

Hartlett Testing – May 2006

Introduction:

The Hartlett Axle System (Hartlett) was designed to incorporate the ease and speed of use of traditional quick release wheel mounting systems (quick release) with the stiffness and security benefits of bolted axle (bolt-thru) wheel mounting systems. By seeking to combine these features and benefits in the Hartlett it has been suggested by interested parties to our design that the 'stiffness' of the system may be compromised.

Sportspulse, based at Sheffield Hallam University, was enlisted as an independent party to provide a testing technique to measure the 'stiffness' performance of our system against commercially-available, alternative systems.

Objectives:

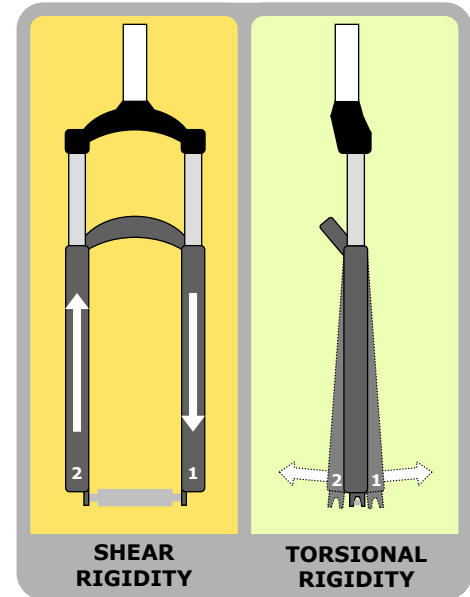
We wanted to perform a simple set of tests that directly compared the Hartlett against a traditional quick release system and a bolt-thru system. We wanted to gather data that tested the 'stiffness' (rigidity) of each design: both in a torsional plane and a shear plane – see diagram for details.

Methodology:

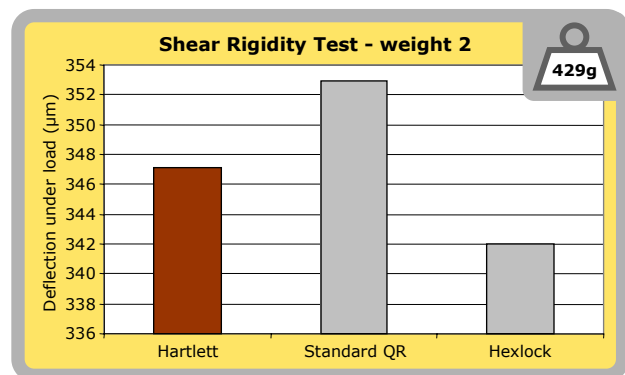
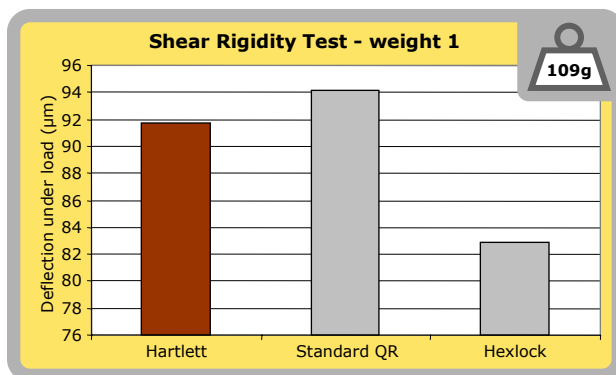
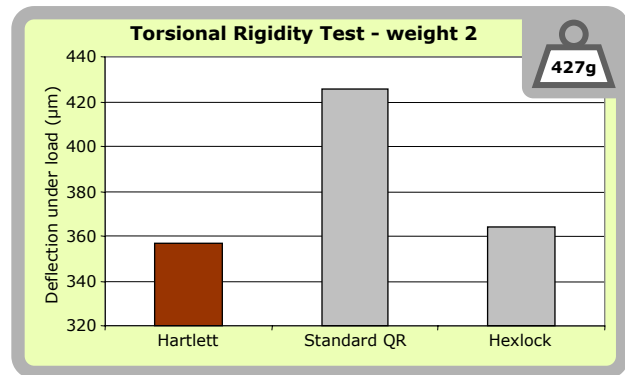
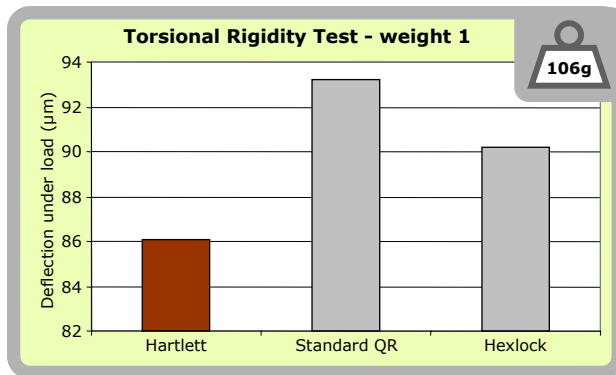
For this test, so as to keep as many variables as standard as possible we used a single set of fork uppers (steerer tube, crown and stanchions assembly) secured for testing in a horizontal plane. We then interchanged three different Manitou Sherman lower leg assemblies, each incorporating one of the three different axle mounting designs: a traditional quick release, Manitou's Hexlock bolt-thru axle and a version of the Hartlett retro-fitted to a pair of modified Hexlock lowers.

To each testing parameter we mounted the same wheel (a Hope Pro II hub, DT Swiss Competition spokes and Mavic 721 EX rim), with either a 20mm bolt-thru setting or 9mm traditional quick release setting (with Hope Ti skewer): depending on lower leg type. We then applied a known force to the rim of the wheel in the same location and manner each time and measured the extent of deflection of the rim using a standard dial gauge.

Two different weights were used to apply the known force for each test, these are illustrated in the '**Results**' section below. For each parameter and weight a minimum of ten deflection readings were taken and then the average deflection calculated for the presentation of the '**Results**'.



Results:



Conclusions:

Prior to testing it was envisaged that the Hexlock system would be 'stiffer' in both planes because of the bolted nature of the axle fitting. This was the case for the shear test, however the Hartlett Axle System was more torsionally rigid than both Hexlock and traditional quick release systems as tested. In practice this means that, assuming all things being equal, a fork equipped with the Hartlett would steer more precisely than a fork with either Hexlock or quick release axle systems.