Category	NOK	USD	Display sub category	y		
Total costs for parts, materials and equipment:	29 281 kr	\$3 404	Tools and Equipment			
Spare / Left in stock after delivery	3 265 kr	\$380				
Category		USD	Sub category	NOK		
Consumables	1 540 kr	\$179	0-11-4-	405		
Electronics	1 268 kr	\$147	Collets	195		
asteners	2 018 kr	\$235	Hand tools	251		
Hardware	8 962 kr	\$1 042	Milling bits	1301		
Raw material	13 590 kr	\$1 580	Safety equipment	80		
Fools and Equipment	1 903 kr	\$221	Storage	76		
Charts in NOK						
Cost distribution Humphrey Tools and Equipment 6,5%		Cons	Distribution in Storage 4,0%	selected category	Collets 10,2%	
Raw material 13,590 46,4%	2,018	F	tronics 4,3% steners 6,9% rdware	80 76 195	Hand tools 13,2%	
Raw material 13,590	2,018	F	tronics Safety 4,2% steners 6,9%	1,301	Hand tools	
Raw material 13,590 46,4%	2,018	F	rdware 30,6% Safety 4,2% Safety 4,2% Milling bits	80 195	Hand tools	
Raw material 13,590	2,018	F	rdware 30,6% Safety 4,2% Safety 4,2% Milling bits	80 195	Hand tools	
Raw material 13,590 46,4% Left in stock / spare	2,018	I-	Safety 4,3%	80 195	Hand tools	
Raw material 13,590 46,4%	2,018	F	Safety 4,3%	80 195	Hand tools	

	563	17,2%			
	V	-			
Aluminium					
44,4%	,451				
	913	Screws, nuts, washers 28,0%			
		Zip ties			
		0,8%			

Material	Category	Sub category C	Quantity	Remai Unit	Comment	Unit priceP	rice total i Currer	ıc USD Calcı N	OK tot Rount NOK is	in stock after Recommended supp Alt Price total in Alt Currency Alternative supplier
Drill bit, 4,5 mm diamter	Consumables	Drill bits	- 1	0 of	For drilling aluminium with cordless drill	37,90	37,90 NOK	\$4,41	38 kr	0 kr https://www.clasohison.com/no/Bosch-HSS-G-metallbor/40-9203-130
Drill bit, 3 mm diamter	Consumables	Drill bits	- 1	1 of	For pre drilling wood with cordless drill	19,92	19,92 NOK	\$2,32	20 kr	20 kr https://www.clasohison.com/no/Bosch-trebor/40-9217-30
Threading drill bit, spiral flute M5	Consumables	Drill bits	- 1	1 of	For threading aluminium with cordless drill. Ali alternativ finns	1,09	1,09 USD	\$1,09	9 kr	9 kr https://www.aliexpress 211,83 NOK https://nettbutikk.wuerth.no/boring-gjenging-kapping-og-sllping/gjenging/maskingjengetapp-hss-e-din-for-staal-bunnhull
Sanding sponge	Consumables	Hand tools	2	1 of	For edge breaking the aluminium parts	47,92	95,84 NOK	\$11,14	96 kr	48 kr https://www.clasohlson.com/no/Bosch-fin-slipesyamp-/40-9311-220
Cutting oil (vaseline)	Consumables	Lubricant	1	0 of	For drilling and threading with cordless drill	49,00	49,00 NOK	\$5,70	49 kr	0 kr https://www.vita.no/klover-vaselin-40-g
Milling bits 1 mm	Consumables	Milling bits	- 1	1 of	1 for pinion teeth	380,43	380,43 NOK	\$44,22	380 kr	380 kr <u>VHF.de</u>
Milling bits 3 mm	Consumables	Milling bits	1	0 of	1 for rack teeth	257,00	257,00 NOK	\$29,87	257 kr	0 kr VHF.de
Milling bits 6 mm	Consumables	Milling bits	- 1	0 of	Expect 1-2 used up in production, they must be ALU compatible	257,00	257,00 NOK	\$29,87	257 kr	0 kr VHF.de 52.26 USD https://www.aliexpress.com/store/product/HUHAO-1pc-6mm-Single-Flute-Spiral-Cutter-3A-TOP-Qualit-CNC-Router-bits-for-wood-Acrylic/2947084 32803524882.html
Milling bits thread cutting M5	Consumables	Milling bits	- 1	0 of	For threading aluminium with CNC	29,19	29,19 USD	\$29,19	251 kr	0 kr https://www.aliexpress 769.39 NOK VHE.de
Ailling bits 4 mm	Consumables	Milling bits	1	1 of	Expect 2-3 used in production they must be ALU compatible	171,00	171,00 NOK	\$19,88	171 kr	171 kr VHF.de 40.38 USD https://www.allexpress.com/store/product/HUHAO-1pc-8mm-Single-Flude-Spiral-Cutter-3A-TOP-Qualit-CNC-Router-bits-for-wood-Acrylic/2947084_32803524882.html
/bit (1 flute if possible)	Consumables	Milling bits	- 1	1 of	For edge braking	1,35	1,35 USD	\$1,35	12 kr	12 kr https://www.aliexpress.com/item/VGEBY-60-120-Degree-3D-V-Type-Cutter-V-Groove-Bits-Engraving-Tools-For-Engraving-Machine/32823482757.html?spm=a2g0s.9042311.0.0.27424c4dckiri9
Shielded Spindle cable 4 way	Electronics	Cable	3	0 m	Can be bought at Fellesverkstedet	46,45	139,35 NOK	\$16,20	139 kr	0 kr http://no.famell.com/lapp-kabel/0036425/cable-offlex-servo-4c-1-5mm-per/dp/1286044
Ribbon cable 8 way max AWG20	Electronics	Cable	7,5	0 m	Cut in 5 of 1,5 m lengths (Can be bought at Fellesverkstedet)	1,47	11,00 GBP	\$14,24	123 kr	0 kr http://uk.farnell.com/pro-power/pp001508/ribbon-cable-10core-20awg-300v/dp/2776633
JSB cable (USB-A to USB-B-Mini	if Electronics	Cable	- 1	0 of	5 m cable For controlling the machine via computer	103,92	103,92 NOK	\$12,08	104 kr	0 kr https://www.kiell.com/no/produkter/data-og-nettverk/kabler-og-adaptere/usb/usb-kabler/mini-usb-kablel-svart-5-m-p99620
lexible power cable 220V	Electronics	Cable	10	0 m	For powering the machine wire via emergency stop	9,52	95,20 NOK	\$11,07	95 kr	0 kr https://www.biltema.no/bygg/elinstallasioner/installasionskabler/gummikabel-2000018917
Cable for probe, single wire	Electronics	Cable	8	0 m		1,92	15,36 NOK	\$1,79	15 kr	0 kr https://www.clasohlson.com/no/FKUX-Enkelleder/49-126-10
U Power plug (for wall socket) 2	2(Electronics	Connectors	- 1	0 of		16,00	16,00 NOK	\$1,86	16 kr	0 kr https://www.biltema.no/bygg/elinstallasjoner/stopsler/jordet-stopsel-2000017391
CB, Connectors and SMD comp		Controller	- 1	0 BOM	See separate PCB BOM list for details	310,00	310,00 NOK	\$36,03	310 kr	0 kr
Arduino NANO	Electronics	Controller	- 1	0 of	Microcontroller board	279,20	279,20 NOK	\$32,45	279 kr	0 kr https://www.digitalimpuls.no/hovedkort/127067/arduino-nano-atmega328-digital-i-o-pins-146-pwm
nductive proximity limit switch	Electronics	Sensors	3	0 of	Comes in packs of 10 st	3,25	9,74 USD	\$9,74	84 kr	0 kr https://www.aliexpress.com/store/product/10PCS-inductive-proximity-sensor-SN04-N-three-wire-NPN-normally-open-Waterproof/907217 1939241212.html?spm=2114.12010612.0.043e2fadthDJbTT
mergency stop, 220V10A	Electronics	Switches	2	0 of	Needs to cut two conductors (2NC) Linked does not!	6,00	12,00 USD	\$12,00	103 kr	0 kr https://www.aliexpress.com/item/AC-660V-10A-Plastic-Shell-Red-Sign-Emergency-Stop-Mushroom-Push-Button-Switch/32650634753.html
Vood glue	Fasteners	Glue	- 1	0 of	1 bottle is enough for table and spoilboard	81,76	81,76 NOK	\$9,50	82 kr	0 kr https://nettbutikk.wuerth.no/kiemi-2/lim/trelim/
tagnets	Fasteners	Magnets	6	0 of	For the dust skirt comes in packs of 6	13.17	79.00 NOK	\$9.18	79 kr	0 kr https://www.kiell.com/no/produkter/hiem-kontor-fritid/gadgets/magneter-6-ok-o50071
Vood Screws, Machine screws, n	ur Fasteners	Screws, nuts, washers	- 1	0,5 BOM	See separate fasteners BOM list for details	1 825,00	1 825,00 NOK	\$212,13	1 825 kr	913 kr https://nettbutikk.wuerth.no
able ties	Fasteners	Zip ties	100	80 of	For organizing cables	0.32	31.92 NOK	\$3.71	32 kr	26 kr https://www.clasohison.com/no/Bunteb%C3%A5ndhvite100-pack/22-515-2
earings 608 8x22x7mm	Hardware	Bearings	40	0 of	36 needed 4 spares for client	1,43	57,00 GBP	\$73,77	635 kr	0 kr https://www.bearing-king.co.uk/bearing/609-2rs-abec9-blue-sealed-skateboard-bearing-8x22x7mm/16848
Drag chain for cable management	t Hardware	Cable management	3	0 m		15,00	45,00 USD	\$45.00	387 kr	0 kr https://www.aliexpress.com/item/15mm-x-30mm-R28-Plastic-Cable-Drao-Chain-Wire-Carrier-with-End-Connector-Length-1m-for/32787359907.html?spm=a2g0s.9042311.0.0.2351404d8ITCl3
Closed loop stepper motors 3Nm		Motors & drivers	4	0 of	Ink toll	105.00	420.00 USD	\$420.00	3 613 kr	0 kr https://www.aliexpress.com/item/NEMA24-3Nm-425oz-in-Integrated-Closed-Loop-Steoper-motor-with-driver-36VDC-JMC-IHSS60-36-30/32713260490.html
Power Supply 220V out 36V	Hardware	Power supply	- 1			38.66	38.66 USD	\$38.66	333 kr	0 for https://www.aliexpress.com/item/350W-36V-Switch-Power-Supply-DC-cower-S-350-36-9-7A-CNC-Router-Single-Output/2028466465.html
ariable Frequency Drive 1,5kW	22 Hardware	Spindle & driver	- 1	0 of	IP66 recommended! Cheaper must be dust protected	235,90	235.90 GBP	\$305.31	2 627 kr	0 kr https://inverterdrive.co 124.33 USD https://www.allexpress.com/store/product/1-5kw-220V-Variable-Frequency-Drive-VFD-Inverter-TA-From-RATTM-MOTOR/907217 32851086380.html
Spindle 800w 24000rpm	Hardware	Spindle & driver	- 1	0 of	Ink toll	158.92	158,92 USD	\$158.92	1 367 kr	0 kr https://www.allexpress.com/item/Square-0-8KW-Air-cooled-Spindle-motor-ER11-24000rpm-400Hz-ENGRAVING-MILLING-GRIND-6-5A/32665487318.html
Numinium 6082-T6 200mmx8mm	Raw material	Aluminium	18	4.18 m	Can be much cheaper with discounts	347.17	6 248.98 NOK	\$726.34	6 249 kr	1 451 kr https://kundeportal.astrup.no/aluminjum/plater-ubehandlet/en-aw-6082
lastic cord for suspending spindl		Elastic cord	10		10 m per package.	8.00	80.00 NOK	\$9.30	80 kr	72 kr https://www.clasohlson.com/no/Elastisk-gummib%C3%ASnd/40-8917
elt cloth, for vipers	Raw material	Leather and cloth		0,35 m	400 mm long in the stiffer cloth direction.	50,00	20,00 NOK	\$2.32	20 kr	18 kr https://www.stoffogstil.ng/
eather for dust skirt	Raw material	Leather and cloth	0.07		Approx price	20.72	1.45 NOK	\$0.17	1 kr	0 kr https://www.tiaderlader.se/framdel-mellan-brun-hel
LA filament for 3d-prints	Raw material	Plastic		0.75 of	Full roll of filament	119,20	119.20 NOK	\$13.86	119 kr	89 kr https://www.clasohlson.com/no/Filament-PLA-til-30-skriver-Flashforge/38-7721-2
OM 12.6 mm	Raw material	Plastic	0,02	0 m^2	Can be bought at Fellesverkstedet	1 758,00	35,16 NOK	\$4.09	35 kr	0 kr https://vink.no/produkter/industri/konstruksionsplast/pom
achromat. 12 mm	Raw material	Valchromat	3	0 of	Price from Oslofiner	1 023.00	3 069.00 NOK	\$356.72	3 069 kr	0 kr https://oslofiner.no/
achromat, 8 mm (2440x1220mr		Valchromat	3	0 of	Price from Oslofiner		2 619.00 NOK	\$304.42	2 619 kr	0 kr https://oslone.co/
achromat, 19mm spoilboard (24		Valchromat	1	0 of	Price from Oslofiner	1 398.00	1 398.00 NOK	\$162.50	1 398 kr	O kr https://soline.co/
R 11 Collet kit	Tools and Equipment		1	0 set		22,72	22,72 USD	\$22.72	195 kr	0 kr https://www.alexpress.com/store/product/Full-sets-ER11-1-7mm-14pcs-spring-collet-for-0-8KW-Spindle-motor/907217_1454430047.html
lex key 4mm (150mm) T handle:			1	0 of	Extremely usefull when tuning. Get this!	85,00	85.00 NOK	\$9.88	85 kr	0 kr https://nettbulikk.wuerth.nohaandverktoy/skurtekkere-og-sekskantnokler/skurtekkere-hex-for-innvendig-Ekt/t-haandtak-hex-skurtekkert-haandtak-hex-sk-t-skurtekker-4x150mm
lex key 2.5mm for set screws (pi			- 1	0.8 of	Only the 2,5 mm hex key is needed, this is a kit	39.92	39.92 NOK	\$4.64	40 kr	32 kr https://www.claschison.com/no/linex-n%/c3%_B8ker/40-7490
combination wrench 8 mm for roll			1	0,0 of	For machine tuning	34.40	34.40 NOK	\$4,04	34 kr	0 kr https://www.classoniaca.com/riskniaska-i acc.astoniamis-na-da-da-da-da-da-da-da-da-da-da-da-da-da
ombination wrench 13 mm for sa			- 1	0 of	For changing bits on the finished machine	34,40	34.40 NOK	\$4,00	34 kr	O kr https://www.casouriser.com/increasoriser.co
ombination wrench 17 mm for E			1	0 of	For changing bits on the limished machine	34,40	34,40 NOK	\$4,00	34 kr	O M INDEX. WWW. GREAT INDEX. CONTINUED TRANSPORTED TO THE STATE OF THE
hillips bits for Wood screws	Tools and Equipment		- 1		r or oranging and orrere minused machine	23,92	23,92 NOK	\$2.78	24 kr	24 kr https://www.classinsoli.com/org/lites/knutreker/d-9512
filling bits 6 mm	Tools and Equipment		3		For the end user, can be the cheaner kind	257.00	771.00 NOK	\$89.62	24 KI 771 kr	2 N INDESTRUME ASSESSED AND THE SECOND PROPERTY OF THE SECOND PROPER
filling bits 4 mm	Tools and Equipment		3	0 of	For the end user, can be the cheaper kind	171,00	513.00 NOK	\$59,62	513 kr	0 for VHF-dat 52,26 USD https://www.alexpress.com/solore/product/HUHG-fulls-fulls-fulls-fulls-fulls-fulls-fulls-fulls-full-full
laning bit 4 mm	Tools and Equipment		1	0 of	For planing the spoilboard	1,100	1.98 USD	\$1,98	17 kr	0 kr http://www.alexpress.com/item/froes-Woodworking-Educ-Custer-Bit-CNC-Carving-Machine-Custer-Or-O2-22mm-Million-Custer-O7-22824741202 html?som=e205-99423110.0274244444541
rotective goggles	Tools and Equipment			0 of	r or planning the spollodard	39.60	1,98 USD 39.60 NOK	\$1,98 \$4.60	17 Kr 40 kr	0 or intestinated interpretation of the control of
rotective goggies ar defenders (Acoustic earmuffs			1			39,60	39,60 NOK	\$4,60	40 kr	
			1		For transporting small and medium parts, cables etc	39,60	39,60 NOK 39.92 NOK	\$4,60	40 Kr 40 Kr	0 kr https://www.claschison.com/m0/Veneutstyr3-deler/41-1458 0 kr https://www.claschison.com/m0/Veneutstyr3-deler/41-1458 0 kr https://www.claschison.com/m0/Veneutstyr3-deler/41-1458
Packing box	Tools and Equipment		1			39,92	39,92 NOK 35.92 NOK	\$4,64	40 Kr 36 Kr	
Carry case	Tools and Equipment	aurage	1	U Of	For storing bits, tools, spares and collets	35,92	35,92 NOK	\$4,18	36 KF	0 kr https://www.dasohlson.com/no/Oppbevaringsskrin/40-7112

Fastener description	Quantity needed	Total qty	Packs	Quantity in pack	Price pack	Tot price	Wurth Nr	Clas nr	Value of leftovers	Comment
M5 nut	14	25	1	25	19,92	19,92		11-503-5	8,76	
M6 nut	8	25	1	25	19,92	19,92		11-503-6	13,55	Can be any head
M8 nut	6	25	1	25	19,92	19,92		11-503-8	15,14	
4x40 wood screws	20	50	1	50	19,92	19,92		40-9566-13	11,95	
M4 washer	25	25	1	25	23,92	23,92		11-1203-4	0,00	
M6x20 cyl head	8	10	1	10	35,92	35,92		11-1133-620	7,18	Rustfri A4, reg is cheaper
6 mm Wood dowels	16	200	1	200	35,92	35,92		40-9483	33,05	
4x16wood screw	29	30	3	10	19,92	59,76		11-1412-3	1,99	
M5x20_cyl head	16	100	1	100	73,00	73	00575 20 005 100		61,32	
M8 large washer	12	20	2	10	39,90	79,8		11-1130-842	31,92	
M5x20 conic sunk head	36	100	1	100	113,59	113,59	00845 20 005 100		72,70	Stainless, cheaper if found regular
M5 stud screw	12	200	1	200	132,00	132	02545 10 005 200		124,08	
M5x20 hex head	36	100	1	100	179,00	179	20945 20 005 100		114,56	
M5x16_cyl head	180	200	1	200	192,00	192	00845 16 005 100		19,20	
M5 large washer	168	400	2	200	103,08	206,16	04115 15 005 100		119,57	
M5x35 cyl head	44	100	1	100	271,24	271,24	009705 35 005 100		151,89	
5x50 wood screw flat neck	214	250	1	250	343,21	343,21	017015050 008 250		49,42	
	844	1860			1642,38	1825,2			836,29	

Where	Centers	Excenters	tot
X axis	6	6	12
z axis	6	6	12
y axis 1	2	4	6
y axis 2	2	4	6
Spares	4	4	8
Needed	20	24	

Assembly	Fastener type	Needed	SUMIF	ISFIRST	Comment
Munt VFD	4x16wood screw	4	29	1	
Legs to underside	4x40 wood screws	20	20	1	
Torsion box	5x50 wood screw flat neck	130	214	1	
Legs	5x50 wood screw flat neck	48	214	2	
Munt VFD pads	5x50 wood screw flat neck	4	214	3	
Z-probe	5x50 wood screw flat neck	4	214	4	
Spoilboard	5x50 wood screw flat neck	28	214	5	
legs to box, top sheet to top	6 mm Wood dowels	16	16	1	
Motors plates to Axis plates	M5 large washer	16	168	1	
Bearings	M5 large washer	108	168	2	
Y rails to nuts	M5 large washer	44	168	3	
Gantry feet, both	M5x16_cyl head	20	180	1	
Y-sole	M5x16_cyl head	24	180	2	
Soles to feet	M5x16_cyl head	8	180	3	
Gantry ribs, top and bottom	M5x16_cyl head	20	180	4	
attach both feet to gantry	M5x16_cyl head	12	180	5	
X-axis to gantry	M5x16_cyl head	26	180	6	
Lids and backside to gantry	M5x16_cyl head	20	180	7	
xaxis plate and sensor holder	M5x16_cyl head	8	180	8	
Zaxis plate, sensor holder and chair	M5x16_cyl head	14	180	9	
Z to X axis plate	M5x16_cyl head	4	180	10	
Motors plates to Axis plates	M5x16_cyl head	16	180	11	
Mount echains	M5x16_cyl head	8	180	12	
Motor spacer and plate	M5x20_cyl head	16	16	1	
Moving bearings	M5x20 conic sunk head	36	36	1	Can be 25 mm
Fixed bearings	M5x20 hex head	36	36	1	Can be 25 mm
Y rails to nuts	M5x35 cyl head	44	44	1	
Spindle to z axis	M6x20 cyl head	8	8	1	
Spindle to z axis	M6 nut	8	8	1	

Endstops spacers	M5 nut	14	14	1	
leg feet	M8 large washer	6	12	1	
Feet topside nuts to stablice	M8 large washer	6	12	2	
Feet topside nuts to stablice	M8 nut	6	6	1	
Fasten leather to dust shoe	4x16wood screw	25	29	2	
Fasten leather to dust shoe	M4 washer	25	25	1	
Fasten pinions	M5 stud screw	12	12	1	

As of 22/01/2019					
Currency	In USD				
NOK	0,116234				
GBP	1,294255				
USD	1				
Currency	In NOK				
USD	8,60333465				
GBP	11,1349089				
NOK	1				

Category	Sub category	NOK tot Rounde	ed

Tools and	Equi	Collets	195 kr	
Tools and	Equi	Hand tools	85 kr	
Tools and	Equi	Hand tools	40 kr	
Tools and	Equi	Hand tools	34 kr	
Tools and	Equi	Hand tools	34 kr	
Tools and	Equi	Hand tools	34 kr	
Tools and	Equi	Hand tools	24 kr	
Tools and	Equi	Milling bits	771 kr	
Tools and	Equi	Milling bits	513 kr	
Tools and	Equi	Milling bits	17 kr	
Tools and	Equi	Safety equipmen	40 kr	
Tools and	Equi	Safety equipmen	40 kr	
Tools and	-		40 kr	
Tools and			36 kr	

Category	Sub category	
Consumables	Drill bits	
Electronics	Hand tools	
Fasteners	Lubricant	
Hardware	Milling bits	
Raw material	Cable	
Tools and Equipr	Connectors	
	Controller	
	Sensors	
	Switches	
	Glue	
	Magnets	
	Screws, nuts, was	shers
	Zip ties	
	Bearings	
	Cable manageme	ent
	Motors & drivers	
	Power supply	
	Spindle & driver	
	Aluminium	
	Elastic cord	
	Leather and cloth	
	Plastic	
	Valchromat	
	Collets	
	Safety equipment	t
	Storage	