

Name of SOP	DJI S1000 Aerial Robot
Effective Date	July 6, 2015
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Reason for SOP	Check All that Apply: <input checked="" type="checkbox"/> Procedure/Process could cause critical injury. <input type="checkbox"/> Procedure/Process could cause occupational illness. <input type="checkbox"/> Procedure/Process could cause environmental impairment. <input checked="" type="checkbox"/> Procedure/Process could damage University property. <input type="checkbox"/> Not critical, but requesting a review.
Approved by (supervisor)	Dr. Shahin Sirouspour
Date reviewed by JHSC	August 12, 2015
Date Last Reviewed	

Definitions

Terms	none
Acronyms	RMM – Risk Management Manual JHSC - Joint Health and Safety Committee EOHSS - Environmental and Occupational Health Support Services EPA – Environmental Protection Act OHSA – Occupational Health and Safety Act

Requirements

Applicable OSHA regulations and / or codes of practice.
1. RMM #101 - McMaster University Risk Management System
Training and Competency
1. Training is provided by the lab supervisor, Dr. S. Sirouspour. 2. Competency is shown by the individual after training.

Description of the Task

Location and time of work	ITB A102
Individuals involved	Named Graduate Students with training and competency assessed by Dr. S. Sirouspour. Names of competent persons recorded and archived by Dr. S. Sirouspour.
Equipment and supplies required	The DJI S1000 aerial robot controlled by a computer.
Personal protective equipment required	Safety glasses.

Sequential Steps to Complete the Work Safely

General Safety instructions:
1. The operators must obtain permission from the lab supervisor, each time, before operating the aerial robot. 2. All operators must obey the safety instructions listed in the DJI S1000 user manual as well as EOS 0720i NET3 AD battery charger manual. 3. No less than two (2) and no more than (3) operators can be present in the room, when operating the aerial robot. 4. All occupants of ITBA102, except the operator(s), must leave the room prior to the operation of

the aerial robot.

5. Protective transparent safety shields are provided. When assembled these for the designated aerial robot safe zone. The operators and other personnel must remain behind the protective transparent safety shields (designated safe zone) at all times when the aerial robot is in operation.
6. The operators can only enter the flying zone when the aerial robot is on the ground, with its propellers stationary and its controller disarmed via the RC device.
7. When operating the aerial robot, one operator must always have the emergency stop switch (located on RC controller) in hand.
8. The aerial robot can be operated only when it is tethered to the ground with the provided cables.
9. The operators must wear safety glasses during the entire time of the aerial robot operation.
10. During the operation of the aerial robot, a warning sign must be posted at the entrance of ITBA102 instructing other personnel against entering the room.
11. When not in use over sufficiently long period of time (e.g. more than a couple of days), the LiPo batteries must be removed from the aerial robot and stored in the designated safe location.
12. The batteries must only be charged by the EOS 0720i NET3 AD Charger.
13. The batteries must regularly be monitored while in charge.
14. Any unusual signs in the batteries must immediately be reported to the lab supervisor.

Specific instructions:

1. Instruct all occupants of ITBA102 to leave the room prior to starting the experiment.
2. Post the warning sign at the entrance of ITBA102 instructing other personnel against entering the room.
3. Wear your safety glasses.
4. Examine the batteries state of charge using the EOS 0720i NET3 AD Charger and ensure they are in good health and ready for use.
5. Place the aerial robot at its designated home position in the flight zone.
6. Connect the power cables to the battery terminal connectors.
7. Closely inspect all mechanical and electrical connections to ensure that they are properly secured. Pay particular attention to the battery and propeller connections, as they may become loose due to flight vibrations.
8. Ensure that the aerial robot is securely tethered to the ground with the provided cables.
9. Ensure that flight zone is clear of any object that may pose safety risk.
10. Clear the flight zone of all personnel and move behind the protective safety shields in the designated safe zone.
11. Assign one of the operators to handle RC device with emergency switch.
12. Ensure that all computer control and instrumentation systems are up and running normally.
13. Arm the aerial robot and enable its controller using the RC device.
14. Operate the aerial robot within its designated flight zone.
15. At no time attempt to fly the aerial robot outside its designated flight zone.
16. At the end of the experiment, land the aerial robot at its designated home position in the flight zone.
17. Before entering the flight zone, disable the robot controller and disconnect the power by pressing the emergency stop button.
18. Only after the propellers have come to complete stop and there is no apparent sign of safety risk, approach the aerial robot and disconnect the batteries connectors.
19. Remove the batteries and store them in the designated location for long-term storage, if applicable.
20. In case of an emergency due to flight instability, or inadvertent entry of any individual to the room during the aerial robot operation, immediately shut down the system using the emergency button. Follow the instructions for disarming the aerial robot above in steps 17-19.

Contingency Plan and Reporting

Accident / injury response

Report all minor cuts and bruises to the lab supervisor.

In the Case of Serious/Critical Injuries

1. Shutdown equipment and secure the area to prevent further injury.
2. Immediately arrange for medical and emergency assistance by calling Security at Ext. 88, or direct dial 905-522-4135.
3. Apply first aid as required using the certified first aid kits in either ITBA11B, ITB 202 or ITB 242.
4. Notify EOHSS immediately at Ext: 24352.
5. Notify supervisor immediately at Ext. 26238.

For all injuries, complete an "Injury/Incident Report" and provide a copy to the Chair and EOHSS.

Equipment Malfunction

1. Push the emergency stop button.

Equipment shutdowns

1. Push the emergency stop button.

Environmental Responsibility**Waste disposal procedures**

Recycle the lithium polymer battery at the end of its life. Battery recycling depots are available on campus. Search the McMaster website for locations.

Building air quality

N/A

References

1. OHSA/ regulations
2. EPA and Municipal environmental regulations
3. RMM #100 McMaster University Environmental Health and Safety Policy
4. Material Safety Data Sheets (MSDS)
5. RMM #300 Safety Orientation and Training Program
6. RMM #301 Standard Operating Procedures

Distribution

1. Faculty of Engineering JHSC (for review)
2. Dr. Sirouspour, the lab supervisor
3. ITBA102, aerial robot location

Legal Disclaimer

The Standard Operating Procedures on this website are provided for the use of the McMaster University employee and/or student community. The procedures outlined in the above referenced document are intended to reflect best practices in this field; as such they are provided to the community for guidance and/or direction. However, these recommendations should not be construed as legal advice.