



CIVL2201 Structural Mechanics

Laboratory Instructions – Material Properties

General Instructions

Students will experience basic material property testing in this demonstration. **In the tutorial session of Thursday 19 March 2009**, groups of approximately 20 students will observe a tensile coupon and a concrete cylinder test, and will be required to write a small report on the procedure and will perform some calculations. **Groups are according to your tutorial group and the times will be allocated in the weekly email update.** In order to achieve approximately equal groups, in which all participants can get a close look at the test method, **students are required to attend at the time assigned.** Guidance on how to write a report will also be given. **There may be an exam question related to the experimental work.**

Safety in the laboratory

- Please take care.
- Please obey the instructions of any staff and any safety notices.
- **Enclosed shoes must be worn or you will be told to leave (no bare feet, thongs or sandals).**
- Please do not touch any equipment not connected with the experiment you are performing. The laboratories are used to conduct commercial and research tests and interference with these tests could have serious consequences.
- Some of the items in the laboratories maybe dirty, dusty and greasy. It is suggested that students may choose to wear clothing appropriate for such a location.

Reports

Each student is to submit a written report on the session. Writing a technical report is a very important generic skill for any engineer. It is realised that many students will not have had much prior experience in preparing such reports. Hence a Microsoft Word template will be provided to help students. Students do not have to use the template if they do not wish, are not obliged to prepare a typewritten report.

A preliminary submission of the graphs from your lab class should be shown to your official tutor during the session on Thursday 2 April. This is to help find any mistakes prior to submission. Final laboratory reports are to be submitted by 2 pm Thursday 9 April 2009 to your tutor. Students should note that the analysis of the results and preparation of the report may take 6 hours. Students should use the Assignment cover sheet available from the web site.

There is a separate instruction sheet on the requirements of a laboratory report. It is assumed that any submissions satisfy the School of Civil Engineering and University of Sydney academic honesty requirements as given at <http://www.civil.usyd.edu.au/current/undergraduate/honesty.shtml>. **Copying and pasting data from the report or spreadsheet of any current or former student is academic dishonesty.**

Peer Report Assessment

Since analysing the reports of others is an important skill, in addition to the report, students are to swap their report with a colleague who will then read and assess the report. An assessment sheet will be provided, and students will be asked to make comments on the quality of their colleague's report. The pair of reports/assessments should then be handed in together so the lecturer will know that you have both submitted a report, and assessed another. This is a serious exercise, and a portion of your own marks will be related to the quality of the assessment you give.

Tensile Testing of a Steel Coupon

A steel tensile coupon will be tested in the Sintech Testing Machine. This machine is electrically powered and screw driven, with a capacity of 300 kN. The procedure is similar to that given in Section 4.7 of the Lecture Notes. A computer screen will display a continuing record of the load vs displacement (which is related to stress and strain). After the experiment a data file will be provided which contains typical information obtained from such a test – containing the raw load and deflection readings at regular time intervals.

Students should examine the specimen closely before the test, make appropriate sketches of the test equipment, take notes concerning the test procedure, and note any important occurrences during the experiment. The failed specimen should be examined. The relevant Australian Standard is AS 1391 – 1991 - Methods for tensile testing of metals.

Concrete Cylinder Testing

A concrete cylinder will be tested in the DARTEC Testing Machine. This machine has a capacity of 2000 kN. A computer screen will display a continuing record of the load vs displacement (which is related to stress and strain). After the experiment a data file will be provided which contains typical information obtained from such a test.

Students should examine the specimen closely before the test, make appropriate sketches of the test equipment, take notes concerning the test procedure, and note any important occurrences. The failed specimen should be examined. The relevant Australian Standard is AS 1012.9-1999: Methods of testing concrete - Determination of the compressive strength of concrete specimens.

Report

A technical report on the procedure and results of the experiment is required. At a minimum, the report should contain the following information

- A description of the test procedure including sketches of the testing apparatus.
- Stress strain curves for both the steel and concrete.
- The results should include the elastic modulus (E), yield stress (f_y) and ultimate strength (f_u) of both samples (are these really applicable for the type of behaviour observed?).
- The format of the report should follow the guidelines given on the accompany information sheet on “How to write a laboratory report”
- To aid students, a Microsoft Word template will be provided. This will be on the Structural Mechanics web site. Students do not have to use the template if they do not wish, and are not obliged to prepare a typewritten report.

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