



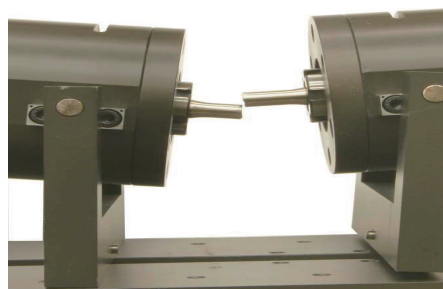
## Model RRM : Rotating Beam Fatigue Testing System



Advance Instrument Inc. (AI), recognized as a pioneer in the field of material testing instrumentation and system developer and manufacturer in Taiwan, has been serving industry faithfully for more than two decades. Over that time, AI has demonstrated an unsurpassed quality of machine design and performance. Today, the use of the aluminum alloys as machine frame and heavy-duty bearing housings are key components making a system built to last for many years of usage.

### Applications:

- Fatigue Test
- Fatigue Limit Test
- Fatigue Fracture Test
- Endurance Limit Test
- Machine Test and Laboratory
- Perform Testing ISO 1143 and ASTM F1160
- Test the Properties of Surface Treatments or Coatings



### Description:

#### • Theory of Operation

Advance Instrument's rotating beam fatigue testing system (RRM) design is based on the rotating beam principle. The specimen functions as a simple beam symmetrically loaded at two points. When rotated one half revolution, the stresses in the fibers originally below the neutral axis are reversed from tension to compression and vice versa. Upon completing the revolution, the stresses are again reversed so that during one revolution the test specimen passes through a complete cycle of flexural stress (tension and compression).

#### • Specimen Loading

The AI RRM can be equipped to test simple straight shank specimens. The standard specimen length is 78mm. The specimen shape can be rod or tube. Specimens approximately 25mm (1 in) longer or 25mm (1 in) shorter can be used without affecting the calibration of the machine. Straight shank specimens are held in place using precision specimen collets. Stress is applied to the specimen by direct application of deadweights to ensure precise loading. Maximum fiber stress in a specimen having a 4.3 mm diameter is 3200 MPa. While minimum fiber stress in a specimen having a 11 mm diameter is 20 MPa. The system is equipped with a 7" LCD controller that provides easy-to-use in determination of the load weights needed to produce a particular stress at a simple calculation.

#### • Load Frame Features

The standard machine operates at an adjustable integrated variable servo speed of 10 RPM to 6,000 RPM. Speed control is important in testing certain alloys that heat up when highly stressed, and it also allows certain correlations of results between high-speed tests and previous lower speed tests. If speed stability is at  $\pm 0.2\%$  of set point assuming a constant line voltage. At the nominal rate of 6,000 RPM, the machine can complete 360,000 cycles per hour; 8,640,000 cycles per day.

#### • 7" LCD HMI Controller

An easy-to-read digital cycle counter with pickup device provides an accurate display of completed cycles in display increments of one cycle per count up to 99,999,999 counts. Control buttons are provided to reset the display count at the start of a test. The display is equipped with a memory back up so that count data is not lost in the event of a power loss. Setting the test stress, specimen diameter and type (Rod / Tube) on controller, will automatically calculate out how many load weights is needed. The test can be unlimited cycle or limited cycle, and it can also show how long the test duration have passed.

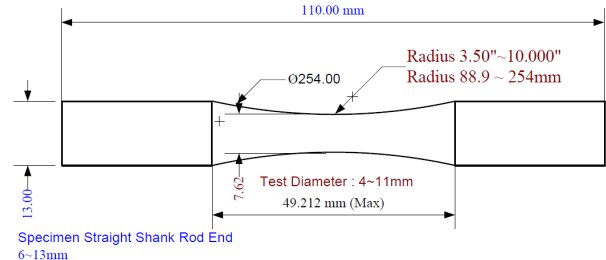


## Model RRM : Rotating Beam Fatigue Testing System

### Specification:

- Model : RRM
  - Rotational Speed: 10 to 6,000 RPM
  - Speed Regulation Accuracy:  $\pm 0.1\%$
  - Test Bending Stress Range: 20 ~ 3,200 MPa
  - Recommended Specimen Diameter: 4.3 ~ 11.0 mm
  - Specimen Shape: Straight Shank Rod or Tube
  - Bending Moment Capacity: 25 kg-cm ~ 250 kg-cm
  - Capacity Increments: 0.25 kg-cm
- Notes:
  1. Includes open-end wrench and Allen wrenches for machine operation
  2. Of yoke and weight pan
  3. Inclusive of one set each C8 (8mm) and C13 (13mm) collets
  4. Standard Power Requirement: 220Vac, 2kva
  5. Approximate System Weights: 76kgs
  6. Approximate Shipping Dimensions and Weights: 990 x 540 x 350mm / 168kgs and includes leveling feet with vibration isolators.
- Optional Accessories:
  - RRM-W Standard load weight set
  - RRM-T1 Power source. 100~125 Volts, 50/60 Hz.
  - RRM-CAA Complete Eight sets of two precision collets (6 to 13 mm diameter) for use on straight shank specimens
  - RRM-Cxx : Specific dimension set of two pieces precision collets
  - RRM-FUR. Furnace system for use on RRM.
- Optional RRM-W Standard Load Weight Sets Include :
 

▪ 10kg x4 pieces	▪ 5kg x1 piece
▪ 2kg x2 pieces	▪ 1kg x1 piece
▪ 0.5kg x2 pieces	▪ 0.2kg x2 pieces
▪ 0.1kg x1 piece	▪ 0.05kg x1 piece



Test Diameter	Test Stress MPa
4.0mm	310~4000 MPa
4.5mm	220~2800 MPa
5.0mm	170~2000 MPa
5.5mm	120~1500 MPa
6.0mm	90 ~1150MPa
6.5mm	75 ~900MPa
7.0mm	60 ~750MPa
7.5mm	50 ~600MPa
8.0mm	40 ~490MPa



How-to-Order : RRM - B1 - CAA - FUR

Model

B1 : 100~125 Volts, 50/60 Hz  
B2 : 220 Vac, 2kva (Standard)

Option : High temperature furnace

CAA : Complete 8 sets of precision collets from 6 to 13mm  
Collets reference for additional order:

C6 : 6mm	C7 : 7mm	C8 : 8mm	C9 : 9mm
C10 : 10mm	C11 : 11mm	C12 : 12mm	C13 : 13mm



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Rotating Beam Fatigue Testing System

## 1

D

C

B

C

## A



Nelson\_Vx1

# RBF Test - SUS304

RRM :SUS304 RBF Test

Normal Range:10k~1,000,000 k Times (Turns)

Specimen: Dia. 4mm			D	Speed	Times (Turns)	Times Divation	Stress
Date	Number	Material	mm	RPM	(k)	Max/Min	MPa
2018.05.04	#11	SUS304	4	5000	43	1.209302326	447.561
2018.05.04	#12	SUS304	4	5000	47		447.561
2018.05.04	#13	SUS304	4	5000	49	Average	447.561
2018.05.04	#14	SUS304	4	5000	52	47.75	447.561
2018.04.30	#2	SUS304	4	5000	141	Max/Min	428.065
2018.04.30	#3	SUS304	4	5000	152	1.153284672	428.065
2018.04.30	#4	SUS304	4	5000	137	Average	428.065
2018.04.30	#5	SUS304	4	5000	158	147	428.065
2018.04.30	#6	SUS304	4	5000	413	Max/Min	389.072
2018.05.02	#7	SUS304	4	5000	384	1.183381089	389.072
2018.05.02	#8	SUS304	4	5000	349		389.072
2018.05.02	#9	SUS304	4	5000	397	Average	389.072
2018.05.03	#10	SUS304	4	5000	420	385.75	389.072
2018.05.04	#15	SUS304	4	5000	878	Max/Min	373.475
2018.06.08	#16	SUS304	4	5000	723	1.318118949	373.475
2018.06.11	#17	SUS304	4	5000	953	Average	373.475
2018.06.12	#18	SUS304	4	5000	910	866	373.475

RRM Rotating Beam Fatigue Test : SUS304

