GUZIK Test System
2004 – 2006

Throughput and Accuracy Improvements

In the past few years Guzik Technical Enterprises introduced several major improvements to the test system accuracy, repeatability, and the test time. Some of the improvements come as an optional purchase hardware components or software packages, some are included into basic configuration of the test system, when you purchase the system of the latest revision. This article summarizes the important milestones of Guzik system improvements, based on the configuration that includes RWA-2000 series and V2002 Spinstand.

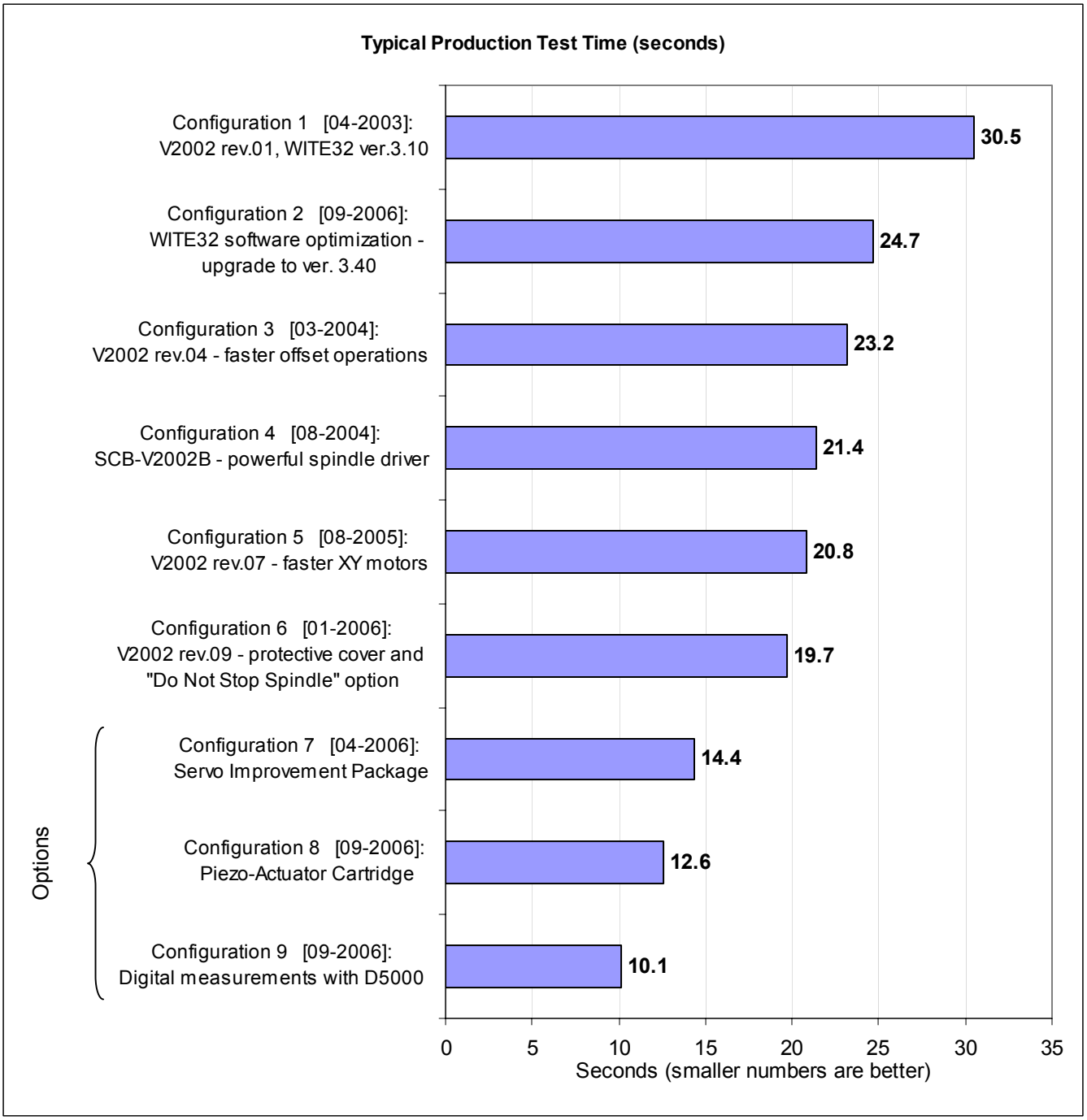
The test system performance was evaluated using the typical production sequence, which was performed in the Production Mode (WITE32 Operator Panel). The test time includes the spinstand start time, the production sequence execution, up to the moment WITE32 produces the pass/fail result for the head under test.

The following is the production test summary:

Rotational speed:	7200 RPM
Number of zones/setups:	1 (ID)
Tests sequence:	• Servo Erase • Write Servo • Band Erase • W/R Offset • SNR with Crest Factor • PWN Asymmetry • Parametric • Spectral Integral SNR • Triple Track

The chart below summarizes the improvements in the order of adding new features. Each subsequent timing includes improvement achieved by the specified feature, and all previous features.

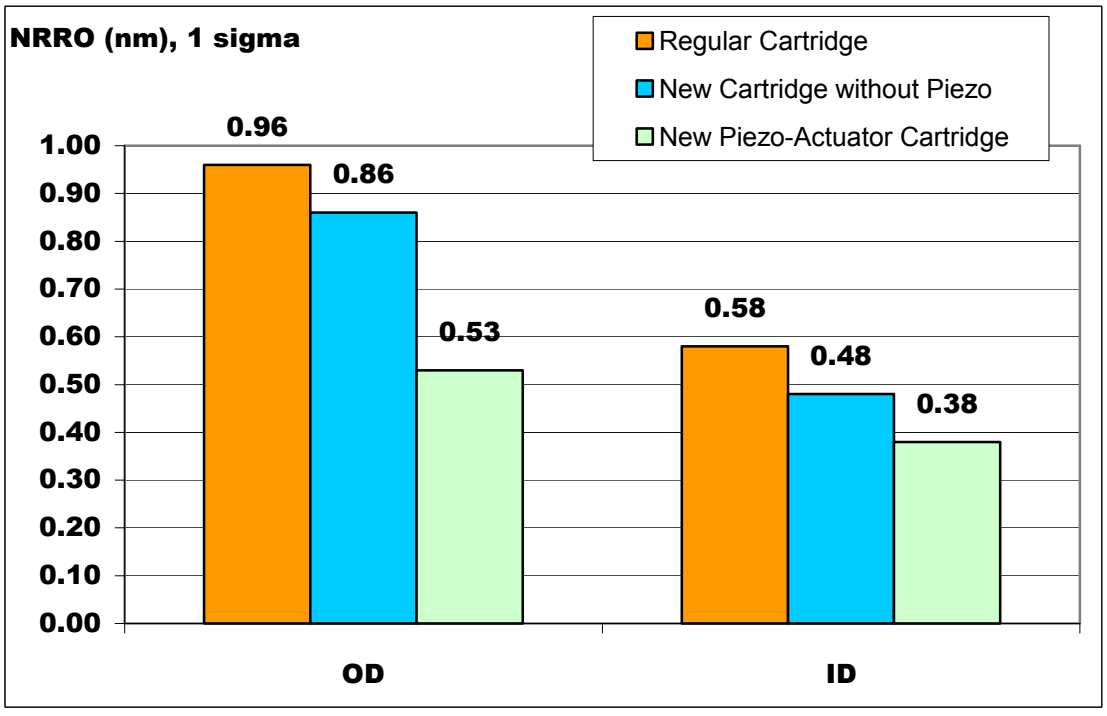
For example, the 12.6 sec test time in the Configuration 8 is based the on configuration with Piezo-Actuator Cartridge, Servo Improvement Package, the latest V2002 Spinstand revision, and the latest WITE32 software version.



Note: Test time includes spinstand start/stop time

Servo Improvement Package – Better Accuracy

Piezo-Actuator Cartridge – Non-Repeatable Run-Out Improvement



The tables below explain each configuration / optional feature.

Configuration 1: V2002 Spinstand rev.01 and WITE32 ver.3.10

This is a “reference” configuration, with the original V2002 Spinstand revision 01, and WITE32 ver.3.10.

Product Introduction Date	04-2003
Hardware Configuration	RWA-2000 series V2002 Spinstand rev.01 SCB-V2002
Software Version	WITE32 ver.3.10

Configuration 2: V2002 Spinstand rev.01 and WITE32 ver.3.40

The same hardware as in Configuration 1 above, except the software was upgraded to WITE32 version 3.40. During WITE32 development, the software algorithms were optimized for better throughput.

Main Improvement	WITE32 software algorithms optimization
Product Introduction Date	01-2007
Hardware Configuration	RWA-2000 series V2002 Spinstand rev.01 SCB-V2002
Software Version	WITE32 ver.3.40

Configuration 3: V2002 Spinstand rev.04

Starting with rev.04, the V2002 Spinstand performs positioning offset operations faster.

Main Improvement	Fast offset operations
Product Introduction Date	03-2004
Minimum Hardware Requirements	V2002 Spinstand rev.04 SCB-V2002 with Servo Controller 3+
Software Version	WITE32 ver.3.40 (min.3.10 required)

Configuration 4: Spinstand Control Box SCB-V2002B

Spinstand Control Box SCB-V2002B has a more powerful spindle driver, which allows to accelerate / decelerate spindle faster. This improves spinstand start/stop time, and also changing RPM from loading to nominal, and from nominal to unloading.

Main Improvement	Powerful spindle driver
Product Introduction Date	08-2004
Minimum Hardware Requirements	SCB-V2002B
Software Version	WITE32 ver.3.40 (min. 3.20 required)

Configuration 5: V2002 Spinstand rev.07

Starting with V2002 Spinstand rev.07, Guzik introduced faster XY-stage, which performs track-to-track seek and start/stop operations faster.

Main Improvement	Faster XY motors
Product Introduction Date	08-2005
Minimum Hardware Requirements	V2002 Spinstand rev.07
Software Version	WITE32 ver.3.40 (min. 3.30 required)
Reference Document(s)	WITE32 Release Notes 3.30 http://www.guzik.com/releasenotes/pdf/Wite32_330.pdf

Configuration 6: V2002 Spinstand rev.09

WITE32 software has a software option "Do Not Stop Spindle", which allows to keep the spindle spinning while operator replaces the cartridge. Keeping the spindle spinning not only makes tests more repeatable, it also saves time on spindle acceleration / deceleration. This mode, however, is not safe, since the operator can accidentally touch the rotating media. Starting with V2002 Spinstand rev.09, Guzik added a protective plastic cover, which covers the rotating media while operator changes the cartridge. This makes the "Do Not Stop Spindle" option safe.

Main Improvement	Protective cover and "Do Not Stop Spindle" option
Product Introduction Date	01-2006
Minimum Hardware Requirements	V2002 Spinstand rev.09
Software Version	WITE32 ver.3.40 (min. 3.30 required)
Reference Document(s)	P/N 02-107376-01 http://www.guzik.com/products_headtestauto.asp

Configuration 7: Servo Improvement Package (option)

The Servo Improvement Package allows to write servo by one head, and use by many heads. This removes the Servo Erase and Write Servo operations from the production sequence.

Main Improvement	Higher servo position accuracy, reduction in test time, RRO compensation
Product Introduction Date	04-2006
Minimum Hardware Requirements	RWA-2000 with Servo-3 V2002 with Servo Controller 4
Software Version	WITE32 ver.4.00 (min. 3.30 required)
License	Optional purchase license required
Reference Document(s)	P/N 02-107380-02 http://www.guzik.com/documents/products/servoimprovement.pdf

Configuration 8: Piezo-Actuator Cartridge (option)

Piezo-Actuator Cartridge is the next generation of Guzik cartridges for V2002 Spinstand, which contain a piezo element. This piezo allows for high-bandwidth servo loop (2-3kHz), reducing the time of the positioning operations.

Main Improvement	Higher servo bandwidth for better NRRO and shorter test time
Product Introduction Date	09-2006
Minimum Hardware Requirements	RWA-2000 with Servo-3, V2002 with Servo Controller 5, Piezo-Actuator Cartridge
Software Version	WITE32 ver.4.00
Reference Document(s)	P/N 02-107400-01 http://www.guzik.com/documents/products/piezoactuator.pdf

Configuration 9: Digital measurements with D5000 (option)

D5000 Signal Analyzer is capable of measuring RMS of the signal in one revolution, whereas RWA-2000 requires 50-80 revolutions to measure RMS. Using D5000 significantly reduces SNR test time.

D5000 also performs spectral measurements using FFT (Fast Fourier Transform) algorithm, while RWA-2000 performs spectral measurements sequentially, changing the frequency of the Spectrum Analyzer 960 and spending one revolution per measured frequency. This reduces the execution time for Spectral Integral SNR test, and other spectral measurements.

Main Improvement	Faster and more accurate measurements
Product Introduction Date	09-2006
Minimum Hardware Requirements	RWA-2000 series with optional purchase D5000 Signal Analyzer
Software Version	WITE32 ver.4.00 (min. 3.40 required)
Reference Document(s)	P/N 02-107410-01 http://www.guzik.com/documents/products/frequencydomain_analysisD5000.pdf P/N 02-107350-02 http://www.guzik.com/documents/products/analyzerD5000.pdf