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Session Chairs: *Saburo Tanaka, Toyohashi Univ. of Tech. & Joern Beyer, PTB Berlin*

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First Practical High Tc SQUID System for the Detection of Magnetic Foreign Substances in Commercial Products

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First practical High Tc SQUID system for the detection of magnetic foreign substances in commercial products was developed and tested. Most of the food production lines use metal detectors to eliminate the metal contaminants that are mistakenly introduced into the products. From practical standpoints, metal detectors do not have enough performance for large products or small contaminants. Recently X-ray detectors have come to be popular because of their high detection abilities. Even so, the X-ray detectors have disadvantages with the exposure of radioactive ray, difficulty in detection of contaminants in products with ambiguous pieces and the detection limitation based on sensing unit. Most of the food production lines consist of the stainless steel which can be magnetized with fatigue or fracture. Therefore, the high sensitive SQUID can be applied for the detection of the contaminants. The detection system consists of the 3-channel SQUIDs with liquid nitrogen Dewars, the permalloy magnetic shield, the conveyer and the magnets. The SQUIDs are driven by the modulated FLL circuit which is controlled by the microchip computer operated by the PC through the USB interface. The LabView based operating software was developed for the SQUID tuning, the data acquisition and the judgment of the existence of the contaminants. The system can inspect the objects whose cross sectional area is up to 200mm by 90mm. The system was evaluated with the iron and the stainless steel small balls. The iron balls were detected down to 0.7mm diameter and the stainless steel balls were detected down to 1.2mm diameter at the surface of the conveyer. The sensitivity is practically preferable to the metal detectors. Moreover, the SQUID system could detect stainless steel tiny pieces with less than few hundreds of micron which could not be detected by the X-ray detectors.
