



Cycling Test Lab

SSEH – UTC Collaboration

At SSEH we are developing three new mechanical test rigs in the form of a rolling resistance rig, stiffness rig and a chain efficiency rig; to create a 'Cycling Test Lab' in collaboration with Silverstone University Technical College and supported by a Local Growth Fund from BucksLEP. The formation of this relationship will allow the students at Silverstone UTC to have access to these rigs, offering them an opportunity to further their education by applying learning to real-world applications. The project also provides the students with valuable hands-on experience and exposure to engineering and industry, whilst allowing SSEH to advance our research and development services for sports engineering.

Rolling Resistance Rig

Rolling resistance is the force resisting the motion of a tyre rolling over a surface, rider power is required to overcome this force. The rolling resistance rig utilises a motor driven roller contained within an enclosure to rotate a wheel; vertical mass can be applied to simulate the tyre contact patch load. Using measurements from a torque meter, the rolling resistance is then quantified by comparing the power required to drive the roller at a constant rotational speed, with and without tyre in contact, thus the power required to rotate the wheel is then calculated. The rig can measure marginal differences in power and can be used for the comparison of test samples or to investigate variables such as wheel speed, contact patch load and tyre pressures.



Also at SSEHub

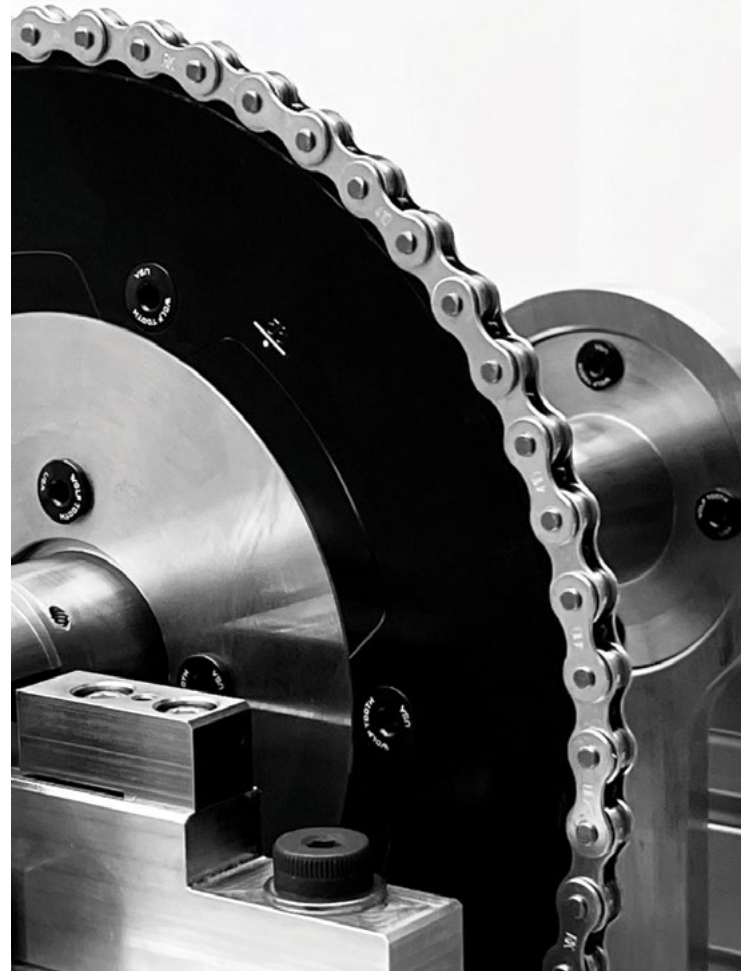
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Stiffness Rig

A component tested in the isolation of a wind tunnel could prove to be aerodynamically advantageous, however, if the components stiffness or mechanical efficiency to transmit rider power to the road is not considered, then any aerodynamic gain could be wasted. This bedplate-mounted rig allows a bike frame (without wheels) to be mounted on the front and rear axles and a static load applied through either the crank arms, bottom bracket bearing, handlebars or seat post; force and displacement is measured, and stiffness is then calculated. Additional rig configurations also allow crank arms, handlebars, stems and wheels to be stiffness tested in isolation.

Chain Efficiency Rig

Friction within a chain contributes to energy loss and therefore reduces drivetrain efficiency. Based on simple pendulum theory, the chain efficiency rig comprises of a swinging pendulum that rotates a chain around a chainring or sprocket. The energy lost to friction is removed from the pendulum's velocity, causing its motion to decay. The pendulum's decay can then be compared to a chain-less run to determine the frictional losses of the chain and thus its efficiency. Utilising a swinging pendulum combined with knife edge bearings instead of a motor driven configuration with rotational bearings and couplings, keeps frictional losses and damping of the rig to a minimum and omits the effect of rotational inertia, all of which are critical factors when measuring the most marginal of differences between samples. This rig will allow for testing of different chains, lubricants as well as chainrings and sprockets, to help optimise bicycle drivetrains.



Due early 2022

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