

INDUSTRY & LOGISTICS: DESIGN AND CONSTRUCTION OF COMPLEX INDUSTRIAL UNITS

The design of modern industrial facilities is evolving rapidly, following the requirements of Industry 4.0, automation and sustainable development. New production units are no longer just production sites, but intelligent systems that integrate technology, flexibility and energy efficiency.

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Industrial architecture worldwide is adapting to new standards, with sustainability and efficiency becoming key design drivers. Despite the challenges, Greek industrial facilities must adopt these developments in order to remain competitive and to create a more sustainable and efficient development model.

1. Flexible and smart industrial facilities

The architecture of industrial units is evolving, adopting an approach of flexibility and adaptability. The aim is to build facilities that can be upgraded without requiring extensive structural interventions.

This is accomplished through:

- Open-plan layouts, open architectural arrangements, which allow for easy rearrangement of production areas
- Modular design, which allows for the gradual development or modification / expansion of facilities without pausing operations
- Height utilisation for the integration of automated systems for both storage and production, as well as space saving

Adopting these practices facilitates production management, reduces the cost of adapting facilities and allows the integration of new technologies without the need for major reconstruction.

2. International trends in industrial design

A. Architecture and Integration into the Environment

Traditionally, industrial buildings were designed solely with functionality in mind. Today, however, the scientific community focuses on the optimal integration of facilities into the landscape and urban environment. Modern approaches include:

- Use of appropriate surfaces and contemporary materials to reduce the massiveness of buildings, and to integrate light into the interior of work spaces
- Bioclimatic and sustainable design, which improves thermal insulation and the aesthetic quality of facilities (green roofs – planted facades)
- Design that respects the topography, where possible, in order to minimise the visual and environmental footprint

B. Sustainable Development and Energy Efficiency

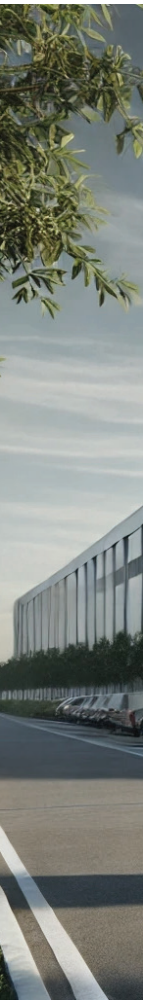
Today, energy sustainability is a key priority in the design of industrial units. Research shows that integrating passive and active energy-saving strategies can reduce consumption by up to 40%. The most common practices include:

- Utilisation of renewable energy sources (solar, geothermal, wind energy)
- Passive cooling and heating systems based on natural air circulation
- Dynamic facades with light sensors, which adapt to weather conditions

In Greece, although there is interest in green buildings, industrial units often remain outside this design framework. The transition to more sustainable practices is not a luxury, but a strategic necessity.

C. Life Cycle and Circular Economy

Modern industrial design is based on the Life Cycle Assessment (LCA) principle. The aim is to reduce waste and reuse construction components, contributing to sustainable development.





3. Automated Systems and Logistics

Today, industrial facility design is inextricably linked to automated logistics and technology integration. The most important developments include:

- Robotic storage systems that improve efficiency and reduce space requirements
- Autonomous transport vehicles, which facilitate the flow of raw materials and finished goods
- Digital logistics management, which allows for real-time adjustment of stock and distribution

In Greece, adoption of such systems is still limited. But as the industry evolves, it is essential to integrate these technologies to enhance the competitiveness of our businesses.

In conclusion

The new era in industrial architecture and logistics design is defined by three key elements: flexibility, sustainability and technological innovation. Businesses that invest in these principles ensure not only their efficiency, but also their ability

to evolve in a rapidly changing business environment.

As part of this evolution, Greece is faced with the challenge and opportunity to integrate these new design principles, creating industrial infrastructures that will ensure its competitiveness at international level. This transition is not just a technological choice, but a practical direction that can improve the efficiency and resilience of the industrial sector. 



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