

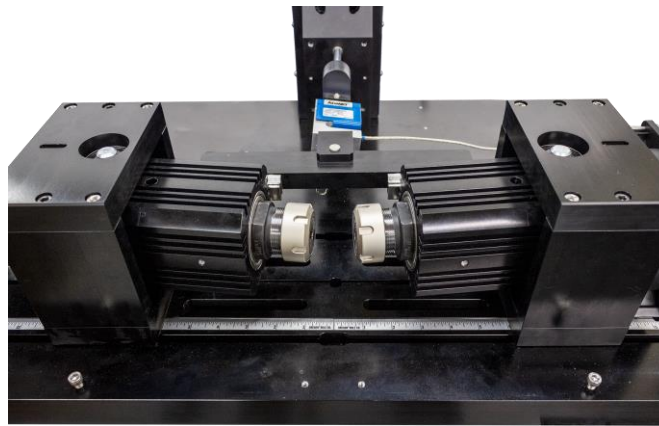
eXpert 9300 Series®

Rotating Beam Fatigue Testing Systems



Faster, More Reliable Fatigue Testing, Competitive Price

The ADMET eXpert 9300 Series Rotating Beam Fatigue Testing System delivers compact, high-frequency fatigue testing using a proven **ISO 1143-compliant** rotating beam method. Designed for evaluating the **endurance limit and fatigue life of metallic materials**, the system applies a pure bending moment through a four-point loading configuration that produces a uniform stress profile along the specimen—resulting in more repeatable fatigue data than single-point cantilever systems. Capable of operating at **speeds up to 6,000 RPM (100 Hz cyclic frequency)**, the eXpert 9300 Series **produces data for complete S–N curves faster than conventional axial fatigue** test methods, helping engineers accelerate durability decisions with confidence.



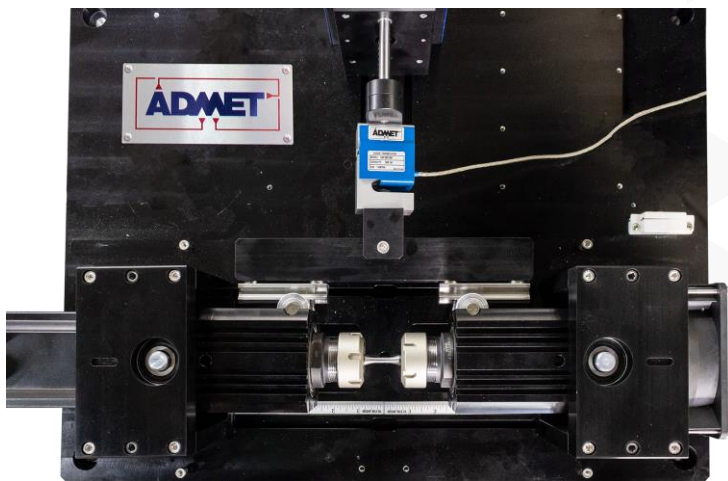
System Highlights

4-Point Pure Bending: Applies a constant moment with a fully reversed, uniform stress along the specimen. This test method delivers consistent data for accurate, reliable S–N curves.

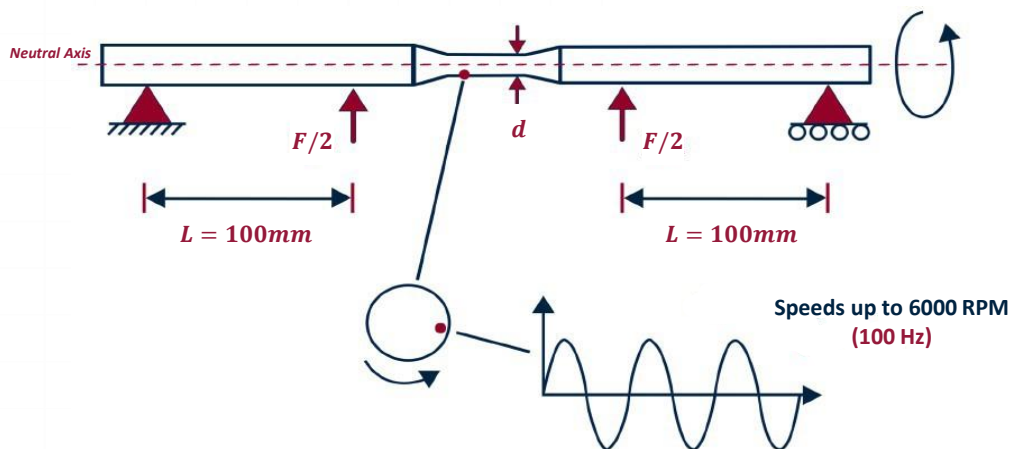
High-Frequency Testing, Faster Results: Operates at rotational speeds up to 6,000 RPM (100 Hz), allowing engineers to accumulate cycles quickly and generate S–N curves fast.

Brushless Motor: for quiet operation, long lifetime, and minimal maintenance requirements compared to brushed motor systems found on most other Rotating Beam Fatigue systems.

Safety Enclosure With Viewports: eXpert 9300 Series features a electrically-interlocked safety enclosure with viewports to ensure that testing remains safe and efficient.



Rotating Beam Bending Fatigue Testing: Principle of Operation



1. Stress Induction via Four-Point Bending

The machine utilizes a four-point loading system to apply a bending moment M to a cylindrical specimen. By applying two equal forces $F/2$ at a distance L from the outer supports, a state of pure bending is created within the central gauge section.

In this configuration, the bending moment is constant between the two inner loading points, calculated as:

$$M = \frac{F}{2} \times L$$

Because the moment is uniform, the maximum normal stress is distributed across the entire length of the reduced diameter d , making the test less sensitive to localized material flaws compared to cantilever loading.

2. Mechanics of Fully Reversed Loading ($R = -1$)

As the motor rotates the specimen at speeds up to 6,000 RPM, any given fiber on the surface of the specimen undergoes a continuous transition between peak tension and peak compression.

- **Top Position:** The material fibers are compressed (negative stress).
- **Bottom Position:** The fibers are stretched (positive stress).
- **Rotation:** One full 360° rotation completes one full sinusoidal stress cycle.

The maximum fiber stress σ at the surface is calculated using the elastic beam formula:

$$\sigma = \frac{32M}{\pi d^3}$$

This results in a fully reversed fatigue cycle where the stress ratio R (the ratio of minimum stress to maximum stress) is exactly -1.

3. Closed-Loop Servo Control

Unlike "dead-weight" systems that rely on gravity and manual calibration, the closed-loop servo actuator uses a feedback loop to maintain a precise displacement or force. This allows the system to:

- **Compensate for Compliance:** As a crack initiates and the specimen's stiffness decreases, the servo-actuator maintains the programmed bending moment to ensure the stress level remains constant until the point of failure.
- **Frequency Stability:** The eXpert 9300 Series maintains a constant 100 Hz cyclic frequency, ensuring that the cyclic bending moment is consistent throughout the duration of testing.

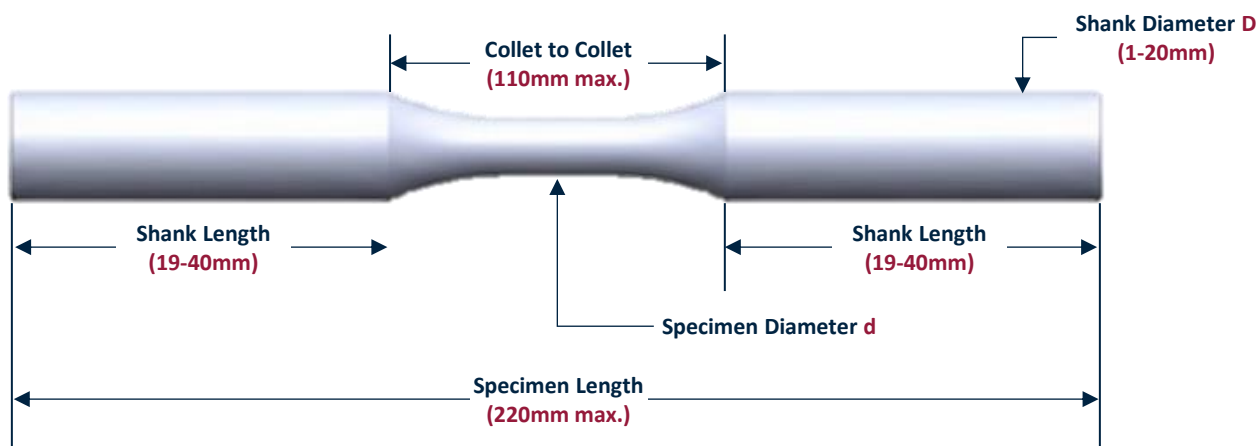
Specimen Specifications for the eXpert 9300 RBF

The **ADMET eXpert 9300 Series** is engineered to accommodate cylindrical, smooth, straight-shank specimens designed in accordance with the **ISO 1143** test specification. To ensure precise mounting and alignment during high-speed rotation, the system utilizes standard **ER32 collets**.

Acceptable Specimen Dimensions

The eXpert 9300 is compatible with a wide range of specimen geometries, featuring the following standard dimensions:

- **Shank Diameter D:** Accepts diameters ranging from **1mm to 20mm**.
- **Shank Length:** Requires a length between **19mm and 40mm** per side.
- **Maximum Total Length:** Can accommodate specimens up to **220mm** in total length.
- **Collet to Collet Separation:** The maximum distance between collets is **110mm**.



Parameter	Specification
Standard Compliance	ISO 1143
Mounting Hardware	ER32 Collets
Shank Diameter D	1mm to 20mm
Shank Length	19mm to 40mm
Maximum Specimen Length	220mm*
Maximum Collet Separation	110mm
Maximum Rotational Speed	6,000 RPM
Maximum Cycle Count	100,000,000 cycles
Standard Electrical Power	220VAC, 1 ϕ
Approximate System Size	44" wide, 36" deep, 10" tall, 150 pounds
Specimen Heating Capability	Up to 600°C <i>with furnace add-on</i>

About the eXpert 9300 Test Controller

The **eXpert 9300 Series** utilizes a high-speed, closed-loop RBF controller designed to simplify the complexities of fatigue testing through a rugged 24-key keypad and a 4-line LCD display. The system architecture enables users to program specimen IDs, diameters, target stresses, and cycle limits up to 100 million cycles. During operation, the controller maintains accuracy by monitoring live bending force and stress, ensuring the servo-actuator applies a constant moment even as material compliance changes. For added safety, the controller automatically senses specimen failure and terminates the test immediately.

Data management is streamlined through a seamless link between the controller and **ADMET's LineLogger** software. Test data is transmitted via Serial/USB to a Windows PC, where the system automatically calculates average stress and stores results—including cycle counts, failure status, and timestamps—to permanent memory. These logged results can be exported directly into common spreadsheet programs, allowing for the rapid aggregation of multiple test runs to construct professional **S-N (stress-life) diagrams**.

Service and Training

ADMET strives to make its materials testing products powerful and easy-to-use. Free technical support is standard with the purchase of any ADMET product. We also offer an array of services to help you use your ADMET system to its fullest potential.

Available Services

- ✓ On-site installation and training.
- ✓ Custom analysis and report generation.
- ✓ Creation of, or connectivity to, your in-house database program.
- ✓ Online training with WebEx.
- ✓ On-Site ISO/IEC 17025:2017 Calibration Services.
- ✓ Preventative Maintenance Planning.
- ✓ Install, Operational Qualification (IQ/OQ) Documentation.

ISO/IEC 17025:2017 On-Site Calibration Services

ADMET provides a full range of calibration and maintenance services designed to fit your needs and budget. Our in-house calibration and service team has deep, hands-on knowledge of ADMET systems and is equipped to support you in any situation. Customers who require accredited calibrations in their laboratories or production facilities can establish calibration contracts with ADMET, ensuring automatic service at customer-defined calibration intervals. Proven maintenance programs help minimize downtime on production testing equipment, and each contract can be customized to match your specific equipment and operational requirements.

As a matter of course, we provide all calibration passwords to you at the time of your instrument or machine purchase. This enables you to choose who performs calibration and maintenance on your systems.

ASTM Calibration Standards offered:

- ASTM E4 – Tension/Compression Force Verification
- ASTM E2309 – Crosshead Displacement Verification
- ASTM E2658 – Crosshead Speed Calibration
- ASTM E83 – Extensometer Verification and Classification
- ASTM E2624 – Torque Calibration



Submit An Inquiry At:
calibration@admet.com

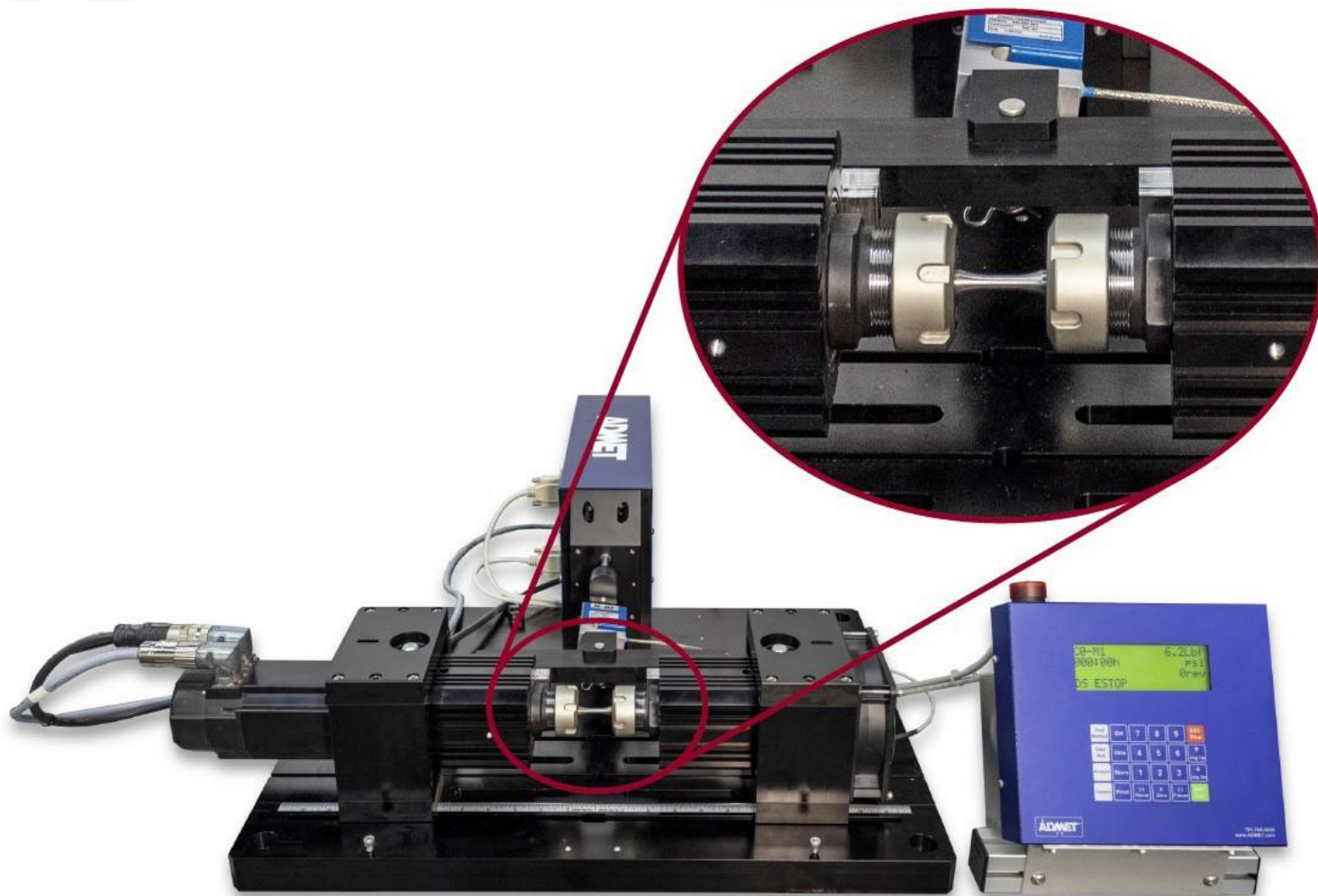


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Rotating Beam Fatigue Testing Systems

ADMET
Materials Testing Systems

High Fidelity Fatigue Data with Best-In-Class Efficiency



All ADMET systems and software are designed, engineered, and manufactured in the United States.

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Test with Certainty.

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