

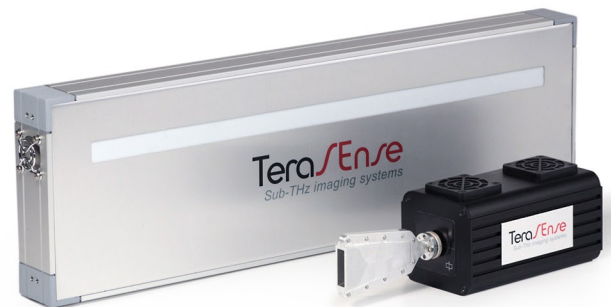
TERAHERTZ APPLICATIONS IN THE CERAMIC INDUSTRY

The high speed linear terahertz scanning system manufactured by TeraSense for conveyor belt applications is a perfect solution for non-destructive test and quality control of various materials in an industrial environment. A key benefit of the TeraSense THz imaging technology is its high sensitivity to multiple features and inclusions in the volume of non-metallic materials (ceramics, plastics, wood) which makes it suitable for evaluation of density and humidity variations in the pressed powders ('green tiles' and kiln fired tiles in the ceramic industry; pills, caplets and tablets in the pharmaceutical industry, etc.).

One of the important aspects in the ceramic tile industry is to monitor density gradients in 'green' tiles right after their being formed in a press and examine finished tiles for various defects. Unlike the X-Ray technology, the TeraSense THz imaging is highly sensitive to density deviations and especially to moisture content of ceramic samples. The TeraSense technology is your instrument to monitor density deviations in a tile right from the forming press and to provide feedback for a powder feeding machine.

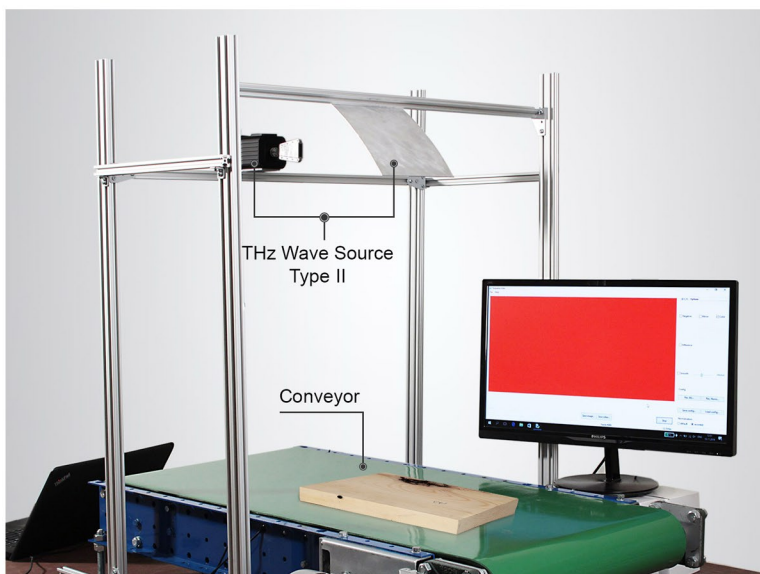
Advantages of the THz imaging system

- Extremely high image acquisition rate (up to 5000 fps)
- Non-destructive (no ionizing radiation)
- Powerful tool for inspection of defects in dry tiles
- Powerful tool for measuring density or humidity variations in wet tiles
- Low cost solution



High Speed Linear Terahertz Scanner with Type II sub-THz Source

Basic specifications of the system Type II



System set up

CAMERA

- Optimal frequency: 100 GHz
- Pixel pitch: 1.5 mm
- Image width and number of pixels: custom (typical 384 x 3 mm², 256x1 pixel)
- Frame rate: up to 5000 lines per second
- Suitable for conveyor belt speed up to 15 m/s
- Included software: TeraFast® Viewer
- Interface: mini-USB
- Power supply: 24V / 20W

SOURCE

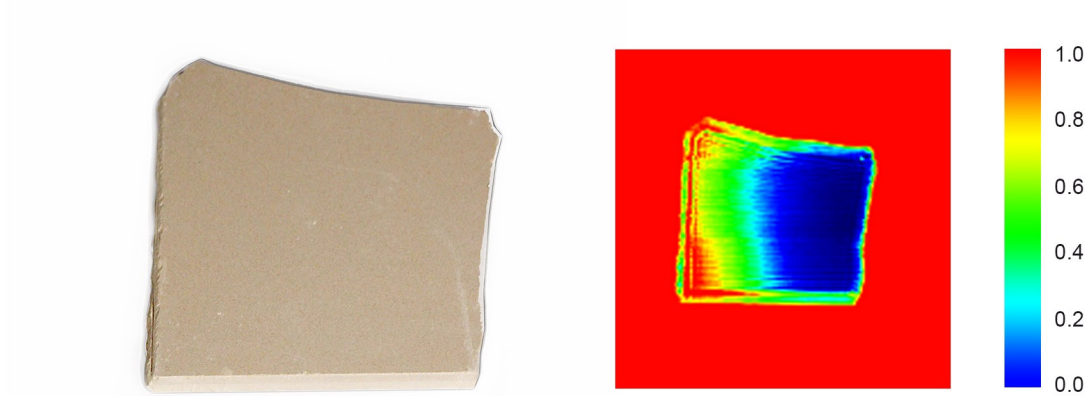
- Operation frequency: 100 GHz
- Power per camera pixel: 140 µW
- Reflection beamforming optics
- Protective isolator for enhanced stability
- Power supply: 24V / 20W

Defect detection and moisture measurements

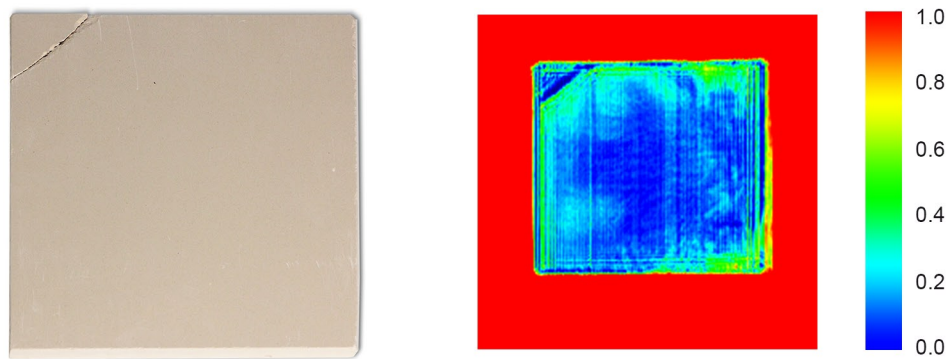


TeraSense TeraFAST imaging system can detect various defects, such as:

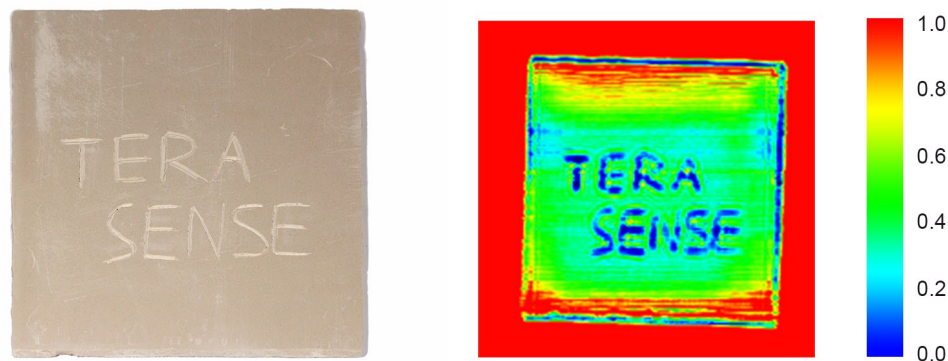
- Cracks
- Holes, voids $D > 3$ mm
- Scratches > 3 mm deep
- Inclusions (especially metallic)



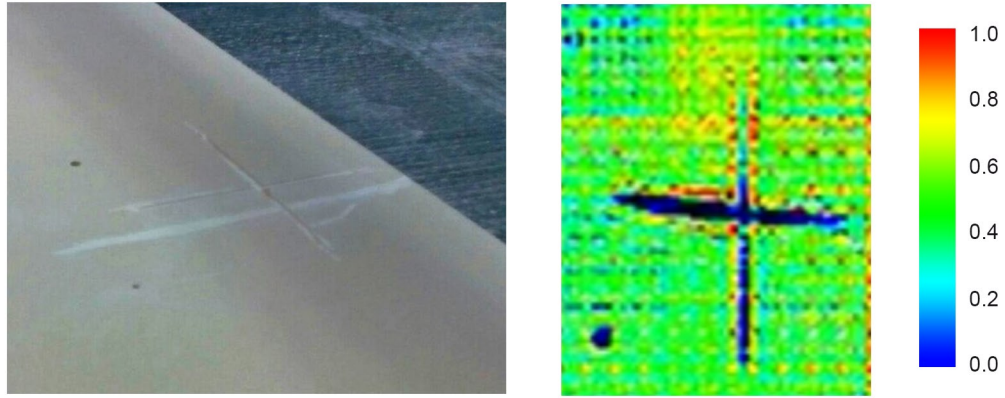
THz transmission image of a 'green' ceramic tile with strong moisture gradient from 0% to 3%.



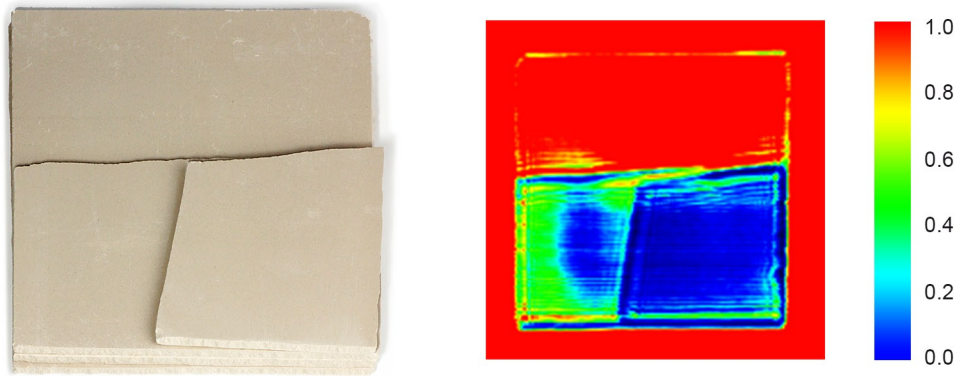
THz transmission image of a cracked 'green' tile with moisture gradient: 1.5 - 2.2%.
Cracks, hidden defects and moisture gradient of the tile are clearly detectable.



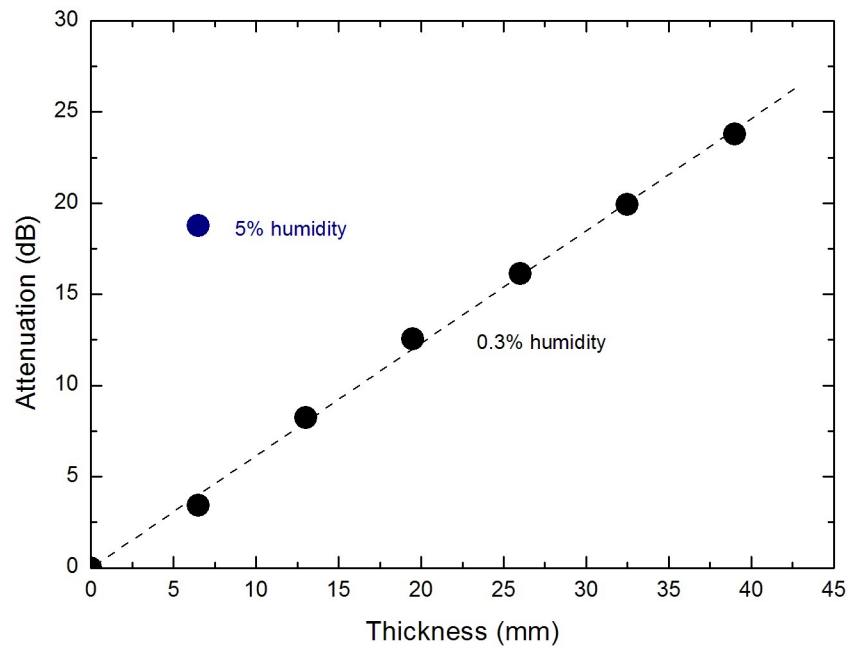
THz transmission image of a tile with scratched text on it. The scratched text, which in fact is a non-uniform surface, shows lower transmission in THz image due to the scattering properties of the terahertz radiation.



THz transmission image of a dry ceramic tile. Holes and scratches can be clearly seen.



THz transmission image of 13 mm, 19.5 mm and 26 mm thick ceramic tile (two, three and four layers of 6.5 mm thick tile accordingly).



Sub-THz signal attenuation at 100 GHz for ceramic tiles of differing thicknesses and moisture.