

Generic Name	Component	Possible provider	Units in Pack	Packs used	Pack price	Amount used	Price per Unit	Price total	Use
Single Output Switchable Power	Mean Well LRS-350-48	Amazon (Mean Well)	N/A	N/A	N/A	1	\$ 35.06	\$ 35.06	Main 48V DC power supply for motors/magnet
Microcontroller	STM32 NUCLEO-F446RE	Amazon (STMicroelectronics)	N/A	N/A	N/A	1	\$ 31.00	\$ 31.00	Main microcontroller/brain of system
4-channel digital buffer/line driver	SN74AHCT125N Quadruple Buffer	Amazon	10	1	\$ 7.99	1	\$ 0.80	\$ 0.80	Logic-level/signal buffering for STM32 outputs
Stepper Motor	3HS22-2804S Nema 23	StepperOnline	N/A	N/A	N/A	2	\$ 13.37	\$ 26.74	Drive the linear dip axis motion Memory
Stepper Controller	DM542TE Stepper Controller	Amazon (StepperOnline)	N/A	N/A	N/A	2	\$ 21.00	\$ 42.00	Drive/control the Nema 23 steppers
Ethernet Module	W5500 Ethernet LAN Network Module Support	Amazon	2	1	\$ 12.99	1	\$ 6.50	\$ 6.50	Ethernet connection enabling telemetry
E-Stop	1NC 1NO Red Mushroom Emergency Stop	Amazon	N/A	N/A	N/A	1	\$ 9.99	\$ 9.99	Emergency stop, triggers safe mode + power-off
Transformer	ALITOVE Power Supply Adapter Converter Transformer	Amazon	N/A	N/A	N/A	1	\$ 14.00	\$ 14.00	Steps down AC to DC for a sub-system rail
Buck Converter	LM2596 DC a DC Buck	Amazon	2	1	\$ 7.99	1	\$ 1.60	\$ 1.60	Steps 48V/24V down to lower logic voltage (e.g. 12V/5V)
Electro Magnet	Electromagnet Solenoid BM-P 80-38	Baomain	N/A	N/A	N/A	1	\$ 44.98	\$ 44.98	Picks up/holds the metal part for dipping Memory+1
Proximity Laser Sensor	VL53L0X ToF sensor	Amazon	5	1	\$ 14.88	1	\$ 2.98	\$ 2.98	Detects object placed on the pick up area
Shaft Coupler	Shaft coupler (6.35x8mm)	Amazon	2	1	\$ 11.99	2	\$ 6.00	\$ 11.99	Connects stepper shaft to lead screw
Limit Switch	HiLetgo Micro Interruptor de Limite KW12-3	Amazon	10	1	\$ 5.99	1	\$ 0.60	\$ 0.60	
Rail Guide	MGN12H 300mm Linear Rail Guide	Amazon	2	1	\$ 35.99	2	\$ 18.00	\$ 35.99	Guides the carriage precisely on the dip axis
Lead Screw	Tr8x2 Lead Screw (300mm)	Amazon	2	1	\$ 11.99	1	\$ 11.99	\$ 11.99	Converts stepper rotation into linear dip motion
Bearings	Pillow Block Bearing 4Pcs, 5/16" (8mm)	Amazon	4	1	\$ 8.49	4	\$ 2.12	\$ 8.49	Support/rotate the lead screw smoothly
Guide Rails	Linear Rail Slide SBR20-800mm	Amazon	2	1	\$ 44.90	2	\$ 22.45	\$ 44.90	Main structural rail for larger axis travel
Belt	3D Printing GT2 Timing Belt	Amazon	Kit	N/A	N/A	1	\$ 16.88	\$ 16.88	Transmits motion for the conveyor X-axis
Aluminum Beams	4040 T-Slot Extruded Aluminum Profile 1000mm	Amazon	4	1	\$ 79.99	4	\$ 20.00	\$ 79.99	Frame/structure for the whole rig
Relay	One Channel Relay Module Relay Switch	Amazon	2	1	\$ 7.39	2	\$ 3.70	\$ 7.39	Isolates STM32 from magnet/E-stop power switching Memory
Buzzer	Gikfun Terminals Passive Electronic Buzzer	Amazon	10	1	\$ 8.98	2	\$ 0.90	\$ 1.80	Audible alert (e.g. cycle done, fault, E-stop)
MOSFET Transistor	RLZ44N IRLZ44 MOSFET Transistors	Amazon	10	1	\$ 9.99	4	\$ 1.00	\$ 4.00	Switches the electromagnet coil on/off from STM32 Memory
Terminal Block	Glarks Terminal Block Set	Amazon	Kit	N/A	N/A	2	\$ 0.13	\$ 0.26	Wiring connection/junction points
Flyback Diode	BOJACK 1N4007 Rectifier Diode	Amazon	125	1	\$ 5.99	1	\$ 0.05	\$ 0.05	Protects circuit from magnet coil's back-EMF Memory
Wires	22 AWG Stranded Wire Spool	Amazon	Kit	N/A	N/A	1	\$ 12.29	\$ 12.29	General wiring
Cable Wrap Insulation	Eventronic Heat Shrink Tubing 2:1	Amazon	560	1	\$ 6.99	1	\$ 6.99	\$ 6.99	Insulates/protects wire splices
Fuse Holder	FEBRYTOLD 0 Gauge Inline Fuse Holder	Amazon	2	1	\$ 8.49	1	\$ 4.25	\$ 4.25	Overcurrent protection on a power rail
Resistors kit	Upvivi Resistor Assortment Kit	Amazon	Kit	N/A	N/A	1	\$ 6.99	\$ 6.99	Gate resistors, pull-ups/downs, current limiting
T-nuts	4040 Series T Sliding Nuts Hammer Nut Block Square	Amazon	15	1	\$ 9.99	15	\$ 0.67	\$ 9.99	Fasten components to 4040 extrusion
Bolt and Nuts Kit	Button Head Socket Cap Screws Bolts Nuts Kit M5	Amazon	Kit	N/A	N/A	1	\$ 16.99	\$ 16.99	General assembly fastening
Motor Mounting	Nema 23 Stepper Motor Steel Mounting Bracket	Amazon	4	1	\$ 11.99	4	\$ 3.00	\$ 11.99	Mounts stepper motors to frame
Nut Block	Lysee 3D Printer Parts & Accessories	Amazon	2	1	\$ 20.19	2	\$ 10.10	\$ 20.19	Removes lead screw backlash for repeatable positioning
Conveyor Belt	DC 12V Electric Desktop Conveyor Belt	Amazon	N/A	N/A	N/A	1	\$ 99.51	\$ 99.51	Feeds parts into position under the magnet Memory

Possible Improvements	Total (without taxes):	\$	529.63
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