

SAFETY PROCEDURES FOR THE STRUCTURES RESEARCH LABORATORY (SRL)

Issue 2.0

1. Safety Officers 2011-2012

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2. Risk Assessment and COSHH Forms

A Risk Assessment form must be completed before any activity or experiment can commence. Blank electronic forms are available from the Departmental Safety Officer or the Chief Technician. Advice on how to complete them can be obtained from the Departmental Safety Officer and/or the Chief Technician, and/or the Local Officer Responsible for Safety (LORS) or, for students, from their supervisors.

When the form is completed and approved by the Safety Office, a copy should be taken and given to the Chief Technician so it can be kept as a lab record: a copy should also be given to the LORS. If the risk assessment includes chemicals or hazardous substances, then a Control of Substances Hazardous to Health (COSHH) form will be required as well. These are available from the Departmental Safety Office.

3. Personal protection equipment

Hard hats should be worn whenever:-

- the overhead crane or forklift truck are being used to lift above 2 m
- anyone is working above 2 m.
- a risk assessment has highlighted the need.

Safety footwear should be worn by :-

- All technicians at all times.
- 4th year project students who will be spending extended time in the SRL constructing rigs or carrying out tests.
- post-graduate research students spending extended time in the SRL constructing rigs or testing.
- members of academic staff spending extended time in the SRL constructing rigs or testing.
- a risk assessment has highlighted the need.

Overalls should be worn:-

- When an open heat source is used e.g. welding, gas cutting.
- When loose clothing is worn and there is a danger of it getting caught in machinery.
- When a risk assessment highlights the need.

Eye protection should be worn:-

- When using any workshop equipment.
- When there is a danger of flying objects.
- When testing is being carried out.
- When a risk assessment highlights the need.

Face masks should be worn:-

- When using any cements or powders.
- When cutting dust producing materials eg ceramics or CFRP (special mask required)
- When a risk assessment highlights the need.

4. Working at heights

Working from ground level up to 2 m can be done with no significant risk of falling, or of falling objects posing serious risks. Hence, no special precautions need be taken unless the Risk Assessment has identified other requirements.

Working above 2 m from ground level. The SRL will be declared a hard hat area and notices placed at all entrances informing people of this. Approved ladders and forklift attachments should be used only by competent, authorised personnel.

Working above 3 m from ground level. All personnel working above 3 m must also wear a safety harness.

5. Lasers and radioactive sources

All users of lasers and radioactive sources have to register with the Department Laser/Radiation Officer. A risk assessment has to be carried out before using any lasers.

6. Design of Meccano test rigs (see also Appendix A)

Test rigs should be designed according to EuroCode 3 for Steel. A yield stress of 200 N/mm² should be assumed for beams and all bolts are 8.8 grade, unless they can be shown to be stronger (e.g. by selecting higher strength bolts, which have a special mark). In general, a safety factor of 3 on the most severe load case should be used. All calculations should be checked and signed by the project supervisor.

In particular, care should be taken not create a mechanism in your loading arrangement.

Once the test rig has been constructed, it should be shown to a competent person who has not been involved in its design, usually the LORS, in order to identify any unforeseen failure modes. They should sign off against the Risk Assessment.

All newly constructed testing rigs should be either proof tested to a load of 1.5 times the most severe load case or, if this is not practical, the performance of the rig during a test that reaches the most severe load should be carefully monitored.

The above information should be recorded and attached to the Risk Assessment.

7. Forklift and overhead crane

The forklift and crane should only be used by persons who have taken and passed the relevant training course. A list of drivers / operators for the Department is held in the Departmental Safety Office. Local operators are as follows.

Forklift

Martin Touhey

Phil McLaren

Crane

Martin Touhey

Phil McLaren

8. First Aid

A First Aid box is located by the sink at the north end of the SRL. There are lists of all departmental First Aiders located by the First Aid box and on the SRL office door, with instructions on how to contact these people.

The nearest local first aiders are:-

Martin Touhey/Peter Knott in the Structures Research Lab office Tel. 32612

9. Fire

- If you discover a fire:

Immediately operate nearest fire alarm call point, leave the building and go to the Assembly Point. Outside working hours go to the Enquiry Office or Telephone Security on 31818.

Only attack the fire, with the appliances provided, if you know how to use them correctly and without taking personal risks.

- Evacuation procedure:

Intermittent alarm: on hearing this all persons should continue with what they are doing and be in readiness for further instructions. Do not move from the area you are in, you may be walking towards the fire.

Continuous alarm: on hearing this all persons in the Structures area should leave by the nearest exit and proceed to the assembly point at Coe Fen.

In the event of evacuation message being given remember:-

**USE THE NEAREST AVAILABLE EXIT
DO NOT USE LIFTS
DO NOT STOP TO COLLECT PERSONAL BELONGINGS
DO NOT RE-ENTER THE BUILDING UNTIL TOLD TO DO SO**

10. Out of hours working

Because of the risks involved in working when technicians are not around *no construction of testing rigs are to be carried out outside normal office hours*. Generally, testing is also not allowed outside office hours unless continuity demands it, for example, for fatigue or creep testing: *in such cases, written permission must be obtained from the project supervisor; also see note 10 below*. Normal office hours are 8.00 am to 5.00 pm Monday to Friday, except Departmental Holidays. Outside of office hours, the SRL is alarmed for security purposes.

If an emergency occurs out of hours, help can be obtained from central security by calling 31818 on any internal phone.

11. Experiments left running unattended

Any experiment left running unattended e.g. a fatigue test, must have instructions clearly displayed, on what to do in the case of an emergency.

These should include :-

- How to shut down the experiment safely.
- Location of emergency stop button and mains isolator.
- Contact number for person conducting the experiment.
- Contact number for the supervisor.

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APPENDIX A

Designers of tests should supply a set of calculations for the test rig (or a cross-reference to either a standard test machine safety case or a set of calculations carried out for the same test rig for a similar set of tests). These calculations should accompany the Risk Assessment form, and should be countersigned by the supervisor.

The calculations should make reference to (or explicitly state that the hazard is not applicable):-

1. The strength of the test frame under the designed loading, including its overall robustness and stability.
2. The measure taken to ensure that the desired load cannot be exceeded. If it is not possible to limit the load, the test rig must be designed for the maximum load that the system is capable of applying.
3. The expected failure mechanisms of the test frame and the consequences should any component fail (e.g. excessive deflection of the Meccano, fatigue failure of a frame bolt, failure of a floor bolt).
4. The construction method for the test frame (to be countersigned by the Chief Technician).
5. The method of moving the specimen into the test rig, and out of it after failure. Specimens that are heavy, awkward or out of reach of the crane, or which rely on the use of the fork-lift truck must have this section completed. The limits of the weights that can safely be manhandled must be complied with.
6. The expected failure mechanism of failure of the test specimen, and any possible alternative mechanisms should be identified. If any of these are brittle, or if the failed specimen will need containment, this should be identified. Any consequences of the expected (or possible) failure mechanisms which may have safety implications (such as specimens dropping or moving in unpredictable directions) should be identified.
7. If any adjustments will be needed to the test rig or the specimen after the test has begun, these must be possible without any risk to the operator. Safe means of doing the work must be identified, but if possible such operations should be avoided.
8. Wherever possible, measurements of or on the specimen should be carried out by instruments that can be monitored remotely. If it is necessary to inspect the specimen closely during the test (for example to detect crack patterns or to reposition a gauge), safe means of carrying this out should be identified on the assumption that such operations may need to be carried out when the specimen is on the point of failure.

The list of examples quoted above should be regarded as illustrative, not exhaustive.

CJ Burgoyne