FSAE Design Spec Sheet 2018

Competitors: **Please read the Instructions**-Tips (tab below) prior to the completion and submission of this sheet.

Car No.	81
School	Ecole Centrale de Lyon

Dimensions	**Units**						
Overall Dimensions	mm	Length:	2880	Width:	1481	Height:	1242
Wheelbase & Track	mm	Wheelbase:	1600	Front Track:	1276	Rear Track:	1222
Center of Gravity Design Height	mm	CG Height:	300.0	Confirmed Via:	confirmed via tilt test		
Mass without driver	kg	Front:	123.0	Rear:	109.0	Total:	232.0
Weight Distribution with 68kg driver		% Front:	49.0	% Left:	52.0		

Suspension Parameters	**Units**	**Front**			**Rear**		
Tire Size, Compound and Make		20.5x7	R25B	Hoosier	20.5x7	R25B	Hoosier
Wheels (diameter, width, material)	inch	Diamter (col D): / Width (col E):	13''	7.0	Diameter (col G): / Width (col H):	13''	7.0
Wheel material and construction		Aluminium, OZ racing			Aluminium, OZ racing		
Suspension Type		Double unequal length and non parallel A-Arm pull rod actuated Ohlins TTX25 dampers			Double unequal length and non parallel A-Arm push rod actuated Ohlins TTX25 dampers		
Suspension design travel	mm	Jounce (col D): / Rebound (col E):	30.0	26.0	Jounce (col G): / Rebound (col H):	30.0	26.0
Wheel rate (chassis to wheel center)	N/mm	36.4			32.2		
Roll rate (chassis to wheel center)	Nm/deg	513			424		
Sprung mass natural frequency	Hz	1.78			1.67		
Jounce Damping	% critical	adjustable	at __ mm/sec:		adjustable	at __ mm/sec:	
Rebound Damping	% critical	adjustable	at __ mm/sec:		adjustable	at __ mm/sec:	
Motion ratio	_.__:1	1.1	Type:	Linear descending	1.1	Type:	Linear descending
Ride Camber (Rate of Camber Change)	deg/m	40.0			80		
Roll Camber	deg/deg	0.5			0.175		
Static Toe (- out, + in)	deg	0.00			0		
Static camber	deg	2.00			1.5		
Static camber adjustment method		Via Shrims			Via Shrims		
Anti dive / Anti Squat	%	0			0		
Roll center height above ground, static	mm	36.4			50.7		
Roll center position at 1g lateral acc	mm	Height (col D): / Lateral (col E):	36.4	37.7	Height (col G): / Lateral (col H):	50.8	11.2
Front Caster, Trail, and Scrub Radius		Caster (deg):	1.5	Kin Trail (mm):	17.0	Scrub Rad (mm)	41.7
Front Kingpin Axis		Inclination (deg):	4.6	Offset (mm):	54.0		
Static Ackermann	%	25	Adjustable?	No			
Suspension Adjustment Methods		No adjustement					
Steer Ratio, C-Factor, Steer Arm Length		Steer Ratio (x:1)	5:1	c-factor (mm)	80.0	Steer Arm Length	382.0

Brake System / Hub & Axle	**Units**	**Front**			**Rear**		
Rotors		230 cast-iron, 4,5mm thick, hub mounted			230 cast-iron, 4,5mm thick, hub mounted		
Master Cylinder		AP racing, CP7855-88PRTE, bore : 14mm			AP racing, CP7855-92PRTE, bore : 19,1mm		
Calipers		Béringer dual piston 2P1A, 32mm bore			Béringer dual piston 2P1A, 32mm bore		
Brake Pad/Lining Material		Béringer 1158S			Béringer 1158S		
Force and Pressures @ 1g Deceleration		Front Pres. (bar):	33.0	Rear Pres. (bar):	9.8	Pedal Force (kN)	0.27
Upright Assembly		Machined 7075 T6 Al, with lug mount caliper and camber setting with shims			Machined 7075 T6 Al, with lug mount caliper and camber setting with shims		
Hub Bearings		2 Angular contact bearing, back-to-back			2 Angular contact bearing, back-to-back		
Axle type, size, and material		stub axle, diam 35mm, Aluminum 7075 T6			stub axle, diam 50mm, Aluminum 7075 T6		

Ergonomics	**Units**				
Driver Size Adjustments		Fixed seat, adjustable pedalbox (up to 240mm adjustement by 20mm step.			
Seat (materials, padding/damping)		Karting based seat - Glass fiber and polyester resin			
Steering Wheel (dia, construction)		Diamter (mm)	27mm	Construction	Momo model 29, black suede
Shift Actuator (type, location)		Electric brushless servomotor, actuated by paddles behind the steering wheel.			
Clutch Actuator (type, location)		Hand actuated (pull cable), lever on the right side of the cockpit			
Instrumentation		Water temp seven-segments display, Led RPM indication, fan indicator, shift light, Neutral indicator, Oil pressure warning light, Contact light.			
Optional: Driver Safety Systems?		Sensata crash sensor			

Electrical	Units	
Power Management / Control		All electrical component are fuse protected, and all power devices are relay-activated to only have signal for firewall. Relays and fuses in a sealed hard-wired power distribution module.
Wiring / Loom / ECM mounting		Color-code allows cables to be identified. All signal cables in 20/22 AWG. Harnessing tapes, spiral wrap and zipties
Battery / Charging System		Super-B LiFEPO4 12V, 7,8Ah, charged by the stock Honda alternator
Grounding		Specific ground bolts located under the seat, near the engine and battery. Dedicated ground wires connect engine body, chassis and battery negative together. Sensor ground in a specific circuit. No ground loop except for fan, pump and dashboard ground.
Driver Assist Systems		Launch control, traction control,
Logging / Telemetry		DTA ECU logging system recording data from ECU sensors and wheels speed.
Special Sensing Technology		Hall effect sensors for wheels speed, analogical sensors for the other

Frame	Units						
Frame Construction		Spaceframe steel					
Material		SAE 4130 steel tubes from outside diameter 30, 25, 20mm					
Joining method and material		TIG welding, SAE 4130 as filler material					
Bare frame mass with brackets & paint	kg	Target:	40.5	Physical Test:	41.0		
Torsional stiffness	N-m/deg	Target:	1200	Simulated:	1114	Physical Test:	1205
Torsional stiffness validation method		Physical test, torque applied with lever on front suspension points and rear suspension points fixed.					
Impact Attenuator configuration		Standard IA					
Impact Attenuator dimensions	mm	Width:	305	Height:	356	Depth:	254
Impact Attenuator energy capacity	kJ	Energy:	N/A	Method:	N/A		

Powertrain	Units						
Manufacturer / Model		Honda CBR600RR (PC40)					
Cylinders & Fuel		Cylinders:	4	Fuel Type:	RON 98		
Displacement & Compression		Displacement (cc):	599	Compression (_:1):	12.2		
Bore & Stroke	mm	Bore:	67.0	Stroke:	42.5		
Engine Output		Peak Power (kW)	64	PeakTorque (Nm)	61		
Design Speeds	rpm	Max Power:	11 000	Max Torque:	9 500	80% Torque:	5 500
Induction (natural or forced, intercooled)		natural aspirated					
Throttle Body / Mechanism		28mm butterfly type throttle actuated by pull cable, Linear link with pedal					
Fuel Injection System (manf'r, and type)		Honda PC37 fuel rail and injectors, aftermarket pressure regulator, DTA S80 ECU with 3D RPM / throttle pos.					
Fuel System Sensors (for fuel mapping)		Throttle position, Crank position, Camshaft position, coolant temperature, wideband lamdba sensor, air intake temperature.					
Fuel Pressure	bar	3.6					
Injector location		25,4mm before the runner end and directed towards the center of the runner end.					
Intake Plenum		Volume (cc):	2299	Runner length (mm):	351.0		
Exhaust Header Configuration		4-2-1	Effective Runner Length (mm):	417.5	Variation (mm):	20	
Exhaust Header Diameters		Primary (mm):	31.0	Collector (mm):	50.0		
Ignition System		Stock Honda ignition system, ECU DTA S80					
Ignition Timing		3D map rpm - throttle position, 60° BTDC max advance					
Oiling System (wet/dry sump, mods)		Flat wet sump, stock Honda pump					
Engine Lubricants / Friction Treatment		Stock Honda friction treatment, Motul 300V racing oil SAE 10W40.					
Coolant System and Radiator location		single side mounted 42mm core aluminium radiator , 800 cfm fan mounted on the back of the radiator.					
Fuel Tank Location, Type		Mounted between firewall and engine, aluminium tank with buffer volum				Capacity (L):	7.5
Muffler		After market Akrapovic muffler, 570mm long, 50mm inner diameter					
Other significant engine modifications		slipper clutch, gear for the shift system					

Drivetrain	Units						
Drive Type		Chain (520), Stock Honda gearbox with team made wheel for shifting					
Differential System		Drexler Limited slip differential					
Final Drive Ratio	_:1	3.4					
Vehicle Speed @ max power (design) rpm	kph	1st gear:	55	2nd gear:	76	3rd gear:	91
Vehicle Speed @ max power (design) rpm	kph	4th gear:	105	5th gear:	116	6th gear:	125
Half shaft size and material		Right axle size : 431,8mm, Left axle size : 362,2mm, 4340 steel hollow tube diameter 20 mm					
Axle Joint type and grease used		Tripod join (RCV Performances), lithium grease (GKN XP595)					

Aerodynamics (if applicable)	Units						
Type / Configuration		N/A					
Forces (at 80 kph, ρ= 1.162 kg/m^3)		Downforce (N):	N/A	% Front:	N/A	Drag (N):	N/A
Coefficients & Reference Area		Cl:	N/A	Ref. Area (m^2):	N/A	Cd:	N/A
Noteable Features (active, etc)		N/A					

Other Information	Units	
Body Work (material, process)		Glass fiber, vaccum infusion.
Optional Information		