# MEASURING MOISTURE IN CERAMIC TILE

The Problem: A large European producer of ceramic roofing tiles experienced an unacceptable level of customer complaints regarding off-quality tiles, apparent in color variations and cracking across the extended life of roofing tile. These problems were directly traceable to varying moisture content in the aggregate mixture, which caused distortions and cracking upon kiln firing. Moisture varied in the 5% to 9% range, too great a spread. Despite rigorous quality inspection procedures, defective tiles continued to slip into the market place.

The Berthold Solution: Berthold installed its LB 354 Micro-Moist moisture analyzer (**Now LB 456 MicroMoist**), providing on-line and real time measurement. This process control device employs multiple microwave frequencies constantly penetrating the material, and measuring changes in both the attenuation and phase of the transmitted signal. Through this patented procedure, the measurement is largely independent of particle size, color, density, layer thickness, volatile matter and temperature,

As shown by the attached picture, installation was across a synthetic belt. Micro-Moist was positioned after sand and cement had been combined, and before the mixer, measuring a product stream about 5 inches in depth. Components include two microwave antenna positioned over and below the belt, and a leveler located upstream. A sensor within the leveler triggers discontinuation of the measurement, should product bed depth fall below the leveler. Berthold's two-tier microprocessor amplifier is located adjacent to the belt, providing both visual readout, 4-20 mA and RS232 outputs of percent-moisture.

Calibration was simple and straight-forward. The initial procedure consisted of performing a "zero" measurement. Next**,** a theoretical curve was entered into the LB 354 microprocessor (essentially a slope and offset), putting the instrument into operation. Thereafter, the LB 354 Micro-Moist was fine-tuned by taking periodic samples, and comparing the laboratory result with the Micro-Moist reading taken at time of sampling. In this manner, calibration was completed within a few days.

System Performance for the several Micro-Moist installed by the customer was consistent, and includes:

1) Percent-moisture accuracy of under +/- 0.3%,

2) Immediate and significant reduction in scrap rate and customer rejects, and

3) Freeing up laboratory staff from having to perform routine process sampling.

Payback reported for the project was well under one year.