



Vortex Brainnovates Job Safety Analysis

Pre-launch

Task	Hazards	Controls
Dry system operation test	Electrical fire from damaged components	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Electrical shock or electrocution 	<ul style="list-style-type: none"> ▪ Check overall insulation and waterproofing elements
Launching and removing the ROV in/from water	<ul style="list-style-type: none"> ▪ Wrist injury from lifting heavy ▪ Slipping and falling on pool side 	<ul style="list-style-type: none"> ▪ Use proper lifting techniques and share loads if possible. ▪ Wear non-slippery shoes, stay low and keep body down.
Transportation	<ul style="list-style-type: none"> ▪ Slips / Trips / Falls ▪ Back strain ▪ Physical strain ▪ Foot injury 	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Electrical shock or electrocution 	<ul style="list-style-type: none"> ▪ 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

Task	Hazards	Controls
Powering the ROV	<ul style="list-style-type: none"> ▪ Electric shock ▪ Overvoltage 	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Damage to fingers ▪ Damage to limbs ▪ Scalp injury 	<ul style="list-style-type: none"> ▪ Keep propellers shrouded and use proper mech. ▪ Put warning labels on the motor housings.
Setting up and managing the tether	<ul style="list-style-type: none"> ▪ Loose tether ▪ Tangled tether ▪ Tether damage from pulling 	<ul style="list-style-type: none"> ▪ 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

Task	Hazards	Controls
Accessing tools	<ul style="list-style-type: none"> ▪ Tripping on miscellaneous tools, cables and/or rubbish 	<ul style="list-style-type: none"> ▪ Have working space organized, have equipment stored in designated places.
Applying sealant	<ul style="list-style-type: none"> ▪ Eye, skin and respiratory system irritation 	<ul style="list-style-type: none"> ▪ Wear correct PPE. ▪ Have enough ventilation. ▪ Keep compound away from skin.
Using hand tools (hacksaws, files, screwdrivers, hammers, etc.)	<ul style="list-style-type: none"> ▪ Eye injury ▪ Respiratory irritation ▪ Skin injury 	<ul style="list-style-type: none"> ▪ 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.)	<ul style="list-style-type: none"> ▪ Ear injury ▪ Eye injury ▪ Skin injury ▪ Scalp injury 	<ul style="list-style-type: none"> ▪ 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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