THE UNIVERSITY OF SYDNEY

RISK ASSESSMENT FORM

Use this form to assist you to complete risk assessments for hazardous activities and processes[1]. Any serious or ongoing hazards should be reported via RiskWare to ensure that appropriate corrective actions are tracked and completed.

Faculty/School:	Faculty of Science — School of Physics (SAIL Labs)	**Initial Issue Date: January 2026**
		Next Review Date: January 2027
Risk Assessment Reference Number:	RA-A28-SAIL-218G-3sae-cms	
Risk Assessment Name:	Operation of 3SAE Combiner Manufacturing System (CMS) for Fibre Optic Glass Processing	
Prepared by:	Chris Betters	
Responsible supervisor/s:	Chris Betters, Sergio Leon-Saval	

Identify the activity and the location	**Identify who may be at risk** This might include fellow workers, students, visitors, contractors, patients, research participants and the public
Activity or process: 3SAE Combiner Manufacturing System (CMS) - Fibre Optic Glass Processing System. Purpose/use: - Fusion splicing of optical fibres (125µm to 2mm diameter) - Fibre optic tapering for combiners and mode-field adapters - Precision cleaving of optical fibres and components up to 500µm diameter - Production of multi-kilowatt class optical components - Manufacturing of photonic crystal fibre assemblies - Research and development of custom fibre optic assemblies	**Persons at risk**: Laboratory staff operating the CMS, Research students and postgraduate researchers, Technical support personnel, Maintenance technicians, Visitors to the laboratory (when equipment is operational)
Location: 218G SAIL Nexus Lab	**Risk assessment team** (who was consulted?)**:** Laboratory manager, Safety officer, Equipment users and operators, Manufacturer documentation review, Technical specifications analysis

List of Legislation, Code of Practice, Australian Standards, Guidance Materials used to determine control measures
AS/NZS 60825.1:2014 - Safety of laser products AS/NZS 3000:2018 - Electrical installations (Wiring Rules) AS/NZS 4804:2001 - Occupational health and safety management systems AS 1940:2017 - The storage and handling of flammable and combustible liquids AS 2243 Series - Safety in laboratories Work Health and Safety Act 2011 Work Health and Safety Regulation 2017 AS 4343:2014 - Pressure equipment - Hazard levels AS 1210:2010 - Pressure vessels

[1] This tool should also be used to assess the risk associated with clinical activities. Information gathered will be used to guide the classification of clinics in accordance with the University's Health Clinics and Clinical Services Policy and Procedures 2020.

Manufacturer's documentation (3SAE Technologies Inc.)
CMS Product Information Sheet and User Manual (https://3sae.com/wp-content/uploads/2024/01/CMS.pdf)
University WHS policies and procedures

Risk Assessment Methodology

Assessing the risk is a brainstorming exercise, which is most effectively carried out in a team environment with the people required to complete the activity or process. Most activities or processes are broken down into a variety of separate tasks. For each task, consider the hazards, the potential harm or negative outcomes and the conditions required for those negative outcomes to occur.

Whenever assessing the health and safety risks associated with a task, always consider the following primary risk factors.

- The **physical activities** required to complete the task e.g. repetitive movement, high force, physical exertion, awkward posture
- The **work environment** e.g. lighting, layout, traffic flow, ventilation, access to support (isolation)
- The **nature of the hazard itself** e.g. working with chemicals, microorganisms, radiation, use of plant and equipment, sharps, working with potentially aggressive clients, patients or research participants
- The **people involved**, e.g. level of training, supervision, experience, health, age, physical capacity.

The information gathered from the **risk assessment** process must be used to develop a **Safe Work Procedure (SWP)** or **clinical protocol** for the activity.

Task or scenario	**Hazard/s**	**Associated harm,** e.g. what could go wrong?	**Existing Risk Controls**	**Current risk rating** Use the Risk Matrix	**Any additional controls are required?**[2]	**Residual risk rating** Use the Risk Matrix
High-temperature plasma operation (Ring of Fire technology)	Thermally Stabilised Plasma operating at temperatures from 300°C to >3000°C for fusion splicing, tapering, and glass processing operations.	- Severe thermal burns from contact with plasma, heated components, or processed fibres - Eye injury from intense visible and infrared radiation from plasma - Fire ignition if flammable materials are present near plasma zone - Heat stress from prolonged operation in proximity to heat source - Thermal damage to skin from radiant heat exposure - Secondary burns from heated electrode assemblies and processing chambers - Ignition of combustible materials (paper, solvents, packaging materials)	- Enclosed processing chamber with controlled access during operation - Integrated cooling system for Ring of Fire electrodes and electrical components - Automatic shut-off systems and emergency stop functionality - Two orthogonal camera systems allowing remote viewing of process - Manufacturer-designed thermal barriers and shielding - Clear operational protocols specifying minimum safe distances - Warning labels on equipment indicating hot	Medium	- Mandatory completion of manufacturer-provided training before operation - Supervised operation for all users until competency demonstrated - Annual thermal safety audit of equipment and enclosure integrity - Prohibition of leaving system unattended during plasma operation - Automatic plasma shut-off if chamber is opened during operation (interlock verification) - NEVER disable safety interlocks or protective systems - NEVER attempt to touch or inspect components during or immediately after plasma operation	Low

[2] Always consider whether it is possible to eliminate the hazard or hazardous task altogether. If this is not possible, refer to the hierarchy of risk controls.

			surfaces - Plasma operates within enclosed chamber, not exposed to operator - Load cell feedback system for process monitoring without physical contact			
Compressed air system operation	High-pressure compressed air system operating at 6.2 bar (90 psi) with flow rate of 126 L/min (~4.5 cfm).	- Projectile hazards from disconnected or failed air lines - Air embolism if compressed air contacts broken skin or body orifices - Eye injury from airborne particles propelled by compressed air - Hearing damage from sudden pressure releases or air leaks - Equipment damage from over-pressurisation - Rapid decompression injuries if partial vacuum system fails catastrophically - Whiplash injuries from flailing disconnected air hoses	- Manufacturer-specified pressure regulator and relief valves - Industrial-grade compressed air fittings and hoses - Pressure gauges for monitoring system pressure - Air filtration system to remove particulates and moisture - Specified air quality requirements in manufacturer documentation - Equipment designed to operate within specified pressure range - Built-in pressure monitoring systems	Medium	- Monthly visual inspection of all air lines, fittings, and connections for wear or damage - Pressure testing of air supply system annually by qualified technician - All air line connections must use proper industrial quick-disconnect fittings - Air line routing must prevent trip hazards and protect from damage - "High Pressure Air" warning labels at connection points - Procedure for safe depressurisation before maintenance - Training on safe compressed air practices including prohibition of using air for cleaning clothing or skin - Eye protection mandatory when working with compressed air systems - Annual testing of pressure relief valves - Secondary pressure regulator if facility air supply exceeds equipment requirements	Low
Electrical hazards	Dual 24V 200W power supplies and electrical	- Electric shock from contact with live electrical components - Electrical burns from short circuits or component failure	- Manufacturer-designed electrical safety systems	Medium	- Annual electrical safety inspection by qualified electrician - Residual current device	Low

	components within the system including electrode power systems, vision systems, and control electronics.	- Fire from electrical faults or overheating - Equipment damage from power surges or incorrect supply - Secondary injuries from startle response to electric shock - Arc flash during maintenance if residual charge present	- 24V operation reduces shock severity compared to mains voltage - Enclosed electrical components within equipment housing - Proper earthing and electrical isolation as per design - Circuit protection and fusing built into system - Electrical interconnection cables provided by manufacturer - CE/relevant certification compliance for electrical safety		(RCD) protection on mains supply to equipment - "Electrical Hazard" warning labels on access panels - Lockout/tagout procedures for any maintenance requiring access to electrical components - Only qualified electrical personnel authorised to access internal electrical systems - Immediate shutdown and reporting of any unusual electrical behaviour (sparking, burning smell, tripped breakers) - Dedicated power circuit for CMS to prevent overloading - Emergency shutdown procedure prominently displayed - Testing of earth continuity during annual inspection - Regular inspection of equipment for signs of electrical overheating or damage - Documented procedure for safe de-energisation before any internal access	
Optical radiation and vision system hazards	Intense visible and infrared radiation from plasma, bright illumination from vision system, and direct viewing of molten glass during processing.	- Eye strain and fatigue from prolonged viewing of bright processes - Potential retinal damage from intense plasma radiation - Flash blindness from sudden bright emissions - Long-term eye damage from repeated exposure to intense light - Headaches and discomfort from monitor viewing for extended periods - Temporary vision impairment affecting ability to perform other tasks safely	- Indirect viewing via camera systems rather than direct observation - Two orthogonal 5MP cameras with telecentric lenses provide remote viewing - "Hot Imaging" provides live viewing with appropriate exposure compensation - Automatic exposure control prevents over or	Medium	- Mandatory pre-operation verification that vision system is functioning correctly - Prohibition of direct viewing of plasma or molten glass - Monitor positioned to minimise screen glare and at appropriate height for ergonomic viewing - Regular breaks during extended operation sessions (minimum 5-minute break every hour) - Adjustment of monitor brightness to comfortable level for ambient lighting conditions - Room lighting sufficient to prevent excessive monitor brightness contrast	Low

			under-exposure of vision system - 23-inch (or 40-inch with upgrade) monitor for viewing at safe distance - Processing occurs within chamber, not in direct line of sight - Vision system designed to handle brightness of plasma without damage		- Safety glasses with appropriate plasma viewing filters available if direct inspection required (maintenance only) - Annual vision system calibration and safety assessment - Documented procedure for what to do if vision system fails during operation (emergency stop) - Alternative viewing method available if primary system fails - Immediate reporting of any vision system malfunctions - Eye examinations recommended for frequent users as part of health surveillance	
Sharp objects and glass fibre handling	Handling of optical fibres, cleaved glass ends, diamond-tipped ultrasonic cleaving blade, broken or scrap fibres, and sharp glass edges.	- Puncture wounds and lacerations from sharp glass fibre ends - Glass fibre fragments embedded in skin (difficult to see and remove) - Eye injuries from glass splinters or fragments - Cuts from diamond cleaving blade during blade changes or maintenance - Infection from contaminated glass penetrating skin - Injuries from broken glass components during handling or disposal	- Integrated cleaver with blade enclosed during operation - Precision handling systems reduce direct hand contact with fibres - Fibre holders and fixtures position fibres securely - Automatic alignment reduces need for manual fibre manipulation - Manufacturer-designed fibre handling accessories (holders for different diameters) - Controlled cleaving process	Medium	- Safety glasses mandatory at all times when handling optical fibres - Close-fitting safety glasses to prevent entry of glass fragments - Designated sharps disposal containers positioned within easy reach of work area - Nitrile gloves recommended for handling fibres (provides some cut protection while maintaining dexterity) - No hand contact with freshly cleaved fibre ends - Tweezers or fibre handling tools must be used for positioning small components - Work surface with contrasting colour to improve visibility of glass fragments - Immediate cleanup of any broken fibres or glass debris using sticky tape or damp cloth (not hands) - Regular inspection and replacement of diamond	Low

			reduces random glass shard generation - Ultrasonic cleaver with controlled operation parameters		cleaving blade per manufacturer schedule - Lockout procedure when accessing cleaver blade for replacement - Training on safe fibre handling techniques and first aid for glass injuries - First aid kit with splinter removal tools available - Regular workspace cleaning to remove accumulated glass debris - Warning signs indicating sharp materials hazard - Magnification available for inspection of fibre handling areas for fragments - Documented procedure for safe disposal of scrap fibres and glass waste	
Vacuum system operation	Partial vacuum operation capability for adiabatic tapering and specialised processing modes.	- Implosion hazard if vacuum chamber fails structurally - Rapid inrush of air if seal fails during vacuum operation - Crush injuries to fingers or hands if caught in vacuum seal mechanisms - Inhalation of particles if vacuum system draws in contaminated air upon seal breach - Secondary injuries from sudden pressure equalisation (noise, flying components)	- Manufacturer-designed vacuum chamber with appropriate pressure rating - Controlled evacuation and venting procedures built into system - Pressure monitoring and control systems - Emergency pressure relief mechanisms - Chamber designed to withstand operating vacuum levels - Interlocked systems prevent chamber opening under vacuum	Medium	- Pre-operation inspection of vacuum chamber seals and O-rings - Maintenance schedule for vacuum pump and sealing systems - Immediate shutdown if unusual sounds or pressure readings detected - Hands and fingers clear of all sealing surfaces before vacuum initiation - Prohibition of opening chamber until fully vented to atmospheric pressure - Pressure gauge verification before each vacuum operation - Annual pressure testing of vacuum chamber by competent person - Documented procedure for emergency venting - Training on vacuum system operation and emergency procedures - Vacuum pump exhaust	Low

					directed away from operator breathing zone - Regular inspection of chamber viewing windows for cracks or damage - Replacement schedule for seals and gaskets	
Chemical hazards from electrodes and processing	Electrode materials, potential contaminatio n from electrode wear, cleaning chemicals for electrode maintenance, and any chemicals used in fibre preparation or cleaning.	- Skin irritation or allergic reactions from electrode materials or metal dust - Inhalation of particulates from electrode wear or cleaning - Eye irritation from cleaning chemicals - Chemical burns from improper use of cleaning agents - Long-term health effects from repeated exposure to metal particulates - Fire or explosion from incompatible chemical mixing	- Embedded electrode cooling system minimises oxidation and contamination - Thermally Stabilised Plasma operation reduces electrode wear compared to conventional systems - Manufacturer documentation specifies electrode materials and handling - Enclosed processing area limits airborne particulate spread - Electrode cleaning performed outside of operating chamber - Spare electrode sets provided with system	Low	- Safety Data Sheets (SDS) available for all chemicals used with equipment - Nitrile gloves worn when handling electrodes or performing cleaning - Electrode cleaning performed in well-ventilated area or fume hood - Eye protection during electrode handling and cleaning - Designated electrode cleaning area with appropriate spill containment - Electrode disposal via appropriate waste stream (not general waste) - Training on safe handling of electrode materials - Respiratory protection assessment if electrode material particulates are generated - Prohibition of eating, drinking, or applying cosmetics in areas where electrode handling occurs - Hand washing required after electrode handling - Regular housekeeping to prevent accumulation of electrode material dust - Documented procedure for spill response for any cleaning chemicals - Chemical inventory maintained and reviewed annually	Low
Ergonomic and	Prolonged	- Eye strain and visual fatigue	- Adjustable	Low	- Ergonomic workstation	Low

musculoskeletal hazards	seated work at computer monitor, repetitive precise movements, sustained awkward postures during fibre alignment and loading, and extended periods of concentration.	from monitor work and precision tasks - Neck and shoulder pain from sustained postures - Back pain from prolonged sitting - Wrist and hand strain from repetitive precision movements - Mental fatigue from sustained concentration on critical tasks - Headaches from prolonged near-focus work	workstation with standard CMS package (upgrade includes ergonomic cart) - Monitor viewing at appropriate distance via camera systems (no need for extreme close-up work) - Precision automated alignment reduces manual manipulation requirements - Orthogonal camera views reduce need for awkward viewing angles		assessment and setup for each regular user - Adjustable chair with lumbar support provided - Monitor positioned at eye level and appropriate distance (50-70cm) - Regular micro-breaks during precision work (30 seconds every 10-15 minutes) - Task rotation where possible to vary physical demands - Maximum continuous operation time without breaks: 1 hour - Training on proper posture and ergonomic setup - Workstation setup checklist completed before extended sessions - Adequate task lighting to reduce eye strain without creating monitor glare - Consider upgrade to workstation cart package (CMS-01-0150) for improved ergonomics - Stretching exercises guidance for operators - Reporting procedure for any musculoskeletal discomfort - Periodic ergonomic reviews for frequent users	
Training and competency requirements	Operation of complex, high-hazard equipment by inadequately trained or supervised personnel.	- All hazards listed above are significantly increased if operators lack proper training - Equipment damage from incorrect operation - Injury to self or others from not understanding emergency procedures - Production of unsafe or poor-quality components - Inability to recognise and respond to abnormal operating conditions	- Detailed operator's manual provided with equipment - Multi-day on-site installation and operational training available (TRN-01-0012) - Complex system requiring demonstrated competency - PC with all	High	NOTE: current rating applies to untrained users; residual rating applies to trained and authorised users. - Mandatory completion of manufacturer training before independent operation - Competency assessment must be completed and documented before authorisation - Authorised users list maintained and displayed near equipment	Low

			necessary software and documentation included		- Graduated training program: observation, then supervised operation, then independent operation - Minimum supervision requirements for new users (defined in SWP) - Theory assessment covering safety-critical knowledge - Practical assessment demonstrating safe operation and emergency response - Refresher training annually or after 6 months of non-use - Retraining required after any safety incident or procedure changes - Documented training records for all operators - Induction briefing for any visitors or observers covering hazards and emergency procedures - Prohibition of operation outside authorised users list - Clear signage indicating training requirement - Training must include all hazard categories and emergency procedures	
Software and control system hazards	Software malfunctions, incorrect programming of tapering or splicing processes, control system failures, and human-computer interface errors.	- Uncontrolled equipment operation from software errors - Component damage from incorrect process parameters - Safety system bypass from software faults - Operator confusion from unclear interface leading to errors - Inability to execute emergency stop if software freezes - Loss of critical safety data or process monitoring - Repetitive strain from poorly designed user interface	- LabVIEW-based GUI designed for simplified operation - Table-based tapering software provides process control with preview capability - Automatic process capture and documentation - Multiple software interfaces available	Medium	- Training must include software operation and common error messages - Emergency stop remains functional regardless of software state (hardware-based) - Software version control and change management procedures - Validation of custom programs before use on actual components - Test runs with dummy components before processing valuable materials - Regular software backups	Low

			(including MATLAB, Excel for custom programs) - PC with all necessary software pre-installed and configured - Manufacturer software updates and support		and system restore points - Procedure for software failure during operation (safe shutdown process) - Documentation of all custom programs with safety parameter limits - User access controls to prevent unauthorised software changes - Annual software functionality testing including emergency stop interface - Prohibition of using software from untrusted sources - Documented process for reporting software issues - Redundant control (physical emergency stop) independent of software	
General laboratory safety and housekeeping	Cluttered work area, spills, trip hazards from cables and air lines, inadequate lighting, poor ventilation, and general laboratory hazards.	- Trips and falls causing injury - Inability to access emergency equipment or exits - Increased risk of contamination or cross-contamination - Fire hazards from combustible materials near heat sources - Electrical hazards from cable damage - Delayed emergency response due to obstructed access	- Defined equipment footprint (71cm W x 56cm D x 43cm H) - Specified weight (~75 kg) allows for stable positioning - Necessary cables and connections provided by manufacturer - Equipment designed for laboratory bench installation	Low	- Defined equipment location with adequate clearance on all sides (minimum 1 metre) - Cable management system to prevent trip hazards - Regular housekeeping schedule (daily cleanup, weekly deep clean) - Clear access to emergency stop, fire extinguisher, and exits at all times - Adequate bench space for component staging and handling - Non-slip matting if floor surface is smooth - Adequate lighting for precision work (minimum 500 lux at work surface) - Ventilation adequate for heat dissipation and any fumes - Storage system for electrodes, fibre holders, and accessories - Spill kit appropriate for any chemicals used - Clear labelling of all gas lines,	Low

					electrical connections, and controls - Daily pre-operation area inspection checklist - Immediate cleanup of any spills or broken components - Fire extinguisher (suitable for electrical fires) within 10 metres - Monthly safety inspection of work area and equipment surrounds - Prohibition of food and drink in equipment operation area	

Implementation of Additional Risk Controls				
Additional controls needed	**Resources required**	**Responsible person**	**Date of implementation**	**RiskWare Reference**
Write the Safe Work Procedure (SWP) or clinical protocol for the relevant activity	Time (approx 1 hour)	Supervisor	Prior to equipment use	N/A
Education and training for workers to complete process in accordance with SWP	Time – supervisor and workers	Supervisor	Prior to equipment use	N/A
Manufacturer training completion	Training course booking, travel costs if off-site	Laboratory Manager	Prior to equipment use	N/A
Competency assessment program	Assessment tools, time for practical evaluation	Supervisor/Trainer	Prior to equipment use	N/A
Authorised users list creation and display	Signage, documentation system	Laboratory Manager	Prior to equipment use	N/A
RCD installation on power supply	Qualified electrician, RCD unit	Facilities/Safety Officer	Prior to equipment use	N/A
Annual electrical safety inspection schedule	Qualified electrician, budget allocation	Laboratory Manager	Within 12 months of installation	N/A
Thermal inspection camera procurement	Budget for camera purchase	Laboratory Manager	Prior to first use	N/A
Sharps disposal containers	Appropriate containers, waste contract	Laboratory Manager	Prior to equipment use	N/A
SDS collection for all chemicals	Contact manufacturers, file system	Laboratory Staff	Prior to equipment use	N/A
Ergonomic workstation setup	Adjustable chair, assessment tool	OH Coordinator	Prior to regular use	N/A
Emergency shutdown procedure signage	Sign design and printing	Safety Officer	Prior to equipment use	N/A
Exclusion zone markings	Floor tape, warning signs	Laboratory Staff	Prior to equipment use	N/A
First aid kit with splinter removal tools	First aid supplies	First Aid Officer	Prior to equipment use	N/A
Vacuum system inspection procedure	Procedure documentation	Laboratory Manager	Prior to vacuum operation	N/A

Compressed air line inspection schedule	Inspection checklist	Laboratory Manager	Prior to equipment use	N/A
Software validation and backup procedures	IT support, documentation	IT/Laboratory Manager	Prior to equipment use	N/A

List emergency controls

These might include how to deal with fires, spills, emergency shutdown of equipment, exposure to hazardous materials and adverse reactions or the deteriorating condition of a patients/research participants in our care.

CRITICAL SAFETY PROHIBITIONS (apply at all times):
- NEVER disable safety interlocks or protective systems
- NEVER operate without appropriate thermal and eye protection
- NEVER leave the system unattended during operation
- NEVER attempt to touch or inspect components during or immediately after plasma operation

EMERGENCY SHUTDOWN:
1. Press EMERGENCY STOP button (location to be identified on equipment and documented in SWP)
2. Close compressed air supply using emergency shut-off valve
3. If emergency stop fails: switch off power at mains isolator
4. Do NOT attempt to restart until: the emergency condition has been fully resolved; the equipment has been inspected by a competent person; the supervisor has authorised restart; and any necessary repairs have been completed.
Do not restart if: equipment damage is visible; unusual sounds, smells, or visual signs were present during the emergency; the cause of the emergency is not fully understood; or any safety system appears compromised.

FIRE EMERGENCY:
1. Activate emergency stop to shut down all systems
2. Close compressed air supply immediately
3. If fire is small and contained: use appropriate fire extinguisher (CO2 or dry powder for electrical fires); ensure you have a clear escape route; do not fight the fire if it threatens your safety
4. If fire is spreading or involves stored compressed gases: evacuate area immediately; activate building fire alarm; call 000 (Emergency Services); evacuate to assembly point
5. After fire is extinguished: do not re-enter area until declared safe by emergency services; equipment must be inspected before any restart attempt; complete incident report

THERMAL BURN INJURY:
1. Immediately cool affected area under running cold water for at least 20 minutes
2. Remove jewellery or constricting items before swelling occurs
3. Do NOT apply ice, ointments, or home remedies
4. Cover burn with sterile non-stick dressing after cooling
5. Seek immediate medical attention for: burns larger than a 20-cent coin; burns to face, hands, feet, genitals, or major joints; full thickness burns (white, waxy, or charred appearance); any burn causing severe pain or blistering
6. For chemical burns: flush with copious water and seek immediate medical attention
7. Complete incident report and inform supervisor

ELECTRIC SHOCK:
1. Do NOT touch the person if they are still in contact with the electrical source
2. Switch off power at mains or remove person using non-conductive material (dry wood, plastic)
3. Call 000 immediately if person is unconscious or not breathing
4. If trained in CPR, commence if required
5. If conscious but shocked: have person lie down and stay still
6. Treat any burns as per thermal burn procedure
7. Seek medical attention for all electric shock incidents
8. Equipment must be tagged out and inspected before any restart

9. Complete incident report

GLASS INJURY (CUTS OR EMBEDDED FRAGMENTS):
1. Do NOT attempt to remove embedded glass - seek medical attention
2. For minor cuts: clean wound gently with clean water; apply sterile dressing; seek medical attention if bleeding does not stop
3. For eye injuries: do NOT rub eye; do NOT attempt to remove any object from eye; cover eye with sterile dressing without pressure; seek immediate medical attention
4. For deep cuts or significant bleeding: apply direct pressure with clean cloth; elevate injured area if possible; call 000 if bleeding is severe
5. All glass injuries must be reported to supervisor
6. Complete incident report

COMPRESSED AIR SYSTEM FAILURE:
1. Activate emergency stop
2. Close compressed air supply at emergency shut-off valve
3. Evacuate area if loud hissing or visible air leaks present
4. Do NOT approach failed air lines or fittings
5. If injury from air blast: move to safe area; seek immediate medical attention for suspected air embolism (chest pain, difficulty breathing, confusion); treat any projectile injuries
6. Lock out and tag equipment
7. Contact maintenance for pressure system inspection
8. Complete incident report

VACUUM SYSTEM FAILURE:
1. Activate emergency stop
2. Vent vacuum chamber using controlled venting procedure (if safe to do so)
3. If catastrophic failure (implosion or explosion): evacuate area immediately; call emergency services if injuries present; do not re-enter until area declared safe
4. If rapid inrush of air: check for injuries from flying debris or noise trauma; seek medical attention as required
5. Lock out and tag equipment
6. Complete incident report
7. Equipment must be inspected by qualified technician before any restart

SOFTWARE/CONTROL SYSTEM FAILURE:
1. Attempt emergency stop via software interface
2. If software unresponsive: use physical emergency stop button
3. If both fail: switch off power at mains
4. Record error messages or system state if safe to do so
5. Do NOT attempt to restart until IT/technical support has assessed
6. Lock out and tag equipment
7. Complete incident report
8. Contact manufacturer technical support for software issues

EMERGENCY CONTACTS:
- Emergency Services: 000
- University Security (after hours): 9351 3333
- Supervisor: Sergio Leon-Saval
- Safety Officer: Chris Betters
- First Aid Officers: Christopher Hoffmann (Rm 227)

REVIEW			
Scheduled review date	**1 year**	**2 years**	**3 years**

Are control measures in place (YES/NO)			
Are controls eliminating or minimizing the risk (YES/NO)			
Are there any new problems with the risk (YES/NO)			
Reviewed by:			
Actual Review date:			

Risk Matrix.

			Potential Consequences				
			Class 3	Class 2	Class 2	Class 1b/1c	Class 1a
			Minor injuries or physical discomfort. Short-term psychological impact (isolated or one-off event).	Injury or illness requiring medical treatment and/or short-term impairment (less than 2 weeks). Psychological impact requiring support.	Injury or illness requiring hospital admission and/or temporary impairment (less than 6 months). Psychological impact requiring medical treatment.	Injury or illness (physical or psychological) resulting in long-term or permanent impairment (more than 6 months). Injury or illness resulting in temporary impairment to multiple people.	One or more fatalities. Injury or illness resulting in long-term or permanent impairment to multiple people.
			Insignificant	**Minor**	**Moderate**	**Major**	**Severe**
Likelihood	Expected to occur regularly under normal circumstances	**Almost Certain**	**Medium**	**High**	**Very High**	**Very High**	**Very High**
	Expected to occur at some time	**Likely**	**Low**	**Medium**	**High**	**Very High**	**Very High**
	May occur at some time	**Possible**	**Low**	**Medium**	**Medium**	**High**	**High**
	Not likely to occur in normal circumstances	**Unlikely**	**Low**	**Low**	**Medium**	**Medium**	**High**
	Could happen, but probably never will	**Rare**	**Low**	**Low**	**Low**	**Medium**	**Medium**