Torque Wrenches

What is torque?

All threaded fasteners, nuts, bolts etc, are held together by tension between the internal and external parts. The threads provide a continuous plane wrapped around a shaft in an evenly spaced or pitched, helical path. This provides a wedge for the mating part when a torque is applied to either that shaft or the mating part.

The applied torque will make the material of both parts flex or deform locally, so causing a tensile force (tension) that will clamp the two parts together.

A torque is a method of setting that tension by twisting the parts together. In order to get a known tensile force, it follows that a known turning force needs to be applied to shaft or mating part.

This is done using a torque wrench. Turning the torque wrench around a threaded part, the resistance will increase as the threads become tight. Given the correct setting on the wrench, the wrench will indicate the point at which sufficient tightness as specified by the manufacturer has been reached.

If threads are over-tightened they will become damaged, and if under-tightened they may work loose in service.

Manufacturers will test the internal and external threads on components to the point at which they fail. They will then recommend a torque limit lower than this failure point, but tight enough not to allow the threads to work loose during service.

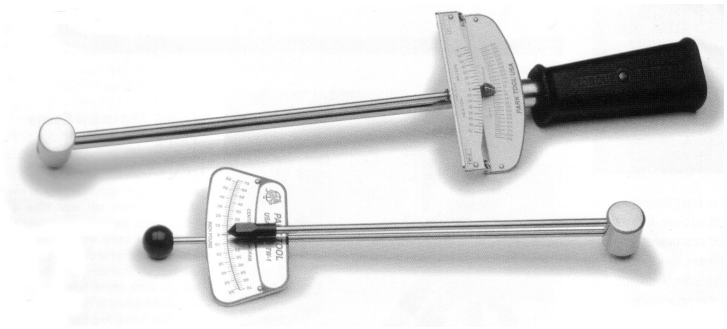

Fig 13.1 - Park Torque Wrenches

Why a torque wrench should be used

A torque wrench should be used to ensure that the threads in any component are tightened to the manufacturers' recommended, or in some cases, a generic, torque. This torque not only avoids damage from over-tightening, but also guards against under-tightening resulting in a component that works loose during use.

What are the consequences of not using a torque wrench at the correct settings?

Most manufacturers now give the recommended torque settings for the equipment they supply or components that they make. This is done so that they can ensure that the equipment will be installed correctly, and achieves maximum service life. If this setting is followed, the component will stay tight during use, and also, when tightened, will not damage any part of the equipment.

Why is it important for a mechanic follow these settings?

- To prevent component damage caused by over-tightening.
- If the fixings are under-tight, then the component may work loose during use.
- If the recommended settings are not used, the manufacturer's recommendations have not been followed. In the case of failure, the mechanic or business may be liable for incorrect fitting contributory to that failure.

Take the following scenario:

> A customer returns to the shop after having a rear derailleur installed and is complains that it has become loose in service, has become tangled up in the chain and wheel, and damaged the frame, chain, wheel and the derailleur itself. By using the correct torque this situation could have been prevented.

Provided that the correct settings were used during assembly, whilst the customer might hold the mechanic or the shop responsible for the problem, the business could refer the matter to the manufacturer as the fault would be theirs, not that of mechanic who did the job. This would become even more crucial if the fault or problem resulted in an injury.

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With easy access to 'No win no fee' litigation, the customer is far more likely to pursue a claim now than they would have been even a few years ago.

Types of torque wrenches

There are many types of torque wrench available, but whichever choice you make, all mechanical staff should be trained to read and set the tool correctly, use it and of course, maintain it.

With torque settings being supplied for almost all components on the bike, it may no longer be possible to cover the full range with a single tool.

Good quality torque wrenches are available from a number of trade suppliers.

Note: For all torque settings always refer to the manufacturer's specification sheets.