GENERAL HEALTH AND SAFETY RISK ASSESSMENT FORM

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| --- | --- | --- | --- | --- | --- | --- |
| Site | **Various** | **Department** | **School of Metallurgy and Materials** | | **Version / Ref No.** | **1** |
| **Activity Location** | **At a variety of indoor locations as a workshop activity** | **Activity Description** | Designing a helmet - Chocolate impact testing and UV colour changing beads | | | |
| **Assessor** | **Chris Hamlett** | **Assessment Date** | **21/03/2023** | **Date of Assessment Review** | **21/03/2024** | |
| **Academic / Manager Name** | **Alessandro Mottura / Irina Hoffman** | **Academic / Manager Signature** |  | | | |

| Hazard Assessment | | | | | Control Assessment | | | | | | | | | | Actions | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hazard Category | Hazards Identified | Who might be harmed?  Staff  Students  Contractors  Others | How might people be harmed? | Existing Control Measures | | Initial Risk Rating | | | Are these adequate?  Yes/No | Changes to/ Additional Controls | Residual Risk Rating | | | Owner | | Due  Date | Action Complete |
| S | L | R | S | L | R |
| Venue specific risk assessment: | | | | | | | | | | | | | | | | | | |
| Site specific risks | These could vary from uneven surfaces | Staff, students, visitors | This depends on the specific location – risks will be identified on location and y prior discussions with the event organiser. | * Advise will be sought from the event organiser and local risks assessments adhered to | | 1 | 1 | 1 | Yes |  |  |  |  |  | |  |  |
| Activity specific risk assessment: | | | | | | | | | | | | | | | | | |
| Impact injury  - Intro  - Activity 1 | * Dropping the bars of different materials (Intro) * Striking finger with hammer (Activity 1) | * Demonstrators * Participants * Audience | **Introduction**  Handlers may drop the bars of material which may then drop onto their foot (or strike another body part)  **Activity 1**  The user may miss the protective D30 with the hammer and hit themselves in the finger – Activity 4e | **Introduction**   * The bars of materials are only 25cm long and so are not too heavy. * The participants will be warned of the heavier ones (iron) * The demonstrator will ask the participant before handing them the bar and, if deemed necessary, help the participant by helping to support the bar.   **Activity 1**   * Only demonstrators will be allowed to carry out the hammer / science putty demonstration. | | 1  3 | 2  1 | 2  3 | Yes  Yes |  |  |  |  |  | |  |  |
| Slips  - Activity 2 | Loose UV colour-changing beads | * Demonstrators * Participants * Audience | **Activity 2**   * Slipping on spiled UV colour changing beads | **Activity 2**   * Keep the UV-colour changing beads in a sealed, plastic petri dish * Sweep up any loose beads if the petri dish breaks | | 1 | 1 | 1 | Yes |  |  |  |  |  | |  |  |
| Eye damage  - Activity 2 | UV torch | * Demonstrators * Participants * Audience | * By exposure of their eye to the UV torch | * Verbal and (where appropriate) visual warnings not to look at the torch * Use a long wavelength torch | | 3 | 1 | 3 | Yes |  |  |  |  |  | |  |  |
| Choking hazard  - Activity 2 |  | * Participants | * By swallowing the UV-colour changing beads | * Keep the UV-colour changing bead in a sealed petri dish | | 3 | 1 | 3 | Yes |  |  |  |  |  | |  |  |

**:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cuts  - Intro  - Activity 1 | Intro  Sharp edges on bars / pipes of material (Intro)  Impact tester blade  (Activity – see diagram 1) | Ambassadors, children , visitors | **Intro**  By cutting their hands on any sharp edges left on the bars / pips after machining  **Activity 1**  By their hand being stuck by the blade of the impact tester | **Intro**   * Check bars / pipes beforehand to check for sharp edges and only bring smooth edged samples   **Activity 1**   * Warn participants of the risk of hand injuries beforehand * Do not allow visitors to use the tester * Correct safety signage must to be shown/seen at all times * The blade is not sharp | 2  2 | 1  1 | 2  2 | Yes  Yes |  |  |  |  |  |  |  |
| Allergic reaction    - Activity 1 | The ingredients in food-based samples (e.g., nuts, dairy) | Ambassadors, children , visitors | Allergic reaction to eating the chocolate bars | * Find out about any allergies in advance if possible and do not use specific chocolate bars if required (e.g bars containing nuts of gluten) * Prominent signage indicating allergens must to be shown/seen at all time. * Packaging of chocolate bars kept for the participants to check allergens * The chocolate bars will be commercially available and the packaging retained in order for participants to check allergens. * Printed and verbal warnings advising against eating samples after testing by those allergic to contents. * Provide alcohol-free hand sanitiser so participants can clean their hands before and afterwards to avoid contamination to other areas. * Good housekeeping practices must be completed after every testing by wiping down the equipment between tests. | 3 | 1 | 3 | Yes |  |  |  |  |  |  |  |

**Appendix 1 – Proformas for activities (and possible extensions) for the ‘Designing a helmet’ workshop**

*Worksheets to be handed round the class / group at the start of the session*

**Introduction**

The demonstrator will introduce materials and bars of different materials may be passed round for the participants to handle.

Bars of the following materials may be used:

* Iron
* Steel
* Aluminium
* Carbon Fibre Reinforced Composite
* Wood
* Perspex
* Polypropylene (PP)
* Polytetrafluoroethylene (PTFE)
* Copper tube

**Risks (introduction)**

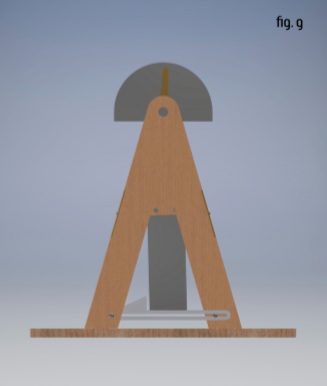
Crushing injury – if sample is dropped on someone’s foot (be careful when passing the sample around).

*Half of the class will do Activity 1 whilst the other half do activity 2. They the swap over after about 15 minutes.*

**Activity 1 – Chocolate Impact testing (choosing which chocolate to use in a crash helmet)**

*(Assemble the impact tester in advance of the session - see separate instructions)*

* Introduction the concept of toughness and how materials behave at different temperatures
* Calibrate the chocolate impact tester ensure the dial reads ‘zero’ when the pendulum is swung with no sample present)
* Measure the energy absorbed by three different chocolate bars at two different temperatures by using the tester as follows:



1. Raise the impact testing blade and hold
2. Place a chocolate bar on the rails of the tester
3. Release the blade.
4. Read off the energy absorbed on the dial

**Diagram 1. Diagram of impact testing blade**

*As a follow on the shock absorbing properties of D30 may be shown*

* Place your hand (or mobile phone) on a stable, flat (non-porous) surface
* Make a bridge of Science Putty and place if over your finger
* Hit the bridge of putty with the hammer
* Stretch the putty slowly (draws easily into a string)
* Remodel it into a ball / rods and then get the audience to try to pull it apart quicky (it should snap)
* Then show how this has been applied to PPE by showing the knee pad
* Get them to gently bend the knee pads and then try to hit the knee pad (with fist or hammer)

**Risks**

Impact injuries – when using the hammer to demonstrate the material’s properties.

**Activity 2 – UV Colour changing beads (choosing a material to use as a visor)**

Introduce UV light and then set the challenge of what the group should make a visor out of.

Split the pupils into groups of 2

**Activity:**

* The pairs are provided with
  + 2 x sealed petri dishes containing UV colour changing beads
  + A UV torch
  + Sheets of different materials (paper, cellophane, foil)
  + A UV index chart will be included in the worksheet
* The pupils place a sheet of material on top of the petri dish and shine than UV torch on it for 10s
* They then take the sheet away and immediately compare the colour of the UV colour changing beads to the colour chat and write down the corresponding UV Index rating (the higher the number the worse it is at absorbing UV light).
* They wait until the beads have returned to their original colour and repeat with a different sheet material.

**Risks**

* Eye damage – from UV torch. UV torch is long wavelength (395nm) but do not shine in people’s eyes!
* Slips on spilled beads – Clear up any spilled UV colour changing beads immediately
* Choking hazard – do not swallow beads

**Activity 3 (all pupils at once)**

* The pupils will then work on their own, or in pairs, to design a crash helmet and decide which chocolate bar will be best for the helmet and which sheet material to use for the visor.

**Risk Assessment Guidance**

Risk Scoring System

The scoring system is provided as a tool to help structure thinking about assessments and to provide a framework for identifying which are the most serious risks and why.

|  | **Consequence / Severity score (severity levels) and examples of descriptors** | | | | |
| --- | --- | --- | --- | --- | --- |
|  | **1** | **2** | **3** | **4** | **5** |
| **Domains** | **Negligible** | **Minor** | **Moderate** | **Major** | **Catastrophic** |
| **Impact on the safety of staff, students or public (physical / psychological harm)** | Minimal injury not requiring first aid or requiring no/minimal intervention or treatment.  No time off work | Minor injury or illness, first aid treatment needed or requiring minor intervention.  Requiring time off work for <3 days | Moderate injury requiring professional intervention  Requiring time off work for 4-14 days  RIDDOR / MHRA / agency reportable incident | Major injury leading to long-term incapacity/ disability (loss of limb)  Requiring time off work for >14 days | Incident leading to death  Multiple permanent injuries or irreversible health effects |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Likelihood score** | **1** | **2** | **3** | **4** | **5** |
| **Frequency** | **Rare** | **Unlikely** | **Possible** | **Likely** | **Almost certain** |
| **Broad descriptor** | This will probably never happen/occur | Do not expect it to happen/occur but it is possible it may do so | Might happen or occur occasionally | Will probably happen/occur but it is not a persisting issue | Will undoubtedly happen/occur, possibly frequently |
| **Time-framed descriptor** | Not expected to occur  for years | Expected to occur  at least annually | Expected to occur at  least monthly | Expected to occur at least weekly | Expected to occur at least daily |
| **Probability**  Will it happen or not? | <0.1 per cent | 0.1–1 per cent | 1.1–10 per cent | 11–50 per cent | >50 per cent |

The overall ***level of risk*** is then calculated by multiplying the two scores together.

**Risk Level = Consequence / Severity x Likelihood (C x L)**

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| --- | --- | --- | --- | --- | --- |
|  | **Likelihood** | | | | |
| **Likelihood score** | **1** | **2** | **3** | **4** | **5** |
|  | **Rare** | **Unlikely** | **Possible** | **Likely** | **Almost certain** |
| **5 Catastrophic** | 5 | 10 | 15 | 20 | 25 |
| **4 Major** | 4 | 8 | 12 | 16 | 20 |
| **3 Moderate** | 3 | 6 | 9 | 12 | 15 |
| **2 Minor** | 2 | 4 | 6 | 8 | 10 |
| **1 Negligible** | 1 | 2 | 3 | 4 | 5 |

The Initial Risk Rating is the level of risk before control measures have been applied or with current control measures in place.

The Residual Risk is the level of risk after further control measures are put in place.