

Section2	3.50	3.66	3.78	3.97
Section3	2.90	3.36	3.58	3.49
Section4	3.15	3.65	3.36	3.77
Section5	3.25	3.35	3.72	3.46
Section6	3.85	3.88	4.09	4.36
Section7	3.20	3.56	3.45	4.06

There may be some reasons for these errors' generating:

- (1) Every turn nonrecurring random rotary error has a great influence.
- (2) The transmission bands of the filter of TALYROND262 is 1 ~ 15 μ m and it is 1 ~ 50 μ m in our experiments. Maybe it is the reason for the difference between the real results and the measuring ones.
- (3) There is remnants radial rotary error in the results of error separation that is caused by the radial motion error of the shafting. The generating of the error in the experiment is caused by the above remnants error. Theoretically, the value of eccentricity of the separated roundness error function is zero. Actually, the value of eccentricity is numerously more than 0.02 μ m. The larger one can reach 0.1 ~ 0.25 μ m.
- (4) The measuring device has the adjustment error.

As a whole, the measuring results of roundness error tally well with the calibrated value.

IV. CONCLUSIONS

Simulation results show that when doing the micro-roughness fitting data, single-probe two-step error separation method take three times measurement to get the gyration error of fitted values is the same . That means when the measurement system's Gyration accuracy is very high, it's separation effect is very satisfying. It also can be concluded that the Single-probe two-step measurement method of roundness error separation technique can play a ideal separation effect on lathe spindle's bearing roller wear and thermal deformation etc system error.

When we add random errors to fitted value of three times measurement of gyration error, that means when rotary errors take different values, the outline of the roundness error is still kept consistent with the trends of the given error curve. Single-probe two-step method can not separate the random error off, but we can use the method of repeatedly measuring and taking average to decrease or basically eliminate random errors.

Several contrastive experiments of the on-line measurement are carried out in a grinding machine (MB1332A). The workpieces used in the experiments is measured by TALYROND 262 geometrical error measurement instrument. The results of these experiments successfully verify that the theory and mathematical models are correct. The contrast of the measuring results in these experiments proves that the Single-probe two-step method can realize the complete separation of all kinds of errors basically and this method is applicable to on-line measurement of a workpiece and it can also make the measurement accuracy very high.

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