

Name of SOP	Rheometer
Effective Date	June 11, 2008
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Reason for SOP Safety of the operator, people around and equipment	<p>Check All that Apply:</p> <p><input type="checkbox"/> Procedure/Process could cause critical injury.</p> <p><input checked="" type="checkbox"/> Procedure/Process could cause occupational illness.</p> <p><input type="checkbox"/> Procedure/Process could cause environmental impairment.</p> <p><input type="checkbox"/> Procedure/Process could damage University property.</p> <p><input type="checkbox"/> Supervisor's discretion.</p> <p>Provide Details:</p>
Approved by (supervisor)	Dr. Sumanth Shankar
Date reviewed by JHSC	June 11, 2008

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 OHSA regulations and / or codes of practice. <ol style="list-style-type: none"> RMM #101 - McMaster University Risk Management System
Training and Competency <ol style="list-style-type: none"> Training provided by Light Metal Casting Research Center (LMCRC) and graduate students who operate the facility. Competency is shown by the individual after training

Description of the Task

Location and time of work	JHE 107
Individuals involved	Undergraduate and Graduate Students with adequate training as defined above. PDFs
Equipment and supplies required	Gas cylinders and test liquids / Melts
Personal protective equipment required	Safety glasses, leather gloves

Sequential Steps to Complete the Work Safely

General safety instructions

1. Do not over reach
2. Read the MSDS for the test specimen
3. Guard against electric shock
4. Wear gloves while working or operating at high temperatures
5. Do not open the furnace when the torque head is rotating.
6. Do not open the furnace when the heater is on.
7. Do not touch the rheometer while it's operating
8. Never shut off the air supply to the air bearing without covering the air bearing with the protective cap
9. Keep the work area clean.
10. Do not attempt to remove a hot geometry without wearing safety gloves
11. Do not forcibly remove a geometry
12. Do not allow any object to obstruct the safety interlock sensors at the rear of the ETC housing

Part I: Rheometer Set-up

1. Turn on the compressed air pressure and maintain an air pressure of 25 to 30 psi
2. Remove the bearing interlock
3. Turn on the computer
4. Turn on the rheometer
5. Start the instrument control Software in the computer
6. Attach the geometry to be used in the experiment
7. Close the furnace and turn on the heater, if rheometer is going to be used at high temperature
8. Once the required temperature is reached do the zero gap setting.
9. Turn off the heater and open the furnace.
10. Raise the torque head and load the test specimen in the respective geometry
11. Lower the head and close the furnace
12. Turn on the heater and wait for temperature equilibrium.
13. Execute the designed experiments from the controller and wait till all the experiments have been executed. (Some experiments can be designed for more than 24 hours in one go, in that case a sign saying experiment is progress must be placed.)
14. Stop the torque head from controller. Raise the torque head by your geometry height (~15 mm).
15. Wait for to furnace cool down
16. Open the furnace and change the geometry if required or remove the sample (as applicable)
17. Repeat step 7 to 16 for other specimens if required

Part II: Controller Software Programming

1. Read programming manual for different options available
2. Program the controller as per your experiment design

Contingency Plan and Reporting

Equipment Malfunction

In the event of an equipment malfunction, stop the torque head rotational movement and vertical movement. Call technical support people in TA instruments to troubleshoot.

Equipment shutdowns

1. **To stop furnace in an emergency:** Push the red color stop button on the rheometer
2. **For a controlled shut down of the Rheometer:**
 - After finishing the experiments ,raise the torque head by geometry height
 - Let the furnace cool down
 - Open the furnace and remove the geometry
 - If planning to stop the air supply to the air bearing then replace the interlock and air bearing cover

- Switch off the controller and computer

Accident / injury response

1. Apply first aid as required
2. Notify Mechanical Engineering technical staff immediately
3. For all injuries complete a “Injury/Incident Report” and provide a copy to the Chair and EOHSS
4. In case of critical injury call security (dial 88).
5. In case of critical injury notify EOHSS immediately, ext 24352

In the Case of 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”.
3. Apply first aid as required
4. Notify EOHSS immediately, ext 24352
5. Notify Technical Staff immediately. Ext. 24628

For all injuries complete a “Injury/Incident Report” and provide a copy to the Chair and EOHSS

Environmental Responsibility

Waste disposal procedures

Procedure does not require disposal

Building air quality

Procedure does not affect air quality

References

1. OSHA/ 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
7. RMM #304 persons Working Alone
8. RMM #309 Laboratory safety manual
9. RMM #310 Eye Protection Program

Distribution

1. Faculty of Engineering JHSC (for review)
2. Technical Staff of Mechanical Engineering JHE 205 ext. 24628