

Car No.	181
University	Ecole Centrale de Lyon

Dimensions	Units						
Overall Dimensions	mm	Length:	2880	Width:	1481	Height:	1242
Wheelbase & Track	mm	Wheelbase:	1575	Front Track:	1254	Rear Track:	1180
Center of Gravity Design Height	mm	CG Height:	300,0	Confirmed	confirmed via tilt test		
Mass without driver	kg	Front:	108,0	Rear:	108,0	Total:	216,0
Weight Distribution with 68kg		% Front:	50,0%	% Left:	50,0%		

Suspension Parameters	Units	Front			Rear		
Tire Size, Compound and Make		20.5x7	R25B	Hoosier	20.5x7	R25B	Hoosier
Wheels (diameter, width, material)	inch	Diameter (col D): Width (col E):	13"	7,0	Diameter (col G): Width (col H):	13"	7,0
Wheel material and		Magnesium, OZ racing			Magnesium, OZ racing		
Suspension Type		Double unequal length and non parallel A-Arm push 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	24,1			35,4		
Roll rate (chassis to wheel center)	Nm/deg	586			725		
Sprung mass natural frequency	Hz	1,82			1,73		
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:		1.1	Type:	Linear descend
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 Shims			Via Shims		
Anti dive / Anti Squat	%	0			0		
Roll center height above ground, static	mm	35.42			49,0		

Roll center position at 1g lateral acc	mm	Height (col D): Lateral (col E):	35,6	2,4	Height (col G): Lateral (col H):	49,3	1,7
Front Caster, Trail, and Scrub		Caster (deg):	0,8	Kin Trail	12,0	Scrub Rad	33,4
Front Kingpin Axis		Inclination (deg):	7,8	Offset (mm):	33,4		
Static Ackermann	%	25	Adjustable?	No			
Suspension Adjustment Methods		No adjustment					
Steer Ratio, C-Factor, Steer		Steer Ratio	5:1	c-factor (mm)	80,0	Steer Arm	382,0

Brake System / Hub & Axle	Units	Front		Rear			
Rotors		230 cast-iron, 4,5mm thick, hub mounted		193 inox, 5mm thick, hub mounted			
Master Cylinder		Béringer, MC127, bore : 12,7mm		Béringer, MC127, bore : 12,7mm			
Calipers		Béringer dual piston 2P1A, 32mm bore		Béringer dual piston 2D1, 27mm bore			
Brake Pad/Lining Material		Béringer 1158S		Béringer 1158S			
Force and Pressures @ 1g		Front Pres.	53,9	Rear Pres.	45,2	Pedal Force	0,38
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 adjustment by 20mm step).					
Seat (materials, padding/damping)		Karting based seat - Glass fiber and polyester resin					
Steering Wheel (dia,		Diamter (mm)	265	Construction	Formula Style Steering Wheel		
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		Engaged gear, water temp and battery voltage on seven-segments display, Led RPM indication, shift light, Neutral indicator, Oil pressure warning, Contact light, Launch Control indicator and error shift of the shifter actuator light.					
Optional: Driver Safety Systems?		Sensata crash sensor, BSPD and GPS tracking device in the data logger					

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. There is a three way switch on the dashboard which allow us to turn on only low part like ECU or datalogger to get a connection and or to turn on all the electrical device.					
Wiring / Loom / ECM mounting		Color-code allows cables to be identified. All signal cables are in 22/24 AWG twisted together. Power cables are sized in 12 - 16 or 18 AWG except for starter and have been sized to have less than 5% of voltage loss. Waterproof harnessing tapes, spiral wrap and zipties used to guide and protect electrical wiring harness.					
Battery / Charging System		Super-B LiFePo4 12V, 7,8Ah, charged by the stock Honda alternator. This allow us to do several starts in a row during testing.					

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		Shift light, RPM and engaged gear on the dashboard, launch control traction control and automatic gearshift
Logging / Telemetry		AutosportLab MK3 logging system records motor data from the ECU via CAN, GPS and Acceleration integrated, suspensions travel, steering position and brake pressure via 8 analog channel.
Special Sensing Technology		Hall effect sensors for wheels speed and steering rack position and analogical sensors for the other

Frame	Units						
Frame Construction		Spaceframe steel					
Material		SAE 4130 steel tubes from outside diameter 30, 25, 20, 15 mm					
Joining method and material		TIG welding, SAE 4130 as filler material					
Bare frame mass with brackets &	kg	Target:	40,5	Physical Test:	41,0		
Torsional stiffness	N-m/deg	Target:	1200	Simulated:	1212	Physical Test:	1169
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 capac	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)	75	Peak Torque (Nm)	56		
Design Speeds	rpm	Max Power:	11300	Max Torque:	8300	80% Torque:	7200
Induction (natural or forced, intercooled)		natural aspirated					
Throttle Body / Mechanism		guillotine 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 / manifold pressure					
Fuel System Sensors (for fuel mapping)		Throttle position, Crank position, Camshaft position, coolant temperature, wideband lambda sensor, air intake temperature, manifold pressure, oil pressure sensor, fuel pressure sensor.					

Fuel Pressure	bar	3,5				
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):	405,3	Variation (mm):	14	
Exhaust Header Diameters	Primary (mm):	31,0	Collector (mm):	50,0		
Ignition System	Custom, ECU DTA S80					
Ignition Timing	3D map rpm - manifold pressure, 45° BTDC max advance					
Oiling System (wet/dry sump, mods)	Flat wet sump, stock Honda pump					
Engine Lubricants / Friction Treatment	Motul 300V 10W40 / Oil pressure max: 450kPa					
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):	6,9	
Muffler	After market Akrapovic muffler, 450mm 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 Adjustable Limited Slip differential					
Final Drive Ratio	_:1	3,20					
Vehicle Speed @ max power (des	kph	1st gear:	73,97	2nd gear:	101,71	3rd gear:	122,02
Vehicle Speed @ max power (des	kph	4th gear:	140,87	5th gear:	155,99	6th gear:	168,39
Half shaft size and material	Right axle size : 386,4mm, Left axle size : 353mm, 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, $\rho=1.162$		Downforce	N/A	% Front:	N/A	Drag (N):	N/A
Coefficients & Reference Area		Cl:	N/A	Ref. Area	N/A	Cd:	N/A
Noteable Features (active, etc)							

Other Information	Units	
Body Work (material, process)		Carbon fiber, <input data-bbox="711 121 1588 157" type="text"/>
Optional Information		