

Sectoral Human Capital Study II

Aerospace Industry

Results of the second
edition of the study

About the study



Project name

Sectoral Human Capital Study II
Aerospace industry – 2nd edition *



Objectives

To increase the knowledge about the current and future demand for skills in the aerospace industry



Timing

2nd edition of the study:

April 2022 – May 2023

including quantitative surveys:

December 2022 – February 2023

* The first edition of the study was implemented in February-August 2021.
The report from the first edition is available on the PARP website

Industry information

The aerospace industry includes entities engaged in the following activities:

PKD C.30.3	Production of other transport equipment:
PKD 26.20.Z	Manufacture of computers and peripheral devices;
PKD 26.30.Z	Production of (tele)communication equipment;
PKD 26.51.Z	Manufacture of aviation instruments, manufacture of air navigation systems, classified (subclass of the main code included in the study);
PKD 26.52.Z	Manufacture of watches and clocks;
PKD 26.70.Z	Manufacture of optical instruments and photographic equipment;
PKD 51.10.Z	Passenger air transport;
PKD 51.21.Z	Air transport of goods;
PKD 51.22.Z	Space transport;
PKD 27.40.Z	Production of lighting equipment for aircraft;
PKD 28.99.Z	Production of aircraft take off machines and devices, catapulting devices and similar devices;
PKD 33.13.Z	Repair and maintenance of electronic and optical devices;
PKD 33.16.Z	Repair and maintenance of aircrafts and spacecraft;
PKD 52.23.Z	Service activities supporting air transport;
PKD 52.24.C	Reloading of goods at other reloading points;
PKD 77.35.Z	Rental and lease of means of air transport;
PKD 93.19.Z	Other activities related to sport (concerns, for example, Aero Clubs of 35 entities with the main PKD).

There were

26 820 entities (excluding the self-employed) *

* Estimates for PKD groups developed based on Statistics Poland data: Quarterly information on national economy entities in the REGON register for 2022, as of December 31, 2022.

96% of the industry's enterprises are micro-enterprises, 4% are small and medium-sized enterprises, 0.2% are large enterprises *

* Quarterly information on economic entities REGON, CSO, 2022.

Key positions and major business processes

Key industry positions related to major business processes

Conducting development and industrial works

chief constructor

technologist

constructor

Manufacturing of a product/service

technologist

production manager

Continuing airworthiness management and quality control

test engineer/controller

aircraft mechanic technician/certifying staff

quality auditor

airworthiness engineer/operations engineer

Management of air and space operations

pilot

handling employee/agent

purchaser/logistics specialist

manager in charge in a service organization

airworthiness engineer/service engineer

Technology and business trends in the Aerospace industry

A circular orange badge with the word "NEW" in white capital letters.

Trend 1

Rapid development of materials and components with potential aerospace applications (including nanomaterials, composite materials, and materials manufacturing technologies)

Trend 2

Further development of automation, robotization, as well as digitization, virtual and augmented reality technologies in all areas of the LOT-KOS industry, which has been progressing since the 1990s – from R&D and design, production, assembly (excluding the space sector), operation, maintenance, to training and support of employees in their daily job tasks

Trend 3

Progressing development of electric and hydrogen propulsion technologies in aviation, whose first stage will be the implementation and popularization of hybrid propulsion systems

Trend 4

Further changes in the organization and flow of production processes, implemented since the 1990s, to reduce substances hazardous to the environment and protect physical and mental health of workers



Technology and business trends in the Aerospace industry

Trend 5

Growing opportunities of using big data (through the development of computing infrastructure) to optimize industry processes (e.g., technological processes and business processes)

Trend 6

Progressing development and growing widespread use of unmanned systems

Trend 7

Progressing development and growing widespread use of unmanned systems

Trend 8

Increasing opportunities for service applications using satellite navigation and observation, in many areas of the economy. At the same time, increasing entry of companies previously not active in the space sector – lowering the threshold for entry into the industry as a hallmark of the Space 4.0 concept

Trend 9

Development of urban air mobility

A circular orange badge with the word "NEW" in white capital letters, positioned in the bottom right corner of the page.

NEW

Factors strongly affecting the industry



Impact of the Covid-19 pandemic



Impact of the war in Ukraine



Rising prices of energy carriers



Consequences of the development of unmanned aviation in the context of the impact on educational processes



Lack of adequate state support for the aerospace sector

Changes in Aerospace industry companies

43% of companies introduced changes in 2022 regarding new or improved services, products, work organization methods, technology or equipment.

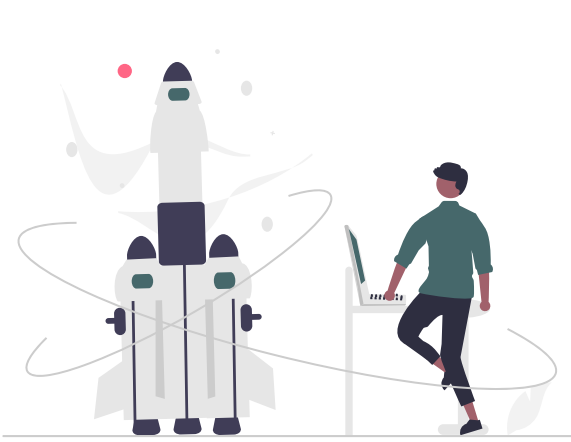
The impact of the trends is reflected in changes to the companies' operating models, planned in the next 3 years, which include:

- » Increased hiring of employees with interdisciplinary skills **(17%)**
- » Increased hiring of specialists who integrate IT skills with industry knowledge **(16%)**
- » Increased hiring of employees with Big Data analytics skills and industry knowledge **(15%)**
- » Increased hiring of IT staff to supervise proper functioning of systems controlling the movement of unmanned aircraft **(14%)**
- » Increased hiring of employees with environmental and legal competence **(13%)**
- » Investing or increasing investment in developing the skills of maintenance and ground staff **(12%)**
- » Increasing the number of new, innovative providers of various services using navigation and satellite observation **(12%)**
- » Increased hiring of qualified UAV operators **(9%)**

Industry development scenarios

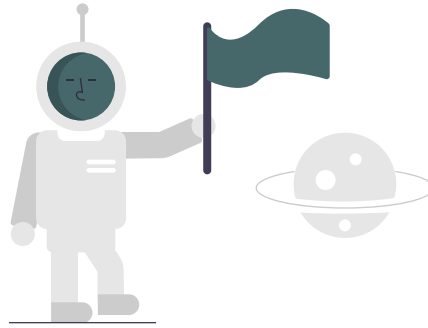
Scenario III: Gliding at low altitude

Progressive liberalization of access to space, new services in the aerospace industry gradually appearing



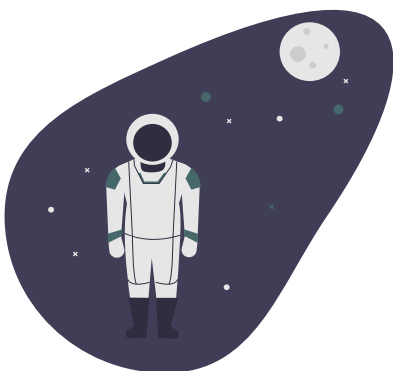
Scenario I: Space Innovation

Progressive liberalization of access to space, new services in the aerospace industry emerging intensively



Scenario IV: Hard Landing

Strong regulation of access to space, new aerospace services emerging gradually



Scenario II: High flying

Strong regulation of access to space, new aerospace services emerging intensively



Scenario I: Space Innovation

Progressive liberalization of access to space, new services in aerospace industry emerging intensively

The most optimistic scenario, according to which the Aerospace industry will be developing dynamically, its development conditioned by parallel development of technology, robotization, automation, IT, AI, etc.

This will result in high demand for professionals from other industries (including IT) interested in working in this field.

Salaries in the industry will increase, making Aerospace jobs extremely attractive.

In view of the need to quickly provide a large number of people to work in the fast-growing industry, business will work dynamically with science and education to train and recruit staff. This will further encourage the creation of new businesses, including the development of academic entrepreneurship.

To materialize, the scenario will require, among other things, central-level adoption of strategic documents for the industry's development, strong cooperation, both within the industry, and between the industry, public administration and education, and the will to cooperate.



Scenario II: High Flying

Strong regulation of access to space, new services in the aerospace industry emerging intensively



The emergence of restrictive regulation of access to airspace associated with severely limited level of liberalization in this area should be considered extremely likely.

Significantly liberalized access could affect the safety of passenger traffic, and state security (e.g. aerial reconnaissance over areas where the state's critical infrastructure is located).

Despite these regulations, developing technological capabilities and strong demand will result in the emergence of new companies and new services in the industry.

However, development of new companies and services will depend not only on business factors (business plans, ideas, access to capital, risks taken), but, above all, on the degree and direction of regulation.

In this scenario, it is expected that the business potential of companies operating in the industry will be reduced.

Polish companies will, therefore, be at a slight disadvantage compared to companies operating in countries that have liberalized their aviation laws to a greater extent.

However, this is not a pessimistic scenario, as gradual development of the industry will make it easier to respond to changing demand for skills in the industry's labor market.

Scenario III: Gliding at low altitude

Progressive liberalization of access to space, new services in the aerospace industry emerging gradually

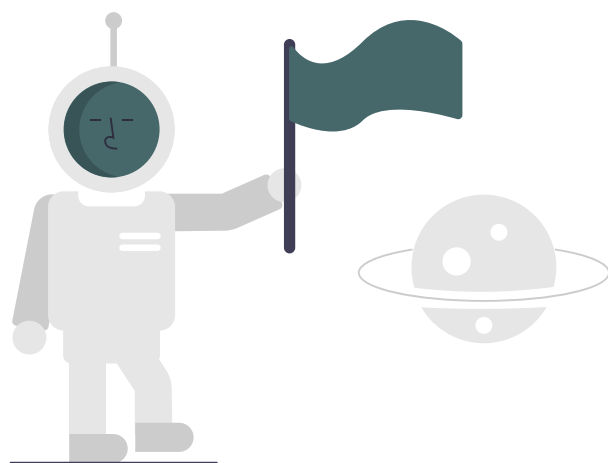
In this scenario, the industry is expected to stagnate. This means that, medium-term, emerging technological opportunities and demand will not be fully utilized by the Polish aerospace industry.

This will happen despite a favorable legal environment, which will be liberalized, thus potentially enabling the introduction of modern services and products to the market.

Gradually, innovative start-ups and spin-off and spin-out companies will develop, but will not take advantage of all the development opportunities.

The only factors slowing down development will be skills shortages and barriers on the part of the education and science systems, which will limit the process of skilled professionals entering the labor market.

The emergence of new services using satellite navigation and observation will be slow enough for legislators to keep up adapting space access regulations to the industry's demand at the time.



Scenario IV: Hard landing

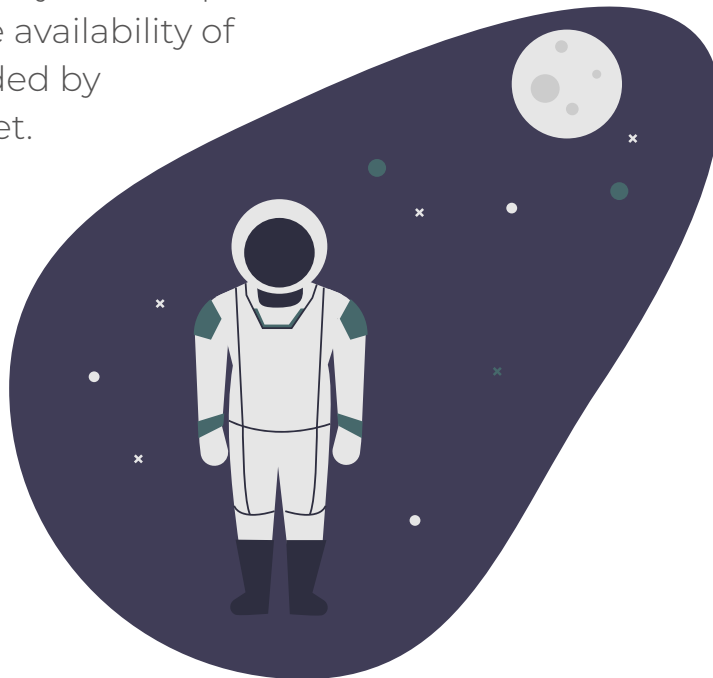
Strong regulation of access to space, new aerospace services emerging gradually

This is the most pessimistic scenario.

Strong regulation will result from both Poland's external obligations (a commitment to comply with certain provisions of international law or implement these norms into the Polish legal order) and from internal – domestic regulations that will restrict the development of innovation.

At the same time, new services will appear, but the pace of this process will not be dynamic.

A factor limiting the industry's development will also be a deficit in the availability of personnel with skills needed by the industry's labor market.



Skills of the future

Skills of the future will arise from the need to update and improve knowledge, skills, and skills already existing in the industry.

Positions of the future

The positions will be related to:

- » **advancing automation, digitization, robotization, and process optimization**, e.g., electronics mechanic/robotics/automation/mechatronics technician
- » **Market analytics, strategic analytics, new technology acquisition analytics, and cost optimization**, e.g., business analyst/strategist
- » **Progressive development of electric and hydrogen technologies, and propulsion systems in aviation**, e.g., electric/hydrogen engine/fuel cell mechanic
- » **Transforming processes as a result of reducing environmentally hazardous substances**, e.g., aircraft environmental auditor and eco-engineer
- » **Increased use of unmanned systems**, e.g., controller of unmanned aircraft
- » **Increased opportunities to apply navigation and satellite observation**, e.g., space operations security specialist

The industry will also create hybrid positions (combining tasks and skills from different disciplines, e.g., hydrogen propulsion and piloting).

Employment in the industry

One in ten employers looked for employees in 2022.

37% of employers who were looking for employees faced some recruitment difficulties, especially when looking for people for the following positions:



» technologist



» constructor



» quality auditor

N=113

Reasons behind recruitment difficulties

- » Little interest in job opportunities
- » Candidates who applied did not meet the expectations
- » Candidates who met the expectations did not accept the terms of employment

The most sought-after employees in February 2022 – February 2023:

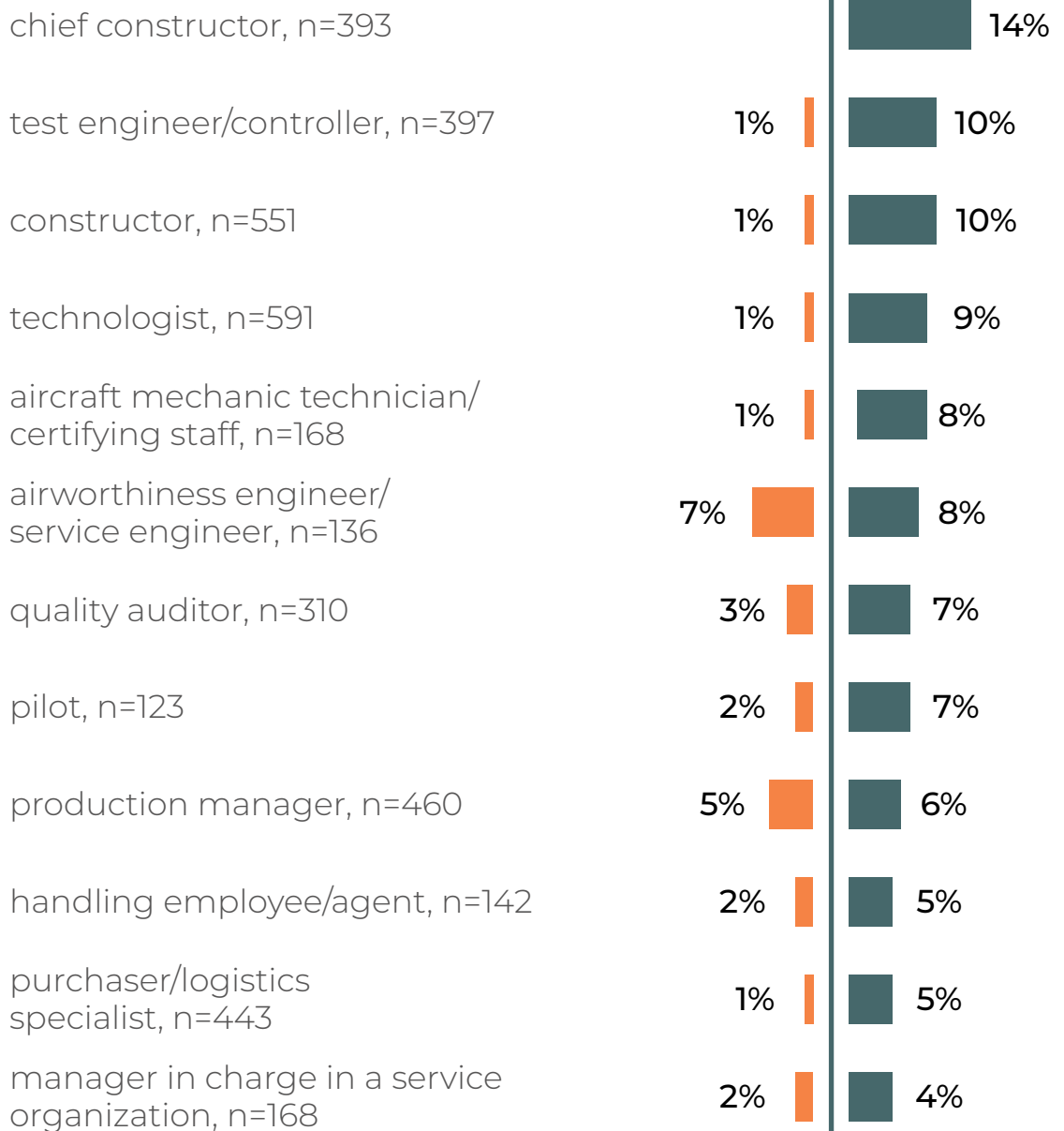
- » technologist: **32%**
- » constructor: **25%**
- » quality auditor: **15%**
- » electronics technician: **11%**

N=138

Projected changes in employment

Over the next 3 years, **6%** of employers expect to increase employment in the industry.

Projected changes in employment on key positions in the next 3 years



employment will decrease

employment will increase

Foreigners

Most employers (95%) do not employ foreigners in their companies. Only 5% say that they currently employ foreigners.

Foreigners were most likely to be hired as technologists (20%) and commercial procurement logistics specialists (18%).

According to data obtained from employers, the vast majority of foreigners employed are from Ukraine.

In companies where foreigners are employed:

79% of foreigners are from Ukraine

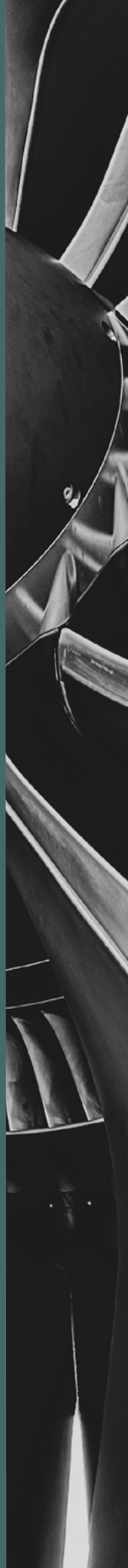
- » **19%** are from European countries other than Ukraine and Belarus,
- » **3%** are from Belarus,
- » **7%** are from the Americas,
- » **2%** from Asia.

43% have been employed for about a year or less

- » **41%** have been employed for about 3 years or more
- » **16%** have been employed for about 2 years

According to the majority of entrepreneurs (65%) employing foreigners, the number of foreigners employed by the company has not changed compared to 2021.

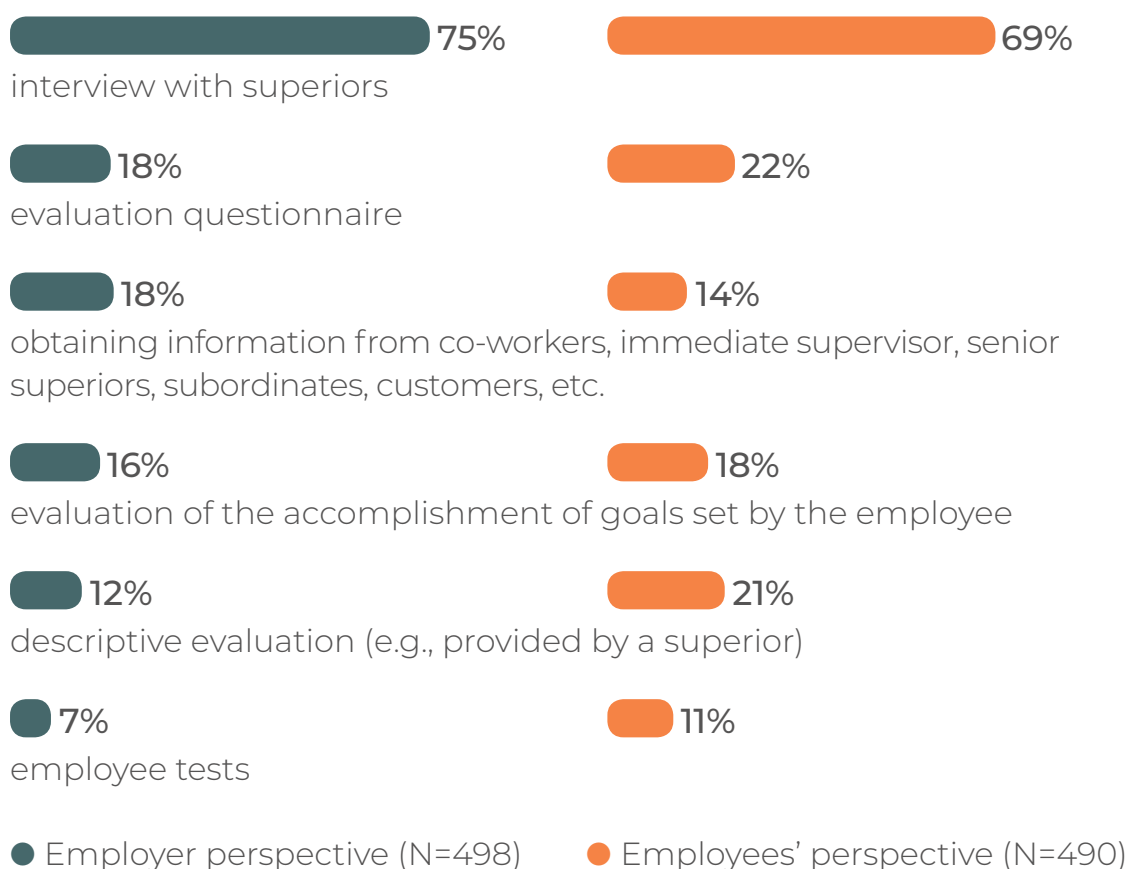
Answers of employers who hire foreigners (N=82)



Assessing the skills of employees

Fifty-six percent of companies assess the skills of their employees, with 33% conducting assessments systematically (at least once a year)

Methods used to assess employees' skills in 2022.



Employers' action strategies in the face of skills deficits

76% of employers estimate that the skills of their employees are fully satisfactory

20% of employers see the need for development of employee skills

But what if certain skills are lacking?

44%
current employees are trained

34%
new employees with appropriate skills are hired

22%
the company is reorganized to make better use of existing employee skills

19%
new employees are hired and then trained

14%
no action is taken

N=865



Methods of developing employees' skills in the workplace

56% development activity rate

More than a half of Aerospace companies offered their employees at least one form of development activity (on- or off-the-job).

Forms of developing employees' skills in the workplace – employers' answers

- » Instruction on, for example, the operation of new equipment, machinery, software **(34%)**
- » In-house courses and training, implemented by company employees **(24%)**
- » Courses and training provided by an external company **(20%)**
- » E-learning courses **(19%)**
- » Direct observation of another employee's work **(18%)**
- » Job rotation **(16%)**
- » Coaching, mentoring **(12%)**
- » „Open days” of teams, inter-team meetings **(11%)**

N=865

Balance of skills

Balance of skills – a compilation of assessments of key skills for individual positions in the LOT-KOS industry from the perspective of employers and employees, in order to better balance the labor market in terms of the supply of and the demand for workers with the right skills.

Employers and employees evaluated the skills identified for 12 key positions in the industry.

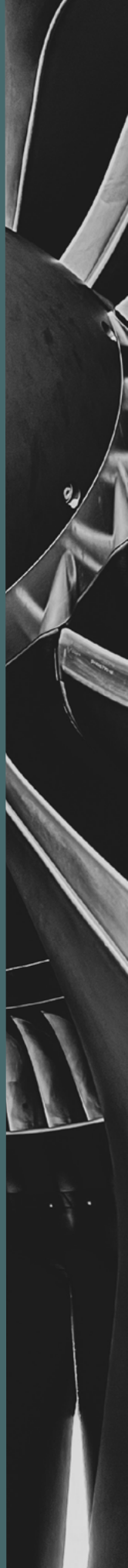
Regardless of the profile, employers' overall rating of the importance of individual skills is high, and so is employees' self-assessment.

For each of the listed positions, employers rated the importance of knowledge-related skills, social skills, and other skills high.

As assessed by employers, the most important **social skills** (regardless of the position) **were soft skills related to staying calm, flexibility, assertiveness, sense of responsibility, as well as work-organization skills involving meticulousness and the ability to learn and self-develop.**

The **knowledge-related skills** whose importance employers rated as highest include the knowledge of limitations, knowledge of the aircraft, knowledge of emergency response, knowledge of problem-solving methods, and knowledge of English.

Other skills whose importance employers rated as highest are observation skills, communication skills, flight-planning skills, skills related to applying in-flight procedures, following new trends, and the ability to analyze the industry market.



Balance of skills

Among the skills whose importance is already growing or will grow in the future, **a group of job-defining skills** is emerging.

Among the skills that are hard-to-find¹ (regardless of the position), social skills, knowledge-related skills, and other skills featured equally frequently. Employers point out that the number of hard-to-find skills is particularly high in the case of chief constructors (39 out of 39 skills) and pilots (26 out of 26).

Employers also define a vast majority of skills as hard-to-find in the case of managers in charge of a service organization (28 in 30 skills), test engineers/controllers (22 in 24), production managers (27 in 30), and airworthiness engineers/service engineers (25 in 29). Besides, the position of airworthiness engineer/service engineer is characterized by the highest number of skills whose importance is believed to grow over the next 3 years.

The vast **majority of hot skills, i.e., skills whose importance is already growing rapidly or will soon increase, are position-defining skills.** The highest number of hot skills was recorded for the position of airworthiness engineer/service engineer (11 out of 29 skills in the profile), of which nearly half are abilities. Hot skills are also more likely to include skills related to industry knowledge and knowledge of laws, standards, and procedures.

The largest share of skills that will increase in importance in the future² relative to the number of total skills in the profile was observed for airworthiness engineer/service engineer (69%).

Regardless of the position evaluated, employers pointed out that the importance of knowledge-related skills (including those related to industry knowledge and knowledge of laws, norms, and procedures) and social skills (including soft skills) will increase over the next three years.

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- 1 Hard-to-find skills are those that at least 50% of employers believe are difficult to obtain on the market
 - 2 These are skills that at least 20% of employers believe will become increasingly important in the next 3 years.

Full results of the survey are
discussed in the Report:

Sectoral Human Capital Study II

Aerospace industry

Report on the 2nd edition of the survey:

 [https://www.parp.gov.pl/
component/site/site/bilans-kapitalu-
ludzkiego#wynikibadanbranzowych](https://www.parp.gov.pl/component/site/site/bilans-kapitalu-ludzkiego#wynikibadanbranzowych)