# Echomac® VM

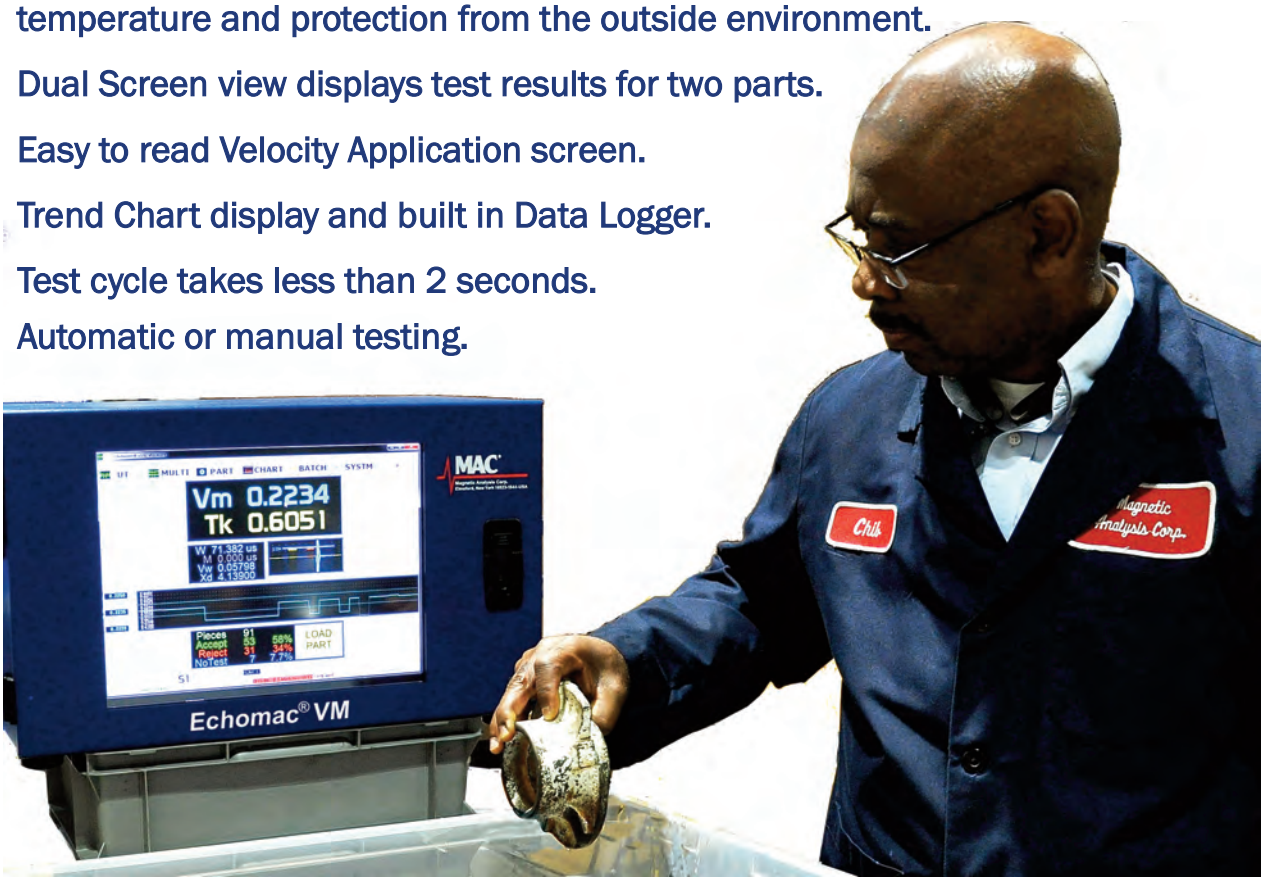
## Velocity Measurement to Assess Nodularity in Ductile Iron Cast Automotive Components


*As the use of nodular graphite iron material has expanded in recent years for automotive safety parts, ultrasonic velocity measurement provides an industry accepted, reliable means of verifying the material integrity of the part. Unacceptable degrees or variations in Nodularity, a type of graphite structure that can develop during the production process, can attenuate the velocity of sound waves passing through the material. The Echomac® VM measures the sound velocity and, using known limits, reports whether the part is acceptable.*

# Simple, Effective Instrument to Test Velocity

## Echomac® VM Features

- Operates with either full immersion or bubbler couplant technology.
- Test two parts simultaneously in separate test stations using one instrument.
- Evaluate Velocity, Thickness or Flaw detection.
- Standard configuration has 2 Velocity channels and 2 Flaw channels with an option for 4 additional Flaw channels.
- Industrial hardened I/O connections are protected from the environment.
- Enclosure includes a closed loop heat exchanger to ensure proper operating temperature and protection from the outside environment.
- Dual Screen view displays test results for two parts.
- Easy to read Velocity Application screen.
- Trend Chart display and built in Data Logger.
- Test cycle takes less than 2 seconds.
- Automatic or manual testing.




*Live A-scan during test*

**The new Echomac® VM Velocity Measurer is designed and manufactured by Magnetic Analysis Corp., a US based leader in supplying NDT instruments, systems and service for over 90 years.**

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MAC® Magnetic Analysis Corp.

# Echomac® VM Instrument Technical Data

| *PULSER* | |
|---|---|
| **SPIKE VOLTAGE** | 500 Volts into 50 Ω, adjustable 0 to 100% in 1% steps |
| **RISE TIME** | 10 ns or less |
| **DAMPING** | 50 Ω OR 200 Ω |
| **REPETITION RATE** | 0.8 TO 15 kHz per channel, adjustable in 0.1 kHz steps |
| **PULSE DELAY** | 1 to 1000 µs steps, adjustable in 1 µs steps |
| **PROBE TYPE** | Through Transmission |

| *RECEIVER/AMPLIFIER* | |
|---|---|
| **BAND WIDTH** | 0.4 to 30.0 MHz |
| **GAIN** | 0 to 60 dB, adjustable in 0.25 dB steps |
| **DIFFERENTIAL GAIN** | Adjustable in the full gain range for each gate interval |
| **HIGH PASS FILTER** | 0.4 MHz cutoff frequency |
| **LINEAR REJECT** | Digital (adjustable from 0 to 40% in 1% steps) |

| *EVALUATION* | |
|---|---|
| **DIGITIZER** | 100 MHz base sampling rate<br>400 MHz TOF resolution |
| **RECTIFICATION MODES** | RF Gating |
| **VELOCITY RESOLUTION** | 0.0003 inches/µs<br>0.007 km/s |
| **VELOCITY RANGE** | 500 to 20,000 m/s |
| **THICKNESS RESOLUTION** | 0.0025 µs<br>0.0003 inches in steel<br>0.0076 mm |
| **MEASUREMENT TECHNIQUES** | Flank |
| **MEASURING RANGE** | 2.5 to 500mm (in steel) |

| *A-SCAN DISPLAY* | |
|---|---|
| **MODES** | FW, PHW, NHW and RF display |
| **GATES** | Bar display |
| **DAC CURVE** | 16 segment, no width limitations, any segment can be increasing or decreasing, mouse drag adjustment |
| **RANGE** | 1 µs or greater |
| **DEPTH** | 500 points |
| **DELAY** | -10 to +499 µs |
| **TRIGGER MODES** | Initial pulse (IP) or interface echo (IF) with delay |
| **TRACES** | 1,2,4, or all (overlaid on baseline) |

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| *GATES* | |
|---|---|
| **NUMBER** | 1 interface and 4 measurement |
| **LIMITS** | Min velocity and max velocity<br>Or Min thickness and max thickness |
| **SYNCHRONIZATION MODES** | Initial pulse (IP) or interface echo (IF) |
| **MEASUREMENTS** | Component velocity<br>Min, max, and average velocity<br>Component thickness<br>Limits evaluation (alarms) |
| **RANGE** | 0.1 to 500 µsec |
| **DELAY** | 0.04 to 499 µsec |

| *OUTPUTS* | |
|---|---|
| **OPTO ISOLATED LOGIC & SOLID STATE RELAYS** | Reject on Min/Max Velocity or Flaw<br>Accept<br>Load Part<br>No Test |
| **ANALOG PART THICKNESS** | 5 volts full scale (12 bit) |
| **VELOCITY TEST CYCLE TIME** | Less than 2 seconds |

| *NETWORK* | |
|---|---|
| **NETWORK** | 10/100 Ethernet. TCP/IP, Remote application can control test parameters and view signal waveforms. |

| *COMPUTER* | |
|---|---|
| **COMPUTER** | Intel dual core process. Ethernet, 120 GB FD, keyboard, mouse, USB ports,<br>Windows 7 Professional |

| *OPERATING CONDITIONS* | |
|---|---|
| **AC POWER REQUIREMENT** | Under 500 VA from a 115 V or 230 V, 50 or 60 Hz line |
| **ENCLOSURE** | Standalone computer enclosure with integrated monitor. These units come with electric coolers |
| **WEIGHT** | 46 lbs. (20.87 kg) |
| **DIMENSIONS** | 24”L x 12”H x 12”D (61cm x 30.5cm x 30.5cm) |
| **OPERATING TEMPERATURE RANGE** | 0 to 50 degrees C (32 to 122 degrees F) |



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