

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama", Belgaum - 590 014



A Dissertation report on

"CHARACTERISTICS OF MASONRY BIOBLOCKS"

(KSCST FUNDED PROJECT)

Submitted in partial fulfillment of the requirements for the award of the degree of

Master of Technology

in

Structural Engineering

For the Academic year

2013-2014

By

RAVITHEJA.K.S

1RV12CSE16

4th semester, M.Tech (CSE)

Under the guidance of

Dr. RADHAKRISHNA

Associate Professor and Dean PG studies



Department of Civil Engineering,

R. V. College of Engineering,

BENGALURU - 560 059

ABSTRACT

Burnt clay bricks and concrete blocks are the most commonly and extensively used masonry units in the construction industry. The burnt bricks require fertile soil and thermal input whereas cement blocks are not sustainable. Hence there is a need to find an alternative to these traditional masonry units. The use of bioblocks would have technical and positive economical impact on the growth. The compressed blocks can be the better replacement to these masonry units and have gained popularity around the world. Microbially induced calcite precipitation (MICP) is a metabolic process which occurs in some bacteria to precipitate calcium carbonate and is an eco-friendly process. The reported literature is mainly focused on the use of bacteria into cement mortar and concrete. But there is no research reported on the addition of bacteria into compressed masonry blocks.. In the present study, compressed masonry blocks were cast with and without adding bacteria and tested for various properties and compared with that of the conventional blocks.

Bacillus Sphaericus and *Sporosarcina Pastuerii* are the two bacterial strains used in this research which were obtained from Microbial type culture and collection gene bank (MTCC), Chandigarh. These bacteria were considered for the study due to many advantages. The bacterial solution was prepared and the same was used to prepare the bioblocks with an optimum concentration of 10^6 cells/ml. The traditional cement blocks were also prepared for the purpose of comparison. The blocks were tested for various properties such as compressive strength, water absorption, Initial rate of absorption (IRA), modulus of elasticity, flexural strength, bond strength, prism strength and the results obtained were analyzed and compared with that of the conventional blocks.

The experimental results indicate that the dry density of bioblocks was higher than the conventional blocks. The compressive strength of the bioblocks initially at 7 days of curing was lesser but at the age of 28, 56 and 90 days, the bioblocks attained higher strength than the conventional block. The percentage of water absorption and IRA of the bioblocks were lesser compared to the conventional blocks and was in the range of 7 – 10% and 2.4 – 3.25 kg/m²/min which satisfy the codal requirements. The flexural strength, bond strength, prism strength and modulus of elasticity of the bioblocks were found to be higher than that of the conventional blocks. Among the two types of bioblocks, the *Bacillus sphaericus* block was found to be performed better than the *Sporosarcina pasteurii* block. Hence the masonry bioblocks can be recommended as masonry units for structural masonry and thus sustainability would be achieved.