



LEI & SO Co., Ltd.



Ball Bar Box
Planar contour measurement

Ball Bar Box

Introduction

The Ball Bar Box (BBB) is a 2D contour measuring system using two optical scale ball bars. After installing two ball bars on the table of a machine tool, the CNC controller drives the table to move relative to the tool on a 2D plane according to a NC test program. The BBB system measures the lengths of the two ball bars and computes the actual positions of the tool. After the measurement, the dynamic motion errors of the machine tool can be obtained by comparing the actual contour and the ideal testing paths.

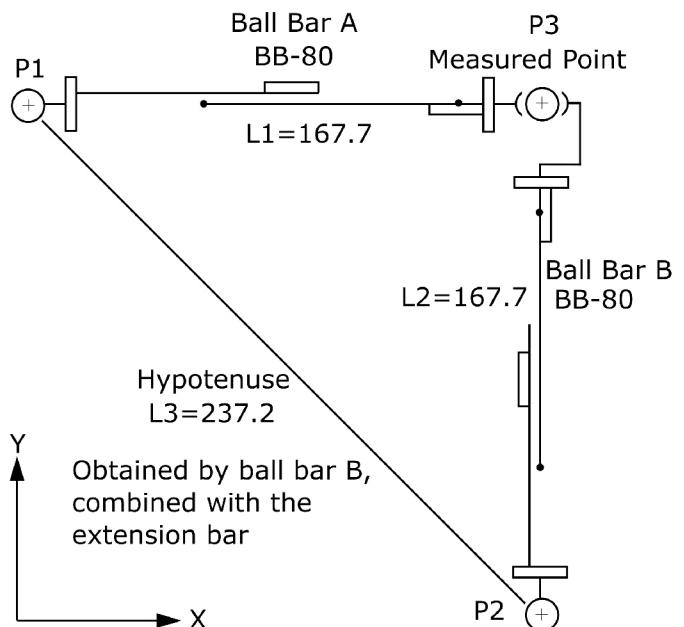
System Description

Measuring the motion of small circle with the trilateration method.

- Fix the center rod on the main spindle.
- The ball at the end of the center rod will be the measured point, noted as P3.
- Before starting the measurement, measure the hypotenuse defined by P1 and P2, noted as L3.
- Install two ball bars on work table

which are parallel to X- and Y-axis, respectively.

- During the measurement, lengths of the two ball bars, L1 and L2, are recorded by the BBB measurement system.
- Obtain the actual position of the point P3 by using the trilateration method.
- Analysis the measured data to obtain the real contour.
- The center of the small circle can be fitted out and the radial errors can also be obtained.





Product Model & Specification

Ball Bar Specification

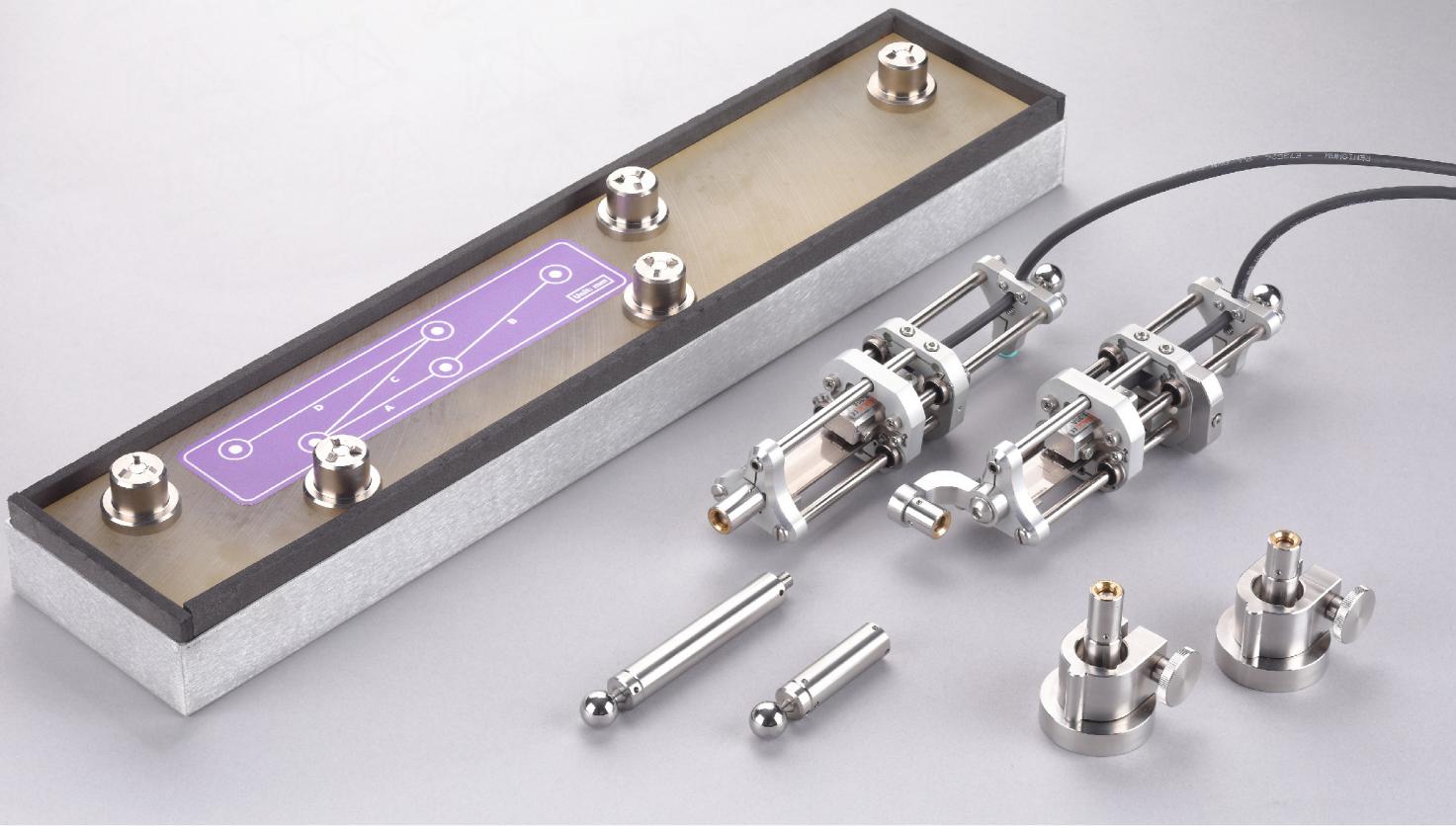
LEI & SO Ball Bar List						
Type	Scale Length (mm)	Minimum Length (mm)	Maximum Length (mm)	Stroke (mm)	Scale Resolution (μm)	Scale Accuracy (μm)
BB-080	80	150	180	30	0.05	1
BB-130	130	200	280	80	0.05	1
BB-180	180	250	380	130	0.05	1
BB-230	230	300	480	180	0.05	1
BB-280	280	350	580	230	0.05	1

BBB-080 System Specification

Workspace	Ball Bar Minimum Length	150 mm
	Ball Bar Maximum Length	185 mm
	Diameter of Measured Circle	0.1~25 mm
Dimension of Measurement		2D
Accuracy	Linear Positioning	$\pm 2 \mu\text{m}$
Sampling Frequency		1 kHz
Operating Temperature		0°C-40°C
Scale Maximum Speed		100 mm/s
Scale Resolution		50 nm
Computer Interface	USB 2.0 or above	
Operating System	Windows7 or above NET 4.0 Client is required	
Power Supply	100~240V VAC	

BBB-080 Hardware

Item	Quantity	Remarks
Ball Bar A	1	BB-080
Ball Bar B	1	BB-080
Calibration Board	1	Dimensions: 426 x 80 x 15 (mm) Thermal Expansion < 0.1 ppm Calibration Lengths: 150, 166, 186, 235 (mm)
Signal Box	1	Dimensions: 365 x 300 x 75 (mm) Input Frequency : 10 MHz
Center Rod	1	
Extension Rod	1	
Short Ball Socket	2	
Long Ball Socket	3	
Fixable Pivot Assembly	2	
L-Shaped Block	1	
Counterweighting Block	2	
Precision Ball	2	Sphericity < 0.1 μm



About LEI&SO

Lei & So Co., Ltd. is an innovation driving company. We deliver highly reliable, accurate optical scale ball bars and measurement devices based on it, such as 6D motion measurement device (MMD) and 2D ball bar box (BBB).

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