Standard Security Methods and RFID Authentication for Machine Access and Management.

Security has become a critical factor in an ever-widening number of applications. But with the variety of choices available, which is right for your specific needs. This article will cover the benefits and drawbacks of several different security methods being used today.

IDEC Corporation

USING THE PROPER SECURITY DEVICES in industrial settings for machines and other equipment is a critical factor in providing levels of engagement with highly sensitive operations. Industries already interested in such security include machine tools, material handling, injection molding, food and beverage, automotive and aerospace, and packaging.

Companies require devices that offer simplicity and convenience but are also safe. They understand that enabling traceability might mean an added level of capabilities. Depending on the particular needs of the company or machine, a limited variety of devices are available, which include mechanical keys, magnetic strip cards, password protection, biometrics, and RFID key cards.

Simple Security Methods

One of the most common methods for controlling access to spaces or machines is the simple, and low-cost lock and key method. Special keys are distributed only to those who have the proper access level. Like an on/off switch, the lock-and-key method has only two state: access or no access. The greatest drawback of this type of system is the loss of a key. Not only can that person not gain access, but if that key is found by someone who should not have access, it can still be used. In this case, either the lock-and-key unit has to be changed—and keys redistributed—or you have to trust that the key is truly lost and make a copy.

Another relatively low-cost method for security is the magnetic strip card where a reader is installed, and a card swiped through it to enable access. These devices are widely used in consumer locations and are convenient. A user must have the exact card to open gain access unlike the lock and key where the key can be easily copied. The drawbacks for this type of system includes that the magnetic stripe can get damaged or corrupted, particularly when used in industrial settings, and it uses less advanced technology to copy the device.

Another familiar method for maintaining security is the system where you have to key in a password to gain access. This is common for computers, mobile devices, and human-machine interfaces (HMIs) and require the operator to remember their password. These systems are

typically part of the on-board software for the device and can be set up rather inexpensively from that point. The primary challenges that occur with this type of security include people creating simple passwords that are easily hacked (birthdays, favorite pet, child or spouse's name) making them less secure than other methods mentioned. In industrial settings where protective gloves are used regularly, keying in a password can be difficult. And then there is the ever-present memory glitch where the user has forgotten a complicated password.

Biometric security, such as face recognition and fingerprint scanners provide personal, non-transmittable information so that operators don't have to carry or remember anything—and cannot be duplicated. These systems are used more and more often for consumer electronics but are also more expensive to implement and manage. Further, this method doesn't work well around machinery where gloves, helmets, masks, and safety glasses may impede their function.

RFID Security Capabilities

Radio frequency identification (RFID) security methods use a passive card and an RFID reader (see Figure 1). The card incorporates an antenna, capacitor, and integrated circuit that contains a unique ID number. The RFID reader also incorporates an antenna that continuously emits a short-range RF signal so that when you hold the key card or tag on the reader, the two interact to create the current necessary for the card's integrated circuit to deliver the ID number to the reader. The reader communicates directly with the host device, whether that is a controller, computer, HMI, or individual machine using Modbus TCP communication. The reader automatically checks the number against those registered in the RFID reader and either allows or rejects access. Registered users then have multi-level access to their machines or equipment based on their priority level.

Figure 1: The RFID reader is compact and lightweight for use in a wide variety of applications.

These RFID devices offer the same simple and inexpensive capabilities as some other methods mentioned above but are much safer and more secure because the authentication and authorization process can be quickly and easily modified. Managed digitally, these flexible RFID cards can be programmed and reprogrammed eliminating the concerns about lost keys or cards, changes in level of access, or stolen cards. The disadvantage is in forgetting your keycard—of which another can be created quickly and easily. Companies such as IDEC offer two styles of cards: key fobs and a card tags (see Figure 2) where the default authorization level for the card tag is 10. Key fobs are available with five default authorization levels indicated by color from first to fifth level: green, yellow, red, blue, black respectively. The RFID reader works with all 13.56 MHz RFID tags (Type A, F, or V standard). IDEC tags also include enhanced encryption, unlike other tag types presently on the market.

Figure 2: RFID readers are available for use with a variety of card types. IDEC tags offer additional security to the user, unlike many standard products on the market.

Devices feature three colors of LED on the reader: white to indicate standby mode, green to indicate success, and red to indicate error. A built-in buzzer also provides audible feedback for success or error conditions. Since the devices are managed digitally these capabilities can be silenced if the user wishes. Other features include a push-in power supply terminal for safety and easy installation and a built-in Ethernet port to facilitate easy connectivity to a host device such as a PLC or HMI. The KW2D series RFID devices are compact and lightweight and mounts into a 22mm cutout for ease of installation (see Figure 3). The devices are made to work on metal surfaces and also come in IP65/67-rated versions for water, dust, and oil proof applications.

Figure 3: Compact and lightweight, the KW2D series RFID devices mount into a 22mm cutout for ease of installation.

Whatever your choice in security method, be sure that you work with a partner that provides full specifications and capabilities online for ease of selection and use. For higher-level capabilities like those offered by RFID systems, reputable companies will have a free downloadable configuration tool (see Figure 4), such as the one offered by IDEC. Such software will allow you to set authentication/authorization levels (up to 255 levels) and configure the device to key settings (up to 500 items) depending on use.
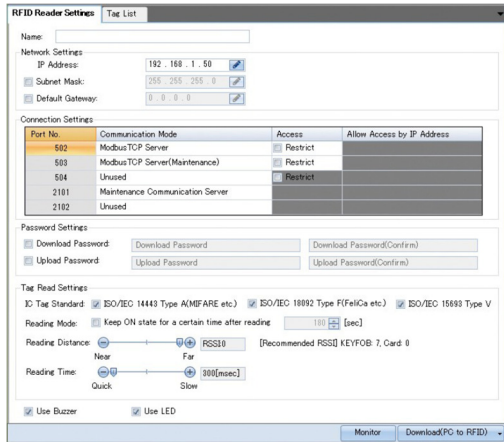

Figure 4: Typical screen shots from an RFID configuration tool.

Using the software that is available, users can easily track and manage the access to machines and equipment. This provides greater safety and security for sensitive pieces of machinery where people must be authenticated at different authorization levels. (see figure 5) For example, an operator may have a lower level of authorization than a supervisor, while a manager may have the highest level of authorization.

Figure 5. This photo shows workers who have been authenticated at different authorization level.

Because every person who accesses the machine is listed and timestamped for traceability and historical purposes, managing access becomes organized and simple, and provides greater flexibility. Greater traceability allows the manager and supervisor to monitor machine use for maintenance scheduling, to maintain inspection schedules for part lots, to evaluate an employee's workload and output, and to manage user authority for machines.

Conclusion

As discussed in this article, there are a wide range of security methods that are available for use from the simplest and least secure functions of a lock and key system to the most flexible and highly secure capabilities of the RFID security device. While every company must choose which level of protection is adequate for their operation, they now must also weigh the added capabilities of access control and traceability. It is now possible to consider your whole company's needs when making security device decisions.

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A leading manufacturer of innovative industrial automation and control products since 1945, IDEC delivers world-class products backed by personalized service and highly-rated technical support. IDEC provides solution-driven products to design engineers to help them create lean, cost-effective and safe solutions for their automation applications. Products provided include PLCs, HMIs, machine safety, relays, power supplies, sensors, switches, LED lighting and more.