

# Battelle Memorial Institute - Resource Effective BioIdentification System (REBS) - Laboratory Variant



## GENERAL DESCRIPTION:

The Resource Effective BioIdentification System (REBS) -Laboratory Variant is a microbial identification technology that enumerates and identifies microbes using a combination of microscopic imaging and Raman microspectroscopy. The measurement process begins when the system collects



particulate material on a solid substrate within a defined region. Next, using standard microscopy techniques, the collected material is imaged at a high magnification, and each field of view is recorded and indexed as the macroscopic collection region is scanned. This iterative process continues until the entire collected region has been scanned. From these images, all particles are located automatically by image processing algorithms, and their morphological properties are used as a first test to discriminate biological particles from non-biological particles. The collection substrate is then moved to bring each particle directly below the microscope objective in order to measure its Raman spectrum. This spectral signature provides accurate discrimination of biological particles from non-biological particles. Moreover, the particle can be identified by matching the measured spectrum to a database of spectra for known materials. Identification is supported only if spectral signatures of the material are available in the spectral database.

## TECHNICAL DESCRIPTION:

Battelle has developed an autonomous micro-Raman spectroscopy technology that enables chemical and biological aerosol identification. The technology incorporates automated sample analysis, single particle Raman spectroscopy, and multivariate signature analysis methods to analyze the chemical and biological materials.

## CONTACT INFORMATION

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## COST

- \$N/A/system
- \$0.003/analysis

## Tier Selection

Final tier assignment is based on overall product score.

- Top Tier
- Second Tier
- Third Tier
- ◐ Fourth Tier
- Bottom Tier

### RANKINGS

	Biological	Chemical	Radiological
<b>FIELD USE System</b>			N/A
<b>MOBILE Laboratory</b>			N/A
<b>DIAGNOSTIC Laboratory</b>			N/A
<b>ANALYTICAL Laboratory</b>			N/A

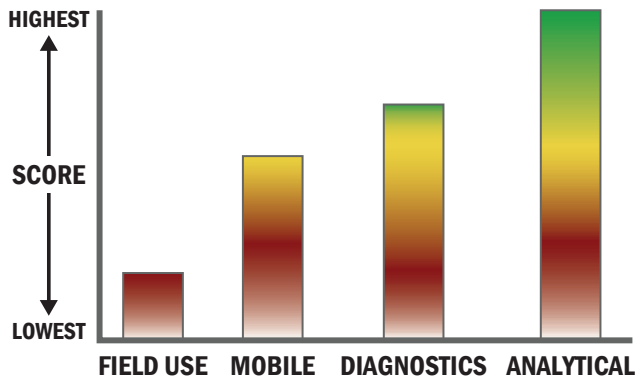
## Survey Source

Vendor Supplied Information



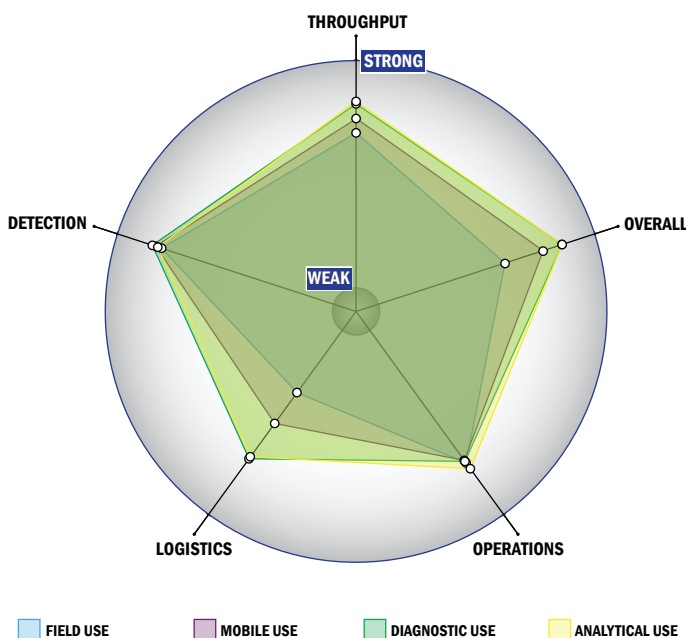
## Scoring Analysis

System scores are compared across the four scenarios and ranked from highest to lowest.



## Impact Chart

The Impact Chart is a spider graph representing specific categories and designed to give the reader a visual depiction of how a particular system is expected to operate across the four different scenarios. The score for each of the seven categories is presented as the percentage of the total possible score. Higher category scores extend the spokes of a graphic toward the outer edge of the chart. The area graphed for each of the four scenarios relates to how well the system performed in that scenario. Graphics for each of the four scenarios are super-imposed for ease of comparison.



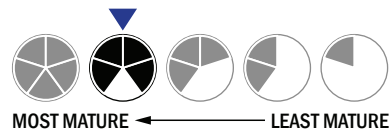
## Evaluation Criteria

### Throughput:

- Between 2 and 15 minutes for detection
- Multiple samples, multiple tests/sample per run
- System is continuous and provides real time analysis with no defined tests/samples
- The system or device is currently semi-automated
- Device or system is intended for multiple detection assays
- 0-1 solutions, buffer, eluents, and/or reagents
- 5 or more components
- Less than 5 minutes is required for set-up
- 1-2 steps are required for detection

### Logistics:

- An afternoon of training and some technical skills required
- Approximately the size of a carry-on luggage suitcase
- Between 25 and 50 kg
- Wired connections are available
- System or device has 110V electrical requirement



### Operations:

- Can be used from 25 °C to 37 °C
- Performance is not influenced by relative humidity
- Greater than 3 years shelf life
- 3-5 years expected life
- Results can be viewed in real-time
- The system could easily be adapted into a fully autonomous system
- The system software is open but modification requires licensing
- The system hardware is open but modification requires licensing

### Detection:

- Efforts are underway to achieve 510K clearance
- Efforts are underway to achieve FDA approval
- Less than 10 µL
- Superior specificity. System has a false alarm rate approaching zero (~0%)
- 1-100 CFU per mL
- 100-1,000 PFU per mL
- 1-10 ng per mL
- Spore lysis not necessary for detection by system
- 1 ppb-1 ppm
- System currently can identify aerosolized chemical agent
- System currently can identify liquid chemical agent