

Mini-Jector: Injection Molding Machine**Model: #55.1****Location of Machine:** Composites Lab, RFM 1218**Location of SOP and Machine Operating & Safety Manual:** Composites Lab website under resources; Composites Lab TRACS site; and Hardcopy near machine.**Emergency Contact:**

- Call 911
- Call EHS & Risk Management at 512-245-3616
- Call Head Lab Technician, Dr. Ray Cook (office 512-245-2050)
- Call Dr. Jitendra S Tate (office 512-245-4872)

Before using this machine:

- You must have permission from Dr. Tate.
- You must have received formal training from technician or, trained research student (designated by Dr. Tate) related to machine safety and operation.
- You must read and understand **SOP and Machine Operating & Manual.**
- You must use this machine under direct supervision of Dr. Tate or, Dr. Cook or, trained research student (designated by Dr. Tate).
- You must have signed “Lab Rules” document with Dr. Tate. This document must be signed every semester fall, spring, and summer (as applicable).
- If you do NOT follow above instructions you will be held responsible for your own safety and damages.

Safety Precautions:

Protective Equipment: Prior to performing this procedure, the following personal protective equipment must be obtained and ready for use: **Safety Goggles, insulated gloves, and lab coat**

Important Safeguards:

- 1) Always wear safety glasses and insulated gloves for operating “Wasp” V molds during each molding cycle.
- 2) Never have more than one person operating the machine at any time.
- 3) Never reach into the machine when the machine is going through its cycle or at any time other than when loading or unloading the ‘V’ mold.
- 4) Make sure the machine is securely bolted to its table or workbench before operating.
- 5) Always shut off power the power to the machine when performing maintenance task.
- 6) Never purge the machine without using the purging fixture supplied with machine.
- 7) Never try to extrude or turn the screw until the machine is up to proper operating temperature.
- 8) Never leave the machine’s heaters on for any extended length of time when the machine is not being operated.
- 9) Always dry the resin to be molded according to its manufacturer’s instructions.

- 10) When removing the screw and barrel for maintenance, shut off power, unplug the heater and thermocouple leads, and make sure the unit has cooled down sufficiently before handling.
- 11) Do not put fingers into feed opening when machine is running.

Accidental Spill: (In the event that a hazardous material spills during this procedure, be prepared to execute the following emergency procedure)
Clean with cleaner according to MSDS of material used



General information

The Mini-Jector Model #55 “Wasp” is a self-contained hydraulically operated injection molding machine. It requires only electrical power to operate. It develops a clamping force of 11.75 tons, will inject up to one ounce (general purpose polystyrene) of plastic per cycle, operate at material temperatures up to 700° F, and can mold a piece with a projected area of up to 6 in². Temperature of the material is controlled by three (3) auto-tuning pyrometers, which are labeled “rear zone”, “front zone”, and “nozzle”.

Specifications:

Clamp forces: up to 11.75 tons
Shot size: up to 1 ounce
Max Temperature: 700 F
Mold Size: up to 6 in²
Three zone screw
Water cooling system (1/8th NPT)
5 Gallon container for **AW32** Hydraulic Oil



Accessories:

- **Fixture:** 7" x 3" dogbone mold (x2)
- **Fixture:** 7" x 3" keychain mold
- **Fixture:** 7" x 3" golf tee mold
- **Fixture:** 7" x 3" Blank mold


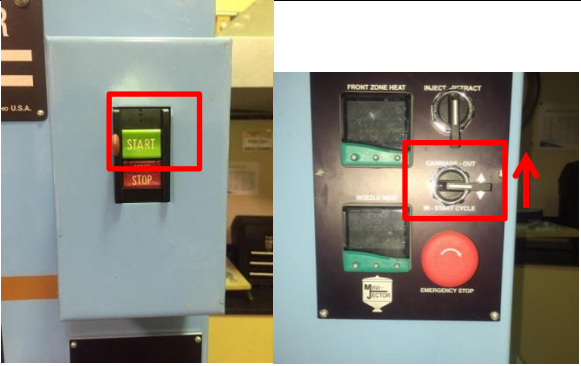
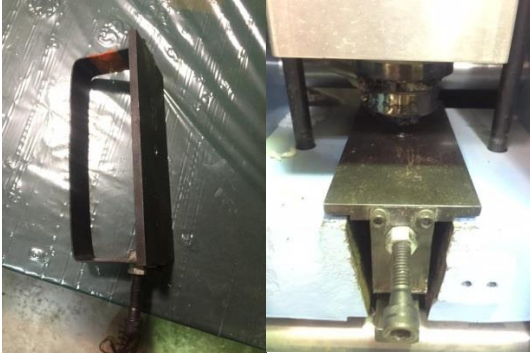

Controls Panel Functions:




- A) Breaker: The illuminated 15 Amp breaker acts as a power on-off switch plus providing overload protection for the machine's electrical components.
- B) Heaters On/Off - This toggle switch turns on the three pyrometers that control the heats. No current can pass through the outputs unless this switch is on.
- C) Timers On/Off - This toggle switch activates the two timers to permit the running of a semi-automatic cycle. The switch should be turned to the "off" position when running the machine on a manual cycle.
- D) De-compress On/Off - This toggle switch enables you to select whether the screw "de-compresses" or retracts 1/4" after it has reached the "extrude" limit switch at the end of the plasticizing cycle.
- E) Extrude - When pressed this pushbutton allows the screw motor to rotate - NOTE: To use manual extrude, inject, or retract, the carriage selector switch must be first turned to the "in" position.
- F) Inject/Retract - The selector switch so marked permits operating the screw forward (inject) or back (retract) by turning the pointer to the desired function.
- G) Carriage In/Out - Cycle Start - This is the selector switch used to raise or lower the entire injection unit and to start the semi-automatic cycle. Turning the lever switch down to the "in-start cycle" position will lower the injection unit nozzle onto the mold and the switch, being detented, will remain in that position. Turning the lever up to the "carriage out" position will raise the injection unit. It will spring return to the center position when released.
- H) Emergency Stop - The red mushroom head "emergency stop" pushbutton will cut all machine power when depressed on single or three-phase machines.


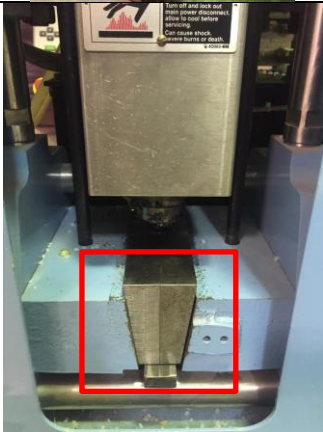




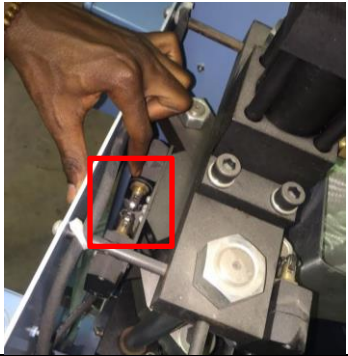


Mini-Jector Setup :Instructions	
<p>1. Move to front of Instron</p> <ul style="list-style-type: none"> a) Plug the main power cord into the power source located behind Instron. (30A-125/250V) b) Connect water valve ¼” turn behind instron computer (on wall) 	 <p>The first photograph shows a power cord being plugged into a power source, with a red box highlighting the connection point. The second photograph shows a water valve being turned, with a red box highlighting the valve handle.</p>
<p>2. Turning on Water flow</p> <ul style="list-style-type: none"> a) Put the water disposal valve into the drainage lid in front of the instron. b) Turn ON water so that there is a steady flow of water into drain. (Minimal flow) 	 <p>The first photograph shows a water disposal valve being placed into a drainage lid, with a red box highlighting the valve. The second photograph shows the valve fully seated in the lid, with a red box highlighting the valve.</p>

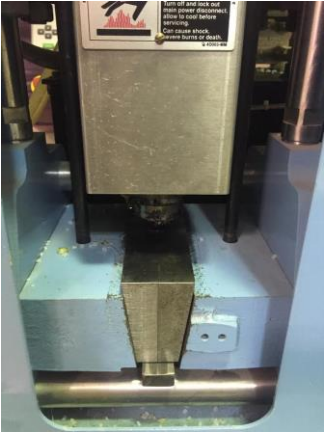

Mini-Jector Standard Operating Procedure	
<p>3. Turn on the machines breaker (activates control panel)</p> <ul style="list-style-type: none"> a) Turn breaker switch to ON position. b) Turn the heaters switch to ON position. 	
<p>4. Setting Desired Temperatures.</p> <ul style="list-style-type: none"> a) Hold down star button then a "F" will show in green. b) Adjust temperature to desired temperature using up and down arrows (refer TDS melting temperature) c) Once selected, Lower temp indicates desired temp. Upper temp indicates actual temp. d) Wait for temp to climb to set points. 	


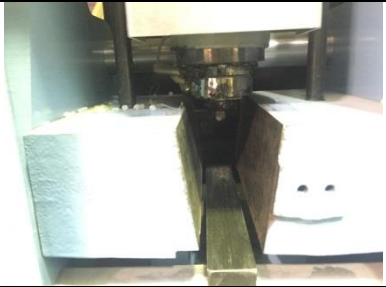

<p>5. Insert desired material into hopper.</p> <ol style="list-style-type: none"> If you are doing a short run (<5 molds) then only about 150-200 mL is needed. Excess Material has to be removed after operation. (refer Purging step) 	
<p>6. Turn on hydraulics by pressing START button.</p> <ol style="list-style-type: none"> Use carriage controller to move carriage to up position (Carriage out). 	
<p>Purging: material is injection grade LDPE</p> <p>7. Place purging fixture into machine as shown</p> <ol style="list-style-type: none"> While in the carriage up position, insert purge fixture. Push fixture all the way to the back of machine. Make sure both fixture hole and screw nozzle are clean. 	
<p>8. Lower carriage</p> <ol style="list-style-type: none"> Turn carriage control to "in start cycle" position. (leave down) Brings carriage against mold. Do not leave carriage down without performing other task for too long. Makes motor work too hard and can overheat. Other task include injection/retract and extrude. 	

<p>9. Purging process</p> <ol style="list-style-type: none"> Move Injection controller to retract position. Let the screw retract completely then release. Press the extrude button for 10 seconds. This fills chamber Move injection controller to Inject position. Hold there for 5 seconds then release. 	
<p>10. Repeat step 9 three times.</p>	
<p>11. Removing the purging fixture</p> <ol style="list-style-type: none"> Move the carriage controller to the "carriage out" position. Remove fixture with insulated gloves and discard material. (bucket of water is useful) Clean out the hole of purge fixture and clean screw nozzle. (Screwdriver is useful) 	

<p>12. Repeat steps 9 -11 until there is no more material coming out while purging.</p>	
<p>Manually Feeding Mold 13. Insert desired mold. (May need preheating)</p> <ul style="list-style-type: none"> a) If hopper empty, put another 150 mL of material. b) Insert mold all the way until it touches back of “V” slot. 	
<p>14. Gauging shot size</p> <ul style="list-style-type: none"> a) Move carriage to in-start cycle position. b) Press extrude to fill chamber with material c) Observe position of tripper and times required to accumulate shot. (tripper should stop moving upward when mold is full) d) Turn inject selector to INJECT. If does not fill, pressure or temp is too low. If material flashes out of mold, settings may be too high. 	 <div style="border: 1px solid black; padding: 5px;"> <p>Usually, if tripper goes just above tape show is full.</p> </div>

<p>15. Removing mold Turn carriage selector to out position. This loosens mold in “V” slot.</p> <ol style="list-style-type: none"> Carefully remove mold with insulated gloves. Observe molded part for voids. Make adjustments as necessary. See step 14d & change Temp, extrude time, and lastly the pressure 	
<p>Automatic Cycles</p> <p>16. Adjust the extrude tripper to just contact 2LS at the point you have established as sufficient volume to fill your mold. Lock with jam nut.</p>	
<p>17. Set the cycle and injection timers to the values observed during your manual set-up. Injection time should be sufficient to have the screw motion stop. If your cavities are of thick section, both longer injection dwell and overall cycle time should be lengthened to prevent “sinking” of the part.</p>	
<p>18. Turn ON the “timers” toggle switch.</p> <ol style="list-style-type: none"> carriage selector switch to the “IN START CYCLE” position. When the hydraulic pressure in the carriage cylinder reaches 1750 PSI and indicates that the mold is seated, the pressure switch contacts close, starting the injection 	

<p>timer.</p>	
<p>19. The machine will inject, holding pressure until the injection timer times out.</p> <ul style="list-style-type: none"> a) The screw will rotate until the motion upward of the thrust housing trips 2LS at the point you have set it. b) When the decompression or extrusion cycle is completed, a relay in the machine will de-energize the “carriage in” solenoid, idling the hydraulic system. <p>Note: For decompression see end of SOP.</p>	
<p>20. When the cycle times out, “carriage out” is energized, which lifts the injection unit off of the mold. When the injection unit has pulled out, it will trip 1LS, de-energizing the “carriage out” solenoid.</p>	
<p>21. Remove molded specimen</p> <ul style="list-style-type: none"> a) Observe the results and make any adjustments necessary 	

<p>b) Put the mold back in the “V” slot and turn the “carriage” selector switch to the middle position(idle), return it to the “in-start cycle” position to initiate another cycle. Turning the switch to the center position is necessary to reset the two timers for the next cycle.</p>	
<p>Completion Purge 22. Repeat steps 9-12 until material stops coming out of chamber.</p>	
<p>Powering Machine Off 23. Lower the carriage. a) With no mold installed, turn carriage selector to “IN START CYCLE” position. Immediately put back into idle position.</p>	
<p>24. Disable hydraulic pumps by pressing the STOP button.</p>	
<p>25. Switch OFF heaters, timers, and decompress (if used). 26. Switch illuminated power breaker to OFF position. Deactivating the control system. 27. Let water run for approx. 30 mins to assist with cool down. 28. Turn OFF water.</p>	