



SACoMaTiS 2008

International RILEM Conference

1-2 September 2008 Varenna (LC)
Como Lake – Italy



POLITECNICO DI MILANO

www.sacomatis.org

on Site Assessment of
Concrete, Masonry and Timber

IN SITU MECHANICAL CHARACTERIZATION OF THE MORTAR IN MASONRY BUILDINGS WITH DRMS

Emanuele Del Monte (1) and Andrea Vignoli (1)

(1) DICeA, University of Florence, Italy

Abstract

This paper presents the first results of a research project carried on to validate a Non Destructive Test (NDT) to determine the in situ mechanical characteristics of mortar in historical masonry buildings. On the basis of the compositions of historical mortars, the most common used in Tuscan buildings, there were produced 15 types of mortar with different mechanical characteristics, obtained with 5 classes of lime (hydraulic and aerial) and river sand with 3 grading curves. For each class of mortar there were obtained 15 samples, 6 of which were subjected to flexural and compression tests and the other 6 to the Drilling Resistance Measurement System (DRMS). The DRMS is the device that performs the drilling and measures the resistance to the perforation of the material object being tested. During the test the resistant force to the perforation is measured with continuity, maintaining constant the rotational speed and the penetration rate. The result is a curve that shows the drilling resistance profile. The goal of this research project is to validate a correlation between the sizes measured through DRMS and the mechanical characteristics of mortar in masonry buildings.

1. INTRODUCTION

The mechanical characteristics of mortar in masonry buildings affect the load bearing capacity of the structure under gravitational loads and horizontal actions, such as seismic action. All Standards national [1] and international [2] define the parameters of masonry, such as the compression and shear strength, depending on the mechanical properties of the elements: bricks or stones and the mortar. In the new buildings this method has no particular difficulties. In fact it is possible to estimate the mechanical characteristics of the components of masonry through simple laboratory tests carried out according to the Standards [2] and [4]. Assess the load bearing capacity of existing buildings it is certainly more complex, because it's impossible to take samples of mortar to perform tests of mechanical strength. Therefore, to assess the mechanical properties of mortar it is necessary carry out in situ tests, but for now there aren't Standard tests. Physical methods such as thermal, x-ray diffraction and granulometry analysis, chemical methods and petrographic section analysis have been codified in the Standards, but they only provide qualitative information on the composition of mortar (binder and aggregate). Moderately destructive methods for the determination of mortar load capacity are described in technical literature, however. Those techniques are penetration tests carried out on mortar joints and there are percussion and rotation methods.