

UG Racing Formula Student Garage Risk Assessment

University of Glasgow School of Engineering

Location: Formula Student Workshop

Building: Rankine Building, Oakfield Avenue Glasgow G12 8LT

Summary of activities covered by this assessment:

Static power tools

Use of hand held portable power tools

Hand tool operations

Electric welding and soldering

Human factors

Workplace and working environment

Manual handling and use of lifting equipment

Electrical safety

Compressed air

Compressed gases

Solvents and fuels

Engine tuning

Assessed by

Name : James Beeley, Hristo Maystorov

Date : Oct 2015

Signature :

Approved by

Name :

Date :

Signature :

Review Dates	January 2012	Oct 2014	Oct 2015	Oct 2017

Further actions required/comments:

1. Significant hazards

<i>Workshop Activity</i>	<i>Hazards associated with Activity</i>
Static Power Tools	Entanglement, friction/abrasion, cutting, shearing, stabbing/puncturing, impact, crushing, drawing in of body parts to moving/rotating machinery, ejection
Hand held/portable power tools	Electric shock/burns/fire, materials, dust, small projectiles, noise, cuts and abrasions, trips.
Hand / foot operated machine tools Hand tools	Cutting, shearing, crushing, Abrasions, stabbing, dust
Electric welding/soldering	High temperature, hot work-pieces, fire, materials, fumes, compressed gases, flashbacks electrical, UV radiation, arc flashes, noise
Human factors	Unsafe person and practices
Workplace and working environment	Access, slips, trips, falls, heating, lighting, ventilation, fume extraction, noise, welfare facilities and fire.
Manual handling operations	Musculo-skeletal injury, cuts, abrasions, impact.
Electricity in the workplace	Electric shock, burns, fire.
Materials	Inhalation of dusts, fumes, aerosols, skin/eye contact.
Compressed air	Injection and ejection
Compressed gases	Injection, ejection, fire and explosion
Solvents and fuels	Fire, explosion, vapour inhalation, poisoning
Engine tuning	Fire, explosion, entanglement, friction/abrasion, cutting, shearing, stabbing/puncturing, impact, crushing, drawing in of body parts to moving/rotating machinery, ejection, noise, fume poisoning, electric shock, burns

2. Individuals who may be harmed by the hazards.

<i>Those who may be harmed</i>
Members of the team
Staff supervising/assisting the UGRacing project
Mechanical/Civil Engineering Workshop staff
Estates & Buildings/security/cleaning staff

Other visitors, including schools open day attendees

Risk	Likelihood <i>Without</i> Control Measures	Severity	Control Measures to Mitigate Risk	Likelihood <i>With</i> Control Measures
<p>Hazards associated with use of powered machinery.</p> <p>Entanglement, Friction/Abrasion, Cutting, Shearing, Stabbing/Puncturing, Drawing in, and Ejection.</p> <p><i>(Electrical hazards are dealt with in the section on “Electricity in the workplace”)</i></p>	Likely	High	<p>Guards are either permanent fixtures, or are available to be fitted to machines as necessary. They are correctly adjusted and used by operators to prevent injury from the following:</p> <p>Moving/rotating machine parts. Moving/rotating cutting tools and blades. Moving/rotating work-pieces Flying cuttings Abrasive wheels or parts thereof</p> <p>Work-pieces are securely held by suitable vices, fixtures and clamps. Emergency stop/brake mechanisms are fitted as appropriate. Space is available around machines to allow safe movement and prevent crushing and impacts. Abrasive wheels are mounted and dressed by trained and competent persons. Work-rests on bench and pedestal grinders are properly set by experienced and competent persons. Machine operators wear suitable protective clothing including lab coats and eye/face protection. Loose clothing and jewelery, including rings with large protrusions, are not worn. Long hair is required to be tied back. Machinery is kept in good working condition by regular maintenance and cleaning. Machinery only used by persons with appropriate training, or under appropriate supervision.</p>	Very low

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Risk	Likelihood Without Control Measures	Severity	Control Measures to Mitigate Risk	Likelihood With Control Measures
<p>Hazards associated with maintenance of powered machinery:</p> <p>Entanglement/ drawing in, crushing, electricity.</p>	Likely	High	<p>Machinery is stopped and electrically isolated during maintenance. Electrical fault diagnosis or testing requiring power to be switched on is only done by experienced, competent electrical engineers working to IET standards.</p>	Very low
<p>Hazards associated with the use of hand held/portable power tools: Electric shock, burns, fire.</p> <p>Materials, dust and small projectiles</p> <p>Noise</p> <p>Cuts, abrasions.</p> <p>Trips.</p>	Likely	High	<p>Portable electrical equipment and power tools are maintained, inspected and PAT tested 6 or 12 monthly in compliance with the University Electrical Safety policy. An in line Residual Current Device (RCD) is provided and used.</p> <p>Eye, face, respiratory protection and gloves are provided and used and a flexible dust extraction arm is provided and used as necessary.</p> <p>Ear defenders are provided and used where noise levels are high. Guards are fitted, correctly adjusted and used where required and are periodically checked and maintained. Gloves and overalls/lab coats are provided and used as necessary to protect hands and body.</p> <p>Trailing leads are routed away from walkways or are covered to reduce trip hazard.</p>	Very low

Risk	Likelihood Without Control Measures	Severity	Control Measures to Mitigate Risk	Likelihood With Control Measures
<p>Hazards Associated with the use of hand/ foot operated machine tools:</p> <p>Cutting, shearing, and crushing.</p>	Likely	High	Guards are fitted and used to prevent access to shear blades, punch tools and dies.	Very low
<p>Hazards associated with the use of hand tools:</p> <p>Cutting, crushing, abrasions, stabbing, dust</p>	Moderate	Moderate	Suitable tools for holding and moving work-pieces are provided. Suitable hand tools in good condition are provided and maintained as appropriate. Eye protection, overalls /lab coats, gloves, safety shoes and dust masks are provided and used where appropriate.	Very Low
<p>Hazards associated with hot work processes and electric welding/soldering:</p> <p>High temperature, hot work-pieces, fire, materials, fumes, compressed gases, flashbacks</p> <p>Electrical, UV Radiation, arc flashes, noise</p>	Likely	High	<p>Suitable tools for holding and moving hot work-pieces are provided and used.</p> <p>Suitable fire resistant overalls, lab coats, aprons, hats and gloves are used.</p> <p>Suitable welding shields and goggles are supplied and used and maintained as appropriate.</p> <p>Working area is kept clear of combustible materials. Materials are selected carefully to minimise the health risks. Adequate ventilation, or a flexible fume extraction arm is provided and used.</p> <p>Face masks are supplied and used where appropriate. Mobile welding screens are provided and used.</p> <p>Electric welders are checked periodically by a competent electrical technician in line with the University Electrical Safety Policy.</p> <p>Ear defenders are provided and used where appropriate.</p>	Very Low

Risk	Likelihood <i>Without</i> Control Measures	Severity	Control Measures to Mitigate Risk	Likelihood <i>With</i> Control Measures
<p>Hazards Associated with Human Factors:</p> <p>Unsafe person/practices</p>	Likely	High	<p>Only people who are adequately trained or are experienced and deemed as competent are allowed to work independently in the workshop. Tools are colour coded according to risk, and persons may only use tools for which they have received appropriate training, or be under appropriate supervision.</p> <p>New members, or others with limited experience, are instructed and closely supervised when working in the area.</p> <p>A range of personal protective equipment is provided and instructions on its proper use and maintenance are provided as appropriate.</p> <p>Lone working is not allowed in the workshop.</p> <p>There is adequate provision of first aiders and FA equipment. Access to the workshop is controlled by code lock.</p> <p>The consumption of food and drink is not allowed in the workshop.</p>	Very low
<p>Hazards associated with the workplace and the working environment:</p> <p>Access. Slips, trips, fall.</p>	Moderate	Moderate	<p>A good standard of housekeeping is maintained. Passages are kept free of obstructions.</p> <p>Spills and/or leaks are dealt with promptly. Storage and work areas are kept separate.</p> <p>Floor surfaces are sound and are painted periodically.</p>	Very low

Risk	Likelihood <i>Without</i> Control Measures	Severity	Control Measures to Mitigate Risk	Likelihood <i>With</i> Control Measures
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<p>Environmental factors. (Heating, ventilation/fume extraction.)</p> <p>Noise.</p> <p>Welfare facilities.</p> <p>Fire.</p>	Likely	High	<p>Fan assisted convector heaters are provided. General and local lighting is provided Fume extraction is provided. Ventilation is by means of a variable speed, filtered, ducted fresh air supply fan.</p> <p>Ear defenders are provided and used when required. Where noise levels are likely to exceed 85dB (A) this can be verified using meter available in the department and measures to reduce noise level and/or protect people working in the vicinity are taken as appropriate.</p> <p>Adequate facilities for personal hygiene are provided. Sinks, hot water, soap and towels are provided. Toilet facilities are available nearby. A common room for the consumption of food and drink is provided. A conditioned drinking water supply is available in the common room.</p> <p>A full detection fire alarm system is in place, maintained and tested. Adequate fire escape routes are provided, sign posted and kept clear of obstructions. Adequate emergency lighting is provided. Fire drills are done twice annually. Appropriate fire extinguishers are accessible at strategic points in the workshop and are properly maintained. Training in the use of fire extinguishers is provided through the UFO. Combustible waste materials are disposed of on a daily basis.</p>	Very low
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Risk	Likelihood <i>Without</i> Control Measures	Severity	Control Measures to Mitigate Risk	Likelihood <i>With</i> Control Measures
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<p>Hazards associated with the use of electricity in the workplace:</p> <p>Electric shock, burns, fire.</p>	Likely	High	<p>Fixed and portable electrical equipment is maintained and tested by experienced and competent electrical technicians in accordance with the University's Electrical Safety Policy.</p>	Very low
<p>Hazards associated with Manual Handling Operations and Lifting Equipment.</p> <p>Musculo-skeletal injury, cuts, abrasions, impacts.</p>	Moderate	Moderate	<p>Materials are stored so as to minimise manual handling. Key staff are trained and/or are experienced in manual handling tasks. Adequate lifting and moving equipment is provided and used only by trained and experienced staff. Lifting equipment is maintained and inspected in accordance with the Lifting Operations & Lifting Equipment Regulations 1998. Gloves and safety glasses are provided and used. Training specific to handling of compressed gases has been undertaken by appropriate team members. Key team members trained in use of lift accessing storage tunnels.</p>	Very low
<p>Hazards associated with the use of materials:</p> <p>Inhalation of dusts, fumes and aerosols.</p>	Moderate	High	<p>Materials are selected so as to avoid risks to health where possible. Proprietary products are used in accordance with manufacturers' instructions or safety data sheets. COSHH assessments are done for all substances hazardous to health. All substances, including cleaning materials and oils are stored in appropriate locations and labelled as required.</p> <p>Where possible harmful dusts, fumes and aerosol vapours are extracted at source using a portable fume extraction unit. (Borrowed from Civil Engineering when required) Face masks are provided and used as required.</p>	Very low
Risk	Likelihood Without Control Measures	Severity	Control Measures to Mitigate Risk	Likelihood With Control Measures

<p>Hazards associated with the use of compressed air and gases: Compressed air:</p> <p>Compressed gases:</p>	Likely	High	<p>Compressed air system is checked for leaks or malfunction on a regular basis by workshop staff. Air compressors are inspected annually by Zurich Insurance Services as part of a University wide programme. All faults are repaired as per inspectors’ recommendations. Compressors are serviced in house by a competent technician.</p> <p>Only trained and experienced technicians handle compressed gases. Workshop gas systems are checked and maintained to BCGA standards by a trained technician</p>	Very low
<p>Hazards associated with the use of solvents and fuels</p> <p>Fire, explosion, vapour inhalation, poisoning.</p>	Likely	High	<p>Solvents/fuels stored in appropriate and clearly labelled containers, caps properly secured, and kept in appropriate metal solvent cabinet when not in use. Proper ventilation. Solvents kept well away from heat ignition sources, e.g. welding, grinding, soldering. Smoking/naked flames prohibited.</p>	Very low

Risk	Likelihood Without Control Measures	Severity	Control Measures to Mitigate Risk	Likelihood With Control Measures
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<p>Hazards associated with engine tuning:</p> <p>Fire, explosion, burns</p> <p>Entanglement, friction/abrasion, cutting, shearing, stabbing/puncturing, impact, crushing, drawing in, ejection</p> <p>Noise</p> <p>Fume poisoning</p> <p>Electric shock</p>	Likely	High	<p>Properly constructed, fully enclosed and mechanically robust engine test rig fuel system. Inspection prior to use. Labelling of hot components. Appropriate fire extinguisher within immediate reach.</p> <p>Enclosure of exposed moving parts in engine test rig. Solid construction. Inspection prior to use. Operators wear suitable protective clothing including overalls and eye/face protection. Loose clothing and jewelery, including rings with large protrusions, are not worn. Long hair is required to be tied back.</p> <p>Ear protection to be used. Appropriate exhaust silencer fitted.</p> <p>Sufficient ventilation/use of fume extraction system.</p> <p>Sufficient insulation of high voltage ignition system.</p>	Very low
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