



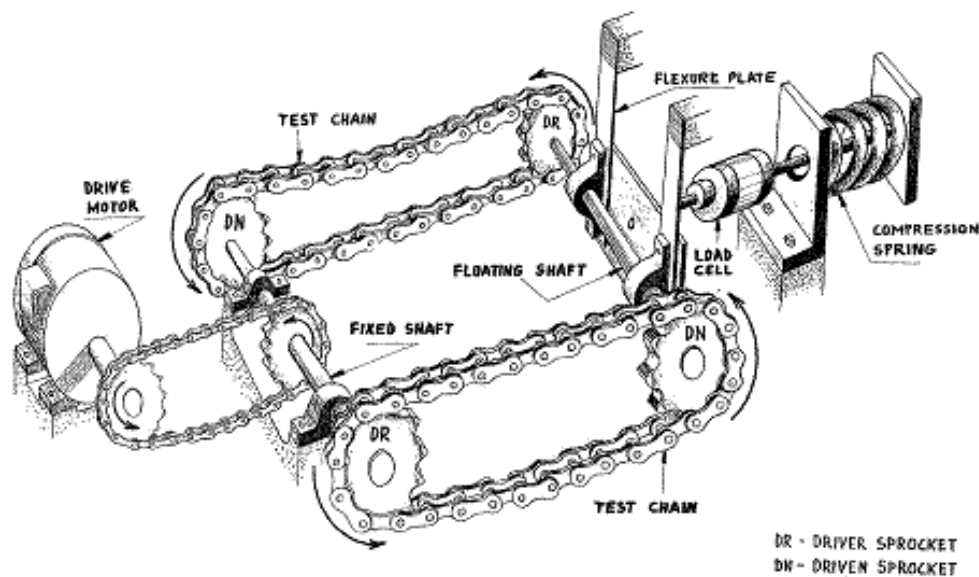
## Technically Speaking

### What is a four-square test?

Four-square testers provide an efficient way to test power transmission products. The general principle is that an even number of components are working against each other with torque being regenerated through a closed loop. This means that a relatively small motor can be used to drive components at relatively high horsepower, because all that has to be provided is enough energy to overcome the friction losses in the test system.

Some of the products that can be tested using the four-square principle include chain, driveshafts, couplings, universal joints, axles, gears, and transmissions.

The drawing below illustrates the concept as it is applied to chain testing.



**FOUR-SQUARE CHAIN TESTER**

There are two shafts. The one that connects to the drive motor is fixed, the other is free to move parallel to the first. Each shaft has a sprocket on each side. The chains are then tensioned, one side on the top and the opposite side on the bottom. A variable speed motor is used to control the RPM. The torque is applied by tensioning a compression spring attached to the moveable shaft. Once the speed and RPM are known, horsepower can be calculated. Because of the configuration, both chains are subjected to the same horsepower. For a wear test, the chains are periodically measured for elongation, an indication of wear. For an operating fatigue test, the chains are periodically inspected for component failure.

For testing transmissions, couplings, and shafts, a full rotation rotary actuator is used

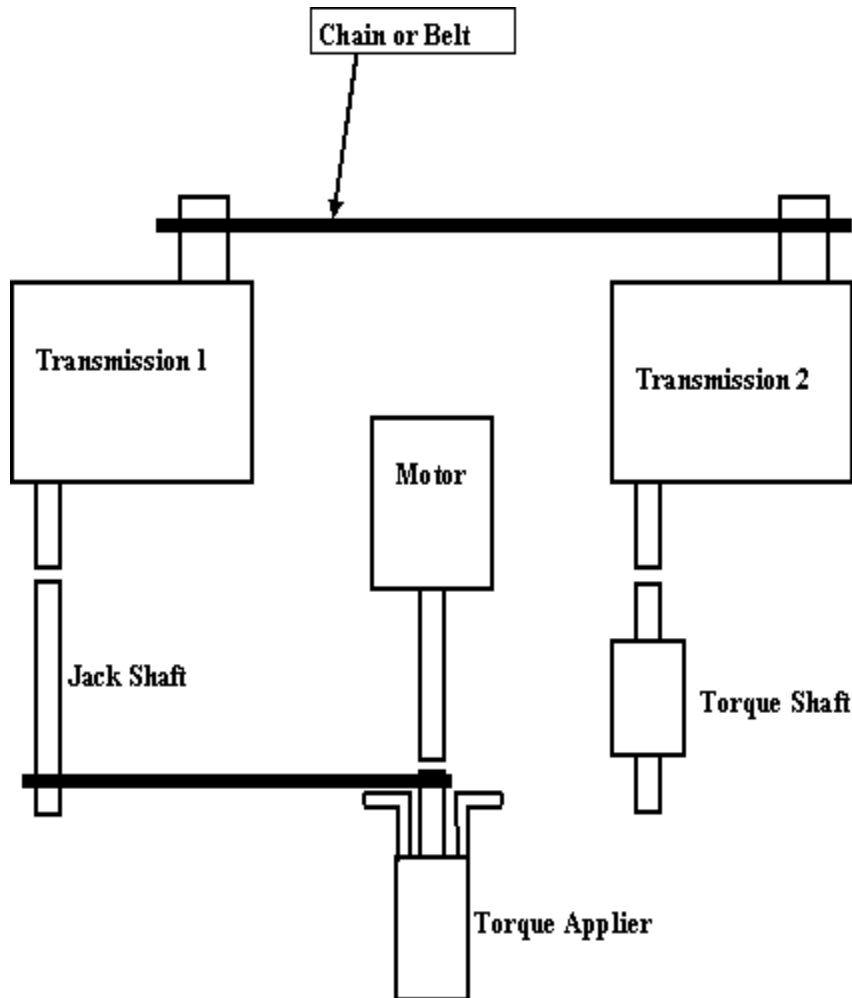
to complete the torque loop.

RTS has a number of different four-square testers, including small medium and large chain testers, and a large tester used for coupling tests. The coupling tester is shown below being used to test Thomas® couplings. The coupling tester can also be used for testing shafts with capacity of up to 2250ft-lb@5400 RPM or 6700 ft-lbs @1800 RPM.



RTS has also developed four-square testers for clients to test recreational vehicle transmissions. The diagram below shows a conceptual drawing of that type of testing.





*Success is the ability to go from failure to failure  
without losing your enthusiasm.*  
-Winston Churchill

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