Title : Evaluation of Capacity and Performance of Rock Anchor Bolt for an Underground Defence Project

Sponsoring Agency: L&T Construction, Chennai

Project Leader: Dr. Saptarshi Sasmal

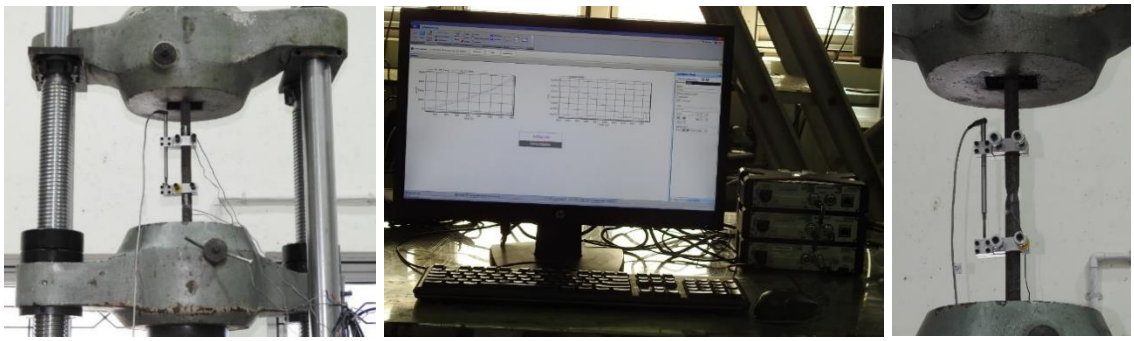
Team: Dr. V. Srinivas, Dr. Nawal Kishor Banjara, Dr. B. S. Sindu, Mr. M. Kannusamy

Scope/Objectives:

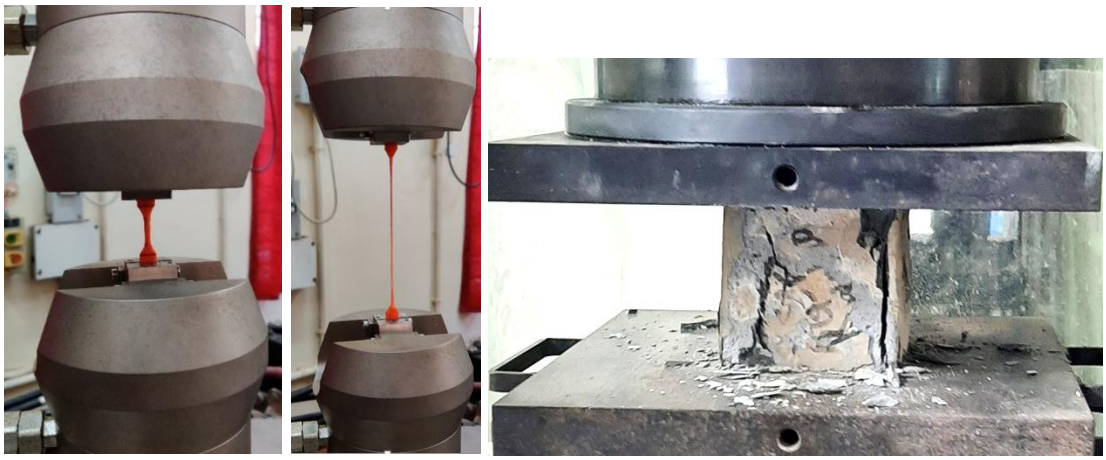
1. Rebar testing as per IS 1786
    - Mechanical Properties (yield strength, tensile strength, elongation at the maximum force, total elongation, stress strain curve
    - Chemical analysis consisting of chemical content
2. Mechanical properties of Plastic duct (tensile strength, elongation at break)
3. Grout testing
    - Compressive strength
    - Bleeding conforming to ASTM or equivalent standards
4. Rock bolt capacity testing
    - Testing for bond strength between steel and grout
    - Testing for bond strength between grout and sleeve
    - Testing for bond strength between grout and rock
5. In-situ pull out strength test to determine the capacity of rock bolt (the testing will be done by L&T under the supervision of CSIR-SERC with additional measurements as found necessary)
6. Comprehensive technical reports for both the tests with recommendations

Objectives Achieved/ Progress made:

In this study, the laboratory tests carried out in CSIR-SERC on different specimens and in-situ tests carried out on rock anchor bolts at L&T site as per the client specified locations. The works are carried out based on the scope and objectives formulated for the project. The material properties of each individual material, namely, grout (bleeding and compressive strength), steel rebar (chemical analysis and tensile properties), plastic duct (tensile properties) are determined from the detailed laboratory tests. Then, the bond properties between different interfaces on the rock anchor type assembly, i.e., rock-grout, plastic duct-grout, and steel rebar-grout are evaluated based on the laboratory tests carried out as per the relevant codal provisions/literature. The details regarding specimen geometry, test set-up, instrumentation, relevant codal provisions, observed results from the laboratory investigations are presented. The details regarding the in-situ tests on the selected anchors carried out and the results obtained from the in-situ tests are also presented.



(a) (b) (c)



(d) (e) (f)

(g) (h)

Fig. 1: Laboratory investigations of the material used in rock anchor bolt for underground defence site