Comments after the Meeting of 5th October 2010

8th October 2010

Brief summary of points raised at this meeting as I remember them.

- The unusual damage exhibited by the interior surface of many of the clear glass pieces in the East Window involves severe cracking and spalling. We believe this to be the result of attack by moisture vapour present in the internal air.
- Two principal results of this are (1) significant cracking of the affected pieces which makes it likely that these pieces would be fragmented under the stress of removal; (2) significant spalling means that much of the original glass surface and its artwork has been irretrievably lost.
- The sensors fitted to the window point to the severe effect of the radiator beneath the central lancets of the East Window. It was advised that this radiator be removed.
- Sensors on the side lancets indicate the church heating strategy does keep the air temperature above 10°C: temperatures in winter vary between 10°C and 20°C, with a slight rising trend in late spring and early summer. Relative humidity (RH) varies between 50% and 70%.
- There is no visual evidence of condensation events on the interior surfaces of the Savile Chapel windows.
- Margaret West had achieved excellent duplicate quantitative analyses of a thumb-nail sized sample from one of the crizzled pieces from the left of centre lancet. The alkali is potash, indicating forest glass possibly of northern European provenance. Calcia and magnesia contents are high and silica content is unusually low. We believe this glass composition to be inherently vulnerable to moisture attack.
- The leadwork holding the window together is assessed as near the end of its working life. Embrittlement will inevitably progress further, so the window's vulnerability to mechanical vibration will become more severe.
- In the face of mechanical vulnerability and continuing moisture attack with its resultant crizzling, it would appear that to do nothing to conserve these windows would be a high risk strategy.
- Conservation of the east window by removal, re-leading and replacement is not a viable option: it is likely that many pieces of the historic glass would be lost (as was recorded in respect of the north windows conservation in the 1970s).
- Conservation in situ was discussed: one suggestion was to install protective clear glazing both on the internal and the exterior aspects leaving sufficient gap to allow effective ventilation by external air. The likely aesthetics of this option were not enthusiastically received.
- David Gelder and David Martlew both articulated the view that the artefact of value was in fact the iconography created on the original glass

surface. Spalling had irretrievably removed a high proportion of this iconography, to the point where the window no longer functioned as an aid to worship in the chapel.

- Richard Jaques suggested that the most effective conservation strategy might be to remove the historic panels from the window opening for display in a suitably environmentally controlled display case inside the church, and to create a new window for the east end of the Savile Chapel. He undertook to discuss this option with colleagues as required by English Heritage protocols.
- It was noted that the PCC and the church congregation would need to be consulted about any conservation proposals, and especially about the replacement concept.
- The north windows were currently less damaged than the east window, although they were likely to contain vulnerable glass. The conservation proposal was to remove them for appropriate conservation then subsequently re-install them as part of a suitable isothermal glazing scheme.
- Discussion of the environmental conditions which would then be required by the historic glass hinged on what is known about damage to vulnerable glass. Façon de Venise goblets in the museum environment had suffered from "glass disease", a visible moistening of the glass surface followed by severe cracking and spalling. Studies indicated that very high RH would lead to visible droplets on the artefact's surface; if the object were subsequently exposed to atmosphere with low RH then crizzling and spalling would rapidly follow. The view was that severe hydration of the glass surface would create compressive stresses in the surface layers; subsequent exposure to low RH air would lead to moisture loss from the hydrated surface layer, causing tensile stresses which would initiate cracking and spalling.
- Professor Bob Brill of Corning Museum of Glass had measured the relative humidity of atmosphere in equilibrium with these hydrated glasses. 42% RH emerged as the critical threshold value. Since cracking was relatively rapid and irreversible, the advice was to keep the objects in RH levels above this value.
- Thornhill glass is much higher in calcia and much lower in silica than these museum glasses. No critical threshold value for RH has been published for glasses of this composition. Further research (perhaps desk-based) on this is needed to advise the design of isothermal glazing and whether the cavity should be vented to internal or external air.
- It seems clear that wide swings in RH could be seriously damaging, since drying of the hydrated surface glass would present a high risk of crack propagation and spalling. Overall it seems better to err on the side of "too moist" rather than "too dry". As far as is practicable, constancy of temperature and of RH should be the aim.