

1-1-2007


Radio Frequency Identification (RFID) Tag

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DOI: 10.5703/1288284315878

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Recommended Citation

ECT Team, Purdue, "Radio Frequency Identification (RFID) Tag" (2007). *ECT Fact Sheets*. Paper 169.
<http://dx.doi.org/10.5703/1288284315878>

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RADIO FREQUENCY IDENTIFICATION (RFID) TAG

THE NEED

For the receipt and tracking of pipe supports material at construction jobsites, the proprietary electronic identification tags, RFID (Radio Frequency Identification) was designed and manufactured by SAT Corporation. With Radio Frequency Identification (RFID) technology, no line of sight or direct contact is required between the reader and the tag. Since RFID does not rely on optics, it is ideal for dirty, oily, wet or harsh environments. RFID is an automatic identification technology, similar to bar code technology, with positive identification and automatic data transfer between a tagged object and a reader. Since the RFID tags are read by low wattage radio waves, instead of light waves (as with bar-codes) they will communicate through non-metallic materials such as paint, plastic, grease, and dirt, and are impervious to vibration, light, water, and heat up to 100 degrees C in most cases.

THE TECHNOLOGY

A RFID system consist of two major components (reader and the tag) which work together to provide the user with a non-contact solution to uniquely identify people, assets, and locations.



**FIGURE 1 THE RFID TAGS AND RFID HANDHELD READER USED BY PIPING TECHNOLOGY & PRODUCTS, INC.
(AT THE BECHTEL RED HILLS POWER PLANT)**

The reader performs several functions, one of which is to produce a low-level radio frequency magnetic field. The RF magnetic field services as a "carrier" of power from



the reader to the passive (no battery required) RFID tag. When a tag is brought into the magnetic field produced by the reader, the recovered energy powers the integrated circuit in the tag, and the memory contents are transmitted back to the reader. Once the reader has checked for errors and validated the received data, the data is decoded and restructured for transmission to a user in the format required by the host computer system. The RFID tags used were both readable and writable. This capability enables information to be written back to the tag for enhanced asset management. RFID tags do not require a line of sight for identification and readability is not affected by bright lighting situations.



FIGURE 2 PIPING TECHNOLOGY & PRODUCTS, INC.

(NOTE: SHIPPED APPROXIMATELY 150 PIPE SUPPORTS TO BECHTEL RED HILLS POWER PLANT PROJECT FOR THE RFID PILOT APPLICATION. THE MATERIAL SHOWN HERE ARRIVED FROM PT&P'S MANUFACTURING FACILITY IN HOUSTON, TEXAS WITH AN RFID TAG AFFIXED TO EACH PIPE SUPPORT ASSEMBLY)

BENEFITS

Radio Frequency Identification (RFID) tags provide for error-free data gathering.

- Eliminate delays and errors of manual data collection
- Automatically identify locations and tracks assets
- No line-of-site required for reading tags
- Ruggedized tags allow for use in more extreme harsh environments with no loss of information or data
- Read & write to the tag in the field up to 250K times

STATUS

The RFID-Pipe Supports project is being led by Dr. Ed Jaselskis of Iowa State University and is being conducted and sponsored in conjunction with the Construction Industry Institute (CII). Piping Technology & Products, Inc., in conjunction with the Construction Industry Institute (CII), Bechtel Corp. and SAT Corp.



has completed the first pilot test of Radio Frequency Identification (RFID) technology on Feb. 18, 2000 in Houston, TX, USA.

BARRIERS

- Lack of standardization: It's not possible for one manufacturer's tag to be read by another company's reader.
- Metal hampers RFID tag operation by blocking and canceling signals: It would be not be possible to read a tag through a steel beam.
- Active tags will most likely require a battery management program to ensure that batteries with sufficient energy are powering the tags.

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Proceedings - Construction Industry Institute 2000 Annual Conference

REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

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PUBLISHER

Emerging Construction Technologies, Division of Construction Engineering and Management, Purdue University, West Lafayette, Indiana