects, on paint and enamel, of the ultrasonic cleaning bath. Eighteen pieces of glass (nine with firm paint or enamel and nine with "loose" paint or enamel) of various ages from 12th to 19th centuries, were cleaned for ½ minute, 3 minutes and 6 minutes; nearly 500 photographs were taken (most of them using a microscope) and the results are being examined by experts.

H. Adhesives

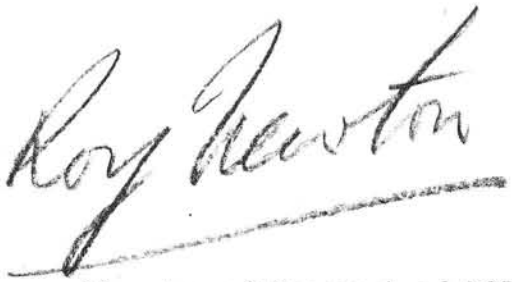
The report "La Restauration de Vitraux brises: Vieillissement accelere de Colles" written by M. J. M. Bettembourg, has aroused much interest and it has been suggested that he should coordinate all further work on glass-to-glass adhesives for use under moist conditions. Many failures of Epoxy-resin bonds, under these conditions, have been reported and it seems that it is essential to treat the glass with Siloxanes before using Epoxy-resins.

J. Miscellaneous

A standardised illuminated screen, with a brightness of about 2000 lumens per square metre, is being designed to enable glass panels to be photographed under reproducible conditions.

3. OTHER POINTS

Will readers please tell me about any other items which it would be useful to include in these News Letters?



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