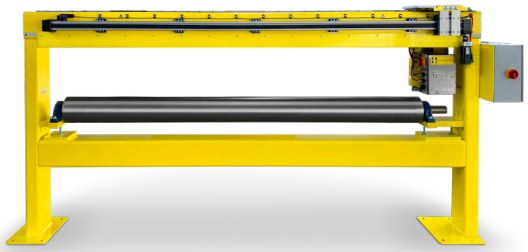
HAMMER-IMS

MARVELOC-CHARIOT SYSTEM
USING U-RAYS

The CHARIOT mechanical platform is perfectly suited for both new production lines or space-limited retrofits for thickness or basis-weight measurement. By moving a single measuring head across the entire product width instead of the complete frame, the CHARIOT is cost and space efficient.

CHARIOT PLATFORM

IDEAL FOR IN-LINE MEASUREMENT

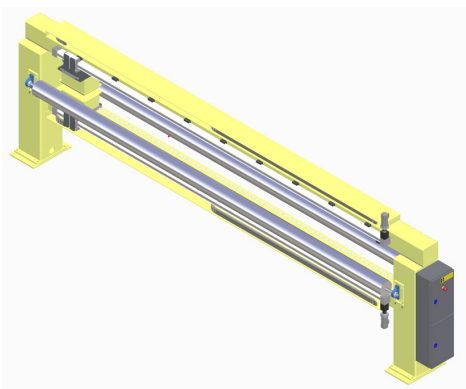


The CHARIOT platform is equipped with our Marveloc sensor technology, specifically featuring our C-Ray, L-Ray, or U-Ray sensors to suit your specific application:

- **C-Ray:** Measures the thickness of thin materials such as plastic films.
- **L-Ray:** Designed for thicker materials, including insulation sheets, extruded sheets, and foams.
- **U-Ray:** Our specialized solution for precise basis-weight measurement.

CHARIOT's minimal-effort sensor integration and the moving sensor unit within the fixed machine frame provide an extremely valuable solution for in-line measurement that is space-efficient.

Scan to watch product video

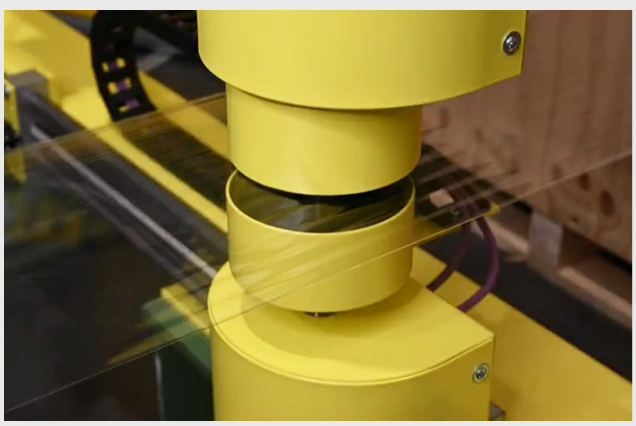


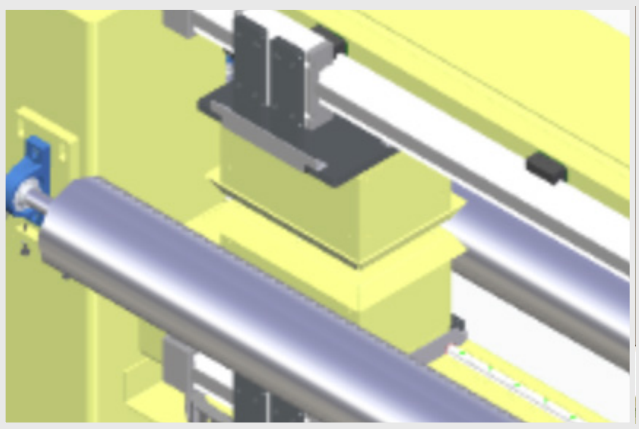
FLAT MATERIAL PASSAGE

To ensure maximum precision, the system can be equipped with **one or two integrated rollers**, maintaining a steady, flat material passage for optimized measurement performance.

HEAD-MECHANICS

We offer two types of measuring heads tailored to your specific applications, ensuring optimal results for every measurement.





COMPACT MEASURING HEAD:

- For thin nonwovens and coated materials
- Suitable for lab applications.
- No integrated conveyor rollers

ROBUST MEASURING HEAD:

- For heavier and thick nonwovens
- Wider lines
- Suitable for harsh industrial environments
- Including chamfered sensor base plate and conveyor rollers

MARVELOC U-RAY SENSOR

U-RAY TECHNOLOGY

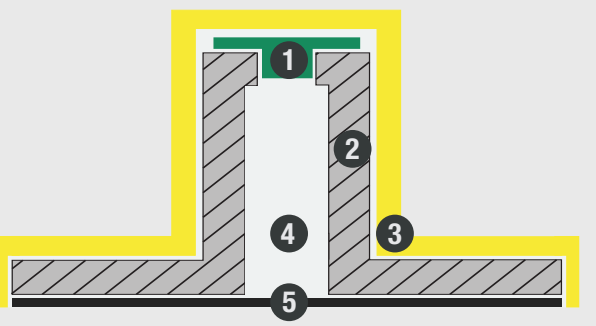
U-Ray is an ultrasonic technology for basis-weight measurement, optimized for materials where electromagnetic methods, such as C-Rays (our capacitive technology) and M-Rays (our millimeter wave technology), are ineffective. It's ideal for quality control of thin materials, such as battery films on metal substrates, and provides precise basis-weight measurement for coated, impregnated, and felt materials.

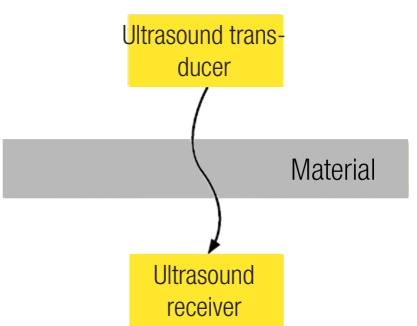
The system consists of a transmitter above and a receiver below, with the material passing through the gap. Non-ionizing and cost-effective, U-Ray can effortlessly measure through metal and semiconductive materials, making it a versatile solution for markets such as battery film, nonwovens, wall coverings, and other specialty products.

U-RAY HEAD

The transducer 1 is housed in a foam-lined waveguide 2 which is a rectangular or circular tube 3 with foam on the inside and an air-filled center. 4 The foam acts as an anti-reflective layer, reducing the reflection of ultrasound waves.

To regulate the air within the gap and maintain consistent measurements, the transducer is enclosed in this tube. This design minimizes variations in the air gap, leading to more precise measurements. It prevents movements or disturbances from affecting the receiver. Additionally, a thin, nonwoven protective layer is included to prevent dust infiltration. 5





STAND-OFF

The transducer is positioned at a specific distance from the material, known as the stand-off. This stand-off ensures the ultrasound waves to travel before reaching the material and receiver below. By the time the waves are detected, the transmitter has already stopped transmitting. Reducing the chances of interference by the direct coupling of the transmitted signal into the receiver.

CALIBRATION

To maintain accuracy, the system periodically calibrates itself to account for any variations caused by environmental conditions. Calibration is typically performed either in air or using a reference material, with the reference material being preferred. This process, also called "zeroing," helps keep the system's measurements reliable.

U-RAY SPECIFICATIONS

FEATURE	VALUE
GENERAL DEVICE INFO	
Generic name	MARVELOC-U-RAY-SENSOR
Featured technology	Hammer-IM's genuine U-Ray technology Dual-head with one of the following operating modes time-of-flight or power detection
MEASUREMENT SPECS	
Nonwoven	
Measurable weight range	1.7 kg for softer nonwovens 2.6 kg for rigid and hard-surface nonwovens
Typical scanning speed	80 mm/s
Sensor head update rate	142 Hz, averaged over 5 bursts: 28 Hz
Burst duration	275 µs
Applied frequency	40 kHz
DIMENSIONS AND GEOMETRY	
Head area	250×150 mm^2
Typical head-to-head distance (2·stand-off)	35 mm
Head-to-material surface angle	90 degrees (perpendicular)
Measurement spot (diameter)	20 mm
CONNECTIVITY	
Bus	RS-485
ELECTRICAL SPECS	
Power inlet	230 VAC / 50 Hz
Motor drive power	< 500 mW
Emergency stop present	yes

SOME U-RAY INTEGRATIONS