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BR (Brake System)		Balance Bar				BR_A0400
[Assembly Processes]			Make		1 x	BR_A0400_P
Process	Other: Assemble by hand	<i>Put balance bar through pedal supports</i>			1 x	
Balance bar		<i>Bought from Reverchon</i>	Buy		1 x	BR_04001
Material	Bought Part	<i>n/a</i>			1 x	
Master Cylinder support		<i>Threaded aluminum part</i>	Make		2 x	BR_04002



BR (Brake System)		Brake Master Cylinder			BR_A0300
[Assembly Processes]			Make	1 x	BR_A0300_P
Process	Other: Assemble by hand	Fixing the lower part of master cylinder		1 x	
Process	Other: Tighten bolts	Fixing the upper part of master cylinder		1 x	
Master Cylinder		Bought from Beringer	Buy	2 x	BR_03001
Material	Bought Part	n/a		1 x	



BR (Brake System)		Brake System Front		BR_A0100
[Assembly Processes]		Make	1 x	P_BR_A0100
Material	Safety wire	Safety wire for calipers	4 x	
Material	Other: Brake pad	Brake pad, iron or steel rotor	4 x	
Material	Other: Seal, O-ring, copper	Between caliper, master cylinder, hose	4 x	
Material	Fluid	Brake fluid	1 x	
Process	Other: Assemble by hand	Assemble brake rotor and shrink disc	1 x	
Process	Fastener install (every)	Insert button, retaining ring and washer	1 x	
Process	Drilled hole	On bolts head for safety wire	1 x	
Process	Other: Assemble by hand	Line up brake pad	1 x	
Process	Other: Assemble by hand	Put caliper in place with bolts, x2	1 x	
Process	Other: Tighten bolts	For brake caliper and upright, x4	1 x	
Process	Safety Wire, Install	Caliper bolts locking device	1 x	
Process	Other: Assemble by hand	Positioning the tank on the mount, x1	1 x	
Process	Other: Tighten bolts	Fixing the reservoir on the mount, x1	1 x	
Process	Other: Assemble by hand	Positioning tee on tee mount, x1	1 x	
Process	Other: Tighten bolts	Fixing tee to tee mount, x1	1 x	
Process	Other: Assemble by hand	Fitting on master cylinder, x1	1 x	
Process	Other: Tighten bolts	Fixing fitting on master cylinder, x1	1 x	
Process	Other: Assemble by hand	Put hose between MC and reservoir, x1	1 x	
Process	Install Tie Wrap (Zip Tie, Cable Clamp)	Install clamp on the hose, x2	1 x	
Process	Other: Assemble by hand	Install hose between MC and tee, x1	1 x	
Process	Other: Tighten bolts	Tighten the fittings, x1	1 x	
Process	Other: Assemble by hand	Install hose between tee and caliper, x2	1 x	
Process	Fastener install (every)	Tighten the fittings, x4	1 x	
Process	Install Tie Wrap (Zip Tie, Cable Clamp)	Install zip tie on frame and A-arms	1 x	
Process	Other: Assemble by hand	Install pressure sensor adapter on tee	1 x	
Process	Other: Tighten bolts	Pressure sensor adapter on the tee, x1	1 x	
Process	Other: Sealing verification	Verification of absence of air, leakage	1 x	
Fastener	Other: Adapter, H.P., Female Flare Tee, Brass	Brake lines-splitter tee	1 x	
Fastener	Bolt	grade 8.8, Fixing fluid reservoir	1 x	
Fastener	Nut	grade 8.8, Fixing fluid reservoir	2 x	
Fastener	Bolt	grade 8.8, Fixing tee to tee mount	1 x	
Fastener	Washer	Fixing tee to tee mount	2 x	
Fastener	Other: Nut, grade 8.8	grade 8.8, Fixing tee to tee mount	1 x	
Fastener	Other: Bolt grade 8.8	grade 8.8, Fixing caliper to upright	2 x	
Fastener	Other: Washer, steel stainless	Fixing caliper to upright	3 x	
Fastener	Hose Clamp	For the reservoir hose	2 x	
Fastener	Other: Zip tie	To clamp hoses on the frame	10 x	



Front brake rotor		<i>230 mm cast iron disc</i>	Buy	2 x	BR_01001
Material	Bought Part	<i>n/a</i>		1 x	
Front brake caliper		<i>Beringer 2P1A, dual piston 32mm bore</i>	Buy	2 x	BR_01002
Material	Bought Part	<i>n/a</i>		1 x	
Front brake reservoir		<i>tank to store brake fluid</i>	Buy	1 x	BR_01003
Material	Bought Part	<i>n/a</i>		1 x	
Rotor button		<i>to assemble brake rotor and shrink disc</i>	Buy	12 x	BR_01004
Material	Bought Part	<i>n/a</i>		1 x	
Fastener	Retaining Ring	<i>To secure brake button on rotor</i>		1 x	
Fastener	Washer	<i>Between brake button and rotor</i>		2 x	
Adapter		<i>Adapter for pressure sensors</i>	Make	1 x	BR_01005
Material	Steel	<i>30NCD8 steel</i>		1 x	
Process	Other: Programming	<i>Turning + milling</i>		1 x	
Process	Other: Machining setup, install and remove	<i>Turning</i>		1 x	
Process	Other: Machining (CNC)	<i>Turning, phase 1</i>		1 x	
Process	Other: Machining setup, change	<i>Turning</i>		1 x	
Process	Other: Machining (CNC)	<i>Turning, phase 2 + milling</i>		1 x	
Process	Other: Metrology	<i>Verification of the part</i>		1 x	
Front brake circuit		<i>Hoses stainless lines with fittings</i>	Make	1 x	BR_01006
Material	Other: Hose, Stainless Steel Braided Outer, H.P	<i>High pressure, brake lines</i>		1 x	
Material	Other: Hose, Stainless Steel Braided Outer, L.P	<i>Low pressure, for brake fluid tank</i>		1 x	
Process	Other: Cut metallic hoses (grinder)	<i>Btw master cylinder and tee, 1x</i>		1 x	
Process	Other: Cut metallic hoses (grinder)	<i>Btw master tee and caliper, 2x</i>		1 x	
Process	Other: Cut metallic hoses (grinder)	<i>Btw master cylinder and reservoir, 1x</i>		1 x	
Process	Other: Assemble (fittings on hoses)	<i>Assemble the fittings, 7x</i>		1 x	
Fastener	Other: Fitting, H.P., straight, Steel	<i>Between hose and master cylinder</i>		1 x	
Fastener	Other: Fitting, H.P., straight, Steel	<i>To fix hose to tee, caliper and MC</i>		6 x	



BR (Brake System)		Brake System Rear			BR_A0200
[Assembly Processes]			Make	1 x	P_BR_A0200
Material	Safety wire	Safety wire for caliper		4 x	
Material	Other: Brake pad	Brake pad, iron or steel rotor		4 x	
Material	Other: Seal, O-ring, copper	Between caliper, master cylinder, hose		4 x	
Material	Fluid	Brake fluid		1 x	
Process	Fastener install (every)	Insert button and washer		1 x	
Process	Drilled hole	On bolts head for safety wire		1 x	
Process	Other: Assemble by hand	Line up brake pad		1 x	
Process	Other: Assemble by hand	Put caliper in place with bolts, x2		1 x	
Process	Other: Tighten bolts	For brake caliper and upright, x4		1 x	
Process	Safety Wire, Install	Caliper bolts locking device, x2		1 x	
Process	Other: Assemble by hand	Positioning the tank on the mount, x1		1 x	
Process	Other: Tighten bolts	Fixing the reservoir on the mount, x1		1 x	
Process	Other: Assemble by hand	Positioning tee on tee mount, x1		1 x	
Process	Other: Tighten bolts	Fixing tee to tee mount, x1		1 x	
Process	Other: Assemble by hand	Fitting on master cylinder, x1		1 x	
Process	Other: Tighten bolts	Fixing fitting on master cylinder, x1		1 x	
Process	Other: Assemble by hand	Put hose between MC and reservoir, x1		1 x	
Process	Install Tie Wrap (Zip Tie, Cable Clamp)	Install clamp on the hose, x2		1 x	
Process	Other: Assemble by hand	Install hose between MC and tee, x1		1 x	
Process	Other: Tighten bolts	Tighten the fittings, x1		1 x	
Process	Other: Assemble by hand	Install hose between tee and caliper, x2		1 x	
Process	Other: Tighten bolts	Tighten the fittings, x4		1 x	
Process	Install Tie Wrap (Zip Tie, Cable Clamp)	Install zip tie on frame and A-arms		1 x	
Process	Other: Assemble by hand	Install pressure sensor adapter on tee		1 x	
Process	Other: Tighten bolts	Pressure sensor adapter on the tee, x1		1 x	
Process	Other: Sealing verification	Verification of absence of air, leakage		1 x	
Fastener	Other: Adapter, H.P., Female Flare Tee, Brass	Brake lines-splitter tee		1 x	
Fastener	Bolt	Banjo bolt, to fix hose to left caliper		1 x	
Fastener	Other: Nut, grade 8.8	To fix brake fluid tank		1 x	
Fastener	Other: Zip tie	Fixing tee to tee mount		1 x	
Fastener	Other: Bolt grade 8.8	To fix caliper to upright		4 x	
Fastener	Other: Washer, steel stainless	To fix caliper to upright		6 x	
Fastener	Hose Clamp	For the reservoir hose		2 x	
Fastener	Other: Zip tie	To clamp hoses on the frame		10 x	
Rear brake rotor		Sold attached with the rear brake bell	Buy	2 x	BR_02001
Material	Bought Part	n/a		1 x	



Rear brake caliper		<i>Béringer 2D1, dual piston 27mm bore</i>	Buy	2 x	BR_02002
Material	Bought Part	<i>n/a</i>		1 x	
Rear brake reservoir		<i>tank to store brake fluid</i>	Buy	1 x	BR_02003
Material	Bought Part	<i>n/a</i>		1 x	
Rear brake circuit		<i>Hoses stainless lines with fittings</i>	Make	1 x	BR_02005
Material	Other: Hose, Stainless Steel Braided Outer, H.P	<i>High pressure, brake lines</i>		3 x	
Material	Other: Hose, Stainless Steel Braided Outer, L.P	<i>Low pressure, for brake fluid tank</i>		1 x	
Process	Other: Cut metallic hoses (grinder)	<i>Btw master cylinder and tee, 1x</i>		1 x	
Process	Other: Cut metallic hoses (grinder)	<i>Btw master tee and caliper, 2x</i>		1 x	
Process	Other: Cut metallic hoses (grinder)	<i>Btw master cylinder and reservoir, 1x</i>		1 x	
Process	Other: Assemble (fittings on hoses)	<i>Assemble the fittings, 7x</i>		1 x	
Fastener	Other: Banjo fitting, 45°, Steel	<i>To fix hose to the left caliper</i>		1 x	
Fastener	Other: Fitting, H.P., straight, Steel	<i>To fix hose to tee, caliper and MC</i>		5 x	
Fastener	Other: Fitting, H.P., straight, Steel	<i>Between hose and master cylinder</i>		1 x	
Adapter		<i>Adapter for pressure sensors</i>	Make	1 x	BR_02004
Material	Steel	<i>30NCD8 steel</i>		1 x	
Process	Other: Programming	<i>Turning + milling</i>		1 x	
Process	Other: Machining setup, install and remove	<i>Turning</i>		1 x	
Process	Other: Machining (CNC)	<i>Turning, phase 1</i>		1 x	
Process	Other: Machining setup, change	<i>Turning</i>		1 x	
Process	Other: Machining (CNC)	<i>Turning + milling</i>		1 x	
Process	Other: Metrology	<i>Verification of the part</i>		1 x	



EL (Electrical)	Control Unit				EL_A0700
Rear box shifter	<i>protect plastic case</i>	Buy	1 x		EL_07001
Rear board shifter	<i>control the servo motor</i>	Make	1 x		EL_07002
Servo motor cables	<i>set of cable for the servo motor</i>	Buy	1 x		EL_07003
Servo motor	<i>controled by high power motor</i>	Buy	1 x		EL_07004
servo motor support 1	<i>support the servo motor assembly 1</i>	Make	1 x		EL_07005
servo motor support 2	<i>support the servo motor assembly 2</i>	Make	1 x		EL_07006
Paddle	<i>placed on the steering wheel</i>	Buy	1 x		EL_07007



EL (Electrical)	Dash Panel				EL_A0100
Dashboard plate	<i>inside the front hoop</i>	Make	1 x		EL_01001
LED Bar	<i>RPM display</i>	Buy	1 x		EL_01002
2 way switch	<i>for secondary functions</i>	Buy	4 x		EL_01003
3 way switch	<i>contact switch</i>	Buy	1 x		EL_01004
push button red	<i>with a red light circle</i>	Buy	1 x		EL_01005
push button blue	<i>with a blue light circle</i>	Buy	2 x		EL_01006
push button	<i>without any light</i>	Buy	2 x		EL_01007
1 digit I2C display board	<i>display engaged gear</i>	Make	1 x		EL_01008
3 digit I2C display board	<i>display water temp. Or Batt. Voltage</i>	Make	1 x		EL_01009
front board	<i>control the Dashboard and sensors</i>	Make	1 x		EL_01010
front board box	<i>protecting plastic case</i>	Buy	1 x		EL_01011



EL (Electrical)	Fuses				EL_A0500
Rear Fuse Box	<i>on the rear left hand side</i>	Buy	1 x		EL_05001
Brake light Fuse 3A	<i>in the Fuse box</i>	Buy	1 x		EL_05002
Fuse 10A	<i>in the Fuse box, Fan, Fr. har.</i>	Buy	2 x		EL_05003
Lambda sensor Fuse 5A	<i>in the Fuse box</i>	Buy	1 x		EL_05004
Pump Fuse 20A	<i>in the Fuse box</i>	Buy	1 x		EL_05005
Fuse 15A	<i>Servo motor ,Inject., in the Fuse Box</i>	Buy	2 x		EL_05006
starter relay	<i>on the right hand side of the motor</i>	Buy	1 x		EL_05007
relays 35A	<i>in the fuse box, fan, pump, DTA, rear</i>	Buy	4 x		EL_05008



EL (Electrical)	Kill Switch				EL_A0600
Main hoop kill Switch	<i>on both sides of the main hoop</i>	Buy	2 x		EL_06001
24mm kill Switch	<i>Dashboard and BOTS</i>	Buy	2 x		EL_06002
BSPD	<i>right hand side of the front hoop</i>	Make	1 x		EL_06003
Crash sensor	<i>right hand side of the front hoop</i>	Buy	1 x		EL_06004
BSPD Box	<i>protecting metal case</i>	Buy	1 x		EL_06005



EL (Electrical)	LV-Battery				EL_A0400
Battery support	<i>on the rear righth side</i>	Make	1 x		EL_04001
LV-Battery	<i>12V Battery</i>	Buy	1 x		EL_04002
Battery connector	<i>Battery connector</i>	Make	2 x		EL_04003
Battery Fuse 250A	<i>General fuse</i>	Buy	1 x		EL_04004
Master switch	<i>on the right hand side of the main hoop</i>	Buy	1 x		EL_04005
Master switch pannel	<i>on the right hand side of the main hoop</i>	Make	1 x		EL_04006
Booster connector	<i>on the right hand side of the main hoop</i>	Buy	1 x		EL_04007
3 phase rectifier	<i>mounted on the fire wall</i>	Buy	1 x		EL_04008



EL (Electrical)	Sensors				EL_A0200
data logger	MK3	Buy	1 x		EL_02001
data log connector set	connectors for the MK3	Buy	1 x		EL_02002
wheel speed sensor	on each four wheels, Hall effect	Buy	4 x		EL_02003
suspension travel sensor	on each four suspensions	Buy	4 x		EL_02004
steering wheel pos sensor	in the steering rack	Buy	1 x		EL_02005
pressure sensors	pressure of brake sys., fuel, oil	Buy	4 x		EL_02006
Lambda sensor	placed on the exhaust	Buy	1 x		EL_02007
Camshaft position sensor	present on the purchased engine	Buy	1 x		EL_02008
throttle position	linear sensor on the throttle body	Buy	1 x		EL_02009
Air temp,pressure sensor	to the ECU	Buy	1 x		EL_02010
Crankshaft pos sensor	present on the purchased engine	Buy	1 x		EL_02011
Water temp sensor	to the ECU	Buy	1 x		EL_02012
GPS Antenna	placed on top of the main hoop	Buy	1 x		EL_02013
connectors for the sensor	to the harness (fr./re.)	Buy	14 x		EL_02014
lambda connector	standard automobile connector	Buy	1 x		EL_02015



camshaft sensors connecto	<i>standard automobile connector</i>	Buy	1 x	EL_02016
Crankshaft sensor connect	<i>standard automobile connector</i>	Buy	1 x	EL_02017
ECT connector	<i>standard automobile connector</i>	Buy	1 x	EL_02018
TPS connector	<i>standard automobile connector</i>	Buy	1 x	EL_02019
TMAP connector	<i>standard automobile connector</i>	Buy	1 x	EL_02020



EL (Electrical)	Wire Harness/Connectors				EL_A0300
front harness	<i>link rear, dashboard, sensors</i>	Make	1 x		EL_03001
rear harness	<i>link fr. , servo motor, sensors, bat.</i>	Make	1 x		EL_03002
connector front-rear	<i>8STA71828S&P, sensors and Power</i>	Buy	2 x		EL_03003
connector BSPD	<i>8STA70835S&P, Power and DATA</i>	Buy	1 x		EL_03004
connector rear board	<i>8STA01497P&S, Power and DATA</i>	Buy	2 x		EL_03005
connector front board	<i>8STA01002S&P, 5V Power</i>	Buy	3 x		EL_03006
Brake light	<i>rear red light</i>	Buy	1 x		EL_03007
ECU	<i>DTAFast S80 Pro</i>	Buy	1 x		EL_03008
ECU Power connector	<i>power connector for the ECU</i>	Buy	1 x		EL_03009
DB-9 connector	<i>Access to the DTA</i>	Buy	1 x		EL_03010
ECU Data connector	<i>DATA Connector for the ECU</i>	Buy	1 x		EL_03011
3 phase rectifier connect	<i>2 pin connector</i>	Buy	2 x		EL_03012
injectors connector	<i>2 pin connector</i>	Buy	4 x		EL_03013
Fan connector	<i>For the fan - cooling system</i>	Buy	1 x		EL_03014
Brake light connector	<i>For the brake light - rear</i>	Buy	1 x		EL_03015



EN (Engine & Drivetrain)		Cooling System		655,08€	EN_A0600
[Assembly Processes]			Make	1 x 48,89€ = 48,89€	EN_A0600_P
Material	Fluid	Demineralized water as coolant	2 x 0,33€ = 0,66€	2L in cooling system when full	
Process	Weld	Radiator tabs on radiator	1 x 5,22€ = 5,22€	3 tabs of 15mm long weld, aluminum	
Process	Other: Assemble by hand	Radiator to frame & fixing bar	1 x 0,20€ = 0,20€	2 bolts to put in position	
Process	Other: Tighten bolts	Tighten radiator bolts	1 x 0,40€ = 0,40€	2 bolts to tighten	
Process	Other: Assemble by hand	Fixing bar on radiator	1 x 0,10€ = 0,10€	1 bolt	
Process	Other: Tighten bolts	Fixing bar to radiator	1 x 0,20€ = 0,20€	1 bolt	
Process	Other: Assemble by hand	Fixing bar to frame	1 x 0,10€ = 0,10€	1 bolt	
Process	Other: Tighten bolts	Fixing bar to frame	1 x 0,20€ = 0,20€	1 bolt	
Process	Other: Assemble by hand	Fan to radiator	1 x 0,40€ = 0,40€	4 tie straps to install	
Process	Other: Install tie straps	Tie fan to radiator	1 x 0,40€ = 0,40€	Tighten 4 tie straps	
Process	Weld	Expansion tank filler neck on core	1 x 8,69€ = 8,69€	75mm long aluminum weld	
Process	Other: Sealing verification	Expansion tank welds sealing check	1 x 3,46€ = 3,46€	Aluminum welds check-up	
Process	Weld	Expansion tank tab welding	1 x 0,70€ = 0,70€	6mm long weld	
Process	Other: Assemble by hand	Expansion tank on frame	1 x 0,10€ = 0,10€	1 bolt	
Process	Other: Tighten bolts	Expansion tank on frame	1 x 0,20€ = 0,20€	1 bolt	
Process	Other: Assemble by hand	Main coolant line assembly	1 x 0,80€ = 0,80€	4 clamps to install	
Process	Other: Tighten bolts	Main cooling line setup	1 x 0,80€ = 0,80€	4 clamps to tighten	
Process	Other: Assemble by hand	Secondary coolant line setup	1 x 0,40€ = 0,40€	2 clamps to install	
Process	Other: Tighten bolts	Secondary coolant line setup	1 x 0,40€ = 0,40€	2 clamps to tighten	
Process	Other: Fill with liquids, grease ...	Cooling system filling	1 x 2,04€ = 2,04€	2L of demineralized water	
Process	Other: Assemble by hand	Expansion tank cap setup	1 x 0,10€ = 0,10€	Manual operation, no tools	
Process	Other: Sealing verification	Cooling system sealing verification	1 x 6,12€ = 6,12€	Check all junctions for leaks	
Fastener	Bolt	Maintains radiator, bar and exp. tank	5 x 0,02€ = 0,10€	5 8.8 M6 bolts	
Fastener	Other: Fitting, Weld-in, Male, Aluminum	Exp. tank exit	1 x 4,06€ = 4,06€	Exp. tank to calorstat	
Fastener	Hose Clamp	4 25-32mm for main	4 x 0,63€ = 2,52€	4 25-32mm for main	
Fastener	Hose Clamp	2 12-18 for secondary	2 x 0,56€ = 1,12€	2 12-18 for secondary	
Fastener	Other: Tie straps, blower	Attachs between radiator and fan	4 x 2,35€ = 9,40€	Attachs between radiator and fan	
Radiator		Aluminum radiator	Buy	1 x 380,00€ = 380,00€	EN_06001
Material	Bought Part	n/a	1 x 380,00€ = 380,00€	Aluminum radiator	
Fan		SPAL Fan 1360M3/H	Buy	1 x 81,75€ = 81,75€	EN_06002
Material	Bought Part	n/a	1 x 81,75€ = 81,75€	Radiator Fan	
Expansion tank base		Part of expansion tank welded to filler	Make	1 x 12,30€ = 12,30€	EN_06003
Material	Other: Tubing, Aluminum	Used for expansion tank core	1 x 0,47€ = 0,47€	D 24mm H 60mm e 1mm	
Material	Other: Aluminium 2017A	Tank bottom	1 x 0,04€ = 0,04€	24*24*1,5 aluminum sheet material	



Process	Other: Saw or tubing cut	Cut the expansion tank core	1 x 2,04€ = 2,04€	Tube cut at correct length
Process	Programming	Expansion tank base laser cut	1 x 0,61€ = 0,61€	Cut D24mm circle in plate
Process	Other: Laser cut setup, install and remove	Expansion tank bottom	1 x 0,01€ = 0,01€	24mm*24mm plate
Process	Laser Cut	Expansion tank bottom	1 x 0,03€ = 0,03€	87mm laser cut length
Process	Other: Metrology	Expansion tank bottom	1 x 0,41€ = 0,41€	24mm diameter circle
Process	Weld	Weld cut plate to tube	1 x 8,69€ = 8,69€	75mm aluminum welding
Expansion tank filler nec		<i>Receives the tank cap</i>	Buy	1 x 14,93€ = 14,93€ EN_06004
Material	Bought Part	n/a	1 x 14,93€ = 14,93€	Receives the tank cap
Expansion tank cap		<i>Expansion tank cap</i>	Buy	1 x 24,68€ = 24,68€ EN_06005
Material	Bought Part	n/a	1 x 24,68€ = 24,68€	Aluminum cap
Fixing tube		<i>Maintains the radiator</i>	Make	1 x 5,94€ = 5,94€ EN_06006
Material	Other: Tubing, Aluminum	Keeps the radiator in place	1 x 1,44€ = 1,44€	D12*11mm*L375mm aluminum tube
Process	Other: Saw or tubing cut	Cut the raw tube at the correct length	1 x 2,04€ = 2,04€	Cut tube at fitting length
Process	Other: Press operation	Flatten ends of tube for bolts locations	1 x 0,82€ = 0,82€	Flatten both ends of tube
Process	Drilled hole	Holes for bolts fitting	1 x 1,64€ = 1,64€	2 Manually drilled holes for bolts
Radiator tab		<i>Tabs welded to the radiator</i>	Make	1 x 1,14€ = 1,14€ EN_06007
Material	Aluminum	Tabs welded on the radiator	1 x 0,09€ = 0,09€	20*45*2mm aluminum plate
Process	Programming	Laser cut program	1 x 0,61€ = 0,61€	Laser cut programming cost
Process	Other: Laser cut setup, install and remove	Laser cut setup	1 x 0,01€ = 0,01€	20*45*2mm plate setup
Process	Laser Cut	Cut three tabs in aluminum	1 x 0,02€ = 0,02€	3 tabs of 85mm laser cut length each
Process	Other: Metrology	controls	1 x 0,41€ = 0,41€	controls
Expansion tank tab		<i>Welded to the tank</i>	Make	1 x 1,05€ = 1,05€ EN_06008
Material	Aluminum	Expansion tank tab	1 x 0,01€ = 0,01€	1 plate of 15*20*1.5mm
Process	Other: Programming	programming laser cut	1 x 0,61€ = 0,61€	programming cost
Process	Other: Laser cut setup, install and remove	Laser cut setup	1 x 0,01€ = 0,01€	15*20mm plate setup
Process	Laser Cut	Laser cut tank tab	1 x 0,01€ = 0,01€	57mm laser cut on 1.5mm plate
Process	Other: Metrology	controls	1 x 0,41€ = 0,41€	controls
Main coolant line		<i>Engine - radiator links</i>	Make	1 x 73,36€ = 73,36€ EN_06009
Material	Other: Hose, Stainless	Main part of main coolant line	1 x 42,00€ = 42,00€	2m long D25mm stainless steel hose
Material	Other: Hose, Rubber	Joints for stainless hoses ends	1 x 15,00€ = 15,00€	1m long rubber hose, D25mm
Process	Other: Saw or tubing cut	Cut hoses at correct length	1 x 12,24€ = 12,24€	6 cuts to do
Process	Other: Assemble by hand	Assemble hoses and junctions	1 x 0,80€ = 0,80€	4 hoses clamps to install
Process	Other: Tighten bolts	Tighten hoses clamps	1 x 0,80€ = 0,80€	4 hoses clamps to tighten, screwdriver



Fastener	Hose Clamp	Hose clamps stainless/rubber hoses	4 x 0,63€ = 2,52€	25-32 hose clamps
Secondary coolant line		Engine - expansion tank	Make	1 x 11,04€ = 11,04€ EN_06010
Material	Other: Hose, Rubber	One hose D6-12mm	1 x 9,00€ = 9,00€	1m raw rubber hose
Process	Other: Saw or tubing cut	Cut hose to right length	1 x 2,04€ = 2,04€	Cut hose

EN (Engine & Drivetrain)		Drivetrain Assembly		4.105,38€	EN_A0700
[Assembly Processes]			Make	1 x 129,46€ = 129,46€	EN_A0700_P
Material	Fluid	Limited slip differential oil 75W140	1 x 20,54€ = 20,54€	1 L	
Material	Fluid	Tripod grease	1 x 5,80€ = 5,80€	50g	
Material	Fluid	Chain oil	1 x 1,70€ = 1,70€	10 times	
Material	Fluid	Threadlock	1 x 0,40€ = 0,40€	2 times	
Process	Other: Assemble by hand	Front sprocket with engine	1 x 0,10€ = 0,10€	1 (nbr of bolts) * 0,1	
Process	Other: Tighten bolts	Tighten bolts Front sprocket with engine	1 x 0,20€ = 0,20€	1 (nbr of bolts) * 0.2	
Process	Other: Press operation	Left roller bearing mounting	1 x 2,04€ = 2,04€	5 min by an operator	
Process	Other: Press operation	Right roller bearing mounting	1 x 2,04€ = 2,04€	5 min by an operator	
Process	Other: Press operation	1st needle roller bearing, differential	1 x 2,04€ = 2,04€	5 min by an operator	
Process	Other: Press operation	2nd needle roller bearing, differential	1 x 2,04€ = 2,04€	5 min by an operator	
Process	Other: Assemble by hand	Eccentrics and their carriers	1 x 0,40€ = 0,40€	4 (nbr of bolts) * 0,1	
Process	Other: Tighten bolts	Eccentrics and their carriers	1 x 0,80€ = 0,80€	4 (nbr of bolts) * 0.2	
Process	Other: Assemble by hand	Eccentrics carriers and differential	1 x 0,41€ = 0,41€	1 min by an operator	
Process	Other: Tighten bolts	Tighten bolts rear sprocket and adaptor	1 x 1,20€ = 1,20€	6 (nbr of bolts) * 0.2	
Process	Other: Assemble by hand	Sprocket adaptor and differential	1 x 2,04€ = 2,04€	5 min by an operator	
Process	Fastener install (every)	Retaining ring on differential	1 x 0,10€ = 0,10€	1 (nbr of fasteners) * 0.1	
Process	Preparing	Threadlock application	1 x 0,40€ = 0,40€	2 (nbr of application)*0.2	
Process	Other: Tighten bolts	Inner tripods housings in differential	1 x 0,40€ = 0,40€	2 (nbr of bolts) * 0.2	
Process	Other: Tighten bolts	Setting on the frame	1 x 0,80€ = 0,80€	4 (nbr of bolts) * 0.2	
Process	Other: Assemble by hand	Differential assembly with frame	1 x 0,40€ = 0,40€	4 (nbr of bolts) * 0,1	
Process	Other: Fill with liquids, grease ...	Differential oil	1 x 4,08€ = 4,08€	10 min by an operator	
Process	Other: Tighten bolts	Outer tripod housing with hub	1 x 0,40€ = 0,40€	2 (nbr of bolts) * 0.2	
Process	Programming	Adjustement of driveshaft left	1 x 0,31€ = 0,31€	By a technician	
Process	Machining setup	Setup, install and remove	1 x 15,94€ = 15,94€	By operator	
Process	Machining	CNC	1 x 2,64€ = 2,64€	By operator 10600 mm3	
Process	Other: Metrology	Metrology	1 x 0,25€ = 0,25€	By a technician	
Process	Programming	Adjustment of driveshaft right	1 x 0,53€ = 0,53€	By a technician	
Process	Machining setup	Setup, install and remove	1 x 15,94€ = 15,94€	By operator	
Process	Machining	CNC	1 x 4,37€ = 4,37€	By operator 17600 cm3	
Process	Other: Metrology	Metrology	1 x 0,42€ = 0,42€	By a technician	
Process	Other: Assemble by hand	Tripods on driveshafts	1 x 0,41€ = 0,41€	1 min by an operator	
Process	Fastener install (every)	Retaining rings on driveshafts	1 x 0,80€ = 0,80€	8 (nbr of fastener) * 0.1	
Process	Other: Assemble by hand	Axle boots on driveshafts	1 x 2,04€ = 2,04€	5 min by an operator	
Process	Other: Fill with liquids, grease ...	Tripod grease	1 x 1,64€ = 1,64€	/	
Process	Fastener install (every)	Boot clamps to lock axle boots	1 x 0,80€ = 0,80€	4 (nbr of clamp) * 0.2	
Process	Preparing	Chain length adjustment	1 x 4,08€ = 4,08€	10 min by an operator	
Process	Assemble	Chain lenght installation	1 x 4,08€ = 4,08€	10 min by an operator	
Process	Other: Tighten bolts	Tighten bolts, chainshield with frame	1 x 0,40€ = 0,40€	2 (nbr of bolts) * 0.2	



Process	Aerosol Apply	Chain oil	1 x 0,80€ = 0,80€	/
Fastener	Other: Bolt grade 8.8	M6, assembly of chainshield	2 x 0,02€ = 0,04€	/
Fastener	Other: Nut, grade 8.8	M6, assembly of chainshield	2 x 0,02€ = 0,04€	/
Fastener	Other: Washer, steel stainless	M6, assembly of chainshield	4 x 0,04€ = 0,16€	/
Fastener	Other: Bolt grade 8.8	M8, assembly of excentrics carriers	8 x 0,04€ = 0,32€	/
Fastener	Other: Nut, grade 8.8	M8, assembly of excentrics carriers	6 x 0,03€ = 0,18€	/
Fastener	Other: Washer, steel stainless	M8, assembly of excentrics carriers	14 x 0,05€ = 0,70€	/
Fastener	Other: Bolt grade 8.8	M10, assembly of sprockets	7 x 0,10€ = 0,70€	/
Fastener	Other: Nut, grade 8.8	M10, assembly of sprockets	6 x 0,06€ = 0,36€	/
Fastener	Other: Washer, steel stainless	M10, assembly of sprockets	13 x 0,07€ = 0,91€	/
Fastener	Other: Bolt grade 12.9	M10, assembly of inner tripod housing	2 x 0,14€ = 0,28€	/
Fastener	Retaining Ring	External, diam 47 mm, for EN_07012	1 x 0,15€ = 0,15€	/
Fastener	Retaining Ring	External, diam 20 mm, for tripods	8 x 0,74€ = 5,92€	/
Fastener	Other: Boot clamp, ligarex strap with buckle	Assembly of axle boot, medium (33 cm)	4 x 0,90€ = 3,60€	/
Fastener	Other: Boot clamp, ligarex strap with buckle	Assembly of axle boot, large (72 cm)	4 x 0,90€ = 3,60€	/
Fastener	Other: Quick link chain	To close the chain	2 x 4,36€ = 8,72€	/

Differential	<i>Adjustable Limited Slip</i>	Buy	1 x 1.541,70€ = 1.541,70€	EN_07001
Material	Bought Part	n/a	1 x 1.541,70€ = 1.541,70€	provided by Drexler

Eccentric left	<i>Carry the differential</i>	Make	1 x 104,87€ = 104,87€	EN_07002
Material	Plastic	Delrin	1 x 12,99€ = 12,99€	185*185*23
Process	Programming	Programming of CNC	1 x 17,30€ = 17,30€	By a technician
Process	Machining setup	Setup, install and remove	1 x 15,94€ = 15,94€	By an operator
Process	Machining	CNC	1 x 14,00€ = 14,00€	By an operator 282 000 mm3
Process	Machining setup	Setup, change	1 x 15,94€ = 15,94€	By an operator
Process	Machining	CNC	1 x 14,90€ = 14,90€	By an operator 300 000 mm3
Process	Other: Metrology	Metrology	1 x 13,80€ = 13,80€	By a technician

Eccentric right	<i>Carry the differential</i>	Make	1 x 91,69€ = 91,69€	EN_07003
Material	Plastic	Delrin	1 x 10,61€ = 10,61€	175*175*21
Process	Programming	Programming of CNC	1 x 14,10€ = 14,10€	By a technician
Process	Machining setup	Setup, install and remove	1 x 15,94€ = 15,94€	By an operator
Process	Machining	CNC	1 x 12,00€ = 12,00€	By an operator 241 000 mm3
Process	Machining setup	Setup, change	1 x 15,94€ = 15,94€	By an operator
Process	Machining	CNC	1 x 11,80€ = 11,80€	By an operator 238 000 mm3
Process	Other: Metrology	Metrology	1 x 11,30€ = 11,30€	By a technician



Eccentric carrier left		<i>Link between drivetrain and frame</i>	Make	1 x 124,23€ = 124,23€	EN_07004
Material	Aluminum	7075 T6	1 x 15,65€ = 15,65€	367*190*10	
Process	Programming	Programming CNC	1 x 14,80€ = 14,80€	By a technician	
Process	Machining setup	Setup, install and remove	1 x 15,94€ = 15,94€	By an operator	
Process	Machining	CNC	1 x 25,00€ = 25,00€	By an operator 251 000 mm3	
Process	Machining setup	Setup, change	1 x 15,94€ = 15,94€	By an operator	
Process	Machining	CNC	1 x 25,00€ = 25,00€	By an operator 251 000 mm3	
Process	Other: Metrology	Metrology	1 x 11,90€ = 11,90€	By a technician	
Eccentric carrier right		<i>Link between drivetrain and frame</i>	Make	1 x 120,71€ = 120,71€	EN_07005
Material	Aluminum	7075 T6	1 x 14,83€ = 14,83€	367*180*10	
Process	Programming	Programming CNC	1 x 14,30€ = 14,30€	By a technician	
Process	Machining setup	Setup, install and remove	1 x 15,94€ = 15,94€	By an operator	
Process	Machining	CNC	1 x 24,10€ = 24,10€	By an operator 242 000 mm3	
Process	Machining setup	Setup, change	1 x 15,94€ = 15,94€	By an operator	
Process	Machining	CNC	1 x 24,10€ = 24,10€	By an operator 242 000 mm3	
Process	Other: Metrology	Metrology	1 x 11,50€ = 11,50€	By a technician	
Ball bearing left		<i>Ball bearing</i>	Buy	1 x 20,00€ = 20,00€	EN_07006
Material	Bought Part	n/a	1 x 20,00€ = 20,00€	provided by SKF	
Ball bearing right		<i>Ball bearing</i>	Buy	1 x 20,00€ = 20,00€	EN_07007
Material	Bought Part	n/a	1 x 20,00€ = 20,00€	provided by SKF	
Needle roller bearing		<i>Between drive shaft and differential</i>	Buy	2 x 16,00€ = 32,00€	EN_07008
Material	Bought Part	n/a	1 x 16,00€ = 16,00€	provided by SKF	
Chain		<i>Chain</i>	Buy	1 x 205,50€ = 205,50€	EN_07009
Material	Bought Part	n/a	1 x 205,50€ = 205,50€	With the 2 sprockets	
Front sprocket		<i>Link between chain and output of engine</i>	Buy	1 x 0,01€ = 0,01€	EN_07010
Material	Bought Part	n/a	1 x 0,01€ = 0,01€	bought in kit with front sprocket, chain	
Rear sprocket		<i>Link between chain and EN_07012</i>	Buy	1 x 0,01€ = 0,01€	EN_07011
Material	Bought Part	n/a	1 x 0,01€ = 0,01€	bought in kit with chain, rear sprocket	
Rear sprocket adaptator		<i>Link between rear sprocket and different</i>	Make	1 x 184,93€ = 184,93€	EN_07012
Material	Aluminum	7075 T81	1 x 0,01€ = 0,01€	Included with differential drexler	



Process	Programming	Programming CNC	1 x 27,77€ = 27,77€	By a technician
Process	Machining setup	Setup, install and remove	1 x 15,94€ = 15,94€	By an operator
Process	Machining	CNC	1 x 42,64€ = 42,64€	By an operator Turning 465000 mm3
Process	Machining setup	Setup, change	1 x 15,94€ = 15,94€	By an operator
Process	Machining	CNC	1 x 29,36€ = 29,36€	By an operator Turning 324000 mm3
Process	Machining setup	Setup, install and remove	1 x 15,94€ = 15,94€	By an operator
Process	Machining	CNC	1 x 15,11€ = 15,11€	By an operator 152000 mm3
Process	Other: Metrology	Metrology	1 x 22,22€ = 22,22€	By a technician
Chainshield		Protection around the chain	Make	1 x 14,79€ = 14,79€ EN_07013
Material	Steel	S355	1 x 4,22€ = 4,22€	80*905
Process	Programming	Programming laser cut	1 x 0,89€ = 0,89€	By a technician
Process	Other: Laser cut setup, install and remove	none	1 x 0,17€ = 0,17€	By an operator 0.017 m2
Process	Laser Cut	none	1 x 0,76€ = 0,76€	2100 mm By an operator
Process	Bending	none	1 x 8,16€ = 8,16€	4 bending * 2.04
Process	Other: Metrology	Metrology	1 x 0,59€ = 0,59€	By a technician
Driveshaft left		Driveshaft	Buy	1 x 192,80€ = 192,80€ EN_07014
Material	Bought Part	n/a	1 x 192,80€ = 192,80€	Provided by RCV
Driveshaft right		Driveshaft	Buy	1 x 192,80€ = 192,80€ EN_07015
Material	Bought Part	n/a	1 x 192,80€ = 192,80€	Provided by RCV
Tripod		Enable small displacement of driveshafts	Buy	4 x 77,87€ = 311,48€ EN_07016
Material	Bought Part	n/a	1 x 77,87€ = 77,87€	Provided by RCV
Inner tripod housing		Link differential and driveshaft	Buy	2 x 192,80€ = 385,60€ EN_07017
Material	Bought Part	n/a	1 x 192,80€ = 192,80€	Provided by RCV
Outer tripod housing		Link between wheel and driveshaft	Buy	2 x 192,80€ = 385,60€ EN_07018
Material	Bought Part	n/a	1 x 192,80€ = 192,80€	Provided by RCV
Tripod housing nut		Nylstop, non metric	Buy	2 x 5,80€ = 11,60€ EN_07019
Material	Bought Part	n/a	1 x 5,80€ = 5,80€	Uncommon nut
Axle boots		Over driveshafts and tripod housings	Buy	4 x 8,90€ = 35,60€ EN_07020
Material	Bought Part	n/a	1 x 8,90€ = 8,90€	Provided by RCV



EN (Engine & Drivetrain)		Engine		3.888,73€	EN_A0100
[Assembly Processes]		Make		1 x 162,05€ = 162,05€	55
Material	Other: Engine Sealant Paste	For clutch carter and oil pan	1 x 3,81€ = 3,81€	(70 + 60) (cm) * 0,025 (€/cm)	
Process	Other: Untighten bolts	Remove older pair plate	1 x 0,82€ = 0,82€	4 (nbr of bolts) * 0.20	
Process	Other: Assemble by hand	Put PAIR plate on the engine	1 x 0,41€ = 0,41€	0.102 * 4 (nbr of bolts)	
Process	Other: Tighten bolts	Tighten PAIR plate bolt	1 x 0,82€ = 0,82€	4 (nbr of bolts) * 0.20	
Process	Other: Untighten bolts	Remove clutch carter	1 x 2,67€ = 2,67€	13 (nbr of bolts)*0,20	
Process	Other: Untighten bolts	Remove clutch	1 x 1,23€ = 1,23€	6 (nbr of bolts)*0,20	
Process	Other: Assemble by hand	Remove older shifter axis, put new one	1 x 6,12€ = 6,12€	15 min of Operator time	
Process	Fastener install (every)	Circlip to lock the axis on engine	1 x 0,21€ = 0,21€	2 (nbr of retaining ring) * 0.105	
Process	Other: Tighten bolts	Permit to lock gear on the engine	1 x 0,21€ = 0,21€	1 (nb of bolts)*0.205	
Process	Other: Assemble by hand	Instal wet slipper clutch, clutch discs	1 x 4,08€ = 4,08€	10 min of operator time	
Process	Other: Tighten bolts	Lock the slipper clutch	1 x 1,00€ = 1,00€	5 (nbr of bolts)*0,20	
Process	Other: Assemble by hand	Clutch engine casing with sealing	1 x 6,12€ = 6,12€	15 min of operator time	
Process	Other: Tighten bolts	Engine casing screws	1 x 2,67€ = 2,67€	13 (nb of bolts)*0,2	
Process	Other: Untighten bolts	Remove older oil pressure sensor	1 x 0,20€ = 0,20€	1 (nbr of sensor) * 0.2	
Process	Other: Tighten bolts	New Adaptator oil pressure	1 x 0,20€ = 0,20€	1 (nbr of adaptater) * 0.2	
Process	Other: Welding (Aluminium)	Drain outlet to oil sump shell	1 x 12,24€ = 12,24€	12,24	
Process	Other: Welding (Aluminium)	Oil sump shell to joint plate	1 x 69,97€ = 69,97€	583,1*0,12	
Process	Other: Welding (Aluminium)	Anti planning plate and oil sump shell	1 x 10,08€ = 10,08€	84*0,12	
Process	Other: Welding (Aluminium)	Draining outlet, male fitting weld-in	1 x 1,13€ = 1,13€	9,42*0,12	
Process	Fastener install (every)	Plug to close the drain outlet	1 x 0,10€ = 0,10€	1 (nbr of plug) * 0.1	
Process	Other: Tighten bolts	Close the drain outlet	1 x 0,20€ = 0,20€	1 (nbr of plug) * 0.2	
Process	Other: Untighten bolts	Remove the older oil shell	1 x 2,60€ = 2,60€	13(nbr of bolts)*0,2	
Process	Other: Assemble by hand	Draining, modif. Oil strainer, new pan	1 x 12,24€ = 12,24€	30 min of operator time	
Process	Other: Tighten bolts	Lock the oil pan on the engine	1 x 0,20€ = 0,20€	1*0,20	
Process	Other: Fill with liquids, grease ...	Engine oil	1 x 2,04€ = 2,04€	5 min of operator time	
Process	Other: Assemble by hand	Oil filter	1 x 2,04€ = 2,04€	5 min of operator time	
Process	Other: Untighten bolts	Remove older thermostat of engine	1 x 0,40€ = 0,40€	2*0,20	
Process	Other: Assemble by hand	Put new thermostat	1 x 0,20€ = 0,20€	2*0,10	
Process	Other: Tighten bolts	Lock the thermostat on the engine	1 x 0,40€ = 0,40€	2*0,20	
Process	Other: Assemble by hand (>10kg)	Put the engine on the frame	1 x 8,16€ = 8,16€	10 min for 2 operators	
Process	Other: Tighten bolts	Engine mount	1 x 0,60€ = 0,60€	3*0,20	
Fastener	Other: Washer, steel stainless	Rear engine mount	4 x 0,09€ = 0,36€	0.089	
Fastener	Other: Washer, steel stainless	Joint plate on the engine	13 x 0,03€ = 0,39€	0.029	
Fastener	Other: Washer, steel stainless	PAIR Plate on the engine	4 x 0,03€ = 0,12€	0.029	
Fastener	Other: Retaining ring, external	To lock shifter axis inside the engine	2 x 0,02€ = 0,04€	0.022	
Fastener	Other: Bolt grade 8.8	M12, Center bolt for clutch system	1 x 0,70€ = 0,70€	0.7	
Fastener	Other: Bolt grade 8.8	M8x40, Btw shifter gear and engine	1 x 0,05€ = 0,05€	1 (nbr of bolt) * 0.05	
Fastener	Other: Fitting, Weld-in, Male, Aluminum	To drain engine, weld with oil sump	1 x 4,06€ = 4,06€	1 (nbr of fitting to weld) * 4.06	



Fastener	Other: Fitting, L.P, female plug, aluminium	Plug for draining outlet	1 x 3,16€ = 3,16€	1 (dash 6 plug) * 3.16	
Honda CBR600RR Engine <i>Second-hand, PC40</i> Buy 1 x 2.700,00€ = 2.700,00€ EN_01001					
Material	Bought Part	n/a	1 x 2.700,00€ = 2.700,00€	Second hand from Accimoto	
Spark plugs <i>Second hand</i> Buy 4 x 0,01€ = 0,04€ EN_01003					
Material	Bought Part	n/a	1 x 0,01€ = 0,01€	Sold with the engine	
Wet slipper clutch <i>To help with downshifting</i> Buy 1 x 667,18€ = 667,18€ EN_01004					
Material	Bought Part	n/a	1 x 667,00€ = 667,00€	Bought new, price without taxes, Maxxess	
Fastener	Other: Bolt grade 8.8	M6, To contraint the clutch mecanism	6 x 0,03€ = 0,18€	0.03	
Thermostat <i>From PC37, new</i> Buy 1 x 57,54€ = 57,54€ EN_01005					
Material	Bought Part	n/a	1 x 57,50€ = 57,50€	From honda, price without taxes	
Fastener	Other: Bolt grade 8.8	M6, Top of thermostat and thermostat	2 x 0,02€ = 0,04€	0.02	
PAIR plate <i>Permit to close the PAIR sensors</i> Make 2 x 1,61€ = 3,22€ EN_01006					
Material	Other: Aluminium 2017A	Sheet 2mm	1 x 0,41€ = 0,41€	For one pair plate : 0,00424*97,20	
Process	Other: Programming	Laser cut	1 x 0,61€ = 0,61€	Laser cut - Operator	
Process	Other: Laser cut setup, install and remove	Laser cut	1 x 0,10€ = 0,10€	For one pair plate: 0,00424*2.37	
Process	Laser Cut	Laser cut	1 x 0,08€ = 0,08€	Laser cut for one pair plate=222*0,0003	
Process	Other: Metrology	To be completed	1 x 0,41€ = 0,41€	Metrology - Operator	
Adaptater oil pressure <i>Permit to plug our oil pressure sensors</i> Make 1 x 31,63€ = 31,63€ EN_01007					
Material	Other: Aluminium 2017A	Raw material	1 x 0,17€ = 0,17€	9852*1,75E-5	
Process	Other: Programming	Turning (+ milling)	1 x 0,20€ = 0,20€	2.04E-5*9852	
Process	Other: Machining setup, install and remove	Turning	1 x 14,17€ = 14,17€	14,17	
Process	Other: Machining (CNC)	Turning, phase 1	1 x 0,89€ = 0,89€	9,06E-5*9852	
Process	Other: Machining setup, change	Turning	1 x 14,17€ = 14,17€	14,17	
Process	Other: Machining (CNC)	Turning, phase 2 + milling	1 x 1,87€ = 1,87€	(9.06E-5+9.94E-5)*9852	
Process	Other: Metrology	Turning	1 x 0,16€ = 0,16€	1,63E-5*9852	
Oil sump shell <i>Contain engine's oil</i> Make 1 x 15,65€ = 15,65€ EN_01008					
Material	Other: Aluminium 2017A	Sheet 2,5mm	1 x 6,08€ = 6,08€	0.05*121,50	
Process	Other: Programming	Laser cut	1 x 0,61€ = 0,61€	0,61	
Process	Other: Laser cut setup, install and remove	Laser cut	1 x 0,01€ = 0,01€	2.37*0,05	
Process	Laser Cut	Laser cut	1 x 0,38€ = 0,38€	1056,4*0,000362	
Process	Other: Metrology	Laser cut	1 x 0,41€ = 0,41€	0,41	
Process	Bending	x4, 1 bending for each side, 90 degrees	1 x 8,16€ = 8,16€	4 (nbr of bendings) * 2.04	



Join plate		<i>Weld with sump shell, attached to engine</i>	Buy	1 x 75,00€ = 75,00€	EN_01009
Material	Bought Part	n/a		1 x 75,00€ = 75,00€	<i>Subcontracting, too thick (8mm)</i>
Anti-planing plate		<i>Limit oil move, welded with oil sump</i>	Make	1 x 2,04€ = 2,04€	EN_01010
Material	Other: Aluminium 2017A	<i>Sheet 2,5mm</i>		1 x 0,85€ = 0,85€	<i>0,007*121,5</i>
Process	Other: Programming	<i>Laser cut</i>		1 x 0,61€ = 0,61€	<i>To be completed</i>
Process	Other: Laser cut setup, install and remove	<i>Laser cut</i>		1 x 0,02€ = 0,02€	<i>0.007*2.37</i>
Process	Laser Cut	<i>Laser cut</i>		1 x 0,15€ = 0,15€	<i>417.1*3.62E-4</i>
Process	Other: Metrology	<i>Laser cut</i>		1 x 0,41€ = 0,41€	<i>0,41</i>
Smooth clutch disc		<i>Discs of the clutch system, new</i>	Buy	8 x 5,00€ = 40,00€	EN_01011
Material	Bought Part	n/a		1 x 5,00€ = 5,00€	<i>Bought from Maxxes, price without taxes</i>
Lining clutch disc		<i>Discs of the clutch system, new</i>	Buy	7 x 8,00€ = 56,00€	EN_01012
Material	Bought Part	n/a		1 x 8,00€ = 8,00€	<i>Buy from Maxxes, price without taxes</i>
Shifter axis		<i>Shaft between Shifter and gear motor</i>	Make	1 x 37,52€ = 37,52€	EN_01013
Material	Other: Steel, 25CD4	<i>Round</i>		1 x 1,09€ = 1,09€	<i>73200*1,49E-5</i>
Process	Other: Programming	<i>Turning (+ milling)</i>		1 x 2,99€ = 2,99€	<i>73200*(2,04E-4+2,04E-4))</i>
Process	Other: Machining setup, install and remove	<i>Turning</i>		1 x 14,17€ = 14,17€	<i>14,17</i>
Process	Other: Machining (CNC)	<i>Turning, phase 1</i>		1 x 4,09€ = 4,09€	<i>45135*9,06E-5</i>
Process	Other: Machining setup, change	<i>Turning</i>		1 x 14,17€ = 14,17€	<i>14,17</i>
Process	Other: Machining (CNC)	<i>Turning, phase 2 + milling</i>		1 x 0,39€ = 0,39€	<i>109.3*9,06E-5+9,94E-5*37960</i>
Process	Other: Metrology	<i>Turning</i>		1 x 0,62€ = 0,62€	<i>37960*1,63E-5</i>
Shifter gear		<i>Assemble with shifter axis</i>	Make	1 x 40,66€ = 40,66€	EN_01014
Material	Other: Steel, 25CD4	<i>Round</i>		1 x 1,19€ = 1,19€	<i>80157*1,49E-5</i>
Process	Other: Programming	<i>Turning</i>		1 x 1,64€ = 1,64€	<i>80157*2,04E-5</i>
Process	Other: Machining setup, install and remove	<i>Turning</i>		1 x 14,17€ = 14,17€	<i>14,17</i>
Process	Other: Machining (CNC)	<i>Turning, phase 1</i>		1 x 5,71€ = 5,71€	<i>63121*9,06E-5</i>
Process	Other: Machining setup, change	<i>Turning</i>		1 x 14,17€ = 14,17€	<i>14,17</i>
Process	Other: Machining (CNC)	<i>Turning, phase 2 + milling</i>		1 x 3,28€ = 3,28€	<i>2683*9,06E-5+30630*9,94E-5</i>
Process	Other: Metrology	<i>Turning</i>		1 x 0,50€ = 0,50€	<i>30630*1,63E-5</i>
Fuel injectors		<i>Second hand</i>	Buy	4 x 0,05€ = 0,20€	EN_01002
Material	Bought Part	n/a		1 x 0,01€ = 0,01€	<i>Sold with the engine</i>
Material	Other: Seal, O-ring, Elastomer	<i>Ensure sealing</i>		4 x 0,01€ = 0,04€	<i>Sold with the engine</i>

EN (Engine & Drivetrain)		Exhaust System		2.004,09€	EN_A0200
[Assembly Processes]		Make		1 x 27,73€ = 27,73€	P_EN_A0200
Material	Other: Seal, O-ring, copper	Ensure the sealing with the engine	4 x 1,48€ = 5,92€	by O-ring	
Process	Other: Assemble by hand	Exhaust flange to exhaust headers	1 x 0,40€ = 0,40€	0.10 €/exhaust flange * 4	
Process	Other: Assemble by hand	Assemble O-ring seal to engine	1 x 0,40€ = 0,40€	0.10 €/O-ring seal * 4	
Process	Other: Assemble by hand	Assemble headers to engine with nuts	1 x 0,80€ = 0,80€	0.10 €/nut * 8 nuts	
Process	Other: Tighten bolts	Tighten exhaust nuts	1 x 1,60€ = 1,60€	0.20 €/nut * 8 nuts	
Process	Other: Assemble by hand	Assemble 1st tubing collector to headers	1 x 4,90€ = 4,90€	2.45 €/1st tubing collector	
Process	Other: Assemble by hand	Assemble 2nd tubing collector to 1st	1 x 2,45€ = 2,45€	2.45 €/2nd tubing collector	
Process	Other: Assemble by hand	Assemble muffler to collector	1 x 2,45€ = 2,45€	none	
Process	Other: Assemble by hand	Assemble the springs	1 x 0,50€ = 0,50€	0.10 €/spring	
Process	Other: Assemble by hand	Assemble muffler clamp to muffler and M3	1 x 0,10€ = 0,10€	0.10 € * 1 bolt	
Process	Other: Tighten bolts	Tighten muffler clamp bolt	1 x 0,20€ = 0,20€	0.20 € * 1 bolt	
Process	Other: Assemble by hand	Assemble the loop strap to the frame	1 x 0,10€ = 0,10€	0.10 € * 1 loop strap	
Process	Other: Tighten bolts	Tighten the loop strap bolt	1 x 0,20€ = 0,20€	0.20 € * 1 loop strap	
Process	Other: Assemble by hand	Bolt, washer into loop strap	1 x 0,10€ = 0,10€	0.10 € * 1 bolt	
Process	Other: Tighten bolts	Tighten the bolt to the loop strap	1 x 0,20€ = 0,20€	0.20 € * 1 bolt	
Fastener	Other: Steel loop Straps, Rubber-Cushioned	Link up the muffler clamp to the frame	1 x 2,08€ = 2,08€	2.08 €/loop strap	
Fastener	Other: Exhaust nuts	Bought with the engine	8 x 0,01€ = 0,08€	Free	
Fastener	Bolt	Grade 8.8, M10	1 x 0,09€ = 0,09€	Length 30mm	
Fastener	Washer	Steel stainless, M10	1 x 0,07€ = 0,07€	none	
Fastener	Other: Spring, exhaust system	Link up parts of the system	5 x 1,00€ = 5,00€	none	
Fastener	Bolt	Grade 8.8, M3	1 x 0,02€ = 0,02€	Length 20mm	
Fastener	Nut	Grade 8.8, M3	1 x 0,03€ = 0,03€	none	
Fastener	Washer	Steel stainless, M3	2 x 0,02€ = 0,04€	none	
Exhaust header n°1		Collect gas from the 1st cylinder	Make	1 x 126,63€ = 126,63€	EN_02001
Material	Other: Tubing, Steel stainless, to weld	45°, r=55mm, l=43.2mm	1 x 3,40€ = 3,40€	0.08 €/° * 45°	
Material	Other: Tubing, Steel stainless, to weld	l=140mm	1 x 0,91€ = 0,91€	6.50 €/m * 0.14 m	
Material	Other: Tubing, Steel stainless, to weld	90°, r=55mm, l=84.4mm	1 x 6,80€ = 6,80€	0.08 €/° * 90°	
Material	Other: Tubing, Steel stainless, to weld	l=100mm	1 x 0,65€ = 0,65€	6.50 €/m * 0.10 m	
Process	Preparing	Preparing before welding	1 x 28,84€ = 28,84€	7.21 €/tube * 4 tubes	
Process	Other: Steel welding	Exhaust tip and tubes welding together	1 x 51,60€ = 51,60€	0.12 €/mm * 430 mm	
Process	Other: Steel welding	Spring hooks welding	1 x 1,92€ = 1,92€	0.12 €/mm * 16 mm	
Process	Sandblasting	Coating preparing	1 x 0,01€ = 0,01€	Outsourced	
Process	Coating	Ceramic coating	1 x 32,49€ = 32,49€	Outsourced	
Fastener	Other: Spring hooks	Hold the exhaust springs on the collecto	1 x 0,01€ = 0,01€	Bought with exhaust springs	

Exhaust header n°2			Collect gas from the 2nd cylinder	Make	1 x 229,99€ = 229,99€	EN_02002
Material	Other: Tubing, Steel stainless, to weld		<i>l=40mm</i>	1 x 0,26€ = 0,26€	6.50 €/m * 0.040 m	
Material	Other: Tubing, Steel stainless, to weld		<i>45 °, r=55mm, l=43.2mm</i>	1 x 3,40€ = 3,40€	0.08 €/° * 45 °	
Material	Other: Tubing, Steel stainless, to weld		<i>l=55mm</i>	1 x 0,36€ = 0,36€	6.50 €/m * 0.055 m	
Material	Other: Tubing, Steel stainless, to weld		<i>40 °, r=55mm, l=38.4mm</i>	1 x 3,02€ = 3,02€	0.08 €/° * 40 °	
Material	Other: Tubing, Steel stainless, to weld		<i>l=45mm</i>	1 x 0,29€ = 0,29€	6.50 €/m * 0.045 m	
Material	Other: Tubing, Steel stainless, to weld		<i>50 °, r=55mm, l=48mm</i>	1 x 3,78€ = 3,78€	0.08 €/° * 50 °	
Material	Other: Tubing, Steel stainless, to weld		<i>l=20mm</i>	1 x 0,13€ = 0,13€	6.50 €/m * 0.020 m	
Material	Other: Tubing, Steel stainless, to weld		<i>35 °, r=55mm, l=33.6mm</i>	1 x 2,64€ = 2,64€	0.08 €/° * 35 °	
Material	Other: Tubing, Steel stainless, to weld		<i>l=60mm</i>	1 x 0,39€ = 0,39€	6.50 €/m * 0.060 m	
Process	Preparing		<i>Preparing before welding</i>	1 x 64,89€ = 64,89€	7.21 €/tube * 9 tubes	
Process	Other: Steel welding		<i>Exhaust tip and tubes welding together</i>	1 x 116,40€ = 116,40€	0.12 €/mm * 970 mm	
Process	Other: Steel welding		<i>Spring hooks welding</i>	1 x 1,92€ = 1,92€	0.12 €/mm * 16 mm	
Process	Sandblasting		<i>Coating preparing</i>	1 x 0,01€ = 0,01€	Outsourced	
Process	Coating		<i>Ceramic coating</i>	1 x 32,49€ = 32,49€	Outsourced	
Fastener	Other: Spring hooks		<i>Hold the exhaust springs on the collecto</i>	1 x 0,01€ = 0,01€	Bought with exhaust springs	

Exhaust header n°3			Collect gas from the 3rd cylinder	Make	1 x 139,81€ = 139,81€	EN_02003
Material	Other: Tubing, Steel stainless, to weld		<i>35 °, r=55mm, l=33.6mm</i>	1 x 2,64€ = 2,64€	0.08 €/° * 35 °	
Material	Other: Tubing, Steel stainless, to weld		<i>120 °, r=55mm, l=115.2mm</i>	1 x 9,07€ = 9,07€	0.08 €/° * 120 °	
Material	Other: Tubing, Steel stainless, to weld		<i>172 °, r=55mm, l=165.1mm</i>	1 x 13,00€ = 13,00€	0.08 €/° * 172 °	
Material	Other: Tubing, Steel stainless, to weld		<i>l=35mm</i>	1 x 0,23€ = 0,23€	6.50 €/m * 0.035 m	
Process	Preparing		<i>Preparing before welding</i>	1 x 28,84€ = 28,84€	7.21 €/tube * 4 tubes	
Process	Other: Steel welding		<i>Exhaust tip and tubes welding together</i>	1 x 51,60€ = 51,60€	0.12 €/mm * 430 mm	
Process	Other: Steel welding		<i>Spring hooks welding</i>	1 x 1,92€ = 1,92€	0.12 €/mm * 16 mm	
Process	Sandblasting		<i>Coating preparing</i>	1 x 0,01€ = 0,01€	Outsourced	
Process	Coating		<i>Ceramic coating</i>	1 x 32,49€ = 32,49€	Outsourced	
Fastener	Other: Spring hooks		<i>Hold the exhaust springs on the collecto</i>	1 x 0,01€ = 0,01€	Bought with exhaust springs	

Exhaust header n°4			Collect gas from the 4th cylinder	Make	1 x 161,45€ = 161,45€	EN_02004
Material	Other: Tubing, Steel stainless, to weld		<i>45 °, r=55mm, l=43.2mm</i>	1 x 3,40€ = 3,40€	0.08 €/° * 45 °	
Material	Other: Tubing, Steel stainless, to weld		<i>102 °, r=55mm, l=98mm</i>	1 x 7,71€ = 7,71€	0.08 €/° * 102 °	
Material	Other: Tubing, Steel stainless, to weld		<i>l=15mm</i>	1 x 0,10€ = 0,10€	6.50 €/m * 0.015 m	
Material	Other: Tubing, Steel stainless, to weld		<i>195 °, r=55mm, l=187.2mm</i>	1 x 14,73€ = 14,73€	0.08 €/° * 195 °	
Material	Other: Tubing, Steel stainless, to weld		<i>l=35mm</i>	1 x 0,23€ = 0,23€	6.50 €/m * 0.035 m	
Process	Preparing		<i>Preparing before welding</i>	1 x 36,05€ = 36,05€	7.21 €/tube * 5 tubes	
Process	Other: Steel welding		<i>Exhaust tip and tubes welding together</i>	1 x 64,80€ = 64,80€	0.12 €/mm * 540 mm	
Process	Other: Steel welding		<i>Spring hooks welding</i>	1 x 1,92€ = 1,92€	0.12 €/mm * 16 mm	
Process	Sandblasting		<i>Coating preparing</i>	1 x 0,01€ = 0,01€	Outsourced	
Process	Coating		<i>Ceramic coating</i>	1 x 32,49€ = 32,49€	Outsourced	

Fastener	Other: Spring hooks	Hold the exhaust springs on the collector	1 x 0,01€ = 0,01€	Bought with the exhaust springs
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1st tubing collector n°1		Collect gas from exhaust header 1 and 4	Make	1 x 321,71€ = 321,71€	EN_02005
Material	Other: Tubing, Steel stainless, to weld	l=50mm	1 x 0,50€ = 0,50€	10 €/m * 0.050 m	
Material	Other: Tubing, Steel stainless, to weld	35°, r=55mm, l=33.6mm	2 x 6,22€ = 12,44€	16 €/° * 35°	
Material	Other: Tubing, Steel stainless, to weld	l=44mm	1 x 0,44€ = 0,44€	10 €/m * 0.044 m	
Material	Other: Tubing, Steel stainless, to weld	To do the Y collector	2 x 0,98€ = 1,96€	6,50 €/m * 0.15m	
Material	Other: Tubing, Steel stainless, to weld	Connection to other parts of exhaust	2 x 0,24€ = 0,48€	6.50 €/m * 0.037 m	
Process	Preparing	Preparing before welding the Y collector	1 x 129,79€ = 129,79€	129.79 €/Y	
Process	Other: Steel welding	Welding the two parts of the Y collector	1 x 19,20€ = 19,20€	0.12 €/mm * 160 mm	
Process	Preparing	Preparing before welding	1 x 14,42€ = 14,42€	7.21 €/tube * 2 tubes	
Process	Other: Steel welding	Welding the connection tube to the Y	1 x 25,68€ = 25,68€	7.21 €/mm * 114 mm	
Process	Preparing	Preparing before welding	1 x 28,84€ = 28,84€	7.21 €/tube * 4 tubes	
Process	Other: Steel welding	Tubes welding together	1 x 51,60€ = 51,60€	0.12 €/mm * 430 mm	
Process	Sandblasting	Coating preparing	1 x 0,01€ = 0,01€	Outsourced	
Process	Coating	Ceramic coating	1 x 32,49€ = 32,49€	Outsourced	
Process	Other: Steel welding	Spring hooks welding	1 x 3,84€ = 3,84€	0.12 €/mm * 32 mm	
Fastener	Other: Spring hooks	Hold the exhaust springs on the collector	2 x 0,01€ = 0,02€	Bought with exhaust springs	

1st tubing collector n°2		Collect gas from exhaust header 2 and 3	Make	1 x 247,76€ = 247,76€	EN_02006
Material	Other: Tubing, Steel stainless, to weld	l=139mm	1 x 1,39€ = 1,39€	10 €/m * 0.139 m	
Material	Other: Tubing, Steel stainless, to weld	To do the Y	2 x 0,98€ = 1,96€	6,50 €/m * 0.15m	
Material	Other: Tubing, Steel stainless, to weld	Connection to other parts of exhaust	2 x 0,24€ = 0,48€	6.50 €/m * 0.037	
Process	Preparing	Preparing before welding the Y collector	1 x 129,79€ = 129,79€	129.79 €/Y	
Process	Other: Steel welding	Welding the two parts of the Y collector	1 x 19,20€ = 19,20€	0.12 €/mm * 160 mm	
Process	Preparing	Preparing before welding the connection	1 x 14,42€ = 14,42€	7.21 €/tube * 2 tubes	
Process	Other: Steel welding	Welding the connection tube to the Y	1 x 25,68€ = 25,68€	0.12 €/mm * 214 mm	
Process	Preparing	Preparing before welding	1 x 7,21€ = 7,21€	7.21 €/tube * 1 tube	
Process	Other: Steel welding	Tubes welding together	1 x 13,20€ = 13,20€	0.12 €/mm * 110 mm	
Process	Other: Steel welding	Spring hooks welding	1 x 1,92€ = 1,92€	0.12 €/mm * 16 mm	
Process	Sandblasting	Coating preparing	1 x 0,01€ = 0,01€	Outsourced	
Process	Coating	Ceramic coating	1 x 32,49€ = 32,49€	Outsourced	
Fastener	Other: Spring hooks	Hold the exhaust springs on the collector	1 x 0,01€ = 0,01€	Bought with exhaust springs	

2nd tubing collector		Collect gas from primary collectors	Make	1 x 330,09€ = 330,09€	EN_02007
Material	Other: Tubing, Steel stainless, to weld	90°, r=75mm, l=117.8mm	1 x 9,00€ = 9,00€	0.10 €/° * 90°	
Material	Other: Tubing, Steel stainless, to weld	50°, r=75mm, l=65.4mm	1 x 5,00€ = 5,00€	0.10 €/° * 50°	
Material	Other: Tubing, Steel stainless, to weld	l=20mm	1 x 0,26€ = 0,26€	13 €/m * 0.020 m	
Material	Other: Tubing, Steel stainless, to weld	To do the Y	2 x 1,00€ = 2,00€	none	
Material	Other: Tubing, Steel stainless, to weld	Connection to other parts of exhaust	2 x 0,37€ = 0,74€	10 €/m * 0.037 m	

Process	Preparing	Preparing before welding the Y collector	1 x 129,79€ = 129,79€	129.79 €/Y
Process	Other: Steel welding	Welding the two parts of the Y collector	1 x 19,20€ = 19,20€	0.12 €/mm * 160 mm
Process	Preparing	Preparing before welding the connection	1 x 14,42€ = 14,42€	7.21 €/tube * 2 tubes
Process	Other: Steel welding	Welding the connection tube to the Y	1 x 32,16€ = 32,16€	0.12 €/mm * 264 mm
Process	Preparing	Preparing before welding	1 x 21,63€ = 21,63€	7.21 €/tube * 3 tubes
Process	Other: Steel welding	Tubes welding together	1 x 57,60€ = 57,60€	0.12 €/mm * 480 mm
Process	Other: Steel welding	Spring hooks welding	1 x 5,76€ = 5,76€	0.12 €/mm * 48 mm
Process	Sandblasting	Coating preparing	1 x 0,01€ = 0,01€	Outsourced
Process	Coating	Ceramic coating	1 x 32,49€ = 32,49€	Outsourced
Fastener	Other: Spring hooks	Hold the exhaust springs on the collecto	3 x 0,01€ = 0,03€	Bought with exhaust springs
Exhaust flange		Join the collector to the engine	Make	4 x 7,77€ = 31,08€ EN_02008
Material	Steel	S355 ep 3mm, exhaust flange materials	1 x 0,20€ = 0,20€	58.275 €/m^2 * 3400 mm^2
Process	Programming	Programming the exhaust flange machining	1 x 0,61€ = 0,61€	Operator - fixed cost
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,81€ = 0,81€	2.37 €/m^2 * 3400 mm^2
Process	Laser Cut	Cut the plate	1 x 0,13€ = 0,13€	3.63E-4 €/mm * 360 mm
Process	Other: Metrology	Metrology of the exhaust flange	1 x 0,41€ = 0,41€	Operator - fixed cost
Process	Sandblasting	Coating preparing	1 x 0,01€ = 0,01€	Outsourced
Process	Coating	Ceramic coating	1 x 5,60€ = 5,60€	Outsourced
Muffler		Buy with a chicane	Buy	1 x 250,00€ = 250,00€ EN_02009
Material	Bought Part	n/a	1 x 250,00€ = 250,00€	none
Muffler clamp		Fasten the muffler to the frame	Make	1 x 17,00€ = 17,00€ EN_02010
Material	Aluminum	2017A ep 1.5mm - Muffler clamp materials	1 x 0,90€ = 0,90€	72.90 €/m^2 * 12300 mm^2
Process	Programming	Programming exhaust clamp machining	1 x 0,61€ = 0,61€	Operator - fixed cost
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 2,93€ = 2,93€	2.37 €/m^2 * 12300 mm^2
Process	Laser Cut	Cut the plate	1 x 0,32€ = 0,32€	3.62E-4 €/mm * 880 mm
Process	Other: Metrology	Metrology of the exhaust clamp	1 x 0,41€ = 0,41€	Operator - fixed cost
Process	Bending	Change the plate shape	1 x 10,20€ = 10,20€	2.04 €/bending * 5
Process	Drilled hole	M3 and M10	1 x 1,63€ = 1,63€	0.82 €/hole * 2 holes
Exhaust tip		Part chich link collector to engine	Make	4 x 30,21€ = 120,84€ EN_02011
Material	Steel	25CD4, exhaust tip material	1 x 2,23€ = 2,23€	1.49E-5 €/mm^3 * 15E4 mm^3
Process	Programming	Programming the exhaust tip machining	1 x 2,45€ = 2,45€	2.04E-5 €/mm^3 * 12E4 mm^3
Process	Other: Machining setup, install and remove	Preparing to machine the exhaust tip	1 x 14,17€ = 14,17€	Fixed cost
Process	Machining	CNC - machine the exhaust tip	1 x 10,87€ = 10,87€	9.06E-5 €/mm^3 * 12E4 mm^3
Process	Other: Metrology	Metrology of the exhaust tip	1 x 0,49€ = 0,49€	1.63E-5 €/mm^3 * 3E4 mm^3

EN (Engine & Drivetrain)			Fuel Tank – NOT THE HV-Battery		282,22€	EN_A0900
[Assembly Processes]			Make		1 x 128,88€ = 128,88€	EN_A0900_P
Material	Other: Fiberglass Insulation	Thermal protection of the Fuel Tank	1 x 12,29€ = 12,29€	122.9€ /m ² * 0.1m ²		
Material	Other: Glue, High temperature resistance	To fix the thermal protection	1 x 7,75€ = 7,75€	none		
Material	Fluid	gasoline 98RON for engine checks	1 x 2,75€ = 2,75€	1.65€ /L *2L		
Process	Other: Welding (Aluminium)	Fuel Tank welding	1 x 53,52€ = 53,52€	0.12€ /cm * 446cm		
Process	Assemble	Vibration dampings sandwich on Fuel tank	1 x 0,40€ = 0,40€	0.1€ * 4 dampings		
Process	Other: Tighten bolts	Tighten vibration damping sandwich-Tank	1 x 0,80€ = 0,80€	0.2€ * 4 dampings		
Process	Assemble	Fuel tank on the tabs	1 x 0,40€ = 0,40€	0.1€ * 4 dampings		
Process	Other: Tighten bolts	Tighten Fuel tank on the tabs	1 x 0,80€ = 0,80€	0.2€ * 4 bolts		
Process	Drilled hole	Fuel Check Valve hole (20mm)	1 x 0,82€ = 0,82€	0.82€ * 1 hole		
Process	Other: Sealing verification	For alu welded part of the fuel tank	1 x 3,46€ = 3,46€	operator-fixed cost		
Process	Cut (scissors, knife)	Thermal protection to the Fuel Tank	1 x 4,08€ = 4,08€	0.002 €/mm * 2000mm		
Process	Liquid Applicator Gun	To fix the thermal protection	1 x 0,82€ = 0,82€	none		
Process	Other: Fill with liquids, grease ...	Gasoline in filler tube	1 x 2,04€ = 2,04€	operator-fixed cost		
Process	Other: Sealing verification	Sealing test to the fuel line	1 x 6,62€ = 6,62€	6.12€ operator-fixed cost		
Fastener	Other: Mount, vibration damping, Sandwich	Vibration-damping sandwich fuel tank	4 x 4,80€ = 19,20€	none		
Fastener	Nut	Grade8.8 M4 nut vibration damping	4 x 0,03€ = 0,12€	none		
Fastener	Washer	Grade8.8 M4 washer for vibration damping	8 x 0,02€ = 0,16€	none		
Fastener	Bolt	Grade8.8 M4 bolt vibration damping	4 x 0,02€ = 0,08€	none		
Fastener	Other: Fitting, Weld-in, Male, Aluminum	For Dash6 connection	3 x 3,38€ = 10,14€	none		
Fastener	Other: Fitting, L.P, female plug, aluminium	Dash 6 plug for draining the Fuel Tank	1 x 2,63€ = 2,63€	none		
Fuel Tank(main1)			Under the seat (Folding-front part))	Make	1 x 25,72€ = 25,72€	EN_09001
Material	Aluminum	2017A Fuel tank plate material	1 x 19,44€ = 19,44€	97.2 €/m ² * 0.2m ²		
Process	Programming	Side plate	1 x 0,61€ = 0,61€	operator-fixed cost		
Process	Other: Laser cut setup, install and remove	Side plate	1 x 0,43€ = 0,43€	2.37 €/m ² * 0.18 m ²		
Process	Laser Cut	Side plate	1 x 0,75€ = 0,75€	3.62E-04 €/mm * 2077mm		
Process	Other: Metrology	Side plate	1 x 0,41€ = 0,41€	operator-fixed cost		
Process	Bending	Side plate	1 x 4,08€ = 4,08€	2.04€ * 2 bends		
Fuel Tank(main2)			Under the seat (Folding-top part)	Make	1 x 25,08€ = 25,08€	EN_09002
Material	Aluminum	2017A Fuel tank plate material	1 x 21,00€ = 21,00€	97.2€/m ² * 0.216m ²		
Process	Programming	Upper plate	1 x 0,61€ = 0,61€	operator-fixed cost		
Process	Other: Laser cut setup, install and remove	Upper plate	1 x 0,53€ = 0,53€	2.37€/m ² * 0.22 m ²		
Process	Laser Cut	Upper plate	1 x 0,49€ = 0,49€	3.62E-04 €/mm * 1363mm		
Process	Other: Metrology	Upper plate	1 x 0,41€ = 0,41€	operator-fixed cost		
Process	Bending	Upper plate	1 x 2,04€ = 2,04€	2.04€ * 1 bend		

Fuel Tank(bottom)			Under the seat (Folding-bottom part)	Make	1 x 23,49€ = 23,49€	EN_09003
Material	Aluminum	2017A Fuel tank plate material		1 x 19,44€ = 19,44€	97.2€/m ² * 0.2 m ²	
Process	Programming	Lower plate		1 x 0,61€ = 0,61€	operator- fixed cost	
Process	Other: Laser cut setup, install and remove	Lower plate		1 x 0,48€ = 0,48€	2.37€/m ² * 0.2m ²	
Process	Laser Cut	Lower plate		1 x 0,51€ = 0,51€	3.6E-04€/mm * 1412mm	
Process	Other: Metrology	Lower plate		1 x 0,41€ = 0,41€	operator- fixed cost	
Process	Bending	Lower plate		1 x 2,04€ = 2,04€	2.04€ * 1 bend	
Fuel Tank(Triangle)			Under the seat (With Fuel Tank)	Make	1 x 5,40€ = 5,40€	EN_09004
Material	Aluminum	2017A Fuel tank plate material		1 x 2,14€ = 2,14€	97.2€/m ² * 0.022m ²	
Process	Programming	Cavity		1 x 0,61€ = 0,61€	operator-fixed cost	
Process	Other: Laser cut setup, install and remove	Cavity		1 x 0,05€ = 0,05€	2.37€/m ² * 0.02m ²	
Process	Laser Cut	Cavity		1 x 0,15€ = 0,15€	3.62E-04€/mm * 423mm	
Process	Other: Metrology	Cavity		1 x 0,41€ = 0,41€	operator-fixed cost	
Process	Bending	Cavity		1 x 2,04€ = 2,04€	2.04€ * 1 bend	
Filler Neck			Welded to Fuel Tank	Make	1 x 8,02€ = 8,02€	EN_09005
Material	Aluminum	2017A Neck tube		1 x 3,94€ = 3,94€	26.25€/m * 0.15m	
Process	Other: Saw or tubing cut	Neck tube cut		1 x 4,08€ = 4,08€	2.04€ * 2 cuts	
Filler Cap			On the top of filler Tube	Buy	1 x 36,58€ = 36,58€	EN_09006
Material	Bought Part	n/a		1 x 3,25€ = 3,25€	none	
Fastener	Other: Fuel check valve, in-line, aluminium	On the filler cap		1 x 33,33€ = 33,33€	none	
Filler Tube			With Fuel Tank	Make	1 x 29,05€ = 29,05€	EN_09007
Material	Aluminum	2017A Filler neck body		1 x 7,09€ = 7,09€	26.25€/m * 0.27m	
Material	Aluminum	2017A Sight tube fitting		1 x 0,18€ = 0,18€	1.85€/m * 0.1m	
Material	Other: Hose, FEP	Sight tube		1 x 2,73€ = 2,73€	9.09€/m * 0.3m	
Material	Other: Hose, Rubber	reinforced (neck-tube),filler(tube-cap)		1 x 3,50€ = 3,50€	23.3€/m * 0.15m	
Process	Other: Saw or tubing cut	Filler neck body, and sight tube fittin		1 x 6,12€ = 6,12€	2.04€ * 3 cuts	
Process	Weld	Barb fittings welding on tube		1 x 5,10€ = 5,10€	0.12€/cm * 42.5cm	
Process	Cut (scissors, knife)	Hose and sight tube cut		1 x 0,83€ = 0,83€	0.002€/mm * 108mm	
Process	Assemble	Hose and sight tube mounting		1 x 0,80€ = 0,80€	0.2€ * 4 clamps	
Process	Other: Tighten bolts	Tighten sight tube clamp on Hoses		1 x 0,80€ = 0,80€	0.2€ * 4 clamps	
Fastener	Other: Hose clapms	Attach sight tube to filler tube		2 x 0,42€ = 0,84€	none	
Fastener	Other: Hose clapms	Attach the filler tube to filler cap		1 x 0,53€ = 0,53€	none	
Fastener	Other: Hose clapms	Attach filler tube to hose		1 x 0,53€ = 0,53€	none	

EN (Engine & Drivetrain)		Intake System		1.713,81€	EN_A0300
[Assembly Processes]		Make		1 x 23,38€ = 23,38€	P_EN_A0300
Material	Other: Sealing paper	Ensure the sealing between parts	1 x 4,58€ = 4,58€	70.63 €/m ² * 64900 mm ²	
Process	Programming	Programming the sealing paper machining	1 x 0,61€ = 0,61€	Operator - Fixed cost	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,06€ = 0,06€	2.37 €/m ² * 22500 mm ²	
Process	Laser Cut	Cut sealing paper	1 x 0,41€ = 0,41€	3.62E-4 €/mm * 1140 mm	
Process	Assemble	Assemble together with bolts M4	1 x 1,00€ = 1,00€	0.10 € * 10 bolts	
Process	Other: Tighten bolts	Link up flat-bottomed to tubing	1 x 2,00€ = 2,00€	0.20 € * 10 bolts	
Process	Programming	Programming the sealing paper machining	1 x 0,61€ = 0,61€	Operator - Fixed cost	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,11€ = 0,11€	2.37 €/m ² * 42400 mm ²	
Process	Laser Cut	Cut sealing paper	1 x 0,50€ = 0,50€	3.62E-4 €/mm * 1370 mm	
Process	Assemble	Assemble together with bolts M3	1 x 1,00€ = 1,00€	0.10 € * 10 bolts	
Process	Other: Tighten bolts	Link up air manifold to assembly	1 x 2,00€ = 2,00€	0.20 € * 10 bolts	
Process	Assemble	Coopling sleeves, engine, bolts M6	1 x 0,60€ = 0,60€	0.10 € * 6 bolts	
Process	Other: Tighten bolts	Link up coopling sleeves to engine	1 x 1,20€ = 1,20€	0.20 € * 6 bolts	
Process	Assemble	Hose clamps, coopling sleeves, assembly	1 x 0,80€ = 0,80€	0.20 € * 4 clamps	
Process	Other: Tighten bolts	Tighten hose clamps	1 x 0,80€ = 0,80€	0.20 € * 4 clamps	
Process	Assemble	Frame mounting tubes, mounting plates M4	1 x 0,40€ = 0,40€	0.10 € * 4 bolts	
Process	Other: Tighten bolts	Link up the two parts to assembly	1 x 0,80€ = 0,80€	0.20 € * 4 bolts	
Process	Assemble	Engine mounting tubes, M4	1 x 0,40€ = 0,40€	0.10 € * 4 bolts	
Process	Other: Tighten bolts	Link up assembly to engine mounting tube	1 x 0,80€ = 0,80€	0.20 € * 4 bolts	
Fastener	Bolt	Grade 8.8, M3	10 x 0,02€ = 0,20€	Length 20mm	
Fastener	Nut	Grade 8.8, M3	10 x 0,03€ = 0,30€	none	
Fastener	Washer	Steel stainless, M3	20 x 0,02€ = 0,40€	none	
Fastener	Bolt	Grade 8.8, M4	18 x 0,02€ = 0,36€	Length 20mm	
Fastener	Nut	Grade 8.8, M4	18 x 0,03€ = 0,54€	none	
Fastener	Washer	Steel stainless, M4	36 x 0,02€ = 0,72€	none	
Fastener	Bolt	Grade 8.8, M6	6 x 0,01€ = 0,06€	Bought with the engine	
Fastener	Hose Clamp	Link up to the tubing collector	4 x 0,53€ = 2,12€	none	
Air manifold		Under the restrictor	Buy	1 x 756,00€ = 756,00€	EN_03001
Material	Bought Part	n/a	1 x 756,00€ = 756,00€	none	
Flat-bottomed		Under the air manifold	Make	1 x 5,70€ = 5,70€	EN_03002
Material	Aluminum	2017A, ep 2mm - Flat-bottomed material	1 x 4,12€ = 4,12€	97.20 €/m ² * 42400 mm ²	
Process	Programming	Programming the flat-bottomed machining	1 x 0,61€ = 0,61€	Operator - fixed cost	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,11€ = 0,11€	2.37 €/m ² * 42400 mm ²	
Process	Laser Cut	Cut the plate	1 x 0,45€ = 0,45€	3.62E-4 €/mm * 1240 mm	
Process	Other: Metrology	Metrology of the flat-bottomed	1 x 0,41€ = 0,41€	Operator - fixed cost	



Tubing collector		<i>Link up the flat-bottomed to the engine</i>	Buy	1 x 888,00€ = 888,00€	EN_03003
Material	Bought Part	n/a		1 x 888,00€ = 888,00€	none
Coupling sleeve		<i>Link up the air intake to the engine</i>	Buy	2 x 0,01€ = 0,02€	EN_03004
Material	Bought Part	n/a		1 x 0,01€ = 0,01€	Buy with the engine
Left frame mounting tube		<i>Fasten the air intake to the frame</i>	Make	1 x 7,26€ = 7,26€	EN_03005
Material	Aluminum	2017A - Frame mounting tube material		1 x 0,35€ = 0,35€	3.19 €/m * 0.11
Process	Other: Saw or tubing cut	Cut the tube		1 x 4,08€ = 4,08€	2.04 €/cutting * 2
Process	Grinding	Create a plane surface		1 x 0,40€ = 0,40€	0.20 €/grinding * 2
Process	Drilled hole	M6		1 x 1,63€ = 1,63€	0.82 €/hole * 2 holes
Process	Grinding	Remove strong angles		1 x 0,80€ = 0,80€	0.20 €/grinding * 4
Right frame mounting tube		<i>Fasten the air intake to the frame</i>	Make	1 x 7,45€ = 7,45€	EN_03006
Material	Aluminum	2017A - Frame mounting tube material		1 x 0,54€ = 0,54€	3.19 €/m * 0.17 m
Process	Other: Saw or tubing cut	Cut the tube		1 x 4,08€ = 4,08€	2.04 €/cutting * 2
Process	Grinding	Create a plane surface		1 x 0,40€ = 0,40€	0.20 €/grinding * 2
Process	Drilled hole	M6		1 x 1,63€ = 1,63€	0.82 €/hole * 2 holes
Process	Grinding	Remove strong angles		1 x 0,80€ = 0,80€	0.20 €/grinding * 4
Engine mounting tube		<i>Fasten the air intake to the engine</i>	Make	2 x 11,79€ = 23,58€	EN_03007
Material	Aluminum	5754 - Engine mounting tube material		1 x 0,80€ = 0,80€	3.19 €/m * 0.25
Process	Other: Saw or tubing cut	Cut the tube		1 x 4,08€ = 4,08€	2.04 €/cutting * 2
Process	Grinding	Create a plane surface		1 x 0,40€ = 0,40€	0.20 €/grinding * 2
Process	Bending	Change the tube shape		1 x 4,08€ = 4,08€	2.04 €/bending * 2
Process	Drilled hole	M6		1 x 1,63€ = 1,63€	0.82 €/hole * 2 holes
Process	Grinding	Remove strong angles		1 x 0,80€ = 0,80€	0.20 €/grinding * 4
Mounting plate		<i>Fasten the restrictor to the air intake</i>	Make	2 x 1,21€ = 2,42€	EN_03008
Material	Aluminum	2017A ep 1.5mm - Mounting plate material		1 x 0,03€ = 0,03€	72.90 €/m^2 * 470 mm^2
Process	Programming	Programming mounting plate machining		1 x 0,61€ = 0,61€	Operator - fixed cost
Process	Other: Laser cut setup, install and remove	Laser cut preparing		1 x 0,12€ = 0,12€	2.37 €/m^2 * 470 mm^2
Process	Laser Cut	M4		1 x 0,04€ = 0,04€	3.62E-4 €/mm * 120 mm
Process	Other: Metrology	Metrology of the mounting plate		1 x 0,41€ = 0,41€	Operator - fixed cost



EN (Engine & Drivetrain)		Other: Fuel system	to be completed	508,79€	EN_A0500
[Assembly Processes]			Make	1 x 217,06€ = 217,06€	EN_A0500_P
Process	Assemble	assembly	1 x 0,01€ = 0,01€	Assembly of the Fuel system	
Material	Other: Hose, Stainless Steel Braided Outer, L.P	Conect elements where fuel flows Dash6	1 x 48,48€ = 48,48€	30.30 €/m * 1.6m	
Process	Other: Cut metallic hoses (grinder)	For fuel lines	1 x 20,39€ = 20,39€	4.08€ *5 cuts	
Process	Other: Assemble (fittings on hoses)	All fittings assembly on stainless hoses	1 x 40,79€ = 40,79€	4.08 €*10 fittings	
Process	Other: Tighten bolts	Tighten fitting male part on female part	1 x 2,04€ = 2,04€	0.20€ *10 fittings	
Process	Assemble	Assemble Pump on Collar (by hand)	1 x 0,20€ = 0,20€	0.2€ * 1 clamp	
Process	Assemble	Assemble Pump + Collar on Pump tab	1 x 0,10€ = 0,10€	0.1€ * 1 bolt	
Process	Other: Tighten bolts	Tighten M4 bolt Pump Collar-Tab	1 x 0,20€ = 0,20€	0.2€ * 1 bolt	
Process	Assemble	Assemble Fuel pressure regulator on Tab	1 x 0,20€ = 0,20€	0.1€ * 2 bolts	
Process	Other: Tighten bolts	Tighten M6 bolt pressure regulator-Tab	1 x 0,40€ = 0,40€	0.2€ * 2 bolts	
Process	Other: Tighten bolts	Tighten Tube nut	1 x 0,20€ = 0,20€	0.2€ * 1 nut	
Process	Other: Tighten bolts	Tighten fittings + adapters	1 x 2,86€ = 2,86€	0.2 € * 14 fittings	
Process	Assemble	Assemble Injectors on Fuel rail(by hand)	1 x 0,40€ = 0,40€	0.1€* 4 injectors	
Process	Assemble	Assemble Rail on Admission pipe	1 x 0,30€ = 0,30€	0.1€ * 3 bolts	
Process	Other: Tighten bolts	Tighten M4 bolts Rail-admission pipe	1 x 0,60€ = 0,60€	0.2€* 3 bolts	
Process	Assemble	Assemble banjo on fuel rail(by hand)	1 x 0,10€ = 0,10€	0.1 € * 1 banjo	
Fastener	Other: Fitting, L.P., straight, aluminium	Return-outlet fuel tank,inlet fuelFilter	3 x 7,87€ = 23,61€	none	
Fastener	Other: Banjo fitting, straight, Aluminium	Fuel rail alimentation	1 x 25,86€ = 25,86€	none	
Fastener	Other: Adapter, L.P., Union Tee, Aluminum	Regulator in	1 x 12,69€ = 12,69€	none	
Fastener	Other: Adapter, L.P., Female Flare, Aluminum	Tee out, pump inlet	2 x 11,17€ = 22,34€	none	
Fastener	Other: Adapter, L.P., Union Reducer, Aluminum	Adaptater Pump inlet/outlet, regulator	4 x 2,92€ = 11,68€	none	
Fastener	Washer	Copper to ensure the sealing ramp-banjo	2 x 0,19€ = 0,38€	none	
Fastener	Bolt	Grade8.8 M4 bolt for Pump collar on Tab	1 x 2,06€ = 2,06€	none	
Fastener	Nut	Grade8.8M4-nut collar on collar mount	1 x 0,03€ = 0,03€	none	
Fastener	Washer	Grade8.8 M4 for collar on collar mount	2 x 0,02€ = 0,04€	none	
Fastener	Bolt	Grade8.8 M6 bolt for regulator on tab	2 x 0,02€ = 0,04€	none	
Fastener	Nut	Grade8.8 M6 nut for regulator on tab	2 x 0,45€ = 0,90€	none	
Fastener	Washer	Grade8.8 M6 washer for regulator on tab	4 x 0,04€ = 0,16€	none	
Fuel Rail		Above the Engine	Buy	1 x 1,66€ = 1,66€	EN_05001
Material	Bought Part	n/a	1 x 0,01€ = 0,01€	buy with the engine	
Fastener	Bolt	Grade8.8M6 bolt:rail on admission pipe	3 x 0,02€ = 0,06€	none	
Fastener	Nut	Grade8.8 M6 nut:rail on admission pip	3 x 0,45€ = 1,35€	none	
Fastener	Washer	Grade8.8 M6 washer:rail on admission	6 x 0,04€ = 0,24€	none	
Fuel Pump		Under the Fuel Tank	Buy	1 x 110,00€ = 110,00€	EN_05002
Material	Bought Part	n/a	1 x 110,00€ = 110,00€	none	



Pressure Regulator		<i>Left side of the Engine</i>	Buy	1 x 135,00€ = 135,00€	EN_05003
Material	Bought Part	n/a		1 x 135,00€ = 135,00€ 1	
Fuel Filter		<i>Next to the Fuel Pump</i>	Buy	1 x 8,10€ = 8,10€	EN_05004
Material	Bought Part	n/a		1 x 8,10€ = 8,10€ 1	
Fuel Pump Collar		<i>Around the Fuel Pump</i>	Make	1 x 19,57€ = 19,57€	EN_05005
Material	Aluminum	2017A, Collar material		1 x 0,15€ = 0,15€ 72.9 €/m ² * 0.002 m ²	
Process	Programming	Fuel Pump Collar		1 x 0,61€ = 0,61€ operator-fixed cost	
Process	Other: Laser cut setup, install and remove	Setup for laser cut		1 x 0,01€ = 0,01€ 2.37€/m ² * 0.002 m ²	
Process	Laser Cut	Fuel Pump Collar		1 x 0,04€ = 0,04€ 3.62E-04 €/mm * 100mm	
Process	Other: Metrology	Fuel Pump Collar		1 x 0,41€ = 0,41€ operator-fixed cost	
Process	Bending	Rolling at 90°		1 x 18,35€ = 18,35€ 2.04€ * 9 bendings	
Pressure Sensor Adapter		<i>At the end of the Fuel Rail</i>	Make	1 x 17,40€ = 17,40€	EN_05006
Material	Aluminum	2017A, 17mm external diameter		1 x 0,25€ = 0,25€ 1.75E-05 €/mm ³ * 14137.16 mm ³	
Process	Programming	Turning + Milling		1 x 1,22€ = 1,22€ operator- fixed cost	
Process	Other: Machining setup, install and remove	Turning		1 x 7,82€ = 7,82€ operator fixed-cost	
Process	Machining	(conventionnal) Turning		1 x 0,22€ = 0,22€ 9.94E-05 €/mm ³ * 2474mm ³	
Process	Other: Metrology	Turning		1 x 0,04€ = 0,04€ 1.63E-05 €/mm ³ * 2474 mm ³	
Process	Other: Machining setup, install and remove	Milling		1 x 7,82€ = 7,82€ operator-fixed cost	
Process	Machining	(conventionnal) Milling		1 x 0,02€ = 0,02€ 2.08E-05 €/mm ³ * 100mm ³	
Process	Other: Metrology	Milling		1 x 0,01€ = 0,01€ 2.36E-05 €/mm ³ * 100mm ³	

EN (Engine & Drivetrain)		Overflow Bottles		97,91€		EN_A0800
[Assembly Processes]		Make		1 x 73,91€ = 73,91€		EN_A0800_P
Material	Other: Hose, Stainless Steel Braided Outer, L.P	From Engine's top and Expansion tank	1 x 30,30€ = 30,30€	1 m * 30,30		
Material	Other: Paint	Black paint, aerosol apply	1 x 0,92€ = 0,92€	500 (cm^2) * 2 cans * 0,0009		
Process	Drilled hole	Bottles drilling for hoses	1 x 3,26€ = 3,26€	4 (nbr of holes) * 0,82		
Process	Other: Painting, aerosol apply	For cans	1 x 20,39€ = 20,39€	500 (cm^2) * 2 (cans) * 0,02		
Process	Other: Cut metallic hoses (grinder)	Hoses cut	1 x 9,16€ = 9,16€	2 (nbr of cut) * 4,08		
Process	Other: Assemble by hand	Cans on frame, Hose mounting on cans	1 x 2,04€ = 2,04€	5 min of operator time		
Process	Fastener install (every)	Install can with tie wrap to frame	1 x 0,40€ = 0,40€	4 (nbr of tie wrap) * 0,1		
Process	Fastener install (every)	Install can with tie wrap to frame	1 x 0,40€ = 0,40€	4 (nbr of tie wrap) * 0,1		
Fastener	Hose Clamp	Engine and Expansion tank clamp	2 x 0,42€ = 0,84€	5 - 10 mm (diameter)		
Fastener	Hose Clamp	Engine and Expansion tank clamp	2 x 0,42€ = 0,84€	5 - 10 mm (diameter)		
Fastener	Other: Zip tie	Attach on the frame	4 x 0,67€ = 2,68€	4 (nbr of zip tie) * 0,17		
Fastener	Other: Zip tie	Attach on the frame	4 x 0,67€ = 2,68€	4 (nbr of zip tie) * 0,17		
Oil overflow		Contain the oil overflow	Buy	1 x 12,00€ = 12,00€		EN_08001
Material	Bought Part	n/a	1 x 12,00€ = 12,00€	Product container of varnishes		
Water overflow		Contain the water overflow	Buy	1 x 12,00€ = 12,00€		EN_08002
Material	Bought Part	n/a	1 x 12,00€ = 12,00€	Product container of varnishes		

EN (Engine & Drivetrain)		Throttle Body	477,38€		EN_A0400
[Assembly Processes]		Make	1 x 20,75€ = 20,75€		P_EN_A0400
Material	Other: Sealing paper	Ensure the sealing between parts	1 x 0,35€ = 0,35€	70.63 €/m ² * 5000 mm ²	
Material	Other: Seal, O-ring, Elastomer	Ensure the sealing with air intake	1 x 0,56€ = 0,56€	1 (nbr of O-ring) * 0,56	
Process	Programming	Programming the sealing paper machining	1 x 1,22€ = 1,22€	0.61 €/program (Operator - Fixed cost)	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,01€ = 0,01€	2.37 €/m ² * 2000 mm ²	
Process	Laser Cut	Cut sealing paper	1 x 0,35€ = 0,35€	3.62E-4 €/mm * 970 mm	
Process	Assemble	All plates, sealing paper, M3	1 x 0,50€ = 0,50€	0.10 € * 5 bolts	
Process	Other: Tighten bolts	Link up all plates of the system	1 x 1,00€ = 1,00€	0.20 € * 5 bolts	
Process	Programming	Programming the sealing paper machining	1 x 0,61€ = 0,61€	0.61 €/program (Operator - Fixed cost)	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,01€ = 0,01€	2.37 €/m ² * 2000 mm ²	
Process	Laser Cut	Cut sealing paper	1 x 0,20€ = 0,20€	3.62E-4 €/mm * 560 mm	
Process	Assemble	Convergent, air restrictor, assembly, M3	1 x 0,40€ = 0,40€	0.10 € * 4 bolts	
Process	Other: Tighten bolts	link up the two parts to assembly	1 x 0,80€ = 0,80€	0.20 € * 4 bolts	
Process	Assemble	Air filter, hose clamp, convergent	1 x 0,20€ = 0,20€	0.20 € * 1 clamp	
Process	Other: Tighten bolts	Tighten the hose clamp	1 x 0,20€ = 0,20€	0.20 € * 1 clamp	
Process	Assemble	Assembly, O-ring seal, air intake, M6	1 x 0,20€ = 0,20€	0.10 € * 2 bolts	
Process	Other: Tighten bolts	Link up the assembly to air intake	1 x 0,40€ = 0,40€	0.20 € * 2 bolts	
Process	Assemble	Positioning bolts, nuts, washers M4	1 x 0,20€ = 0,20€	0.10 € * 2 bolts	
Process	Other: Tighten bolts	Link up the assembly to mounting plates	1 x 0,40€ = 0,40€	0.20 € * 2 bolts	
Fastener	Bolt	Grade 8.8, M3	9 x 0,02€ = 0,18€	Length 20mm	
Fastener	Nut	Grade 8.8, M3	9 x 0,03€ = 0,27€	none	
Fastener	Washer	Steel stainless, M3	18 x 0,02€ = 0,36€	none	
Fastener	Bolt	Grade 8.8, M4	2 x 0,02€ = 0,04€	Length 20mm	
Fastener	Nut	Grade 8.8, M4	2 x 0,03€ = 0,06€	none	
Fastener	Washer	Steel stainless, M4	4 x 0,02€ = 0,08€	none	
Fastener	Bolt	Grade 8.8, M6	2 x 0,02€ = 0,04€	Length 20mm	
Fastener	Nut	Grade 8.8, M6	2 x 0,02€ = 0,04€	none	
Fastener	Washer	Steel stainless, M6	4 x 0,04€ = 0,16€	none	
Fastener	Hose Clamp	Link up the air filter to convergent	1 x 0,53€ = 0,53€	none	
Fastener	Other: Spring, intake system	Counter spring for the slide throttle	2 x 5,69€ = 11,38€	none	
Inferior plate		Under the moving plate	1 x 4,34€ = 4,34€		EN_04001
Material	Steel	S235 ep 1.5mm - Inferior plate material	1 x 0,06€ = 0,06€	12.82 €/m ² * 4900 mm ²	
Process	Programming	Programming the inferior plate machining	1 x 0,61€ = 0,61€	Operator - fixed cost	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,02€ = 0,02€	2.37 €/m ² * 4900 mm ²	
Process	Laser Cut	Cut the plate	1 x 0,21€ = 0,21€	3.62E-4 €/mm * 590 mm	
Process	Other: Metrology	Metrology of the inferior plate	1 x 0,41€ = 0,41€	Operator - fixed cost	
Process	Bending	Change the shape of the plate	1 x 2,04€ = 2,04€	2.04 €/bending * 1	
Process	Other: Burring	Inferior plate burring	1 x 0,01€ = 0,01€	Outsourced with medium plate coating[?]	

Process	Painting	Black painting	1 x 0,98€ = 0,98€	0.02 €/cm ² * 48 cm ²	
Front stop plate		Stop the translation of the moving plate	Make	1 x 4,11€ = 4,11€	EN_04002
Material	Aluminum	2017A ep2.5mm -Front stop plate material	1 x 0,70€ = 0,70€	121.50 €/m ² * 5800 mm ²	
Process	Programming	Programming front stop plate machining	1 x 0,61€ = 0,61€	Operator - fixed cost	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,02€ = 0,02€	2,37 €/m ² * 5800 mm ²	
Process	Laser Cut	Cut the plate	1 x 0,17€ = 0,17€	3.62E-4 €/mm * 480 mm	
Process	Other: Metrology	Metrology of the front stop plate	1 x 0,41€ = 0,41€	Operator - fixed cost	
Process	Bending	Change the chape of the plate	1 x 2,04€ = 2,04€	2.04 €/bending * 1	
Process	Painting	Black painting	1 x 0,16€ = 0,16€	0.02 €/cm ² * 8 cm ²	
Rear stop plate		Stop the translation of the moving plate	Make	1 x 1,19€ = 1,19€	EN_04003
Material	Aluminum	2017A ep2.5mm - Rear stop plate material	1 x 0,05€ = 0,05€	121.50 €/m ² * 440 mm ²	
Process	Programming	Programming rear stop plate machining	1 x 0,61€ = 0,61€	Operator - fixed cost	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,01€ = 0,01€	2.37 €/m ² * 440 mm ²	
Process	Laser Cut	Cut the plate	1 x 0,05€ = 0,05€	3.61E-4 €/mm * 140 mm	
Process	Other: Metrology	Metrology of the rear stop plate	1 x 0,41€ = 0,41€	Operator - fixed cost	
Process	Painting	Black painting	1 x 0,06€ = 0,06€	0.02 €/cm ² * 3 cm ²	
Medium plate		Moving plate	Make	1 x 125,61€ = 125,61€	EN_04004
Material	Steel	S355 ep 3mm - Medium plate material	1 x 0,33€ = 0,33€	58.27 €/m ² * 5710 mm ²	
Process	Programming	Programming the medium plate machining	1 x 0,61€ = 0,61€	Operator - fixed cost	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,02€ = 0,02€	2.37 €/m ² * 5710 mm ²	
Process	Laser Cut	Cut the plate	1 x 0,14€ = 0,14€	3.62E-4 €/mm * 380 mm	
Process	Other: Metrology	Metrology of the superior plate	1 x 0,41€ = 0,41€	Operator - fixed cost	
Process	Other: Burring	Medium plate burring	1 x 0,01€ = 0,01€	Outsourced with the coating	
Process	Bending	Change the shape of the plate	1 x 4,08€ = 4,08€	2.04 €/bending * 2	
Process	Sandblasting	Coating preparing	1 x 0,01€ = 0,01€	Outsourced with the coating[?]	
Process	Coating	Sursulf coating	1 x 120,00€ = 120,00€	Outsourced	
Superior plate		Above the moving plate	Make	1 x 2,11€ = 2,11€	EN_04005
Material	Steel	S235 ep 1.5 mm - Superior plate material	1 x 0,05€ = 0,05€	12.82 €/m ² * 4200 mm ²	
Process	Programming	Programming the superior plate machining	1 x 0,61€ = 0,61€	Operator - fixed cost	
Process	Other: Laser cut setup, install and remove	Laser cut preparing	1 x 0,01€ = 0,01€	2.37 €/m ² * 4200 mm ²	
Process	Laser Cut	Cut the plate	1 x 0,16€ = 0,16€	3.62E-4 €/mm * 440 mm	
Process	Other: Metrology	Metrology of the superior plate	1 x 0,41€ = 0,41€	Operator - fixed cost	
Process	Other: Burring	Superior plate burring	1 x 0,01€ = 0,01€	Outsourced with medium plate coating[?]	
Process	Painting	Black painting	1 x 0,86€ = 0,86€	0.02 €/cm ² * 42 cm ²	



Air filter		<i>Filter the air which goes to the engine</i>	Buy	1 x 73,27€ = 73,27€	EN_04006
Material	Bought Part	<i>n/a</i>		1 x 73,27€ = 73,27€	<i>Bought from Maxxes</i>
Convergent		<i>Link up the filter to the slide throttle</i>	Buy	1 x 94,50€ = 94,50€	EN_04007
Material	Bought Part	<i>n/a</i>		1 x 94,50€ = 94,50€	<i>none</i>
Air restrictor		<i>Link up the slide throttle to the intake</i>	Buy	1 x 151,50€ = 151,50€	EN_04008
Material	Bought Part	<i>n/a</i>		1 x 151,50€ = 151,50€	<i>none</i>



FR (Chassis & Body)		Brackets => Braking System			FR_0200_BR
Rear pedal bracket	<i>S355, 3mm thick</i>	Make	4 x	FR_02002_BR	
Pedal fluid tank bracket	<i>S355, 1.5mm thick</i>	Make	1 x	FR_02003_BR	
Tee breaking bracket	<i>S355, 1.5mm thick</i>	Make	1 x	FR_02004_BR	
Front pedal bracket	<i>S355, 3mm thick</i>	Make	4 x	FR_02001_BR	



FR (Chassis & Body)		Brackets => Electrical			FR_0200_EL
Dashboard bracket 1	S235, 1.5mm thick	Make	2 x		FR_02001_EL
Dashboard bracket 2	S235, 1.5mm thick	Make	1 x		FR_02002_EL
Dashboard bracket 3	S235, 1.5mm thick	Make	1 x		FR_02003_EL
Emergency stop bracket	S355, 3mm thick	Make	2 x		FR_02004_EL
Support battery bracket 2	S235, 1.5mm thick	Make	1 x		FR_02005_EL
Power box bracket	S235, 1.5mm thick	Make	2 x		FR_02006_EL
Master switch bracket	S235, 1.5mm thick	Make	2 x		FR_02007_EL
Crash sensor bracket	S235, 1.5mm thick	Make	1 x		FR_02008_EL
Support battery bracket 1	S235, 1.5mm thick	Make	2 x		FR_02009_EL
Electrical earth bracket	S235, 1.5mm thick	Make	4 x		FR_02010_EL
Breaklight bracket	S235, 1.5mm thick	Make	1 x		FR_02011_EL
Booster bracket	S355, 3mm thick	Make	1 x		FR_02012_EL



FR (Chassis & Body)		Brackets => Engine & Powertrain			FR_0200_EN
Engine bracket	S700, 4mm thick	Make	2 x		FR_02001_EN
Up excentric carry brack1	S355, 3mm thick	Make	2 x		FR_02002_EN
Low excentric carry brack	S355, 3mm thick	Make	4 x		FR_02003_EN
Up excentric carry brack2	S355, 3mm thick	Make	2 x		FR_02004_EN
Fuel tank bracket	S235, 3mm thick	Make	4 x		FR_02005_EN
Chain shield bracket 1	S355, 3mm thick, top	Make	1 x		FR_02006_EN
Pump bracket	S235, 3mm thick	Make	1 x		FR_02007_EN
Regulator bracket	S235, 2mm thick, for pressure regulator	Make	1 x		FR_02008_EN
Shifter bracket	S355, 3mm thick	Make	1 x		FR_02009_EN
Radiator bracket 1	S355, 3mm thick, rear	Make	1 x		FR_02010_EN
Expansion tank bracket	S235, 1.5mm thick	Make	1 x		FR_02011_EN
Air admission bracket	S235, 1.5mm thick	Make	2 x		FR_02012_EN
Clutch actuation axis	S355, 1.5mm thick	Make	1 x		FR_02013_EN
Clutch actu. cable holder	S355, 1.5mm thick	Make	1 x		FR_02014_EN
Chain shield bracket 2	S355, 3mm thick, top	Make	1 x		FR_02015_EN



Radiator bracket 2	<i>S355, 3mm thick, front</i>	Make	1 x	FR_02016_EN
Radiator bracket 3	<i>S355, 3mm thick, top</i>	Make	1 x	FR_02017_EN



FR (Chassis & Body)	Brackets => Frame & Body				FR_0200_FR
Jacking bar bracket	<i>attached to excentric carriers</i>	Make	2 x		FR_02001_FR
Body bracket	<i>S235, 1.5mm thick</i>	Make	4 x		FR_02002_FR
Floor pan bracket	<i>S235, 1.5mm thick</i>	Make	8 x		FR_02003_FR



FR (Chassis & Body)	Brackets => Miscellaneous, Finish & Assembly			FR_0200_MS
Upper bucket seat bracket	<i>S355, 3mm thick</i>	Make	2 x	FR_02001_MS
Lower bucket seat bracket	<i>S355, 3mm thick</i>	Make	4 x	FR_02002_MS
Harness bracket	<i>S700, 4mm thick</i>	Make	2 x	FR_02003_MS
Head support bracket	<i>S355, 3mm thick</i>	Make	2 x	FR_02004_MS
Firewall bracket	<i>S235, 1.5mm thick</i>	Make	12 x	FR_02005_MS



FR (Chassis & Body)	Brackets => Steering system				FR_0200_ST
Rack brackets	S235, 1.5mm thick	Make	2 x		FR_02001_ST



FR (Chassis & Body)		Brackets => Suspension bracket			FR_0200_SU
A-arm upper fr arm fr_2	upper part, S700, 4mm thick	Make	2 x		FR_02001_SU
A-arm upper fr arm fr_1	lower part, S700, 4mm thick	Make	2 x		FR_02002_SU
A-arm upper fr arm rr_2	upper part, S700, 4mm thick	Make	2 x		FR_02003_SU
A-arm upper fr arm rr_1	lower part, S700, 4mm thick	Make	2 x		FR_02004_SU
A-arm lower fr arm fr_2	upper part, S700, 4mm thick	Make	2 x		FR_02005_SU
A-arm lower fr arm fr_1	lower part, S700, 4mm thick	Make	2 x		FR_02006_SU
A-arm upper rr arm fr_2	upper part, S700, 4mm thick	Make	2 x		FR_02007_SU
A-arm upper rr arm fr_1	lower part, S700, 4mm thick	Make	2 x		FR_02008_SU
A-arm lower rr arm fr_2	upper part, S700, 4mm thick	Make	2 x		FR_02009_SU
A-arm lower rr arm fr_1	lower part, S700, 4mm thick	Make	2 x		FR_02010_SU
A-arm lower fr arm rr_2	upper part, S700, 4mm thick	Make	2 x		FR_02011_SU
A-arm lower fr arm rr_1	lower part, S700, 4mm thick	Make	2 x		FR_02012_SU
A-arm upper rr arm rr_2	upper part, S700, 4mm thick	Make	2 x		FR_02013_SU
A-arm upper rr arm rr_1	lower part, S700, 4mm thick	Make	2 x		FR_02014_SU
A-arm lower rr arm rr_2	upper part, S700, 4mm thick	Make	2 x		FR_02015_SU



A-arm lower rr arm rr_1	<i>lower part, S700, 4mm thick</i>	Make	2 x	FR_02016_SU
Fr anti roll bar bracket	<i>S700, 4mm thick</i>	Make	2 x	FR_02017_SU
Rr anti roll bar bracket	<i>S355, 3mm thick</i>	Make	2 x	FR_02018_SU
Front rocker bracket 1	<i>S355, 3mm thick</i>	Make	2 x	FR_02019_SU
Front rocker bracket 2	<i>S355, 3mm thick</i>	Make	2 x	FR_02020_SU
Ohlins front bracket	<i>S355, 3mm thick</i>	Make	2 x	FR_02021_SU
Ohlins rear bracket	<i>CNC machining</i>	Make	2 x	FR_02022_SU
Rear rocker bracket	<i>CNC machined part</i>	Make	2 x	FR_02023_SU



FR (Chassis & Body)	Floor Pan				FR_A0500
Rear floor pan	<i>Floor pan from front hoop to main hoop</i>	Buy	1 x		FR_05002
Front floor pan	<i>Floor pan from front hoop to front car</i>	Buy	1 x		FR_05001



FR (Chassis & Body)	Frame / Frame Tubes				FR_A0100
Round bent steel tubing	<i>25CrMo4 ; 30*2 (mm)</i>	Make	2 x		FR_01003
Steering bore	<i>CNC machining</i>	Make	1 x		FR_01004
Jacking bar	<i>CNC machining</i>	Make	1 x		FR_01005
Sleeved joint	<i>S350 ; Rules-compliant sleeved joints</i>	Make	2 x		FR_01006
Square steel tubing	<i>25CrMo4 ; 20*20*1,5 (mm)</i>	Make	1 x		FR_01002
Round steel tubing	<i>25CrMo4 ; 30*1,5, 25*1,5, 20*15, 15*1,5</i>	Make	87 x		FR_01001



FR (Chassis & Body)		Impact Attenuator			FR_A0300
Impact attenuator	<i>Approved by event</i>	Buy	1 x	FR_03001	
Anti-Intrusion plate	<i>Steel, (thickness 1.5mm)</i>	Make	1 x	FR_03002	



FR (Chassis & Body)	Other: Bodywork	<i>Bodywork</i>		FR_A0700
Back nose	<i>Part of the nose after the suspensions</i>	Buy	1 x	FR_07002
Big side plate	<i>Side plate from the front hoop to main</i>	Buy	2 x	FR_07003
Middle side plate	<i>Lower side plate with holes</i>	Buy	2 x	FR_07004
Medium side plate	<i>Side plate over the middle side plate</i>	Buy	2 x	FR_07005
Small side plate	<i>Side plate next to impact attenuator</i>	Buy	2 x	FR_07006
Push clips	<i>Attachement of the nose to the frame</i>	Buy	4 x	FR_07007
Nose	<i>Nose of the bodywork</i>	Buy	1 x	FR_07001



FR (Chassis & Body)	Other: Clutch actuation system	<i>Clutch actuation system</i>		FR_A0600
Lever	<i>Drilled tube</i>	Make	1 x	FR_06001
Clutch cable sheath	-	Buy	1 x	FR_06002
Clutch cable	-	Buy	1 x	FR_06003
Lock plate	<i>In the lever, prevent cable from removin</i>	Make	1 x	FR_06004
Cable protectors	<i>On the lever, prevent cable from cutting</i>	Make	2 x	FR_06005
Bronze rings	<i>Lubricating rings for the lever</i>	Buy	2 x	FR_06006



FR (Chassis & Body)	Pedals				FR_A0400
Upper rail brake pedal	<i>Allow easy setup</i>	Make	1 x		FR_04001
Lower rail	<i>Same for pedal accel and brake</i>	Make	2 x		FR_04002
Accelerator pedal	<i>Aluminium, machining</i>	Make	1 x		FR_04003
Brake pedal	<i>Aluminium, machined part</i>	Make	1 x		FR_04004
Top foot support	<i>Laser cutted part + bending</i>	Make	2 x		FR_04005
Below foot support	<i>Laser cutted part + bending</i>	Make	2 x		FR_04006
Side support brake pedal	<i>Lateral support</i>	Make	2 x		FR_04007
Side support accelerator	<i>Symmetric allow FR_04018 to slide</i>	Make	2 x		FR_04008
Rod accelerator	<i>Rod mounted btw pedal and cable support</i>	Make	2 x		FR_04009
Brake support	<i>Brake over-travel switch support</i>	Make	1 x		FR_04010
Cable sheath support	<i>For accel. cable sheath</i>	Make	1 x		FR_04011
Inside spacer	<i>Upper part of the master cylinder</i>	Make	2 x		FR_04012
Outside spacer	<i>Upper part of the master cylinder</i>	Make	2 x		FR_04013
Upper rail accel. pedal	<i>Allow easy setup</i>	Make	1 x		FR_04014
Accel. cable sheath	<i>Cable protection</i>	Buy	1 x		FR_04015



Accel. cable	<i>To open the throttle</i>	Buy	1 x	FR_04016
Throttle pedal stop	<i>Mechanical stop</i>	Make	1 x	FR_04017
Accel pedal slide part	<i>Steel, slide on FR_04008</i>	Make	1 x	FR_04018



MS (Misc., Fit & Finish & Assembly)	Driver's Harness				MS_A0300
Harness	<i>Seatbelt of the Pilot</i>	Buy	1 x		MS_03001



MS (Misc., Fit & Finish & Assembly)	Fire Wall				MS_A0100
Firewall Bottom Plate	<i>Behind the seat</i>	Make	1 x		MS_01001
Firewall Middle Plate	<i>Below harness</i>	Make	1 x		MS_01002
Firewall Top Plate	<i>At the back of the head foam</i>	Make	1 x		MS_01003
Firewall Joints	<i>Triangles for MS_01003</i>	Make	2 x		MS_01004
Firewall Floor Plate	<i>Join the Firewall to the Floor Pan</i>	Make	1 x		MS_01005



MS (Misc., Fit & Finish & Assembly)	Headrest / Restraints				MS_A0200
Headrest Plate	<i>Sthrengthen the Headrest</i>	Make	1 x		MS_02001
Head Foam	<i>Absorb chocs for Head impact</i>	Buy	1 x		MS_02002
Side Head Foam	<i>Absorb chocs for Head impact on the side</i>	Buy	2 x		MS_02003
Top Back Foam	<i>Absorb chocs for back impact</i>	Buy	1 x		MS_02004



MS (Misc., Fit & Finish & Assembly)		Seats			MS_A0400
Seat	<i>Allow the Pilot to seat</i>	Buy	1 x	MS_04001	
Back Foam	<i>Soften the seat for the back</i>	Buy	1 x	MS_04002	



ST (Steering System)		Steering Rack			ST_A0300
[Assembly Processes]			Make	1 x	ST_A0300P
Process	Other: Assemble by hand	ST_03002 and ST_03001 with tabs		1 x	
Process	Other: Tighten bolts	For the 4 M6 grade 12.9 bolts		1 x	
Process	Other: Assemble by hand	ST_03003 on frame tabs		1 x	
Process	Other: Tighten bolts	For the 4 M4 grade 8.8 bolts		1 x	
Fastener	Other: Bolt grade 8.8	M4, for ST_03003		4 x	
Fastener	Other: Nut, grade 8.8	M4, for ST_03003		4 x	
Fastener	Other: Bolt grade 12.9	Size M6		4 x	
Fastener	Other: k-nuts	Size M6		4 x	
Fastener	Other: Washer, steel stainless	Size M6		4 x	
Steering Rack		Bought at Formula Seven.	Buy	1 x	ST_03001
Material	Bought Part	n/a		1 x	
Process	Drilled hole	6mm hole in the Tie rod Braces, 2 holes		1 x	
Half moon		To support the steering rack.	Make	4 x	ST_03002
Material	Other: Aluminium 2017A	Raw material, 45x16x16 mm		1 x	
Process	Programming	Milling		1 x	
Process	Other: Machining setup, install and remove	Milling		1 x	
Process	Other: Machining (CNC)	Milling, For the half moon		1 x	
Process	Other: Machining setup, change	Milling		1 x	
Process	Drilled hole	Milling, 2 holes		1 x	
Process	Other: Metrology	To check the part		1 x	
Steering Rack protection		To protect the steering rack.	Make	1 x	ST_03003
Material	Other: Plexiglass	Sheet materials, 180x355mm		1 x	
Process	Programming	For laser cut		1 x	
Process	Other: Laser cut setup, install and remove	For laser cut		1 x	
Process	Laser Cut	Laser cut		1 x	
Process	Other: Metrology	To check the part		1 x	
Process	Bending	2 bending		1 x	



ST (Steering System)		Steering Shaft			ST_A0200
[Assembly Processes]			Make	1 x	ST_A0200P
Material	Other: Paint	Black color		1 x	
Process	Preparing	For the welding		1 x	
Process	Other: Welding (Steel)	Between ST_02001 and ST_02002		1 x	
Process	Preparing	For the welding		1 x	
Process	Other: Welding (Steel)	Between ST_02002 and ST_02003		1 x	
Process	Preparing	For the welding		1 x	
Process	Other: Welding (Steel)	Between ST_02003 and ST_02004		1 x	
Process	Preparing	For the welding		1 x	
Process	Other: Welding (Steel)	Between ST_02004 and ST_02005		1 x	
Process	Other: Painting, aerosol apply	On ST_02004 and ST_02005		1 x	
Process	Other: Press operation	1 x ST_02006 on ST_02002		1 x	
Process	Other: Assemble by hand	ST_02007 on ST_02003		1 x	
Process	Other: Assemble by hand	Steering shaft on rack and frame		1 x	
Process	Other: Press operation	1 x ST_02006 on ST_02002		1 x	
Process	Fastener install (every)	For the retaining ring		1 x	
Fastener	Retaining Ring	For the bearings		1 x	
Quick Release Shaft		Fixed part of the Quick release	Buy	1 x	ST_02001
Material	Bought Part	n/a		1 x	
Steering Shaft Pivot		Bearing seat for the steering pivot	Make	1 x	ST_02002
Material	Other: Steel, 25CD4	Circular section : diameter 32mm		1 x	
Process	Programming	Turning		1 x	
Process	Other: Machining setup, install and remove	Turning, First side		1 x	
Process	Other: Machining (CNC)	Turning, First side		1 x	
Process	Other: Machining setup, change	Turning, For the second side		1 x	
Process	Other: Machining (CNC)	Turning, For the second side		1 x	
Process	Other: Metrology	To Check the part		1 x	
Steering U-joint		U-joint for steering column and ST_02002	Buy	1 x	ST_02003
Material	Bought Part	n/a		1 x	
Steering column		Steering column	Make	1 x	ST_02004
Material	Other: Tubing, Steel, 25CD4S	Length of 343mm		1 x	
Process	Other: Saw or tubing cut	To cut the tube		1 x	



Spline coupler		<i>Connect the steering column to the rack</i>	Buy	1 x	ST_02005
Material	Bought Part	<i>n/a</i>		1 x	
Process	Other: Machining setup, install and remove	<i>Turning</i>		1 x	
Process	Other: Machining (conventionnal)	<i>Turning, hole for steering column</i>		1 x	
Bearing, Ball, Radial		<i>Steering pivot bearings</i>	Buy	2 x	ST_02006
Material	Bought Part	<i>n/a</i>		1 x	
U-joint boot		<i>Over steering u-joint</i>	Buy	1 x	ST_02007
Material	Bought Part	<i>n/a</i>		1 x	



ST (Steering System)		Steering Wheel			ST_A0100
[Assembly Processes]			Make	1 x	P_ST_A0100
Process	Other: Assemble by hand	ST_01003, ST_01002 and ST_01001		1 x	
Process	Other: Tighten bolts	For the 3 bolts		1 x	
Fastener	Other: Bolt grade 8.8	To attach the steering wheel		3 x	
Fastener	Other: Nut, grade 8.8	To attach the steering wheel		3 x	
Fastener	Other: Washer, steel stainless	To attach the steering wheel		3 x	
Steering wheel		Bought at Formula Seven.	Buy	1 x	ST_01001
Material	Bought Part	n/a		1 x	
Process	Drilled hole	4 holes		1 x	
Spacer		Between steering wheel and Quick release	Make	1 x	ST_01002
Material	Other: Aluminium 2017A	Raw material, 55x55x28 mm (Alu 2017A)		1 x	
Process	Programming	Milling		1 x	
Process	Other: Machining setup, install and remove	Milling		1 x	
Process	Other: Machining (CNC)	Milling, First face		1 x	
Process	Other: Machining setup, change	Milling		1 x	
Process	Other: Machining (CNC)	Milling, For the second face		1 x	
Process	Other: Metrology	Milling		1 x	
Quick Release mobil part		Removing part of the Quick release	Buy	1 x	ST_01003
Material	Bought Part	n/a		1 x	



ST (Steering System)		Tie Rods			ST_A0400
[Assembly Processes]			Make	1 x	ST_A0400P
Material	Other: Glue, Structural Epoxy Adhesive	To glue ST_04001 and ST_04003		2 x	
Process	Hand Finish	Surface of ST_04001		1 x	
Process	Other: Surface cleaning, by hand	Surface of ST_04001		1 x	
Process	Liquid Applicator Gun	To apply the glue		1 x	
Process	Other: Assemble by hand	ST_04001 and ST_04003		1 x	
Process	Other: Assemble by hand	ST_04001 and ST_04005 with the nut		1 x	
Process	Other: Assemble by hand	Assemble on fixture for dry time		1 x	
Process	Other: Tighten bolts	for fixture, same as on the car		1 x	
Process	Hand Finish	Surface of ST_04002		1 x	
Process	Other: Surface cleaning, by hand	Surface of ST_04002		1 x	
Process	Liquid Applicator Gun	To apply the glue		1 x	
Process	Other: Assemble by hand	ST_04002 and ST_04003		1 x	
Process	Other: Assemble by hand	ST_04002 and ST_04004 with the nut		1 x	
Process	Other: Assemble by hand	Assemble on fixture for dry time		1 x	
Process	Other: Tighten bolts	for fixture, same as on the car		1 x	
Process	Other: Untighten bolts	Remove from the fixture		1 x	
Process	Other: Assemble by hand	ST_04005 and ST_04007		1 x	
Process	Other: Assemble by hand	ST_04004 and ST_04006		1 x	
Process	Other: Tighten bolts	same as on the fixture		1 x	
Fastener	Other: Nut, Low hex. Nut	Right hand		1 x	
Fastener	Other: Nut, Low hex. Nut	left hand		1 x	
Fastener	Other: Bolt grade 12.9	M6		2 x	
Fastener	Other: k-nuts	M6		2 x	
Fastener	Other: Washer, steel stainless	M6		2 x	
Tooling	Other: Fixture	During dry time		1 x	
Tapped insert, right hand		Right-hand thread, glued to carbon tube	Make	2 x	ST_04001
Material	Other: Aluminium, 7075 T6	Raw material, D=18 mm and L=35mm		1 x	
Process	Programming	Turning+ flat spot		1 x	
Process	Other: Machining setup, install and remove	Turning		1 x	
Process	Other: Machining (CNC)	Turning + flat spot		1 x	
Process	Other: Metrology	Turning		1 x	
Tapped insert, left hand		Left-hand thread, glued to carbon tube	Make	2 x	ST_04002
Material	Other: Aluminium, 7075 T6	Raw material, D=18 mm and L=35mm		1 x	
Process	Programming	Turning+ flat spot		1 x	
Process	Other: Machining setup, install and remove	Turning		1 x	



Process	Other: Machining (CNC)	Turning+ flat spot	1 x		
Process	Other: Metrology	Turning	1 x		
Carbon tube	<i>carbon tubes for tie rod</i>	Buy	2 x	ST_04003	
Material	Bought Part	n/a	1 x		
Rod ends bearing, male r	<i>2 with a left-hand thread</i>	Buy	2 x	ST_04004	
Material	Bought Part	n/a	1 x		
Rod ends bearing, male l	<i>2 with a right-hand thread</i>	Buy	2 x	ST_04005	
Material	Bought Part	n/a	1 x		
Spacer 1	<i>M6 type 16 mm spacer, frame side</i>	Make	4 x	ST_04006	
Material	Other: Steel, 30NCD8	Raw material, D=18 mm and L=16mm	1 x		
Process	Other: Machining setup, install and remove	Turning	1 x		
Process	Other: Machining (conventionnal)	Turning	1 x		
Spacer 2	<i>M6 type 25 mm spacer, wheel side</i>	Make	4 x	ST_04007	
Material	Other: Steel, 30NCD8	Raw material, D=10 mm and L=25mm	1 x		
Process	Other: Machining setup, install and remove	Turning	1 x		
Process	Other: Machining (conventionnal)	Turning	1 x		



SU (Suspension System)	A-Arms front lower				SU_A0200
Lower fr. bearing support	<i>Wheel side</i>	Make	2 x		SU_02001
Inner bearing support	<i>Frame side</i>	Make	4 x		SU_02002
Front carbon fiber tube	<i>Carbon tube at the front</i>	Buy	2 x		SU_02003
Back Carbon fiber tube	<i>Carbon tube at the rear</i>	Buy	2 x		SU_02004
Spacer 1	<i>M6 type 16 mm spacer, frame side</i>	Make	8 x		SU_02005
Spacer 2	<i>M6 type 25 mm spacer, wheel side</i>	Make	4 x		SU_02006
Spherical bearing	<i>M6, steel/steel contact</i>	Buy	6 x		SU_02007



SU (Suspension System)	A-Arms front upper				SU_A0100
Upper fr. bearing support	<i>Wheel side</i>	Make	2 x		SU_01001
Inner bearing support	<i>Frame side</i>	Make	4 x		SU_01002
Front carbon fiber tube	<i>Carbon tube at the front</i>	Buy	2 x		SU_01003
Back Carbon fiber tube	<i>Carbon tube at the rear</i>	Buy	2 x		SU_01004
Spacer 1	<i>M6 type 16 mm spacer, frame side</i>	Make	8 x		SU_01005
Spacer 2	<i>M6 type 25 mm spacer, wheel side</i>	Make	4 x		SU_01006
Cylinder aluminium	<i>Glued junction carbon/bearing support</i>	Make	4 x		SU_01007
Spherical bearing	<i>M6, steel/steel contact</i>	Buy	6 x		SU_01008



SU (Suspension System)	A-Arms rear lower				SU_A0400
Lower rr. bearing support	<i>Wheel side</i>	Make	2 x		SU_04001
Inner bearing support	<i>Frame side</i>	Make	4 x		SU_04002
Front carbon fiber tube	<i>Carbon tube at the front</i>	Buy	2 x		SU_04003
Back Carbon fiber tube	<i>Carbon tube at the rear</i>	Buy	2 x		SU_04004
Spacer 1	<i>M6 type 16 mm spacer, frame side</i>	Make	8 x		SU_04005
Spacer 2	<i>M6 type 25 mm spacer, wheel side</i>	Make	4 x		SU_04006
Spherical bearing	<i>M6, steel/steel contact</i>	Buy	6 x		SU_04007



SU (Suspension System)	A-Arms rear upper				SU_A0300
Upper rr. bearing support	<i>Wheel side (1 + symmetric)</i>	Make	2 x		SU_03001
Inner bearing support	<i>Frame side</i>	Make	4 x		SU_03002
Front carbon fiber tube	<i>Carbon tube at the front</i>	Buy	2 x		SU_03003
Back Carbon fiber tube	<i>Carbon tube at the rear</i>	Buy	2 x		SU_03004
Spacer 1	<i>M6 type 16 mm spacer, frame side</i>	Make	8 x		SU_03005
Spacer 2	<i>M6 type 25 mm spacer, wheel side</i>	Make	4 x		SU_03006
Cylinder aluminium	<i>Glued junction carbon/bearing support</i>	Make	4 x		SU_03007
Spherical bearing	<i>M6, steel/steel contact</i>	Buy	6 x		SU_03008



SU (Suspension System)	Anti Roll Bar Front			SU_A1400
Torsion bar	<i>Tube used for the anti roll bar, 25CrMo4</i>	Buy	1 x	SU_14001
Right bearing support	<i>Outside diameter of the SU_14007</i>	Make	1 x	SU_14002
Left bearing support	<i>Outside diameter of the SU_14007</i>	Make	1 x	SU_14003
End plate	<i>Laser cutted, S355, 3mm thick</i>	Make	4 x	SU_14004
Rod ends bearing, male r	<i>2 male thread, ARB rod, right hand</i>	Buy	2 x	SU_14005
Rod ends bearing female r	<i>2 female thread, ARB rod, right hand</i>	Buy	2 x	SU_14006
Spherical plain bearings	<i>Used in the bearing supports, M12</i>	Buy	2 x	SU_14007
Spacer	<i>M6 type 16 mm spacer</i>	Make	4 x	SU_14008



SU (Suspension System)	Anti Roll Bar Rear			SU_A1500
Torsion bar	<i>Tube used for the anti roll bar, 25CrMo4</i>	Buy	1 x	SU_15001
Right bearing support	<i>Outside diameter of the SU_15007</i>	Make	1 x	SU_15002
Left bearing support	<i>Outside diameter of the SU_15007</i>	Make	1 x	SU_15003
End plate	<i>Laser cutted, S355, 3mm thick</i>	Make	4 x	SU_15004
Rod ends bearing, male r	<i>2 with a right-hand thread, ARB rod</i>	Buy	2 x	SU_15005
Rod ends bearing, male l	<i>2 with a left-hand thread, ARB rod</i>	Buy	2 x	SU_15006
Spherical plain bearings	<i>Used in the bearing support, M12</i>	Buy	2 x	SU_15007
Spacer	<i>M6 type 16 mm spacer</i>	Make	4 x	SU_15008
Aluminium tapped tube	<i>Aluminium tube for the ARB rod</i>	Make	2 x	SU_15009



SU (Suspension System)	Bell Cranks Front			SU_A0600
Front rocker	<i>Sheet of metal for the rocker</i>	Make	4 x	SU_06001
Front rocker spacer 1	<i>for the pivot</i>	Make	2 x	SU_06002
Front rocker spacer 2	<i>M6 type 20 mm spacer</i>	Make	8 x	SU_06003



SU (Suspension System)	Bell Cranks Rear				SU_A0800
Rear Rocker	<i>Sheet of metal for the rocker</i>	Make	4 x		SU_08001
Rear rocker spacer 1	<i>for the pivot</i>	Make	2 x		SU_08002
Rear rocker spacer 2	<i>M6 type 20 mm spacer</i>	Make	8 x		SU_08003



SU (Suspension System)	Front Uprights			SU_A1000
Front Left Upright	<i>Right's drawing, left is symmetric.</i>	Make	2 x	SU_10001
Upper Arm Bracket		Make	2 x	SU_10002
Upper Arm Wedge Shim	<i>2mm, 3mm, 1mm for camber adjustments</i>	Make	6 x	SU_10003
Speed Sensor Washer	<i>external sensor washer</i>	Make	2 x	SU_10004
Upper Arm Wedge Base		Make	2 x	SU_10005



SU (Suspension System)	Push/Pullrod Front			SU_A1200
Tapped insert, right hand	<i>Right-hand thread, glued to carbon tube</i>	Make	2 x	SU_12001
Tapped insert, left hand	<i>Left-hand thread, glued to carbon tube</i>	Make	2 x	SU_12002
Carbon tube	<i>carbon tubes for tie rod</i>	Buy	2 x	SU_12003
Rod ends bearing, male r	<i>2 with a right-hand thread</i>	Buy	2 x	SU_12004
Rod ends bearing, male l	<i>2 with a left-hand thread</i>	Buy	2 x	SU_12005
Spacer	<i>M6 type 16 mm spacer, A-arm side</i>	Make	4 x	SU_12006



SU (Suspension System)	Push/Pullrod Rear			SU_A1300
Tapped insert, right hand	<i>Right-hand thread, glued to carbon tube</i>	Make	2 x	SU_13001
Tapped insert, left hand	<i>Left-hand thread, glued to carbon tube</i>	Make	2 x	SU_13002
Carbon tube	<i>carbon tubes for tie rod</i>	Buy	2 x	SU_13003
Rod ends bearing, male r	<i>2 with a right-hand thread</i>	Buy	2 x	SU_13004
Rod ends bearing, male l	<i>2 with a left-hand thread</i>	Buy	2 x	SU_12005
Spacer	<i>M6 type 16 mm spacer, A-arm side</i>	Make	4 x	SU_13006



SU (Suspension System)	Rear Uprights			SU_A1100
Rear Left Upright	<i>Right's drawing, left is symmetric.</i>	Make	2 x	SU_11001
Upper Arm Bracket	<i>same part as in Front Assembly</i>	Make	2 x	SU_11002
Upper Arm Wedge Shim	<i>2mm,3mm, 1mm for camber adjustments</i>	Make	6 x	SU_11003
Speed Sensor Washer	<i>external sensor washer, same as front</i>	Make	2 x	SU_11004



SU (Suspension System)	Shocks Front				SU_A0500
Dampers	<i>Ohlins TTX 25</i>	Buy	2 x		SU_05001
Springs	<i>Springs mounted on the dampers</i>	Buy	2 x		SU_05002
Damper Spacers	<i>M8 type 20 mm spacer</i>	Make	8 x		SU_05003



SU (Suspension System)	Shocks Rear				SU_A0700
Dampers	<i>Ohlins TTX 25</i>	Buy	2 x		SU_07001
Springs	<i>Springs mounted on the dampers</i>	Buy	2 x		SU_07002
Damper spacers	<i>M8 type 20 mm spacer</i>	Make	8 x		SU_07003



SU (Suspension System)	Tie Rod - Rear			SU_A0900
Tapped insert, right hand	<i>Right-hand thread, glued to carbon tube</i>	Make	2 x	SU_09001
Tapped insert, left hand	<i>Left-hand thread, glued to carbon tube</i>	Make	2 x	SU_09002
Carbon tube	<i>carbon tubes for tie rod</i>	Buy	2 x	SU_09003
Rod ends bearing, male r	<i>2 with a left-hand thread</i>	Buy	2 x	SU_09004
Rod ends bearing, male l	<i>2 with a right-hand thread</i>	Buy	2 x	SU_09005
Spacer 1	<i>M6 type 16 mm spacer, frame side</i>	Make	4 x	SU_09006
Spacer 2	<i>M6 type 25 mm spacer, wheel side</i>	Make	4 x	SU_09007



WT (Wheels, Wheel Bearings & Tires) Front Hubs					WT_A0200
Front Hub	<i>Aluminium</i>	Make	2 x		WT_02001
Brake Bell	<i>Aluminium, junction between disc and hub</i>	Make	2 x		WT_02002
Front Bearing Washer	<i>outer side of the external bearing</i>	Make	2 x		WT_02003
Speed disc spacer 1	<i>to position WT_02005 (1mm thick)</i>	Make	6 x		WT_02004
Speed sensor disc	<i>iron teeth shape like</i>	Make	2 x		WT_02005
Speed disc spacer 2	<i>to position WT_02005 (2mm thick)</i>	Make	4 x		WT_02006
Front Bearing	<i>Wheel Bearing, Ball, Angular Contact</i>	Buy	4 x		WT_02007
Front Hub Lock	<i>SKF lock nut KM10</i>	Buy	2 x		WT_02008
Front Hub Locknut Washer	<i>SKF locknut washer MB10</i>	Buy	2 x		WT_02009
Rim Dowel	<i>hand trimmed</i>	Buy	8 x		WT_02010
Rim Nut		Buy	8 x		WT_02011



WT (Wheels, Wheel Bearings & Tires) Rear Hubs					WT_A0300
Rear Hub	<i>Aluminium, flutting for tripod housing</i>	Make	2 x		WT_03001
Brake Bell	<i>Sold attached with the rear breake rotor</i>	Buy	2 x		WT_03002
Rear Bearing Washer	<i>outer side of the external bearing</i>	Make	2 x		WT_03003
Tripod Housing Spacer	<i>rear upright vehicle inner side</i>	Make	2 x		WT_03004
Speed disc spacer 1	<i>to position WT_03006 (1mm thick)</i>	Make	6 x		WT_03005
Speed sensor disc	<i>iron teeth shape like</i>	Make	2 x		WT_03006
Speed disc spacer 2	<i>to position WT_03006 (2mm thick)</i>	Make	4 x		WT_03007
Rear Bearing	<i>Wheel Bearing, Ball, Angular Contact</i>	Buy	4 x		WT_03008
Rim Dowel	<i>hand trimmed</i>	Buy	8 x		WT_03009
Rim Nut		Buy	8 x		WT_03010



WT (Wheels, Wheel Bearings & Tires) Wheels				WT_A0100
Oz Magnesium Rim	Buy	4 x		WT_01001
Hoosier 13", Dry	Buy	4 x		WT_01002



Overview Costed System: EN				
Engine & Drivetrain	Cooling System		655,08 €	EN_A0600
Engine & Drivetrain	Drivetrain Assembly		4.105,38 €	EN_A0700
Engine & Drivetrain	Engine		3.888,73 €	EN_A0100
Engine & Drivetrain	Exhaust System		2.004,09 €	EN_A0200
Engine & Drivetrain	Fuel Tank – NOT THE HV-Battery		282,22 €	EN_A0900
Engine & Drivetrain	Intake System		1.713,81 €	EN_A0300
Engine & Drivetrain	Other: Fuel system	<i>to be completed</i>	508,79 €	EN_A0500
Engine & Drivetrain	Overflow Bottles		97,91 €	EN_A0800
Engine & Drivetrain	Throttle Body		477,38 €	EN_A0400
SUM			13.733,39 €	