

## REPORT

### **Analyses of the survey held among stakeholders from Bulgaria** under FactCheck Project - Adapting quality of VET offer to the need of the industry – manufacturing sector

## METAL SECTOR

### *0. Abstract*

*“Education is that which remains when one has forgotten everything he learned in school.”*

*Albert Einstein*

Education and training for sustainable competitiveness, social fairness and resilience. The Recommendation defines key principles for ensuring that vocational education and training is agile in that it adapts swiftly to labour market needs and provides quality learning opportunities for young people and adults alike.

Through the Council of the EU, Member States have set the target that by 2025 at least 60% of recent graduates from VET should benefit from exposure to work-based learning during their vocational education and training [/https://education.ec.europa.eu/education-levels/vocational-education-and-training/about-vocational-education-and-training/](https://education.ec.europa.eu/education-levels/vocational-education-and-training/about-vocational-education-and-training/).

Following recommendations of existing policies and studies, and selected priorities in this regard, the FACTCHECK project brings strategic cooperation between active continuing

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vocational training providers and local / regional industry in two dimension – in terms of VET process and level of cooperation. FACTCHECK seeks to improve several aspects of VET-Business (Industry) cooperation.

- In terms of VET process: Adapting vocational education and training to labour market needs through skills assessment demand framework which will support the project to develop European training module for VET centres in order to adapt their curriculums according to industry SMEs skills demand in metal and electro sector.

- The terms of level of cooperation: Improving collaboration between VET teachers and company trainers/mentors in their use of digital tools in teaching, bearing in mind their complementary roles and responsibilities, in order to improve the performance of apprenticeships and work-based learning from the aspect of remote working/learning

ANALYSES on skills demand in occupational profiles of metal sector based on survey results have been elaborated in the present report.

### *1. Introduction*

The present report is an outcome of the activities under project FactCheck: Adapting quality of VET offer to the need of industry – manufacturing sector. It is based on a survey held by the FactCheck consortium partners in the period February – April 2023 among companies from Germany, Spain, Poland, Greece and Bulgaria countries. The report unveils the results and findings of the survey in Bulgaria. The analyses were produced by an expert team of the Bulgarian Chamber of Commerce and Industry Chamber following the requirements of the project.

The Factcheck project aims to facilitate cooperation between VET providers and metal and electro companies.

Work-based learning and apprenticeships are the core of VET. Systematic cooperation between VET schools and companies was one of the identified principles to ensure high performing apprenticeships and work-based learning.

The Covid-19 crisis has accelerated the transition to Industry 4.0 even much faster than expected, so VET must not only follow digitalization in the industry, but also drive new developments.

The project partners from Germany, Spain, Poland, Greece and Bulgaria, representing the VET centers and the Association of Companies from the metal and electricity sector have agreed that many dimensions of the VET-industry cooperation need to be improved in order not only to respond to the demand of the sectors, but also to generate change, in particular the change related to the transition to Industry 4.0.

The FactCheck project seeks to adapt vocational education and training to the needs of the labour market and improve collaboration between VET teachers and company trainers/mentors in the use of digital tools in teaching.

The level of digitalization is an important measure for the capacity of Bulgarian Economy to go for digitalization and Industry 4.0. The Digital Economy and Society Index /DESI/, measures the development in five areas according to quantity data: connectivity, human capital, Internet services usage, implementation of digital technologies and digital public service. Bulgaria ranks 26th of the 27 EU Member States in the European Commission Digital Economy and Society Index (DESI) in 2022. / <https://digital-strategy.ec.europa.eu/bg/policies/desi-bulgaria/> Bulgaria's DESI score grew at an annual average of 9% over the past five years. Given the positioning of Bulgaria, this growth rate is not sufficient for the country to catch up with the other EU Member States. On digital skills, despite recent increased efforts, the country remains significantly below the EU average, having a score of 32.6 versus the EU average of 45.7. The proportion of individuals with at least basic skills and above basic digital skills is well lower than the EU average, the latter significantly so (8% versus the EU average of 26%). Considering the EU's ambitious target of 80% of adults having at least basic digital skills by 2030, the country needs to step up efforts, as more than two thirds of its population lack such skills. Bulgaria also underperforms on the proportion of ICT specialists in the workforce (3.5% versus 4.5% EU average). However, the proportion of female ICT specialists is high.

## 2. Steady state of metal labour market

Metal processing enterprises in Bulgaria have successfully passed through the 2020 marked by the pandemic. This can be seen in the results of the most dynamic companies representing the

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sector. Their turnover in 2020 increased by an average of 63% which is comparable to the result of the previous year. The three fastest-growing companies recorded triple-digit increase. All in the top 20 are in profit, with their score rising nearly fivefold.

The technological transformation of the 21<sup>st</sup> century is leading to a new industrial revolution that will change the way economies and societies` function. Digitalized manufacturing and the rise of production automation will lead to a wide range of changes in production processes, outcomes and business models. “Industry 4.0”.

According to some authors, “If we do not prepare in advance, we will face various risks. We risk giving great power to machines. We risk changing changing the course of humanity without fully understanding the consequence. We risk creating a huge in equality between the “techno-super -rich” and the rest of the broad underclass.” (Dalmia & Sharma, 2017).

The most characteristic problem is related to drastic changes in the labour market. Overall, robotization and digitalization are significantly transforming both workflow processes and the work environment, shifting the focus away from the human factor and forcing the new forms of employment. According to some studies, up to 47% of jobs in developed countries are predicted to be lost in the next 25 years.” /Plutschinski, 2017/

Substantial changes are taking place in labour-legal relationships – there is, for example, a tendency towards the elimination of permanent employment contracts, towards remote work and the imposition of higher flexibility on the labour market, which, however, also brings with it and increased risk of permanent unemployment /European Commission, 2009/.

These processes hide a threat of higher social vulnerability and a gradual erosion of the labour rights of workers, mostly related to the right to work and its equal, non-discriminatory and dignified exercise /for example, in remote forms of employment/, which may harm the democratic structure of modern society. This necessitates the development of a network of new measures for additional protection of the rights of individuals – natural persons in the conditions of Industry 4.0 who enter into production and employment relations /European Parliament, 2017/.

At the same time, digital literacy becomes a decisive, key factor in the labour market, which inspires the formation of two main social segments: one, including low-skilled workers with

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low incomes and another, composed of highly qualified specialists and, accordingly, with relatively high incomes. Demographic problems are also touched here: older workers do not have enough skills and potential to cope with new technological challenges, which significantly reduces their chances of a well-paid job and a decent life.

It is extremely important in this regard to pay special attention to the improvement of the qualifications and competencies of workers through adequate training and education, corresponding to the new realities of the labor market. For this purpose, along with the ongoing modernization of educational programs and the imposition of the lifelong learning model, issues related to work ethics and the challenges arising from the development of Industry 4.0 should be advocated much more widely, within the framework of different educational levels and in training in different specialties also in metal sector. This would ensure greater adaptability of workers to changes in the working environment and to the dynamics of labor relations.

At the European Union level, it is realized that “digitalization leads to rapid changes in the labor market, affecting its nature, its quality and labor productivity. European leaders are challenged to take advantage of these developments to accelerate economic growth and employment – while ensuring decent working conditions, social protection and equal opportunities for all” /European Commission, 2019/

## 2.1 skills shortage

Today’s society faces skills shortages in many essential areas, and metal sector is one of them. The reasons are not easy to pinpoint. One issue is that many experienced workers are close to retirement age, and there are not enough younger people to replace them. Relatedly, it takes a while for knowledge transfer to happen.

Another concern is that younger people may not immediately consider working in metal sector. That’s especially true if they perceive them as dirty or dangerous or if family members or peers push them toward other options.

There is a worker shortage that is going to grow with the years due to demographic reasons in Bulgaria. The unemployment rate in the country is 4,3 % /2022/, the employment reached 70,4% /2022/ but still employers report shortage of skilled workers especially in some economic fields including manufacturing industry.

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Ongoing education is already a priority in solving this issue. Dealing with the metal fabrication skills shortage requires more than providing the foundational know-how to get started in the industry. Many other new skills are needed.

## 2.2 Skills development

Global trends such as the rising role of technology, climate change, demographic shifts, urbanization, and the globalization of value chains are changing the nature of work and skills demands. To succeed in the 21st century labor market, one needs a comprehensive skill set /World bank/ composed of:

- **Cognitive skills**, which encompass the ability to understand complex ideas, adapt effectively to the environment, learn from experience, and reason. Foundational literacy and numeracy as well as creativity, critical thinking, and problem-solving are cognitive skills.
- **Socio-emotional skills**, which describe the ability to navigate interpersonal and social situations effectively, and include leadership, teamwork, self-control, and grit.
- **Technical skills**, which refer to the acquired knowledge, expertise, and interactions needed to perform a specific task, including the mastery of required materials, tools, or technologies.
- **Digital skills**, which are cross-cutting and draw on all of the above skills, and describe the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately.

Obviously, the development of skills can contribute to structural transformation and economic growth by enhancing employability and labor productivity and helping countries to become more competitive.

Companies need not only specific workers – as expertise and people to fill in a certain position but they require more often exact skills.

According to information from the Bulgarian Employment Agency over 194 000 workers and specialist had been in demand in 2022. More than 50 000 employers had new employees, about



15% less than in 2021. The highly profiled workers – doctors, teachers and IT specialists have been the mostly wanted. The work advertisements for specialists with university degree have been about 44 000. Almost the same number have been those for unqualified personnel.

According to the Bulgarian Employment Agency the most wanted professions by the Bulgarian employers in 2021 were lathe operator, moulder and welder. These professions were in need also in 2022.

### 2.3 Occupational specific tasks

The metal worker is working with metals to create individual parts, assemblies, or large-scale structures. Metal workers work in plants, factories, and fabrication shops that produce metal structures, parts and components in a variety of materials from metals for a wide range of applications.

Some of the main areas of the metalworking industry are:

- Steel works and foundries: processing of metal ores and production of semi-finished metal goods, such as rolled and drawn profiles, tubes and sheet metal
- Metal fabrication: production of metal components, such as cable, netting and mesh, screws, nails, bolts and other small metal parts
- Machine tool manufacturing: construction of machinery and machine tools for the production and machining of metals, plastics, wood etc.
- Structural steelwork (light, medium, heavy), production of metal structures, bars, tubes and wire and load-bearing elements for the construction industry
- Electromechanical engineering: production of electric equipment and electro-mechanical components and manufacturing of electrical appliance
- Vehicle manufacturing: production of cars, motorbikes trains, ships and aircraft
- Arms industry: fabrication of weapons and ammunition

Metal workers perform cold working operations - operate machine or benchtop tools in their job /they are thus often referred to in relation to the machine they operate /mill machinists, turners and welders/or are engaged in the hot forming process /forging, casting, extrusion, stamping and deep drawing of metals/.





The duties of a metal worker tend to vary significantly based on the type of plant, factory or shop they work in and the work they are individually assigned. Some of the most common tasks include:

- Performing machining operations on metal workpieces based on mechanical designs
- Programming, setting and operating machine tools
- Loading and unloading workpieces
- Ensuring products meet production specifications
- Finishing and assembling metal components
- Carrying out maintenance of machine tools
- Providing apprentices and junior metal workers with training and support in the use of machine tools

**Metal workers require the following skills:**

- Ability to perform metalworking operations
- Ability to use machine tools and benchtop tools
- Ability to read mechanical drawings
- Ability to use measuring instruments
- Strong manual skills and precision
- Ability to work as part of a team
- Strength and physical fitness
- Flexibility and ability to work with minimum supervision

*3. Methodology and Analysis of company survey*

The survey was carried out following the methodology developed by the project consortium. 30 representatives of the target groups in Bulgaria took part in it. The team of the Bulgarian Chamber of Commerce and Industry conducted the survey online and made the analyses report on the basis of the answers provided regarding the updating information about skills demand as “occupation task screening”.



### 3.1 Concept of the Survey

#### **Company survey in metal sector**

According to analytical approaches used to measure skills in employer surveys (CEDEFOP, 2016) the FactCheck survey used task-based approach. It was based on the idea that tasks and skills are closely related, i.e. skills are used when workers carry out tasks. Operationally, employers are asked about the tasks undertaken by a particular employee (usually defined by an attached occupation), and this provides a characterization of the skills needed to perform the tasks adequately. It has been claimed that the task approach has the advantage that employers find it easier to think in terms of production processes, tasks to be performed and objectives to achieve. The survey concept aimed at combining the collection of background information on possible drivers of change at the level of the whole organisation with the collection of information on qualitative changes regarding the tasks to be carried out by particular occupational group (metal and electro) within the organisation. To this end, at the beginning of a survey interview session were selected as reference group for all questions related to particular tasks. The questionnaire consisted of the following three modules:

Module 1: background information on the organisation; the selection of a particular occupational group for reference in further questions;

Module 2: importance and development of a series of occupation-specific tasks (tasks that are characteristic for a particular type of job/profile) and emergence of any new tasks, again for the selected occupational group only;

Module 3: background questions on major changes and innovations introduced in the organisation and their impact on the selected occupational group and selected job profiles.

Task-related approach is closely related to competency-based approach. Elements of Competence are a key component of occupational standards and represent statement of a key function or tasks in a particular job or occupation. Description of competencies will be used for occupational group in the metal and electro sector and related to selected occupational profiles: Specialist in metal technology, Industrial mechanic, Tool mechanic, Mechatronic engineer, Electronics technician for industrial engineering, Industrial electrician for industrial engineering, Industrial electrician for devices and systems.

The survey instrument had been developed by project partners, with BSW leading the responsibility of coordinating the work. Revision and review of the instrument had been done

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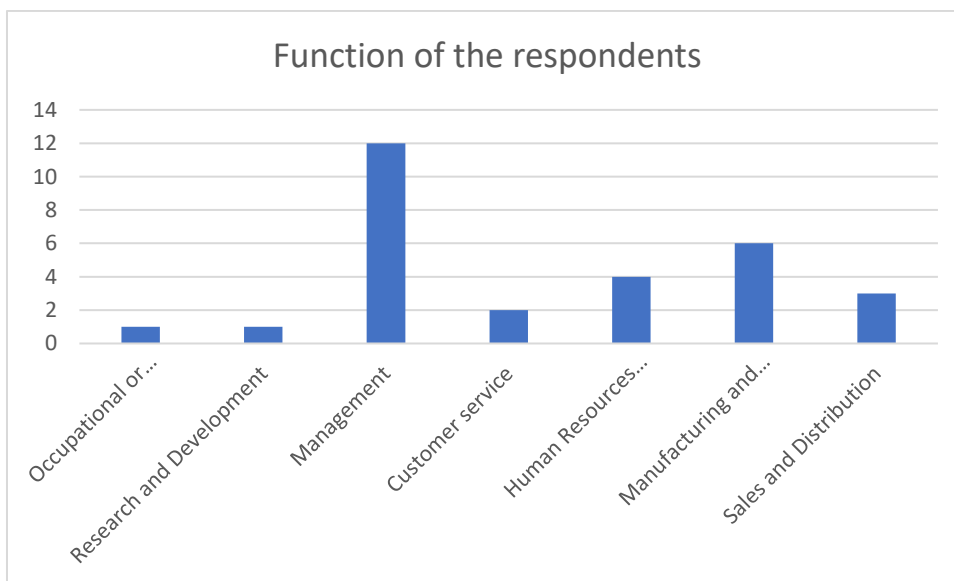
by experts from partner organizations taking in mind possible differences in occupational standards, job profiles in particular country and VET within system. Definition of key characteristics of survey was made. Sampling and definition of respondents (coverage of occupational groups, definition and identification of the right respondent).

Responding demands of the manufacturing companies, based on selected occupational profiles were defined.

### 3.2 Analysis of company feedback

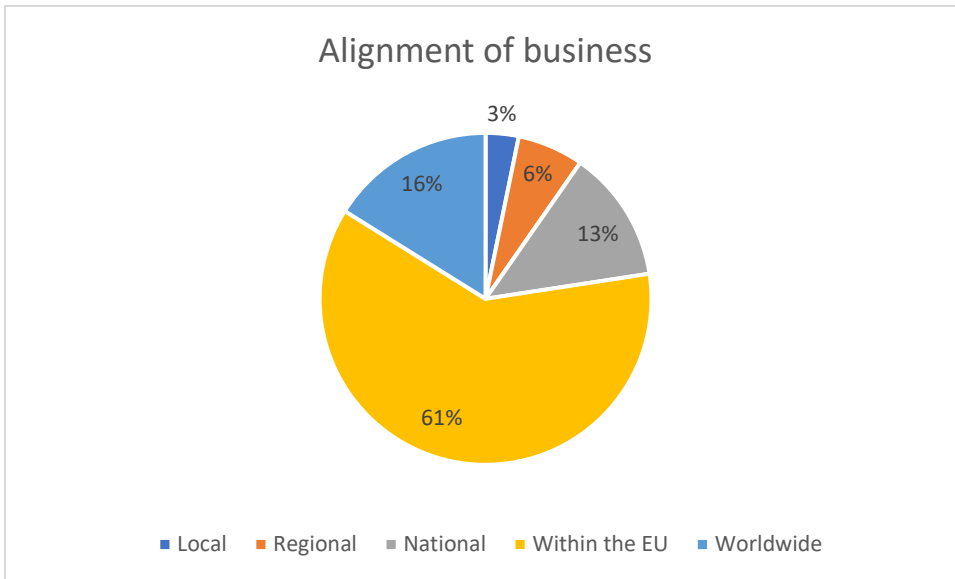
80,6% of the companies that participated in the survey are working in the manufacturing.

61,3% of the respondents represent companies that have provided some kind of vocational education training or coaching in professional skills.

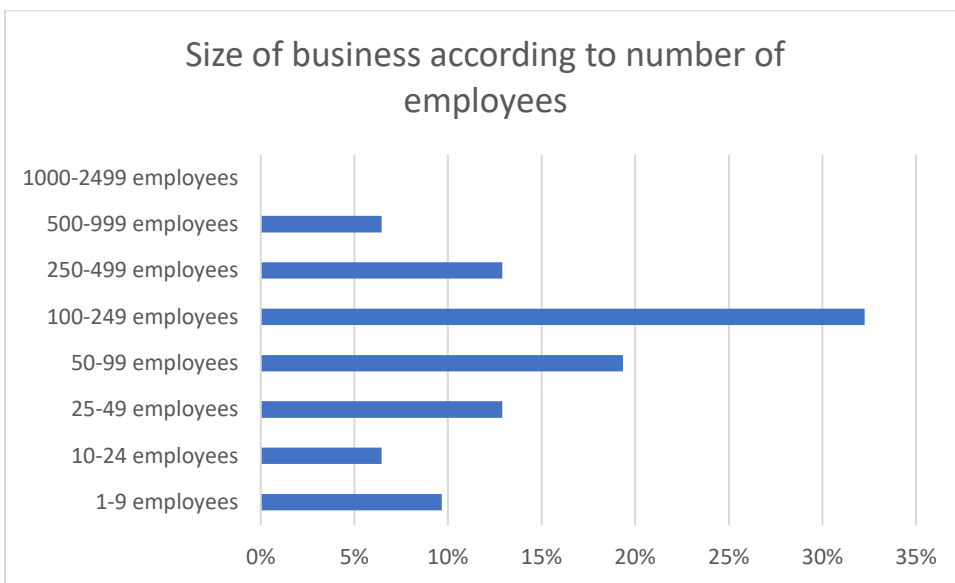


The alignment of business of the participating companies in the survey is explained below.

61% of them have European outreach. 16% explore business worldwide and 13% have national coverage.



33% of the companies have 100-249 employees. 19% manage 50-99 employees.



When asked about the average age of their employees the respondents provide the following information:

42% have average age 45-49 years;

25.8 % have average age 50-54 years

10% are 55-59 years

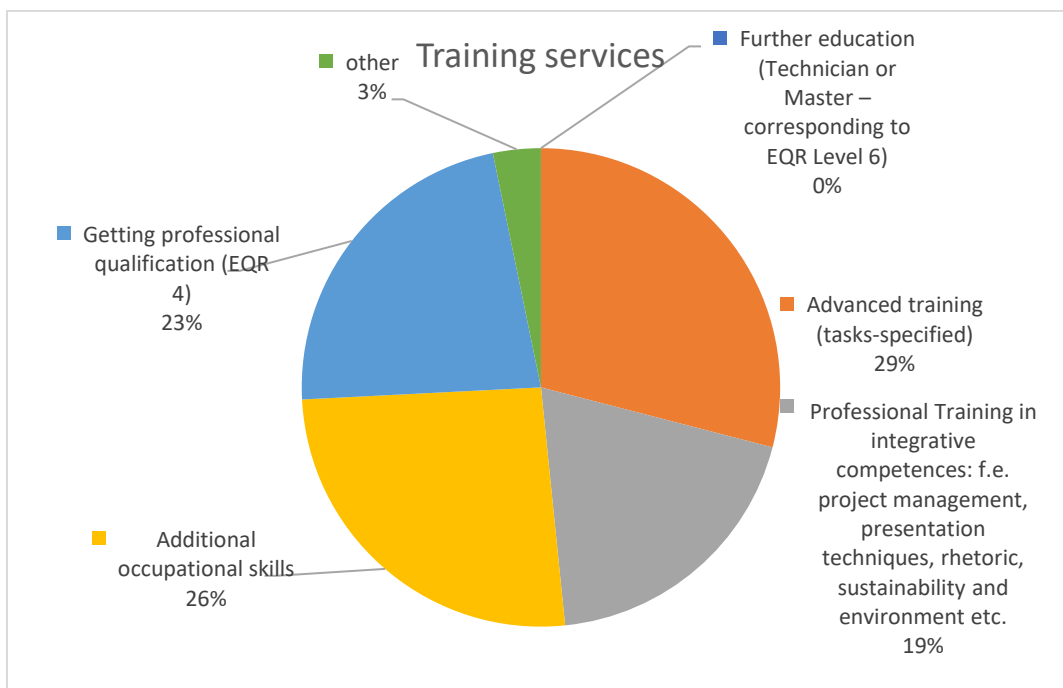


10% are 60-64 years

The age of the eldest worker is ranged as below:

age	Number of companies	% of companies
45-49	1	3%
50-54	5	16%
55-59	5	16%
60-64	11	36%
65+	9	29%

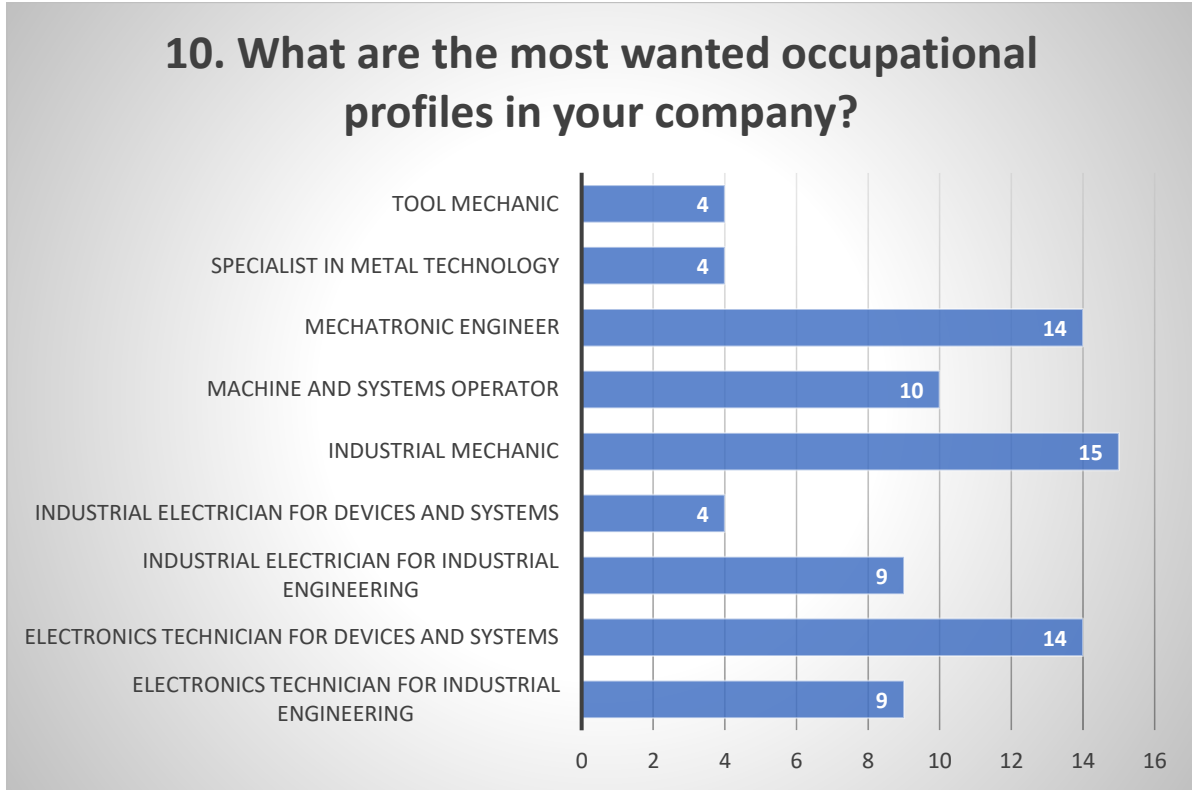
The training services offered or provided by companies vary in range. Most of them 29% provide advanced training, specified by a certain task. 26% offer obtaining additional occupational skills while 23% provide EQR4 – professional qualification. None is offering EQR6 level.





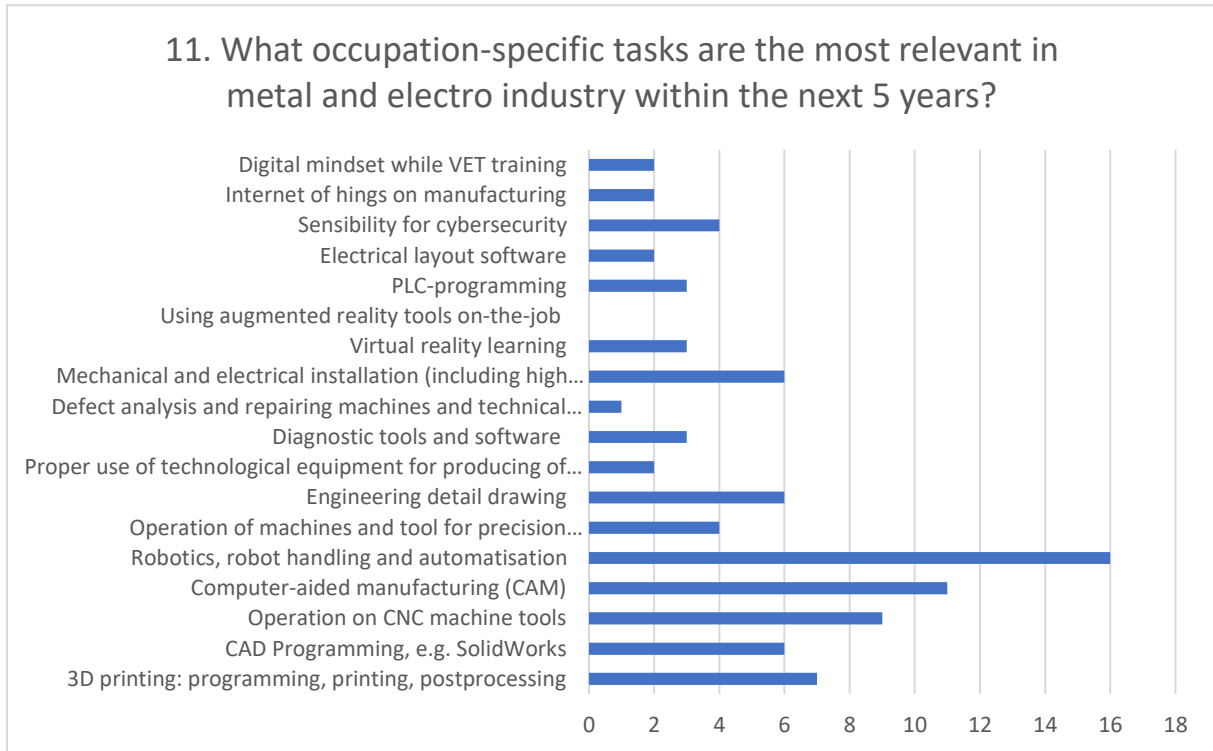
The most wanted occupational profiles in metal sector are well defined:

Industrial mechanic - 48%, mechanical engineer -45 %, machine and system operator - 32%.

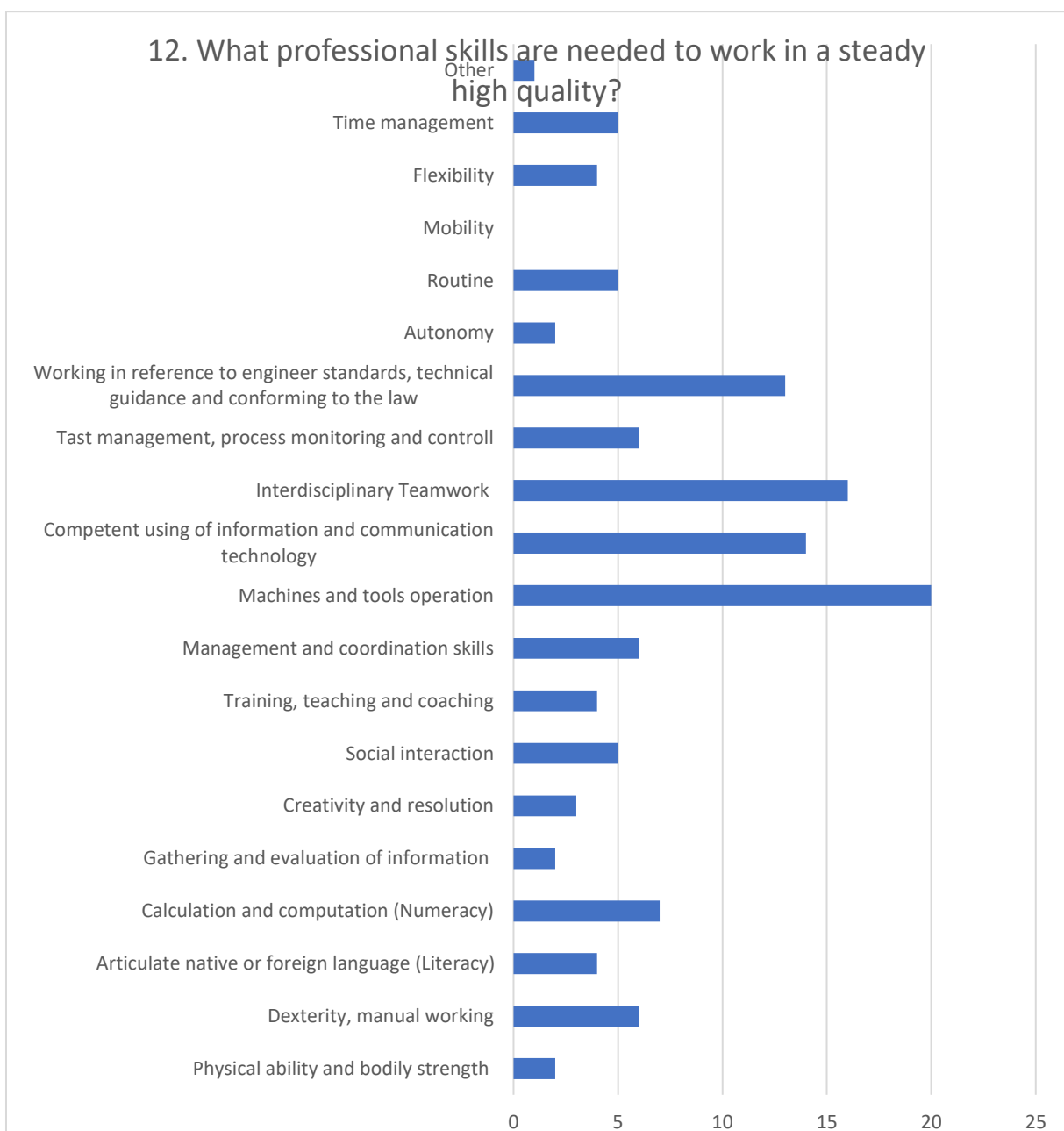




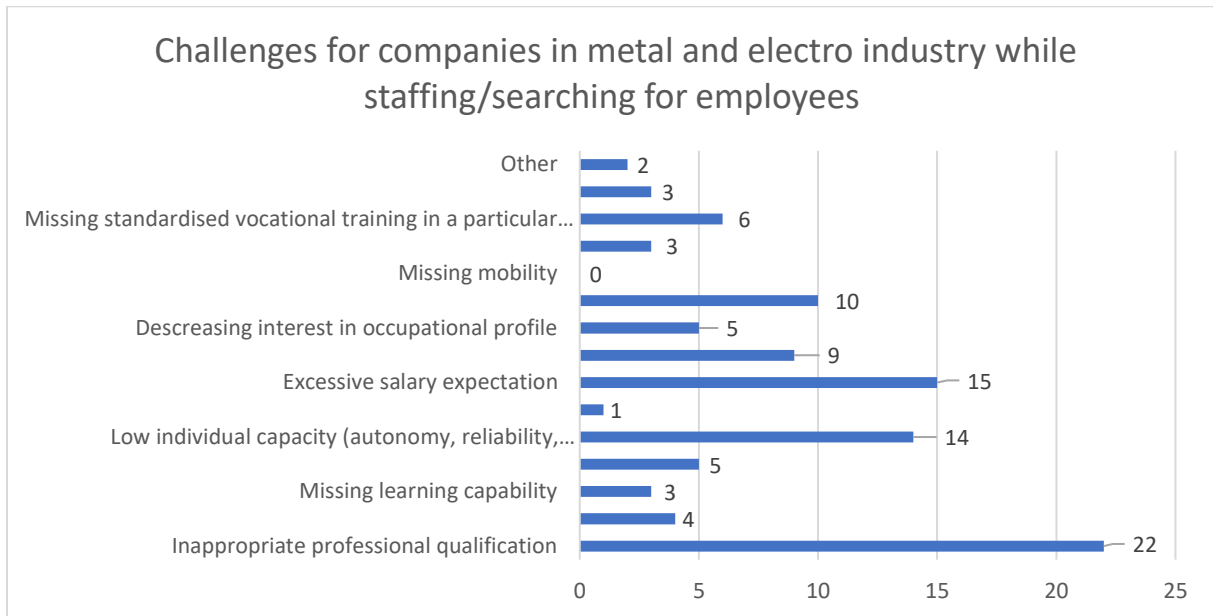
The occupation-specific tasks that are expected to be most relevant in the industry within the next 5 years are: Robotics, robot handling and automatization – 51.6%, Computer aided manufacturing /CAM/ - 35.5%, Operation on CNC machine tools - 29% and 3D printing: programming, printing, postprocessing – 22.6%.



The professional skills that ensure high quality of the work according to the respondents are: Machines and tools operation – 64.5%, Interdisciplinary Teamwork - 51%, Competent using of information and communication technology - 45%, Working in reference to engineer standards, technical guidance and conforming to the law -42 %, Calculation and computation – 22.5%, Management and coordination skills - 19% and Test management, process monitoring and control - 19%.



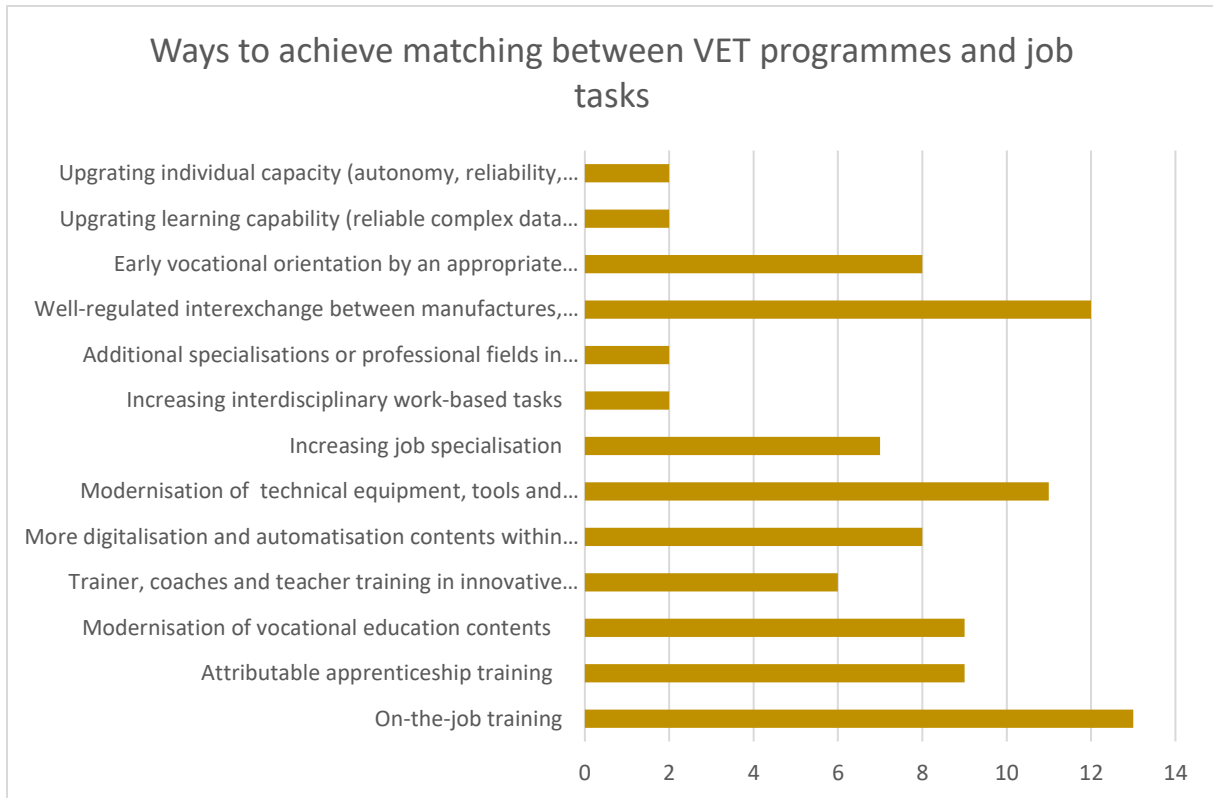
Companies are facing many challenges while looking for employees. The inappropriate professional qualification is among the most common. Excessive salary expectations and low individual capacity are following.



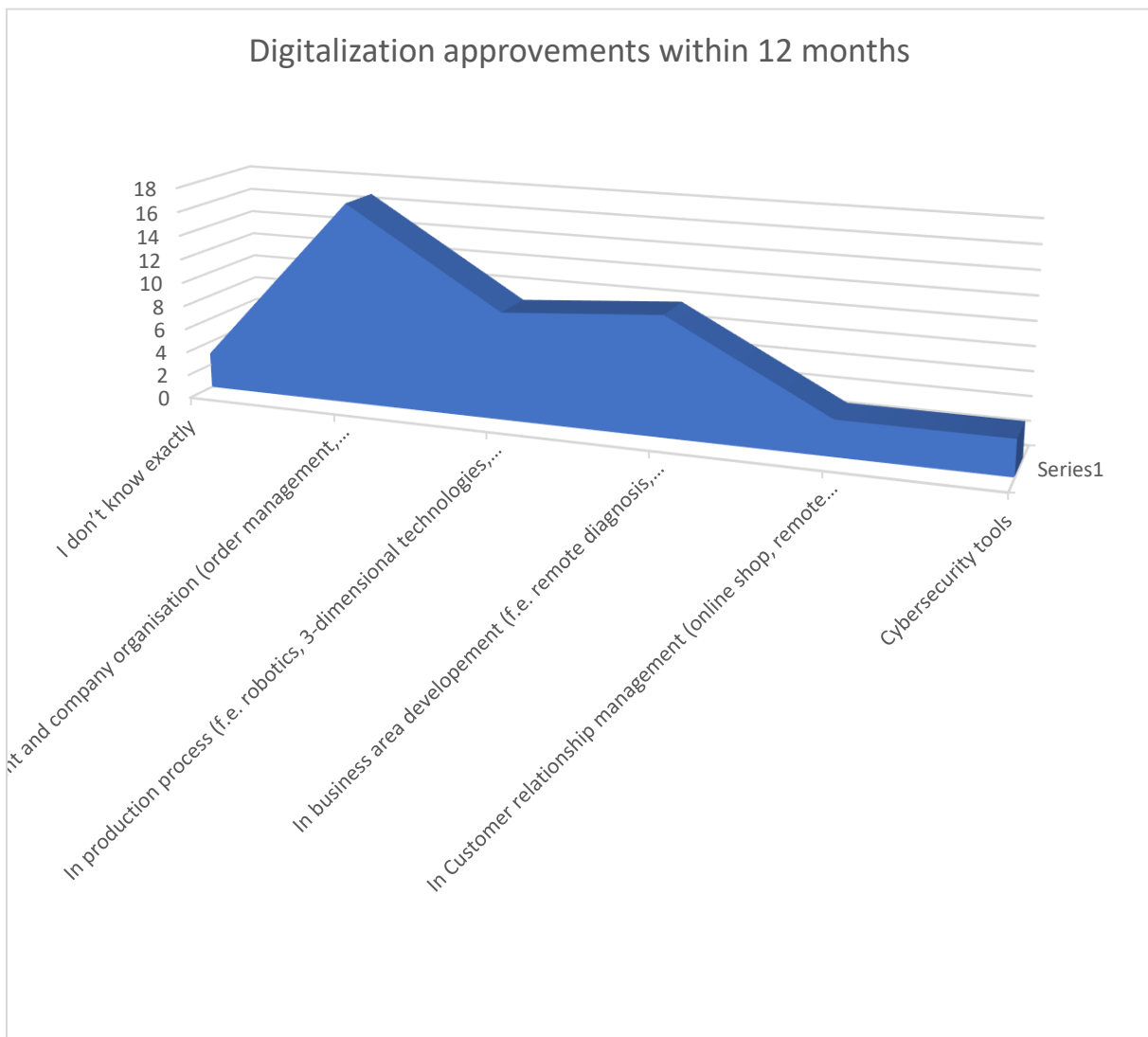
The respondents suggest how to achieve a higher accuracy between VET learning programme and job-related tasks answering question #14.

The following methods are considered as most appropriate: on the job training, modernization of the VET content, modernization of the working base, well regulated interexchange with companies, VET training centers and other educational institutions as well as early vocational orientation to be applied.





Companies report that there were some digitalization improvements within the past 12 months and they are described below. Most of them were related to management and company organisation (order management, human resources management, customer management) In business area development (i.e. remote diagnosis, preventive maintenance, IT-services etc.) and in production process (i.e. robotics, 3-dimensional technologies, networked manufacturing etc.). Just a few were in Customer relationship management and cybersecurity tools.



Regarding the digital approaches planned to be implemented within the next 12 months respondents answer that most of them will be in production process 38.7%, in business area development – 38.7%, in management and company organization 22.6% and in Cybersecurity tools and approaches 16%.

### 3.4 Evaluation of the feedback:

#### **Most demanded occupational profiles**

Of the 31 companies surveyed, the following occupational profiles were identified as the most in-demand in metal sector:

1. Industrial mechanic – 46.88%
2. Mechatronic engineer – 43,75%
3. Machine and systems operator – 31.25%
4. Specialist in metal technology – 12,5%
5. Tool mechanic – 12.5%

The companies surveyed highlighted the skills most in demand in the next 5 years in the metalworking industry:

- Robotics, robot handling and automatization – 50%
- Computer-aided manufacturing (CAM) – 34.38%
- Operation on CNC machine tools – 28.13%
- 3D printing: programming, printing, postprocessing – 21.88%
- Mechanical and electrical installation, including high voltage approaches 18.75%
- Engineering detail drawing skills - 18.76%
- CAD programming – 12.88%
- Operation of machines and tool for precision measurements: dimensional and shape metrological measurement – 11.76%

Respondents in the survey report that the task “Tool operation for precise measurements” may not be required - 0%.

In terms of recruitment challenges, companies indicated the professional skills needed to work at a consistently high quality. These skills include:

- Machine and tool operation (62.5%)
- Interdisciplinary teamwork (50%)
- Competence in the use of information and communication technologies (43,75%)



- Calculation and computing: numeracy skills (24,7%)
- Manual dexterity and manual work (18,75%)
- Management and coordination skills (18,75%)

The rest are with lower than 5% and are not so important for maintaining the high quality of the work.

#### *4. Outcome*

The metal and electrotechnical sectors require highly qualified and skilled personnel to meet current and future challenges. To solve these challenges, it is necessary to take measures to address the problems of lack of professional qualifications, low individual skills and lack of standardised vocational training in a specific professional profile. It is also important to establish fair wages and provide incentives to retain skilled staff.

To address the difficulties, training and capacity building programmes in technical and leadership skills are essential. Companies can improve communication with workers and foster a positive work environment that motivates employees to do their best.

To ensure consistently high quality at work and secure a promising future for the sector, good time management and the ability to work in interdisciplinary teams are required. It is essential to further develop skills in these areas as well as in technical, leadership and problem-solving skills.

The most required skills in the metal and electrotechnical industry for the next 5 years are: industrial mechanic, electronics technician for devices and systems, mechatronic engineer, machine and systems operator, electronics technician for industrial engineering and industrial electrician for industrial engineering.

#### *5. Summary and Recommendations*

In addition, recruitment challenges demonstrate the importance of the following skills: machine and tool operation, interdisciplinary teamwork, competence in the use of information and communication technologies, calculation and computing: numeracy skills, manual dexterity and manual work, management and coordination skills for success in the sector. Issues such as

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lack of professional qualifications, low individual skills and lack of standardised vocational training in a specific occupational profile also need to be addressed. Companies can improve communication with employees and foster a positive working environment that motivates employees to do their best.

In the strategic document of the European Commission called “Vision for European industry 2023” it is envisaged that education policy should be linked more closely to the needs of the industry and the cooperation between business, social partners and educational institutions will be encouraged. The goal is to maintain at an acceptable level or increase the employability of the workforce by applying additional measures such as specialized training aimed at adapting to the new types of jobs, creating employment cells, assisting in job search etc. As the document states, this will be a shared responsibility for the industry and the public sector /European Commission 2019/.

