Case Study: Providing Smart Hygiene Control in Food and Pharmaceutical Processing Plants

Background

Maintaining high standards of hygiene has always been important in any facilities, such as food and pharmaceutical processing plants, that are involved in the manufacturing and/or processing of anything—food, drinks, or drugs—that will ultimately be ingested by human beings or injected or inserted into them.

The stakes are much greater these days for a variety of reasons, including the fact that the products from a single food or pharmaceutical processing plant may be quickly distributed around the country or around the world. If these products have been handled in an unhygienic manner causing them to become contaminated in any way, the result can be to cause injury or death to a large number of end users. The financial costs involved in recalling the failed product, compensating any victims, and -- potentially -- paying any fines imposed by the authorities, may be crippling to the company. Furthermore, the negative impact to the company's reputation may be so severe as to cause it to become insolvent and, ultimately, forced to declare bankruptcy.

Further exacerbating the problem is the current COVID-19 pandemic, which requires all personal -- managers, technicians, workers, maintenance, and janitorial staff -- to wear masks, practice social distancing, and maintain personal hygiene including the regular washing of hands.

Why Smart Hygiene Control

One part of the puzzle is to equip the food or pharmaceutical processing facility with the ability to provide smart hygiene control using special panel computers or box computers featuring high-power processors—both central processing units (CPUs) and graphics processing units (GPUs)—running sophisticated artificial intelligence (AI) and machine learning (ML) applications.
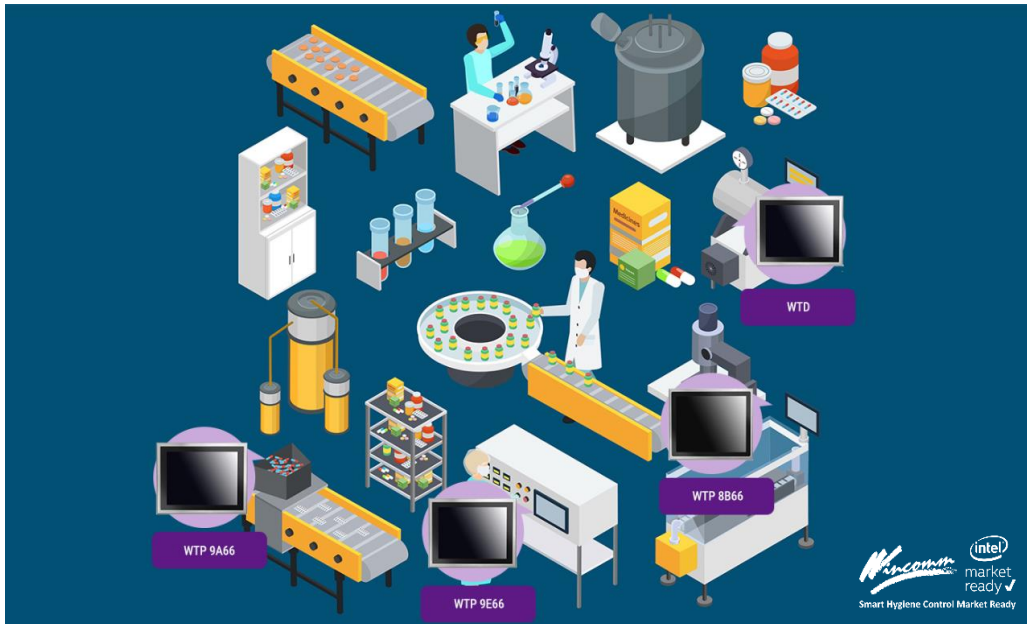
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Figure 1. Wincomm provides a family of smart process and hygiene control solutions suitable for food manufacturing and processing facilities.

● ***Monitor the environment to suit for food/pharmaceutical processing***

The entire facility can also be equipped with a wide variety of microelectromechanical systems (MEMs) sensors so as to monitor things like temperature and humidity. Using this data coupled with their machine vision capabilities, the smart control systems can verify that consumables and pharmaceuticals are not left sitting in unsuitable environments for longer than recommended durations.

● ***Maintaining Clean and Sterile Environments***

Multiple product recalls over the past few years—in conjunction with the current COVID-19 pandemic—have driven increasing awareness of the importance of hygiene in manufacturing and processing plants.

As part of this, it's also important to maintain clean—sometimes sterile—environments. In turn, this means that any equipment that comes into close proximity of food or pharmaceutical products as part of their manufacturing and processing must be able to withstand rigorous cleaning. As a result, there is now a requirement in food and pharmaceutical manufacturing and processing facilities for strict adherence to ingress protection (IP) against solids and liquids.

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Figure 2. Any equipment that comes into close proximity of food or pharmaceutical products must be able to withstand rigorous cleaning.

Defined as part of the international IEC 60529 standard (the equivalent European standard is EN 60529), IP Ratings have been around for more than 20 years, but they've never been more in the spotlight than they are today. The IP Code, or Ingress Protection Code, sometimes interpreted as International Protection Code, classifies and rates the degree of protection provided by mechanical casings and electrical enclosures against intrusion, dust, accidental contact, and water.

The standard aims to provide users with more detailed information than vague marketing terms such as "water resistant" or "waterproof."

Following the letters "IP" are two digits. The first digit indicates the level of protection that the enclosure provides against access to hazardous parts (e.g., electrical conductors, moving parts) and the ingress of solid foreign objects. This ranges from 0 (no protection against contact and ingress of objects) to 6 (dust-tight; complete protection against ingress of dust). The second digit indicates the level of protection that the enclosure provides against harmful ingress of water. This ranges from 0 (none) to 9K (protection against close-range high pressure, high-temperature water jets). For example, an electrical socket rated as IP22 is protected against the insertion of fingers and will not

be damaged or become unsafe when exposed to vertically or nearly vertically (when tilted up to 15°) dripping water.

In the case of food and pharmaceutical manufacturing and processing plants, an important goal of the standard is to make the various protection levels very precise and remove any potential ambiguity around how "clean" a system actually is.

- *Hygiene Control is Required the Standard – Waterproof & Dustproof*

In addition to simply wiping exposed surfaces down with soapy water or disinfectant, it's not unusual to have powerful liquid streams -- such as a water jet from a hose, for example -- in places where food and pharmaceutical processing and preparation takes place. In fact, this may occur at every step of the process until the product reaches the consumer. The liquids applied could be water or may involve some other cleaning liquid (including bleach), which might be far harsher than water.

A rating of IP66 is fairly common and adequate for many food and pharmaceutical manufacturing and processing applications. IP66 is defined as being "dust tight," denoted by the first digit, and being "protected against powerful water jets," denoted by the second digit. The IP66 rating allows users to clean their equipment with powerful water jets without fear of compromising that equipment.
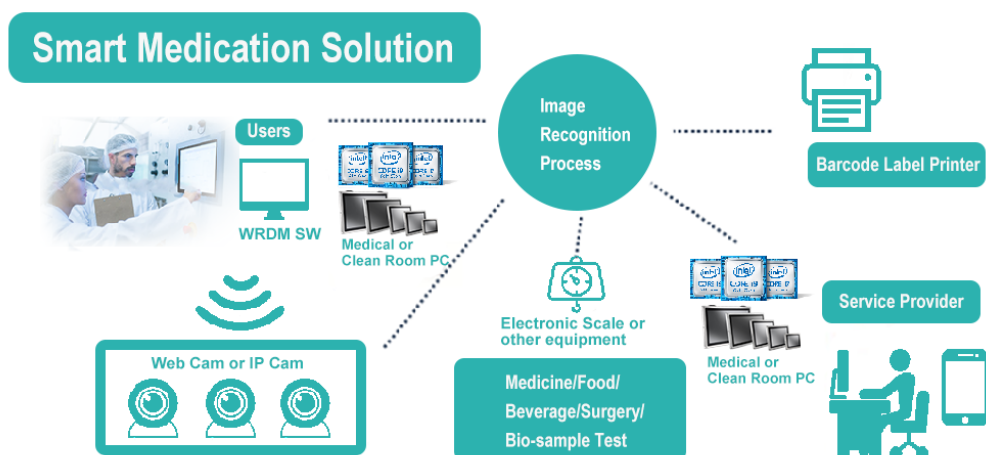

Figure 3. Wincomm provides a family of smart process and hygiene control solutions suitable for pharmaceutical manufacturing and processing facilities.

Having said this, there are some cases where a higher rating is required, such as IP67, which says that—in addition to being dust tight—the system must be completely watertight when fully immersed in water up to 1 m deep, or even IP69K, which says that the system must be completely watertight when subjected to close-range, high pressure, high-temperature spray downs.

It's important to keep in mind that most pieces of equipment have six sides (top, bottom, front, back, left, and right), and all of these surfaces must meet adhere to the guidelines of the designated IP rating. This includes the human-machine interface (HMI), which could include some sort of display, as well as those points where external power and other input/output (I/O) interfaces connect to the system.

Meeting and Exceeding the Standard by Wincomm Smart Hygiene Solutions
As a supplier of state-of-the-art panel and box PCs for hygiene and process control solutions, Wincomm Corporation prides itself on its ability to meet the necessary IP standards for food and pharmaceutical manufacturing and processing facilities.

As part of this, the company has developed a unique design for the various power and I/O interfaces, including the cables, which are custom-designed by the company. Furthermore, when testing these cables, negative pressure is applied, which would make it far easier for liquids to enter the system should there be a breach. If liquids can't penetrate the system when negative pressure is applied, it's far less likely for a breach to occur in a more natural setting. Of course, extra costs are incurred when testing systems to this degree, but customers are fully aware of the value of such testing.

If necessary, Wincomm can deliver platforms that go all the way up to the IP69K rating, where the 'K' refers to special testing using close-range, high pressure, high-temperature water jets. This level of testing was originally developed for road vehicles. It was later adopted by food, beverage, and other industries that demand sanitary conditions and require frequent washdowns.

Since all engineering work is performed in-house at Wincomm, the creation of custom or specialized designs is not a problem. Wincomm can handle all aspects of the hardware and firmware, so there's no need to recruit multiple third parties to complete the system. Although extra costs may be involved with regard to creating custom solutions, such costs are insignificant when compared to the

advantages associated with special products that won't fail in the field. In many cases, equipment of this type could be in operation for many years; in some cases, the equipment could remain in operation for a decade or more.

● **Flat-Panel PCs All the Way to IP69K**

Wincomm designs its latest platforms around Intel's 7th generation Core i7/i5/i3/Celeron microprocessor to the highest electromagnetic compatibility (EMC) level (4.0). A good example is the company's WTP-9E66 Kaby Lake 19-inch flat-panel fanless stainless PC, which offers CE, FCC, and VCCI Class B certifications and is available with either an IP66 or IP69K fully-sealed anti-corrosion enclosure.

Figure 4. Wincomm's WTP-9E66 Kaby Lake flat-panel PC can handle the rigors of food and pharmaceutical processing plants.

Featuring a flat resistive touchscreen, the WTP-9E66 Kaby Lake's chassis mounts with downward power and I/O interfaces, which reduces the required installation space (various mounting options are available). Any of the Wincomm's systems that are targeted at food preparation or pharmaceutical processing can be tailored with various forms of I/O, high-definition cameras, IP ratings, software, etc.

In summary, maintaining high standards of hygiene has always been important in any facilities involved in the manufacturing and/or processing of anything—food, drinks, or drugs—that will ultimately be ingested by human beings or injected or inserted into them. The current COVID-19 pandemic has placed a renewed emphasis on keeping things clean and protected.

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One part of the puzzle is to equip the food or pharmaceutical processing facility with smart hygiene control systems using high-performance computers that are equipped with state-of-the-art sensors and that run artificial intelligence applications to ensure that products are correctly handled and personnel maintain hygienic practices. Another aspect of the solution is to use equipment that can be cleaned and sterilized using powerful water jets without fear of compromising that equipment.

If your end application involves the manufacturing, processing, or preparation of food, beverages, or pharmaceuticals, then smart hygiene must be at the top of your requirements. Let Wincomm help you cross this box off your checklist.

About Wincomm

Wincomm is one of Taiwan's leading manufacturer of industrial computer and embedded computer products. Wincomm designs and develops all in one panel PC, large size all in one digital signage system, rugged box PC and embedded software products for a broad range of industries and applications. Wincomm aims to provide hardware and software integrated solutions for the most variant environments such as industrial automation/human machine interface control, digital signage/infotainment Kiosk, and medical computing.

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