SESSION: Hands-on conservation techniques: pinning and adhesives, grouting and mortar integration  

INSTRUCTORS: Stefano Volta, Gionata Rizzi, David Odgers  

DATE/TIME: Wednesday, 22nd May / all day; Thursday, 23rd May / all day

SESSION OUTLINE

ABSTRACT
Hands-on experience in a variety of stone conservation techniques is critical for putting theory into practice. In this workshop, participants learn how to implement physical repairs to damaged stone including grouting a crack, integrating an area of loss with color-matched mortar, and joining broken pieces of stone.

OBJECTIVES
By the end of the workshop participants will:

- Learn how mortar is mixed using a mortar mill
- Patch an area of stone loss with color-matched mortar, building on previous sessions in the course devoted to mixing mortars
- Repair a crack with lime-based grout and mortar
- Understand the variety of pins and adhesives available for the structural repair of stone and which materials to select depending on stone type and condition
- Repair a broken masonry unit with adhesive and pins
- Understand the variety of steel and synthetic fiber meshes available for the reinforcement of a broken stone slab
- Repair a broken slab with adhesives and carbon fiber mesh
- Gain practical experience with various methods of cleaning stone

CONTENT OUTLINE
The first day of the workshop is devoted to repairs with mortar and grout, and includes the following activities:

1. Demonstration of materials used for mixing mortars and grouts, including different types of hydraulic and non-hydraulic lime, aggregates and colorants.

2. Demonstration of mixing a typical hydraulic lime-sand mortar mixture using a mortar mill.

3. Demonstration of injection techniques for grouting a crack, including:
   a. Mixing color-matched lime-based grout using a variety of aggregates.
   b. Preparing the crack; cleaning with compressed air and flushing with water or alcohol.
   c. Use of oil-based putty to temporarily seal the crack during injection.
   d. Use of plastic tubing to control grout flow
   e. Injecting grout in stages, ensuring that the crack is properly filled.

4. Demonstration of integrating lacunae with micro-spatulas and color-matched mortar.

5. Seven work stations are prepared, each with a historic stone architectural object that requires treatment. Participants break into groups of 2-3 to practice grouting and mortar integration.
Day 2:
The second day of the workshop is devoted to learning how to join and fix a broken stone object and slab. Activities include:

1. Demonstration of the wide variety of steel and carbon fiber pins and meshes available for use in bonding and structural stabilization of stone, including:
   - Smooth, textured and sanded carbon fiber pins of various thicknesses
   - Threaded stainless steel pins
   - Woven stainless steel mesh and a variety of
     Also demonstrated are a variety of epoxies, resins and adhesives as well as filler/thickeners used for fixing pins in place.

2. Demonstration of the process of pinning broken pieces of stone, including:
   - Accurately measuring and marking locations of holes for pins on both sides of a break
   - Drilling straight pin holes using masonry drill bits
   - Mixing epoxy resin with fillers such as fumed silica, microballoons or carbon fibers to decrease viscosity
   - Ensuring a tight bond using clamps, straps, etc.

3. Demonstration of the process of repairing a broken stone slab with reinforcing mesh.

4. Following the demonstrations, participants break into groups and work on pinning, joining and fixing a broken object or slab.

READINGS

📊 = Essential reading material
📊 = Available online


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