

Unique Tracking Number Assigned by MORTS \_\_\_\_\_  
RESEARCH TOPIC ACCEPTANCE REQUEST (RTAR) FORM  
(2 pages suggested, 3 pages maximum)  
TC/TG: 10.9 Refrigeration Applications for Foods and Beverages

**RESEARCH TOPIC ACCEPTANCE REQUEST (RTAR) FORM**

**TC/TG 10.9**

**Title: Improving Food safety, Food Quality and Food Security using On-line HACCP Monitoring and On-line Preventive and Routine Maintenance with Automatic Rapid Identification and Correction of Problem.**

**Research Category:** Food Processing and Preservation; Safety under Extraordinary Circumstances; Innovative and Emerging Technology; Food Quality; Operating and Maintenance Tools; Refrigeration System.

**Research Classification:** Applied Research

**TC/TG Priority:** 3

**T C Vote:**

**For** 2

**Reasons for negative votes and abstentions**

**Abstentions** 0

**Absent** 5

Against 2

**Reasons for negative votes and abstentions**

**A gainst: “I need a more plausible description as to how this will accomplish (advance) the state-of-the-art.”**

**A gainst: “I believe the technology is out there to do this currently, the industry just needs to be willing to pay for it.”**

**A bsen t voter: “I don ’t think it is A S H R A E ’s place to create hardware that will be commercially sold by others.”**

**-Estimated Cost: \$130.000**

**Other Interested TC/TGs:**

**Possible Co-funding Organizations:**

**Application of Results: Special Publications, Hand book chapters, Seminar Presentations, Industrial Applications.**

**State-of-the-art (Background): Hazard Analysis of Critical Control Points (HACCP) system is currently used around the world as the food safety standard. However, HACCP is not fully safe nor user friendly. It is laborious reactive system, thus responding to failures but not responding to them. Most causes for HACCP failures are equipment breakdown, human errors and force major, which are not monitored by the current HACCP system. To overcome those problems a proactive second generation HACCP system was developed where food safety parameters, equipment and accessories**

operational parameters and possible human error data were automatically monitored and the data wirelessly transmitted into the facility computer, stored and processed into needed reports by specifically developed software.

Various smart controllers were also developed. These units can connect with the electronic box of every processing equipment or accessory such as refrigeration unit, air condition and analytical instruments. The connecting units can retrieve the food safety and the equipment operation data and wirelessly transmit it to a central unit which wirelessly transmit all data produced in the facility into a nearby computer.

If data starts to deviate from the specifications a warning or alarm are sent inside or outside the plant. Among the recipients are equipment and computer repair services who can rapidly access the system, identifying the problem and repair or help to repair it before it runs into a HACCP or equipment failures. As a result food safety failures, recalls, equipment breakdown, plant downtime, food spillage and food deterioration are drastically reduced.

As food security is also proactive in nature, desired preventive parameters are easily being integrated and monitored by this system. Tempering prevention, audio and video surveillances and introducing poisonous substances to water and air are some of the system capabilities for security and bioterrorism.

The system can be easily expanded by integrating cold storage, transportation, processing and production into one operating mega-system.

### **Advancement State-of-the-art**

In order to further improve the efficiency of food safety and food security protecting system as well as to improve the on-line preventive maintenance which is embedded in it shortening the period between warning or alarms issuing and the correction of the problem is desperately needed. This will also improve facility operations, which includes processing, refrigeration, cold transport and cold storage. It will also improve system operations by reducing downtime and emergency repairs, equipment breakdown and energy utilization.

**Justification and Value to ASHRAE:** This project fits the guidelines of ASHRAE'S Strategic Plan, Section: #4, Improve Safety, Security and Health and advancing ASHRAE'S role in the Safety and Security of Food production and distribution with the emphasis on refrigeration. The proposed new type technology could be adopted by almost any segment of ASHRAE as it can improve operations, performance, and reduce maintenance costs of almost any mechanical system. The improved reliability of equipment used by ASHRAE members and the products produced by them at higher food safety level will be significant and will be achieved at lower cost.

**Objectives:** To accomplish project goals, a computer software and simulation program, will be developed in order to demonstrate the principals of the automatic problem solver in general and in specific cases taken from food processing. The software will be integrated with previously developed software which issues the warnings and will be tested on one or more food processing applications.

**Key References:**

