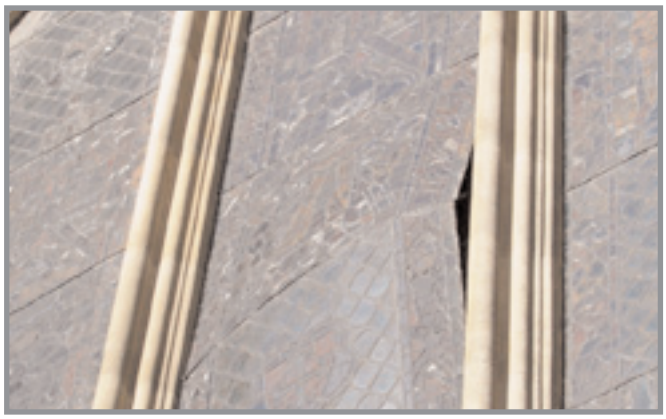
Replacing Ties in Situ: Method 2



This article follows on (although belatedly) from the article about 'Replacing wire ties in situ' in issue 38 of June 2007, where Keith Hill addressed the difficulties experienced by glaziers/conservators when faced with the task of in-situ vertical soldering and replacing failed copper ties with new ones. Here we report another method of soldering wire ties in situ.

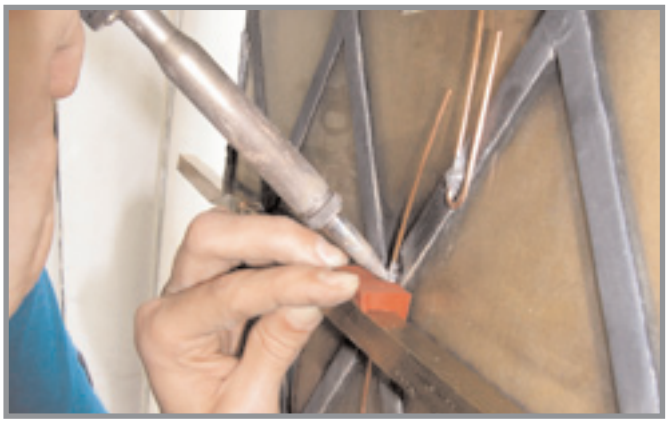
The problem arose in March 2007 when we were called to a church to rescue two panels that were in danger of falling out. The church had been hit by storms on the previous afternoon. The opening of a door on the north side of the building had caused enough air pressure to build inside, forcing the panels of glass (19th C. copy of a 14th C. window) outward from their supporting structure (photo above). In this case the existing ties were made of lead; many were weakened with age and had fractured. Fortunately, the panels were wedged (in their new alarming position) by the mullions and held by the remaining ties at the divisions. We were able to access and remove the displaced panels promptly by cherry-picker. (There was remarkably little damage to the lead and none to the glass.) Internal scaffold was erected to enable the re-fixing of this panel; this also allowed us to survey all the ties of this three-light window and its associated tracery panels. From this we counted that around 50 ties had fractured or were loose across the window. As the fractured ties were found sitting alongside stable intact ties, we decided that it would be preferable to leave the glazing bar undisturbed when fixing new ones.

The problem of in-situ vertical soldering is that one has to maintain heat on the molten solder, keeping it liquid and flowing without it all running downwards and ending up on the floor.

(top) Panels after the storm; (above) cut rubber mould; (top right) workshop trials; (above right) attached tie in place.

Our solution to the problem was prompted by a discussion with a colleague who had cast his own lead figures using a flexible heat-proof silicone rubber. We thought that this material would serve well as a mould for solder as it designed for low-melt metals up to 316 degrees centigrade. After much trial and error, we cut a mould from cold-set silicone rubber shaped so that it could be slotted in behind the square bar. This mould held a newly prepared copper tie snugly in place (with tallow flux applied) against the panel (photos below left and below).

The new tie sat about 3 mm higher than the bar. We successfully cleaned suitable lead solder joints to bright metal with a scalpel blade in preparation for the new tie, tinning the lead in preparation. We used a thinner gauge wire where the only option was to solder onto a length of lead.



Though we found we could use a small micro-flame with caution, we favoured a 110 V – 100 W iron for the safety of the glass and the building. The mould allowed us to heat the solder for as long as it was needed for good solder-to-metal contact whilst holding the wire in place with pliers. The resulting solder blobs were reliably uniform and neat (photo below). We twisted the ties and folded them back on top of the bar so they were away from the risk of snagging and out of sight.

We soldered more additional ties than might normally be the case when, working on the bench, to help provide better long-term support. One mould stood up to being used about 40 times before it started to disintegrate. The rubber could also be held in place with the fingers if needed, as it is a good insulator against heat.

We have successfully used this technique on other windows since this time. The rubber is flexible not only in its nature but is adaptable to cope with different challenges presented with each new window (Rubber - RTV 101 Silicone Rubber supplied by Tiranti).

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