

Cleanroom technology – a young sector of investment, educational, and employment opportunities

A prerequisite for ensuring Slovenia's economic competitiveness in the future will be the systematic and coordinated integration of industry, academia, and the state, also in the field of cleanroom technology – The pharmaceutical industry is announcing investments exceeding two billion euros, while there is a shortage of professionals with the appropriate competences and expertise in our country

Ljubljana, 15 September 2025 – Participants of today's symposium "It is time for Slovenia to take a step forward in the development and education of cleanroom technology," organized by the Slovenian Cleanroom Society (SCS), operating within the Chamber of Small Business and Trade (PTZ) at the Chamber of Commerce and Industry of Slovenia (GZS), highlighted the urgent steps needed in the coming years to enable the realization of extensive investment plans of the Slovenian economy, while also creating opportunities for further development of cleanroom technology in the country. They concluded that the key challenge lies in ensuring fundamental, specialized knowledge in the field of cleanroom technology and in access to such knowledge within the formal education system.

Key opportunities are emerging particularly in pharmaceuticals, biotechnology, and healthcare. Leading international companies from these sectors are planning **development projects in Slovenia** in the coming years, with a total **value exceeding two billion euros**, requiring fundamental knowledge and competencies in cleanroom technology. These extensive projects will demand more professionals with expertise and competencies in cleanroom technology than are currently available in the country. To ensure sufficient qualified professionals, closer cooperation among all key stakeholders is essential. Therefore, the participants of the symposium set the goal of **deepening collaboration between industry, science, and the educational sector**, while also calling on the **state** to take part. A commitment to long-term cooperation between the SCS and SZE (Slovenian Energy Association) was also signed at the event.

The symposium, the **first event in the field of cleanroom technology at such a high level in Slovenia**, was hosted by the Chamber of Commerce and Industry of Slovenia (GZS) and attended by more than 120 representatives from business, science, healthcare, and government institutions. Under the working title "**Establishing a comprehensive knowledge ecosystem for clean rooms in Slovenia**" – which, alongside fostering cooperation and developing long-term partnerships, is one of the key objectives of the SCS association – participants discussed the economic significance of cleanroom technology and the strategic opportunities this sector offers, as well as human resources, education and future skills, and issues related to technologies, innovation, and regulatory framework.

As the representative of the state, **State Secretary at the Ministry of Higher Education, Science and Innovation, Urban Kodrič**, addressed the participants and emphasized: *"We are creating the conditions for Slovenia to become more successful in the fields of higher education, science, research, and advanced technologies. The new higher education legislation brings more funding and greater autonomy, enabling universities to keep pace with rapid changes more easily and respond to the needs of the economy and society. We are building new faculties and investing in modern research infrastructure. With the higher education reform for a green and resilient transition to society 5.0, we are preparing education for the future so that the knowledge and competences of experts will be better aligned with the labour market and the needs of the community."*

The great economic and developmental significance of cleanroom technology

Cleanroom technology is a young and evolving multidisciplinary field, but at the same time, **an economic sector with significant impact**. It is estimated to account for **4 to 6% of Slovenia's GDP** and **employs tens of thousands of people** in the country. This sector is highly **diverse** – from the users' perspective, it encompasses pharmaceuticals, healthcare, electronics, defence, and research, while from the suppliers' perspective, it also includes industries engaged in the development and production of cleanroom equipment, as well as its installation and maintenance.

Vesna Nahtigal, General Manager of the Chamber of Commerce and Industry of Slovenia (GZS), highlighted the importance of cleanroom technology for the Slovenian economy and its **potential to stimulate and sustain development investments across various industries and sectors in Slovenia**. *"We hope that the role of this technology will also be duly recognized at the national level and that together we will succeed in taking the necessary steps to establish an adequate support environment both for its further development and for the advancement of education in this field. Only in this way will we be able to ensure a sufficient number of highly qualified professionals who can fill newly created quality jobs with high added value."* She added that the **new European Commission strategy, which aims to establish Europe as a leading region in the field of life sciences by 2030**, also emphasizes the importance of breakthrough technologies and high quality *"in the life sciences sector, where cleanrooms play an essential role in ensuring safety, quality, and compliance in the production of medicines, medical equipment, and biotechnology."*

Systematic and internationally recognised training – a prerequisite for the development of the discipline and the sector

After a presentation on the development of the discipline in Ireland as an example of good practice by **Conor Murray, President of the Irish Cleanroom Society (ICS)**, participants in the discussion on the HR situation in the sector pointed out that both industry and the healthcare sector are facing **a significant shortage of experts** trained for all phases of the cleanroom lifecycle. The most evident gap is in specialised knowledge, while other stems from basic professions related to this technology, which are relatively weakly represented in formal

education. Therefore, SCS proposes considering the introduction of new educational programs, including higher education programs, or specialised modules within existing ones.

President of SCS, Nataša Štirn, MA, stated: *"It is encouraging that we now have the first foundations in Slovenia for systematic and internationally recognised training. One of them is the first Slovenian translation of key professional literature in cleanroom technology, the professional book by renowned international expert **Dr. William Whyte, "Cleanroom Technology – Fundamentals of Design, Testing and Operation"**. The Slovenian translation was published just a few days ago in cooperation with the Faculty of Mechanical Engineering of the University of Ljubljana. It will be a valuable resource for all those involved in the educational process who need comprehensive information about the discipline.*

The SCS President added: *"The second foundation is **the first international accreditation for the Cleanroom PASS program**, which we obtained at SCS. Until now, Slovenian experts had to go abroad for specialized knowledge and internationally recognized certificates, but from now on, we will be able to provide this within our domestic industry association. This is particularly important for securing business with international companies that see Slovenia as having the potential to develop demanding products manufactured in cleanrooms. This is, naturally, linked to creating new jobs that require professional expertise and carry high added value. Based on the international accreditation obtained, the SCS Association has the opportunity to develop other accredited programs and thus become one of the pillars of the national education and certification system in this field."*

Hasim Solmaz, President of the International Confederation of Contamination Control Societies (ICCCS), which grants accreditations for the Cleanroom PASS program, praised the efforts of SCS and emphasized that they are **already being recognized internationally**: *"The Slovenian Cleanroom Society is playing an increasingly prominent role in the rapidly growing global market. By joining forces within ICCCS, we can turn challenges into opportunities and help shape future standards together. Slovenia has much to offer to the international community, while also gaining significantly from its cooperation."*

Goal: establishment of a competence centre for cleanrooms

The discussion on the future of technologies and the regulatory framework for clean rooms showed that the most significant potential lies in linking technology, regulation, and practice. The speakers emphasized that everyone involved in the design, installation, or maintenance of cleanroom equipment must understand the basic rules of their operation. Appropriate training requires laboratories, standardised education, and clear proof of competence. SCS will therefore encourage the establishment of a **competence centre for cleanrooms**, which would become **a national platform for development and collaboration**, as only through multidisciplinary will it be possible to build a sustainable and internationally recognized ecosystem in this field.