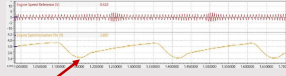


Engine Control Unit (ECU)



MoTeC

MAP-based synchronization



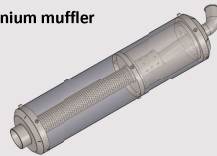
Intake pressure drops during cranking

Acceleration Event



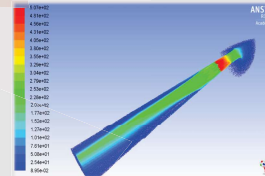
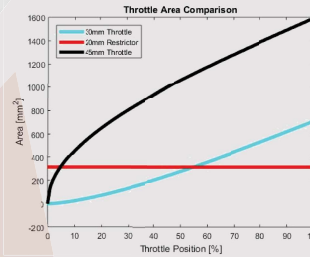
Exhaust System

Custom titanium muffler



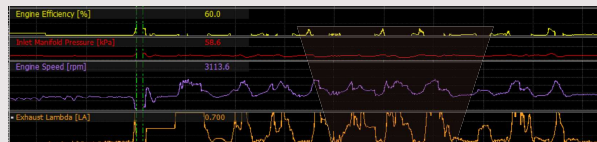
The team designed a titanium muffler to reduce the muffler weight from 2.5kg to 1.5kg and also allowing for custom points to attach the muffler to the vehicle

Intake System



"Blade" throttle body (swivel action)

Engine Tuning



Piston Replacement

Main Goal:

Increasing the compression ratio by exchanging the engine piston

Reason for replacement:

1. Replacing the engine piston will not hurt the engine reliability.
2. Increasing the compression ratio will improve the engine performance.

Advantages of the new piston:

- 10 grams lighter
- The geometric structure of the SX-F piston is different from the EXC-F piston, it reduces the TDC volume.
- Theoretically produce 7% more power in cylinder.



EXC-F piston



SX-F piston

GT-POWER Simulation

GT-POWER Simulation

- Helps us to predict the engine performance with the new piston
- allows us to make some optimization to the engine analysis
- Pointing on problems that can occur

GT Assumptions:

1. Simulating one cylinder gasoline engine.
2. Using theoretical information about small gasoline engines inside cylinder temperatures and pressure order.
3. Using KTM similar engines geometric details at first and after engine disassembly.

GT-POWER Simulation - Comparison between the old and new engine piston

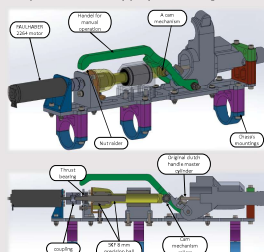
The GT figures below shows the improvement of the engine performance when using a "high compression" piston.



CCLS - Controlled Clutch Launching System

Design advantages:

- **Smart Launching** – reduces acceleration time
- **Fast recovery** – maintains high rpm and torque while turning and braking
- **Light weight** – increases power to weight ratio
- **Prevents downshifting high rpm "jumps"** – synchronization with the EGS syst.
- **Utilizing existing power source** – battery and engine charging system
- **Allows manual operation for safety purposes** – integrated handle



Specifications:

Motor: Faulhaber 2264 Brushless

Controller: Faulhaber MC 5010

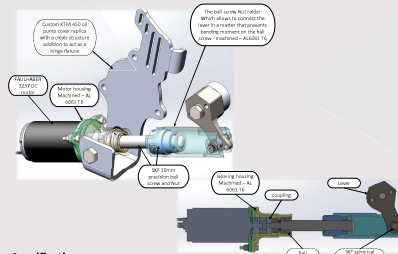
Weight: 570gr

EGSS - Electric Gear-Shifting System



Design advantages:

- **Fast gear shifting** – less than 40msec – improves performance
- **Light weight** – increases power to weight ratio
- **No added controller is needed** – using main engine computer
- **utilizes existing power source** – battery and engine charging system
- **High durability** – engine mounting decreases vibrational impacts



Specifications:

Motor: Faulhaber 3257 DC

Up-Shift time: 25ms

Down-shift time: 35ms

Electrical: 13V / max 11A

Torque: 10Nm

Weight: 480gr

Drivetrain

Design:

- Final drive ratio: 3.272
- Rear axle Mono braking
- Drexler limited slip differential
- Drilled driveshafts for weight reduction
- Custom design of:
 - Titanium brackets
 - AL-7075 sprocket with spline adapter
 - 1010 steel brake disc

Design advantages:

- **Reduced unsprung mass** – improves car performance
- **Less over/understeer** – limited slip differential keeps constant yaw moment
- **Light weight** – increases power to weight ratio

