

## Job Safety Analysis (JSA)

Company: impROVise

Activity	Potential Hazard	Control Risk	Responsibility
Using hand tools (hand drills, screwdrivers, hammer)	<ul style="list-style-type: none"> <li>• Physical injury from sharp objects, blades, drills bits.</li> </ul>	<ul style="list-style-type: none"> <li>• Safety goggles</li> <li>• Gloves</li> <li>• Implement danger labels for moving parts and sharp edges</li> </ul>	Engineer
Using Power tools (power drills, pillar drills, soldering irons)	<ul style="list-style-type: none"> <li>• Physical injury from sharp objects, blades, drills bits.</li> <li>• Burns from soldering iron.</li> </ul>	<ul style="list-style-type: none"> <li>• Safety goggles</li> <li>• Gloves</li> <li>• Ensure items have time to cool down before storing.</li> <li>• When not in use, turn off.</li> </ul>	Engineer
Fixed machinery (Laser cutter, 3D printer, Vacuum former)	<ul style="list-style-type: none"> <li>• Fire risk from high temperatures.</li> <li>• Physical injury; burns from hot parts</li> </ul>	<ul style="list-style-type: none"> <li>• Do not use a 3D printer in close proximity to flammable materials</li> <li>• Wait five minutes before removing anything from the printer</li> <li>• Have precautionary materials nearby, such as fire extinguishers, or fire blankets</li> </ul>	Engineer
Electrical safety	<ul style="list-style-type: none"> <li>• Fumes/ fires that may be the result of electrical short</li> <li>• Electrocutation</li> </ul>	<ul style="list-style-type: none"> <li>• Double check power connections</li> <li>• Fuses are added to prevent overload</li> <li>• Heat shrink and insulated tape are used to cover</li> </ul>	Engineer Safety manager

		<p>connections.</p> <ul style="list-style-type: none"> <li>No modification of electrical equipment with wet hands.</li> </ul>	
ROV operating in the water	<ul style="list-style-type: none"> <li>Potential shorts from improperly sealed connections</li> <li>Tripping hazards from cables leading into the water</li> </ul>	<ul style="list-style-type: none"> <li>Use both silicone and heat shrink for all connections.</li> <li>Develop and use a tether management protocol.</li> <li>Put strain relief on all cables and secure systems at the surface.</li> <li>Implement danger labels for moving parts and sharp edges.</li> </ul>	<p>Tether manager Engineer Pilot Co-pilot</p>
ROV design and construction	<ul style="list-style-type: none"> <li>Sharp edges from jubilee clips or other objects</li> <li>Screws sticking out.</li> <li>Heavy for lifting</li> <li>Trip on the tether</li> </ul>	<ul style="list-style-type: none"> <li>Design thrusters and propellers to be both inboard and shrouded at all times.</li> <li>Wear gloves when working on the ROV.</li> <li>Large or heavy items or equipment, use a cart or other form of safe transportation or have two people carrying this at a time.</li> <li>Always lift from the legs.</li> <li>Make sure that someone is on tether management and hazard signs are displayed.</li> </ul>	<p>Engineer</p>

Recovering the ROV from the water	<ul style="list-style-type: none"> <li>• Slipping into the water</li> <li>• Heavy lifting</li> <li>• Electrical safety</li> <li>• Tripping over tether</li> </ul>	<ul style="list-style-type: none"> <li>• Disconnect main power line before handling the ROV</li> <li>• Two people need to carry this out at a time, one person on tether and one person carrying the ROV</li> </ul>	Safety manager Retrieval and deployment person
Unscheduled maintenance	<ul style="list-style-type: none"> <li>• Electrical faults</li> <li>• Mechanical faults</li> <li>• Physically damaged in transit</li> </ul>	<ul style="list-style-type: none"> <li>• Asses the problem before performing any maintenance</li> <li>• Do not assume systems are okay without checking them first</li> <li>• Thorough visual electrical inspections, especially of high power components.</li> </ul>	Engineer Safety manager
Electrical safety - Fuses	<ul style="list-style-type: none"> <li>• Electrical faults</li> </ul>	<ul style="list-style-type: none"> <li>• 25amp fuse in the main power line</li> <li>• 10 amp fuses for the cameras</li> <li>• Main power on/off switch</li> </ul>	Engineer Safety manager

Personal Protective Equipment (PPE):

- Safety goggles and closed toe shoes to be worn at all times when working around or with the ROV
- Hearing protection for use with power tools and loud machinery.
- Gloves to be worn with hot tools.

