Microstructural Investigation of Mortar/Unit Interaction

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Abstract:

The bond between mortar and a masonry unit is controlled by mechanisms at the microstructural level. IRA, unit porosity, unit surface texture, and the character of the mortar/unit interface all affect bond strength and all are controlled by the material structure at the micron-level. In this study, a microstructural approach was used to investigate the dominant mechanisms of bond in masonry. A variety of materials characterization techniques were utilized, including mercury intrusion porosimetry, microscopy and image analysis, to probe the issue of masonry bond. The study revealed important aspects of the nature of the units, mortars, interfaces and the interaction of mortar with the units. Two competing mechanisms, created by water transport in masonry, were found to have a significant impact on bond strength. These are densification and dewatering. Densification consolidates solid phases and curbs bled water at the interface, thereby enhancing bond. However, dewatering limits water for hydration and creates air voids in the mortar as water is removed, reducing bond.

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