GUZIK PRODUCT BULLETIN

Advanced Optical Scales Interpolation for Guzik Spinstand S1701B

More Than Five Times Improved Linear Scales Accuracy

Better Test Results Repeatability between Spinstands

Up to Three Times Better Repeatability of W/R Offset Measurements

Guzik Technical Enterprises developed a new **Advanced Interpolation Algorithm** for optical linear scales. This algorithm measures the repeatable component of the optical scale position error and compensates for this component. The interpolation effectively linearizes the scale position feedback. The linear, non-distorted position readings from the optical scales are extremely important in the precise head geometry measurements including W/R Offset, Write Width, and Read Width tests.

The plot on Figure 1 shows how the W/R Offset changes when the track write location moves across the optical scale within three scale periods. X-axis shows track offsets from an initial location, Y-axis shows W/R offset variation (µInch). The repeatable components of the scale distortion are clearly visible. Due to the scale errors, the total variation of the W/R Offset measurement is ±0.6 µInch. The Figure 2 represents the results of the same W/R Offset measurements but with the new scales interpolation. The repeatable component is suppressed, and the maximum error is less than ±0.2 µInch.

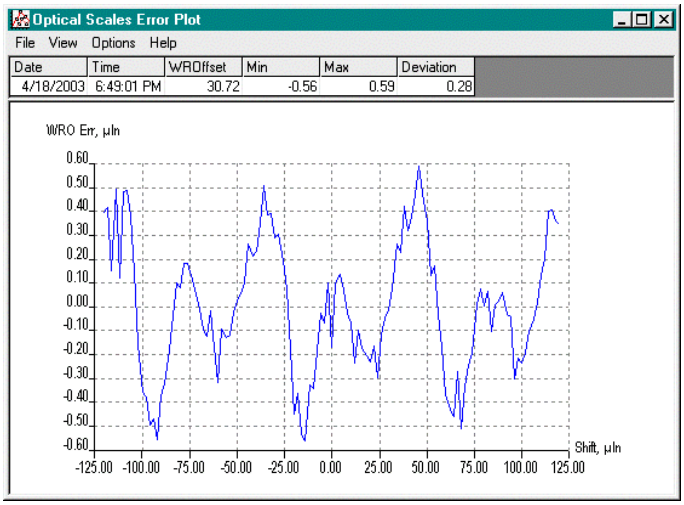

Figure 1: W/R Offset Variation Measured with the Original Scales Interpolation

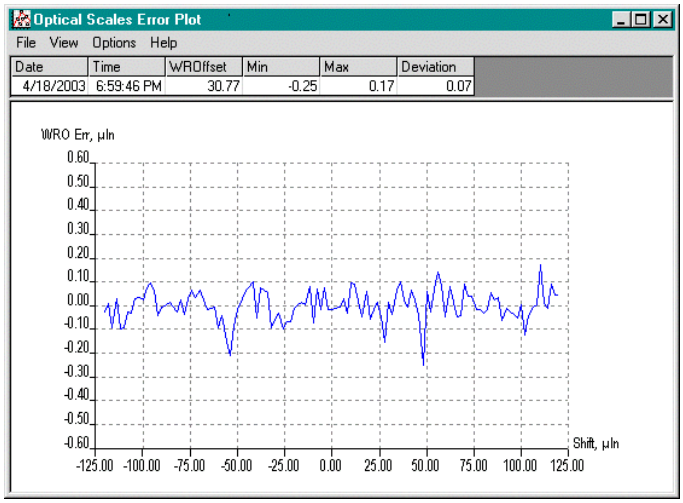

Figure 2: W/R Offset Variation Measured with the Advanced Scales Interpolation

The magnitude of the periodic error of the optical scales can be as big as ±1% of the scale period. The scales used on S1701B spinstand have period of 80 µInch, which means that maximum error can be as big as ±0.8 µInch. The **Figure 3** shows the typical error of ±0.25 µInch measured on S1701B spinstand.

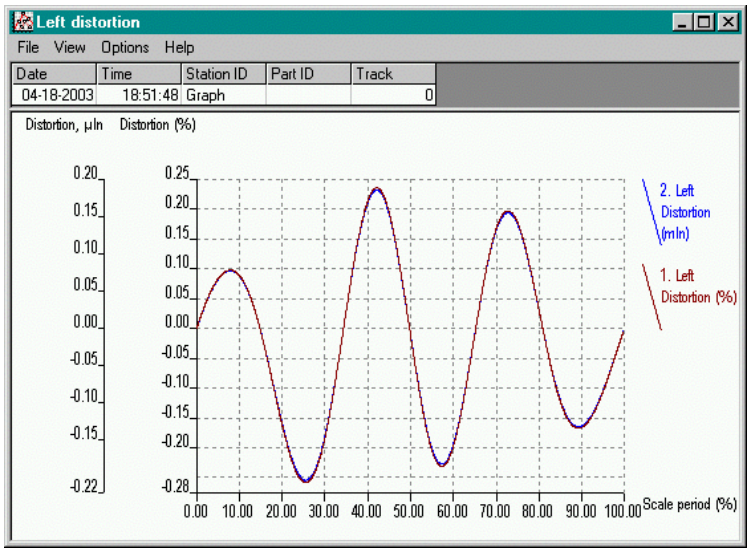

Figure 3: Periodic Distortion of Optical Scale Position Readings

The position reading inaccuracy causes the error in the head micro-positioning, which leads to distortion of the track profile measurement. This in turn reduces the absolute accuracy of the W/R Offset, Write Width, and Read Width, and causes poor result correlation on different spinstands. Moreover, track profiles built on two tracks written with some small position shift (i.e. in the different scale period phase) will have dissimilar distortions, producing the different head geometry measurement results. The effect can be observed in the following situations:

- The spinstand performs a reset operation. The operation changes the scale period phase of the reset position. This, in turn, leads to the different scale period phase on the tested track. So, the two track profile measurements performed on the same track before and after the spinstand reset vary.
- The same head has been tested on different spinstands. It is impossible to find two optical scales with the same position distortion. This results in dissimilar track profiles distortions for different spinstands, so the head geometry measurement results diverge.

The Advanced Optical Scales Interpolation is distributed as a WITE32 external module called *Scale Correction* test. The test is available for Guzik S1701B spinstands starting from WITE32 Version 2.70.

The *Scale Correction* test requires a license based on the RWA and Spinstand serial numbers. To obtain the license, call the Guzik Technical Enterprises sales department.

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