	I3E ***South East Europe TCP***

Best Practice Report

Frozen Food Temperature Monitoring during Transportation and Storage

Document type	**:** Best Practice Report
Document version	**:** Final
Document Preparation Date	**:** February 3rd, 2011
Classification	**:** Internal
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Project co-ordination	**:** Fotec
Deliverable Responsible	**:** Fotec

Rev.	Content	Resp. Partner	Date
0.1	Creation of document	Fotec	03.02.2011
0.2	Correction	Fotec	04.02.2011
0.3	Additions	Fotec	08.02.2011

Everybody please state revision index and short description of what has been done + partners involved and date.

Final approval	Name	Partner
Reviewer	Manfred Radlwimmer	Fotec
Reviewer	Martina Dürauer	Fotec

1. Best Practice Title

Frozen Food Temperature Monitoring during Transportation and Storage

2. Location of Best Practice

Country, region, town

Austria, Lower Austria, Wiener Neustadt

3. Best Practice Executive Summary

Describe briefly (max 10 lines) the GP context (partnership, funding, objectives, approach followed, results)

As of January 1st 2010 the owner of a catering or gastronomy company has the obligation to record the temperature of his short-life food products during transportation and storage without a gap. Furthermore the owner has to keep the recordings for more than a year.

The main points in this project was to develop a concept and a functional model for:

I. Retrieve temperature readings from temperature sensors in refrigerating plants.

II. Analyze the recordings for eventual abnormalities to generate an alarm.

III. Archive the recordings in a database for a continuous report.

An additional requirement was to ensure that the communication to the sensors happens over a wireless bond. This wireless aspect is due to the fact that in the locations of our industrial partner the laying of electrical cables is not allowed.

4. Best Practice Classification

Best Practice Theme

☒ *Research Transformed to Innovative Product*
☒ *Research Transformed to Innovative Service*
☐ *Research Transformed to Innovative Methodology*
☐ *Research Transformed to Innovative Production Process*
☐ *Financial Mechanism for Transformation of Research to Innovation*
☒ *Support Mechanism for Transformation of Research to Innovation*
☐ *Other (describe)*

Best Practice Research / Application Areas

☒ *Industrial / Manufacturing Systems*
- ☒ *Industrial Informatics and Communications*
- ☒ *Intelligent Devices*
- ☒ *Distributed Control Systems*
- ☐ *Flexible Manufacturing Systems*

☒ *Embedded Systems*
- ☒ *Industrial Embedded Systems*
- ☐ *Nomadic Environments*
- ☐ *Private Spaces*
- ☒ *Public Infrastructures*

5. Description of Best Practice

5.1 Best Practice Context

Overall background of the Best Practice. Location, socio-economic, technical & policy background of the BP (max 10 lines)

Our industrial partner owns some branches of school buffets in which it is not possible to lay electric cables from a centralized temperature recording system to the temperature sensors themselves.

Therefore we developed a concept and a functional model which retrieves temperature readings from temperature sensors in refrigerating plants via a wireless connection.

The acquired recordings are analysed for eventual abnormalities. An alarm will be generated if an abnormality is detected.

Afterwards all recordings and abnormalities will be saved in a database for later access and to generate a continuous report.

5.1.1 Policy Elements

What are the policy initiatives that have influenced the contextual environment of BP: innovation promotion policies, research funding policies, certification etc. as well as relevant tools (max 10 lines)

Fotec participates in various events and forums promoting its innovative ideas and R&B activities.

5.1.2 Socio-economic & Other factors

Other contextual factors such as customer / target market addressed, international validity, customer density, economic conditions, customer values, research area addressed (max 10 lines)

The major achievements of this project aim to give companies the possibility to monitor their frozen food products so they can be legally compliant even though there is no possibility to lay electric cables to acquire a constant reading of temperature of their stored food products.

5.2 Objectives

Aim of the project, specific objectives & strategies to achieve these objectives (max 10 lines)

According to the new food law as for January 1st 2010 every owner of a catering or gastronomy company has the obligation to record the temperature of his short-life food products.

This is imperative during transportation and storage. Furthermore the recordings have to be without a gap. In addition to generate a continuous report over at least one year the measurement data has to be stored in a database.

The overall plan was to develop a concept and a functional model which is capable to:

- Retrieve temperature readings from temperature sensors in refrigerating plants.
- Ensure that the data transfer between sensor and host computer is wireless.
- Analyze the recordings for eventual abnormalities.
- Generate an alarm or notification for the user.
- Archive the recordings in a database.
- Generate a continuous report.

6. Process

Describe the project including key concepts and the overall approach followed. Indicate project end users, target market, main project phases, problems encountered and solutions, problem resolution (max 10 lines)

Our industrial partner is owner of a catering company subdivided in several branches. In each location it is not possible to lay electric cables, therefore it was necessary to use a wireless temperature sensor system to achieve the recordings of the sensors.

Major items of this solution are:

1. More than one company with more than one branch can use this system.
2. The temperature recordings are stored in a central database via the internet for all branches of a customer.
3. The user has the ability to configure threshold values for each temperature sensor and regarding to this generates notifications per SMS or e-Mail to immediately notify himself, a guarantor and/or a maintenance technician.
4. Report Creation – the user can generate a complete record which includes all events and/or temperature readings. Furthermore the user can specify the quantity of reading points per day.
5. Sometimes it occurs that a fridge is out of reception range. For these cases it is possible to use temperature sensors with internal storage capabilities and an USB connector. The user is requested to daily or weekly plug in the USB sensor into the data logger to automatically transfer all readings into the database.
6. This system is norm conform with: DIN EN 12830, DIN EN 13485, DIN EN 13486

6.1 Project Design

Project design based on targeted market complete understanding, project structure, policies and procedures, management and implementation actions (max 10 lines)

Using a state-of-the-art wireless temperature monitoring system coupled with a centralized database it was easily managed to establish a concept for our industrial partner needs.

6.2 Project Management

Activities relevant to project coordination and management, project documentation and reporting, quality control, validation and verification (max 10 lines)

We use an agile project management tool named Scrum for all our projects. We have adapted this project management tool just to our needs.

6.3 Project Implementation

Main elements associated with the project implementation. Realization of new idea, or new technological realization or improvement / novelty to known technology and means to achieve this. Innovation associated with the project realization in terms of new products, services, methodologies. Marketing, advertising and customer service. (max 10 lines)

We used state-of-the-art wireless temperature sensors from the company Arexx Engineering.

These sensors communicate via a 433 MHz frequency with a base station. The base station is connected to the host computer by using the USB bus.

Every sensor is transmitting active its measurement data to base station which itself delivers its data to the host computer. The PC validates the measurement data and as needed generates an alarm or a notification for the user if a temperature data of a refrigerate unit is out of range.

The ranges of temperatures are preset by the user for its individual situation. Also the alarm and notification messages can be set to the needs of the user.

Each day the measurement data from the temperature sensors of the refrigerate units are saved central in a database on the internet.

The system also include a graphical user interface to:

- Edit temperature rages
- Edit Messages for alarm and notifications
- Generate a continuous report
- Control of all refrigerating plants in the field

The following figure shows the abstract principles of this project.

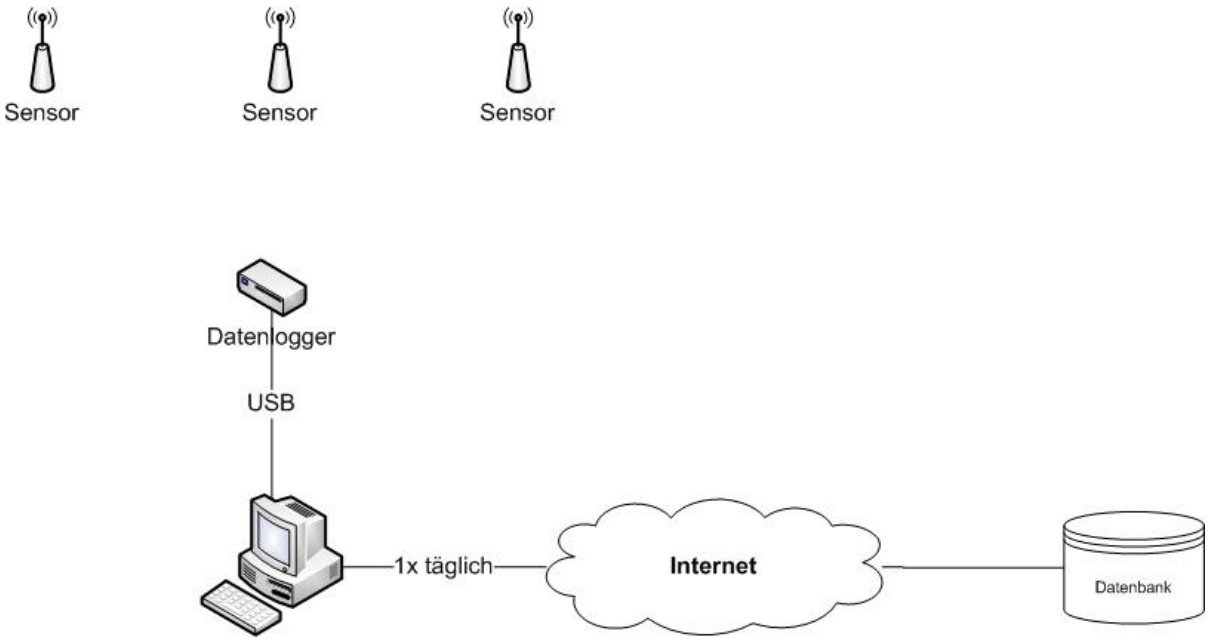

Figure 1: System Assembly

6.4 Project Evaluation

Project feedback mechanisms and evaluation mechanisms. (max 10 lines)

The present functional model shows that the described intended features of this project work quite well and that an implementation as commercial application is proofed possible.

7. Description of Research team/Institution

Short description of R&D team and institution (max. 10 lines)

The R&D teams that cooperated during the first (pilot) operation of the funding mechanism are:

- Fotec
- FFG
- Industrial Partner

8. Applied Financial Mechanism

Describe financial mechanisms applied in transformation of research into innovation within BP, as well as means of connecting scientific research team and financiers (max. 1000 char.)

The project was supported by Austrian Research Promotion Agency (FFG) and by our industrial partner.

9. Impact and benefits

Describe achieved benefits of R&D team and/or enterprise implemented innovation, as well as impacts on institutional and policy levels. (max. 1000 char.)

The involved company benefit from significant results, in terms of quality of products, new products and technologies. With the implementation of this flexible and wireless monitoring system our industrial partner will gain a product in his array of products.

10. Sustainability

Provide information on sustainability of innovation after financial aid within implemented financial mechanisms, and some multiplier effects as replication and extension of the action performed in BP. Expected use of Best Practice and lifecycle considerations. (max. 1000 char.)

This project ended in 2009. There is a follow up product development in discussion.

11. Repeatability and transferability

Lessons learned from the project implementation team. Repeatability and transferability of the project. (max. 1000 char.)

The first phase of this project shows that it is easily possibly to monitor a cluster of generic sensors to ensure a concept of norm.

12. Evaluation

Describe reasons and evaluation criteria why the described example is a best practice. (max. 1000 char.)

This best practice report is an excellent example how research and development helps companies to stay norm conform.

13. Contact of research team/institution	14.Contact of financial mechanism facilitator
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