G-Unit

RFID Description of Operation

Radio Frequency Identification (RFID) is a relatively new technology that we intend to use for product tracking, control, and data acquisition purposes.

Texas Instruments has been one of the leaders in the development of an RFID standard. The Tag-It RFID transponder is fully compliant with the standard and TI has made several options available for communicating with the tags, including a reader board that supports RS-232 and a low-cost ASIC than can be used for custom communications circuit board designs.

The purpose of this document is to describe the intended implementation of RFID technology within the "G-Unit" platform.

Product Identification:
The Product Identification Number and Lot Tracking Code will be read from the tag and stored in a database.

Machine Setup:
Product Initial Freezedown Temperature Setpoint, Mix Concentration (for coarse Brixing adjustment), and possibly a Viscosity Setpoint will be read from the tag and used to automatically set up the bowl operational parameters.

Product Use Control:
If a machine is set up on an upcharge program (where the customer pays for the machine placement through a charge tacked onto the product sales price) then the product tag will receive an Authentication Challenge from the machine. Failed challenges will be logged and may result in an error message directing the operator to report an error code or a Machine Lockout condition. The lockout would be reset once the operator contacted the product manufacturer (ie: Kan-Pak) and followed instructions for entering an Unlock Code.

At the time of product manufacture the unique tag serial number will be run through an algorithm and the result will be stored to the tag. The Authentication Challenge would compare the checksum stored on the tag against the result of running the tag serial number through the encoding algorithm.

"Smart Card":
The Smart Card will be a software update and data collection system tailored to satisfy several needs within Kan-Pak and the equipment community in general.

The Smart Card will leverage the I/O interface of the RFID system. The major limitation of the technology is the storage capacity of the 13.56Mhz Tag-It tag -- 2000 <u>bits</u> (not bytes). In order to increase the storage capacity of the Smart Card, multiple tags will be embedded in the card.

It will be necessary to identify one of the tags as a "Master File Table" of sorts. This tag will provide information about the nature of the data stored on the card and the sequencing of tag serial numbers in the data set.

The G-Unit Operator Interface will be used for advertising when it is not being used to control the machine. One of the ways to keep the information displayed current, or to customize the information to suit a particular customer's needs will be to upload a Smart Card Update to the microprocessor. This can be accomplished by putting data on the card that the machine will recognize as an update when the card is read.

When the Smart Card is used for data collection it will be able to store a variety of data types, such as:

- Machine Serial Number (n characters, alphanumeric?)
- Machine Hours of Operation (Integer)
- Compressor Cycles (Integer)
- Alarm History -- limited to Critical (Alarm Data Table*)
- Avg. Mix Cabinet Temperature (Integer)

Bowl Specific:
- Product in Bowl (n character, alphanumeric)
- Product Pump Run Time -- tube life (Integer)
- Top/Low Selling Times -- decaying avg? (Time)
- Top/Low Selling Days of Week (Integer?)
- Last time cleaned (Time/Date)
- Avg. Recovery Time -- during no-draw condition -- to be measured against a baseling for analysis of refrigeration system...? (Integer -- minutes?)

The tag will be interrogated when the Bag-In-Box is put in the machine. The operational parameters for the bowl will be stored to a buffer location. The bowl will start using the new parameters when it is put into "Auto fill" mode. Once the product pump runs for the first time, the tag will be written to with a date and time stamp and the addresses will be locked. This date/time stamp will be used to determine a case expiration date. It will also be possible to store machine serial numbers to the tags if it is desirable to track where the product was run.

Total Product Pump Run Time for the box will be stored to the tag at the end of each pump run. Storing this data to the tag will allow the run time information to "follow" the box.

The tag on the box will be "killed" once the preset box life has expired or once the product pump run time for the box has exceeded the product capacity of the bag.