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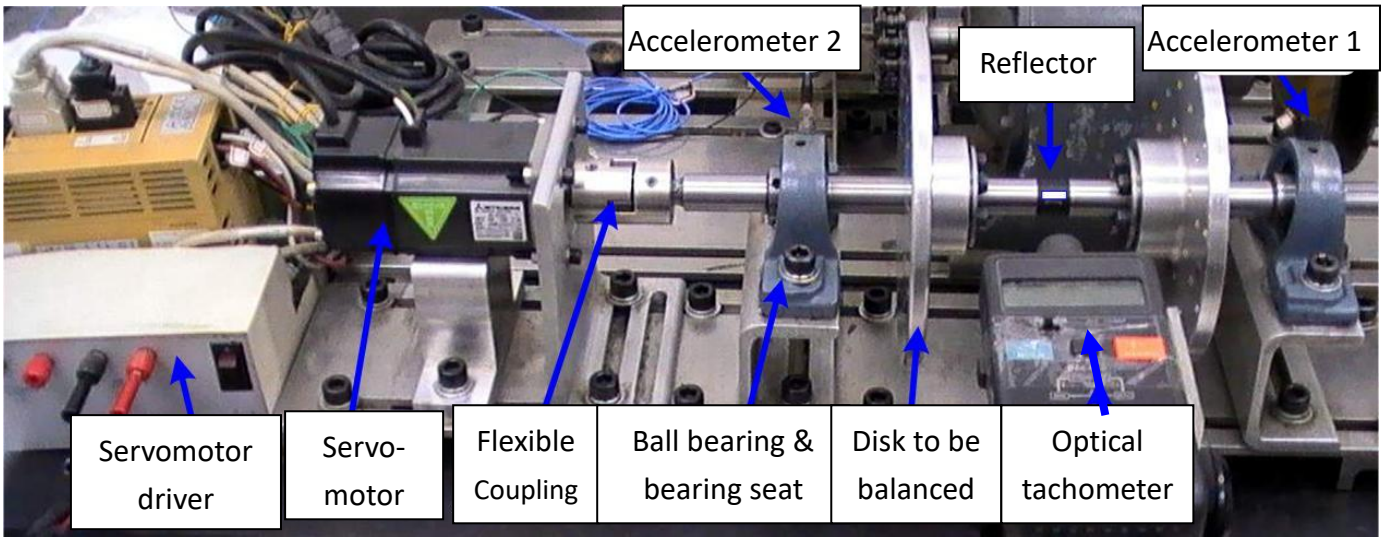
Ball Bearing Data Sets from Two-Disk Balancing Bench



Two-Disk Balancing Bench

Bearing model: UCP-204 block bearing
Inner diameter: 20 mm
Outer diameter: 47 mm
Pitch diameter: 33.5 mm
Ball diameter: 7.8 mm
# of balls：8

(a)UCP-204 block bearing

(b)P204 bearing housing

(c)UC 204 bearing

In experiments, we collected vibration data with varied bearing faults from a two-disk balancing bench whose operation modes kept fixed speed on 1500, 1800 or 2100 rpm, or sped up from stationary to 3000 rpm. In the test bench , two accelerometers were mounted on the right and left bearing seats, respectively, to collect radial vibration during operation. A healthy bearing was always mounted on the left (near the servomotor), and defective bearings with varied faults were mounted on the right; Further, the defective bearings were fabricated through using electro-discharge machining.

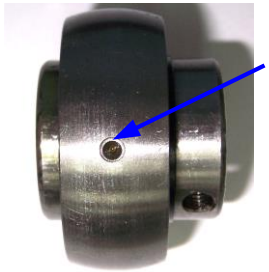
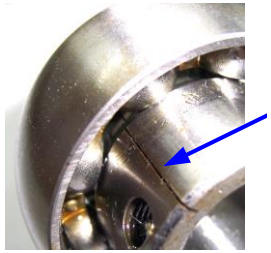
Experimental conditions and data acquisition parameters:

1. Servomotor revolution speed: data captured during a speed-up mode from stationary to 3000 rpm, or on a fixed speed of 1500, 1800, 2100 rpm, where 3 data sets were measured for each operation mode.
2. Motor and shaft speed ratio: 1
3. Sample frequency: 20,480 Hz
4. Data length: 12 s (speed-up mode), 2 s (constant speed modes)
5. (power supply) Gain to acquired acceleration: 40 dB
6. Low-pass filter cutoff frequency: 10,000 Hz
7. Type of bearing faults: **(a) healthy bearing, (b) single fault bearing**, **(c) dual fault bearing** and **(d) triple fault bearing**. One can refer Table 1.1 and 1.2 for bearing specification, bearing fault description and their photos.

Table1.1 Bearing's datasheet

Asahi UCP-204			
pitch diameter (mm)	33.5	ball diameter (mm)	7.8
numbers of balls	8	Contact angle	0°

Table 1.2 Bearing fault description

Types of bearing fault	Fault picture	Bearing fault description	Folder
(a) healthy bearing		● Healthy bearing	2010_0513_normal
(b) single fault bearing	 Outer race defect	● Outer Race: ∅ 1 mm hole	2010_0517_outer race
	 inner race defect	● Inner Race: width 0.2 mm and depth 1 mm gap defect	2010_0528_inner race

(c) dual fault bearing		● Outer race : ∅ 1 mm hole ● Inner race : width 0.2 mm and depth 1 mm gap defect	2010_0606_C4_I-O
(d) triple fault bearing		● Balls: ∅ 1 mm hole ● Cage: ∅ 1 mm hole ● Inner race: width 0.2 mm and depth 1 mm gap defect	2010_0817_C6_I-C-B

* Bearing faults were all fabricated by electro-discharge machining.

References: (The above data sets were employed in the following study.)

1. W.-Ch. Tsao, Y.-F. Li, D.D. Le and M.-Ch. Pan, 2012, “An Insight Concept to Select Appropriate IMFs Proceeded with Envelope Analysis for Bearing Fault Diagnosis,” Measurement, Vol.45, Issue 6, pp.1489-1498.
2. M.-Ch. Pan and W.-Ch. Tsao, 2013, “Using Appropriate IMFs for Envelope Analysis in Multiple Fault Diagnosis of Ball Bearings,” International Journal of Mechanical Sciences, Vol. 69, pp.114–124.