ELATEC
RFID Systems

RFID USER AUTHENTICATION AND ACCESS CONTROL IN INDUSTRIAL AUTOMATION

WHAT YOU NEED TO KNOW

Extend RFID identification card-based capability for the access control of PLC, robot and HMI automation controller software and devices requiring special operator training.

A typical manufacturing plant has a diverse assortment of machinery, robots, and flexible manufacturing systems that fabricate and assemble various products. These machines are often driven by programmable automation controllers (PACs) and use a human-machine interface (HMI) for configuration, notifications and routine control. With automated systems growing in number and increasingly interconnected, programmable controller hardware, software and HMI access control become crucial.

Automation controllers are usually connected through plant-wide networks to IT servers that include databases that collect and store information to manage things like employee user authentication, access control and authorization to run plant manufacturing processes. User authentication allows for employee accountability. Access control and authorization determine if the employee has the proper skill set, is currently certified and is trained to run the manufacturing systems. Equally important is that an employee is authorized to enter a hazardous area to perform maintenance or some other activity.

Plant IT servers typically store copies of the machine automation controller, HMI and robotics software for backup and disaster recovery purposes. To prevent remote or other unauthorized software updates to PAC-based machine controllers, HMIs and robotics software, a verification system should be installed on or near the operator station, which requires a physical presence of the person authorized to make software changes. This authentication and authorization requirement protects the manufacturing system, machine operator and maintenance personnel.

IMPLEMENTING AUTHENTICATION AND ACCESS CONTROL IN INDUSTRIAL AUTOMATION

Traditionally the task of authentication and authorization of personnel who operate, update and maintain manufacturing systems in industrial automation applications is accomplished using one or more methods. Among them are magnetic stripe cards, smart (chip) cards, RFID cards, PIN pads and key switches.

User authentication and authorization to access industrial automation equipment in factories today must be easy to use, flexible, durable, secure, and stand up well to environmental elements. RFID card systems address these application requirements better than other methods and offer added benefits. RFID cards are the most widely used form of identity authentication and access control today.

Benefits of RFID Card Systems

One of the essential benefits of RFID identity authentication and access control is that it is easy and convenient to use. RFID cards are touchless, and the user only has to wave the card within a few inches of the reader to be read.

RFID readers can be used throughout the organizational ecosystem for multipurpose authentication with existing employee building-entry ID cards and adding functionality like time-based access control, access to manufacturing processes and hazardous areas. Additionally, RFID readers can often read and write to more than one type of card. Cards can be updated without issuing a new card if plant requirements change.

When enabled with network access, readers can communicate, using various communication protocols, with information technology systems, programmable controllers and HMIs in plant processes. Some network-enabled RFID readers can also provide programming and firmware updates to a distributed fleet of devices remotely.

Since they are touchless, both cards and the readers experience less wear and tear than in systems requiring the card to contact the reader, such as in magnetic stripe cards and smart (chip) card systems. Over time, this can minimize the replacement cost of both cards and readers.

RFID card systems are more secure than other card-based identification technologies. Data transfer between cards and readers and message traffic between card readers and plant networks can be encrypted.

The RFID system can also execute a kill command if the card is lost or stolen. Since the kill command deactivates the card, it prevents unauthorized access to sensitive data, hazardous areas and the operation of industrial manufacturing processes.

Importantly, given industrial settings, RFID cards and readers are more durable in harsh plant floor environments against dust, heat, dirt and general wear and tear than other authentication and access control technologies.

Application Considerations for RFID System Selection

RFID is a secure, flexible, reliable, and easy to use solution for authentication and access control of hardware and software in industrial automation processes and durable in harsh plant floor environments. There are multiple RFID reader technologies on the market, but they are not all created equal. Choosing a comprehensive authentication and access control platform that offers a wide range of options can help your organization implement a solution that will continue to meet your needs as they change over time. Manufacturing companies typically have similar requirements. Among the most prominent are:

+ **Flexibility:** does the card reader work with the existing card technologies I have in my plant? Will it allow migration to a different card technology that my plant may implement in the future?

HOW RFID AUTHENTICATION AND ACCESS CONTROL WORKS IN INDUSTRIAL AUTOMATION APPLICATIONS

An RFID-based authentication and access control system has cards, readers, and a plant network connection to an HMI, PLC or robot controller. There is also a network connection to the plant wide IT data servers.

The RFID reader has an antenna that constantly emits a short-range radio frequency electro-magnetic field.

To gain access to an automation controller or HMI, the user presents their card (with an embedded antenna and other circuitry) to the RFID reader, typically installed at or near an operator control station.

When the card comes within range of the reader, an electro-magnetic current is induced activating and reading it. The employee unique identifier and any other stored data are passed on to plant IT servers. Card data is compared to stored authentication and user authorization data. User authorization information is then used to grant or deny access to plant manufacturing processes or hazardous areas.

+ **Networking Capabilities:** does the chosen RFID solution support the various networks I use in my plant? Does the solution allow for remote updates and programming of devices in the field?

+ **Security:** does the RFID system meet the security needs of my plant? Does it support industry-standard encryption communications protocols for secure data transmission between readers, networks and peripheral devices in my plant, including PLCs, HMIs, robot controllers and IT servers?

AN RFID SOLUTION DESIGNED FOR INDUSTRIAL AUTOMATION

With more than 30 years of experience, ELATEC has become a global leader in RFID design and manufacturing. For industrial automation applications, ELATEC offers a unique RFID package for identity authentication and access control. This package is secure and flexible, universal and easy to use. And it is future-proof.

Demonstrating its capabilities, ELATEC recently tackled three industrial automation authentication and access control projects that included:

+ Authentication and access control for equipment operators to start up robots in an **automotive assembly plant** for welding, paint, and various other areas

+ Authentication and access control for assembly line workers in an **automotive engine plant** to certify that operations in an assembly station were complete and that the main assembly line could advance to the next station

+ Authentication and access control for quality control personnel in a **beverage packaging plant** to select and draw samples from a beverage container manufacturing line for batch quality verification

Using the TWN4 MultiTech 2 universal reader/writer coupled with the TCP3 network interface module, ELATEC supplied an authentication and access control solution for each of the industrial automation projects described above. The diagram below shows the TWN4 RFID reader and TCP3 network interface module integrated into each application solution.

TWN 4 CARD READER + TCP3 NETWORK INTERFACE MODULE
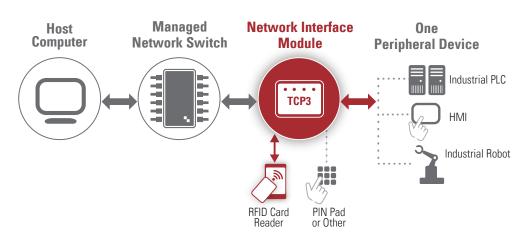**Authentication and Access Control Solution for Industrial Automation Applications**

Fig 1. ELATEC Solution – RFID reader + Network Interface Module

ELATEC RFID SYSTEM SOLUTION DETAILS

RFID Reader/Writer

The TWN4 MultiTech 2 universal, HF/LF, reader/writer supports 60+ RFID transponder technologies simultaneously as well as near field communication (NFC) and BlueTooth Low Energy (BLE) for use with smartphones and other mobile devices. ELATEC holds licenses for all major global security technologies, including HID Global, LEGIC, and NXP. This is ideal for companies employing multiple card technologies or who want to use their current identification cards and expand their functionality to address authentication and access control in their industrial automation applications. The TWN4 also makes it easy for a manufacturing company to migrate from an existing to a new card type that better suits their needs.

RFID Reader to Network Interface Module

The TCP3 network interface module is a small, highly flexible network interface device that shines in industrial authentication and access control applications. It has two USB 3.0 connectors for connecting one or two card readers or, for example, one card reader and another device such as a PIN pad for two-factor authentication.

The TCP3 can also act as an Ethernet router and has two gigabit Ethernet connectors, one used for LAN communications to the Host server and another for message communications to a peripheral device, like a PLC, industrial PC or robot automation controller. The Host connection also supports optional Power over Ethernet (PoE) for applications where it is difficult to find a power source.

Security

When used in industrial automation applications, secure, encrypted communications between the card reader, plant networks and peripheral devices is often critical. The TCP3 Network Interface Module can send card data and secure message traffic to the Host or Device networks using standard encryption methods like HTTP/SSL/TLS1.2/TLS1.3. A typical example is when sending message traffic to a peripheral device through the TCP3. The TCP3 can exchange security certificates with a programmable automation controller, like a PLC, ensuring that the message cannot be read by anyone not authorized.
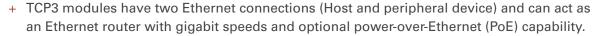
Remote Programmability and Management

Both the TWN4 MultiTech 2 reader and the TCP3 network interface module are easy to support. No need to send a technician to the plant floor when an update is needed. ELATEC's TWN4 readers and TCP3 network interface modules can be easily configured, reconfigured, and upgraded remotely using ELATEC software on a remote computer managed by plant engineering or IT personnel. For example, this means that configuration changes and firmware can be remotely updated to all affected devices simultaneously, saving a significant amount of time.

ELATEC ADVANTAGES FOR AUTHENTICATION AND ACCESS CONTROL IN INDUSTRIAL AUTOMATION APPLICATIONS

Combining ELATEC'S highly flexible, multipurpose TWN4 MultiTech 2 reader/writer with the powerful TCP3 network interface module enables manufacturing plants to extend RFID identification card-based capability to the access control of devices requiring special operator training like PLC, robot and HMI automation controllers. And to control access to hazardous areas. Additional ELATEC advantages include:

+ TWN4 universal readers support every major card technology globally available—more than 60, including HF and LF, and Near Field Communication (NFC) and Bluetooth Low Energy (BLE) used with smartphones and other mobile devices. ELATEC is also a licensee of HID Global, LEGIC and NXP technologies.

+ TCP3 network interface modules have two USB 3.0 connections and can support two card readers or other combinations such as one card reader and a PIN pad for two-factor authentication.

+ TCP3 modules have two Ethernet connections (Host and peripheral device) and can act as an Ethernet router with gigabit speeds and optional power-over-Ethernet (PoE) capability.

+ TWN4 readers and TCP3 modules support secure communications to Host servers and peripheral devices using industry-standard encryption methods like TLS1.3.

+ TWN4 readers and TCP3 modules are both remotely programmable and updateable, network allowing.

+ TWN4 readers and TCP3 modules are also future proof with flexible reconfiguration to address emerging technologies, security threats, and changing user requirements.

ELATEC has the most powerful, secure, flexible, reliable, and easy to use RFID systems for authentication and access control applications on the market today. And they are actively being implemented in industrial automation applications.

For more information, contact an ELATEC Applications Specialist in your region.