

Multifect-GX

Multi-frequency Plus Harmonics Eddy Current Tester for NDE of Components



Multifect-GX is a sixth-generation versatile multi-frequency, multi-channel, multi-parameter eddy current comparator for segregation of metallic components and raw stock. The system outshines old-school instruments by implementing real-time analysis of harmonics of each test frequency. This enables sorting of components previously impossible with conventional instruments. The system is ideally suited for stringent quality checks of crucial automotive components. Some typical applications are:

- Sorting of bars or components according to alloy type
- Sorting of fasteners according to hardness
- Segregation of forgings as per heat-treat condition
- Evaluation of gudgeon pins for case-depth
- Regression readout of values (e.g. Hardness)
- Confidence Testing with known good samples
- Artificial Neural Network based grouping
- Segregation with multiple parameter mixups

Multifect-GX can test parts at up to 32 frequencies at one go. Up to nine harmonics can simultaneously be analysed for each frequency. Harmonics carry information about non-linearity of B-H curve of a material. This additional information enables sorting components which cannot be sorted at multiples of any test frequency. E.g. Third harmonic of 100 Hz is 300 Hz. But the information carried by the third harmonic of 100Hz is *not* available at 300Hz test frequency.

Industry 4.0 Ready!

- Real-time Harmonic Analysis at each frequency
- Single and multi-frequency tests
- Multi-parameter multi-frequency tests
- Confidence tests with a wide frequency band
- Regression readout of values such as hardness
- Artificial neural networks for grouping
- Automatic setup wizards
- Automatic sorting
- Options for simultaneous test frequencies
- Windows® Professional operating system
- Online manual and context sensitive help
- Extensive Data logging and reporting
- TCP/IP servers over Ethernet
- OPC-UA Server for Industry 4.0 integration
- ODBC interface for local / remote SQL servers



Gate Sorter

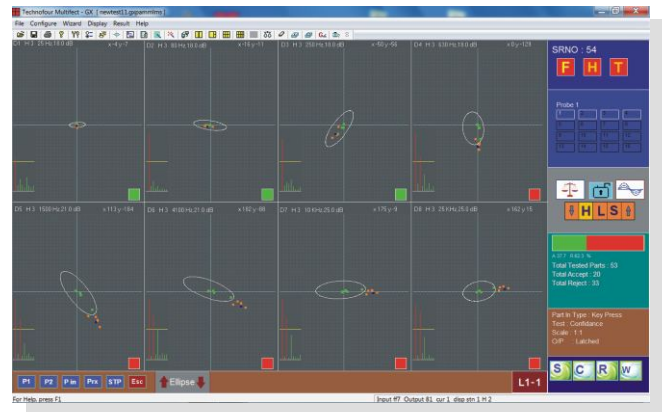


TECHNOFOUR

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MULTIFECT-GX TECHNICAL DATA

- Frequency Range
2 Hz to 1MHz
- Multiplexed operation
Up to 32 time-slots with 32 frequencies
- Simultaneous operation (Optional)
Up to 4 frequencies
- Signal Gain
0 dB to 86 dB in steps of 0.5 dB
- Phase
0 deg to 359 deg in steps of 1 deg
- Thresholds
Elliptical for each frequency and harmonics
- Part-in detection / Test trigger
Automatic or external
- Tests available
 - Single frequency sorting
 - Multi-frequency sorting
 - Harmonic frequency sorting
 - Confidence testing
 - Regression readout
 - Artificial Neural Network assisted sorting
- Data Storage
Hard Disk, USB key
- Operating System
Windows®
- Connectivity
 - TCP/IP over Ethernet
 - OPC-UA over Ethernet
 - ODBC for local/remote database servers
- Setup
Manual and Automatic
- Digital Outputs
GO/NO-GO and group status
- Test Automation
External PLC
- Data Security
Admin/User level password protection
- Test Coils
Rectangular, circular, Probes, custom-built



Multifect-GX displays are quite configurable. This screen shows a typical confidence test. Relative departure from center of each ellipse at each harmonic is also graphically displayed at lower left of each x-y plot. Sinusoid displays are also available at any frequency.

Built for Power Users

Multi-frequency test
For complex group sorting where no single frequency is able to segregate mixups of more than two groups.

Harmonic Analysis
Up to nine harmonics of each test frequency can be analyzed without increasing inspection time. Harmonics carry information about ferromagnetic components that is *not* available at multiples of the same frequency! This feature can thus solve cases impossible with simpler systems.

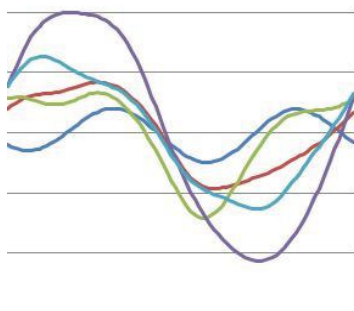
Multi-parameter test
This unique test can work out groupings in situations where two or more variables exist, such as variation in hardness as well as variation in case depth. There could be variation in grade of steel to compound it further. The system can attempt to solve such cases with tests at up to four sets of eight appropriate frequencies.

Confidence test
When just a bunch of acceptable parts is available, the system can set up a confidence test at several frequencies over a wide range. The system then works out tight thresholds at each frequency and tests each part at all those frequencies at a single go. Any outliers are rejected.

Artificial neural network
The system can set up a multilayer artificial neural network that can be trained to recognize known groups.

Regression readout
In this mode, once calibrated with a set of known value samples, the system can present a numeric readout of a value for subsequent unknown samples. It can also compute the confidence level in the indicated value.

WHY HARMONICS ?



Often electromagnetic signals from components have subtle variations that manifest themselves in harmonic content of test frequency as seen in the figure. Conventional test instruments are likely to miss the variations and result in erroneous sorting.



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Technofour can offer standard or custom automation solutions for sorting components or materials.