

<b>Name of SOP</b>	Heat Treatment Furnace
Effective Date	June 11, 2008
Author	Manickaraj Jeyakumar
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

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

### Description of the Task

<b>Location and time of work</b>	<b>JHE 101</b>
<b>Individuals involved</b>	Undergraduate and Graduate Students with adequate training as defined above. PDFs
<b>Equipment and supplies required</b>	
<b>Personal protective equipment required</b>	Safety glasses, coats, leather gloves, face shield, and shoes

### Sequential Steps to Complete the Work Safely

## General safety instructions

### 1. Turning on the furnace

Turn on the power switch, and then press the power button to ON. The instrument will go through a brief self-diagnostic, and then upper readout shows measured temperature and lower readout shows the set-point in the main controller.

### 2. Choosing operation mode

The main controller has two modes of operation: Automatic or Manual mode. Toggle between the modes by pressing the AUTO/MAN button.

### 3 Running the furnace in Manual mode

When manual mode is chosen, upper readout shows measured temperature and lower readout shows the % output. To adjust output, press the ▲ or ▼ button. Press the second button twice, and then adjust the set-point by pressing the ▲ or ▼ button to the target temperature, release the button, the furnace begins to run.

### 4 Running the furnace in Automatic mode

You will normally work with the controller in automatic mode. When auto mode is chosen, upper readout shows measured temperature and lower readout shows the set-point.

There are two ways to run the furnace in auto mode. One way is adjust the setpoint by pressing the ▲ or ▼ button to the target temperature. The other way is setpoint programming. This 2416 instrument have a basic 8-segment programmer built-in, and can store only one program. Please refer to the manual “2416 CONTROLLER SETPOINT PROGRAMMER” to program your heating procedures.

### 5 Running, holding or resetting a setpoint program

From the Home display, press the first button until you reach the ‘run’ list header, then press the second button, use the ▲ or ▼ button to select the status:

- run                      Run program
- hold                     Hold program
- OFF                      Program reset.

After two seconds, the lower readout blinks and the chosen state is now active.

### 6 Loading/unloading sample

- Slide one or both doors open to facilitate loading/unloading the samples in the furnace; **Secure open furnace doors with both the safety pins.**
- Carefully load/unload the samples into furnace; Note: the ceramic tubes supporting the heating elements are very fragile and should not be contacted; the firebrick at the base of the furnace is also fragile.
- Check the thermocouples are not in contact with heating elements.
- Close the doors, checking that no tools or foreign objects are left in furnace

### 7 Turning off the furnace

After completing the operation of the furnace, press the power button to OFF, and unplug the furnace. If the furnace is still hot, keep the warning sign in place until the furnace cools to the room temperature.

## Contingency Plan and Reporting

### Equipment Malfunction

In the event of an equipment malfunction, shut down the furnace and immediately contact the Technical Staff in room JHE 205.

### Equipment shutdowns

1. Turn the black switch on the control panel OFF
2. Turn off the circuit breaker labelled “electrical furnace” OFF

**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 #309 Laboratory safety manual
8. RMM #310 Eye Protection Program

**Distribution**

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