

**BILL OF MATERIALS: CERA-1 CLAY EXTRUDER**

**I.) Hardware and Fasteners**

**Stainless Steel Machine Screws: M3**

Qty	Size	Lng	Style	Location	Source	~ Cost ea	~ Cost Total
4	M3	5mm	Socket Set Screw	Guide Follower	<a href="https://www.belmetric.com/3mm-c-563_581_1026_163/">https://www.belmetric.com/3mm-c-563_581_1026_163/</a>	0.1	0.4
8	M3	8mm	Socket Button Head	Tube Holder	<a href="https://www.belmetric.com/3mm-c-563_581_584_603/">https://www.belmetric.com/3mm-c-563_581_584_603/</a>	0.05	0.4
4	M3	8mm	Socket Flat Head	Tube Holder	<a href="https://www.belmetric.com/3mm-c-563_581_583_609/">https://www.belmetric.com/3mm-c-563_581_583_609/</a>	0.06	0.24
4	M3	12mm	Allen Socket Head	Auger housing - motor	<a href="https://www.belmetric.com/3mm-c-563_581_582_585/">https://www.belmetric.com/3mm-c-563_581_582_585/</a>	0.06	0.24
2	M3	20mm	Allen Socket Head	Tube Holder	<a href="https://www.belmetric.com/3mm-c-563_581_582_585/">https://www.belmetric.com/3mm-c-563_581_582_585/</a>	0.07	0.14
4	M3	30mm	Allen Socket Head	Auger housing - stage	<a href="https://www.belmetric.com/3mm-c-563_581_582_585/">https://www.belmetric.com/3mm-c-563_581_582_585/</a>	0.1	0.4

**Stainless Steel Machine Screws: M4**

Qty	Size	Lng	Style	Location	Source		
4	M4	5mm	Socket Flat Head	Tube Base	<a href="https://www.belmetric.com/4mm-c-563_581_583_610/">https://www.belmetric.com/4mm-c-563_581_583_610/</a>	0.1	0.4
4	M4	12mm	Allen Socket Head	Plunger	<a href="https://www.belmetric.com/4mm-c-563_581_582_586/">https://www.belmetric.com/4mm-c-563_581_582_586/</a>	0.08	0.32
8	M4	16mm	Allen Socket Head	End Mount	<a href="https://www.belmetric.com/4mm-c-563_581_582_586/">https://www.belmetric.com/4mm-c-563_581_582_586/</a>	0.09	0.72
2	M4	18mm	Allen Socket Head	End Mount - Stage	<a href="https://www.belmetric.com/4mm-c-563_581_582_586/">https://www.belmetric.com/4mm-c-563_581_582_586/</a>	0.12	0.24
10	M4	20mm	Allen Socket Head	Base Mount, Guide Mount	<a href="https://www.belmetric.com/4mm-c-563_581_582_586/">https://www.belmetric.com/4mm-c-563_581_582_586/</a>	0.11	1.1
2	M4	22mm	Allen Socket Head	End Mount - Stage	<a href="https://www.belmetric.com/4mm-c-563_581_582_586/">https://www.belmetric.com/4mm-c-563_581_582_586/</a>	0.18	0.36

**Stainless Steel Machine Screws: Other**

Qty	Size	Lng	Style	Location	Source		
4	M5	16mm	Allen Socket Head	Nema 23 Worm Gearbox	<a href="https://www.belmetric.com/5mm-c-563_581_582_587/">https://www.belmetric.com/5mm-c-563_581_582_587/</a>	0.14	0.56
8	M6	20mm	Allen Socket Head	Base Mount, Guide Mount	<a href="https://www.belmetric.com/6mm-c-563_581_582_588/">https://www.belmetric.com/6mm-c-563_581_582_588/</a>	0.22	1.76

**Stainless Steel Nuts: M3 & M4**

Qty	Size	Hgt	Style	Location	Source		
8	M3	1.8mm	Square, Thin	Stage, Guide Follower	<a href="https://www.belmetric.com/square-nut-thin-c-563_578_">https://www.belmetric.com/square-nut-thin-c-563_578_</a>	0.11	0.88
8	M3	2.4mm	Hex	Tube Holder	<a href="https://www.belmetric.com/coarse-thread-c-563_578_6_">https://www.belmetric.com/coarse-thread-c-563_578_6_</a>	0.05	0.4
20	M4	3.5mm	Square	End mount, Base mount	<a href="https://www.mcmaster.com/97258a102">https://www.mcmaster.com/97258a102</a>	0.22	4.4

**II.) 3D Printed / Laser Cut Components**

Qty	File Name	Material	Location	Source (If applicable)		
1	auger_housing.stl	PETG or ABS, 100% i	Auger		1.52	1.52
1	auger_screw.stl	Steel	Auger	<a href="https://www.shapeways.com/product/XDJKCNMEJ/cera-">https://www.shapeways.com/product/XDJKCNMEJ/cera-</a>	40	40
1	auger_stage.stl	PETG or ABS, 100% i	Auger		1.9	1.9
1	bearing_cover.stl	PETG or ABS, 100% i	Auger		0.02	0.02
1	screwGuide_follower	PETG or ABS, 100% i	Screw Guide		0.11	0.11
1	screwGuide_mountA	PETG or ABS, 20% in	Screw Guide		1.4	1.4
1	screwGuide_mountB	PETG or ABS, 20% in	Screw Guide		0.86	0.86
1	tube_baseMount.stl	PETG or ABS, 100% i	Ram		4.96	4.96
1	tube_endMount.stl	PETG or ABS, 100% i	Ram		1.58	1.58
1	tubeHolderA.stl	PETG or ABS, 100% i	Ram		0.5	0.5
1	tubeHolderB.stl	PETG or ABS, 100% i	Ram		0.5	0.5
1	wormGear_nut_coup	Steel	Ram	<a href="https://www.shapeways.com/product/TWY3G84AK/cera">https://www.shapeways.com/product/TWY3G84AK/cera</a>	46	46
1	plunger.stl	PETG or ABS, 100% i	Plunger		2.36	2.36
1	gasket_A.dxf	Nitrile Rubber	Auger	<a href="https://www.faucetdepot.com/prod/lasco-02-1048E-Rui">https://www.faucetdepot.com/prod/lasco-02-1048E-Rui</a>	1.54	1.54
1	gasket_B.dxf	Nitrile Rubber	Auger			
2	tubeHolder_grip.dxf	Nitrile Rubber	Tube Holder			

**III.) Mechanical Components / Hardware**

**Stainless Steel Ball Bearings**

Qty	ID	OD	Height	Location	Source		
1	16mm	35mm	11mm	Tube Base Mount	<a href="https://bearingsdirect.com/ball-bearings/metric-sizes-ba">https://bearingsdirect.com/ball-bearings/metric-sizes-ba</a>	6.69	6.69
1	1/4in	3/4in	9/32in	Auger	<a href="https://www.mcmaster.com/4648k13">https://www.mcmaster.com/4648k13</a>	18.14	18.14

**Stainless Steel Washer**

Qty	ID	OD	Height	Location	Source		
1	6.4mm	11mm	1.6mm	Auger	<a href="https://www.belmetric.com/small-outer-diameter-c-4_3_">https://www.belmetric.com/small-outer-diameter-c-4_3_</a>	0.12	0.12
1	16mm	30mm	3mm	Tube Base Mount	<a href="https://www.belmetric.com/standard-outer-diameter-c-">https://www.belmetric.com/standard-outer-diameter-c-</a>	0.3	0.3

**Stainless Steel T10 Trapezoidal Lead Screw**

Qty	Size	Lng	Pitch, lead	Location	Source		
1	T10	700mm	2mm, 2mm	Ram	<a href="https://www.aliexpress.com/item/32583087650.html">https://www.aliexpress.com/item/32583087650.html</a>	40	40

**Brass T10 Trapezoidal Lead Screw Nut**

Qty	Size	Pitch, lead	Location	Source		
2	T10	2mm, 2mm	Ram, Plunger	<a href="https://www.aliexpress.com/item/4000007745245.html">https://www.aliexpress.com/item/4000007745245.html</a>	4.99	9.98

**Aluminum Square Tubing**

Qty	Size	Wall	Lng	Location	Source		
1	1in	1/16 in	550mm	Screw Guide	<a href="https://www.homedepot.com/p/Everbilt-1-in-x-96-in-Alu">https://www.homedepot.com/p/Everbilt-1-in-x-96-in-Alu</a>	20.48	20.48

**Nema 17 Motor Coupling**

Qty	Size A	Size B	Diameter	Location	Source		
1	6.35mm	10mm	20mm	Auger	<a href="https://www.aliexpress.com/item/32913158582.html?sq">https://www.aliexpress.com/item/32913158582.html?sq</a>	2.4	2.4

**Draw Toggle Latch**

Qty	Length	Brand	Location	Source		
2	38mm	uxcell	Tube Holder	<a href="https://www.aliexpress.com/item/32856362177.html">https://www.aliexpress.com/item/32856362177.html</a>	2	4

**IV.) Motors with Gearboxes**

Qty	Motor	Lng	Gearbox Type	Reduction Ratio	Source		
1	Nema 17	34mm	Planetary	3.71 to 1	<a href="https://www.aliexpress.com/item/4000221889379.html">https://www.aliexpress.com/item/4000221889379.html</a>	30	30
1	Nema 23	56mm	Worm	30 to 1	<a href="https://www.aliexpress.com/item/33011508459.html?sp">https://www.aliexpress.com/item/33011508459.html?sp</a>	100	100

**V.) O-Rings**

Qty	Diameter	Lng	Material	Location	Source		
3	3mm	60mm	Nitrile Rubber	Pluger, End Mount	<a href="https://www.aliexpress.com/item/4000181016661.html">https://www.aliexpress.com/item/4000181016661.html</a>	15	45

**VI.) Nozzles**

<a href="https://www.aliexpress.com/item/32738744288.html?spm=a2e0o_productlist.0.0.1e304f6eNn0Dlt&amp;algo_pvid=df21f6af-004c-4882-b7">https://www.aliexpress.com/item/32738744288.html?spm=a2e0o_productlist.0.0.1e304f6eNn0Dlt&amp;algo_pvid=df21f6af-004c-4882-b7</a>	6	6
---	---	---

**Total Cost (USD):** 399.32