Maintenance Checklist for EML2322L

SEMESTER

Equipment	Task	Frequency	Week Number															
-	-	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
General	clean safety glasses	*weekly*																
	organize mill tables	*weekly*																
	clear off welding table	*weekly*																
	check calipers, sharpies, rules	*weekly*																
	consolidate and empty trash	*weekly*																
	highlight absenses in roster	*weekly*																
	inspect/refill drill indexes	*biweekly*																
	mop floor	*biweekly*																
	refill oil/Simple Green bottles	*biweekly*																
	inventory drills in storage bins	*semesterly*																
Mills	clean, oil, & organize collets	*weekly*																
	oil spindles and ways	*weekly*																
	oil lead screws	*biweekly*																
	tram vises	*monthly*																
	clean & wax painted surfaces	*bimonthly*																
	wax non-oiled surfaces	*bimonthly*																
	tram milling heads	*semesterly*																
	organize /inspect/replace tools	*weekly*																
Lathes	oil ways	*weekly*																
	oil lead screws	*biweekly*																
	inspect inserts / organize tools	*biweekly*																
	clean & wax painted surfaces	*bimonthly*																
	tram chuck and tail stock	*semesterly*																
	grease chuck jaws	*semesterly*																
Drill Presses	organize clamps and work area	*weekly*																
	wax machine table	*monthly*																
	clean and oil vises	*semesterly*																

Maintenance Checklist for EML2322L (cont)

Equipment	Task	Frequency	Week Number															
-	-	-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DoAll Bandsaw	check blade condition	*biweekly*																
	check blade tension	*biweekly*																
	wax blade	*biweekly*																
	wax table	*monthly*																
Marvel Bandsaw	empty swarf bin	*biweekly*																
	check/top off coolant level	*biweekly*																
	check blade condition	*biweekly*																
	clean and wax table & vise	*biweekly*																
Grinder/Sander	check grinding wheels	*weekly*																
	adjust support pedestals (<1/8")	*weekly*																
	check sanding disk	*biweekly*																
	check sander table squareness	*biweekly*																
Sheetmetal	discard all scraps	*weekly*																
	organize sheetmetal/drops	*weekly*																
	organize sheetmetal table	*weekly*																
	organize steel workbench	*weekly*																
Material Rack	organize aluminum barstock	*weekly*																
	organize drops rack	*weekly*																
	organize 80-20 rack	*weekly*																
	organize sheetmetal rack	*weekly*																
Welding Shop	check welding gas levels																	
	check MIG tip																	
	check MIG wire																	
	check MIG/Plasma cables																	
	organize clamps																	

NOTES:

Maintenance Instructions

Equipment	Task	Instructions
General	clean safety glasses	*use glass cleaner or soap and water in a spray bottle; discard any glasses with scratches that make forward vision uncomfortable; if there are not 18-20 pairs of glasses on the rack, check the lab and then retrieve a new pair from the safety cabinet by the garage door*
	organize mill tables	*(1) organize shadow box of tools, parallels (blow out box), caliper boxes, hammer and punches, mallets, deburring tools, rags, degreaser and oil bottles; (2) blow off table; (3) put anything that doesn't belong on the table in a box and place it outside Mike's office for organization or discarding*
	check calipers, sharpies, rules	*blow out caliper boxes and rack & pinion gears; check caliper function by ensuring they return to zero within +/- 0.002"; check Sharpies are present and working; verify 6" x 3/4" steel rule is present; if Sharpies or rules are not present, search the lab and SAE side (DML Sharpies always have a colored dot on the end opposite the cap), and if you can't find them, retrieve a replacement Sharpie from the shelf by my desk and a replacement rule in the metrology cabinet*
	consolidate and empty trash	*consolidate trash bags so they are about 3/4 full, twist tie the bags and place them outside the garage door in the concrete planter for pickup and disposal; place new trash bags in the cans, tying the top so they don't fall inside the can when used; replacement trash bags are in the safety and cleaning supplies cabinet*
	highlight absenses in roster	*review the previous week's roster and mark anyone highlighted as late and never signed in as absent by highlighting their entire signature block for that week; if students obviously signed in the wrong date/block, write the correct date clearly next to their wrongly located signature and initial their proper signature block*
	inspect/refill drill indexes	*blow out lathe, mill and drill press drill indexes; inspect condition of the drills, especially commonly used sizes like 1/8", 1/4", #21; small chips are okay, but if in doubt put it in the drill press and drill a hole; replace missing (after searching the area) and damaged drill bits so the mill and lathe drill sets are complete; the index by the drill press is more tolerant of damaged drills, so refill it with any questionable drills from the other two sets and put the new drill(s) in the lathe or mill drill indexes*

	mop floor	*SAE usually takes care of this on Sundays, so inspect the floor and sweep and mop any areas of lab which are not clean; pay particular attention to the areas around the Marvel, lathes, mills, CNCs and the rear room by the food preparation station*
	refill oil/Simple Green bottles	*SG bottles should be in the following locations: mill table (3), lathes (4), drill press area (1), VF2 table by entrance door (1), sheetmetal table (1); each bottle should be filled with approx. 80% water and 20% Simple Green*
	inventory drills in storage bins	*the drill storage bins are located in the left steel storage cabinet behind the milling machines; we should stock the following quantities based on drill size: 1/4" or smaller (12); between 1/4" and 1/2" (6)*

Mills	clean, oil, & organize collets	***blow all chips and residue out of the collet bores and threads (over a trashcan); if the threads look dry, lubricate them with a little oil; organize collets in sequence; place the drill chucks towards the rear of the collet racks***
	oil spindles and ways	*turn on the spindles and fill the two chrome steel oil cups located at the top of the machines with spindle oil (yellow top bottle); put on nitrile gloves, remove chips or debris from the X, Y, Z ways, apply a light but complete coating of way oil (green top bottle) to X, Y, Z ways*
	oil lead screws	*put on nitrile gloves and rub way oil (green top bottle) on X, Y, Z axis lead screws; Y-axis requires opening way cover for access; apply a light but complete coating (i.e. not so much oil as to cause it to drip on the floor)*
	tram vises	*clean the non-moveable (i.e. rear) vise jaw with a piece of scotchbrite or steel wool; use an indicol and miniature dial indicator to check the parallelism of the non-moveable vise jaw with the X-axis, which should be <0.001" over 6" of travel*
	clean & wax painted surfaces	*clean the chips and residue off the machine as normal, including chips under the table covers; apply a thorough coat of Meguire's liquid wax (maroon bottle) to all painted surfaces, let wax set for 30min and wipe off excess residue*
	wax non-oiled surfaces	*remove any surface rust with scotchbrite; apply a thorough coat of Johnson's hardwood wax (yellow can) to all non-painted surfaces (except guideways!), let wax set for 30min and wipe off excess residue*

	tram milling heads	*remove table covers; blow chips out of vise and out of table; wipe off table; very carefully install the precision ground EZ-tram ring on the mill table; use an indicol and miniature dial indicator to check the perpedicularity of the spindle axis with the X/Y plane formed on tram*
	organize /inspect/replace tools	*blow out shadow box; organize all tools; inspect endmills for large chips or built up edge (if unsure, perform a test cut with the tool and check surface finish); give damaged tools to Mike so he can replace them*

Lathes	oil ways	***put on nitrile gloves, remove chips or debris from the X & Z ways, apply a light but complete coating of way oil (green top bottle) to X & Z ways***
	oil lead screws	*put on nitrile gloves and rub way oil (green top bottle) on X & Z axis lead screws; X-axis requires opening feedscrew cover for access; apply a light but complete coating (i.e. not so much oil as to cause it to drip on the floor)*
	inspect inserts / organize tools	*blow out tool cabinet drawers; organize drawer liners and tools; inspect tools for large chips or built up edge (if unsure, perform a test cut with the tool and check surface finish); give damaged tools to Mike so he can replace them*
	clean & wax painted surfaces	*clean the chips and residue off the machine as normal; apply a thorough coat of Meguire's liquid wax (maroon bottle) to all painted surfaces, let wax set for 30min and wipe off excess residue*
	tram chuck and tail stock	*clean the vise jaws thorough; clamp a precision round artifact gently in the chuck jaws (use the shank of a 3/4" carbide endmill from the top left damaged endmill drawer in the endmill storage cabinet); carefully setup a precision dial indicator and test stand on the lathe to measure runout of endmill shank; barely loosen 3 or 6 bolts clamping the chuck body to the backplate; use radial jacking screws to adjust total indicator reading to < 0.001"; retorque backplate clamping screws* *to check tail stock tram, gently clamp dial indicator in chuck so it can rotate; remove the drill chuck from the tailstock quill and clean the quill well; adjust indicator so you can sweep the inside of the tailstock quill to check its alignment with the spindle centerline in the horizontal plane*

	grease chuck jaws	*put on nitrile gloves; place small piece of plywood under chuck; clean outside surface of chuck and jaws with a rag and scotchbrite pad; open vise jaws until they fall free from the chuck scroll; apply a liberal coating of grease to the chuck scroll using a cue-tip; clean old grease off chuck jaws (use old rag in waste rag recycle bin); apply new coating of grease to jaw teeth and sliding surface on jaw sides; reinstall jaws, ensuring each goes back into its marked position ("1", "2", "3") and make sure jaw 1 is the first to re-engage the scroll for proper vise jaw timing*
Drill Presses	organize clamps and work area	***place clamps securely on clamp rack under the table so they can't fall off; blow off table; sweep the area; place dust pan and duster on hook under table***
	wax machine table	*remove any surface rust with scotchbrite; apply a thorough coat of Johnson's hardwood wax (yellow can) to top surface of table, let wax set for 30min and wipe off excess residue*
	clean and oil vises	*remove any surface rust with scotchbrite; clean with Simple Green; apply a light coat of oil to vise screw and guideways to ensure smooth operation*
DoAll Bandsaw	check blade condition	*gently cut a piece of (approx.) 1/8" aluminum scrap to check for missing teeth or a twisted bandsaw blade; if damaged, inform Mike and replace blade*
	check blade tension	*raise the blade guide approx. 6" off the table; applying 20 lbs of lateral force should result in approx. 1/4" of blade deflection; the goal is to apply just enough tension to make the blade track straight and remain on the drive wheels*
	wax blade	*apply a light coat of blade wax to all teeth on the blade*
	wax table	*remove any surface rust with scotchbrite; apply a thorough coat of Johnson's hardwood wax (yellow can) to top surface of table, let wax set for 30min and wipe off excess residue*
	empty swarf bin	***put on nitrile gloves and remove the chips from the top of the swarf bin using a dust pan and your hands; be careful because the chips can pierce the thin gloves; remove as much of the solid waste as possible and place in any trashcan***

Marvel Bandsaw	check/top off coolant level	*top off coolant by adding a 1/4" of concentrate (on the shelf by the rotisserie) and SLOWLY filling the coolant tank with water from the spigot so the level just covers the screen mesh on the right rear corner of the coolant sump; do NOT overfill*
	check blade condition	*gently cut a piece of (approx.) 1/2" aluminum scrap to check for missing teeth or a twisted bandsaw blade; if damaged, inform Mike and replace blade*
	clean and wax table & vise	*use nitrile gloves; remove vise from table; remove surface rust with scotchbrite or evaporust chemical rust converter; clean out T-slots using the T-slot cleaner and wire brushes located in the tool storage bin on top of the saw; degrease table and apply a thorough coat of Johnson's hardwood wax (yellow can), let wax set for 15min and wipe off excess residue.*
Grinder/Sander	check grinding wheels	***touch wheel(s) with a piece of material to ensure all motion has ceased; clean grinder with compressed air and/or vacuum cleaner; rotate each wheel and inspect for cracks, chips or other anomalies and bring concerns to Mike's attention***
	adjust support pedestals	*use quick release handles to adjust grinding wheel support pedestals so they are within 1/8" of the grinding wheels; also adjust the upper wheel tongue guards to within 1/8" of the grinding wheels*
	check sanding disk	*clean sander with compressed air and/or vacuum cleaner; inspect disc for tears, delamination and excessive wear (i.e. the disc no longer deburs, but just polishes a test piece, and bring concerns to Mike's attention*
	check sander table squareness	*use a carpenter's square to ensure the table is perpendicular to the sanding disc and adjust as necessary*
Sheetmetal	discard all scraps	***wear sheetmetal gloves; clean scraps from all sheetmetal equipment into 5 gal bucket; dump bucket in steel welding shop trashcan***
	organize sheetmetal/drops	*wear sheetmetal gloves; organize pieces larger than 12x12" on the sheetmetal rack by material type; place smaller pieces in the plastic drops bins according to material type; any drops smaller than 4x4" rectangles should be discarded in the welding shop dumpster.*
	organize sheetmetal table	*discard gloves with holes or cuts; organize and clean table, leaving only a file and the box of gloves on top of it*

	organize steel workbench	*clean off workbench, leaving only a piece of MDF and a center punch and hammer for use marking target points for the punch press*

Material Rack	organize aluminum barstock	***wear sheetmetal gloves and organize aluminum barstock by shape, size and length; be careful not to squish or pinch your fingers while rearranging or moving the material around on the shelf***
	organize drops rack	*organize drops by shape and size; any pieces not large enough to safely make another wheel hub (i.e. < approx. 2.5") should be discarded into the aluminum-specific trashcan/bucket*
	organize 80-20 rack	*hopefully this is self explanatory :)*
	organize sheetmetal rack	*wear sheetmetal gloves; organize pieces larger than 12x12" on the sheetmetal rack by material type; place smaller pieces in one of the two plastic drops bins according to material type; any drops smaller than 4x4" rectangles should be discarded in the steel welding shop trashcan*

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