

## CONTACTLESS EARING MEASUREMENT UNIT

Contactless Earing Measurement, Wall Thickness Gauge and Can End Measurement

Huxley Bertram's highly versatile Contactless Earing Measurement Unit (CEMU) enables high speed earing measurement with options for additional wall thickness gauge and back end profile measurement.

The CEMU diagnoses Can forming problems in seconds. Testing of Earing highlights metal quality problems while testing wall thickness highlights tooling positioning, lubrication, or ware problems.



In a world of ever-increasing complexity in Can forming, quickly diagnosing problems is vital.

The Contactless Earing Measurement Unit (CEMU) can be upgraded with the following additions to provide Back End/Lid Scan (Addition 1) and Wall Thickness Measurement (Addition 2).

The Huxley Bertram Contactless earing measurement machine is compliant EN 1669 and ISO 11531. Huxley Bertram, trusted for over 30 years of earing Measurement around the world, supplying earing equipment to 5 continents.



# Product Description

## Key Advantages

**Rapid Precision Earing Measurement** - without the drawbacks of physical probes.

Physical probes cause significant inaccuracies in earing measurement. Due to the probe being physically pushed against the earing rim, it often distorts the earing profile, destroying delicate features. This is a problem on thinner Cans particularly and characterized by a collection aluminum fragments left around earing probe during measurement.

Physical probes are also limited by their own diameter (typically around 1 mm) which means smaller features cannot be captured; whereas the CEMU is capable of measuring these features.



**Automatic Grain Detection** - eliminates need for manual Can orientation

Traditionally, the operator of an Earing Measurement Machine had to place a Can with the grain orientated in a specific direction for correct peak identification. The CEMU uses a laser to detect the grain orientation during rotation and automatically correct for it.

**Cup Size Flexibility**

Measurement of virtually any Can is possible, with one machine being able to measure cups from 33 mm to 100 mm diameter and heights from 15 mm to 200 mm. Simple hand wheels allow for reliable and precise position adjustment of the laser distance sensor. The only parts to change are the Can drive disks which are changed quickly with a single screw.

**Huxley Bertram Advanced Earing Analysis Software** - facilitates detailed and rapid evaluation of the earing characteristics. The analysis automatically generates Polar or Cartesian plots of earing profiles, algorithmically corrects for Can skew, identifies peaks and troughs, using algorithms developed over 30 years of earing experience. Multiple earing profiles can be overlaid for comparison.

## Principles of Operation

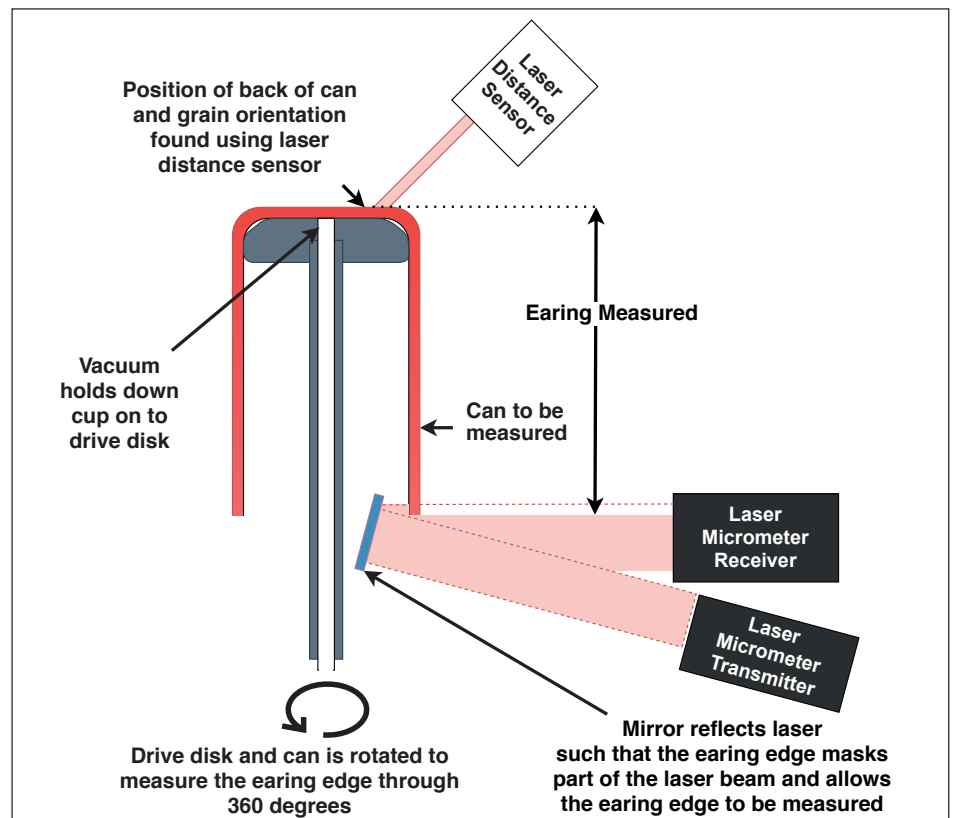
### Contactless Earing Measurement

The Can is placed on the drive disk and vacuum holds the base of the Can to the drive disk.

The drive disk and Can are rotated through 1 turn to record the earing profile.

The earing profile is measured by the portion of the laser beam masked by the earing edge of the Can as shown in the diagram right.

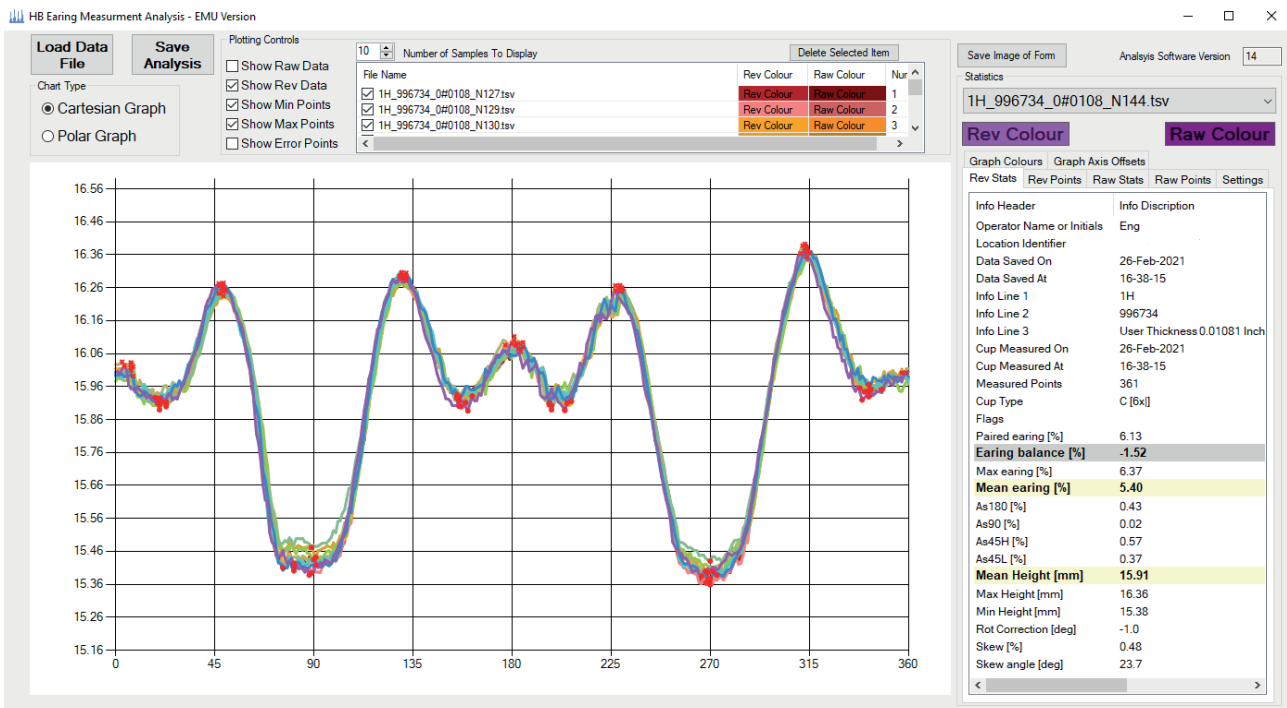
The height of the flat end of the Can is measured by the laser distance sensor. This is the basis for the zero position of the earing measurement.



**Huxley  
Bertram**

Cambridge, UK

| Machine Capability Level   | Functionality   | Key Advantages   |
|--|---|--|
| <b>Basic Machine</b><br>Contactless Earing<br>Measurement Manual | Contactless Rapid Earing Measurement<br><hr/> Manual Can size adjustment from 33 to 100 mm Internal diameter and from 15 to 200 mm tall. Other sizes available on request<br><hr/> Automatic Grain Direction Detection<br><hr/> Huxley Bertram Advanced Earing Analysis Package | Rapid, Precision earing measurement<br><hr/> Measure thin-walled Cans without deformation<br><hr/> Earing profile can be measured in less than 3 seconds<br><hr/> No Manual orientation of can grain direction<br><hr/> Measuring Cans in seconds<br><hr/> Measure hundreds of cans in an hour |
| <b>Addition 1</b><br>Automatic Can Size Adjustment               | Automatic Adjustment for Can Size.<br>Dome Depth Measurement.<br>Shell and End Profile Measurement<br>End Lip Curl Measurement  | Rapid Can change with automatic size detection and adjustment<br><hr/> Measure and record complete Can End or Shell profiles or check critical dimensions against preset criteria. eg Dome Depth   |
| <b>Addition 2</b><br>Wall Thickness Measurement                  | Automatic Wall Thickness Measurement to submicron Resolution<br>Measure rotational and linear profiles along any point on the Can wall  | Wall thickness measurement from 10 to 200 mm of can height through 360 degrees of rotation.  |



Huxley Bertram Advanced Earing Analysis Software Package

Example of the dimensions that can be measured are:

Dome Depth and Rim diameter. Further to this, drive disks can be provided to allow Ends and Shells to be mounted and their profiles measured. Examples of dimensions that can be measured from this are: Curl Height, Overall Height, Curl Opening, Panel Depth, Inner Diameter, Outer Diameter, Curl Opening, and Countersink Depth.



## Addition 1: Back End/Lid Scan

Addition 1 motorises the Can height axis comprising the mirror and micrometer assembly, vertically, and the laser distance sensor axis horizontally.

This enables the laser distance sensor to scan across the back end or lid of the Can. The height of any point is measurable to single micron resolution at any point of rotation of the Can. From these, specific dimensions can be automatically checked.

This also means that the machine can automatically adjust the laser distance sensor position for different diameters of cup and the Can height axis for different heights of cup.

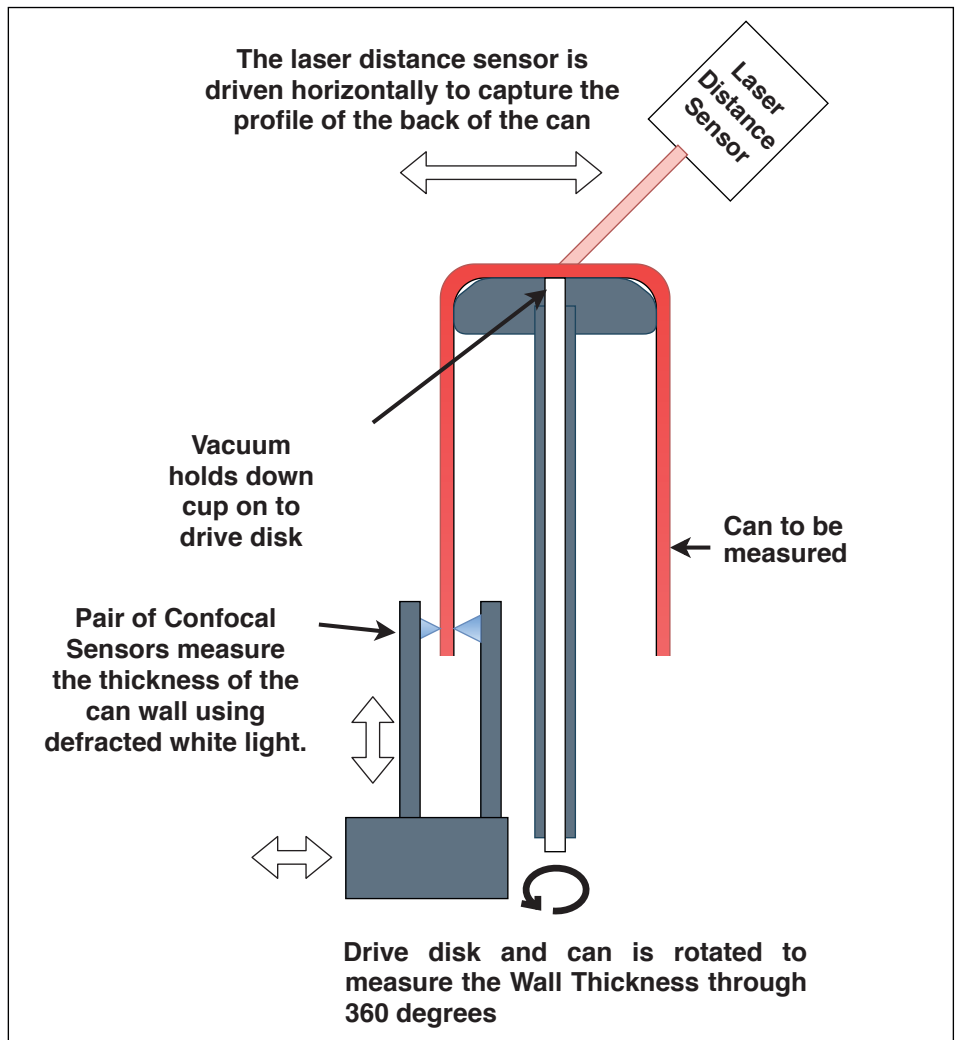
This drastically decreases the time required to measure batches of mixed sized cups.

## Addition 2: Wall Thickness Measurement

The Wall thickness Measurement option allows for Cans, during all draw stages, to have their wall thickness measured. Cans as narrow as 33 mm ID and as deep as 200 mm can have their wall thickness measured.

Wall thicknesses of between 0.005 mm and 2 mm can be measured using Confocal measurement sensor pair. The Confocal sensors are mounted on automatic XY gantry such that the system can automatically adjust to the Cans size and measure at any height on the Can between 20-200 mm from the base of the Can.

Multiple thickness profiles can be measured through 360 degrees of Can rotation in one measurement cycle. This can be used as a diagnostic tool for Can forming problems. If the wall thickness is significantly asymmetrical through one rotation, then this typically indicates tool eccentricity. If there is significant rotation misalignment between the wall thickness at the top and bottom of the Can then this indicates that the punch is not running true to the bore. If tool alignment problems are indicated but there is still asymmetry in the wall thickness then this can indicate poor lubrication or tool wear. Wall thickness measurement is also a useful tool in developing new draw tooling and processes.



# Machine Specification

## Earing Measuring Capabilities:

|  |  |  |                                |
|--|--|--|--------------------------------|
| Can internal diameter:                 | 33 mm to 100 mm <sup>(1)</sup>   | Can Height Range:  | 13 to 200 mm                   |
| Max Earing Peak Trough Distance:       | 30 mm  | Earing measurement resolution:                               | +/- 1 micron                   |
| Total measurement file save time:      | Less Than 4 sec at 180 deg/s   | Earing Measurements per degree at 180 deg/sec <sup>(4)</sup> | Greater than and 12 per degree |
| Typical Earing Accuracy <sup>(5)</sup> | +/- 10 micron<br>Includes Huxley Bertram Advanced Earing Analysis Software Package | Rotational measurement accuracy to:                          | +/- 0.12° at 180 deg/s         |

## Thickness Measurement Capabilities

|                              |                                |  |                             |
|------------------------------|--------------------------------|--|-----------------------------|
| Can internal diameter:       | 33 mm to 100 mm <sup>(1)</sup> | Can Height Range over which thickness can be measured: | 10 to 200 mm <sup>(2)</sup> |
| Measurable Wall Thicknesses: | 0.005 to 2 mm                  |  |                             |

## Physical Specifications:

|  |                                      |                               |                               |
|--|--------------------------------------|-------------------------------|-------------------------------|
| Approximate footprint (excl. monitor) <sup>(3)</sup> : | 540 wide x 460 deep x 720 mm high    | Weight:                       | 40 kg Earing measurement only |
| Electrical Power:                                      | 240/110 V AC 50/60 HZ <sup>(6)</sup> | Pneumatic supply not required |                               |

(1) Maximum height of 33mm ID that Can be measured is 150 mm. 200 mm long Cans must be at least 48 mm ID.

(2) Cans longer than 100mm or very thin Cans may require extra stabilising fixtures for wall thickness measurement. Please let us know your requirements.

(3) A standard 21 Inch computer monitor is supplied with the machine. A second monitor (not supplied) can also be connected as some customers find this easier for analysing results. A spare HDMI socket is provided for this.

(4) 180 deg/s is default but if more detailed results are required a slower rotation speed can be set. Halving the measurement speed doubles the samples per degree.

(5) This is the accuracy that we expect our customers will experience, and be able to verify, of our machines, providing they are well maintained and calibrated. Calibration tooling is provided with the machine. Tooling can be re-certified upon request.

(6) Please specify required voltage and frequency when ordering.



# Huxley Bertram

Huxley Bertram Engineering Limited designs and builds special purpose machines, automation and test equipment; alongside a select line of products for specialised industries.

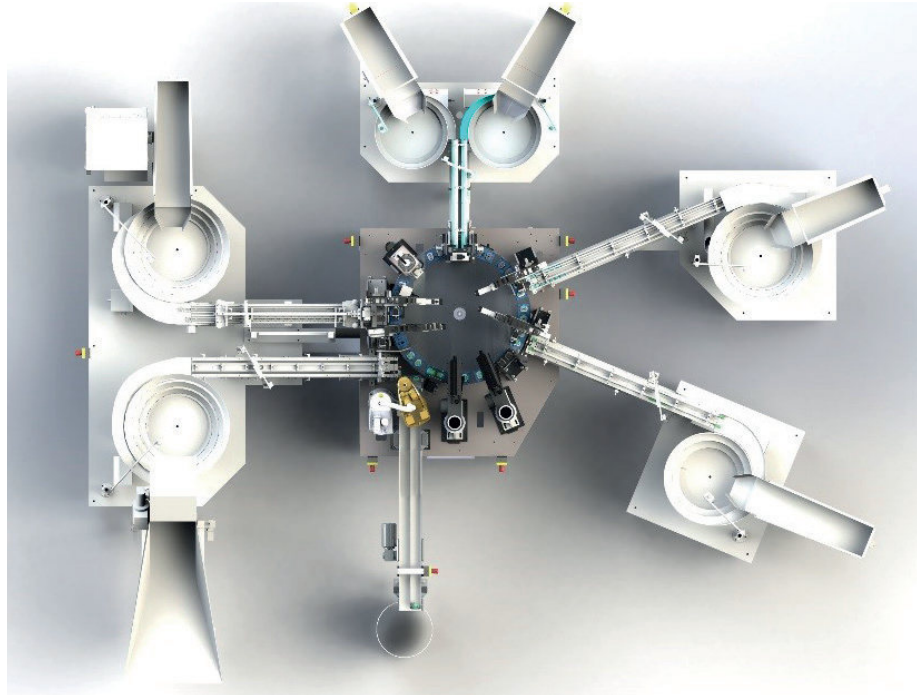
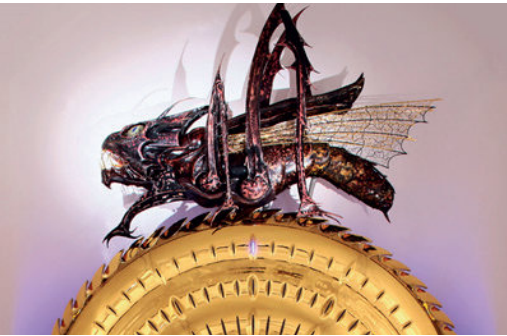
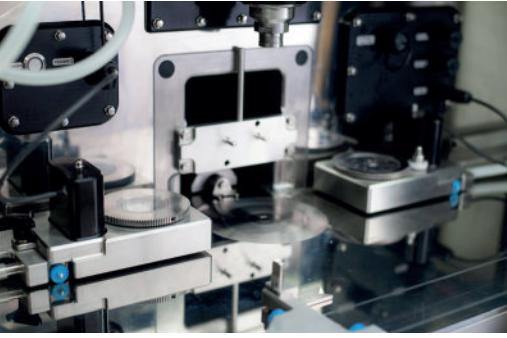
These innovative solutions enable companies to increase quality and throughput and reach new markets. Huxley Bertram regularly supplies equipment and supports customers all around the world.

The company collaborates with clients to solve complex challenges, with the right mix of innovation, technology and simplicity.

Huxley Bertram was founded in 1979. Since then it has delivered over 1,000 solutions, transforming clients' operations in industries from pharmaceutical and nuclear to research and academia.

Located in Waterbeach, Cambridge, with facilities measuring over 25,000 sqft.

For more information on Earing Measurement Machines or Huxley Bertram Special Purpose Machines visit [www.huxleybertram.com](http://www.huxleybertram.com)



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