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# System for Detecting the Presence of Foreign Material in Process Streams

## SUMMARY

This patented inspection system and method uses ultrasound to non-invasively detect foreign objects in process streams. A process stream is typically a continuous flow of slurry or liquid that goes through multiple steps on its way to becoming a finished product. During such processing, objects can fall into, or otherwise enter, the stream. For example, foreign objects may be undesirable natural materials such as bones, cartilage, fibers, pits, etc. or materials accidentally introduced--such as metal, glass, plastic, etc.-- essentially anything that shouldn't be in a high quality product.

Originally developed to look for bone fragments in a chicken breast slurry stream, the method provides high throughput process monitoring whenever the ultrasound response of the targeted foreign object is sufficiently differentiated from the background response. To further enhance the inspection coverage and sensitivity, other inspection modalities such as optics or electromagnetics can easily be added to the system. During the inspection of chicken, it was found that a candling inspection stage added to the ultrasound stage was very effective in enhancing the detection of near-surface foreign objects in a chicken breast.

## ADVANTAGES

- "Non-contact" means of detecting foreign objects at sizes down to 1/16-inch.
- Capable of operating at high product throughput speeds up to 18-inches/s.
- Eliminates the need for manual inspection or costly and slower xray inspection methods which typically requires added safety precautions and complex operator training.
- More accurate results due to the combination of inspection modalities (e.g., acoustics and optics) due to more information extracted from the process stream.
- Adaptable to a variety of applications.

## RELATED LINKS

- » **Macro Property Measurement Website: Acoustic Evaluation of Liquids in Containers**

<http://www.technet.pnl.gov/sensors/macro/projects/es4upecw.stm>



### Patents & Intellectual Property

- » Patent #: 6,786,096
- » Patent #: 6,992,771
- » Patent #: 7,363,817

### Technology Portfolio(s)

- » Electronics
- » Ultrasonics
- » Physical Sensors

### Potential Industry Applications

- » Agriculture & Mining
- » Chemicals
- » Consumer Products
- » Energy & Utilities
- » Food, Beverage & Tobacco
- » Healthcare, Pharma, Biotech & Medical
- » Oil & Gas
- » Recycling & Waste Management
- » Wood, Paper & Forestry

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