

Risk Assessment

Background Information Laser in Room 123		Date: 11.03.04
		Name of Assessor: Dr J. Bloggs
Describe the product and application	Class IV laser for recording holograms in polymeric materials.	
Describe the Laser Equipment	Quantel Brilliant B Nd:Yag Class IV Pulse Laser 532nm, 450mJ max power, 5ns pulse time, 10Hz pulse, ~ 1mm diameter beam.	
Describe the Beam Delivery System	Beam enters optics enclosure and is expanded and reflected onto a polished surface to produce a standing wave/interference pattern.	
Describe the Laser Process	Sensitised polymers are exposed to pulses of the laser and the resulting latent images are developed to produce a hologram.	
Describe the Environment	Laser is housed in a lockable room with sealed windows. The room is also used as a dark room to develop images.	
Who uses the product or could affect its operation?	Trained postgraduate students and post-doctoral researchers.	
Circle the part(s) of the life cycle of interest	<i>Planning, Design, Manufacture, Testing, Transport, Installation, Commissioning, <u>Normal Operation</u>, Maintenance, Servicing, Modification, Decommissioning, Disposal</i>	

Risk Assessment

Assessment Number: 200401 Assessed by: Dr J Bloggs		Assessment Date: 11.03.04 Review Date: 11.03.05		Activity/Facility Assessed: Room 123 Location: Department of ...	
STEP 1	STEP 2	STEP 3			
List significant hazards	List groups of people who are at risk	List existing controls	Are these controls OK?	What is the risk factor from these hazards?	Actions Required (See over)
The Laser Equipment: (Laser <u>Equipment</u> – everything from the aperture <u>backwards</u>) High voltage power supply – electric shock hazard	S,V,C	Only a qualified service engineer allowed to access internal electronics of laser (LR). Servicing is carried out annually. Electrical safety test carried out annually	Yes	Low	Add to local rules
Key Control not used – anyone with access to laboratory can switch equipment on.	S,V	Restricted access to building but access to lab is not restricted	No	Medium	Yes - Refer to actions sheet
Equipment interconnections - trip hazard - damage to equipment	S,V	Any interconnections (cables) are kept tidy and out of the way. Any interconnections crossing walkways are placed in a cable gulley.	Yes	Low	None

Risk Assessment

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STEP 1	STEP 2	STEP 3			
List significant hazards	List groups of people who are at risk	List existing controls	Are these controls OK?	What is the risk factor from these hazards?	Actions Required (See over)
Beam Delivery: See diagram of set-up in Appendix 1 showing beam delivery (via free air, optics and enclosures) at each section of the beam path. Eye hazard from both direct beam and scattered radiation Retinal hazard – exposure may result in permanent retinal damage within a fraction of a second. Skin hazard – exposure may result in skin burns and photochemical damage Considering each section individually: Section 1: Free air path from aperture to enclosure –	S,V	Currently relying on training and PPE to avoid exposure to direct and scattered radiation	No – possible to enclose the beam	Low/ Medium	Yes - Refer to actions sheet
Section 2: Cardboard box used to enclose optics – Possible fire hazard - Enclosure not securely fixed in place – possibility of displacing enclosure allowing access to beam	S,V S,V	Cardboard box used as optics cover has been tested and is not damaged by repeated laser exposure. Test method and results are shown in appendix 2 None	Possibly – but not an ideal material for enclosure of a Class 4 laser No – any enclosure must be firmly fixed in place	Low Low/ Medium	Yes - Refer to actions sheet Yes - Refer to actions sheet
Section 3: Free air path from enclosure to mirror and mirror to sample	S,V	Exposed beam is divergent and only used for several seconds at a time. Beam is kept below eye level. Lab coats, gloves and appropriate eye protection worn at all times. Research supervisors are closely involved in the work and ensure rules are followed.	Can be improved	Low/ medium	Yes - Refer to actions sheet

Risk Assessment

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List significant hazards	List groups of people who are at risk	List existing controls	Are these controls OK?	What is the risk factor from these hazards?	Actions Required (See over)
The Laser Process: Scattered radiation from the sample and surrounding material Hazards to eye as for beam delivery – even diffuse reflections of a Class 4 Laser are not safe to view.	S,V	Currently relying on training and PPE to avoid exposure to scattered radiation.	Can be improved	Low/ Medium	Yes - Refer to actions sheet

Risk Assessment

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STEP 1	STEP 2	STEP 3			
List significant hazards	List groups of people who are at risk	List existing controls	Are these controls OK?	What is the risk factor from these hazards?	Actions Required (See over)
Environment & People: Large volumes of solvents stored on shelves in the room - see CoSHH assessment	S,V	None	No	Medium	Yes - Refer to actions sheet
Various chemicals used in sensitising and developing polymers / holograms – refer to CoSHH assessment	S,V	Only small volumes of chemicals used in polymers. All chemicals and related processes have been assessed by COSHH. Gloves and laboratory coats to be work at all times.	OK, although see below	Low	None (although see above note regarding chemical storage)
Door lock can be opened from outside during laser operation without stopping the laser.	S,V	Warning signs to prevent entry when room is in use/locked.	Could be improved	Low/ Medium	Yes - Refer to actions sheet
Dark room when developing images		Laser work and developing not carried out consecutively - darkroom lamp used	OK	Low	None

Persons at risk				Risk	Life Cycle			Other
Staff	S	Public	P	High	Set-up		Service	
Contractor	C	Other	O	Medium	<u>Normal Operation</u>		Other	
Visitor	V			Low	Maintenance			

Risk Assessment

Significant Hazards Identified	Actions Required	Date for Action	Completed By (Name and Date)
The Laser Equipment: Key control not used. Anyone with access to the building can use the laser. Class 4 lasers present a potential fire hazard	Set up key control. Keys to be held by senior/experienced laser users and only distributed to authorised users on request. Consult Fire safety Officer.	March 2004 April 2004	17/03/04 University Fire Safety Officer has deemed the area low risk. Not necessary to install extinguisher.

Risk Assessment

Significant Hazards Identified	Actions Required	Date for Action	Completed By (Name and Date)
Beam Delivery: Section 1: Free air between aperture and enclosure – x times the MPE at this point Section 2: Enclosure not firmly fixed in place Section 3: Errant beams may reach user. Users are not aware how many times over the MPE any accidental exposure will be.	Enclose beam Investigate ways of fixing in place or look at alternative material for enclosure which is more sturdy and more easily fixed In case of failure to use protective eyewear, a shield can be installed in between the laser and the controller for the laser. Users can only operate the laser behind the shield, minimising any possible risk from stray beams/reflections. Would be useful to show worst case accidental scenario at various points along the beam path in terms of “x” times the Maximum Permissible Exposure.	All by May 2004	

Risk Assessment

Significant Hazards Identified	Actions Required	Date for Action	Completed By (Name and Date)
The Laser Process: Scattered radiation from the sample and surrounding material	Enclose the working area as far as possible while still allowing access to the sample as necessary. Idea for simple enclosure shown in appendix 3. Revise working procedures and local rules – ensure they are clearly written and available to users	May 2004	

Risk Assessment

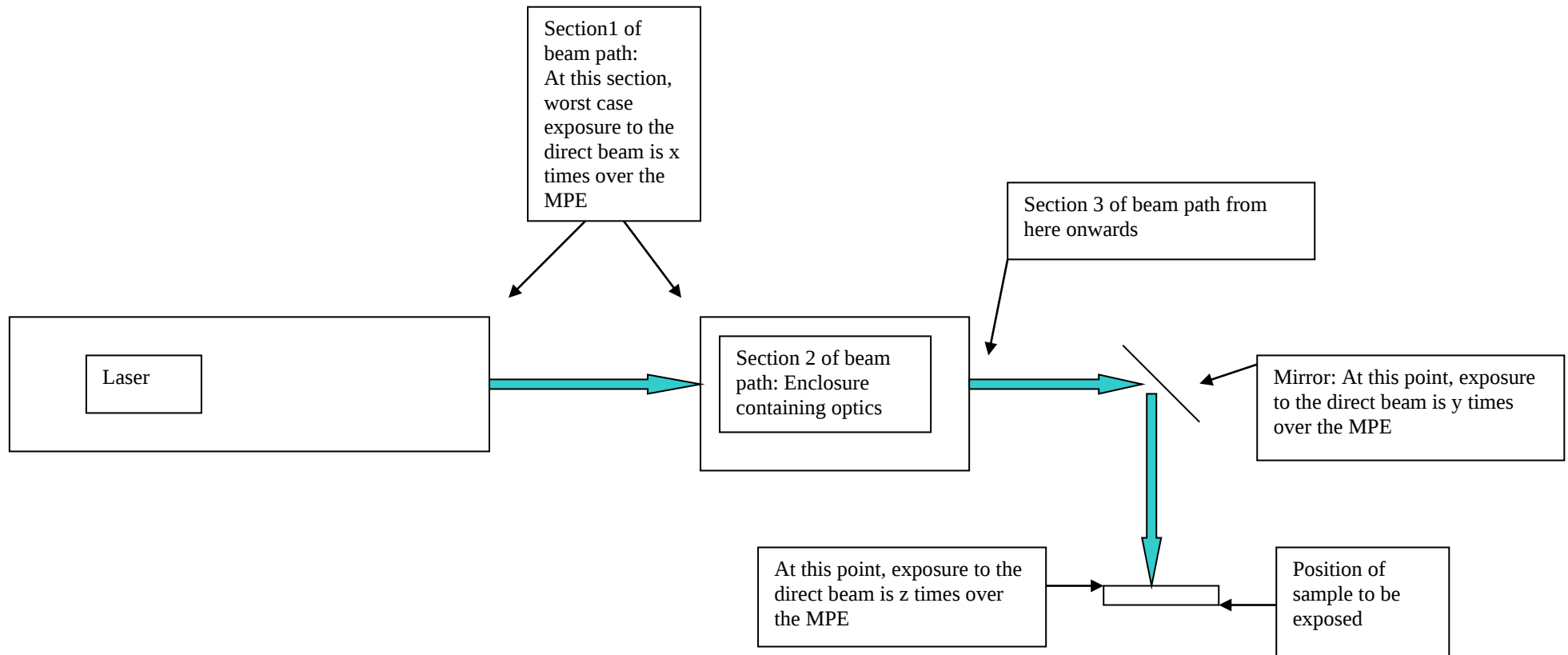
Significant Hazards Identified	Actions Required	Date for Action	Completed By (Name and Date)
Environment & People: Laser can operate when door is unlocked. Large volumes of volatile chemicals stored in the room.	Install gravity controlled shutter interlocked to the laboratory door to block the laser beam if the door is opened. Restrict the volumes of volatile chemicals stored and use an appropriate safety cabinet to store them in.	May 2004 March 2004	

<i>Examples of Hazards</i>					
People	Noise	Fumes	Radiation hazards	Hot objects	
Poor instruction, training	Fire	Moving parts of machinery	X Rays/EMI	Ozone	
Inadequate systems or procedures	Lifting of heavy objects	Pressure systems	Compressed gases	Trailing leads	
Unsuitable workstation/equipment	Electricity	Falling objects	Inadequate optics mounts	Optical fibre breakage	
Poor lighting	Chemicals/substances	Explosion	Optical component failure	Errant beams	
Slip, trip hazards	Dust	Bio-hazards	Confined spaces		

Risk Assessment

Appendix 1

Diagram of set up



Risk Assessment

Appendix 2 – Method and results of enclosure material tests ...

Appendix 3 – One idea for enclosing section 3

