# UP RACING

## NEWSLETTER February 2019

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# Welcome

A very warm welcome from everyone at UPRacing, to all our loyal sponsors, alumni and supporters. The team has been hugely busy so far this year, working hard in preparation for manufacture. Here's a look at what's been going on from the team.

## In This Issue

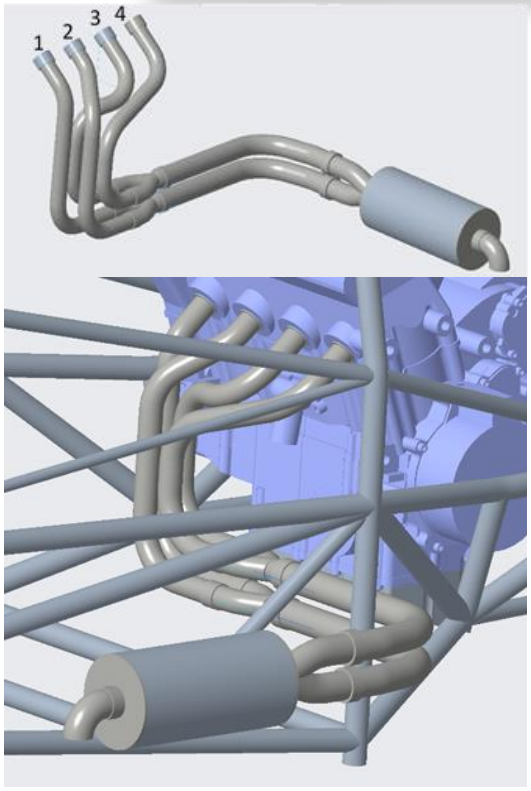


## Exhaust Design

"This year's exhaust uses a 4-2-1 configuration of the primary and secondary tubing. This means the four primary tubes merger into two secondary tubes, with 1 and 2 merging into a secondary tube and 3 and 4 merging into a secondary tube. The exhaust primary and secondary dimensions have been designed to utilise exhaust scavenging. The primary and secondary tube lengths and diameters have been calculated using an online exhaust length calculator. Therefore, we can find the correct amount of restrictiveness in the tube to allow for optimum velocity. This velocity allows for inertia scavenging as the high-speed exhaust gas travels through the collectors it creates a low-pressure area behind it. The low pressure allows for the exhaust gases of the piston linked to the same collector to be evacuated quickly. Thereby meaning the engine doesn't have to work as hard to get rid of exhaust gases and can pull in clean air more efficiently as the pistons are emptied quicker. This results in a more powerful and efficient engine.

The exhaust drawings are to be finalised and will be sent off to a manufacturer to be made."

*Tom Forrest - 1st Year Innovation Engineering*

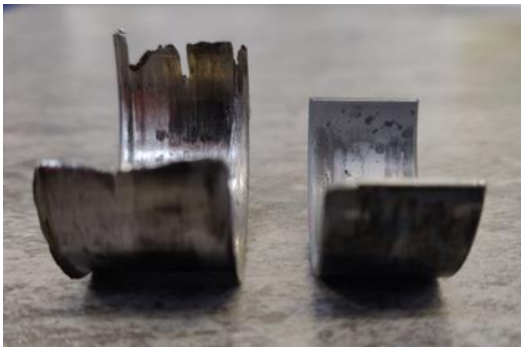



New Exhaust

## Engine Rebuilding

*"The engine rebuilds on our two Yamaha R6 engines are coming along well. We disassembled the engines to investigate issues that arose at last year's event to rectify these for this year and have two running engines in case of any future issues. We found that the knocking was caused by a broken part (shown left) on the crankshaft and whilst we managed to order all of the parts for a total engine rebuild, more specific and unique parts were unfortunately unavailable. This resulted in us ordering a new crankshaft. Despite the issues with the engines, the rebuild goes ahead smoothly with our Maintenance and Manufacture Team cleaning the engine, readying parts for re-spraying and getting to know their way around the engine for when the rebuild parts arrive. This knowledge has been invaluable especially to our new members who will be rebuilding the engine with assistance from the management team for this year's Formula Student event. It has been a great insight into the problem and resolution process that can occur regularly. The whole manufacture team has benefited from being a part of this from a practical and educational aspect."*

*Lewis Sharpe – Vice Lead of Manufacturing - 2nd Year Mechanical Engineering*



Crankshaft Bearings (damaged on left)

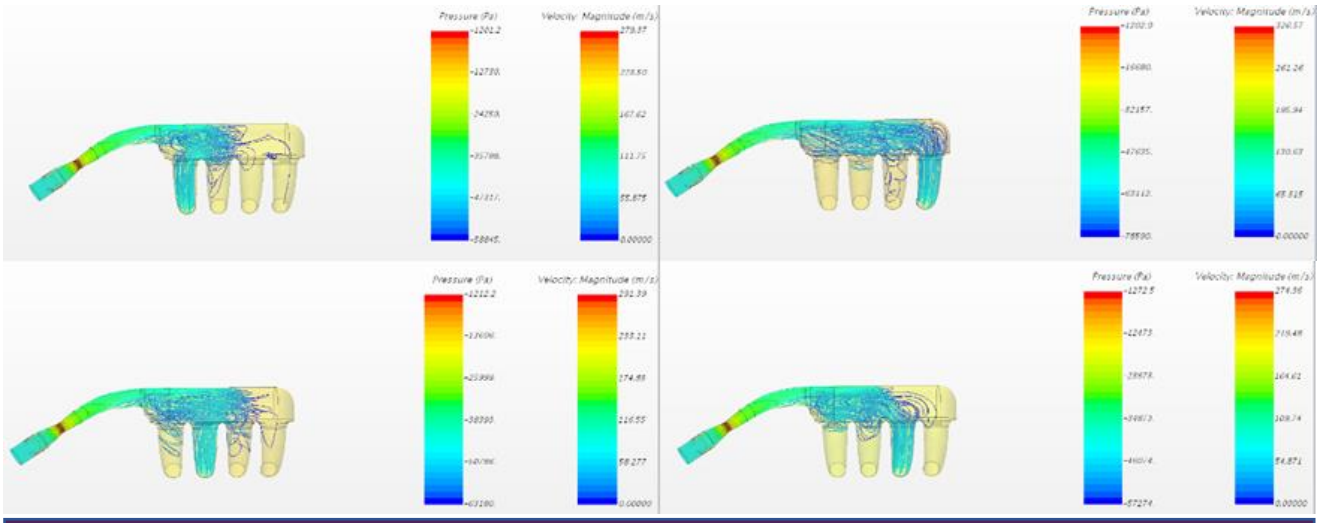
Our Yamaha R6 Crankshafts

## Air Intake

*"The new intake design is focused on creating an intake that increase mass flow rate into the engine and decreasing throttle lag. To achieve this a design with gradually changing geometry and a small volume is created. To achieve these the throttle and inlet are move down from the centre above the driver's head to be placed on the drivers right. In this location a much smaller overall volume can be achieved. The smaller volume will drastically reduce throttle lag as there is a smaller air revere within the plenum for the engine to draw on.*

*Once the smaller volume had been achieved CFD test were undertaken to test whether the mass flow rate and overall mass of air drawn into the engine was increased or remained the same. The results of these tests are shown here It was found that the average mass flow rate was increase by 20%. With these improvements we hope to see increased engine performance and better fuel efficiency."*

*Rob Akhurst - Design Engineer - 3rd Year Mechanical Engineering*



New Intake CFD Models

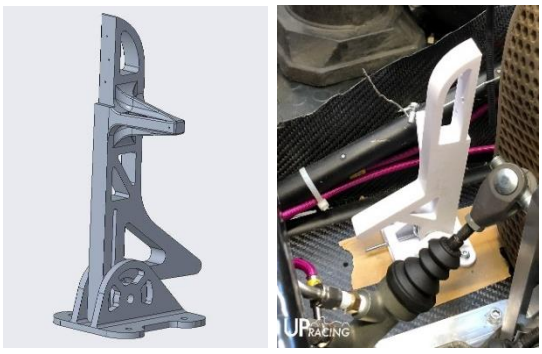
## Throttle Pedal Design

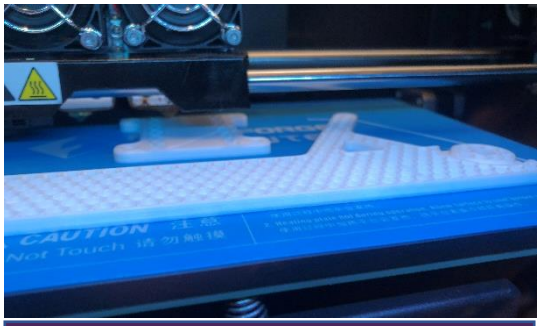
*"The main goals for the design of the throttle pedal this year were to make it lighter and improve driver feel. The drivers said previously that the throttle felt too twitchy as there wasn't enough resistance in the pedal. We also felt that the pedal itself was unnecessarily heavy. The initial concept was that the pedal would be made from 2mm thick steel box tubing which would reduce the weight and a torsion spring would be placed around the bearing in order to provide more resistance, thus improving driver feel.*

*Over the past few weeks, we started 3D printing pedal prototypes in order to gauge how improved the driver feel was with the implementation of the torsion spring and came to the conclusion that 3D printing the final pedal would be a more than feasible option. Progress has since been made in further developing the design to find the balance between the desired weight and strength of the pedal. Due to the flexibility and freedom available with 3D printing we are able to further optimise the pedal design and test different materials such as nylon.*

*We have been testing different prototypes to destruction and determined that a 100% infill pedal has more than enough strength, therefore, the next stage will be to conduct three-point bend tests on pedal prototypes with different levels of infill to reach the final design."*

*Jareth Hallam – Design Engineer - 2nd Year Mechanical Engineering*





3D Printed Throttle Pedal

## A message to our Sponsors and Supporters

Our thanks must go to all our sponsors, supporters and alumni. We are now rapidly heading towards the manufacture period which is of course when we reach out to many of you. This support is invaluable to us and we hope you're equally excited to help us achieve a fantastic UPR-11 car.