SWMS for Nano warehouse Assembly

1. Work Activity

All robotic assembly units in a laboratory or manufacturing environment must adhere to the specified safety requirements.

All activities should follow

- **The Occupational Safety, Health and Working Conditions Code, 2020**

2. Persons Involved

- Robotics engineers
- Assembly technicians
- Electrical technicians
- Quality inspectors

3. Tools & Equipment Used

- Screwdrivers, torque wrenches
- Soldering irons
- Multimeters, oscilloscopes
- Robotic arms or mobile robot chassis
- PPE: gloves, anti-static wristbands, safety shoes

---

4. Hazards Identified

Hazard	Risk Level	Controls Applied
Electric shock from exposed wires	High	Isolate power, use ELCB, PPE
Static electricity damaging components	Medium	Use anti-static mats and wrist straps
Eye injury from soldering	Medium	Use safety goggles
Hand injury from tools	Medium	Gloves, proper training, tool guards

Ergonomic strain (bending, lifting)	Medium	Use adjustable tables, proper posture
Slips and falls	Low	Keep floor dry and clean

---

7. Safe Work Steps

1. Review schematic and assembly instructions
2. Perform a pre-assembly inspection of components
3. Set up anti-static workstation
4. Isolate power sources before wiring
5. Assemble mechanical parts using correct tools
6. Wire components with power off
7. Test circuits using multimeter
8. Power on with caution and perform functional test
9. Log data and report faults
10. Shut down safely and clean up workstation

---

8. PPE Required

- Safety glasses
- Anti-static wristbands
- Gloves (cut-resistant, for assembly)
- Closed-toe, anti-slip footwear

---

9. Emergency Procedures

- Location of first aid kits and fire extinguishers
- Emergency shutdown switch for robotics systems
- Contact numbers of EHS personnel and fire warden

---

9. Responsibilities

Role	Responsibility

Safety Officer	Review hazards, conduct toolbox talk
Team Lead	Ensure procedures are followed
Worker/Technician	Follow SWMS, report hazards

Mechanical Maintenance Checklist

Quarterly Maintenance Procedure,

General Notes:

- Below mentioned points are for the periodic maintenance of all the robots.
- For any retightening of fasteners its mandatory to apply Loctite 243
- Use torque wrench to tighten the fasteners (if available), as per the chart given below
- Fasteners need to be marked with Yellow paint, after fastening. Green or Red dot indicates the number of times its tightened
- *Avoid Over tightening of the fasteners*

---

1. Check the drive chain's tension and oil (SAE 20 to 40) he chains.

2. Check up the LM guideways , guide blocks, racks and apply grease.

3. Check the all Tray holder and its riveting condition and apply the PTFE spray on the tray holders.

4. Check the condition of the Anti friction tape applied on the Push pull, if found wear, replace it

5. Check the Pushpull magnet head
    a. Fasteners
    b. LM Guide Blocks
    c. Magnet Deformation if any due to heat ?
    d. Chain and magnet head attachment bracket

6. Check the Vertical system and Horizontal system fasteners if loose, fasten them

7. Check the Side bay area coupler and its condition and fasten it grub screws,

8. Fasteners which are marked as critical with critical identification marks, need to be checked without ignorance.

9. Observe for any physical damages on cables,drag chain, controller parts, light curtains sensors and camera lens with clean solution & New micro fiber cloth.

10. Listen for excessive audible vibration and noise

11. Monitor robot in motion, inspecting robot, harness,limit switches and cables.

12. Check for robot repeatability.

13. Position deviation: The robot functions outside of its intended perimeters.

14. Repeatability issues: The robot is unable to perform consistent, repetitive movements.

15. Cable damage: Wear and tear on power and data transmitting cords, wires, and cables can cause electrical fires.

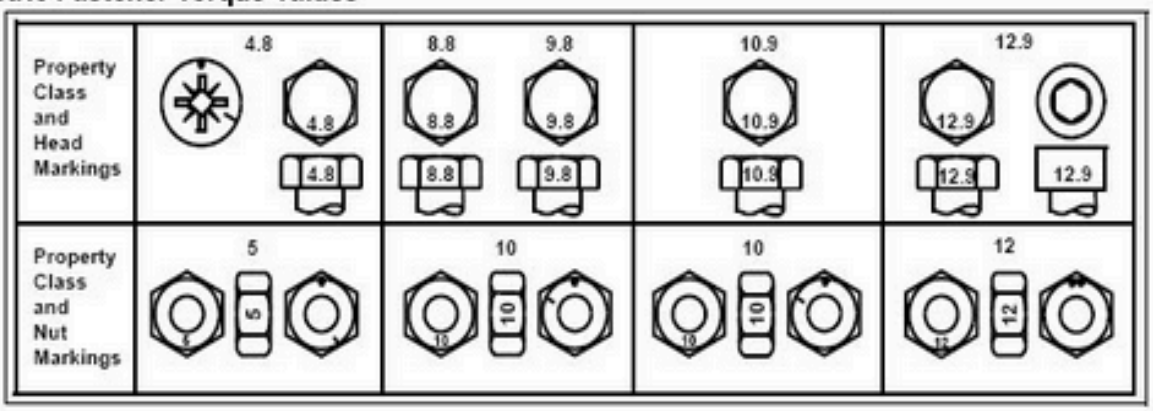
16. Safety issues: The robot behaves unpredictably, resulting in a risk of injury for your staff.

%%%%%

Fastening Torque Data

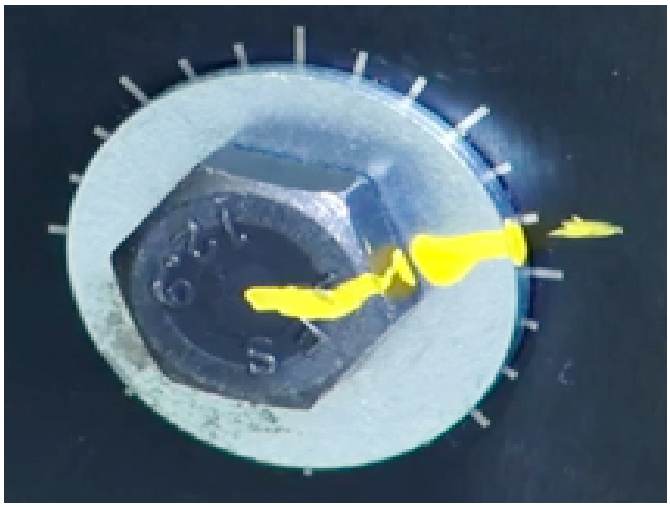
SPECIFICATIONS & INFORMATION FASTENER TORQUES

Metric Fastener Torque Values



	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated a		Dry a		Lubricated a		Dry a		Lubricated a		Dry a		Lubricated a		Dry a	
SIZE	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	109
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000

Thread Fastening Marking



Periodic Fastening Dots