

# Horizontal roundness measuring machine for long shaft

Mitaka Seiko Co.,Ltd.\*<sup>i</sup>

## 1. Product summary

This machine is a horizontal type of roundness measuring machine that can measure roundness on any position of a long shaft. As shown as Fig.1, this machine is arranged a key part of air bearing on horizontally, and open a through hole on the air bearing. A long shaft is put on this through hole, and fixed by a work chuck on opposite side of the air bearing. This work chuck is mounted on a YZ-table and this table is adjusted for centering of the work. Displacement sensors are attached on air bearing side, and measure roundness by rotating around the shaft. Instead a table rotates on typical roundness measuring machine, a sensor side rotates on this horizontal type. To prepare support tables on both side, this machine can measure any positions of roundness up to 10m of shaft. (Photo 1)

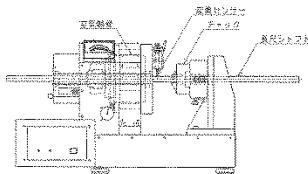


Fig. 1



Photo 1

## 2. Background for development

Mitaka Seiko has experiences to produce a special type of roundness measuring machine opening a through hole on air bearing parts on ordinal table rotate type of roundness measuring machine for measuring roundness of a short shaft such as for printers (Fig 2). However, this type of machine cannot measure roundness of long shaft such as the length of 2m because whirling is occurred if the shaft is fixed vertically on the turn table (static pressure of air bearing part) as Fig. 3. Also, the limit of a column height will prevent for sensing on particular position of the shaft. Usually, polished steel bars makers are used to cut a quality product of shaft and measure roundness with typical table rotate type of roundness measuring machine. There are some problems for this method such as extra cutting process needs to be added, disposing of a product after cutting, very difficult to measure for customer deliver products, and so on. Mitaka Seiko develop, manufacture and sell new types of product to solve these problems to fit the needs of polished steel makers such as measuring roundness without cutting a shaft. If inferior products are found by measuring, it can easily adjust with polishing as smaller size of shaft, which is very efficient for recycling.

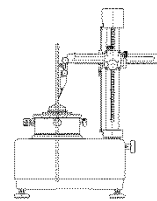


Fig. 2

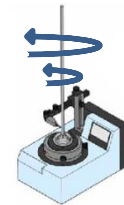


Fig. 3

## 3. Technical approach

### 1) Development of large diameter of static pressure air bearing

To measure large diameter long shaft, the through hole on static pressure air bearing is also large. It may cause the diameter of air bearing itself should be large, difficult to produce the machine and finally the price for the machine become higher. To avoid rising costs for the roundness measure machine, Mitaka Seiko has developed the static pressure air bearing that the bearing has been kept almost the same diameter, rigidity and rotational accuracy of typical machine.

### 2) keep the position difference of displacement sensor (differential transformer) and measurement accuracy

The sensor of this machine is rotating 360 degrees as Fig.4 because of sensor rotating type of roundness measuring machine. Therefore, the gravity may have a bad influence on the accuracy of measuring result. This machine is made to minimize the measurement error to adjust spring pressure and ratting of probe.

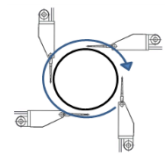


Fig. 4

### 3) Transmission of sensor rotating signal (analog) to fixed part of a unit without noise

Slip rings are effective parts to transmit signals for small diameter machine, but slip ring is expensive part if use for large diameter machine. For this machine, Mitaka Seiko has developed circuit board with several ICs which A/D converter is on rotating (sensor) side and transmitting each measuring digital data to fixed side by wireless.

## 4. Sales performance

This type of machines is used in the factories of famous polished steel makers all over the world. Only Mitaka Seiko produce a horizontal roundness measuring machine.

## 5. Conclusion

According to "small and medium - sized business improvement law", reduce of working process, waste, and environmental burden is needed for makers. This machine is one of the best product to comply the law. Mitaka Seiko will keep developing products that fit to the customer needs and support environment - friendly society.

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