

JOB SAFETY ANALYSIS

Safety Information for the University of California, Berkeley

DEPARTMENT OF MECHANICAL ENGINEERING OPERATING A MARKFORGED X7 3D PRINTER

TASK	HAZARDS	CONTROLS
1. Assess work area; is it clear of obstructions and slip/trip/fall hazards?	<ul style="list-style-type: none">• Slip, trip, or fall	<ul style="list-style-type: none">• Clear work area of any obstructions or slip/trip/fall hazards
2. Operation of equipment. Reaching into the 3D printer to remove parts and perform maintenance	<ul style="list-style-type: none">• Components within equipment enclosure can be hot, may cause burns to skin• Machine will emit thermoplastic odors when in operation• Pinch hazards for hands/fingers	<ul style="list-style-type: none">• Wear leather gloves if necessary when reaching into printer enclosure. Always allow extruder nozzles to cool before opening and/or reaching into the enclosure. Never reach inside the machine while in operation.• Ensure machine is operating in a well ventilated area. Consult with Markforged or an authorized dealer for service. Do not use materials not approved by Markforged for use with the X7 machine.• Keep hands and fingers clear of pinch points; particularly the belts and pulleys of the machine. Never reach inside the machine while in operation.
3. Removing parts from the printer build tray	<ul style="list-style-type: none">• Parts may shatter or dislodge rapidly causing injury to user (cuts, bruises, eye injury from dislodged debris)	<ul style="list-style-type: none">• Always wear safety glasses when operating equipment and when removing parts from the build tray. Wear leather gloves if necessary.

<p>Other Information:</p> <p>Contributors:</p> <p>Created:</p> <p>Updated:</p> <p>JSA Library Number:</p>	<p>4. Modifying parts from X7 machine post-printing</p>	<ul style="list-style-type: none"> • Base material used for printing (onyx) is composed of nylon and carbon fiber. The particulate emitted when modifying parts from the printer is carcinogenic and extremely hazardous to the user. 	<ul style="list-style-type: none"> • Never modify parts that have already been printed. This includes, but is not limited to: <ul style="list-style-type: none"> ○ Sanding/filing ○ Milling/turning/drilling ○ Cutting <p>Re-CAD and re-print always!</p>
	<p>Required Training:</p> <p>Student Shop Safety Training Program</p> <p>Must complete additional training under guidance of a qualified Student Shop Laboratory Mechanician</p> <p>Read and comply with Markforged X7 User Manual prior to operation. Located in staff break room or the operations manual is available on-line at https://support.markforged.com/portal/s/industrial-series</p>	<p>Required Personal Protective Equipment (PPE)</p> <p>Leather gloves, safety glasses</p>	
	<p>Markforged Materials Datasheet, Markforged X7 User Manual</p> <p>Scott G. McCormick; R&D Engineering Manager, Jacob Gallego; Principal Lab. Mech.</p> <p>November 2017</p> <p>July 2020</p> <p>(EH&S will insert number here, if applicable)</p>		
<p>For more information about this JSA, contact the <i>Office of Environment, Health and Safety</i> at UC Berkeley, 317 University Hall #1150, Berkeley, CA 94720-1150 (510) 642-3073 ● http://www.ehs.berkeley.edu</p>			