EUROPEAN CHIPS SKILLS ACADEMY

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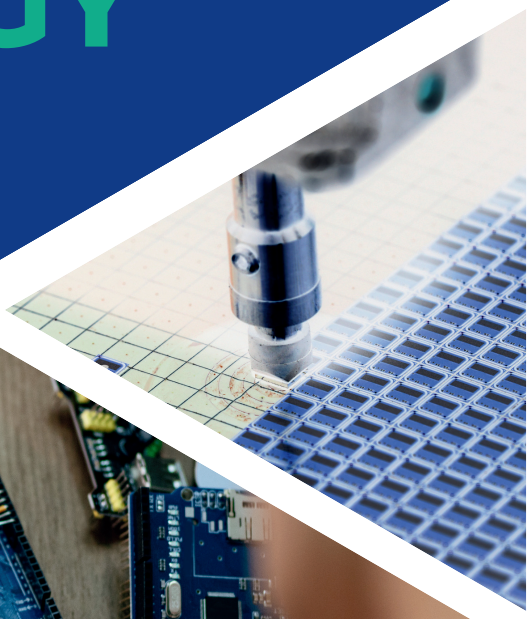

UPDATE ON THE TALENT GAP IN THE EU SEMICONDUCTOR ECOSYSTEM

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EXECUTIVE SUMMARY

THE EU TALENT GAP: A STRUCTURAL CHALLENGE

The European Skills Strategy 2024 report, published in October 2024 under the European Chips Skills Academy (ECSA) project and prepared by DECISION Études & Conseil, presented the projected talent gap in the semiconductor sector across the EU27 for the 2024–2030 period, based primarily on forecasted investment plans within the EU. According to the report, the aging of the European workforce, combined with industry growth, was expected to drive strong demand for talent: 271,000 job openings and a 5% annual increase in talent demand by 2030. Meanwhile, the supply of graduates was expected to follow past trends, with only a 1% annual increase in semiconductor-related fields such as electronic, mechanical, software, and chemical engineering. This imbalance between supply and demand was projected to result in a talent gap of 75,400 skilled workers by 2030, corresponding to an average annual shortfall of 12,600 workers.

These projections, made in mid-2024, have since been revised following two major developments:

- **The postponement or cancellation of four key investment projects in the EU**: (1) Intel's factory in Magdeburg, Germany; (2) Intel's back-end facility in Poland; (3) GlobalFoundries' investment in Crolles, France; and (4) the Wolfspeed/ZF factory in Saarland, Germany.
- **The 8% downturn in the European semiconductor market in 2024**, which led several companies to freeze or slow recruitment plans.

Taking these factors into account, the talent gap, initially estimated at 75,400 by 2030, now stands at around 65,000 as of October 2025. This corresponds to an average annual shortfall of about 10,800 skilled workers across the European Union over the six-year period from 2024 to 2030.

By 2030, the European semiconductor industry is expected to face an average annual shortfall of around 10,800 skilled workers across the value chain, mainly due to an ageing workforce and the limited growth of graduates in semiconductor-related fields of study.

Although the talent gap has narrowed and its onset delayed, it remains a structural challenge for Europe, particularly as it is expected to widen beyond 2030. Given the long lead time required to expand the skilled

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workforce, urgent action is needed – especially in the regions where demand is most concentrated: Saxony, Brainport Eindhoven, Ireland, Belgium, Crolles, Catania, Northern Italy, Bavaria, Baden-Württemberg, Czech Republic.

Main Talent Gap Locations in 2025

Segment	Key Regions / Actors
Design & Test	Most IDMs and fabless companies in Europe
Front-end	Germany, Ireland, Italy, Austria (ESMC, Intel, ST, Infineon, AMS…)
Back-end	Italy, Malta, Portugal (Silicon Box, ST, Amkor…); possibly France in 2026
Pilot Lines	Belgium, France, Italy, Germany, Spain
Equipment & Tools	The Netherlands, Germany (ASML and ecosystem…)
Materials	Mainly Italy and Finland (wafers), and Germany (gases and advanced chemicals)

KEY FINDINGS FROM THE 2025 INDUSTRY SURVEY

The 2025 ECSA survey on the skills needs from the European Semiconductor Industry gathered **102 responses across 75 organizations**, with a balanced representation of SMEs, large companies, universities and RTOs.

In 2025, the EU microelectronics industry expects to hire at similar levels to 2024, with skills shortages persisting across most occupational categories.

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36% of companies plan to increase their workforce, citing three main drivers:

- The EU Chips Act 1.0.
- Geopolitical considerations related to European economic security.
- Specific needs in design, AI and data analysis.

On the other hand, 49% expect to maintain their current workforce while 14% anticipate reducing hiring, due to:

- Weak demand from user industries.
- An insufficiently attractive investment framework in Europe - particularly due to high energy costs.
- Automation and AI which are reducing hiring needs while increasing upskilling requirements.

The persistence of the skills shortage is mainly attributed to:

1. **An ageing workforce**, with 30% of employees expected to retire between 2024 and 2030 (~114,000 people).
2. **Insufficient training provision for certain roles:** insufficient training pipelines in electrical engineering in specific countries (such as France and Italy), and EU-wide shortages in training pipelines for specific profiles: system designers, analog designers, and cybersecurity experts.
3. **The limited attractiveness of the semiconductor industry** amid growing competition for talent from the energy and environment sectors.

The persistent structural gap between an ageing workforce and the limited inflow of new graduates threatens the European ecosystem's ability to sustain its global competitiveness.

Education and training systems are adapting slowly, and long-term investment and EU-wide coordination is required despite modest early progress from recent initiatives (EU Chips Act, EU-funded projects, etc.).

The most sought-after and hardest-to-fill job profiles in 2025 remain:

- **Software engineers.**

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- **Design engineers,** with shortages particularly acute for system and analog specialists, driven by system-level integration, Europe's strengths in sensors and power electronics, and AI-related design needs.
- **Cybersecurity experts**, who have overtaken data specialists as the third most in-demand profile, reflecting growing vulnerabilities linked to digitalization.

Other roles, including process engineers, technicians, and robotic engineers, remain in demand but are somewhat easier to fill, though shortages persist for experienced positions.

The most sought-after and hardest-to-fill skills in 2025 remain:

- **System architecture.** Overtaking AI, reflecting its central role in integrating hardware and software for safety-critical applications and complex SoC systems. The shortage is driven by long training times, the need for cross-disciplinary expertise, and Europe's limited specialized programs, with many roles requiring master's or doctoral-level qualifications.
- **Artificial Intelligence.** Artificial Intelligence remains a key factor, influencing nearly all job profiles. Designers, test, verification, and software engineers are among the most affected, but manufacturing-related roles – such as process and automation engineers and technicians, and quality and reliability engineers – are also being transformed by the use of new AI-powered automation tools. Finally, operator roles are increasingly at risk due to automation and AI, highlighting the need to upskill operators to technician-level positions.

Finally, **Security (1) and Edge IoT/Edge AI (2) are the two top technology trends reshaping skills needs in 2025.** Security has become a universal requirement, embedded across the value chain and spanning many roles well beyond cybersecurity specialists. Edge IoT and Edge AI further reinforce demand for expertise that bridges hardware and software, particularly in system design, embedded development, and application engineering.

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POLICY RECOMMENDATIONS

1. Short term

A) Fund upskilling & reskilling programmes

First, funding upskilling and reskilling programmes are urgently required to address the evolving skill needs of the semiconductor and related industries.

Upskill the existing workforce:

- Notably enabling engineers to transition from digital design towards analog or system design
- And supporting manufacturing profiles to operate new AI- and robotics-based tools as well as to manage the associated data.

In parallel, reskilling initiatives should target workers from other industrial sectors, such as the automotive industry, in order to expand the talent pool available to the semiconductor ecosystem.

B) Attract talent from countries with labor surplus

Second, stakeholders call for stronger efforts to attract talent from countries with a labor surplus, both within and beyond the EU.

At the intra-EU level, countries such as Spain, Croatia, Romania, Bulgaria and Greece are identified as potential sources of skilled professionals.

At the extra-EU level, cooperation should be reinforced with India, Africa and Asia.

To support this objective, the panel recommends:

- Launching dedicated mobility programmes for students and workers
- Simplifying the administrative procedures governing mobility
- Fostering international cooperation with the most relevant partner countries

2. Long term

A) Increase training capacities in targeted fields

In 2025, as has been the case consistently since 2020, respondents have identified as a top priority the need to **increase training capacities in targeted fields**. Two specific actions are recommended in this regard:

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- **System designers, analog designers, and cybersecurity experts.** The EU faces shortages of 3,300 system designers, 2,100 analog designers, and 2,600 cybersecurity experts by 2030. These roles require highly specific training and experience, while the number of professionals to be trained remains relatively limited. The creation of specialised training hubs across the EU is essential to bridge this gap.
- **Electrical and electronic engineers in specific locations.** By 2030, the industry will require 53,400 professionals with electrical engineering backgrounds to support manufacturing, design, and testing. At the EU level, the main challenge is to attract existing STEM students to electrical engineering studies. However, in certain countries or regions (e.g. in France and Italy), training capacities in electrical engineering appear insufficient and/or are declining. There is an urgent need to expand these capacities in such areas. Short-term relief could also come from intra-EU mobility, leveraging countries with surplus graduates (Spain, Romania, Greece, Bulgaria, Croatia), and from extra-EU migration from regions such as India.

The panel insists on **the urgent need to strengthen the overall education and training ecosystem** for microelectronics across Europe.

- **Increase public education investment in microelectronics.** As education funding is being reduced in several Member States – directly affecting electrical engineering training capacities – stakeholders observe a parallel rise in "quick" or low-quality certificates aimed at short-term attractiveness. Such practices undermine the EU's ability to compete in an increasingly complex global environment. Coordination with national Ministries of Education is essential to ensure sustained public funding for electrical engineering and microelectronics programmes in targeted geographical areas.

  This increased funding would also enable the development of modern digital and remote learning infrastructures – such as virtual classrooms, simulation environments, and collaborative online labs – that are indispensable for providing high-quality training across the EU.
- **Set up innovative training initiatives to support upskilling and reskilling.** Initiatives such as summer schools or accessible online training platforms, including recognized certification schemes, would enable professionals at different career stages to upskill or reskill efficiently.

In summary, the European semiconductor skills gap remains structural and long-term. Although the recent market slowdown has temporarily eased pressure, Europe's ability to meet future industrial targets will depend on **sustained policy coordination, expanded training capacity, and effective mobility and attraction measures.**

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B) Attract students and graduates to the semiconductor industry

The second major recommendation stresses the need to **raise awareness and strengthen guidance on education pathways** leading to careers in microelectronics. Beyond increasing training capacity, Europe must inspire young people – starting early – to discover opportunities in the semiconductor and electronics industries.

- **Promote early engagement in STEM and microelectronics.** Efforts should start well before university, at primary and secondary school levels, by introducing pupils to science and technology through hands-on activities such as robotics and electronics labs, hackathons, and after-school clubs. Member States should integrate introductory microelectronics modules – covering electronics, programming, materials science, and emerging technologies – into school curricula to make technology more tangible and appealing. Coordination with national education ministries from Member States is crucial in this regard.
- **Train and support teachers.** Teachers are central to sparking students' interest but often lack the tools to do so. "Train-the-trainer" programmes and updated teaching materials are needed to familiarize educators with new technologies and help them deliver engaging STEM and microelectronics lessons.
- **Create structured orientation and outreach programmes.** Establish accessible career-orientation platforms and public awareness campaigns highlighting the diversity of careers in microelectronics – from engineering and design to sustainability and digital innovation – and their role in Europe's technological sovereignty. Industry experts sharing their experiences via social media and outreach events can further inspire students and demystify technical professions.

C) Ensure the participation of the semiconductor industry

The third major recommendation calls for the **active involvement of the semiconductor industry in education and training.** Companies should move beyond identifying skills needs to co-develop and deliver training, ensuring learners gain both technical expertise and practical experience.

- **Co-develop training and curricula with academia.** Closer collaboration between industry and education providers is essential to align learning outcomes with industrial needs. Companies should help design and deliver courses – such as summer schools and workshops – while universities regularly update curricula to reflect technology and market advances.

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- **Support internships and apprenticeships.** Stakeholders call for structured, co-funded internship and apprenticeship programmes, particularly in SMEs and start-ups, where hands-on experience is most valuable. Dual-track systems combining academic study and industrial placement would improve employability and strengthen long-term links between students and the industry.
- **Establish joint training centres and innovation hubs.** Stakeholders recommend setting up joint training and competence centres co-developed by academia, industry, and public authorities. These hubs would serve as focal points for advanced training and technology transfer, offering practical courses and collaborative projects while strengthening regional ecosystems and aligning programmes with evolving industrial needs.

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