



# Rolling-Contact Fatigue and Wear Testing

NES advancements in proven test technology offer expanded test opportunities for low-cost, proof-of-concept research.

**Napoleon Engineering Services**

North America's Largest Independent Bearing Inspection & Testing Facility

(877) 870-3200 • [nesbearings.com](http://nesbearings.com) • [sales@nesbearings.com](mailto:sales@nesbearings.com)

### Ball-on-Rod RCF Tester

The NES Three-Ball-on-Rod Tester represents one of the most economical rolling-contact fatigue, proof-of-concept tests available in the industry. Testing is performed to evaluate the influences of heat treatment, material, lubricant, and/or coatings on rolling-contact fatigue life.

The NES tester's advantage lies in containing overall project costs through short run times with an inexpensive rod specimen that can provide multiple failure data points. High stress-cycle accumulation per revolution and stress levels up to 900 ksi (6.2 GPa) provide many options to the test engineer. NES has designed these RCF testers with oil heaters, lubricant flow control, test fixture temperature monitoring, and vibration sensors with a dedicated data acquisition and monitoring system to ensure test integrity.



### Five-Ball Tester

The NES Five-Ball tester captures many of the intricate mechanics of bearing fatigue making it very attractive for simulation of full-scale bearing testing of ball bearings without the full-scale costs.

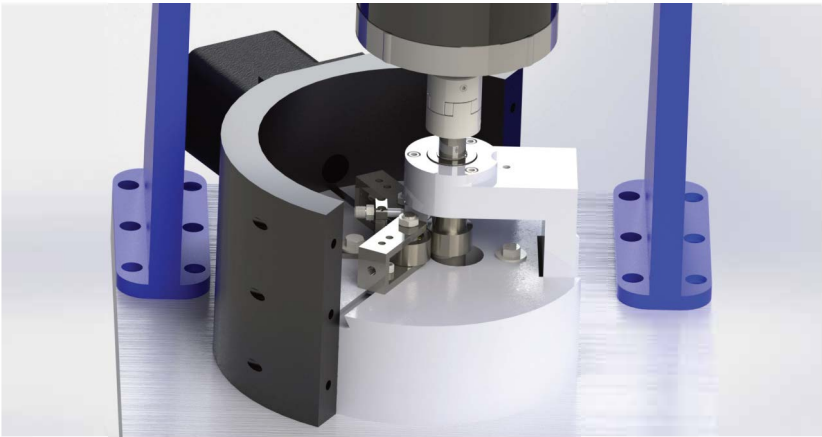


The upper drive ball simulates the inner ring, the cup supporting the lower four balls models the outer ring and the four planetary balls replicate the balls in a bearing. Five-Ball testing can be used to qualify ball manufacturers, verify material lot integrity, investigate lubricant effects on fatigue life, study ceramic ball material and process quality, and determine heat treatment life factors. This modern version of the original NASA tester is designed to run at speeds up to 10,000 rpm and stress levels up to 900 ksi (6.2 GPa) on ball diameters up to 1¼". The NES tester controls lubricant flow, oil temperature, rotational speed, and applied load while monitoring support cup temperature and system vibration for automatic shutdown.

**North America's Largest Independent Bearing  
Inspection and Testing Facility**

### Cylindrical Roller Tester

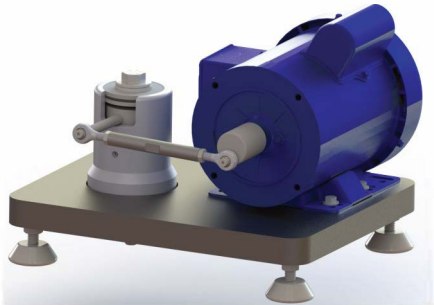
Testing of individual cylindrical rollers outside of a full scale bearing can now be achieved using the NES Cylindrical Roller Tester (CRT). Testing ceramic roller quality or evaluating the influence of crown geometry on roller life can now be done cost-effectively and without the risk of inner or outer ring failure. The NES CRT can accommodate 7mm x 7mm rollers up to 14mm x 14mm making it an ideal test bed for aerospace roller geometry and material research and development. Testing of ceramic rollers to validate material and process integrity at high stress levels can be achieved on the CRT. Stress levels as high as 450 ksi (3.1 GPa) can be achieved with 3 stress cycles per roller rotation resulting in short test times without the need for complete bearing testing and resulting ring failures. The CRT allows for validation of material, surface, form, and process integrity for end users, roller manufacturers, and bearing manufacturers.



### NES Fretting Wear Tester

The NES fretting wear tester is based on ASTM D4170 standard test method for fretting wear protection of lubricating greases. Additionally, the design allows for increased oscillation angles and can be used to validate proof-of-concept wear solutions under aggressive fretting and oscillating conditions.

The NES fretting wear tester is an ideal platform to evaluate the influence that material, dry film lubricant, coatings, plating, cage material, grease, or manufacturing processes have on wear. The machine tests two thrust ball bearings with an axial load applied at oscillation angles up to  $\pm 30^\circ$ . This tester provides test results within twenty-four hours with low cost sample preparation.



**Testing is available in-house at NES or equipment is available for sale or lease.**

## Custom Test Rig Design & Manufacturing

Due to the growing popularity of our bearing testing services, NES has introduced bearing test rig manufacturing, allowing our customers to add an NES bearing test rig to their lab. Rigs are based on standard bearing test conditions or can be built to specific standards. From simple to complex bearing test rig designs, NES will manufacture a rig solution that is right for you.



- » **ISO9001 CERTIFIED QMS**
- » **AS9100 CERTIFIED QMS**
- » **NADCAP CERTIFIED**  
(chemical processing)

## Services Offered

- Endurance testing
- Environmental testing
- Impact/static load testing
- Bearing failure analysis
- First article inspection
- Metallurgical evaluation and testing
- Bearing test rig manufacturing
- Custom bearing manufacturing



## Napoleon Engineering Services

1601 Johnson Street  
Olean, NY 14760

(877) 870-3200 • [nesbearings.com](http://nesbearings.com) • [sales@nesbearings.com](mailto:sales@nesbearings.com)