

Project cost estimate sheet		Project: Flaming Harmonic Wand, Nozzles, Finial		Sub system: FH-Wand						Angus McGregor		Sheet 1 of 1		
												Date of estimate: 21 Nov 2018		
Item	Description	Material / Manufacturers Description	Supplier	Availability (days)	Qty	Labour Hours		Material cost each (NZ \$)	Shipping cost (NZ \$)	Units each (NZ \$)	Total material cost (NZ \$)	Labour cost (NZ \$)	Confidence level	Total
						workshop	contractor							
1	Wand Manufacture	Glass, resin, machine setup, extrusion, pshipping to UC	Gracol Composites (contractor)	xCHCH	2	30		1000.00		/run of 3 poles	2000.00	4800.00	High	7480.00
2	HDPE liner	40 x 28.5 PE100 / SDR7.4 pipe	Advanced Piping Systems / UC works and services	xAdelaide	2		4	300.00	200.00	/unit	600.00	800.00	High	1760.00
3	FH-NOZ-01	Nozzle Back plate 316	UC workshop / Vulcan Metals	xCHCH	20	2	0			/unit	0.00	3200.00	Med	3520.00
4	FH-NOZ-02	Nozzle body 420	UC workshop / Vulcan Metals	xCHCH	20	3	0	12.00		/unit	240.00	4800.00	Med	5544.00
5	FH-NOZ-03	Nozzle front plate 316	UC workshop / Vulcan Metals	xCHCH	20	3	0			/unit	0.00	4800.00	Med	5280.00
6	FH-NOZ-04	Wire bushing 316	UC workshop / Vulcan Metals	xCHCH	20	1	0			/unit	0.00	1600.00	Med	1760.00
7	FH-NOZ-05	Flow Laminator (1/4" and 20BWG wire)	UC workshop /Ambro Metals	xAKL	20	2	0	27.00	25.00	/m	540.00	3200.00	Med	4141.50
8	FH-NOZ-06	Nozzle Shroud 316	UC workshop / Vulcan Metals	xCHCH	20	2	0			/unit	0.00	3200.00	Med	3520.00
9	FH-NOZ-07	Ignition bracket	UC workshop / RS components (5 x 100mm D15 lengths)	xCHCH	20	3	0	32.31	0.00	/unit	646.20	4800.00	Med	5990.82
10	FH-NOZ-08	Spark rod ignition connector 316	UC workshop / Vulcan Metals	xCHCH	20	3	0			/unit	0.00	4800.00	Med	5280.00
11	FH-NOZ-09	Nozzle Locknut 316	UC workshop / RS components (2 x 100mm x D25 lengths)	xCHCH	20	1	0	31.31	0.00	/unit	626.20	1600.00	Med	2448.82
12	FH-NOZ-10	Spark rod/ion probe Kanthal A1		xCHCH	20	2	0			/unit	0.00	3200.00	Med	3520.00
13	FH-NOZ-11	Sparker ferrule	UC workshop / RS Components (1 x PTFE 500mm x D25)	xCHCH	20	0.5	0	3.00		/unit	60.00	800.00	Med	946.00
14	Wiring (HV nozzles) (400m per pole)	PTFE coated wires /22kVDC rated Teledyne 178-8316	Teledyne Reynolds	xCHCH	2			996.00		/ft	1992.00	0.00	Med	2191.20
15	FH-NOZ-12	Filter boot nitrile	UC workshop	xCHCH	20	1	0	5.00	25.00	/m	100.00	1600.00	Med	1897.50
16	FH-NOZ-13	Flow laminator mech / 316SS - 300micron plain weave	Steel and Tube	xAKL	40	0.25	0	2.00	25.00	/m^2	80.00	800.00	Med	995.50
17	FH-NOZ-14	Back plate nitrile gasket	UC workshop / Vulcan Metals	xCHCH	20	0.25	0			/unit	0.00	400.00	Med	440.00
18	FH-FINIAL-01	Cap Body 6061 alloy	UC workshop / Ullrich	xCHCH	1	12	0	164.30		/unit	164.30	960.00	Med	1236.73
19	FH-FINIAL-02	Lake Axial Solenoid Valve (100psi / 12v / 1.5A)	Aerocon Systems	xUSA	1		0	200.00		/unit	200.00	0.00	High	220.00
20	FH-FINIAL-03	Vent valve body 316	UC workshop	xCHCH	1	4	0	50.00		/m	50.00	320.00	High	407.00
21	FH-FINIAL-04	Ball Bearing / Nylon 316	RS Components	xCHCH	1	1	0			/m^2	0.00	80.00	High	88.00
22	FH-FINIAL-05	Pressfit plug / 316	UC workshop	xCHCH	1	4	0	25.00		/unit	25.00	320.00	High	379.50
23	FH-FINIAL-06	Breather O ring	Seal imports ltd	xCHCH	1	0	0	1.00		/unit	1.00	0.00	High	1.10
24	FH-FINIAL-07	Cap body O ring	Seal imports ltd	xCHCH	2	0	0	2.00		/unit	4.00	0.00	High	4.40
25	Wiring (Valve) (22m needed)	RS pro PTFE coated wires / 250V 24AWG	RS Components	xCHCH	1	0		68.59		/100m reel	68.59	0.00	High	75.45
26	Pole Painting	"Ingot Silver"	Perfect Autobody	xCHCH	2	2		933.15		/unit	1866.30	320.00	High	2404.93
26	PVC shipping sleeve	Screw caps, Pipe	Plumbing world	xCHCH	2	3		266.04		/unit	532.08	480.00	High	1113.29
27	General Wand assembly	Wiring, drilling GFRP, assembly			80					/unit	0.00	0.00	High	0.00
										Totals	9795.67	46880.00	MED	62645.74

This quote is an estimate of the cost of purchasing and fabricating two wands with one set of nozzles for the Flaming Harmonic Sculpture. Fabrication times for all metal parts are estimates by UC workshop staff for the subsystems: FH-NOZ noz and FH-CAP

4 spare nozzles are included.

Notes:

UC workshop charge out rate: 80 p/h.

Charges exclusive of GST

10% extra quoted for conservative estimate

Shipping not included in costing

Accurate costings procured from:

Gracol Composites

Advanced Piping Systems

Plumbing World

Perfect Autobody

Ambro Metals

RS Components

Vulcan Metals

Daburn

UC workshop

Zhongfa precision metal.

Aerocon Systems

Steel and Tube

High confidence level:

Written quotes or where high accuracy is ensured - intended to reflect accurately the cost of the service or product

Medium confidence level:

A verbal quote, or where some uncertainty exists but a reasonable estimate of the cost is known

Low Confidence level

An indicative costing only based on incomplete design specifications, or extrapolated from previous design work.

Project cost estimate sheet		Project: Flaming Harmonic Control System		Sub system: FH-PLC				Angus McGregor		Sheet 1 of 1		
										Date of estimate: 21 Nov 2018		
Item	Description	Material / Manufacturers Description	Supplier	Availability (days)	Qty	Labour Hours		Material cost each (NZ \$)	Total material cost (NZ \$)	Labour cost (NZ \$)	Confidence level	Total
						workshop	contractor					
1	PLC power supply	ET200SP PS 24V/10A	CNC Design	xAKL	1			304.80	304.80	0.00	high	335.28
2	PLC processor	CPU 1510SP F-1 PN, 150KB PROG./750KB DATA	CNC Design	xAKL	1			1541.60	1541.60	0.00	high	1695.76
3	PLC digital safety input	ET200SP, F-DI 8X24VDC HF - CC01	CNC Design	xAKL	2			469.6	939.20	0.00	high	1033.12
4	PLC digital input	ET200SP, DI 16X24VDC ST - CC00	CNC Design	xAKL	1			192.8	192.80	0.00	high	212.08
5	PLC digital safety output	ET200SP, F-DQ 8X 24VDC 0.5A	CNC Design	xAKL	2			607.2	1214.40	0.00	high	1335.84
6	PLC digital output	ET200SP, DQ 16X24VDC/0.5A ST - CC00	CNC Design	xAKL	2			223.20	446.40	0.00	high	491.04
7	PLC analogue output	ET200SP, AQ 4XU/I ST -CC00	CNC Design	xAKL	2			491.20	982.40	0.00	high	1080.64
8	PLC analogue inout	ET200SP, AI 4XU/I 2WIRE STD -CC03	CNC Design	xAKL	2			387.20	774.40	0.00	high	851.84
9	Sectional rail	STAND.SECTIONAL RAIL 35MM, LENGTH 483MM	CNC Design	xAKL	1			68.80	68.80	0.00	high	75.68
10	RJ45 bus	ET200SP, BUSADAPTER BA 2XRJ45	CNC Design	xAKL	1			124.00	124.00	0.00	high	136.40
11	PLC base unit a	ET200SP, A0, BU15-P16+A0+2B	CNC Design	xAKL	7			33.84	236.88	0.00	high	260.57
12	PLC base unit b	ET200SP, A0, BU15-P16+A0+2D	CNC Design	xAKL	4			59.68	238.72	0.00	high	262.59
13	Software	STEP 7 TIA PROFESSIONAL V15	CNC Design	xAKL	1			4421.60	4421.60	0.00	high	4863.76
14	Safety software	STEP 7 SAFETY ADVANCED V15	CNC Design	xAKL	1			1440.80	1440.80	0.00	high	1584.88
15	Memory card	SIMATIC S7 MEMORY CARD, 12 MB	CNC Design	xAKL	1			392.80	392.80	0.00	high	432.08
16	Line filter	COSEL NAC-10-472	RS Components	xNZL	1			46.30	46.30	0.00	high	50.93
17	General purpose SMPS	XP power 1kW SMPS	RS Components	xNZL	1			780.26	780.26	0.00	high	858.29
18	PLC SMPS	SIEMENS 230VAC to 24VDC / 6.2A 6EP1333-1LD00	RS Components	xNZL	2			151.92	303.84	0.00	high	334.22
19	SMPS redundancy module	SIEMENS 6EP1961-3BA21	RS Components	xNZL	1			223.56	223.56	0.00	high	245.92
20	Mains Switch	Eaton 3 Pole Enclosed Changeover Switch T0-2-15679/I1/SVB	RS Components	xNZL	1			62.81	62.81	0.00	high	69.09
21	Mains Contactor	Schneider LC1D12BL	RS Components	xNZL	1			283.82	283.82	0.00	high	312.20
22	X-motor motor protection CB	Schneider GV2L14	RS Components	xNZL	1			129.40	129.40	0.00	high	142.34
23	Z-motor protection CB	Schneider GV2L08	RS Components	xNZL	1			255.97	255.97	0.00	high	281.57
24	Pump motor protection CB	Schneider GV2L08	RS Components	xNZL	1			255.97	255.97	0.00	high	281.57
25	Air compressor CB	Siemens 690V MPCB 70-90A 3RV1041-4LA10	RS Components	xNZL	1			409.78	409.78	0.00	high	450.76
26	General 24V CB	Schneider 15A 1 pole CB, A9F54150	RS Components	xNZL	1			36.21	36.21	0.00	high	39.83
27	240V CB(s) lighting and PLC	Scnhneider 10A 1 pole CB, A9F44110	RS Components	xNZL	3			26.27	78.81	0.00	high	86.69
28	Fuse holder	Littelfuse 30A Rail Mount Fuse Holder	RS Components	xNZL	14			11.53	161.42	0.00	high	177.56
29	Fuses	1.5,10A to suit FH-ELEC	RS Components	xNZL	14			1.00	14.00	0.00	high	15.40
30	general purpose relay	Phoenix SPNO NL relay (24VDC / 6A) / 2903361	RS Components	xNZL	7			13.87	97.09	0.00	high	106.80
31	e-stop relay	schneider 3 contact 230V safety relay	RS Components	xNZL	1			615.98	615.98	0.00	high	677.58
32	Switches, buttons, control box	Workshop misc	UC workshop	xNZL	1			1000.00	1000.00	0.00	high	1100.00
33	Ancillary	Wiring, mounting rail, fasteners, assembly, programming	UC workshop	xCHCH	1	80			500.00	6400.00	high	7590.00
								Totals	5316.80	0.00	HIGH	27472.30

This quote is an estimate of the cost of a PLC control system for the Flaming Harmonic Sculpture. Upon finishing the installation, a different interface may be desired depending on user needs.

Notes:

UC workshop charge out rate: 80 p/h.

Charges exclusive of GST

10% extra quoted for conservative estimate

Shipping not included in costing

Accurate costings procured from:

UC Workshop

RS Components

High confidence level:

Written quotes or where high accuracy is ensured - intended to reflect accurately the cost of the service or product

Medium confidence level:

A verbal quote, or where some uncertainty exists but a reasonable estimate of the cost is known

Low Confidence level

An indicative costing only based on incomplete design specifications, or extrapolated from previous design work.

Project cost estimate sheet		Project: Flaming Harmonic Machining Costs		Sub system: Machining Costs						Angus McGregor		Sheet 1 of 1		
												Date of estimate: 21 Nov 2018		
Item	Description	Material / Manufacturers Description	Supplier	Availability (days)	Qty	Labour Hours		Material cost each (NZ \$)	Shipping cost (NZ \$)	Units	Total material cost (NZ \$)	Labour cost (NZ \$)	Confidence level	Total
						workshop	contractor							
1	FH-LGA-01	Wand Hub mount plate	UC workshop / Pole Electroplating / Heat treatment	xCHCH	1	6	2	included in steel cost		/unit		680.00	med	748.00
2	FH-LGA-02	Bearing Hub	UC workshop / Pole Electroplating / Heat treatment	xCHCH	1	28	2	included in steel cost		/unit		2440.00	med	2684.00
3	FH-LGA-03	Wand Shaft	UC workshop / Heat treatment	xCHCH	1	30	1	included in steel cost		/unit		2500.00	med	2750.00
4	FH-LGA-04	lower seal cap	UC workshop / Heat treatment	xCHCH	1	18	1	included in steel cost		/unit		1540.00	med	1694.00
5	FH-LGA-05	z motor mount plate	UC workshop / Pole Electroplating / Heat treatment	xCHCH	1	6	2	included in steel cost		/unit		680.00	med	748.00
6	FH-LGA-06	Tensioner pad	UC workshop / Pole Electroplating / Heat treatment	xCHCH	2	6	2	included in steel cost		/unit		1360.00	med	1496.00
7	FH-LGA-07	Tensioner screw block	UC workshop / Pole Electroplating / Heat treatment	xCHCH	2	5	2	included in steel cost		/unit		1200.00	med	1320.00
8	FH-LGA-08	Bearing inner spacer	UC workshop	xCHCH	1	1.5		included in steel cost		/unit		120.00	med	132.00
9	FH-LGA-09	Lower Seal Spacer	UC workshop	xCHCH	1	1.5		included in steel cost		/unit		120.00	med	132.00
10	FH-LGA-10	RHS-Shuttle	UC workshop	xCHCH	1	35	2	included in steel cost		/unit		3000.00	med	3300.00
11	PULLEY REBORE	8mx_60s_21 rebore	Uc workshop	xCHCH	1	2		included in off the shelf		/unit		160.00	med	176.00
12	FH-DRIVE-01	Motor half hub	UC workshop / Pole Electroplating / Heat treatment	xCHCH	2	25	2	included in steel cost		/unit		4400.00	med	9680.00
13	FH-DRIVE-02	Crank half hub	UC workshop / Pole Electroplating / Heat treatment	xCHCH	2	13	2	included in steel cost		/unit		2480.00	med	5456.00
14	FH-DRIVE-03	Connecting rod	UC workshop / Pole Electroplating / Heat treatment	xCHCH	2	15	2	included in steel cost		/unit		2800.00	med	6160.00
15	FH-DRIVE-04	Connecting rod cap	UC workshop / Heat treatment	xCHCH	2	3	1	included in steel cost		/unit		680.00	med	1496.00
16	FH-DRIVE-05	Connecting rod pin	UC workshop / Heat treatment	xCHCH	2	6	4	included in steel cost		/unit		1760.00	med	3872.00
17	FH-DRIVE-06	Bearing spacer	UC workshop	xCHCH	6	2		included in steel cost		/unit		960.00	med	6336.00
18	FH-DRIVE-07	X Motor Hub	UC workshop / Pole Electroplating / Heat treatment	xCHCH	2	15	2	included in steel cost		/unit		2800.00	med	6160.00
19	FH-DRIVE-08	X Motor locknut spacer	UC workshop	xCHCH	2	2		included in steel cost		/unit		320.00	med	704.00
20	FH-DRIVE-09	X motor mounting bracket	UC workshop	xCHCH	2	10		included in steel cost		/unit		1600.00	med	3520.00
21	FH-UGA-01	RHS-Shuttle	UC workshop / Pole Electroplating / Heat treatment	xCHCH	1	35	4	included in steel cost		/unit		3200.00	med	3520.00
22	FH-UGA-02	Crankshaft mount	UC workshop / Pole Electroplating / Heat treatment	xCHCH	1	15	2	included in steel cost		/unit		1400.00	med	1540.00
23	FH-UGA-03	Upper Gimbal Plate	UC workshop / Pole Electroplating / Heat treatment	xCHCH	1	4	2	included in steel cost		/unit		520.00	med	572.00
24	FH-UGA-04	Gimbal Ring	UC workshop / Pole Electroplating / Heat treatment	xCHCH	1	30	2	included in steel cost		/unit		2600.00	med	2860.00
25	FH-UGA-05	Bearing Hub	UC workshop / Pole Electroplating / Heat treatment	xCHCH	1	25	2	included in steel cost		/unit		2200.00	med	2420.00
26	FH-UGA-06	Upper Shaft	UC workshop / Pole Electroplating / Heat treatment	xCHCH	1	25	4	included in steel cost		/unit		2400.00	med	2640.00
27	FH-UGA-07	Shaft Cap	UC workshop / Pole Electroplating / Heat treatment	xCHCH	2	8	2	included in steel cost		/unit		1680.00	med	1848.00
28	FH-UGA-08	Wand Clamping Bush	UC workshop	xCHCH	2	2		20		/unit	40.00	320.00	med	396.00
29	FH-UGA-09	Upper Boot	UC workshop	xCHCH	1	5		200		/unit	200.00	400.00	med	660.00
30	FH-UGA-010	Lower Boot	UC workshop	xCHCH	1	5		200		/unit	200.00	400.00	med	660.00
31	FH-UGA-011	Bearing Cap Plate	UC workshop	xCHCH	1	12		included in steel cost		/unit		960.00	med	1056.00
32	FH-UGA-012	Bearing Cap Spacer	UC workshop	xCHCH	1	1.5		included in steel cost		/unit		120.00	med	132.00
33	FH-UGA-013	Needle Bearing Spacer	UC workshop	xCHCH	1	1.5		included in steel cost		/unit		120.00	med	132.00
34	FH-FRAME-01	Lower frame	UC workshop / Southfence	xCHCH	1	5	40	included in steel cost		/unit		4400.00	med	4840.00
35	FH-FRAME-02	Upper Frame	UC workshop / Southfence	xCHCH	1	5	40	included in steel cost		/unit		4400.00	med	4840.00
36	FH-FRAME-03	X motor mount	UC Workshop	xCHCH	1	12		included in steel cost		/unit		960.00	med	1056.00
37	FH-FRAME-04	Bump pad	UC Workshop	xCHCH	4	6		included in steel cost		/unit		1920.00	med	2112.00
38	FH-IGNITE-01	Transformer hub	UC Workshop	xCHCH	1	24		included in steel cost		/unit		1920.00	med	2112.00
39	FH-IGNITE-02	Transformer seat	UC Workshop	xCHCH	2		1	10		/unit		200.00	med	220.00
40	FH-IGNITE-03	Cap plate	UC Workshop	xCHCH	1	4		included in steel cost		/unit		320.00	med	352.00
41	FH-IGNITE-04	Feedthrough plate	UC Workshop	xCHCH	1	8		included in steel cost		/unit		640.00	med	704.00
42	FH-IGNITE-05	Wand adapter sleeve	UC Workshop	xCHCH	1	14		included in steel cost		/unit		1120.00	med	1232.00
38	General Fitting of Components	UC workshop	UC workshop	xCHCH	1	160				/unit	0.00	12800.00	med	14080.00
										Totals	440.00	76600.00	MEDIUM	108548.00

This quote is an estimate of the cost of fabricating the mechanical drive system components for the Flaming Harmonic Sculpture. Fabrication times for all metal parts are estimates by UC workshop staff for the subsystems: FH-Drive, FH-LGA, FH-UGA, FH-FRAME

The following steel costs and off the shelf component costs sum to the full cost of these subsystems

Notes:

UC workshop charge out rate: 80 p/h.

Charges exclusive of GST

10% extra quoted for conservative estimate

Charges exclusive of GST

10% extra quoted for conservative estimate

Accurate costings procured from:

UC Workshop staff

Pole Electroplating

Steel costs on separate spreadsheet

High confidence level:

Written quotes or where high accuracy is ensured - intended to reflect accurately the cost of the service or product

Medium confidence level:

A verbal quote, or where some uncertainty exists but a reasonable estimate of the cost is known

Project cost estimate sheet		Project: Flaming Harmonic Bought Machine Components		Sub system: Machine components for FH-LGA, UGA, Drive, Frame					Angus McGregor		Sheet 1 of 1		
											Date of estimate: 21 Nov 2018		
Item	Description	Material / Manufacturers Description	Supplier	Availability (days)	Qty	Unit	Labour Hours		Material cost each (NZ \$)	Total material cost (NZ \$)	Labour cost (NZ \$)	Confidence level	Total
							workshop	contractor					
1	Rotary Union	SUL-5610 Mod.	Scott Rotary Seals	xUSA	1	per unit			713.36	713.36		high	784.70
2	Electrical Slip Ring	24 lead fluoropolymer seal Slip ring	TME Systems	xNSW	1	per unit			750.00	750.00	0.00	med	825.00
3	Z-Motor (Helical gear motor + encoder + VSD)	k67DRN112M4	SEW-Eurodrive	xNZL	1	per unit			4945.28	4945.28	0.00	high	5439.81
4	X-motor (Flange mount helical GM + encoder + VSD)	RF47 DRN90S4/AS7W + MDX61B0014-5A3-4-0T/DEH11B/DFE33B + BW100-006, DBG60B-10.	SEW-Eurodrive	xNZL	1	per unit			4050.78	4050.78	0.00	high	4455.86
5	EM Brake (On LGA)	PBM VAR 02 SZ250 / 60mm bore, no keyway. Armature /hub / inductor / connector kit	Altra-Motion	xNSW	1	per unit			1473.00	1473.00	0.00	high	1620.30
6	Brake Power Supply	K6024-448-005, CBC 450 powr supply, 230VAC input, 24VDC output	Altra-Motion	xNSW	1	per unit			1105.60	1105.60	0.00	high	1216.16
7	Pulley hardware (For Z motor)	1108-25mm / 8MX-28s-21 / 8MX-63S-21 (GATES)	SAECO-Wilson	xAKL	1	per unit			615.22	615.22	0.00	high	676.74
8	Drive Belt (For Z motor)	GT-Carbon belt / 1040mm - 21 (GATES)	SAECO-Wilson	xCHCH	1	per unit			155.56	155.56	0.00	high	171.12
9	Spiderflex Coupling (For X-motor / drive linkage)	HRC150 (2 x F type hubs, flex element, 2 x 2012 bushes to suit 35mm shafts)	SAECO-Wilson	xCHCH	2	per unit			237.99	475.98	0.00	high	523.58
10	Linear Guides (For UGA+LGA)	MRS35w-N-K1	SOUTH ISLAND BEARINGS	xNZL	8	per unit			210.19	1681.52	0.00	high	1849.67
11	Linear Guide Rail (For UGA+LGA)	2 x 800mm to suit MRS35W	SOUTH ISLAND BEARINGS	xNZL	1	3200mm			\$1,197	1197.12	0.00	high	1316.83
12	Shaft Seal (drive)	SKF HMSA(10) rg 65x95x10	SOUTH ISLAND BEARINGS	xNZL	2	per unit			20.00	40.00	0.00	high	44.00
13	Shaft Seal (drive)	SKF HMSA(10) rg 60x85x10	SOUTH ISLAND BEARINGS	xNZL	2	per unit			20.00	40.00	0.00	high	44.00
14	Shaft Seal (UGA upper seal)	SKF HMSA(10) rg 85x105x10	SOUTH ISLAND BEARINGS	xNZL	2	per unit			60.00	120.00	0.00	high	132.00
15	Shaft Seal (LGA upper seal)	SKF HMSA10 (rg) 110 x 150 x 12	SOUTH ISLAND BEARINGS	xNZL	1	per unit			45.00	45.00	0.00	high	49.50
16	Shaft Seal (LGA lower seal)	SKF HMSA10 (rg) 80 x 110 x 10	SOUTH ISLAND BEARINGS	xNZL	1	per unit			20.00	20.00	0.00	high	22.00
17	Taper Roller Bearing (LGA)	32018X	SOUTH ISLAND BEARINGS	xNZL	1	per unit			45.00	45.00	0.00	high	49.50
18	Taper Roller Bearing (LGA)	32017X	SOUTH ISLAND BEARINGS	xNZL	1	per unit			40.00	40.00	0.00	high	44.00
19	Taper Roller Bearing (Drive)	32011X	SOUTH ISLAND BEARINGS	xNZL	2	per unit			30.00	60.00	0.00	high	66.00
20	Taper Roller Bearing (Drive)	32010X	SOUTH ISLAND BEARINGS	xNZL	2	per unit			25.00	50.00	0.00	high	55.00
21	Needle Roller Bearing (UGA)	NK85/35	SOUTH ISLAND BEARINGS	xNZL	2	per unit			115.00	230.00	0.00	high	253.00
22	Deep Groove Ball Bearing (UGA upper)	61816-2rz	SOUTH ISLAND BEARINGS	xNZL	1	per unit			115.00	115.00	0.00	high	126.50
23	Deep Groove Ball Bearing (UGA lower)	61816-2rz	SOUTH ISLAND BEARINGS	xNZL	1	per unit			90.00	90.00	0.00	high	99.00
24	Spherical Bearing (Drive Linkage)	BS2-22206-2RS	SOUTH ISLAND BEARINGS	xNZL	4	per unit			250.00	1000.00	0.00	high	1100.00
25	Lock Nut	KM9/MB9	SOUTH ISLAND BEARINGS	xNZL	1	per unit			8.00	8.00	0.00	high	8.80
26	Lock Nut	KM6/MB6	SOUTH ISLAND BEARINGS	xNZL	6	per unit			3.60	21.60	0.00	high	23.76
27	Lock Nut	KM5/MB5	SOUTH ISLAND BEARINGS	xNZL	3	per unit			2.00	6.00	0.00	high	6.60
28	Lock Nut	KM17/MB17	SOUTH ISLAND BEARINGS	xNZL	1	per unit			5.80	5.80	0.00	high	6.38
29	Lock Nut	KM15/MB15	SOUTH ISLAND BEARINGS	xNZL	1	per unit			10.00	10.00	0.00	high	11.00
30	Bearing Housing (UGA)	SNL205	SOUTH ISLAND BEARINGS	xNZL	4	per unit			90.00	360.00	0.00	high	396.00
31	Spherical Bearings (UGA)	22205E	SOUTH ISLAND BEARINGS	xNZL	4	per unit			65.00	260.00	0.00	high	286.00
32	Locating Rings	FRB 3.55/52	SOUTH ISLAND BEARINGS	xNZL	4	per unit			3.00	12.00	0.00	high	13.20
33	End Cap	ANSH506-605	SOUTH ISLAND BEARINGS	xNZL	4	per unit			5.00	20.00	0.00	high	22.00
34	Spirolox external circlip	95mm (external type)	SOUTH ISLAND BEARINGS	xNZL	1	per unit			10.00	10.00	0.00	high	11.00
35	Spirolox external circlip	80mm (external type)	SOUTH ISLAND BEARINGS	xNZL	1	per unit			9.00	9.00	0.00	high	9.90
36	Circlip 80mm	Circlip 80mm (external type)	SOUTH ISLAND BEARINGS	xNZL	1	per unit			3.00	3.00	0.00	high	3.30
37	Circlip 70mm	Circlip 70mm (external type)	SOUTH ISLAND BEARINGS	xNZL	1	per unit			2.00	2.00	0.00	high	2.20
38	Circlip 25mm	Circlip 25mm (external type)	SOUTH ISLAND BEARINGS	xNZL	2	per unit			0.80	1.60	0.00	high	1.76
39	Misc		UC workshop	xNZL	1				500.00	500.00	0.00	high	550.00
									Totals	20287.42	0.00	HIGH	22316.16

This quote, along with the steel costing and machining costs quotes, is designed to accurately reflect the cost of producing the Flaming Harmonic drive system

Notes:

UC workshop charge out rate: 80 p/h.

Charges exclusive of GST

10% extra quoted for conservative estimate

Shipping typically not included in costing

Accurate costings procured from:

SEW Eurodrive

South Island Bearings

Saeco-Wilson

Altra-Motion

TME Systems

Scott Rotary Seals

High confidence level:

Written quotes or where high accuracy is ensured - intended to reflect accurately the cost of the service or product

Medium confidence level:

A verbal quote, or where some uncertainty exists but a reasonable estimate of the cost is known

Low Confidence level

An indicative costing only based on incomplete design specifications, or extrapolated from previous design work.

Project cost estimate sheet		Project: Flaming Harmonic Steel Costs	Sub system: Steel Costs for drive mechanism				Angus McGregor		Sheet 1 of 1		
									Date of estimate: 21 Nov 2018		
Item	Steel Type	Supplier	Availability (days)	Qty	Labour Hours		Units	Material cost each (NZ \$)	Labour cost (NZ \$)	Confidence level	Total
1	1045 - D230 x 160 LGA bearing hub	Easysteel	xCHCH	1			/unit	262.11	0.00	high	288.32
2	P20 - D110 x 350 LGAWand lower shaft	Special Steels and Metals	xCHCH	1			/unit	173.8	0.00	high	191.18
3	1045 - D290 x 40 LGA seal cap	Easysteel	xCHCH	1			/unit	93.6	0.00	high	102.96
4	MILD 145 x 325 x 12 LGA Z motor mount plate	Easysteel	xCHCH	1			/unit	23.13	10.00	high	36.44
5	MILD 30X50X230 LGA motor tension pad	Easysteel	xCHCH	2			/unit	15.05	20.00	high	60.56
6	MILD 30X50X230 LGA Tensioner blocks	Easysteel	xCHCH	2			/unit	2	20.00	high	46.20
7	4340 - D120x50 LGA spacers	Easysteel	xCHCH	1			/unit	42.22	0.00	high	46.44
8	RHS (hot rolled) - 50 x 75 x 4 (one length) UGA+LGA shuttle	Easysteel	xCHCH	4			/unit	288.36	0.00	high	317.20
9	1045 x D25 x 100 UGA Shuttle frame (C)	Easysteel	xCHCH	1			/unit	10	0.00	high	11.00
10	4140 - D90 x 170 UGA Crank Clevis	Easysteel	xCHCH	2			/unit	76.64	0.00	high	84.30
11	MILD 384 x 210*16 UGA Gimbal plate	Easysteel	xCHCH	1			/unit	52.78	10.00	high	69.06
12	4140 - D370 x 40 UGA Gimbal ring	Easysteel	xCHCH	1			/unit	572.27	0.00	high	629.50
13	1045 - D200 x 120 UGA Upper bearing hub	Easysteel	xCHCH	1			/unit	148.98	0.00	high	163.88
14	P20 - D100 x 210 UGA Upper wand shaft	Special Steels and Metals	xCHCH	1			/unit	115.87	0.00	high	127.46
15	P20 - D100 x 80 UGA Wand shaft cap	Special Steels and Metals	xCHCH	2			/unit	44.14	0.00	high	48.55
16	1045 - D160 x 50 UGA Bearing cap plate	Easysteel	xCHCH	1			/unit	29.98	0.00	high	32.98
17	Bronze LG2 OD110 ID 90 x 40 UGA Spacer hardware	Little Metals	xCHCH	1			/unit	127.84	0.00	high	140.62
18	1045 - D130 x 110 DRIVE Motor drive shaft	Easysteel	xCHCH	2			/unit	131.14	0.00	high	144.25
19	1045 - D130 x 110 DRIVE Crank half hub	Easysteel	xCHCH	2			/unit	57.7	0.00	high	63.47
20	4140 - D90 x 500 DRIVE Crankshaft	Easysteel	xCHCH	2			/unit	237.75	0.00	high	261.53
21	4140 - D90 x 50 DRIVE Crankshaft caps	Easysteel	xCHCH	2			/unit	23.78	0.00	high	26.16
22	EN39B - D50 x 80 DRIVE Crankshaft pin	Easysteel	xCHCH	2			/unit	16.84	0.00	high	18.52
23	4340 - D40 x 50 DRIVE Spacer hardware	Easysteel	xCHCH	4			/unit	8.69	0.00	high	9.56
24	1045 - D130 x 110 DRIVE bearing hub	Easysteel	xCHCH	2			/unit	57.7	0.00	high	63.47
25	MILD 2 x 230x210 + 175*150 16mm plate LGA Z motor mount plate	Easysteel	xCHCH	1			/unit	86.21	10.00	high	105.83
26	4340 - D60 x 50 DRIVE spacer hardware	Easysteel	xCHCH	1			/unit	11.58	0.00	high	12.74
27	6063 - D316x80 Ignite transformer hub	Ullrich	xCHCH	1			/unit	430.2	0.00	high	473.22
28	6063 - D316*8 Ignite cap/feedthrough plate	Ullrich	xCHCH	2			/unit	15	0.00	high	16.50
29	316 - D60*300 - adapter sleeve	Easysteel	xCHCH	1			/unit	94.57	0.00	high	104.03
30	RHS (hot rolled) - 4 lengths 75 x 75 x 6 FRAME	Easysteel	xCHCH	4			/unit	500.04	0.00	high	550.04
31	MILD PLATE - 1025x700 x20 FRAME	Easysteel	xCHCH	1			/unit	403	40.00	high	487.30
32	MILD PLATE - 1000x75 x20 FRAME	Easysteel	xCHCH	2			/unit	52.18	40.00	high	145.40
33	MILD PLATE - 160x160 x20 FRAME	Easysteel	xCHCH	4			/unit	19.04	40.00	high	196.94
34	MILD PLATE - 125 x 125 x 20 FRAME	Easysteel	xCHCH	8			/unit	11.62	80.00	high	716.78
35	MILD PLATE - 150 x 75 x 25 FRAME	Easysteel	xCHCH	4			/unit	11.97	10.00	high	57.17
36	MILD PLATE - 615 x 260 x 20 FRAME	Easysteel	xCHCH	1			/unit	94.75	10.00	high	115.23
							Totals	4342.53	290.00	HIGH	5964.78

This quote, along with the steel costing and machining costs quotes, is designed to accurately reflect the cost of producing the Flaming Harmonic drive system

Does not include costs for the nozzles, wand hardware, or ignition hub

Notes:

UC workshop charge out rate: 80 p/h.

Charges exclusive of GST

10% extra quoted for conservative estimate

Shipping typically not included in costing

Accurate costings procured from:

SEW Eurodrive

South Island Bearings

Saeco-Wilson

Altra-Motion

High confidence level:

Written quotes or where high accuracy is ensured - intended to reflect accurately the cost of the service or product

Medium confidence level:

A verbal quote, or where some uncertainty exists but a reasonable estimate of the cost is known

Low Confidence level

An indicative costing only based on incomplete design specifications, or extrapolated from previous design work.

Project cost estimate sheet		Project: Flaming Harmonic Gas Delivery System		Sub system: FH-GAS, FH-H2O						Angus McGregor		Sheet 1 of 1		
												Date of estimate: 21 Nov 2018		
Item	Description	Material / Manufacturers Description	Supplier	Availability (days)	Qty	Labour Hours		Material cost each (NZ \$)	Shipping cost (NZ \$)	Units each (NZ \$)	Total material cost (NZ \$)	Labour cost (NZ \$)	Confidence level	Total
1	Air compressor	GA7 vsd (64 cu. m per hour)	Atlas Copco	xAKL	1			14765.00		/unit	14765.00	0.00	high	16241.50
2	Air reciever	1000L tank	Atlas Copco	xAKL	1			3890.00		/unit	3890.00	0.00	high	4279.00
3	manual valves	Geca gas ball valve 1" (DN25)	Combustion Control	xAKL	9			19.41		/unit	174.69	0.00	high	192.16
4	Pressure transducers	IFM 0-25 bar (LPG/Air/water transducer)	RS components	xNZL	4			246.56		/unit	986.24	0.00	high	1084.86
5	Vaporaire	V28-PA Air lpg mixer	Vaporgas	xAKL	1			60000.00		/unit	60000.00	0.00	med	66000.00
6	Torrex Vaporiser	TX240 lpg vaporiser	Vaporgas	xAKL	1			27775.00		/unit	27775.00	0.00	high	30552.50
7	LPG pump	Lpg pump - to suit	Vaporgas	xAKL	1			5000.00		/unit	5000.00	0.00	med	5500.00
8	Y-strainers	Hitachi 1" BSP y strainer	Blackwoods	xNZL	1			75.14		/unit	75.14	0.00	high	82.65
9	Solenoid valves	Black Teknigas Solenoid Operated Gas Safety Shut-Off Valve 1" Fast Opening	Combustion control	xNZL	5			320.42		/unit	1602.10	0.00	high	1762.31
10	Manifold Check Valves	Parker C Series 1" check w PTFE seals	Parker NZ	xNZL	1			600.00		/unit	600.00	0.00	high	660.00
11	Ignition transformers	Brahma TSC1 ignition transformer	Combustion Control	xAKL	16			30.00		/unit	480.00	0.00	high	528.00
12	Burner controller	Fireye multi flame system, 16 burner controllers, display/input	HMA instrumentation	xAKL	1			19200.00		/unit	19200.00	0.00	high	21120.00
13	LPG gas detector	geca SE137	Combustion Control	xAKL	3			321.80		/unit	965.40	0.00	high	1061.94
14	Fitting, Installation, testing at UC	Workshop time	UC Workshop	0	1	80				/unit	0.00	6400.00	med	7040.00
15	Algas Commissioning	Algas	Algas	xAUS	1			23700.00		/unit	23700.00		high	26070.00
16	Gasfitting	Gasfitting / design verification	Gascraft	xCHCH	1		80			/unit	0.00	12000.00	med	13200.00
17	Fasteners/Assembly/Misc	Workshop misc	UC workshop	xCHCH	1	24		2500.00		/unit	2500.00	1920.00		4862.00
										Totals	141897.64	20320.00	MED	200236.93

This quote is an estimate of the cost of purchasing components required for a functioning Flaming performance.

Notes:

UC workshop charge out rate: 80 p/h.

Charges exclusive of GST

10% extra quoted for conservative estimate

Shipping not included in costing

Excludes maintenance

Excludes dangerous goods store and plumbing to sculpture at install location

Indicative costings procured from:

BOC

Vaporair

Gascraft

UC workshop

Combustion Control

HMA instrumentation

High confidence level:

Written quotes or where high accuracy is ensured - intended to reflect accurately the cost of the service or product

Medium confidence level:

A verbal quote, or where some uncertainty exists but a reasonable estimate of the cost is known

Low Confidence level

An indicative costing only based on incomplete design specifications, or extrapolated from previous design work.

Project cost estimate sheet		Project: Flaming Harmonic Water Delivery System		Sub system: FH-H2O						Angus McGregor		Sheet 1 of 1		
						Date of estimate: 21 Nov 2018								
Item	Description	Material / Manufacturers Description	Supplier	Availability (days)	Qty	Labour Hours		Material cost each (NZ \$)	Shipping cost (NZ \$)	Units each (NZ \$)	Total material cost (NZ \$)	Labour cost (NZ \$)	Confidence level	Total
1	Primary Filter	Puretec PL10 MP2 filter housing OR SIMILAR	Puretec (Mitre 10)	xNZL	2			500		/unit	1000.00		high	1100.00
2	Filter bags	Puretec PL10 MP2 / "Maxiplus 4.5" x 20" bag filters (10 micron filtration)	Puretec (Mitre 10)	xNZL	2			20		/unit	40.00		high	44.00
3	Mains supply splitter	Brass 2 way tap - threaded for 15mm fittings. (LIKE Pope 1010745) OR SIMILAR (plug in two hoses)	Bunnings	xCHCH	1			20		/unit	20.00		high	22.00
4	Washdown Tap (15mm-brass-ma	To suit mains supply splitter	Bunnings	xCHCH	1			8.2		/unit	8.20		high	9.02
5	Quality garden Hose (15mm)	15m with brass fittings and a nozzle.	Bunnings	xCHCH	1			100		/unit	100.00		high	110.00
6	Water Tank	1100L water tank	RX plastics	xCHCH	1			500	200	/unit	500.00		high	770.00
7	Manual valves	Geca gas ball valve 1" (DN25)	Combustion Control	xAKL	3			19.41		/unit	58.23		high	64.05
8	HDPE PIPING / PE100	Size to suit 1" ball valves and water tank	Hynds / Marley?	xCHCH	10			15		/m	150.00		high	165.00
9	HDPE or PVC piping	Size to suit mains supply splitter and water tank inlet, 15mm??	Hynds / Marley?	xCHCH	10			15		/m	150.00		high	165.00
10	Tank Drain valve	1" Ball type valve to suit water tanks	HCD flow	xCHCH	3			25.44		/unit	76.32		high	83.95
11	Solenoid valves	Black Teknigas Solenoid Operated Gas Safety Shut-Off Valve 1" Fast Opening	Combustion control	xNZL	2			320.42		/unit	640.84		high	704.92
12	Pressure transducers	IFM 0-25 bar (LPG/Air/water transducer)	RS components	xNZL	1			246.56		/unit	246.56		high	271.22
13	Secondary Filter	Y-strainer with 200um max filter aperture. Dutch weave filter element	Eaton?	xNZL	1			200		/unit	200.00		high	220.00
14	Pump + Remote VSD	CR3-17 / HQQV ; CUE 3X380-500V IP55 1.5KW 1.8	Grundfos	xAKL	1			3775.20		/unit	3775.20		high	4152.72
15	Electronic cut off valve	ASCO Solenoid Valve SCE238D005.24/DC, 2 port , NC, 24 V dc, 1in	RS components ltd	xNZL	1			221.46		/unit	221.46		high	243.61
16	Volumetric flow sensor	Sensirion Digital Flow Meter Flow Meter, -100 SLPM → 250 SLPM, SFM3200 Series	RS components ltd	xNZL	1			306.00		/unit	306.00		high	336.60
17	Manifold Check Valves	Parker C Series 1" check w PTFE seals	Parker NZ	xNZL	1			600.00		/unit	600.00		high	660.00
18	Water Isolation Solenoid	PARKER NC, 1" SOLENOID VALVE 221G6136-2995-481865C2	RS Components	xNZL	1			285.40		/unit	285.40		high	313.94
10	Setup/testing	UC workshop	UC workshop	xNZL	1	40				/unit		3200.00	high	3520.00
										Totals	8378.21	0.00	High	12956.03

This quote is an estimate of the cost of purchasing components required for a functioning Water Whirler Performance

Notes:

UC workshop charge out rate: 80 p/h.

Charges exclusive of GST

10% extra quoted for conservative estimate

Shipping typically not included in costing

Accurate costings procured from:

Puretec

Bunnings

RX plastics

Plumbing World

HCD flow

Grundfos

Eaton

RS Components

VPNZ

High confidence level:

Written quotes or where high accuracy is ensured - intended to reflect accurately the cost of the service or product

Medium confidence level:

A verbal quote, or where some uncertainty exists but a reasonable estimate of the cost is known

Low Confidence level

An indicative costing only based on incomplete design specifications, or extrapolated from previous design work.

Project cost estimate sheet		Project: Flaming Harmonic ancilliary equipment		Sub system: FH-ANCILLIARY						Angus McGregor		Sheet 1 of 1		
												Date of estimate: 21 Nov 2018		
Item	Description	Material / Manufacturers Description	Supplier	Availability (days)	Qty	Labour Hours		Material cost each (NZ \$)	Shipping cost (NZ \$)	Units each (NZ \$)	Total material cost (NZ \$)	Labour cost (NZ \$)	Confidence level	Total
1	Wind sensor		Organise contractor during installation / plinth design	xNZL	1			0.00		0.00	0.00	0.00	low	0.00
2	Proximity alert system		Organise contractor during installation / plinth design	xNZL	1			0.00		/m	0.00	0.00	low	0.00
											Totals	0.00	0.00	0.00

This quote is for some ancilliary costs associated with the project, namely several sensors which will be required to verify safe performance conditions. These are unnecessary for test conditions but should be installaed in the finished site subject to end user requiriements.

Notes: Accurate costings procured from:

UC workshop charge out rate: 80 p/h.

Charges exclusive of GST

10% extra quoted for conservative estimate

Shipping typically not included in costing

High confidence level:

A written quote intended to accurately represent the cost of the service or product

Medium confidence level:

A verbal quote or where some uncertainty exists: an estimate at the high end of a resonable expectation is provided

Low Confidence level

An indicative costing only based on incomplete design specifications, or extrapolated from previous design work

Project cost estimate sheet		Project: Flaming Harmonic Temporary Plinth equipment		Sub system: FH-Plinth_1						Angus McGregor		Sheet 1 of 1		
												Date of estimate: 21 Nov 2018		
Item	Description	Material / Manufacturers Description	Supplier	Availability (days)	Qty	Labour Hours		Material cost each (NZ \$)	Shipping cost (NZ \$)	Units each (NZ \$)	Total material cost (NZ \$)	Labour cost (NZ \$)	Confidence level	Total
1	Temporary Plinth - timber	100x50mm	Mitre 10	xCHCH	10			7.11		/m	71.10	0.00	high	78.21
2	Temporary Plinth - walls	7mm Plywood 2400X1200	Mitre 10	xCHCH	5			40.52		/unit	202.60	0.00	high	222.86
3	Temporary Plinth - Paint	Valspar exterior low sheen paint	Mitre 10	xCHCH	1			129.00		/4L	129.00	0.00	high	141.90
4	Temporary Plinth - Hinges	Tee Hinge 150mm Zinc Plated	Mitre 10	xCHCH	2			4.98		/unit	9.96	0.00	high	10.96
5	Temporary Plinth - Bolt	Gartner 200mm Heavy Duty Padbolt	Bunnings	xCHCH	1			10.88		/unit	10.88	0.00	high	11.97
6	Temporary Plinth - Padlock	Yates	Bunnings	xCHCH	1			45.00		/unit	45.00	0.00	high	49.50
8	Fasteners/Assembly/Misc	Workshop misc	UC workshop	xCHCH	1	24		500.00			500.00	1920.00	med	2662.00
										Totals	968.54	1920.00	HIGH	3177.39

This quote is for some ancilliary costs associated with the project, including a temporary plinth to protect the sculpture during testing,

Notes: Accurate costings procured from:

UC workshop charge out rate: 80 p/h. Mitre 10

Charges exclusive of GST

10% extra quoted for conservative estimate

Shipping typically not included in costing

High confidence level:

Written quotes or where high accuracy is ensured - intended to reflect accurately the cost of the service or product

Medium confidence level:

A verbal quote, or where some uncertainty exists but a reasonable estimate of the cost is known

Low Confidence level

An indicative costing only based on incomplete design specifications, or extrapolated from previous design work.