MECHANICAL ENGINEERING WATER TUNNEL LABROTORY
STANDARD OPERATING PROCEDURE (SOP)

Name of SOP	Water Tunnel Laboratory
Effective Date	Oct. 1, 2010
Author	Jing Wang
Reason for SOP	Risk of falls and slips Risk of body injury
Approved by (supervisor)	Dr. D.S. Weaver /Dr. S. Tullis
Date /reviewed by JHSC	July 13th 2011

Definitions

Terms	None
acronyms	RMM - Risk Management Manual JHSC - Joint Health and Safety Committee

Requirements

Applicable OHSA regulations and / or codes of practice.

1. RMM #300 Safety Orientation and Training Program
2. RMM #301 Standard Operating Procedure
3. RMM #306 Tag out/Lock out policy
4. RMM #309 Laboratory safety manual
5. RMM# 1000 Incident ,Accident Reporting

Training and competency.

Training provided by supervisor, technical staff in the Mechanical Engineering Department and EOHSS office for WHMIS. Competency is shown by the individual after training.

Description of the Task

Location and time of work	JHE107 during normal working hours (8:00am~5:00pm)
Individuals and skills required	Graduate Students, none
Equipment and supplies required	Water Tunnel, test section
Personal protective equipment required	Appropriate footwear

Sequential steps to complete the work safely.

General safety instructions

a) All users must obey the safety instructions and warnings posted on the water tunnel, motor, control box and power box.
b) To operate the water tunnel, please borrow the key of control box from the technician in JHE208a.
c) Do not remove guard of motor pump.
d) If the motor doesn't work properly, stop and report the situation to the technicians in JHE205 or JHE208a.
e) For emergency stop double press stop or push the emergency stop button (big red button) on the control box.
f) Before operating the water tunnel, ensure test section is appropriately mounted and can withstand internal pressure.
g) Use appropriate lifting equipment to mount or dismount test section with help of technician(s).

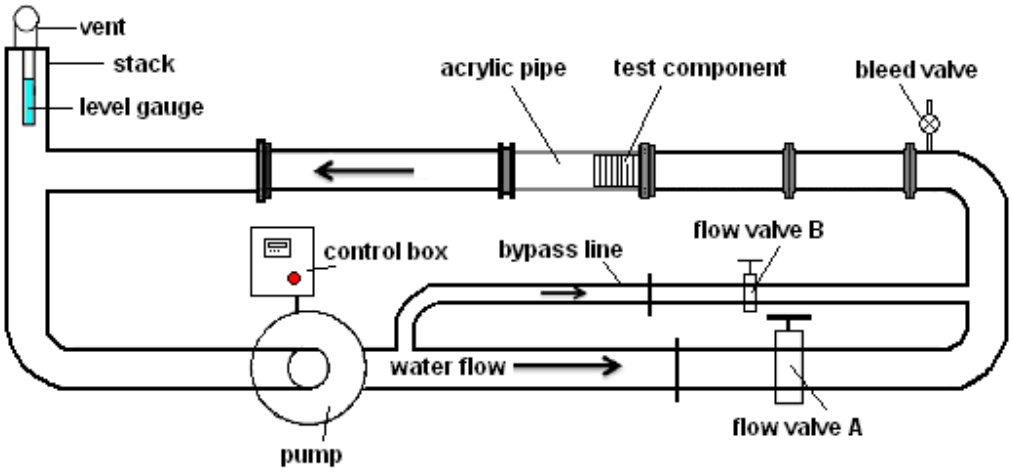
Operation of the water tunnel:

1) Filling the loop with water

a) Fill the loop with water using a hose discharging into the vent stack.
b) Bleed the air from the pump using the small ball valve at the top of the pump.
c) The pump discharge flows through either the full diameter pipe (for high flow meter) or a bypass pipe line (for low flow meter). Ensure that one of the flow valves A or B is open and

the other fully shut so that the flow goes through only one of the lines.

d) Bleed the air from the top part of the test section using the valve on the transition section.
e) Make sure that the water level in the stack is above half the transparent glass level gauge length, but no more than three quarter that length when the pump is stopped.



2) Turning on the controller

a) Ensure safety guards are in place on rotating equipment.
b) Unlock the emergency stop button (the big locked red button on the control box);
c) Double press reset.
d) Press local.
e) Adjust the speed using the knob or the key pad.
f) Press enter.
g) Press run.
h) You can adjust the speed while running.
i) Don't set the speed below 1 Hz because the motor will overload.
j) The rpm of the motor is = controller freq (Hz)×1785×0.75/60. The 0.75 is adjustable. Do not adjust the controller parameters without authorization from the electrical technician.
k) To stop the motor, press stop once. This will bring the motor to a complete stop in a minute. This is also adjustable. Do not adjust these parameters without authorization from the electrical technician.
l) After finishing press the emergency button to lock the controller.
m) Do not shut the power off using the main power breaker unless the controller is off. Disconnecting the power while the controller is running can burn out some parts of the controller.
n) Other settings can be adjusted to change the maximum power limit. Check with the technician if you need to increase the maximum power of the motor. The current setting of power is below the rated power. Do not adjust these parameters without authorization from the electrical technician.

3) Steps before and during measurements

a) Make sure that the valve on the water line going to the pump bearings is slightly open. Do not fully open the valve because the water in this line comes from the loop. Check the water level in the transparent glass level gauge regularly.
b) Check the temperature of the pump casing at the bearings regularly. It is expected to be slightly warm. If it is hot, shut down the pump before damaging the packing of the bearings.
c) At the start run the pump at high rpm (around 30 Hz) to purge all the air trapped inside the loop. Check the water level in the stack transparent glass level gauge after washing the air out of the loop.

After the purge, make sure that all the hoses connected to the pressure taps and the Pitot tubes have no air bubbles within the water.

Equipment shutdowns.

1. Double press stop button or push the emergency stop button (big red button) on the control box.
2. Turn off main cutoff power switch if water tunnel is stopped for more than 1 week.

Contingency Plan and Reporting

Accident / injury response as per RMM# 1000

Minor cuts and bruises report to Technical staff, room JHE205, ext. 24628 receive first aid.
Inform Supervisor
Fill out Accident /Incident report .

In Case of Critical Injuries

1. Shutdown equipment, secure area to prevent further injury. Secure area for accident investigation.
2. Immediately arrange for medical and emergency assistance by calling Security at "88" through the nearest phone (if not available, departmental office phone in JHE 316 may be used).
3. Apply first aid as required
4. Notify Supervisor
5. Notify Mechanical Engineering technical staff immediately
6. In case of critical injury notify EOHSS immediately ,ext 24352
7. For all injuries complete a "Injury/Incident report" and provide a copy to the chair and EOHSS

Spill response

Shut down pump if leak cannot be stopped immediately, and mop up water on floor (or use squeegee).

Environmental Responsibility

Waste disposal procedures

Not applicable

Building air quality

Procedure does not affect air quality

Water spilling or leakages

Water may spill or leak from the water tunnel during the experiment. The experiment operator should be responsible to check the water leakage and clean the site.

References

1. McMaster University Program/ Policy

6. RMM #300 Safety Orientation and Training Program
7. RMM #301 Standard Operating Procedure
8. RMM #306 Tag out/Lock out policy
9. RMM #309 Laboratory safety manual
10. RMM # 1000 Incident /Accident reporting

Distribution

1. Graduate student who is the experiment operator

2. Technical Staff of Mechanical Engineering
3. Mechanical Engineering Chair
4. Faculty of Engineering JHSC