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Career opportunities in mechanical engineering and metalworking industry

Prepared by:



Impact of automation, artificial intelligence (1)

- From 2020 to 2022 almost 2 million new units of industrial robots are expected to be installed in factories around the world. By 2022, 4 million industrial robots are being expected to be in use around the world -- more than double the stock of 2017.
- Between 37% to 69% of jobs in the EU could be partly automated in the future.
- For about 60% of occupations, at least 30% of the constituent activities could be automated.
- Average of 25% jobs, 50-70% of tasks are likely to change significantly because of automation.
- Also jobs that require relatively low levels of formal education are more prone to automation, noted McKinsey in 2017.
- Women, workers with a lower secondary degree education and workers in lower-wage occupations will be most affected by automation, warns ILO.



Impact of automation, artificial intelligence (2)

- One additional technology job creates around five new, complementary jobs in the local non-tradable sector.
- New opportunities in employment will emerge for e.g., programmers and specialists in robot maintenance, in relation to the manufacturing of robots or in the provision of robotics support services.
- Jobs newly created account for 33%-40% of the number of new entrants.
- Advanced technologies will create new jobs, which will need new sets of skills, some not even known, yet. Automation and AI will accelerate the shift in skills that the workforce needs.
- Since AI technology will remain limited and unable to replace human interaction and wisdom, the service and knowledge-work sector could grow 50 - 60% by 2030.

*The Competence Centre on Foresight of European Commission,
https://knowledge4policy.ec.europa.eu/foresight/topic/changing-nature-work/AI-and-automation_en



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Green practices (1)

- Metal is one of those beautiful materials that can be recycled. Companies may include green criteria, like the recycled metal percentage in produced parts.
- Much attention and knowhow goes into design so products can be easily dismantled and recycled.
- Companies are consistently focusing on energy efficiency by lowering weight and wastage, reducing their emissions, their energy consumption and the amount of energy per product.



Green practices (2)

- Digital technologies are key to greener economy.
- Digital technologies help to extend the life of its plant, saving materials, carbon emissions and energy consumption.
- Companies are digitalizing and deploying Industry 4.0 technologies like augmented reality, digital twins and so on, thus keen to seize the opportunity of more green-oriented products, technologies and services.
- Companies are re-orienting their business models – going from simply making parts to delivering innovative solutions for clients along the value chain for example, creating new approaches to reduce vehicle weight by making components lighter – helping automakers meet demands for ever more fuel-efficient cars.



Green practice example - Schneider Electric

- Digital solutions for predictive maintenance, modernisation and optimised design are key to maximising asset value in a greener economy.
- Schneider experts first conducted a thorough analysis of how to optimise the life and efficiency of existing equipment.
- From this, they determined that much of the equipment did not need to be replaced but that the plant could effectively be modernised with retrofit digital solutions.
- The result: French food giant Danone calculates that, by retrofitting instead of replacing parts of the plant, it has effectively saved 8 tons of materials and 70 tons of CO2 emissions. Moreover, the operating data of the plant is now digitalised so that the company can monitor and manage its power quality and energy use in real time. This has helped reduce its energy consumption, down by a third since 2008.
- By leveraging data, the company can optimise the environmental impact of assets over their entire lifecycle, from design to construction and maintenance.

* <https://orgalim.eu/case-studies/schneider-electric-why-digital-technologies-are-key-circularity>



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Green practice example – CMD Gears

- Digitalisation is also increasingly improving maintenance efficiency, through the use and sharing of data obtained from sensors monitoring temperature, vibration, oil use and more. This enables predictive maintenance and reduces downtime.
- CMD Gears specialises in extra-large gears that its customers definitely don't want to have to replace very often.
- Meanwhile, within CMD Gears' own plant, all metal scrap is recycled, and energy use has been cut by the equivalent of one year's worth over six years.
- Parts and products taken back from customers at end of life are remanufactured where possible or disassembled and recycled. There is no steel waste.
- The more the gearbox is adapted and robust, the lower the maintenance needed and hence the greater the productivity.

* <https://orgalim.eu/case-studies/cmd-gears-making-things-last-longer-large-scale>



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What are the biggest challenges in the metalworking industry?

- 1) Qualified specialists and their skills
- 2) Digitalization: it is becoming indispensable to preserve competitiveness therefore making a digitalization for companies' agenda is a must. Closely related is the need to investment in R&D&I as a way to continue adding value to industries' offering.
- 3) An environmental issues to make progress towards a greener economy.

CAREER OPPORTUNITIES IN THE MANUFACTURE OF METAL PRODUCTS, MACHINERY AND EQUIPMENT IN ESTONIA



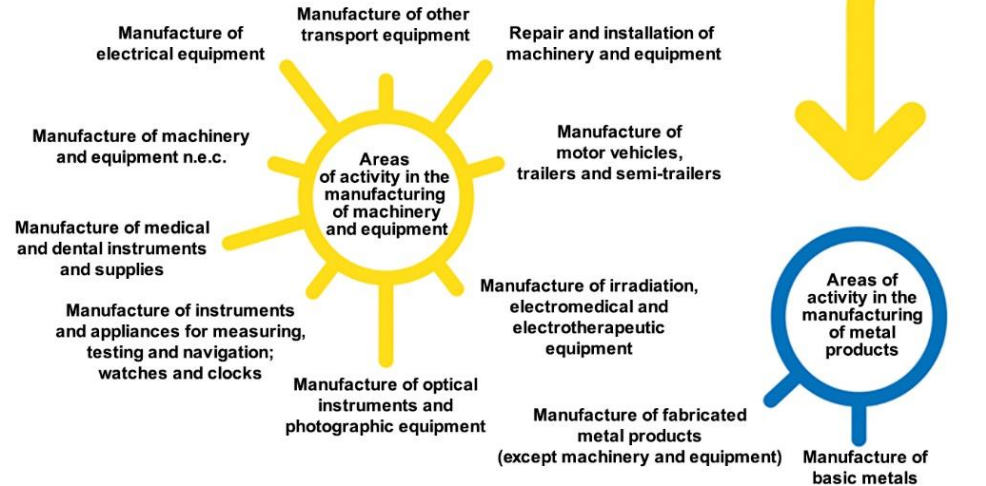
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MANUFACTURING OF METAL PRODUCTS, MACHINERY AND EQUIPMENT

The manufacturing of metal products, machinery and equipment is the leading processing industry in Estonia.

- The processing industry accounts for a **third of the country's export turnover**.
- There are more than 7,500 companies in the Estonian processing industry, most of them small or medium-sized.

Figure 1. OSKA on the field of manufacturing of metal products, machinery and equipment



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MANUFACTURING OF METAL PRODUCTS, MACHINERY AND EQUIPMENT

In total, the processing industry employs around 120,000 people, the sector of manufacturing of metal products, machinery and equipment employs 35,000.

- Managers – sales and marketing managers, product and supply line managers, manufacturing, quality and technical managers;
- Top and mid-level specialists – engineers, masters and supervisors, maintenance technicians and mechatronic engineers;
- Skilled workers – machinery mechanics and locksmiths, welders, manufacturers of metal products and constructions, setters and operators of benches, finishers, and (equipment) assemblers.



Head inimesed ei jää tööst kunagi ilma



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EXPORT

Estonia's primary export markets have traditionally been Scandinavian countries (Finland, Sweden, Norway and Denmark) as well as Latvia and Lithuania.

Exports of machinery and equipment increased by 6% in 2020 compared to 2019.

Swedbank's "Study on industrial undertakings 2021" showed that in 2020, the volume of exports was 3.4 billion euros, while Estonia's total exports of goods was 10.2 billion euros.



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EXPORT

In the sector of manufacturing of metal products, machinery and equipment, exports can be promoted through direct contacts, networking (e.g. company and employee visits), attending trade fairs (e.g. the Hannover Mess in Germany, Alihankinta in Finland, ELMIA in Sweden, TechIndustry in Latvia).

In recent years, digital marketing through social media has really taken off. For example, **Dipperfox** received its first order on TikTok, where their video received 6 million global views over the course of about 1 week.

The successful start-up and online platform **Fractory** use targeted sales marketing on Facebook as well as LinkedIn.



Fractory
making made easy



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EXAMPLES OF ESTONIAN COMPANIES

Largest market participants include, for example, BLRT, Hekotek, Harju Elekter, Hanza Mechanics, Radius Machining, Fortaco Estonia, AQ Lasertool, ESTANC, Cleveron, Bestnet, TECH Group, SRC Group, Saku Metall, Maru Metall.

51% of the market is concentrated in Tallinn and Harju county. There are also fewer companies in Ida and Lääne-Viru county, Tartu county and Pärnu county.

Notable product development examples from Estonia:

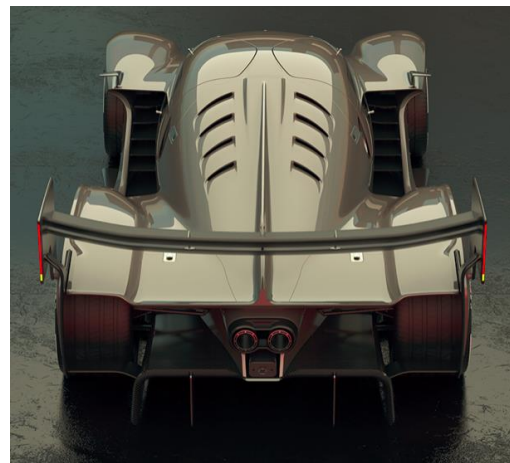
- [Saunum](#) – innovative sauna solution;
- [Baltic Workboats](#) – workboats for professionals;
- [Palms](#) – manufacture of forestry equipment;
- [Luksusjaht](#) – manufacturing of luxury yachts;
- [Estelon](#) – world class speakers;
- [Milrem Robotics](#) – unmanned vehicle;
- [Threed Systems](#) – drone construction.



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OLDBAC in-house track car.



ESTANC

Estanc is the largest and most successful manufacturer of process equipment for high-impact industries in the Nordic and Baltic countries.



Scandinavia as our clients: Anrditz, Valmet, Neste, Wärtsilä, and Yara Marine are just some to mention.



ESTABLISHED: 1992
PRODUCTION AREA >
12,000 m²
NUMBER OF EMPLOYEES:
142



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RESPO

Respo is one of the largest trailer brands in Northern Europe.



ESTABLISHED: 1990
PRODUCTION AREA:
11,000 m²
NUMBER OF
EMPLOYEES: 149
AVERAGE GROSS



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SAKU METALL



sakumetall

Subcontracting plant Saku Metall Allhanke Tehas AS is not just another sheet metal subcontracting company. We are able to design, manufacture and assemble sheet metal products to the highest standards and requirements at short notice.

ESTABLISHED: 1992
PRODUCTION AREA:
10,000 m²
NUMBER OF
EMPLOYEES: 300
AVERAGE GROSS
SALARY: €1,950



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FRACTORY

A cloud manufacturing platform that links engineering companies to the manufacturing market in real time, enabling engineers and purchasing managers to make the switch from data collectors to decision makers.



Fractory

ESTABLISHED: 2017
PRODUCTION AREA: 0 m²
NUMBER OF EMPLOYEES:
51 in Estonia
AVERAGE GROSS SALARY:



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KŌU MOBILITY GROUP

kōu

Developer of IoT solutions for light electric vehicles
(micro-mobility vehicles).

Manufacturer and developer of electric scooters.



I really believe that an electric scooter is
the best way to move around in the city.

ESTABLISHED: 2014
PRODUCTION AREA:
2,000 m²
NUMBER OF
EMPLOYEES: 125
AVERAGE GROSS
SALARY: €2,270
TURNOVER: €9,620,791
EXPORT SHARE: 35%



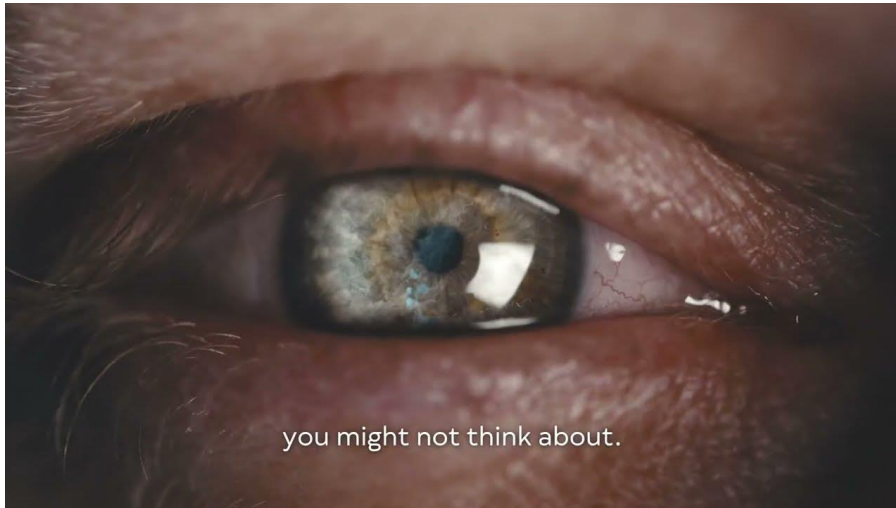
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RADIUS

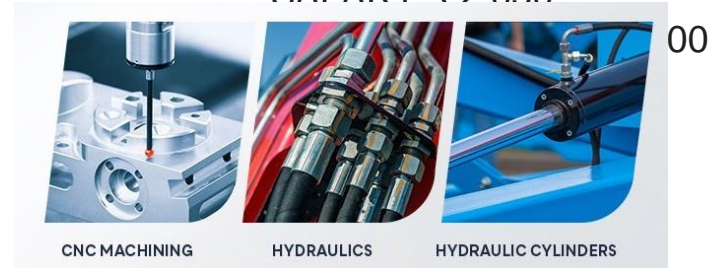


Radius is a contractual manufacturing company with three business units providing CNC turning and CNC milling services, hydraulic tube and hose assemblies and hydraulic cylinders to the OEM sector.

ESTABLISHED: 2005
PRODUCTION AREA:
5,200 m²
NUMBER OF
EMPLOYEES: 85
AVERAGE GROSS
SALARY: €20,500



you might not think about.



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HANZA CLUSTER BALTICS

HANZA

HANZA Mechanics Tartu offers comprehensive manufacturing solutions for various sectors (including medical devices and equipment for the food industry). Sheet metal production involves cutting, bending, stamping, welding and powder coating. HANZA Mechanics Narva offers manufacturing solutions for heavy machinery.

ESTABLISHED: 1996
PRODUCTION AREA:
15,000 m²
NUMBER OF
EMPLOYEES: 500+200
AVERAGE GROSS



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CHALLENGES IN THE MANUFACTURING OF METAL PRODUCTS, MACHINERY AND EQUIPMENT

- Companies are small (more than 70% of the companies engaged in the manufacturing of machinery and equipment have <10 employees) – there are few resources and it is difficult to innovate and offer added value to products, product batches are small and the value chain is short;
- Lack of qualified workforce;
- Automation, digitalisation and robotisation;
- Identifying new export markets and finding existing ones;
- Green transition and sustainability;
- Development of own products and brands;
- Unstable economic situation, global changes in supply chains, lack of national industrial policy and strategy.



Fredy Jäätes, Fredy OÜ

* Reference: EML 85, yearbook of the Federation of Estonian Engineering Industry



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GREEN TRANSITION AND CORPORATE RESPONSIBILITY

ABB is a leading global technology company promoting the transformation of society and industry, for a more productive and sustainable future.

ABB Eesti is active in two areas: manufacturing (generators, drives, renewable energy equipment, electrical cabinets, compact substations) and sales (transmission and distribution substation projects, medium and low voltage equipment, automation projects, robots, maintenance services).

ABB aims to produce and offer products and/or services that have no unacceptable and far-reaching environmental impacts, are safe for their proper use, are optimal in terms of their consumption of energy and natural resources, and can be either sent away for recovery or recovered or safely disposed of.

ABB considers corporate responsibility an important part of its business.

ABB: taking a green approach is natural and profitable for any organisation



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FEDERATION OF ESTONIAN ENGINEERING INDUSTRY



The Federation of Estonian Engineering Industry is an Estonian [non-profit association](#) that brings together undertakings engaged in the [engineering](#), [metal](#) and [machinery industry](#) in Estonia.

According to the [Articles of Association](#) of the federation, its objective is “the development of production, entrepreneurship and marketing in manufacturing of metal products, machinery and equipment, and the creation of favourable conditions for its members in this field.”

Number of members: 144 (as at 25 September 2022)

www.emliit.ee

<https://www.facebook.com/groups/1417587431887879/>

Industrial news (on Äripäev radio) <https://www.aripaev.ee/raadio/saatesarijad/toostusuudised-eetris>

In the programme, Äripäev’s editorial team focuses on different industrial fields from both a broad and practical perspective. We take a closer look at specific topics to show how sectors have grown, their current situation, new products and solutions, growth opportunities, risks and trends. We talk to specialists in the field and bring you different visions. The programme airs every other Monday at 13:00.



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CAREER AND FURTHER EDUCATION OPPORTUNITIES IN ESTONIA



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COMPANY

TECHNOLOGIST

LOCKSMITH

PRODUCER OF METAL CONSTRUCTIONS

BLACKSMITH

PUNCHING MACHINE OPERATOR

TECHNOTRONIC

PURCHASING MANAGER

PRODUCTION MANAGER

UNDERTAKER

INSTALLER OF METAL DOORS

TECHNOLOGY TEACHER

ENGINEER

QUALITY MANAGER

PAINTER

WELDER

SOFTWARE ENGINEER

SHIFT MANAGER

SCULPTOR

SKILLED WORKER

JEWELLERY ARTIST

GALVANISER

FINISHER

SHIP BUILDER

ENGRAVER

INVENTOR

BENCH WORKER

GOLDSMITH

WHITESMITH

MECHATRONICS ENGINEER

PRODUCT DEVELOPER

STRUCTURAL ENGINEER

SALES MANAGER CRAFTSPERSON

METAL CASTER

ASSEMBLER

MECHATRONICS ENGINEER

CLOCKSMITH

POWDER PAINTER

CNC OPERATOR

TECHNOLOGIST

LATHE OPERATOR

SUPPLY CHAIN MANAGER

SERVICE ENGINEER

DESIGNER

CHIEF ENGINEER

ROBOT BUILDER

MOTOR CAR SERVICE ENGINEER



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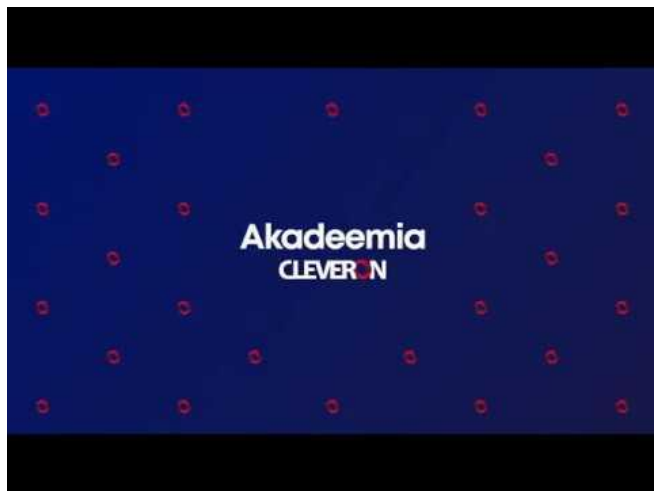
FURTHER EDUCATION OPPORTUNITIES IN VOCATIONAL TRAINING

- [Ida-Virumaa Vocational Training Centre](#)
- [Tallinn Lasnamäe Mechanics School](#)
- [Võrumaa Vocational Education Centre](#)
- [Tartu Vocational College](#)
- [Viljandi Vocational Training Centre](#)
- [Tallinn Centre of Industrial Education](#)
- [Pärnumaa Vocational Education Centre](#)
- [Rakvere Vocational School](#)
- [Tallinn Polytechnic School](#)



FURTHER EDUCATION OPPORTUNITIES IN HIGHER EDUCATION INSTITUTIONS

- [Tallinn University of Technology](#)
- [University of Tartu](#)
- [TTK University of Applied Sciences](#)
- [Estonian University of Life Sciences](#)
- [Cleveron Academy](#)



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FORMULA STUDENT

Formula Student is a product development competition aimed mainly at engineering students and first took place in Estonia in 2006. The team of Formula Student Tallinn comprises of students from Tallinn University of Technology and TTK University of Applied Sciences.

The Formula Student product development competition involves the design, construction and subsequent demonstration of a single-seater formula car, completing various tests and racing it on a track.

Taking part in the project will give students real-life experience on how to design and construct a car, and it shows young engineers the financial side of the automotive industry.



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PNEUMOBIIIL TECHNICS 5 (T5)

Pneumobiil Technics 5 (T5) is a compressed air-powered formula vehicle developed by the Society of Engineering Students and its design draws on the prototype machines competing at Le Mans.

What makes the T5 Pneumobike special is the extensive use of 3D-printing technology. Many of the engine and chassis components are made of stainless steel and aluminium using SLS. The aluminium tubular frame of the vehicle is covered by plastic body panels made using FDM technology.

The Technics 5 compressed air formula is fitted with a National Instruments cRIO controller that makes it “smart” and allows real-time monitoring, modification and analysis of the processes taking place inside the vehicle.



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SOLARIDE

Solaride started in 2020 on the initiative of two students from the University of Tartu to build the first solar car in the Baltics

Today this is an interdisciplinary education and cooperation project whose main focus is the development of future talents and the popularisation of technology education.

More than 300 high school students, university students, mentors, trainers and partners are involved in the project.



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OSKA REPORT ON MANUFACTURING OF METAL PRODUCTS, MACHINERY AND EQUIPMENT



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Processing industry

Problems to be solved



2/3 of engineers are missing



Poor product development and marketing skills



Workers show increasingly more shortages in ICT and general skills



There is a need for employees with knowledge of materials technology and high-tech equipment



Among skilled workers, there is a shortage of robotics, automation and mechatronics engineers



Companies need foreign labour during the "transition period"

Solving these problems will boost living standards and overall economic growth

[Reference: OSKA Töötlev tööstus.](#)

[Uuringu lühiaruanne 2022 \[OSKA processing industry. Short report on the study 2022\]](#)



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Need for general skills and attitudes in the processing industry



SPECIALISTS

capacity for
transdisciplinary
cooperation

ability to make
decisions

creativity

process
management

innovation

intercultural
competence

people management



ALL EMPLOYEES

teamwork skills

analysis skills

adaptability

expressive skills

initiative

ability to learn

language skills



SKILLED WORKERS

ability to see the
big picture

sense of obligation

will to work

interest in the area

accuracy

spatial thinking

planning skills

Reference: OSKA Töötlev tööstus.

Uuringu lühiaaruanne 2022 [OSKA processing industry. Short report on the study 2022]



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Important industry-specific ICT skills and knowledge of future employees in the processing industry



Reference: OSKA Töötlev tööstus.
Uuringu lühiaaruanne 2022 [OSKA processing industry. Short report on the study 2022]



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MERKUUR (EE)

The Merkuur team has developed mobile workshops to introduce various trades, techniques and tools in the metal and wood industries to young people and to offer them hands-on opportunities to test the tasks associated with these trades in order to raise their career awareness and competitiveness in the fields of technology and engineering.



ESTABLISHED: 2008
PRODUCTION AREA: m²
NUMBER OF
EMPLOYEES: 5
AVERAGE GROSS
SALARY: €1,465



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TEHNOBUSS (LV)



The central aim of the platform “TehnoBuss” is to develop closer cooperation between educational institutions, employers and young people of all ages.

We want to help current students become prospective professionals with a smart mind and professional skills that are sought after in Latvian companies.



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CAREER OPPORTUNITIES IN THE MANUFACTURE OF METAL PRODUCTS, MACHINERY AND EQUIPMENT IN LATVIA



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MASOC – basic facts

- Established in 1994
- About 170 members in the network
- Represents and brings together – leading engineering and metalworking companies + related and supporting institutions (material and equipment suppliers; IT; testing and certification; design; research; education and training)
- Activities:
 - Representation of interests
 - Joint projects and activities
 - Human resources / skills / education / training
 - Information and knowledge sharing
 - R&D and innovation
 - Marketing and export promotion
 - Co-operation and networking
- Member of ORGALIM, Latvian Employers Confederation, Latvian Chamber of Trade and Commerce
- **General objective – international competitiveness of the member companies and the sector in general**



Metalworking and mechanical engineering sector in Latvia (structure, % of total turnover, 2020)



C29 – Automotive



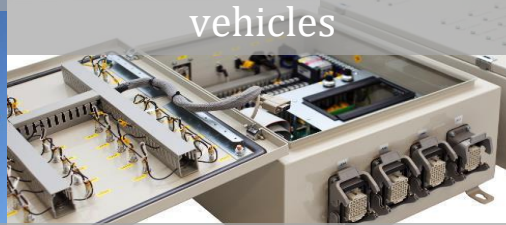
C30 – Other transport vehicles



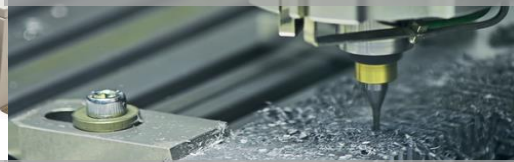
C24 – Metal production



C28 – Equipment and machinery



C27 – Electrical equipment

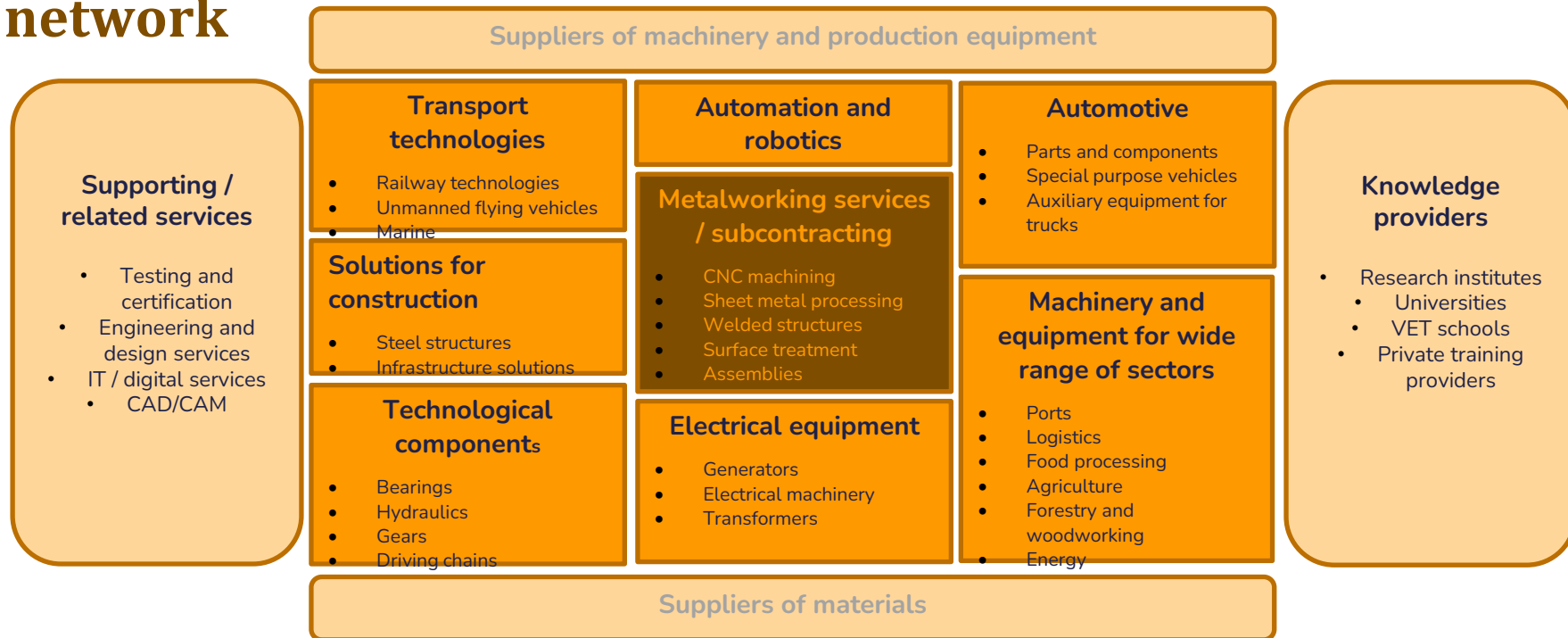


C25 – Metal products



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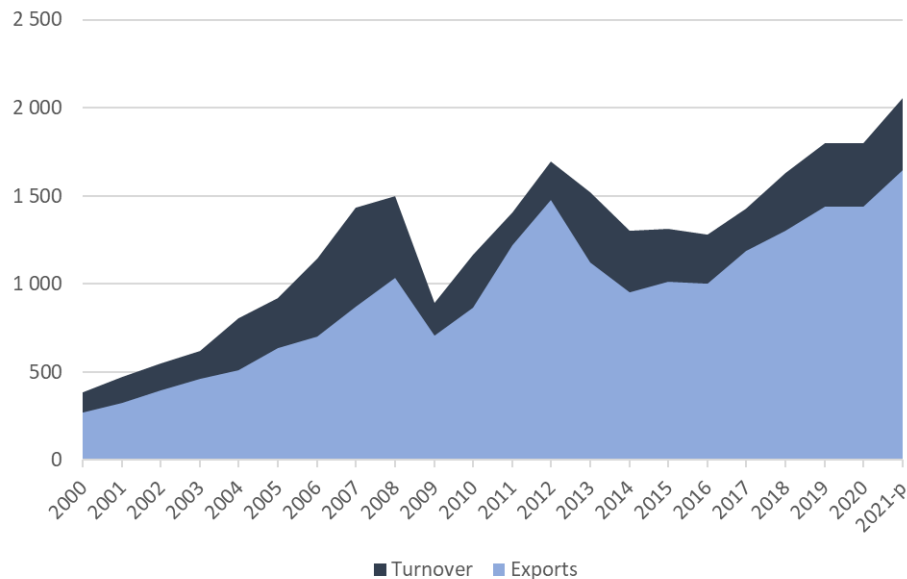
MASOC ecosystem – main areas and players within the network



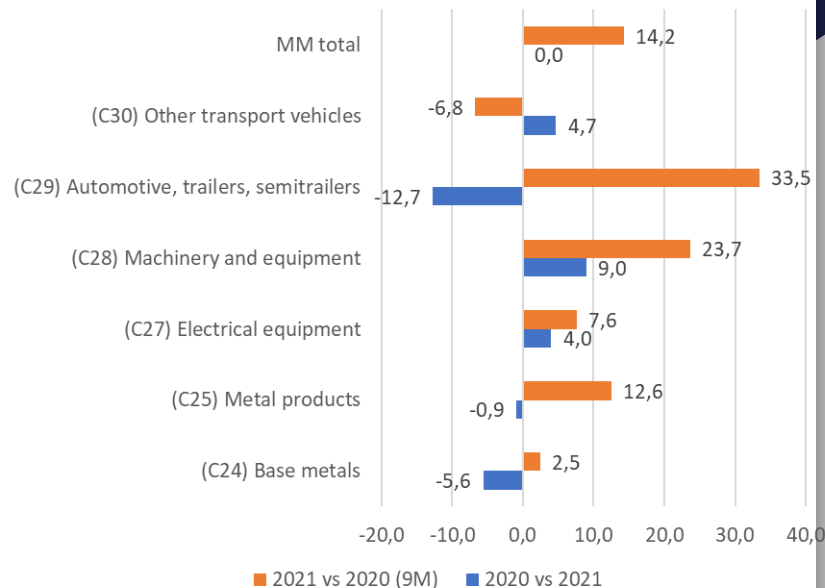
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Turnover and exports in the sector

Turnover and exports (million EUR)

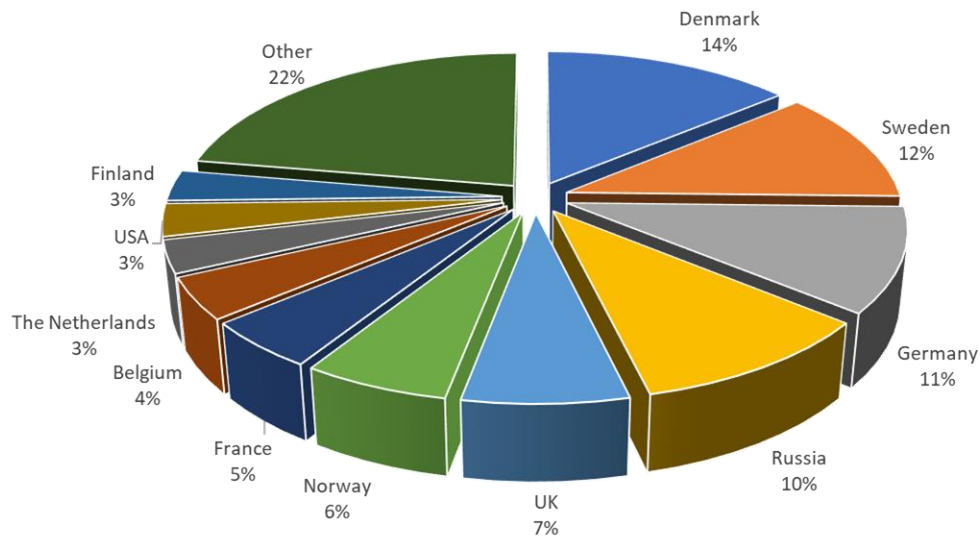


Changes in turnover in subsectors, %



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Main export markets – mechanical engineering and metalworking, 2020



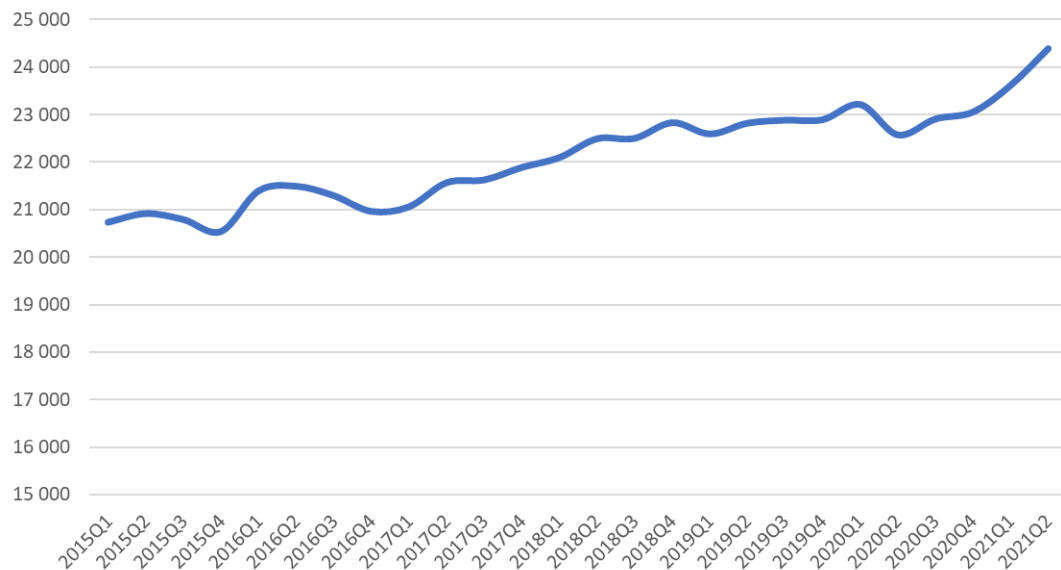
About 80% of production is exported to more than 100 countries.
The biggest market - EU



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Employment

Number of persons employed,
mechanical engineering and metalworking (C24; 25; 27; 28; 29; 30)



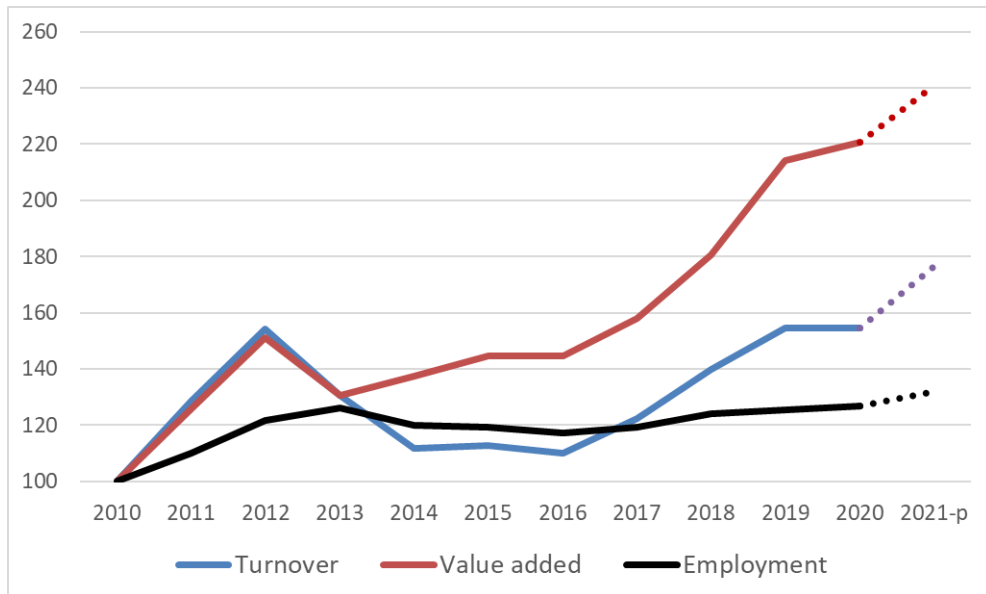
- Decrease in employment -2% in the second quarter of 2020 (2020 Q2 / 2020 Q1)
- Increase in employment in 2021
- Lack of qualified specialists still remains as key challenge according to MASOC's sector study



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Turnover, value added and employment

2010=100%



- Overall productivity keeps growing
- Employment increasing, but at a slower pace than turnover and value added
- The forecasted increase in turnover in 2021 is about 15% compared to 2020 in actual prices
- Increase in value added is expected similar, yet less certain due to dramatic price increase for raw materials, components and energy products

2010-2020 – data from Central Statistical Bureau

2021 – forecast by MASOC based on short term statistics



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Key challenges in LATVIA

- Costs and availability of raw materials and components
- Energy costs
- Covid and related restrictions, vaccination requirements
- Availability of skilled specialists



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New partnership for defence industry– PATRIA 6X6 project

- First meeting with PATRIA representatives in Riga during Tech Industry 2019 exhibition (November 2019)
- Pre-selection and sight visits of potential suppliers with assistance of MASOC
- First contracts signed with Latvian suppliers end of 2020
- First prototype produced and presented in May 2021
- Contract between MoD of Latvia and Patria on full scale production signed
- 4 new vehicles produced and supplied. 200 vehicles planned in total
- First stage – sourcing of parts and components from Latvian suppliers
- Later stage – final assemblies in newly established factory in Cesis, Latvia



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Examples of recent investment projects - Caljan



- Company profile – design and production of telescopic conveyors for logistics sector.
- New production site officially opened in October 2020. Located in Liepaja, territory of the former metallurgical plant «Liepajas metalurgs»
- In 2021 additional production site acquired, one more to be constructed
- Working at full capacity. Production fully booked till October 2022.
- Production output in 2021 foreseen almost two times higher than in 2020
- High demand due to increased online shopping and delivery volumes globally



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Bucher Municipal



BUCHER
municipal

- Has grown into one of the largest mechanical engineering companies in Latvia
- Main product – street sweepers
- Keeps investing in production efficiency and new technologies
- Growing segment – electrically powered sweepers



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Recent investment projects

KÄRCHER

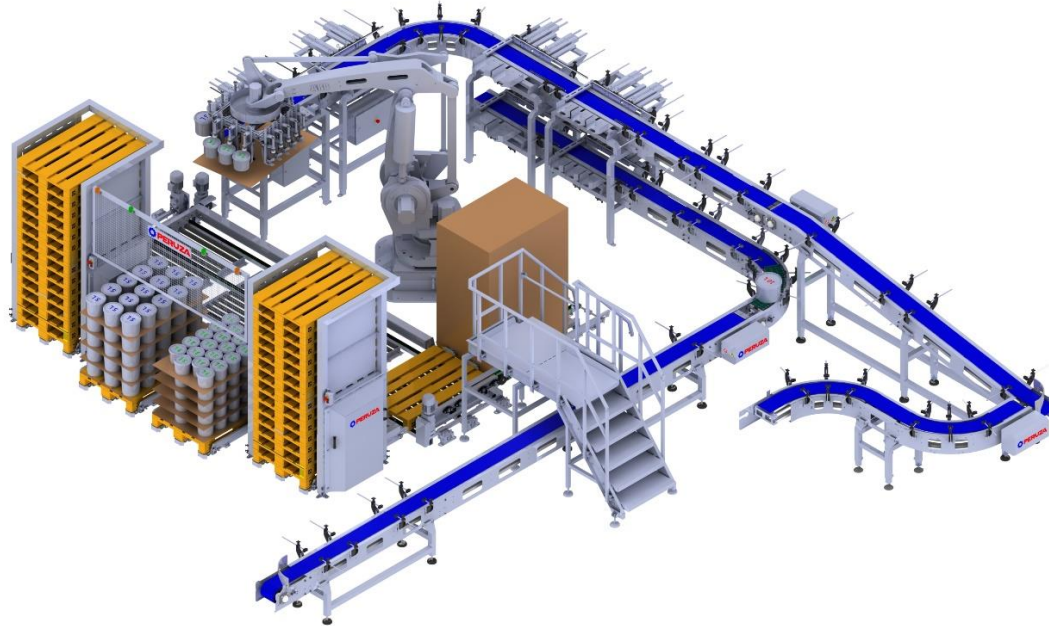


- In September 2021 the investment project of Kärcher was officially announced
- The company has acquired existing metal processing company near Jelgava
- Further investment and development is expected
- Main products – municipal street cleaning machinery



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Robotisation and automation solutions for a wide range of sectors



- Leading producer of automated and robotised production equipment
- Continuous investment in R&D
- Recent projects include robotised and automated solutions for such sectors like:
 - Logistics
 - Food processing
 - Automotive
 - Waste treatment



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EMJ Metāls



- One of the fastest growing companies in the sector and biggest sheet metal service centre
- Investment in new production premises as well as equipment (production premises increased from 4000 to 9000m2)
- Laser cutting and bending of sheet metal parts up to 8m long
- Recently acquired AQAP 2110:2016 certificate for defence and military sector



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Precise machining services - ANTTROM



- New and fast growing company specialised in CNC machining services of complex parts with high accuracy
- The dimensions of the processed parts can vary from 0.5 mm to 500 mm in diameter and up to 1500 mm in length
- Accuracy to the micron
- Customers from aerospace, medical equipment, robotics and other industries



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Precise machining services - EXIGUM



- New and fast growing company specialised in CNC machining services of complex parts with high accuracy
- Investment in new technologies continue
- Focus on highly automated production



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Material is produced within Erasmus+ programme project “Better career guidance in Mechanical Engineering and Metalworking Industries”, No.2021-1-LV01-KA210-SCH-000031207 (2021-2022).

Project partners:

Tehnobuss Latvia (Latvia) www.tehnobuss.lv

Foundation Smart minds (Latvia) www.smartminds.lv

Merkuur Ltd. (Estonia) www.merkuur.eu

Project results available on: <https://www.smartminds.lv/index.php/en/projects/better-career-guidance-in-mechanical-engineering-and-metalworking-industries-bettercareer>

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