

IMC Students' Challenge

Competition for the prediction of the
behaviour of masonry prisms

2nd Announcement
July 2013

1 Introduction

The “**IMC Students’ Challenge**” is an initiative of the Organizing Committee of the 9th International Masonry Conference, and will be held in Guimarães, Portugal, during July 7-9, 2014. This competition is sponsored by EuLA - the European Lime Association.

The objective of this competition is to predict the maximum compressive load of two types of masonry prisms built with solid and hollow bricks, using mortared joints. The prisms will be constructed in the Structural Lab of the University of Minho, three months before the conference, and tested during the conference with an eccentric loading condition. The tests are open to all participants. The detailed description of the geometry, bricks, mortar, testing conditions, as well as all the relevant material properties, will be sent by the Organizing Committee to the participating teams in due time.

This document gives a first outline of the rules and regulations of the competition. Additional information will be made available in September 2013.

2 Objective

The objective of this competition is to predict the maximum average compressive load of a series of masonry prisms. The team with the closest prediction of the maximum average compressive load wins the competition. However, the quality of the submitted report (maximum 10 pages + annexes) also gives credits.

3 Specimens

Two types of prisms will be built: a) three solid brick prisms and b) three hollow brick prisms. The compressive tests will be carried out with an eccentric load in a displacement control testing machine at constant velocity, see Figure 1. The load will be recorded together with the displacements at the prisms’ faces. The boundary conditions will be kept the same for the two series of test specimens. The tests will be conducted at 90 days after the specimens’ construction.

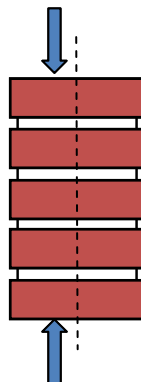


Figure 1 – Test setup for the two series of prisms

4 Deliverables

Each team should send a report with the predicted response, describing the adopted hypotheses, methods used, calculations and estimated collapse values. The principles and the theoretical background supporting the response predictions, the innovative character of the analysis, the creativity and the theoretical soundness will also be evaluated. Students are encouraged to use a formal and scientific style in their reports.

The winning team will give a short presentation about their work, focusing on the most important aspects of their theoretical analysis and models.

Prior to the conference, each team must submit the following three documents in pdf format:

- The registration form
- The report paper (10 pages maximum)
- A poster with A1 size (59.4 x 84.1cm, 23.39 x 33.11 inches)

The registration form must be sent until 31st of October, 2013. The report paper and the presentation must be sent to the conference organization before 15th of June, 2014.

During the conference, team members have to present the printed poster on a special Poster Session dedicated to the “**IMC Students’ Challenge**”.

5 Teams

Each team must consist of not more than three students currently enrolled in a MSc or PhD program. All members of a given team must belong to the same institution. A student may not be a member of more than one team.

Each team must have a supervising institution advisor, who will verify that the students’ team complies with the rules of the competition. The institution advisor is permitted to supervise not more than one team.

At least one team member designated to represent each team must be present at the IMC Students’ Challenge, which will take place during the 9th International Masonry Conference, to be held in Guimarães, Portugal, July 7-9, 2014. During the IMC Students’ Challenge team members can take part in the lab tests.

6 Materials & specimens geometry

The properties of the materials to be used in the specimens, together with the specimens' geometry will be given by the organizing committee to all teams, namely:

- Dimensions for the bricks and mortar joints;
- Density of materials;
- Compressive and flexural strength of the masonry units (including load displacement curves);
- Compressive and flexural strength of the mortar, according to the European standard EN 1015-11 (including load displacement curves). The mortar tests will be carried out only at 14 and 28 days after building the prisms, whereas the prisms themselves will be tested at 90 days for the challenge;
- Specimens' boundary conditions;
- Test procedures, such as sensor locations for data acquisition and load application points.

7 Time Schedule

The chronogram for the competition, including the testing procedure, is the following:

- Reception of the registration forms: up to the 31st of October, 2013;
- Reception of the report-paper and presentation from the participating teams: up to the 15th of June, 2014;
- Specimens testing at the University of Minho Structural Laboratory: 7th of July, 2014
- Poster presentation (A1 size) during the conference sessions 7-9 July, 2014;
- The winners' announcement: 8th of July, 2014.

8 Evaluation

The evaluation will consider two main aspects:

- Criterion A is related with the objective quantification of the estimated maximum load obtained by the two specimens, given by a maximum of 20 points as the average of the two predictions: $20 \times [1 - \text{abs}(1 - \text{Estimated Force} / \text{Experimental Force})]$, rounded up to an integer; and
- Criterion B is related with the evaluation of the reports by the Scientific Committee of the competition, given by a maximum of 20 points, rounded up to an integer.

The final grade is given by the following formula:

$$\text{Final Grade} = 2 \times \text{Grade of Criterion A} + 1 \times \text{Grade of Criterion B}$$

In case of equal scores, the grade on Criterion B ranks the teams.

9 Prizes and awards

The results of the competition, winners and a brief summary of the proposals submitted will be published in the IMS web page and in the newsletter of the Institute for Sustainability and Innovation in Structural Engineering (ISISE). This publication will give visibility and emphasize the most creative and innovative aspects of the teams' work.

The winning teams will be awarded with the following prizes:

- 1st Prize: € 750 (seven hundred and fifty euro);
- 2nd Prize: € 500 (five hundred euro);
- 3rd Prize: € 250 (two hundred and fifty euro).

The 1st Prize team must give a 5 minutes presentation emphasizing the most important aspects of their work. This presentation will be given in the prize ceremony of the IMC Students' Challenge during the 9th International Masonry Conference (8th of July 2014).

Honour mention certificates may be granted to participating teams that, although not winning, are selected for having submitted outstanding proposals considering the main evaluation parameters referred earlier.

10 Support and Grants

50% reduction on student registration fees will be available to the first twenty team members that register to the conference. Additionally, the first eight teams that submit the registration form will have a grant of € 500 (five hundred euro) per team for traveling and accommodation (this applied only for the first team of a given institution).

Guimarães, August 2013

The Challenge Organizing Committee

Luís F. Ramos, University of Minho

Ad Vermeltfoort, Eindhoven University of Technology

Paulo B. Lourenço, University of Minho

IMC Students' Challenge

Registration Form

(Please use caps letters)



European
Lime
Association

Name of the Team: _____

Supervising Institution Advisor Name: _____
(Corresponding student and the one to attend the IMC)

Institution: _____

Address: _____

Country: _____

E-mail: _____

Telephone: _____ Telefax: _____

1st Student Name: _____
(Corresponding student and the one to attend the IMC)

PhD Student ☐ MSc Student ☐ Telephone: _____

E-mail: _____

2nd Student Name: _____

PhD Student ☐ MSc Student ☐ Telephone: _____

E-mail: _____

3rd Student Name: _____

PhD Student ☐ MSc Student ☐ Telephone: _____

E-mail: _____