THEORETICAL BACKGROUND OF INSTALLATION PROCESS OF BARCODE AND RFID IDENTIFICATION SYSTEM

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Abstract: In recent years automatic identification procedures have become very popular in many service industries, purchasing and distribution logistics, industry, manufacturing companies and material flow systems. This paper is analysing the theoretical background and working out operational method in case of computer-aided tracking system integrated with logistics for manufacturing and service companies.

Keywords: installation process, barcode, RFID , identification system

1. Theoretical background of installation process

Task of installation process cover the following details:
- Analyze the logistics system of storage, manufacturing and service and in these systems need to develop characteristic process which is divided into parts (this is the "part of process")
    - All "part of process" is divided into "elementary sections"
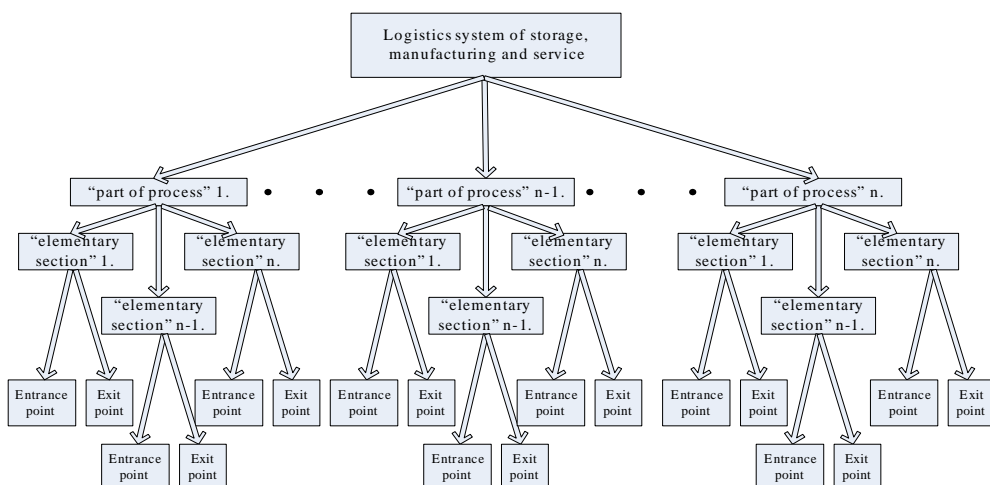   - Determine the point of entrance and exit of an "elementary section"

Figure 1. Breaking down of logistics process

- o Determine the type of code kind of code and divide stored information by code and by supervisor computer
- o When the products enter into the "elementary section" the code will be read. This signal came to the supervisor computer across the "terminal of elementary section" with code of "entrance point" of "elementary section". Instruction is given by supervisor computer what should to do on the work piece. When the specified operation is over, conditions with and around are to be changing and the supervisory computer is to overwrite the code. Finally the computer gives the following operation instruction and overwrites the code of "exit point". It is indicative of the operation is done.
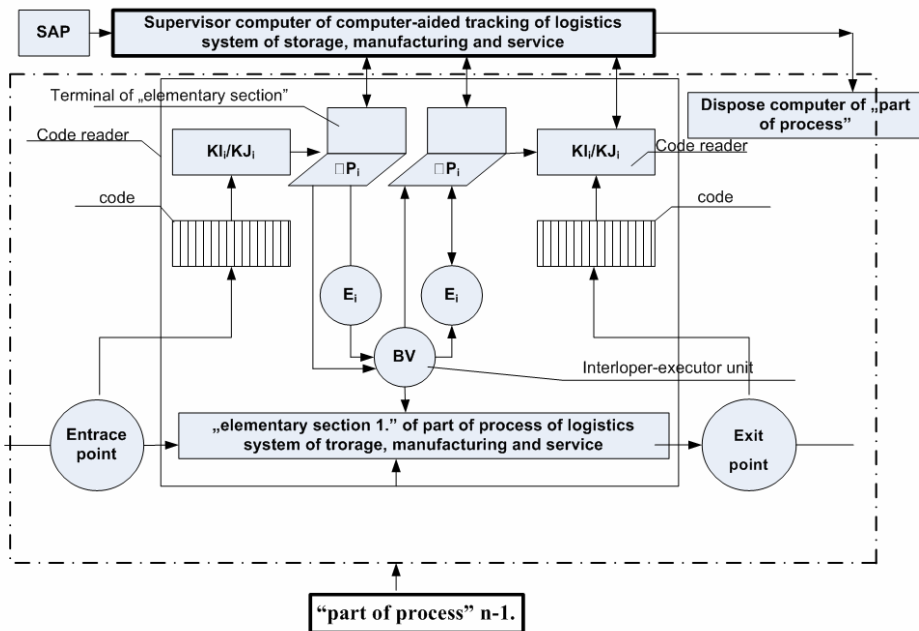

Figure 2. Information flow in the "part of process"

- Installation of identification system
  - o Guidance of designing
  - o Network architecture
- Problem of data transfer and reading
- Development of evaluation system related to computer-aided identification
- Determine level of management and the control of manufacturing which can use the evaluation information in the control of manufacturing and programming within short and middle period of time.

1.1. Installation process of RFID system

- RFID be founded on radio. RFID first part consist of a grid of wireless communication
- Reader is a very high-performance transmitter and sensitive receiver
- Tag is a very small-performance transmitter and low- sensitive receiver

- We can install the optimal RFID system by radio wave
- Design the directive of RFID system
    - Application of lower cost tag and antenna
    - Notation is work all combination
    - More effective throughput and good formation of functional distances
    - Observation of interference / electromagnetic compatibility
    - Consider of medical norm
    - National / International frequency economy
    - Parameter of communication

Application design of RFID we can divide up components because we need to understand the characteristic of these components:

- Environment: the RFID system functions contaminated surrounding. It has a lot of electromagnetic wave, signal of radio frequency, transmitter, and these will interfere with RFID system, or the radio wave will be distorted or decrease.
- Materials, which wear the tag, affect the radiation shape during giving or getting a signal. For example the water absorb the waves, and the metal reflect it.
- Network architecture of RFID belong to the following:
    - Topology data, for example: location, activation;
    - Features of equipment, for example: tag and reader;
    - Configuration adjustment of the reader, for example: ratio of energy
    - Connection features ruling the communication and cooperation of the reader

1.2. Reading problems of data transmission

- Sign mitigation: if the tag can take up less energy, the reader needs to put the tag closer. Density of energy emitted by the reader decreasing in proportion of distance to the power two. Energy reflected by tag decreasing distance to the fourth power. In other words if the density of energy emitted by reader decreasing in proportion of distance, then energy reflected by tag to a high degree decreasing. The water and the carbon absorb the energy.
- Electromagnetic interference: the electromagnetic interference essentially is noise whereby signal receiving is may be more complex from the tag.
- Tuning out the antenna: if there is any material that is not "RF friend" may be tuned out, so the tag can not have sufficient energy to reflect the sign.

2. Installation process of RFID system

RFID system is basically a radar system in which the reader provides the radio frequency signal for communications in both directions. The tag has no transmitter power generating source, but uses the impinging power from the reader on which to modulate its response. In passive systems the reader power field is also used to provide the necessary operating voltages for the tag's circuits. The tag may change either the amplitude or phase of the re-radiated signal depending on whether the real or reactive part of the impedance is changes. In a propagating wave RFID system, the reader radiates a signal which illuminates tags in its field. The tag contains no active transmitting components, but transmits its identity and data by modulating the impinging RF energy and re-radiating the modulated signal back to the reader receiver.
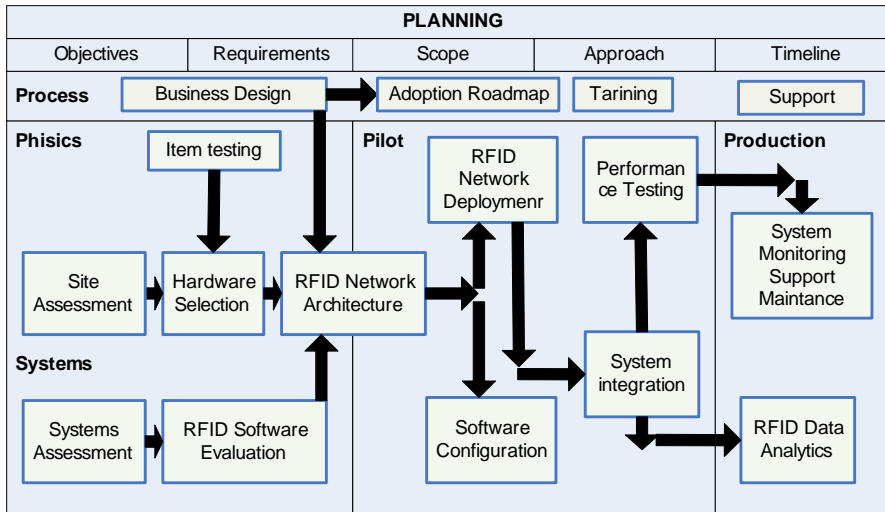
PLANNING				
Objectives	Requirements	Scope	Approach	Timeline

Process — Business Design → Adoption Roadmap — Tarining — Support

Phisics — Item testing — **Pilot** — RFID Network Deploymenr — Performance Testing — **Production**

Site Assessment → Hardware Selection → RFID Network Architecture — System Monitoring Support Maintance

Systems

Systems Assessment → RFID Software Evaluation — Software Configuration — System integration — RFID Data Analytics

Figure 3. Information flow in the "part of process"

The approach to RFID project execution starts with planning and continues through physics, pilot and production phases.

- **Planning**

  Planning is a critical step in any complex undertaking. From a commercial standpoint, the lesson is the same. Measure twice, cut once and save yourself a lot of hassle and rework. However, planning should be neither static nor short term in its outlook. You should plan and design your RFID system with the end in mind. It is one thing to deploy one or two readers and tune them to work properly, it is quite another to enable a dozen or more. This phase is focused clearly on defining business objectives which will establish criteria for decision making and detailing functional and non-functional requirements that will govern the solution design.

- **Physics**

  Applying physics expertise to your RFID implementation design is a first step in developing a solid foundation for your RFID solution. The fact is that the physics aspects of your solution will determine whether your RFID system can properly operate within your facilities. Many early adopters have identified physics as the biggest barrier to RFID project success. This is only true if you do not measure the physics aspects of your solution up front and use the outcomes to influence your solution design. The physics of RF is measurable and can be a big asset in ensuring a properly performing system.

- **Pilot**

  The objective of the pilot is to design and test the reader network configuration in a specific use-case. These activities leverage the inputs from the up front Physics and Planning activities.

- **Production**

  The production phase is typically focused upon adding readers and other devices as the solution is scaled to an operational level and its uses are expanded. This phase of your RFID deployment also includes additional activities such as more complex systems integration, customer testing and system monitoring and support.

3. Conclusion

Our installation is based on the rules of physical the reader and tag of the RFID systems in warehouses and factories. It needs to have connection with company informational systems. After arranging this connection there comes testing and confirming the system. Much of the focus is on the cost and it is on the price of RFID chips and tags. If implementing a fully functional RFID system, it incurs multiple costs that include tags, readers, printers, middleware, infrastructure, R & D, system changes, implementation, consultations, training, management change and service providing fees. You can also calculate with the cost for additional labour that will invariably be needed with today's RFID deployments.

If implementing an RFID system, it helps the control the supply chain, to reduce the cost of production and logistics and to increase the result of business and profit.

References

[1] FREDERICK E. TERMAN: **Radio Engineers Handbook**, 1943, pages 785 – 786; 179
[2] CSELÉNYI J., ILLÉS B.: **Logistics system I.** Miskolci Egyetemi Publisher 2004.
[3] CSELÉNYI J., ILLÉS B.: **Design and control of materials handling's system**, Miskolci Egyetemi Publisher 2006.
[4] ALLAGA GY., AVAR G., JANCSÓ T., MELIS Z., SÁRKÁNY M.: **From barcode to chip card**, PRIM Media Publisher
[5] TÓTH E., ILLÉS B.: **Computer-aided tracking of typical mechatronics system integrated with logistics using bar code** MTeM 2007 8th International Conference; Cluj-Napoca, Romania, 2007.
[6] TÓTH E., ILLÉS B.: **Design of identification**; Scientific Student Conference 2007.
[7] TÓTH E.; ILLÉS B.: **Alignment problem of tracking in the field of production management**; International Scientific Conference as known as micro CAD 2008.