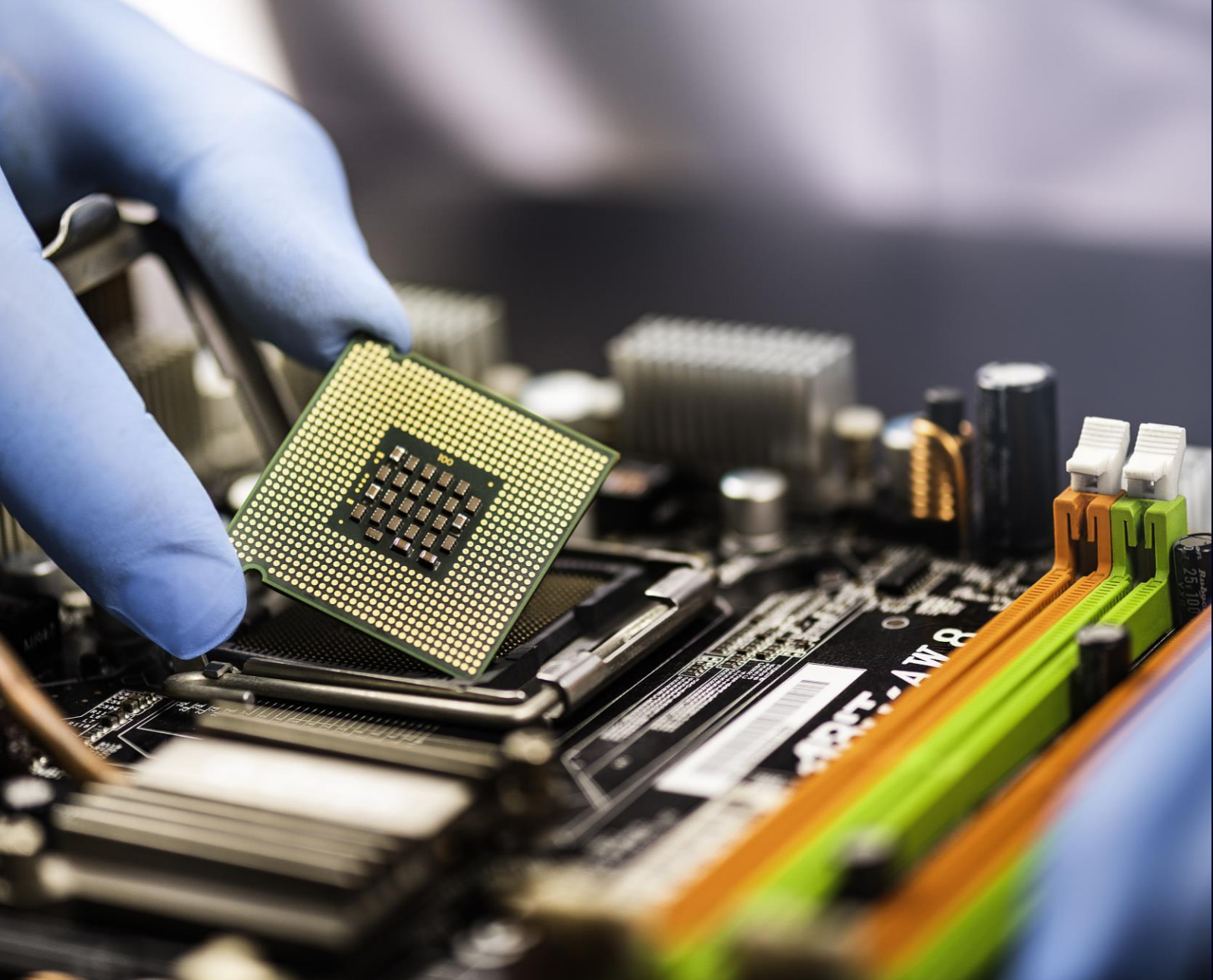




Ensuring fire safety and security in clean room environments

Key requirements and best practices

Mangesh Sanap and Terry Anne Ramos



Sustainability, security, and efficiency

across the entire semi-
conductor ecosystem



End-to-end,
holistic approach
to infrastructure and
manufacturing

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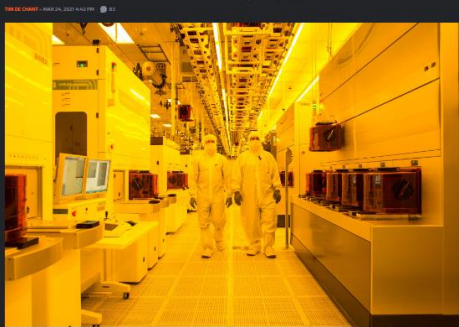


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Application

Fab fires and drought threaten to make chip shortages worse

Back-to-back incidents threaten to further strain already tight chip supplies.



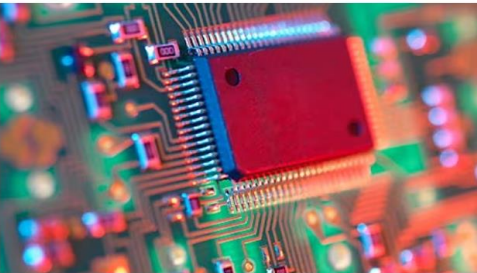
A significant portion of the Micron fab is bathed in yellow light to protect the light-sensitive coating on the wafers. Chips on the wafers are created using a photographic process. Each of the cameras, which are the machines on each side of the aisle, costs about \$70 million. [Credit: Reuters](#)

Semiconductor supply chains have not been having a good year. Shifts in demand brought on by COVID-19 have slammed into a series of fab and factory fires, the effects of which have been cascading throughout the global economy. Now, the semiconductor industry is being threatened by Taiwan's worst drought in 57 years.

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Why this ad?

China factory fire sends memory chip prices to three-year high

Fire damage halts production at Hynix, the world's second largest maker of DRAM chips for mobile phones and computers



Hynix is said to supply chips to Apple, Samsung, Lenovo, Dell and Sony. Photograph: Andrew Brookes/Corbis

The price of memory chips for mobile phones and computers has soared by 19%, a three-year record, following a fire at a factory in China belonging to Apple supplier SK Hynix.

DESIGNLINES | MEMORY DESIGNLINE

Fab Fire Causes DRAM Price Surge

By Peter Clarke 09/09/2013 16

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Why this ad?

A fire at a wafer fab belonging to SK Hynix in Wuxi, China, is likely to push up the price of DRAMs used in personal computers and smartphones in the second half of 2013. After the reports of the fire emerged, the spot market for DRAMs showed jumps of up to 20 percent, according to the DRAMExchange website, although this was partly born of uncertainty awaiting information on the extent of the damage.

The fire happened on Sept. 4 during the installation of equipment and burned for about 90 minutes. One person suffered minor injuries, according to reports that cited SK Hynix as their source.

SK Hynix has been reported saying that no equipment was damaged by the fire and that production at the fab, which is responsible for more than 10 percent of the world's supply of DRAMs, would resume soon.

Market analysis firm TrendForce, which focuses on memory component supply through its DRAMExchange website, issued a statement saying that it believes that it could take six months for SK Hynix's damaged cleanroom to be rebuilt and that this will disrupt production. TrendForce said the Wuxi wafer fab produces about 100,000 DRAM wafers per month and 30,000 NAND flash wafers per month, or about half of SK Hynix's total monthly output of 260,000 wafers.

Fire at Micron Taiwan fab raises memory chip price concerns

Siu Han, Taipei; Jessie Shen, DIGITIMES Asia

Monday 24 June 2024

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Credit: DIGITIMES

A fire recently broke out at Micron Technology's DRAM fab in Taichung, central Taiwan, prompting concerns among industry participants regarding the short-term pricing trend.

The great chip theft: Organised crime is going high-tech in the US with armed gangs holding up chip makers. What can the manufacturers do to prevent the theft and distribution of their valuable bits of silicon?

By Lori Valiga

15 January 1994

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When Larry Chalfan was awakened by the telephone at 3.40 one Saturday morning last October, he knew something was wrong. But he was still shocked when the caller described how five robbers armed with revolvers and automatic rifles had broken into the semiconductor factory he manages in the quiet suburbs of Portland, Oregon. The thieves attacked the security guard, and then tied, gagged and blindfolded 12 employees working the night shift before making off with several hundred thousand computer chips.

TRENDS | Mar 13, 2024

Semiconductor industry beefs up security amid intensifying cyberthreats

Technology, Media & Telecommunications, Digital

Led by generative AI, chip sales look to bounce back this year—but geopolitics could complicate growth in the semiconductor industry. This miniseries, based on the 2024 semiconductor industry outlook, delves into the key trends defining the sector.

Fire at AKM Plant Disrupts Semiconductor Industry



On October 20, 2020, a fire broke out at the Asahi Kasei Microdevices (AKM) semiconductor plant in Miyazaki, Japan. The fire was declared extinguished four days later, leaving the factory severely damaged and out of operation.

AKM is one of the largest manufacturers of large-scale integrated circuits (LSIs). Products affected include analog-to-digital converters (ADC) and digital-to-analog converters (DAC), as well as other digital mixed signal technology used in high-end audio devices. In Q4 2020, AKM

Articles

SIEMENS



Fire safety and security system essential

Ensure the safety and security of people, assets,
and the environment

Maintain continuous, 24/7 operational reliability

High safety awareness due to chemical substances and gases

Preventing cross-contamination





What does the code say?



The Performance-Based Design approach is widely adopted as it provides justification for deviations from prescriptive requirements, especially when there are practical constraints or a need for enhanced fire protection. Specific guidelines are available for applying Performance-Based Design and risk management principles.

Code for design for use

NFPA 318 standard for the protection of semiconductor fabrication facilities

NFPA 99 health care facilities code

BS 7974 Application of fire safety engineering principles to the design of buildings – code of practice

ISO 7204-14 Fire Detection and alarm systems

FM Global DS 1-56, DS 5-1, DS 5-14, DS 5-48, DS 8-1, DS 8-9, DS 7-7 | ISO 7204-20

BS 6266; VdS 2095 Appendixes, R7 Rules, BS 5839-1, (UK) Fire Industry Association Code of Practice, etc.

Code for installation/commissioning

NFPA 72 FM Global DS 5-14

ISO 7240-14 FIA CoP, VdS 2095, BS 5839-1

Product approvals

UL 268, UL 268A EN 54-20, EN 54-7, EN 54-27, GB 50116, AS 1603-8, AS 1603.13



NFPA 318 Guide for smoke detection installation in cleanrooms

Table A.11.1.3.1 Recommended Smoke Detection Design criteria

01 Option	02 Type of cleanroom	03 Detection at cleanroom ceiling	04 Detection in air return	05 Detection Under Waffle Slab (UWS)	06 Detection at facilities sub-fan ceiling
A	Bay and chase with finger wall return	Area of coverage of spot-type detector or sampling ports shall be limited to 18,6 m ² (200 ft ²).	Install smoke detection in the cleanroom return air steam.	N/A	N/A
		Alert Threshold: maximum value of 0.65%/m (1.0%/foot)	Detection installed using the criteria in Column 3, Row A		
		Alarm Threshold: a maximum value of 3.2%/meter (1.0%/foot)			
B	Bay and chase with under floor return	As per Option A	As per Option A	N/A	N/A
C	Ballroom – Two level	Detection is not required	Install smoke detection in the cleanroom return air steam	For ballroom designs with distance to air return greater than 20 m (65.6 ft): 1. Install point detection at a spacing of between 9 m ² (96.9ft ²) and 16 m ² (172 ft ²) to suit the waffle slab construction and layout of services, or 2. Install aspirating smoke detection on a maximum hole spacing of 1 m ² (10,8 ft ²)	N/A
D	Ballroom – Three level (Cleanroom, Clean Sub-fab, “Dirty”/Facilities Sub-fab)	Cleanroom and clean sub-fab to be installed as per Option C above	Cleanroom and clean sub-fab to be installed as per Option C above	Cleanroom and clean sub-fab to be installed as per Option C above	Design and install for “Dirty” facilities area as per NFPA 72
		“Dirty” facilities area:	“Dirty” facilities area:		Area of coverage of spot-type detector or sampling ports shall be limited to 18,6 m ² (200 ft ²).
		As per NFPA 72	As per NFPA 72		Alert Threshold: a maximum value of 0.65%/m (0.2%/ft). Alarm Threshold: a maximum value of 1.5 %/m (0.46%/ft).

Fire safety and security challenges in cleanroom



Challenges in cleanrooms

Ensuring **cleanroom classes** and **other quality regulations**

Avoiding any **cross-contamination**

Maintaining precise **room conditions**

Ensuring full regulatory **compliance**

Protecting people, assets (including know-how) and the environment

Detecting smoke in high air velocities

Delivering consistent high-quality **products**

Ensuring only authorized personnel handle flammable or sensitive materials

Ensuring **data** interpretation, tracking, management and reporting over decades

Evacuating people and assets in case of an incident
at the right time into the right areas



Product and technologies

Siemens fire safety and unified security solution

Siemens fire safety

Complete solution for your clean room

Early detection
with ASD¹



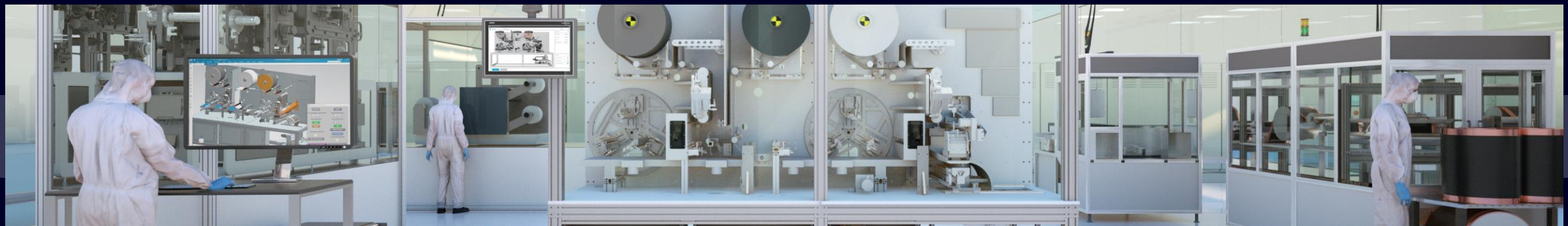
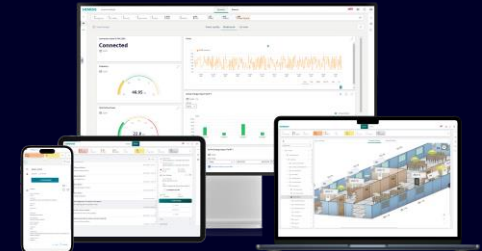
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1 Aspirating smoke detection

Siemens unified security management system

Complete solution for your clean room

Integrated access control systems¹

Intelligent video surveillance

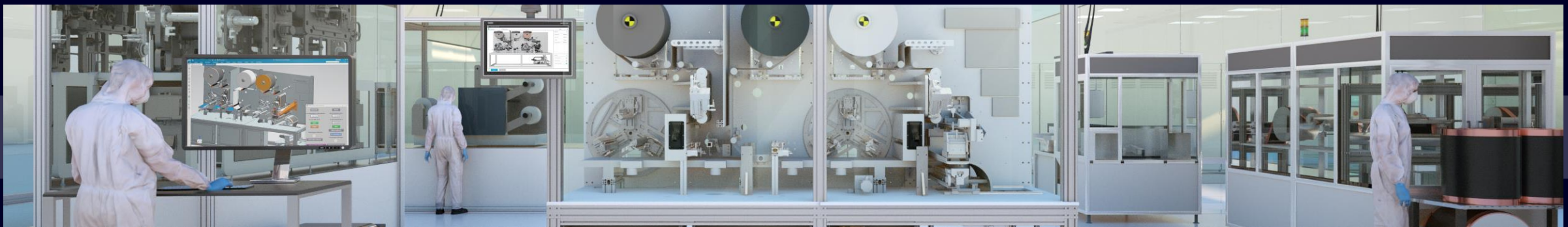
Unified security system



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¹ Compliant to 21 CFR Part 11

Desigo CC – Integrated building management platform

Desigo CC integrates and allows to be integrated

Northbound connectivity



Management level



Server

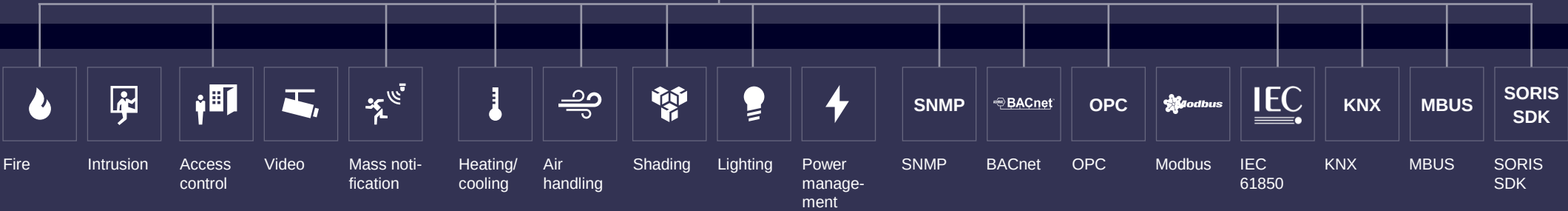
Installed client

Front-end processor

Windows app client

Flex client

Southbound connectivity



Fire safety and security

Energy and comfort

3rd-party integration

Open architecture – Standard protocols and interfaces for a truly open software

Simplifying work processes

Consistent workflow

Standardized interfaces

Open for global standards



Siemens cleanroom example



Industrial Facility / Plant in Asia Pacific

Challenge:

- Maintaining sterility and clean environments (clean room application for oncology, sterile compound)
- Multi-zone fire detections
- Reliable and sustainable fire solution with zero false alarm
- Seamless integration with HVAC system and provision for future project expansion and integration over DMS at multiple locations

Solution:

- 30 x ASD+
- 4 x Cerberus Pro Modular panels; 6250 X ASA detectors
- DMS Software – 5.500+ point detectors
- 1500 x other peripherals

Benefits:

- Zero disruption to the operation by ASD+ combining ASA multi-criteria detectors
- Seamless integration with HVAC system and provision for future project expansion and integration over DMS at multiple locations





Industrial Plant, Germany

Challenge:

- Guarantee critical environmental conditions for production and laboratories
- Deliver increased level of security to meet the Narcotics Act requirements
- Compliance with regulatory requirements of GMP, GAMP 5 and FDA

Solution:

- Installation of Desigo CC building management platform integrating the different disciplines to enable the implementation of cross discipline scenarios and to increase transparency
- CMT monitors and documents all GMP-relevant production parameters
- Installation of comprehensive security solution integrated into
- Desigo CC building management system
- Precisely tailored package for security, fire safety and building automation complies with regulatory provisions

Benefits: Production quality without compromise



Key advantages of Siemens offering for cleanroom

Key feature

01



No costly interruptions

02



Avoid cross-contamination

03



Minimized risks & maximum reliability

04



Ensure cleanroom classes and quality

Benefit

- Very early detection of incipient fires, enabling early intervention and avoiding extinguishing events
- More efficient, safer, and more secure service and maintenance

By controlling personnel flow with validated access control solutions

As a result of proven solutions and many years of expertise from Siemens

With 21CFR Part 11 support for BMS and monitoring solution

Thank you!

Additional information and contact

