## Vortex Brainnovates Job Safety Analysis

### Pre-launch

<table>
<thead>
<tr>
<th>Task</th>
<th>Hazards</th>
<th>Controls</th>
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</thead>
</table>
| Dry system operation test           | Electrical fire from damaged components           | • Inspect all hardware before test, run the propulsion system at low speed, have accessible fire extinguisher.  
▪ Inspect for damaged wires / connectors before retrieving the ROV.  
▪ Evaluate the condition of the wires and replace cables when necessary. |
| Wet system operation test           | • Electrical shock or electrocution                | • Check overall insulation and waterproofing elements                                       |
| Launching and removing the ROV in/from water | • Wrist injury from lifting heavy  
▪ Slipping and falling on pool side | • Use proper lifting techniques and share loads if possible.  
▪ Wear non-slippery shoes, stay low and keep body down. |
| Transportation                      | • Slips / Trips / Falls  
▪ Back strain  
▪ Physical strain  
▪ Foot injury | • Wear closed toed non-slip footwear  
▪ Require two company members to lift the ROV.  
▪ Require an additional company member to direct path and watch for any obstacles.  
▪ Communicate with each company member if there is any strain and stop transport immediately.  
▪ Verify all company members operating near any body of water can swim or will wear lifejackets. |
| Set up                              | • Electrical shock or electrocution                | • Never handle with wet hands, keep electrical appliances dry, keep electrical components insulated.  
▪ Verify power switches and circuit breaker on Tether Control Unit.  
▪ Visually inspect the cables and connectors to check if they have been tightened and sealed.  
▪ Use the proper personal equipment in accordance with the supply voltage. |
### Launching

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| Powering the ROV            | • Electric shock  
   • Overvoltage               | • Follow company Safety Checklist Procedures when powering any equipment or machinery on.  
   • Equipped Power supply with fuses to prevent overvoltage.  
   • Always keep power supply safely away from anybody or water. |
| Operating thrusters         | • Damage to fingers  
   • Damage to limbs  
   • Scalp injury      | • Keep propellers shrouded and use proper mech.  
   • Put warning labels on the motor housings. |
| Setting up and managing the tether | • Loose tether  
   • Tangled tether  
   • Tether damage from pulling | • Connect the tether to the control box and the ROV, have one person in charge of cable.  
   • Wrap the tether properly around the tether transportation cart when going to or leaving the pool.  
   • Applying a proper strain relief. |

### Developing the ROV

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<tr>
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<tbody>
<tr>
<td>Accessing tools</td>
<td>• Tripping on miscellaneous tools, cables and/or rubbish</td>
<td>• Have working space organized, have equipment stored in designated places.</td>
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</tbody>
</table>
| Applying sealant                              | • Eye, skin and respiratory system irritation | • Wear correct PPE.  
   • Have enough ventilation.  
   • Keep compound away from skin. |
| Using hand tools (hacksaws, files, screwdrivers, hammers, etc.) | • Eye injury  
   • Respiratory irritation  
   • Skin injury | • Wear safety goggles when using saws.  
   • Wear gloves when using hand tools.  
   • Wear masks when needed |
| Using power saws and power tools (power drills, power saw, etc.) | • Ear injury  
   • Eye injury  
   • Skin injury  
   • Scalp injury | • Wear safety goggles when operating any power tools.  
   • Wear gloves when operating any power tools.  
   • Wear noise reducing earmuffs to reduce exposure to high sound levels.  
   • Keep all body parts away from moving blades, use clamps when needed.  
   • Maintain necessary saw maintenance and check for any worn blades and malfunctions prior to use. |
Required Personal Protective Equipment (PPE)

- Safety gloves - Tear resistant non-conductive gloves
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- Protective goggles
- Close-toed shoes
- Noise-blocking earmuffs

Required Training

- Safety Checklist Procedure training
- Power supply operations training
- Loading and unloading equipment
- Soldering operations training
- Proper operation of heavy machinery and power tools

✔ For further information about our safety procedures make sure to read Vortex Brainnovates technical report.
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✔ Created: March 2019