



# The James Vu-Con System

**Impact Echo System for measuring the thickness and quality of concrete**

## *Features and Benefits*

- Accurately determines concrete thickness without drilling cores or using similar destructive techniques
- Quickly locates delaminations and voids in concrete slabs & structures where access is limited to a single side
- Rugged design for field use
- Rapid results within seconds at the job-site
- Large easy to view display for data analysis on site and in daylight
- Data can be stored and uploaded to a PC for later analysis and inclusion in reports
- Conforms to ASTM C-1383

# The James Vu-Con System

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## Theory

The James Vu-Con System uses the impact echo method to evaluate concrete and masonry structures. The impact echo method is based on the use of impact generated stress waves that propagate through the material and are reflected by both the material's external surfaces and internal flaws. This method can be used to make accurate non-destructive measurements of thickness in concrete slabs and plates and to locate internal flaws such as honey combing debonding, and delaminations. It can measure thickness, locate cracks, voids and other defects in masonry structures where mortar bonds the masonry together. Finally, the impact echo method is not affected by the presence of steel reinforcing bars.

The method works by creating a short duration mechanical impact on the surface of the material under examination. This is typically performed by small steel balls that produce low frequency stress waves that propagate through the material and reflect off of other surfaces and internal flaws back to the surface used for testing (See diagram, top of opposite page.) By recording and analyzing the vibration from the mechanical impact at the surface, thickness and other physical features (referred to in the preceding paragraph) can be determined. The advantage of using an impact rather than other more classic ultrasonic techniques is the low frequency and the long wave length of the stress waves that are produced. Low frequency stress waves treat concrete and masonry as a single elastic homogeneous material as they propagate through.

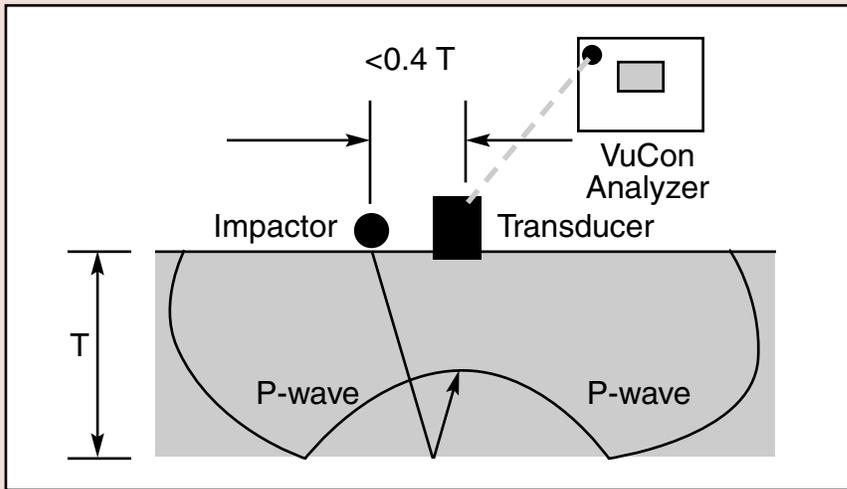
The resulting amplitude waveform from the transducer can be displayed for analysis both with respect to time and frequency. This is illustrated by graphs on the following page. The time domain waveform can be described as a sum of a series of different frequency waveforms.

This allows the user to:

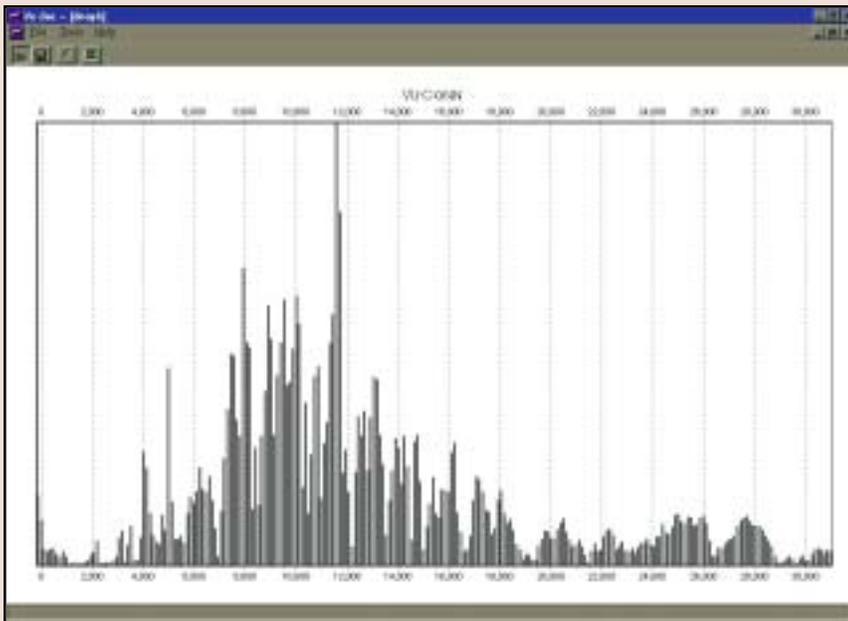
- **Analyze the dominant frequencies of vibration found from the impact and determine thickness as well as distance to features within the material.**
- **Compare the frequency spectra to obtain indications of homogeneity of the concrete.**
- **Calculate the rate of decay of the vibrations to glean information regarding the sub-grade.**

The VuCon System represents the latest technology in concrete ultrasonic analysis, allowing the engineer to "see" into the concrete surface.

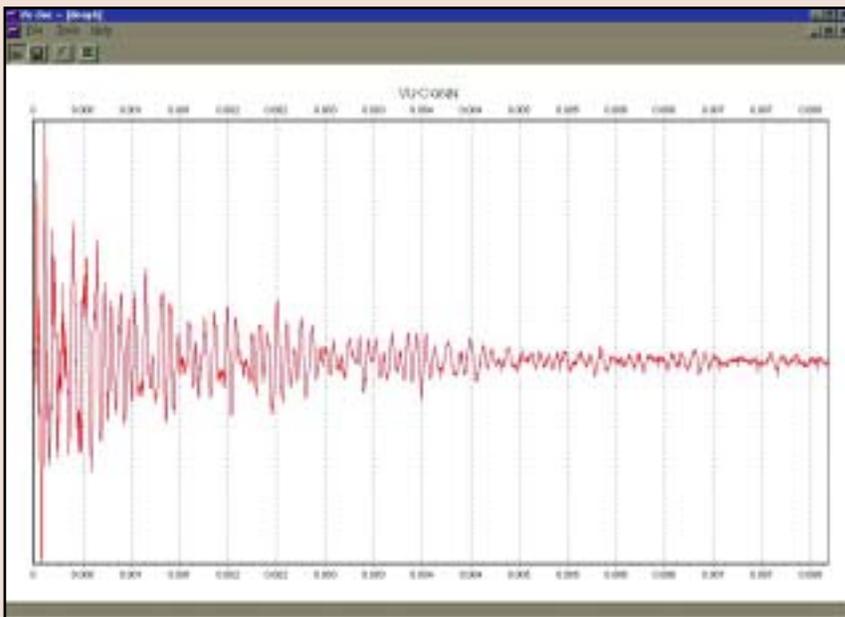
## Results



**Diagram of VuCon System Test.**



**Display of Frequency Spectra for a single test.**



**Display of time domain waveform**



**Measuring the quality of a concrete slab with the VuCon System**

## Unit

The Vu-Con Analyzer provides the engineer with the sturdiest, most reliable system for impact echo analysis. No moving parts and implementation of the latest microcomputer technology has created a system that is both sophisticated and reliable. The unit comes with a 90 mm (3.5") by 115 mm (4.5") graphic display screen that is easily viewed in daylight. This allows rapid analysis of results in situ. It may store more than 200 individual tests with time and date indication. The data is easily uploaded to a PC for inclusion in reports and data analysis. Data communication takes place via the RS-232 port and Windows compatible PC software. The unit allows the user to select sensitivity levels to adapt to varying conditions in the field.

The built-in menu system has provisions for determining all the parameters for the material under test. The thickness menu allows rapid display of the frequency spectra of an impact. Peaks are automatically found and highlighted for a given test. The velocity menu, for use with the dual transducer set, facilitates determination of the stress wave speed in a given material. This allows the operator to gather and analyze data quickly and easily in the field. Finally, the user can select from multiple gain settings for various material dimensions. There is also a selection of multiple data sampling rates and an adjustment for different trigger levels which help the user produce accurate and reliable results.

## Specifications

<b>Instr. Weight:</b>	6 lbs. (2.75Kg)
<b>Ship Weight:</b>	17 lbs. (7.7 Kg)
<b>Dimensions:</b>	4.5" x 8.5" x 10.5" (114.3mm x 223.5mm x 267mm)
<b>Freq. Range:</b>	50khz
<b>Impactor Sizes:</b>	6, 8, 10, 12, 14, & 16mm
<b>Gain Selection:</b>	.5, 1, 1.5, 25, 50
<b>Battery:</b>	12 Volt. 4-10 hours continuous use
<b>Display:</b>	320 by 240; backlit for daylight use
<b>Storage:</b>	200 plus readings
<b>Software:</b>	Windows compatible 9x/me 32MB Ram, 100MB Ram
<b>Temperature:</b>	0° - 50°C

## Sales Numbers

<b>V-V-100:</b>	VuCon Complete System
<b>V-V-120:</b>	Depth Transducers
<b>V-V-130:</b>	Impactor Set
<b>V-V-140:</b>	Velocity Transducers
<b>V-V-150:</b>	Personal Computer Software
<b>V-V-122:</b>	Battery Charger

**NDT** JAMES INSTRUMENTS INC.  
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