
CAEF
The European
Foundry Association
2022

Contents

Preface

Once again, the CAEF - The European Foundry Association - Commission for economics & statistics has compiled a statistical annual entitled "The European Foundry Industry 2022" from national reports and statistical material gathered from its member countries. The main tables were supplemented by information from European foundry nations being non-members of CAEF as far as data has been available.

The publication thus presents an authentic statistical picture of the European foundry industry. All the same, data in some categories, particularly those regarding output values, have remained incomplete. Despite those inadequacies the Annual Report published by the Commission for economics & statistics remains the most comprehensive Europe-wide survey of our industry.

The Commission wishes to express its gratitude to all those CAEF member association representatives who helped in preparing these reports and figures.

Düsseldorf, November 2023

CAEF - The European Foundry Association

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TOTAL SURVEY

The European Foundry Industry in 2022

The Economy and the Casting Customer Industries

The Macro-economic Situation at the end of the year 2022

In 2022, Europe found itself in a state of continued transition. While Europe made significant strides in managing the Covid-19 pandemic, the year ushered in a host of fresh and pressing societal challenges. Supply chain disruptions, which had loomed large in 2021, were notably alleviated in 2022 and had evolved into a relatively minor concern. For the European foundry industry 2022 was a difficult year again. Challenges for foundries were different depending on the customer sectors.

The year 2022 brought a series of issues to Europe, impacting the foundry industry and the entire continent. The eruption of conflict in Europe, surging energy costs, sky rocketing inflation, and mounting interest rates created a challenging environment. In February, Europe experienced a profound macroeconomic shock as a result of the Russian attack on Ukraine. In response, the European Union, alongside Western allies and partners, swiftly enacted stringent economic sanctions. These sanctions led to a steep increase in energy costs, as Russia was till then the biggest energy supplier for Europe. The rising energy prices have been and still are a key driver of European inflation. The European Central Bank meanwhile tried fighting inflation rates close to 10 % in the Euro Area by increasing interest rates. These where as low as 0% in the beginning of 2022, four consecutive increases in the second half of the past year led to an interest rate of 2,5 % in December 2022.[1]

With an increasing number of individuals receiving vaccinations, there has been a gradual and carefully managed easing of Covid-19 related restrictions in Europe and North America over the course of 2022. This positive development underpins the track towards a “back to normal”. In contrast, China has carried its ongoing zero-Covid policy into 2022. Despite relatively low infection numbers, millions of residents were obliged to observe regional lockdowns. While supply chain disruptions have started to reduce, the escalation of energy costs, propelled by the ongoing conflict between Russia and Ukraine, has introduced a counteractive dynamic that necessitates careful monitoring and strategic planning.

In 2022, China's GDP experienced a moderate growth of 3.0%, impacted by stringent Covid-19 restrictions and elevated energy costs[2]. Meanwhile, the figures for the USA show a GDP growth of 2.1%. However, Europe faced a more pronounced challenge with a significant surge in energy prices. Germany, representing the largest foundry industry, was affected strongly by the steep surge of raw materials and energy costs. The German economy grew by only 1.8% over the year. Across CAEF member countries, there was an overall positive economic trajectory, as reflected in a 3.6% increase in GDP, albeit slightly less than the notable 5.5% surge observed in 2021. This growth was fostered by comprehensive government support measures, which also contributed to a continued decline in the CAEF unemployment rate, decreasing by a noteworthy 0.9 percentage points to reach 6.5%. However, the CAEF region also witnessed a substantial rise in consumer prices, with inflation rates skyrocketing from 3.3% in 2021 to a notable 11.6% in 2022.

[1] European Central Bank (2023): “Key ECB interest rates”, Frankfurt am Main, Germany.
[2] International Monetary Fund (2023): „World Economic Outlook “, Washington DC., USA.

Table 1: Forecast 2023/2024

Country	Weighting In %		Gross Domestic Product Growth Rate in %			Consumer Prices Growth Rate in %			Unemployment Rate In %		
	Population	GDP	2022	2023	2024	2022	2023	2024	2022	2023	2024
Austria	1,6	2,4	5,0	0,4	1,1	8,6	8,2	3,0	8,6	8,2	3,0
Belgium	2,0	2,9	3,1	0,7	1,1	10,3	4,7	2,1	5,5	6,0	6,0
Bulgaria	1,2	0,5	3,4	1,4	3,5	13,0	7,5	2,5	4,3	4,6	4,4
Croatia	0,7	0,4	6,3	4,7	2,1	10,7	7,4	3,6	6,8	6,4	6,0
Czech Republic	1,9	1,5	2,4	-0,5	2,0	15,1	11,8	5,8	2,3	3,5	2,5
Denmark	1,0	1,9	3,6	0,0	1,0	8,5	4,8	2,8	4,5	5,1	5,1
Finland	1,0	1,4	2,1	0,5	1,3	7,2	5,3	2,5	6,8	7,5	7,5
France	11,6	13,4	2,6	0,7	1,3	5,9	5,0	2,5	7,3	7,4	7,3
Germany	14,8	19,7	1,8	-0,1	1,1	8,7	6,2	3,1	3,1	3,3	3,3
Hungary	1,7	0,9	4,9	0,6	3,2	14,5	17,7	5,4	3,6	4,1	3,8
Italy	10,4	9,9	3,7	0,7	0,8	8,7	4,5	2,6	8,1	8,3	8,4
Lithuania	0,5	0,4	1,9	-0,3	2,7	18,9	10,5	5,8	5,9	7,0	6,5
Netherlands	3,1	4,9	4,5	1,0	1,2	11,6	3,9	4,2	3,5	3,9	4,2
Norway	1,0	2,5	3,3	2,2	2,5	5,8	4,9	2,8	3,3	3,5	3,7
Poland	6,6	3,4	4,9	0,3	2,4	14,4	11,9	6,1	2,9	3,2	3,5
Portugal	1,8	1,2	6,7	1,0	1,7	8,1	5,7	3,1	6,0	6,6	6,5
Slovenia	0,4	0,3	5,4	1,6	2,1	8,8	6,4	4,9	4,0	3,9	4,0
Spain	8,4	6,8	5,5	1,5	2,0	8,3	4,3	3,2	12,9	12,6	12,4
Sweden	1,9	2,7	2,6	0,5	1,0	8,1	6,8	2,3	7,5	7,8	8,0
Switzerland	1,5	4,0	2,1	0,8	1,8	2,8	2,5	1,6	2,2	2,3	2,4
Türkiye	15,0	4,7	5,6	2,7	3,6	72,3	50,6	35,2	10,5	11,0	10,5
UK	12,0	14,4	4,0	-0,3	1,0	9,1	6,9	3,0	3,7	4,2	4,7
CAEF[3]	**100**	**100**	**3,4**	**0,6**	**1,4**	**11,6**	**8,0**	**4,6**	**6,5**	**6,7**	**6,6**

Source: International Monetary Fund, World Economic Outlook Database, April 2023

The Economic Situation in the Major Casting Customer Industries

Vehicle construction

In 2022, the global passenger car market experienced diverse dynamics, resulting in a steady performance with 71.2 million units sold. Notably, China and India demonstrated robust growth, showcasing their resilience in the face of challenges. Conversely, Europe (EU27, EFTA & UK), Japan, and the USA grappled with factors like supply chain disruptions, escalating energy and logistics costs, and the uncertainties arising from the Russian conflict. As a result, these regions lagged behind previous year's figures.

Within Europe, 11.3 million new vehicles were registered, marking a 4% decrease from the preceding year. This indicates a continued struggle to rebound from the pandemic-induced declines witnessed in the two years prior. Furthermore, when compared to the pre-crisis year of 2019, sales in the past year witnessed a staggering 29% reduction. Notably, major markets such as the United Kingdom (-2%),

[3] Gross Domestic Product and Consumer Prices weighted by GDP share of CAEF countries. Unemployment Rate weighted by population share of CAEF countries.

Spain (-5%), and France (-8%) experienced declines, offset only by a 1% increase in new registrations in Germany. Despite a year-end surge of 15% in December, the European passenger car market ultimately couldn't avert an overall negative annual result.

On the other hand, the Chinese passenger car market exhibited remarkable resilience by achieving a 10% surge in sales, totalling 23.2 million vehicles. Overcoming the setbacks of spring, where lockdowns severely restricted business in key sales regions, the market rebounded in the second half of the year. Contributing to this recovery was a tax reduction on a substantial portion of vehicles sold. Although December saw a 6% decrease compared to the previous year, a commendable 2.2 million new vehicles were sold, underscoring China's ability to adapt and recover.
India emerged as a bright spot in the global automotive landscape, witnessing a remarkable 23% surge in sales, totalling almost 3.8 million cars in 2022. This impressive growth was further highlighted in the year-end spurt, with December recording a 7% increase in brand-new vehicle sales compared to the same month in the previous year.

Mechanical engineering

In 2022, the machinery and equipment industry within the EU-27 demonstrated a robust growth trajectory, surpassing initial expectations. Despite facing significant challenges along supply and logistics chains, the first half of the year saw an impressive year-on-year average growth of 4.7 percent in price-adjusted production. The latter half of the year witnessed a further boost, with real growth reaching 5.2 percent, owing to a gradual alleviation of supply-side constraints.

Among all EU member states, the Netherlands emerged as a standout performer in the machinery and equipment manufacturing sector, driven notably by a surge in exports of semiconductor manufacturing equipment. Several Eastern European member states also experienced production growth rates surpassing the average, benefiting from nearshoring initiatives due to relatively lower labour costs. In contrast, Germany's performance was slightly below par, exhibiting a modest real increase of just 1 percent. Similarly, France saw a dip in production output, experiencing a decline of 1 percent.

Worldwide, machinery and equipment production reached an estimated value of nearly 3.4 trillion euros in 2022. Price hikes in an overall inflationary climate, along with currency exchange fluctuations, held notable significance in the reporting year of 2022. When adjusted for these factors, the growth in turnover stood at a modest 1 percent. China, which surpassed the milestone of EUR 1 trillion in turnover for the first time in the preceding year, experienced a notably sluggish performance due to its stringent zero-covid policy. Consequently, the country's share in the global machinery turnover dropped by 1.6 percentage points compared to the previous year. Despite this, China maintains an undisputed lead in the country rankings with a turnover of EUR 1.215 billion. The disparity between China and the subsequent countries remains substantial. The United States secures second place, followed by Germany, Japan, and Italy. Collectively, these four countries contribute to a turnover of EUR 1.225 billion, only slightly surpassing China's individual turnover.

Building industry

The ongoing war in Ukraine, coupled with the energy crisis and abrupt shifts in monetary policy, initially hinted at a potential downturn in the European economy. However, recent months have shown a more positive performance than initially anticipated. This improvement is attributed to lower energy costs, eased supply constraints, heightened business confidence, and a robust labour market. In 2022, the European construction sector experienced a confirmed growth of 3%, operating within an overall expansionary economic framework.

In contrast, the updated projection for the European construction sector has been revised downward. Previously, it was assumed that the sector would remain stable in 2023, but now there's an expectation of reduced activity levels. The factors contributing to this gradual deceleration in growth, ultimately leading to a contraction in construction expenditure for 2023, have been evolving over time. These include the waning momentum of the global economy, inflation, shifts in monetary policy, and the

ensuing uptick in interest rates. The most recent forecast now anticipates a decline of 1.1% this year, followed by an additional contraction of 0.7% in the subsequent year. This underscores the challenging prospects the construction industry faces since this year due to increased building costs and co-amplified by higher interest rates. The anticipated recovery of this sector has been postponed to 2025.

Steel industry

Global crude steel production reached 1,886 m. tons in 2022, which was 3.9% less than the year before.[4] The EU produced 136.3 m. tons of crude steel in 2022, a decrease of 10.6% compared to 2021. Germany produced 36.8 m. tons of crude steel in 2022, 8,2% less than in 2021. Türkiye's crude steel production for 2022 was 35.1 m. tons, reflecting a 13.2% decrease compared to previous year.

Asia produced 1,383.8 m. tons of crude steel in 2022, a decrease of 1.4% compared to 2021. China's crude steel production in 2022 reached 1,018.0 m. tons, down by 1.4% on 2021. China's share of global crude steel production increased from 53.0% in 2021 to 54.1% in 2022. India's crude steel production for 2022 was 125,3 m. tons, up by 6.0% on 2021. Japan produced 89.2 m. tons in 2022, a decrease of 7.3% compared to 2021. South Korea produced 65.8 m. tons, 6.5% less than 2021.

The United States produced 80.5 m. tons in 2022, 6.1% less than 2021. Russia is estimated to have produced 71.5 m. tons in 2022, 5.4% less than 2021. Ukraine produced 6.3 m. tons in 2021, 70.5% less than in 2021. The significant drop in Ukrainian production can be attributed to the ongoing war with Russia where significant steel infrastructure has been destroyed. The Middle East produced 50.4 m. tons of crude steel in 2022, an increase of 10.0% on 2021. Annual crude steel production for South America was 43.4 m. tons in 2022, a decrease of 6.2% on 2021. Africa produced 21.1 m. tons in 2022, 3.4% more than 2021.

The strong economic recovery from 2021 cannot be reaffirmed. Major production regions are witnessing a downward trend. The notable decrease in production can be linked to the war in Ukraine. This conflict has triggered a global surge in energy costs, which in turn has raised production expenses, leading to an overall decrease in worldwide crude steel production.

The Foundry Industry

In 2022, the iron and steel foundries of CAEF member countries produced 10.7 m. tons of castings. Compared to previous year, this number corresponds to a 0.3% increase in production. However, production was still 6.5% lower than in 2019 and even 12.1% less than in 2018 – admittedly one of the best years in recent decades. The five countries dominating in terms of castings tonnage, namely Germany, Türkiye, France, Spain and Italy, account for 82 % of the ferrous metal castings production. The production increased in eight countries compared to the previous year. Sweden and the United Kingdom had the biggest increase with each above 10% compared to the previous year. Meanwhile the production in Poland was -15% and in Slovenia -9.9% lower than in 2021.

In 2022, non-ferrous metal foundries within CAEF booked a production decrease of -1.1% to 3.8 m. tons. The three countries that dominate the production of non-ferrous metal castings, namely Italy, Germany and Türkiye, account for 62.4% of the total volume of non-ferrous metal castings produced in the CAEF member states. In both Germany and Italy production decreased at an above-average rate (-1.8% and -6.8%) compared to the other CAEF countries. Germany, the second largest country of non-ferrous production was struggling with low production numbers in the automotive sector. Non-ferrous casting production decreased by 1.8% compared to 2021. Compared to 2020 production was still 4.8% higher in Germany.

The number of employees in iron and steel foundries increased in Austria, Finland, Germany, Slovenia, Spain, Switzerland, and Türkiye. All in all, however, the employment of foundries located in CAEF member states stagnated by 123,400 people. In 2022 the non-ferrous metal sector was dominated by

[4] World Steel Association (2023):" World Steel in Figures 2023", Brussels, Belgium.

negative employment trends. In the End of 2021 approx. 113,200 people worked directly in European foundries. Compared to 2021 the number of employees decreased by 2.2%.

The share of cast iron with lamellar graphite in the output total of iron and steel castings was 48.0%, a slightly lower share than in the year before. Correspondingly, the share of ductile cast iron logged (44.3%). The share of steel casting sector was slightly higher (7.5%).

The production of castings made of non-ferrous metal alloys is still dominated by light metals. The share was 88.2%. Furthermore, the share of copper alloys holds the level of round about 5.2%. Therefore, the share of components made of zinc alloys was 5.7%.

From the data available it appears that the export quota of iron and steel foundries increased from 49.9% to 51.9% in 2022. Calculation base is exclusively the foreign trade report of ten member countries. Germany, the country with the second highest exports in castings experienced an increase by 3.2% with a volume of almost than 1.3 m. tons. Türkiye reported an increase by 8.0% in export volume to 1.57 m. tons. Spain exported a volume of 0.66 m. tons (-0.5%) and is placed the third place.

If we consider only those CAEF member states with current figures for the previous year, the value of the iron and steel castings produced increased by 22.5%. The notable upswing in 2022 can primarily be attributed to the elevated inflation rates within all member states of the CAEF.

From the data that is available on the production value of the non-ferrous metal sector a year-on-year comparison shows an increase of 7.6% in turnover.

All countries with missing data were excluded from the calculations.

The Situation in the Casting Material Sectors

Iron

At 5.2 m. tons, the output of the CAEF member states was down by -1.9%. After the strong increase in 2021 (+19.4%) driven by the post-pandemic recovery from the previous year, this favourable trend ends now. Poland, Portugal, and Slovenia all had negative growth double digits in 2022. Germany registered a decrease of 2.7% in iron castings in 2022. Meanwhile United Kingdom (6.0%) and Sweden (8.8%) had the highest growth rates of all CAEF members.

Compared to 2019 however the production is still 8.5% lower. As ever, the data available for the cast-iron sector is too sketchy to allow determining the overall value of production. The output of components made of cast iron with lamellar graphite is largely destined for the motor vehicle and mechanical engineering industries.

For the motor vehicle industry, the highest absorption rates were reported from Portugal (82.4%), Germany (67.9%) and Türkiye (31.9%) respectively. For the mechanical engineering in industry the highest shares in the output were posted for 2020 by Italy (53.5%), Bulgaria (48.4%), Türkiye (39.1%), and Germany (20.8%).

On the one hand the number of persons employed in iron foundries (incl. ductile cast iron) increased in Finland, Germany, Slovenia, and Türkiye and was stable in Poland and Portugal. On the other hand, the number of persons employed in iron foundries decreased in Bulgaria, Hungary, Italy, and Spain leading to a 0.8% decline overall.

Ductile Cast Iron

The producers of ductile cast iron reported an increase of output by 2.0% to 4.8 m. tons.

Poland and Slovenia reported a decline, while Spain hold its production level. Greatest growth was reported from Sweden (+38.7%) and United Kingdom (+17.0%).

Cast iron with spheroidal graphite (GLS) traditionally dominates the ductile cast iron sector with an unchanged share of 99% during the last years. Correspondingly, malleable iron as a niche product holds a share of a little bit more than 1%. In this context, it should be noted that malleable casting statistics have lost some of their meaning because in some states it is impossible to break down the figures for the ductile cast-iron sector. Therefore, data for malleable castings are not collected any more since 2016. Nodular iron components are mainly produced in Germany, Turkey, France, Spain, and Italy.
As ever, components for the motor vehicle and mechanical engineering industries predominate in the production of ductile castings, with the building industry following in third place among the customer industries. If analysing the shares of motor vehicle castings in those countries for which data are available, one sees that the highest shares are reported from Portugal at 85.1%, Spain at 52.8%, Germany at 42.3% and Türkiye at 41.3%. The mechanical engineering industry holds the highest shares in output in Italy at 54.6% and Germany at 36.0%. Unfortunately, it is impossible to present the share for the building industry.

Steel castings

In 2022 the output of steel castings increased by 5.5% to 812,100 tons. Türkiye, the leading producer since 2018, logged this year a moderate increase of 3.9% in production volume compared to the year before. For Germany, second in line, the production increased by 16.2%. Together both countries account for 56.3% of CAEF steel casting production.

In those member countries for which data for a year-on-year comparison was available, the value of the output of steel casting components increased by 14.8%.

The number of persons employed in steel foundries decreased by 0.1%. In Finland, Spain, and Türkiye the number of employees increased, whereas the number of persons employed stayed same in Poland, Portugal, and Slovenia. Meanwhile in Bulgaria, Hungary, and Germany a reduction was reported. At the end of 2022 nearly 22,200 people were employed in European steel foundries.

Non-ferrous metal castings

The output of non-ferrous metal casting components in the CAEF member countries decreased by 1.1% to 3.8 m. tons.

Traditionally, the production of non-ferrous metal castings is dominated by light metals. The motor vehicle industry is the foremost customer. In the year 2022 the output of light metal castings (aluminium and magnesium) increased by 0.1% compared to 2021, reaching nearly 3.3 m. tons. Together Italy, Germany, and Türkiye, the three major producers, account for 62.3% of the light-metal castings. The production for these leading countries went down by 6.5% for Italy. Meanwhile Türkiye noted once again a strong increase, this year it amounts to a growth of 15%. Germany had a stable production compared to 2021. Poland registered a notable decrease of 15%. Among the light metal alloys, magnesium plays a subordinate role in terms of output weight.

The second most important material category in the non-ferrous metal sector is that of copper and its alloys. For countries with registered production for 2022 the level decreased by 8.2% after an increase of 12.7% in 2021. The reported volume in 2022 reached a level of almost 198,800 tons. Germany, Italy, and Türkiye, the three biggest producer countries of copper alloy castings in CAEF accounted together for 59.3% of copper alloy castings production in CAEF in 2022. In 2022 Hungary (-55.8%), Türkiye (-27.1%) and Poland (-9.8%) registered steep declines in production. Italy recorded a decline in

production of 9.8% as well. The output of zinc castings declined by 9.5% to a volume of 213,700 tons. Italy, Germany, and Türkiye are the major producers, together holding a share of 77.4% in output total.

The statistical data available for the category of 'other non-ferrous metal alloys' are fragmentary. In addition, some countries include copper and zinc in this category, because there is no facility for segregating these. Therefore, it is impossible to analyse this category more extensively.

Sources:
ifo Munich, IMF, ACEA, VDA, VDMA, Euroconstruct, Worldsteel, CAEF

REPORTS OF THE COUNTRIES

Economic Situation 2022 and Outlook 2023

The Austrian economy grew strongly until summer of 2022. On the one hand, this was due to the fast recovery from the COVID-19 crisis, and on the other hand, Austrian goods exports expanded strongly from the beginning of 2021 as a result of the global economic momentum. This benefited industrial production in particular, which grew vigorously until summer of 2022. In line with global trends, however, the Austrian economy abruptly lost steam in the 3rd quarter of 2022. In addition to exports, value added in goods manufacturing also fell compared to the previous quarter. The decrease in production was attributed to several factors. Firstly, the post-COVID effects, which had been providing a temporary boost, have now expired. Additionally, China experienced weakened industrial demand due to ongoing COVID-related restrictions. Moreover, the industry grappled with soaring energy prices and consistently high input costs, resulting in extended delivery times. This was further compounded by high inflation rates. The prevailing skills shortage and decreasing margins for companies added to the challenges faced by the industry.

In the winter half-year of 2022/23, economic output is likely to decline significantly. According to the WIFO Business Survey, companies still assess the current situation in many sectors as favourable, but expectations have deteriorated. Persistently high energy prices, strong price dynamics and uncertainty about future developments are dampening the business mood. Nevertheless, economic indicators seem to stabilise somewhat towards the end of the year. Commodity markets are easing slightly, supply chain problems are disappearing due to weakening demand, and inflation is likely to have passed its peak. The Austrian economy can therefore be expected to recover gradually from 2023 onwards. Noticeable impulses from abroad are likely to be felt again from spring onwards. Private consumption and investment are also stabilising with the decreasing uncertainty and the gradual easing on the energy markets. However, the continuing geopolitical conflict with Russia could always lead to renewed tensions and delay the recovery. The rise in interest rates due to monetary tightening will also dampen aggregate demand. Nevertheless, according to current estimates, the domestic economy should return to a moderate growth path in the 2nd half-year of 2023. However, downward risks are significantly higher than upward risks.

Slight easing on the commodity and energy markets

This forecast is made under the assumption that the sanctions against Russia will continue, but that natural gas deliveries from Russia to Europe will not be suspended completely. Nevertheless, prices on the spot and futures markets will remain high for the time being. The tighter monetary policy frameworks worldwide will have a restraining effect on the economy and dampen demand, which should weaken inflation dynamics. The cheapening of commodities would also slow consumer price inflation. However, wage growth has increased in some industrialised countries, which could slow down the decline in inflation. In addition, fiscal policies continue to provide expansionary impulses in many countries. In the euro area, the real GDP is expected to shrink in the winter half-year of 2022/23 before recovering slightly later in 2023. On the supply side, high input prices are constraining production, especially in energy-intensive sectors. On the demand side, high inflation in particular is dampening real incomes and thus - despite considerable support from fiscal policy - private household consumption. However, the upswing will remain subdued as support measures in the context of the energy crisis slowly expire and higher real interest rates have an increasing impact on the economic activity. The US economy will grow at a much slower pace in 2023 than in 2022, with the decline in real disposable household income continuing to affect consumer demand and higher interest rates dampening investment. Business surveys point to a further slowdown in industrial activity. This is likely to have an increasingly negative impact on equipment investment, while construction investment has already been declining for some time,

especially in housing. Inflationary pressure will therefore slowly decrease, also because of lower energy prices. In China, the expected gradual lifting of the severe COVID-19 restrictions will have a positive impact on economic activity over the forecast period.

Although normalisation will still take some time, it will result in a much stronger growth of the overall economy in 2023. Government spending, especially on infrastructure projects, will support the economy. Monetary policy is also providing expansionary impulses, especially since China, in contrast to most of the advanced economies, has tended to loosen its monetary policy after it was tightened in the wake of the real estate boom.

Table 1: WIFO Forecast (in %)

	2022	2023	2024
GDP, real terms	**4.7**	**0.3**	1.8
Goods production	**3.0**	**-2.2**	**1.5**
CPI	**8.5**	**6.5**	**3.2**
Gross Capital Investment		**0.2**	**2.2**

Source: WIFO Economic Forecast 03-2023, FMTI Economic News 03-2023

Situation of the foundry industry

The industry's own survey shows slight losses in production for 2022, but increases in turnover, with a slight decrease in staff compared to 2021. Total production in 2022 amounts to approx. 291,399 t and has decreased by -0.1 % compared to 2021. The total turnover of the sector shows an increase of 19.1 % compared to 2021 and amounts to approximately € 1.66 billion.

Iron castings show a total production of 149,502 t for 2022, a decrease of -1.8 %. Turnover has gone up by 17.3 %, to approximately € 512 million.

Ductile cast iron production amounts to 104,096 t, a decrease of -0.7 % compared to 2021.
Steel castings also decreased to 6,812 t, a decrease of -34.1% compared to 2021.

Production of grey iron castings increased by 4.0% over 2021 to a volume of 38,594 t.

In non-ferrous castings, production incremented by 1.7 % and turnover went up by 19.9 %.

Employment situation

In 2022, a total of 6,457 employees (salaried and blue-collar workers) were employed, which is -1.0% compared to 2021.
The number of industrial apprentices being trained in the sector's apprenticeships (foundry technology and metal foundry) increased compared to 2021.

Incoming orders

By and large, the order situation is good. Still, energy costs and staff shortages continue to be a major issue.

Investment plans

Due to the prevailing conditions and marked delivery problems of the suppliers, investment plans are rather restrained.

Personnel costs

The collectively agreed increase in wages and salaries amounts to 5.4%.

Supply of raw materials and energy

In 2022, raw material prices were volatile.

Electricity prices continued to rise compared to the previous year. Energy and gas prices in Austria also remain at a high level and continue to be a heavy burden on our industry.

All companies are suffering extremely from exploding cost of energy and raw materials.

Outlook 2023

Currently, the automotive industry registers a slight recovery and there is a renaissance of diesel-powered cars. Due to ever-increasing costs, companies are forced to implement price increases. The area of consumer goods registers reductions. We hope for a certain stabilisation of the markets.

Table 2: Foundry Production

	Production in t		Change	Value in k€		Change
	2022	2021	in %	2022	2021	in %
Grey castings	38,594	37,120	4.0			
Ductile cast iron (incl. malleable iron)	104,096	104,800	-0.7			
Steel castings	6,812	10,338	-34.1			
Iron castings	**149,502**	**152,258**	**-1.8**	**511,802**	**436,311**	**17.3**
Total, zinc die-castings & heavy-metal castings	10,038	11,606	-13.5			
Light-alloy castings	131,859	127,971	3.0			
whereof: Aluminium die-castings	106,991	104,210	2.7			
Permanent mould aluminium castings	17,649	17,264	2.2			
Aluminium sand-castings	1,104	1,030	7.1			
Magnesium castings	6,115	5,467	11.9			
Metal castings	**141,897**	**139,577**	**1.7**	**1,150,293**	**959,747**	**19.9**

Source: Association of the Austrian Foundry Industry

Figure 1: Austrian Ferrous Casting Production (volume)

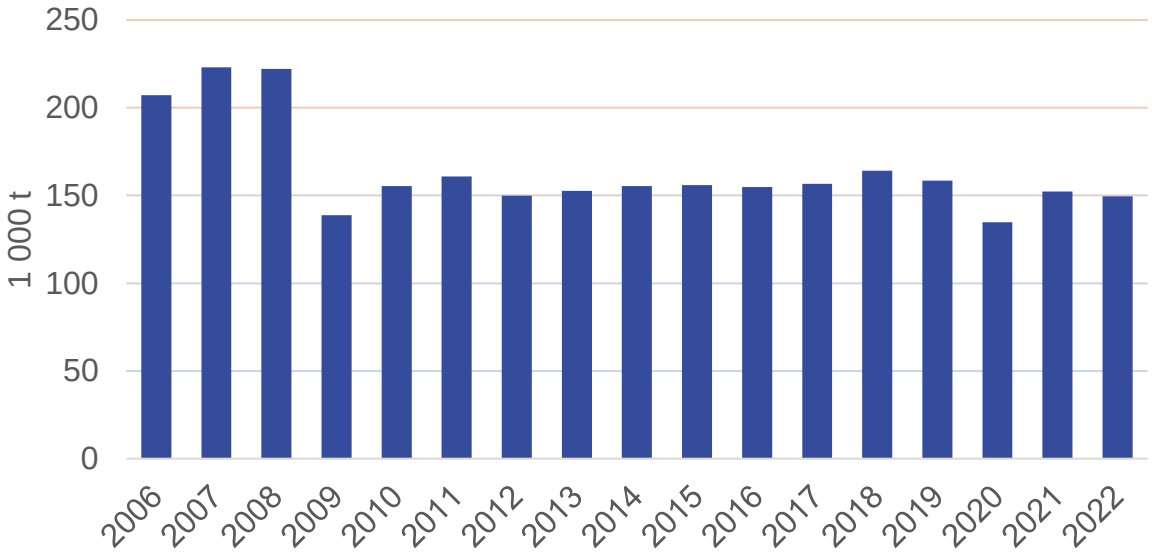
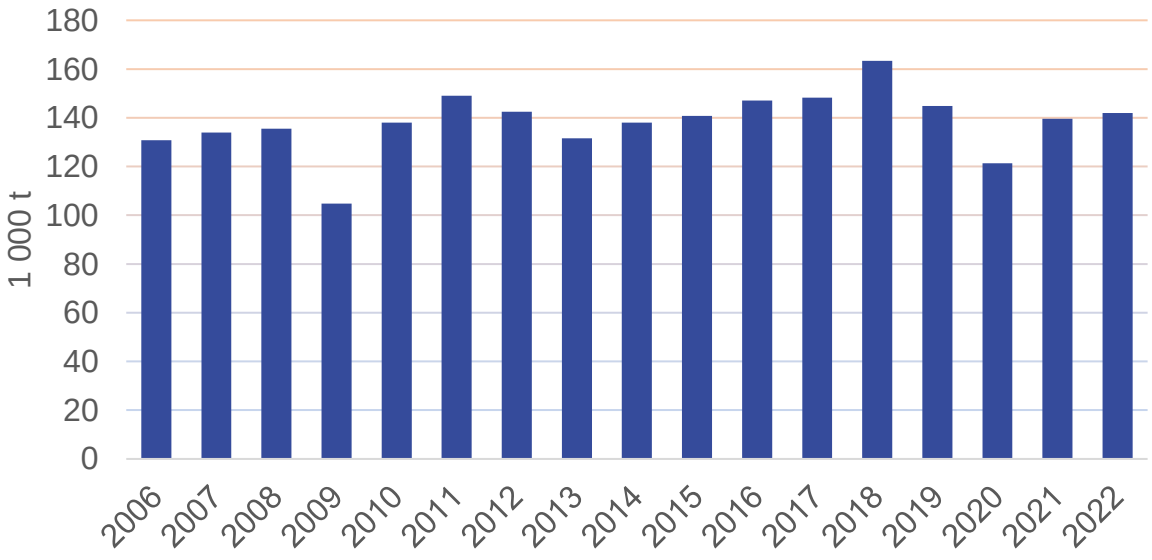


Figure 2: Austrian Non-Ferrous Casting Production (volume)



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Foundry production

The war in Ukraine strongly affected all industry, foundries were no exception. Uncertainty in the supply of raw materials and energy resources from Russia drove up the prices of these commodities last year and triggered an energy crisis across Europe. The rise in inflation, which reached 17%, had a negative effect. Of course, this was also reflected in the foundry segment. After the introduction of the embargo on Russia, the amount of orders mainly for engineering technologies fell. The increase in the prices of energy and raw materials forced foundries to recalculate prices and introduce material and energy surcharges. Customers had a hard time getting used to the price increase and started looking for new suppliers, especially from Asian countries. Order volumes declined due to price increases and the pass-through of actual costs. Foundries found it very difficult to set the prices of castings, due to the uncontrollable and unpredictable prices of basic inputs. Energy prices for wholesale customers were also capped at the end of the year, which was very late. Despite all the problems, the foundries managed to withstand the situation in the end. Compared to the previous year, production fell only slightly, by 2%. The companies managed to find new business partners abroad. In addition to traditional countries such as Germany or Slovakia, new foundry orders appeared with our castings to countries such as Kazakhstan, Azerbaijan, the United Arab Emirates and Mexico. Rising prices of raw materials and energy increased company turnovers. The turnover of foundry companies often increased by up to 60%. High turnovers in the final saved the economic result of a number of foundries despite the decrease of orders. Due to economic exhaustion, it did not reach the planned investments. As a result, a number of investment projects have been suspended or postponed. Employees' wages grew only minimally, the reason for the wage growth was not labour productivity, but the salary policy of the state administration.

Even in early 2022, before Russia's invasion of Ukraine, foundry production had the growing potential of the previous year. However, the expected return to 2019 volumes did not take place. The total production of 328,000 tons was slightly 2% lower compared to the previous year, which is a difference of about 6 thousand tons of castings. Foundry production was affected by the energy crisis. If there was no agreement on price increases with the customer, there was a reduction in orders. On the contrary, orders for the arms industry grew. The lack of workers also had a significant impact on the implementation of orders and deadlines, which is a long-term problem for permanent and now also agency employees. Overall, 2022 was very similar to 2010. But the material mix was different.

The total production of Fe castings in 2022 was about 222,500 tons of castings. The year-on-year decrease was 2%. Turnovers of Fe foundries increased by up to 60% due to the energy crisis and high inflation. Prices of scrap and pig iron rose significantly. For steel foundries, there was a high increase in the prices of alloys. The energy crisis brought unexpected price reversals for the worse. Time-unpredictable changes were hardly reflected operatively in the agreed casting prices. The lack of workers and rising inflation were reflected in firms' wage costs. Despite the increase in labour costs, the labour productivity of Fe foundries did not grow. This is given not only by the equipment and technology, but mainly by the character of orders. In mass production, there is high pressure on price. Foundries update the prices of new orders to the continuous increase in input prices. Consequent industries are considering imports of castings from outside the EU. In terms of materials, the decrease in the production of GJL and GJS was approximately the same value of about 2%.

The year 2022 showed a similar volume of steel castings as the previous year. The total decrease was 500 t, which is negligible. The total production was 44 thousand tons. However, turnover grew at 60%,

thanks to the increase in energy and feedstock prices. A large part of the produced castings found use in the arms industry, which is not very reassuring. However, the production of steel castings was also directed to energy projects in countries outside the EU. The production of carbon steels is economically demanding and ceases to be profitable. The sustainability of Czech steelworks is directed towards alloyed and special steels. The complexity of production, high production costs and low labour productivity is a specificity of steel castings. If we add to this the lack of skilled workers, the situation in steel foundries and steelworks is not simple at all.

It seems that the future of castings belongs to aluminium alloys. This material compensates for the drop in Fe casting production in overall terms and continuously changes the ratio of the material mix in its favour. The year 2022 once again broke the 100,000-tonne limit, despite the difficult economic situation in Europe. Fluctuations in the automotive industry continue to affect production volumes and pricing. High production productivity relies on modern technologies with the mass use of robots. Despite the use of modern technologies, foundries face a lack of workers similarly to Fe foundries.

Production of copper alloy castings in 2022 decreased by 6% to final 17 thousand tons. Predominantly manual production of castings relies on the expertise of qualified personnel. Labour productivity is low here, similarly to steelworks.

The year 2022 expected a renewed growth in the needs of casting production, which was also confirmed in its first quarter. The war in Ukraine triggered unexpected and unpredictable changes in the established "order", which had a huge impact on foundry production, which in principle hardly tolerates any systemic fluctuations. Foundries are almost unable to respond to shock changes, and delayed reactions cause economic damage. The stressful existential situation has forced our foundries to commit to drastic and uncompromising measures. And that ultimately kept them "in the game." But customers do not "sleep" and are looking for new opportunities. The foundries' trade policy must be all the more active so that orders do not start moving out of the EU zone again.

The never-ending war in Ukraine has a strong influence on the general situation and events in Europe. Similarly, industrial production, and with it the foundry industry too, will feel all the effects of this difficult situation and will have to be able to respond adequately, as it did last year.

Figure 1: Czech Ferrous Casting Production (volume)

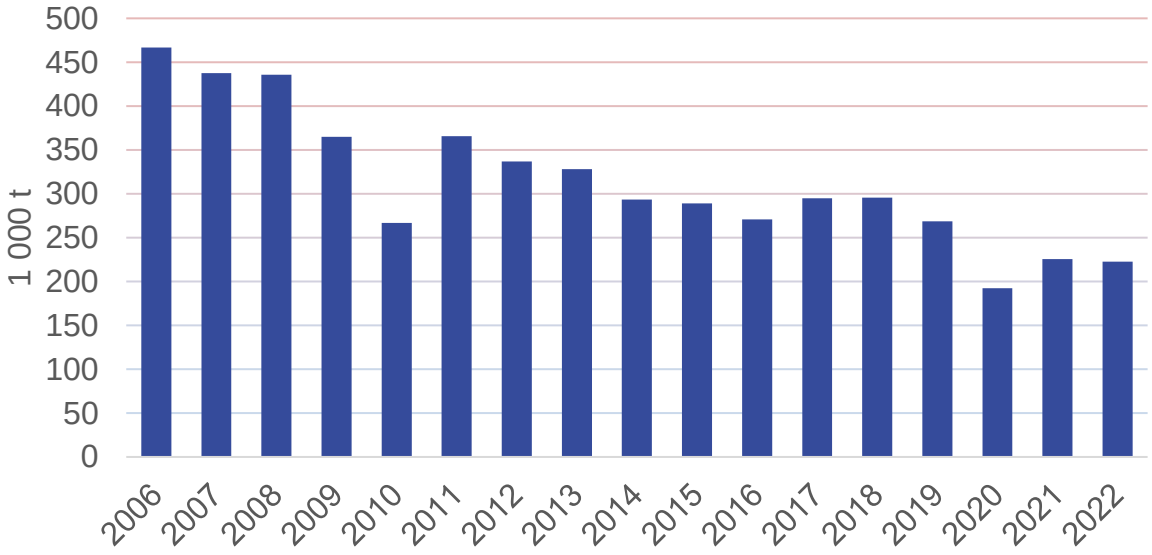
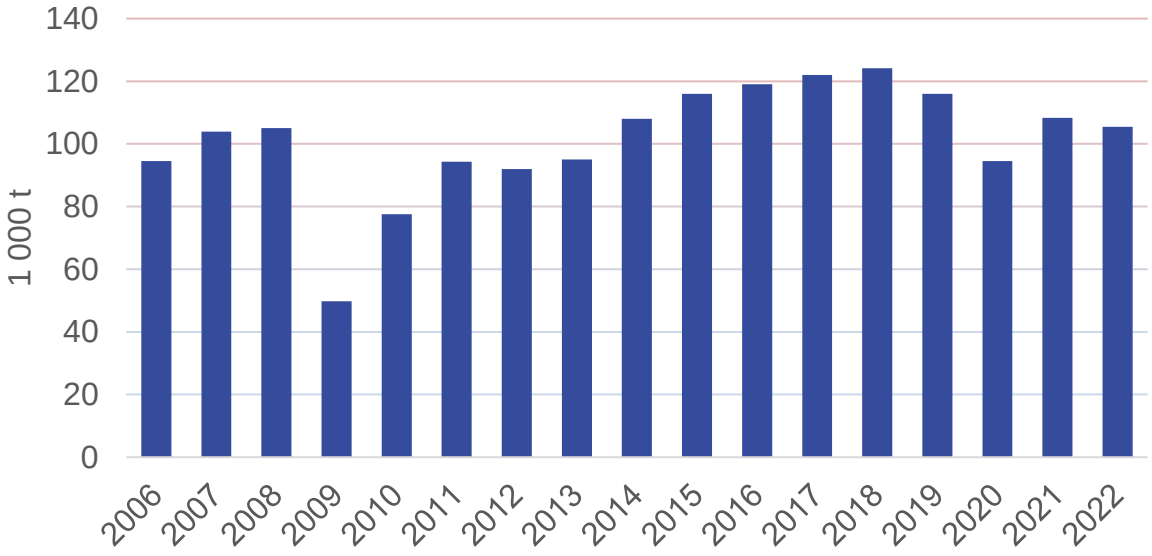


Figure 2: Czech Non-ferrous Casting Production (volume)



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Economic Background

The Finnish Technology Industry as a whole

According to preliminary data, the turnover of technology industry companies in Finland grew approximately 16 per cent in 2022 from 2021. Turnover grew in all main sectors. The significantly higher level of prices contributed to turnover growth. Turnover in Finland in 2022 exceeded EUR 100 billion, totalling EUR 105 billion. The monetary value of new orders in the October-December period was 12 per cent higher than in the previous quarter, but 6 per cent lower year-on-year. The quick rise of producer prices has contributed to the increase in the value of order intake. The balance figure for tender requests in January was -12. The balance figure has now seen six consecutive quarters of decline. However, the rate of decline remains moderate. At the end of December, the value of order books was practically unchanged from the end of September and 1 per cent higher than in December 2021. Judging from order trends towards the end of 2022, the turnover of technology industry companies is expected to grow at a slower pace or stop growing during early 2023.

The number of personnel employed by technology industry companies in Finland in 2022 was up 4 per cent, or 13,000 people, from 2021. On average, the industry employed approximately 336,000 people in 2022. At the end of December, the industry had approximately 338,000 employees. Personnel grew in each quarter of 2022, but expansion in the second half of the year was much slower than in the first half. According to the personnel survey by Technology Industries of Finland, the number of employees affected by lay-off procedures at the end of December was approximately 10,000. Recruitment of new employees remained at the average level in the October-December period. In total, recruitments came to 11,000. Some companies were increasing their personnel, others were hiring new employees due to retirements and employee turnover.

Mechanical Engineering in Finland

According to preliminary data, the turnover of mechanical engineering companies (machinery, metal products and vehicles) in Finland increased by 16 per cent in 2022 from 2021. In 2022, their turnover in Finland amounted to EUR 41 billion. Year-on-year, the value of new orders decreased by 16 per cent. The quick rise of producer prices continues to contribute to the increase in the monetary value of order intake.

Judging from order trends towards the end of 2022, the turnover of mechanical engineering companies in early 2023 is expected to be higher than in the corresponding period last year. However, growth is expected to slow down in early 2023. The number of personnel employed by mechanical engineering companies in Finland grew by 3.1 per cent in 2022 from the 2021 average. The industry employed 137,800 people, approximately 4,100 more than in 2021. At the end of December, the number of personnel was 138,200.

Metals Industry in Finland

According to preliminary data, the turnover of metals industry companies (steel products, non-ferrous metals, castings and metallic minerals) in Finland increased by 39 per cent in 2022 from 2021. In 2022, their turnover in Finland amounted to EUR 20 billion. The sharp rise in producer prices in early 2022 contributed significantly to the turnover growth, but the prices fell quickly during the second half of the year. The total production of steel products, non-ferrous metals, castings and metallic minerals in Finland increased by 7 per cent year-on-year. The number of personnel employed by metals industry companies in Finland grew by 1.2 per cent in 2022 from the 2021 average. The industry employed 17,000 people, approximately 200 more than in 2021.

Foundry Industry in Finland

Foundry industry as a whole

In the year 2022 the total production of castings in Finland increased about 2 % in 2022 from 2021. The production of iron and steel castings was 52.931 tons which is 2 % more compared to year 2021. Iron and nodular iron casting production increased about 3 % and steel casting decreased about 4 %. Metal castings production was 4.370 tons, which is about 1 % more than the previous year. The value of the casting production of Finnish foundries was 261 m€, which is 29 % more compared to year 2021. The foundry industry employed 1445 people, 103 more than in 2021.

Table 1: Finnish grey cast iron production

GJL	2022	2021	Change in %
Production (t)	20,452	17,270	18.4
Export (t)	6,054	3,899	55.2
Value of production (m. €)	46,85	31.92	46.8
Employees	698	645	8.2

Table 2: Finnish ductile cast iron production

GJS	2022	2021	Change in %
Production (t)	27,051	23,118	17.0
Export (t)	9,552	8,002	19.3
Value of production (m. €)	83,82	51.95	61.3
Employees	698	645	8.2

Table 3: Finnish steel casting production

Steel Castings	2022	2020	Change in %
Production (t)	5,428	6,664	-18.5
Export (t)	319	1,997	-84.0
Value of production (m. €)	68,14	58.95	15.6
Employees	386	525	-26.5

Table 4: the Finnish non-ferrous casting production

Non-Ferrous Castings	2022	2021	Change in %
Production (t)	4,370	4,145	5.4
Export (t)	1,630	1,350	20.8
Value of production (m. €)	62,48	45.23	38.1
Employees	361	348	3.7

Figure 1: Finish Ferrous Casting Production (volume)

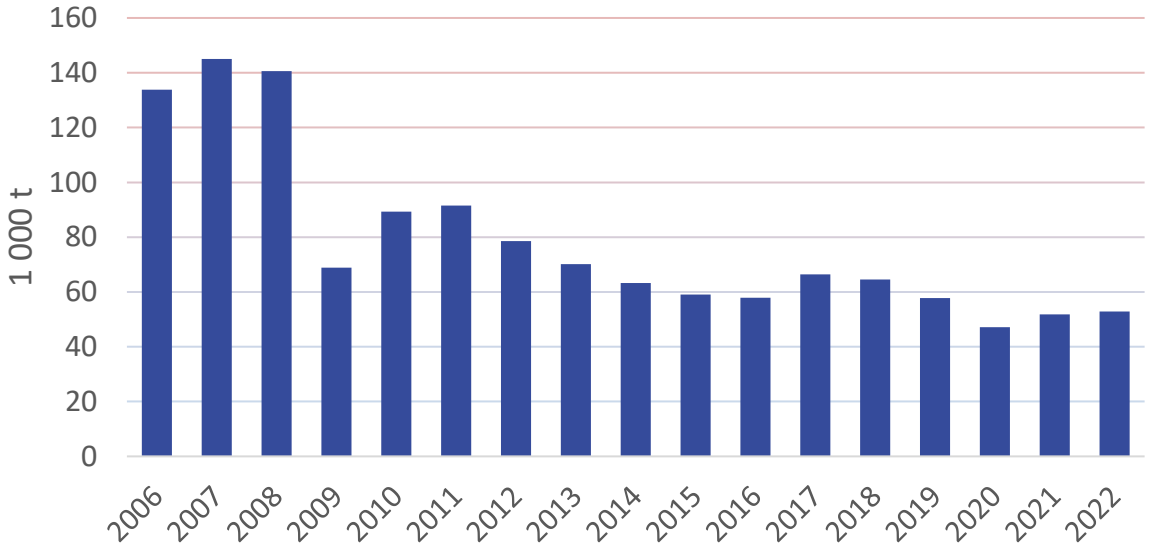
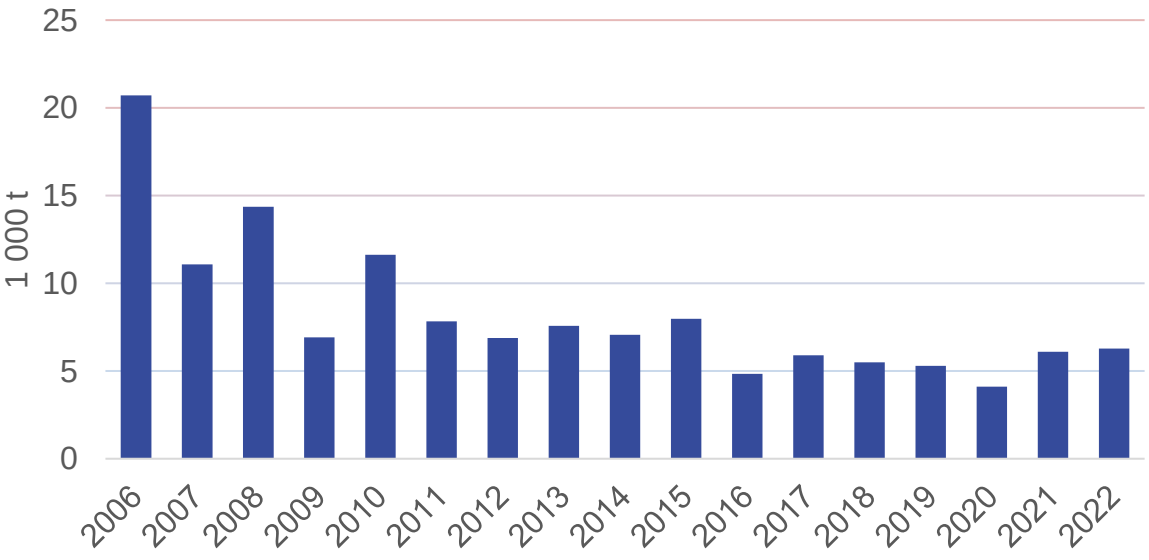


Figure 2: Finish Non-Ferrous Casting Production (volume)



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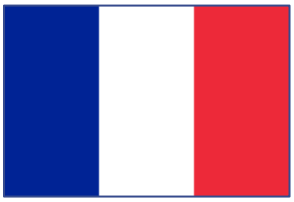
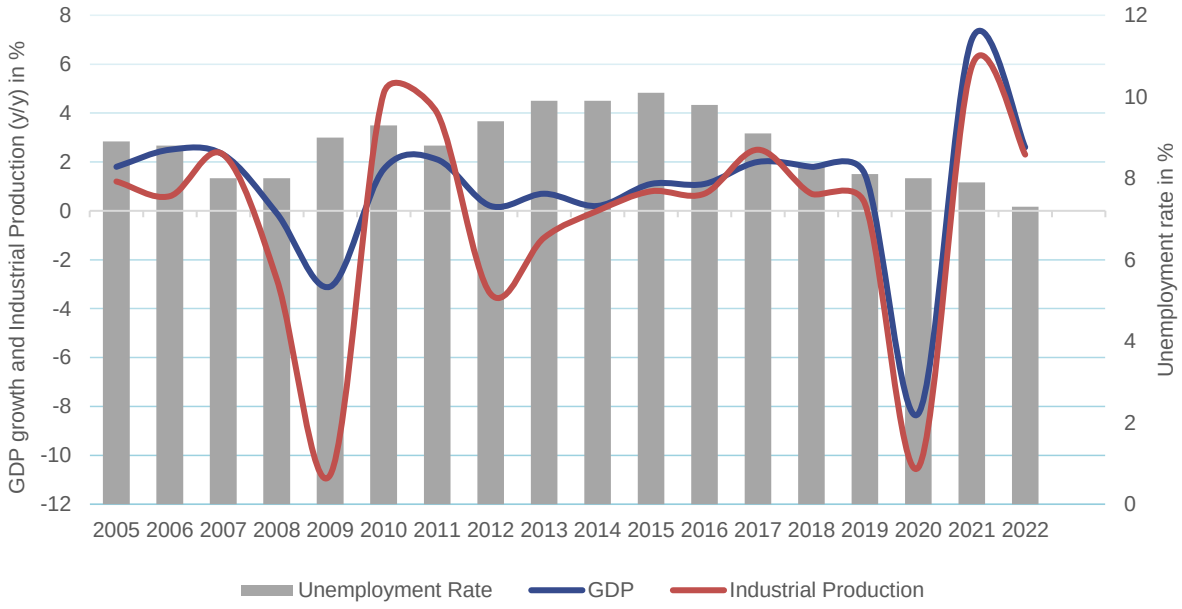


Macroeconomic developments

French GDP increased by + 2,6 % in 2022.This economic growth is due to the increase in domestic demand. Household consumption increased by + 2,7 % in 2022. In addition, business investment grew by + 2,4 % in volume for the entirety of 2022.

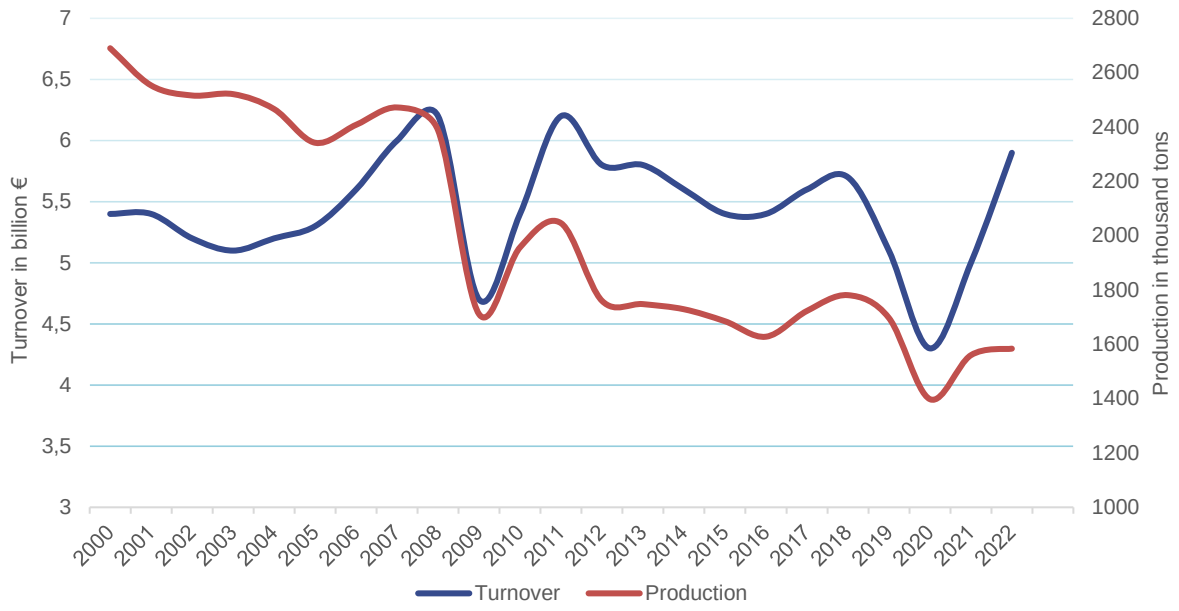
Moreover, the GDP increased by + 1,8 % for Germany, + 3,7 % for Italy and + 5,5 % % for Spain in 2022.

Figure 1: GDP growth, Industrial Production and Unemployment Rate



Situation of the foundry industry

Figure 2: Evolution in volume and in value



The production and turnover of the foundry industries continued to grow in 2022.

The economic environment was favourable. Demand from customer sectors drove sales in foundry industries. Even the automotive sector has recorded an increase in its activity, although the volume remains relatively low (+ 5 % in volume in 2022). The other client sectors continued to be dynamic. Building activity grew by + 3 % in volume in 2022. Overall construction grew by + 2 %. As for French mechanics, the foundry's third-largest client market, this sector has recorded significant growth (+ 9,8 % in value).

In total, ferrous and non-ferrous metal foundries produced 1.585 million tonnes in 2022 compared to 1.560 million tonnes in 2021.

The activity of all foundry industries, all sectors combined, increased in 2022:
- Total production increased by + 1,6 % (in tonnes).
- Total billing also increased by + 15,3 % (in value). The rise in raw materials and energy explains this sustained increase in turnover.

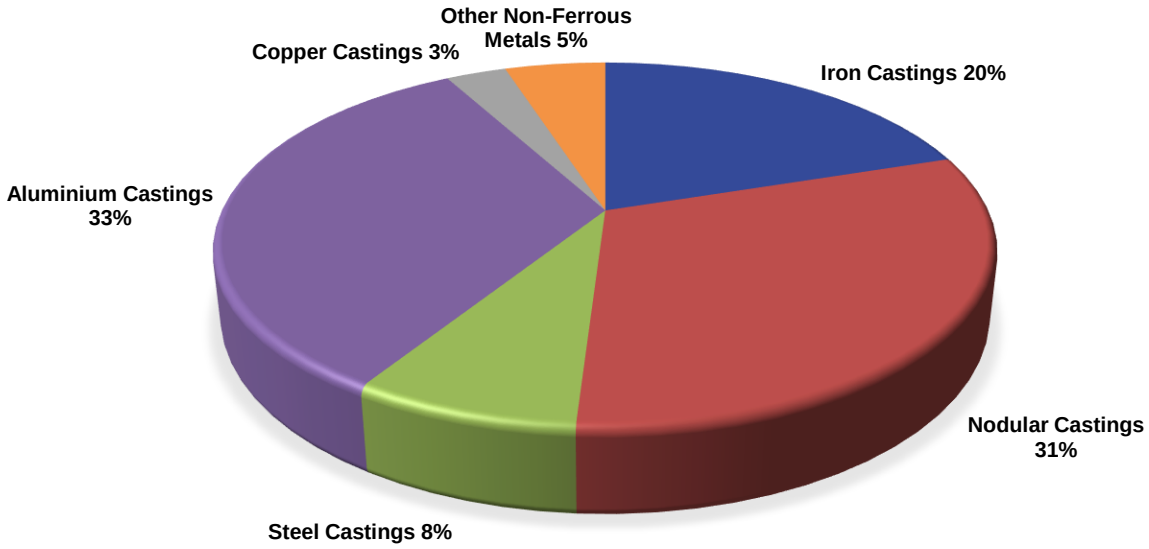
In 2022, the analysis by category shows that the ferrous metal foundry activity recorded an increase of + 2 % in volume against a stabilization for the non-ferrous foundry. However, billings for both categories saw double-digit growth in 2022.

Table 1: Production by alloys

	2022 production in t	Change 2022/2021 in %
Iron Castings	505 558	0.3
Nodular Castings	691 054	8.9
Steel Castings	47 768	10.9
Total Ferrous Castings	1 244 380	2.0
Aluminium Castings	299 255	0.1
Copper Castings	18 459	0.4
Other Non-Ferrous Castings	22 639	-1.2
Total Non-Ferrous Castings	340 354	0.0
TOTAL	**1 584 733**	**1.6**

The total production value of the foundry industries is estimated at 5,9 billion euros in 2022.

Figure 3: Segmentation by main alloys



The workforce of the French foundry will increase slightly in 2022. The number of employees is estimated at 28,288 at the end of December 2022. The number of companies in the foundry sector is 330 in 2022 (<10 people included).

Figure 4: French Ferrous Casting Production (volume)

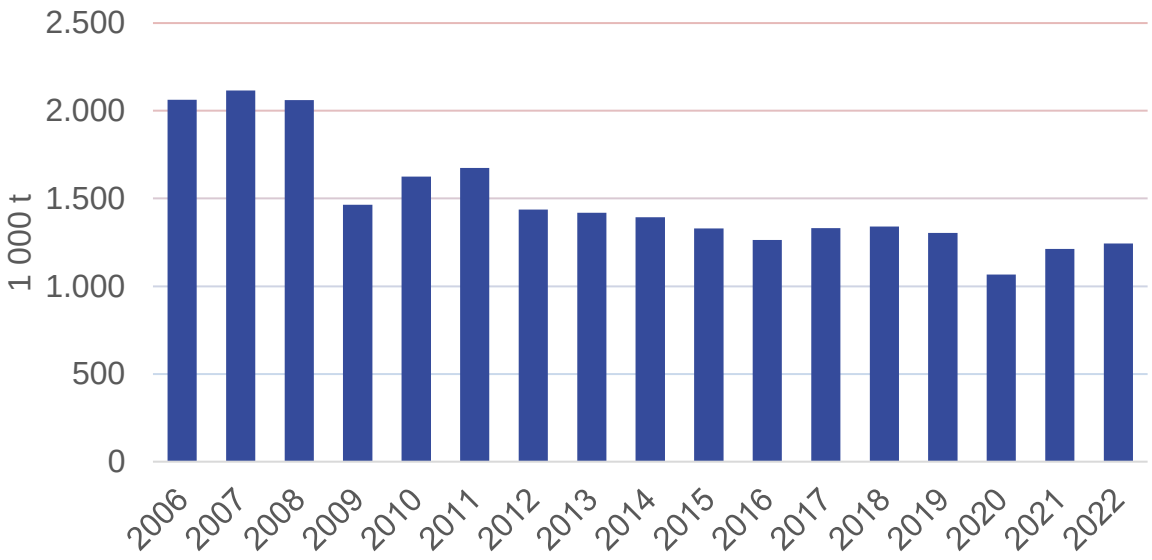
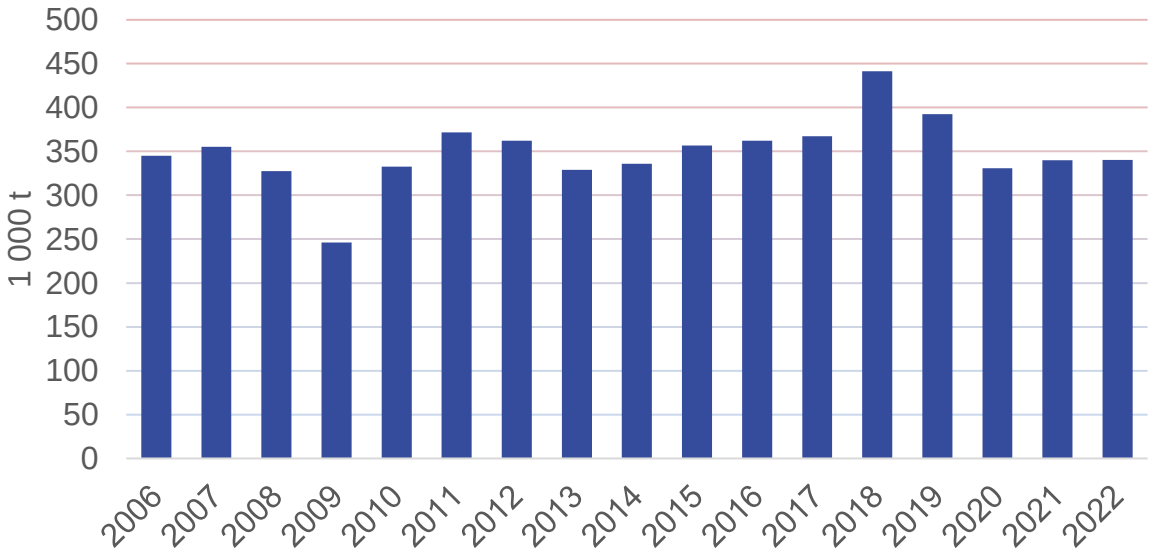


Figure 5: French Non-Ferrous Casting Production (volume)



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The German Economy and the Casting Customer Industries

Macroeconomic developments

Thus, the German economy was on course for growth despite the war in Ukraine and the related energy price crisis. The main reasons for the comparatively positive development were catch-up effects in private consumption and production after the Corona slump, as well as supply bottlenecks that eased over the course of the year. Nevertheless, the price effects increasingly reaching consumers as a result of the associated loss of purchasing power are still likely to dampen the outlook for private consumption. Even if industry on average has coped comparatively well with the increased energy prices so far, the effects of the energy price crisis are particularly visible in the energy-intensive sectors. For example, production in the particularly affected chemical industry was around 20% below the average level for 2021. In addition, the uncertain economic outlook and rising interest rates ensured that many investment projects were put on hold for the time being. Especially in construction, development was weak in the last quarter because financing has become significantly more expensive.

However, the situation in industry has recently become more favourable. After a weak start to the fourth quarter, industrial production stabilised again in at the end of the year. The ifo business climate brightened further in December, partly because material bottlenecks are likely to ease further in the coming months. Likewise, the German government's decisions on the gas and electricity price brake have contributed to a further improvement in sentiment among companies, but also among consumers. However, the outlook for the industrial economy in the first quarter of the new year remains cautious in view of continued weak demand. The global economy has recently cooled down again, which is being felt by domestic industry in the form of a significant decline in orders from abroad.

New orders in the manufacturing sector fell by 4.9 % in 2022 compared to the previous year on a seasonally adjusted basis. Only in the fourth quarter was it possible to break the negative trend that had persisted since February for the first time. Demand in the manufacturing sector has thus stabilised somewhat by the end of 2022. The order data in industry, as well as the improvement in the business climate in recent months, indicate that the economic slowdown is likely to be milder in the winter half-year.

The situation in the major casting customer industries

In 2023, the domestic market reached a registration level of 2.7 million passenger cars. Overall, new registrations rose by around 1 % in the period. Meanwhile, cuts in government subsidies for alternative powertrains, which took effect in January 2023, led to pull-forward effects, so the strong December had a significant positive impact on the annual data.
In the period January to November 2022, domestic new orders were down 6.0 %.
Domestic car production in 2022 picked up due to a slight easing of the semiconductor crisis in the second half of the year. For the year as a whole, 3.4 million units were produced, an increase of 11 %.
Exports developed similarly to production: for the year as a whole, German passenger car exports are also slightly up (10 %) at 2.6 million vehicles.
While many manufacturers are passing on the higher producer prices to customers and focusing on the production of lower-volume but higher-margin models, volume-dependent supplier industries are suffering.

According to data from the VDMA, production in the mechanical engineering sector was able to maintain its previous year's level in the first 11 months of 2022. In the first half of the year, the production of machinery and equipment was still 1.2 per cent below the previous year. The high order backlog (order reach in October: 12.1 months) could not be processed more quickly due to numerous bottlenecks. Above all, there is a shortage of supplies and labour. But in the last few months, production has turned positive thanks to a slight easing in the supply situation. For 2023, VDMA economists are forecasting a real decline in production of 2 per cent.

Crude steel production in Germany dropped in 2022 with an decrease of 8% to 36.8 million tonnes. Noting the losses from 2018-2020, production in 2022 was around 15% below the 2017 level (43.3 million tonnes).

Orders received in the main construction sector amounted to approx. 51 billion € in the first half of 2022. This corresponds to a nominal increase of approx. 12 %, in real terms it means a decline of 3 %.
For the months of January-November, the construction industry recorded a turnover of € 97.7 billion. This nominal increase of 11% means a decline of 5% in real terms. The demand for construction services has thus weakened noticeably in the course of the year. Building construction, meanwhile, with a 0.8% increase in the volume of new orders compared to the same period last year, fared much worse than civil engineering with 13.6%.
Looking at the development of orders and turnover, it can be seen that the construction industry as a whole has lost momentum. The mix of rising costs of living, price increases and delivery problems for building materials, interest rate increases and worsening subsidy opportunities is obviously visibly stifling construction activity.

Developments in the foundry industry

In 2022, Germany´s iron and steel foundries received orders for around 3.0 million tons of castings. Compared to 2021, this marks an decrease of 15.8%. Orders from the biggest customer industry, motor vehicle engineering, were 18.3% lower than the year before (1.7 million tons). At 790,000 tons, the volume of orders from the mechanical-engineering industry went down by 12.9% compared to the previous year. Circa 540,000 tons of parts for miscellaneous applications were ordered, a level that is 12.0% less than in the preceding year.

Germany´s foundries focusing on non-ferrous components received an order volume of 827,200 tons. The demand went up by 0.5% compared to 2021. With approximately 74% of incoming orders the vehicle industry is dominating the non-ferrous sector. The nominal demand increased by 0.5% (613,900 tons). The foundries related to mechanical engineering received orders with a volume of 9,300 tons (-0.7%). Nearly 204,000 tons of miscellaneous parts were ordered, which is an increase of 0.5%.
We should bear in mind, that there is a lack of definition between engineering and miscellaneous applications. This applies for all casted materials.

In 2022, the weight of castings produced by Germany´s iron and steel foundries amounted to 3.1 million tons. Compared to 2021 this corresponds to a 1.2% decrease. By looking at the two major customer industries, casting production for the motor vehicle industry decreased by 1.2% to 1.7 million tons, while production for the mechanical engineering sector dropped by 1.7% to 813,200 tons. The output of castings for miscellaneous functions (including rolls, moulds and castings for buildings as well as pipes and fittings) reached a volume of 582,100 tons, 0.3% less than the previous year.

Non-ferrous foundries registered a production increase of 0.5%, correlating with a volume of 810,300 tons of castings. While more than 76% were produced for the vehicle industry (614.000 tons), this output increased by 0.8%. The foundries related to mechanical engineering produced a volume of 9,200 tons (+0.8%). The casting of non-ferrous components for all other customer industries dropped by 0.3% and therefore had a volume of almost 186,300 tons.

In 2022, 35.5% of the total production volume was exported directly. All in all, 1.4 million tons were sold to customers abroad, representing a 2.6% increase.

By the end of 2022, orders in stock equaled a weight of more than 1.48 million tons of ferrous castings, 0.8% higher than at the end of 2021. The non-ferrous back orders had a volume of approximately 180,500 tons (0.1%).

Capacity utilisation in the iron (grey and nodular) foundry industry amounted to 90.7% in 2022. In comparison to 2021, this means an increase of 5.4 percentages. Steel foundries have reported a capacity utilisation of 85.9%, 6.6 percentages more than in 2021. Capacity utilisation in the non-ferrous foundry industry is calculated as 84.7% in 2022 (plus 5.9 percentages). Capacity utilisation in ferrous, steel and non-ferrous foundries cannot be compared.

The employment situation

As of December 2022, Germany´s foundries (ferrous and non-ferrous) employed circa 68 600 persons, 4.2% more than at the end of 2021. This figure corresponds with 358 foundries (survey cut-off at <50 employees per company).

At the end of 2022, 543 foundries (ferrous and non-ferrous, no cut-off) were operating in Germany.

Raw materials

In 2022, energy costs experienced unprecedented momentum due to the outbreak of the Ukraine war. Concerns about a cold winter and a gas shutdown could be seen daily in the media. At times, prices on the spot market had increased six-fold. Fortunately, the real drama is no longer felt in 2023, but energy costs remain at a higher level than before the start of the war and the corona pandemic. It remains to be said: Energy costs in Germany have already been uncompetitive for several years and a political countermeasure is urgently needed. In the cost table, it is imperative that the values here be adjusted to the individual energy sources, requirements and procurement costs.

For coke, moreover, a significant cost increase is to be expected as a result of the introduction of the "CO2 tax" under the Fuel Emissions Trading Act (BEHG). In 2021 alone, the price of coke has risen by an average of 35%; in 2022 by another 77%! This means that the value is now well above the former record year of 2011 (€488/t). Heating oil has also increased in price by over 82% in 2022 compared with the previous year. Due to the sharp price jumps in natural gas and the individual contractual arrangements in the foundries, no statement is made in this publication. Just for the sake of completeness: According to the German Federal Statistical Office, the annual average price of natural gas has already risen by 103% in 2021 and by a further 163% in 2022! This means that the value is 4.3 times as high as in 2019.

While the price dynamics of basic materials in 2021 were still due to the post-CoVid19 upswing, which can lead to massive supply bottlenecks along many value chains, the situation in 2022 is different. As almost all industrial processes, whether in the chemical, plastics or foundry industries, are dependent on gas as an important energy source, the outbreak of the Ukraine war and the subsequent sanctions represented a turning point and caused costs to rise along the entire value chain.

Metallic input materials

Raw materials generally account for around 35% of the cost of goods sold. Approximately" should be treated with caution here, as fluctuations of 25% to 60% are quite common depending on the material and input costs. In non-ferrous metal foundries, these costs are second only to personnel costs in importance. In this respect, reliable documentation as well as observation of the development and a forecast for the future is very helpful with regard to planning, control and offer calculation.

Small price fluctuations always make planning easier. This is because strong changes cannot be absorbed by the foundries, as production can hardly be delayed. The cost of raw materials can therefore only be calculated separately and on a daily basis. After all, a price increase in raw materials of just 10% results in a cost price increase of around 2.5%. Pig iron fell by an average of 1% in 2022, scrap increased by 10%. But it is imperative to put these figures in context! Since 2019 - the year before the Corona pandemic - the average price of pig iron has risen by 31%; that of scrap by as much as 59%!

Before Corona, prices had reached their lowest point at the turn of 2015/2016. The years since the outbreak of the Corona pandemic have been marked by various events. First, the indices along the commodity exchanges plummeted due to the loss of demand. But this trough did not last. After the Asian markets initially showed initial signs of recovery, there was such a commodity rally that steel was sold before iron ore was even mined. This price momentum slowly began to fade when the Ukraine war suddenly broke out. After this, prices for steel, pig iron and scrap in particular picked up again.

Payroll costs

The share of personnel costs in the cost of goods sold has averaged over 30% for years.

Various factors have an influence on the level of personnel costs: In addition to the agreements of the collective bargaining partners, even though only around half of the companies are still bound by collective bargaining agreements, the shortage of skilled workers is leading to a shortage of qualified

personnel with correspondingly rising wage expectations. In addition, there are additional statutory costs, primarily social security. Finally, absenteeism due to illness, the number of public holidays, overtime and shift premiums, and voluntary employer benefits all have an impact on the development of personnel costs.

This results in an increase in personnel costs of 1.5% for 2022 - based on a key point analysis and excluding collective pay increases and reductions or increases in social security contribution rates - subject to deviating company or individual agreements.

Energy

Energy was the dominant theme of 2022. Natural gas in particular experienced unprecedented price jumps. At times, the price for a MW/h was 340 euros! By comparison, in August 2021, the MW/h cost only around 26 euros. This corresponds to an increase of 1,308%. The price for 100 liters of heating oil here in 2021 was just under 70 euros. After this price also experienced extreme increases and volatility due to the Ukraine war, only the price in December 2022 is given. Here, the price was around 120 euros, well above the 10-year average.

Electricity prices are primarily subject to individual company circumstances. The time and duration of the conclusion of the contract, in addition to the purchase volume, network charges and agreed peak loads, have a considerable influence not only on the level but also on the development of electricity costs. However, the electricity market design in particular was decisive last year. The merit order effect - a system in which the old world should pay for the new world - caused electricity costs to skyrocket after the gas price crisis, as the most expensive MW/h is assumed for the electricity price; and this is now the operation of a gas-fired power plant. Massive fiscal measures initially stabilized the price of electricity, but it remains at an uncompetitive level for businesses. At the time of publication, the so-called bridge electricity price is still being discussed in the coalition.

The coke price has increased by 77% in the past year and was well above the pre-crisis level on average for the year - and this after the increase was already around 35% in 2021. At the same time, the coke aggregate is under strong political and social pressure, even though it remains the cheapest smelting process at high utilization rates and represents the best recyclability of scrap. Unfortunately, there is little public awareness of this "closed-loop" concept and recyclability. The Fuel Emissions Trading Act (FETA), introduced in 2021, is one of the main drivers for development. The law initially provides for an introductory phase until 2025, during which emission certificates can be purchased at a fixed price.

Miscellaneous

With inflation in Germany at a very high 7.9% during 2022, 10-year Bunds have offered a positive yield since February 2022 and are at 2.6% at the time of publication (October 2023). Against this background, interest rates for 2022 have been set at 3% in the tableau, as companies are assumed to have additional riskier investments in addition to conservative bonds. The further development remains quite open due to the increase in key interest rates in 2023.

Summary

On the basis of our model calculations, we have shown that the developments described above will have had a significant impact on the cost price in 2022. In particular, the energy costs resulting from the Russian sanctions and the merit order principle in the electricity market design have caused the costs of industrial production to skyrocket.

If the cost of raw materials is left out of the equation and only the increase in manufacturing costs is considered, then a fictitious statistical average foundry will see its costs rise significantly in 2022. The increased metal and energy costs have the greatest impact in this context. However, it should be borne in mind that this average value can hardly be applied directly to the foundries concerned. It is imperative

to examine the respective costs and their share in the cost of goods sold on a company-by-company basis.

The Situation in the Material Sectors

Grey cast iron

Throughout 2022, production decreased by 2.5% to 1.826 million tons. The output of motor vehicle components dropped by 2.1% to 1.238 million tons. The volume of casted parts for mechanical engineering increased by 0.8% to 384,400 tons. Other grey iron components (including moulds and railway parts, fittings, and components for the steel industry) reached an output volume of 205,400 tons (-9.5%).

Iron foundries received orders for approximately 1.137 million tons of castings from the motor vehicle industry, which is a 7.7% decrease. The demand of the mechanical engineering industry reached a volume of 380,950 tons. Thereby, the orders dropped by 5.6%. Orders for parts for miscellaneous applications made of cast iron reached a volume of 173,200 tons, 8.9% less than in the preceding year.

At the end of December 2022, the order backlog amounted to more than 876,000 tons, 1.5% lower compared to the end of December 2021.

Ductile cast iron (nodular and malleable)

At 1.151 million tons, the production of ductile iron castings was increased by 1.0% compared to the year before. A separate calculation of nodular and malleable castings is not possible, because of the low volume of malleable castings. Nonetheless, malleable castings have their specific markets. The output of motor vehicle components increased by 1,5% to 477,300 tons. The volume of casted parts for mechanical engineering decreased by 4.3% to 404,500 tons. Other components reached an output volume of 268,800 tons (+9.1%).

At the ductile iron sector, the volume of incoming orders reached 1.159 million tons (-25.1%). Ductile iron foundries received orders for more than 508,900 tons of castings from the motor vehicle industry, which is a decrease of 35.2%. With minus 20.1% compared to the order volume received the year before, the demand of the mechanical engineering industry reached a volume of 382,100 tons. Orders for parts for miscellaneous applications made of ductile cast iron reached a volume of 268,200 tons, 5.3% less than in the preceding year.

At the end of December 2022, the order backlog amounted to 560,400 tons, 3.9% more compared to the end of December 2021.

Steel

Throughout 2022, production of steel castings decreased by 1.5% (141,700 tons). The output of motor vehicle components decreased by 4.0% to 9 500 tons. The volume of casted parts for mechanical engineering increased by 5.7% to 24 300 tons. Other components reached an output volume of 107,900 tons (-2.6%).

At 137,000 tons, the volume of orders received by the producers of steel castings in 2022 decreased by 6.6% compared to the year before. Steel foundries received orders for 10,100 tons of castings from the motor vehicle industry, a downturn of 6.5%. The demand of the mechanical engineering industry reached a volume of 27 200 tons (+6.2%). Orders for parts for miscellaneous applications made of steel castings reached nearly a volume of 99,700 tons, 9.7% less than in the preceding year.

At the end of December 2022, the order backlog amounted to 44,300 tons. The order cushion was 8.0% higher compared to the end of December 2021.

Non-ferrous Metal Castings

In 2022 the production of aluminium castings increased by 0.3% (703,300 tons). For the magnesium sector the production reached a level of 13,200 tons (-14.9%). The output of copper castings rose by 5.1%. The level was more than 65,100 tons. Nearly 28,700 tons of zinc castings were produced, marking a decrease of 30.0%.

Aluminium foundries received orders for 715,800 million tons (-0.2%). 84.6% of the demand (605,900 tons) came from the vehicle industry. Down by 14.9% compared to the order volume received the year before, the demand of magnesium castings reached a volume of 13,500 tons. Orders for parts made of copper castings reached a volume of 72,000 tons, 6.4% higher than the year before. Foundries producing casted parts from zinc logged an order level of 25,900 tons (-37.1%).

Source: BDG, Stat. BA, VDA, VDMA, Worldsteel, Kraftfahrt Bundesamt, ZDB, IFO, WV Stahl

Figure 1: German Ferrous Casting Production (volume)

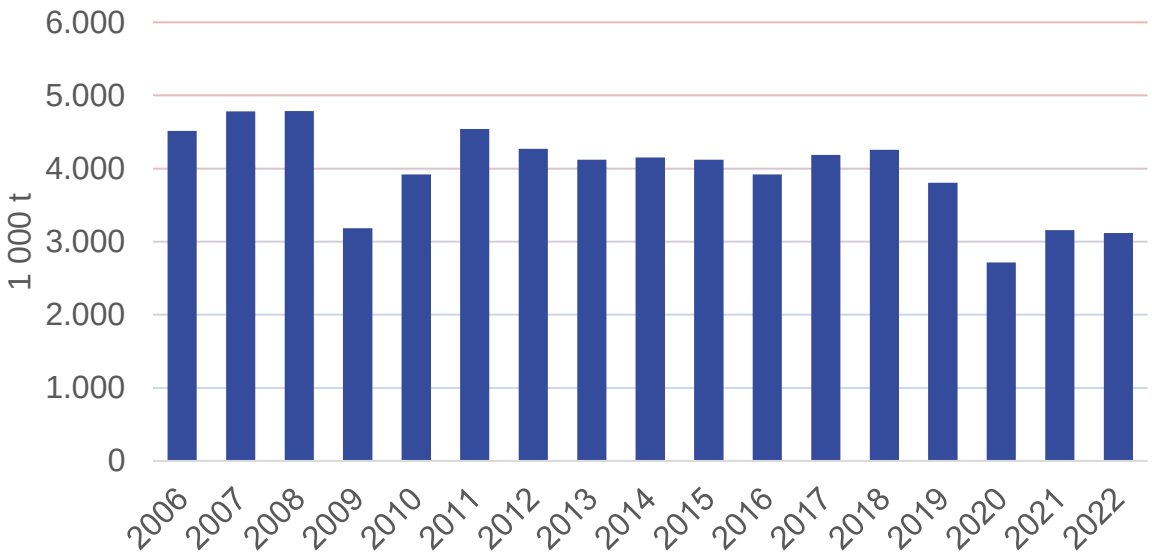
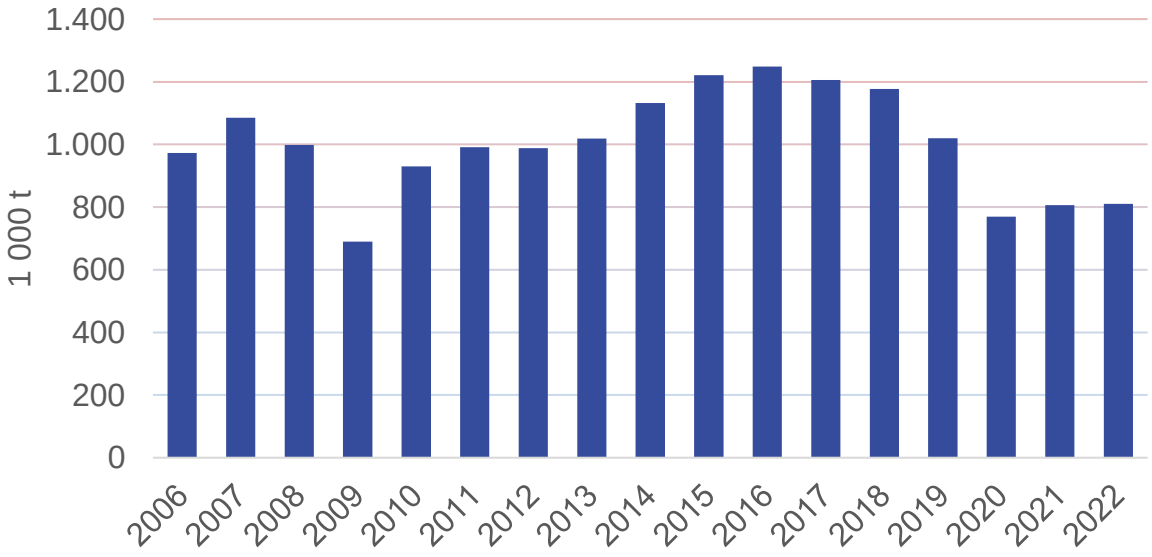


Figure 2: German Non-Ferrous Casting Production (volume)



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Hungarian Economy 2022

The past year has brought many challenges for both the Hungarian and the European foundry industry.

In general terms, the domestic foundry production results of the past year showed very fluctuating results during the year, but overall, the performance was very similar to the previous year. Despite all the difficulties, several member companies (especially the larger aluminium castings producers, mainly serving the automotive industry) reported positive financial results, while smaller ones faced liquidity problems due to increased energy prices.

Energy prices had already risen significantly at the beginning of the year, but with the outbreak of the Russian-Ukrainian war, the Hungarian energy market was characterised by further price increases and a typically volatile price environment, with energy prices reaching unprecedented highs in August.

Hungarian foundry industry 2022

Foundries were only partially able to pass on the price increases to their customers. The situation of individual foundries was largely determined by the contracts they had with their energy suppliers (fixed or spot market pricing). At the start of the new 'gas year' (1 September), suppliers made the conclusion of new contracts conditional on the advance payment of several monthly invoices, which also jeopardised the liquidity of the foundries. In several steps, the electricity transmission company significantly increased the system charges in several steps, so that the electricity price was dominated by 'other' costs, and the subsequent decrease in the market price had a limited impact on the overall cost of energy for foundries. In addition, the war created difficulties in raw material supply and logistics as well.

As the European Union could not provide a quick solution for energy-intensive industries, Member States tried to find their own solutions. Unfortunately, the Government of Hungary could not provide any substantial assistance to Hungarian foundries. Industrial performance within the EU has also been volatile, which has had a particular impact on Hungarian industry and energy-intensive industries within it. Skilled labour shortages remained prevalent in Hungary, with high labour turnover even after repeated wage increases due to the high inflationary environment. Increasingly, foundries are looking to so-called "exotic countries" - especially in the Far East - to provide the labour they need. Another problem is that the number of students enrolled in technical courses at both secondary and university level is falling sharply, so that the sustainability of these courses is threatened by the fact that their numbers have now fallen to critically low levels.

Figure 1: Hungarian Ferrous Casting Production (volume)

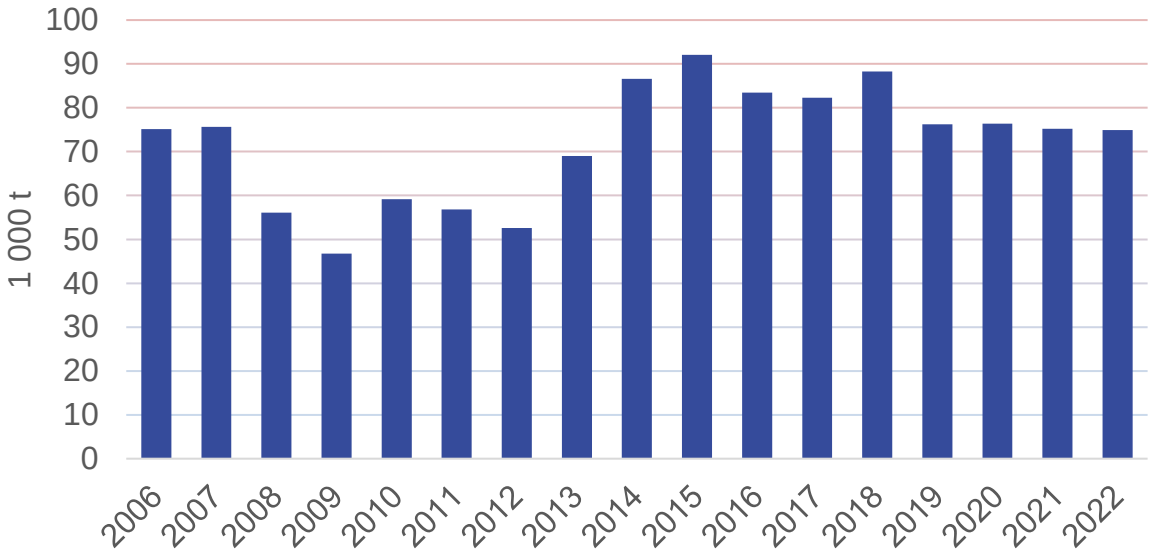
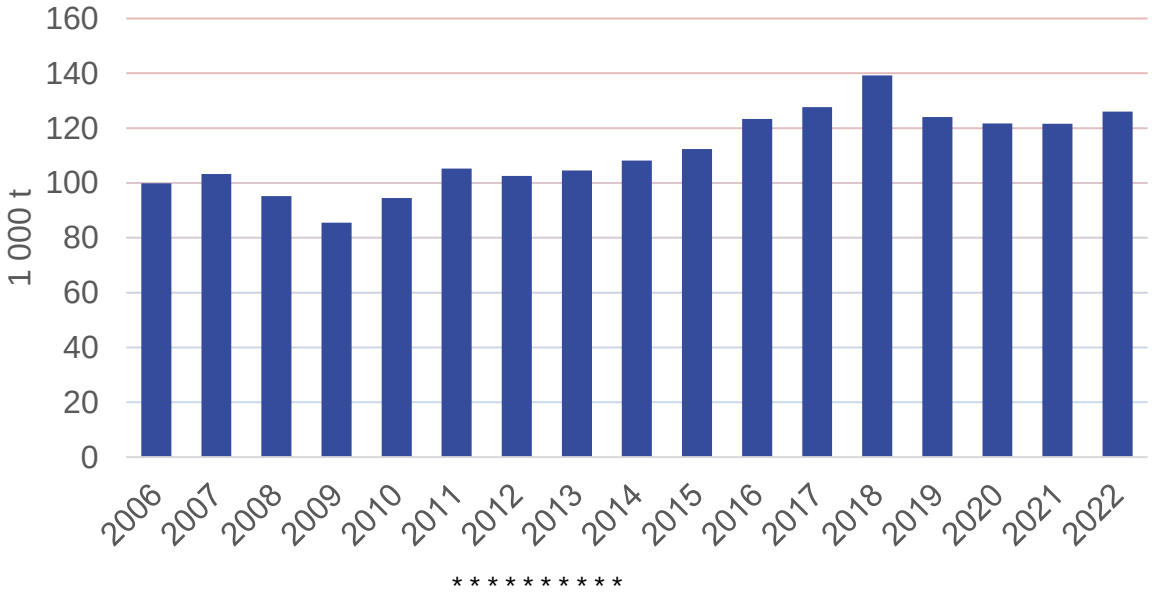


Figure 2: Hungarian Non-Ferrous Casting Production (volume)



Macroeconomic developments

An overview

Following the sharp 7.0 per cent recovery in 2021, Italy's GDP rose by 3.7 per cent in 2022. The growth in GDP benefited from the improvement in the public health situation, which made it possible to lift the measures taken to counter the spread of the pandemic and favoured a strong recovery in tourism, leisure, and transport services. Activity in the construction sector also continued to expand, driven by tax incentives to upgrade and improve the energy efficiency of the building stock. Manufacturing stagnated, despite the gradual easing of difficulties in sourcing intermediate inputs. On the demand side, household consumption increased, in part boosted by savings accumulated during the pandemic and by consumer credit, as did gross fixed investment, which was almost one fifth higher than in 2019. Exports continued to expand, especially in the service sector, driven by tourism receipts. GDP growth in the second half of 2022 was slowed by global tensions and uncertainty stemming from the conflict in Ukraine, further increases in energy commodity prices and the start of the tightening of the monetary policy stance.
Household disposable income grew by 6.2 per cent at current values, but in real terms it fell by 1.2 per cent on account of high inflation. The propensity to save fell and at the end of the year it was lower than before the pandemic. Due to inflation, savings were insufficient to offset the loss in the real value of households' net financial wealth.
Inflation, as measured by the twelve-month change in the harmonized index of consumer prices (HICP), rose markedly, even when excluding the more volatile components (energy and food).
The public accounts continued to improve in 2022. To reduce the public debt as a ratio of GDP, it will be necessary to maintain adequate primary surpluses, and boost the economy's potential for growth. The effective implementation of the reform and investment programmes under the National Recovery and Resilience Plan would contribute to this.
In the first quarter of this year, GDP returned to positive growth (0.5 per cent quarter on quarter, according to preliminary estimates), driven by the expansion of activity in industry and services. Inflation fell, coinciding with the sharp decline in gas and oil prices; however, core inflation remained high (5.3 per cent in April), still affected by the pass-through of energy price hikes in 2022.
In 2022 and in the first quarter of 2023, economic activity increased in all areas of the country.

Firms

Value added grew by 3.9 per cent in 2022, buoyed by the recovery in demand and, in some sectors, benefiting from significant public measures. Activity continued to expand in services, especially thanks to the strong growth in some of the sectors most penalized by the pandemic, such as trade, transport, accommodation, and catering. Value added in manufacturing remained broadly stationary, held back in part by considerably higher energy costs. There was marked growth in the construction sector, partly thanks to public support measures.
Investment continued to increase on average during the year, also net of the construction sector, and firms expect it to grow overall in 2023, mainly driven by the service sector.
The difficulties in sourcing intermediate inputs eased, while the cost pressures linked to higher energy prices increased, the impact of which was mitigated by public support policies and by the containment strategies adopted by firms.
Patent applications decreased, while research and development activity picked up. The digital transformation continues, although some areas still lag behind, particularly in the use of big data, artificial intelligence and cybersecurity measures.
The rises in energy commodity prices and the approval of the REPowerEU plan should spur the achievement of the targets for renewable energy production set in the national plan for the ecological transition.

Firms increased their profitability and maintained large liquidity reserves. Although leverage is rising as a result of the decrease in the market value of capital, it remains low by historical standards; the corporate debt to GDP ratio is lower than the average for the euro area.

The labour market

In 2022, employment grew strongly compared with the previous year, returning to pre-pandemic levels. The number of payroll employees rose across all the main segments of the private sector, while self-employment remained stationary; the number of per capita hours worked increased as well. Jobs in tourism-related activities returned to the high levels of growth observed before the public health emergency. Employment in construction continued to expand, albeit less so than the previous year; looking ahead, it will be buoyed by the demand generated by the investments in infrastructure under the NRRP, including those aimed at advancing the green transition.

Prices and costs

In 2022, consumer price inflation in Italy reached its highest levels since the mid-1980s, amounting to an annual average of 8.7 per cent and exceeding 12 per cent in the last three months of the year. The increases in energy prices contributed, directly or indirectly, to about two thirds of total inflation. Government measures dampened the rate of growth of consumer prices by more than 1 percentage point. Core inflation (excluding food and energy) also rose considerably to 3.3 per cent for the year on average, owing to the gradual pass-through of the higher costs of commodities and intermediate goods to retail prices as well as to the recovery in demand.
Wage growth remained moderate, mainly as a result of the still considerable slack in the labour market and of certain features of the collective bargaining system and is expected to pick up pace over the course of this year. Firms' profit margins decreased on average in 2022.
Inflation started to fall in early 2023 as gas and oil prices fell markedly. The core component remains high, though the sharp slowdown in producer prices is expected to help it to gradually decline over the coming months.

Foreign trade, competitiveness, and the balance of payments

In 2022, Italy's exports of goods increased significantly and at a faster pace than those of the other major euro-area countries, against a background of growth in global trade and the gradual easing of supply-side bottlenecks. Italian exports of services returned to pre-pandemic levels, thanks to tourism receipts. Imports also grew at a robust pace, driven by the demand associated with gross fixed investment and exports.

The situation in the major casting customer industries

The contribution of the demand from major casting customer industries was generally positive in 2022, with a few exceptions.
In terms of the industrial production index, adjusted for calendar effects, the most dynamic sectors for Italy included construction (+12.6%), while the most penalised sectors included iron and steel (-12.4%), domestic appliances (-11.1%) and machine tools (-4.6%). The industrial production index for motor vehicles, in Italy, registered an average annual decrease of 0.9% in 2022. The turbine parts, excluding those for means of transport, was slightly positive, with growth of 1.1%. The industrial production index for machinery for agriculture and forestry expanded by 7.0% in line with the growth in mining, quarrying and construction machinery: +7.1%. General engineering showed a good increase of 3.8%.

Developments in the foundry industry

Ferrous castings

2022 was a highly complex year for Italian ferrous foundries, marked by major uncertainty and tensions on different fronts. After the strong recovery of 2021, the sector had good expectations for 2022 having overcome the problems related to the Covid-19 epidemic and thanks to good demand from the main customer industries.
Russia's invasion of Ukraine abruptly brought some latent critical issues to the fore and dramatically amplified their magnitude: accelerating inflation exploded at the end of 2021; obstacles to the functioning of value chains were added to the panic over the supply of energy commodities and other raw materials from the war zones; volatility in the commodity markets was exacerbated by further hikes in energy prices, in all energy commodities and by ever-present speculation; logistical problems were further aggravated. These emergencies, compounded by the change in the tone of monetary policies with increasing interest rates and the resulting uncertainties in consumption and investments, deflated the short- and medium-term prospects of the general economy and limited the dynamism of domestic and international demand, particularly in the second half of the year. The price effect was felt in the turnover of the Italian ferrous foundry industry, which grew significantly in 2022 and was at its highest point since 2009, with a total value of 2.9 billion. The average increase was up by 32.6% on 2021.
Together with the satisfaction of having at least transferred the inflation of production input to sales prices, there was also a growing fear that a prolonged increase in production costs could give rise to continuous pressure on sales prices, affecting the competitiveness of the Italian industry in international markets and slowing down recovery in domestic consumption, already slower than that experienced in the main European countries. Last year, Italian exports of ferrous castings, in value, rose by 21.4%: also, in this case an increase mainly driven by the price factor rather than by volume, which instead stood at just +1.1%. Unlike turnover, the output of ferrous castings in 2022 closed slightly lower than the previous year, at a total of 1,052,769 tonnes of iron and steel castings and investment castings (-0.7% on 2021).
In the first half of the year Italian production of ferrous castings held up well, supported by good global demand from user sectors both on a national as well as international level, probably also driven by supplies dictated by fears of materials shortages and thanks to a positive carryover from the exceptional rebound of 2021 (+19%). Starting in the summer months, between July and August, the worsening energy crisis and spikes in energy raw materials, which strongly impact the foundries' sector, forced companies to use every available leverage to contain production costs, including production stoppages, rescheduling of shifts and concentrating activity in the days or daily times in which energy costs are lower. The slowdown in the pace of production progressively impacted volumes and dragged the total result for 2022 into negative territory. Last year, the production capacity utilization rate was 80%, in line with 2021. Within the average results of the ferrous castings sector there were, as usual, different dynamics for each individual segment, with excellent growth in the production of investment castings (+23%) and steel castings (+3.8%). The general decrease was influenced by the performance of iron castings (-1%) which represent 95% of ferrous castings in Italy.

Table 1: Ferrous Castings

	2021	2022	Change 2022/2021 (in%)
Production (t)	1,060,299	1,052,769	0.1
Turnover (b. €)			
Production capacity	80%	80%	0%

**Includes investment castings production*

Foreign trade

In 2022 the volume of total exports of ferrous castings grew by 1%, while the value of exports recorded an increase of 21%.
According to ISTAT's foreign trade statistics, imports into Italy of ferrous castings grew by 26% in value and by 3% in volume in 2022.

Cast Iron

With reference to the two macro-types of iron alloy, the 2022 trend in terms of tonnes was largely affected by the drop in ductile iron (-2.6%), while grey iron managed to reconfirm 2021 levels.
616,062 tonnes of grey iron and 375,986 tonnes of ductile iron were produced in total. The latter is almost entirely comparable to spheroidal cast iron since malleable cast iron is no longer produced in Italy. The production mix in 2022 between the two types of iron puts grey iron at 62% (61% in 2021) of the total iron castings, while ductile iron was at 38% (39%).
The breakdown of cast iron production in 2022 in the five major markets confirms the absorption percentages of 2021: mechanical engineering at 54%, motor vehicle industry at 30%, building and iron and steel industry at 7% and 3% respectively, while the miscellaneous applications confirmed its absorption capacity as 6%.
In the map of the final markets for iron castings, the mechanical engineering industry continued to play a leading role and absorbed 54% of the total volume in 2022. However, the total production of iron castings destined for this market closed 2022 with a slightly negative -1.1% (534,998 tonnes produced): +0.5% for grey iron and -3.6% for ductile iron.
Within this statistical category, some production applications related to machine tools had a more pronounced average decrease; while among the best performers with increasing rate were castings for farming machinery, bearings, gears and transmission organs, components for fluid dynamics and castings for earth-moving machinery, all of which are always including in “mechanical engineering”.
The result for 2022 was significantly affected by the performance of transport, which registered a drop of -0.9% and a volume of 293,055 tonnes, driven mainly by the production of ductile iron castings -1.9%; grey iron castings closed substantially in line with 2021 (-0.2%).
Building industry still recorded a drop (-2.2%) which lowered the overall output to a level of 72,496 tonnes; however, its intensity was decidedly more contained than the double figure decreases of past years. Although this rate is below zero, it should be viewed positively since it suggests a recovery for the sector in the future because of various investments deriving from incentives for building renovation, for energy efficiency and from the implementation of the NRRP.
Lastly, the volumes absorbed by the iron and steel industry (ingot moulds and rolling mill rolls) lost ground (-4.9%) in 2021 in evolutionary concordance with the results exhibited in the same period by the Italian iron and steel industry.

Steel

In 2022 the production of steel castings was 58,940 tonnes, up by 3.8% (+2,160 tonnes) on the previous year, but still with a very large gap of -37% (over -34,000 tonnes) on the 2008 peak. As regards the mix of alloys produced, the stainless-steel castings segment suffered a decrease in 2021. The growth in volumes was mainly driven by steel alloys (+6.2%) followed by carbon steels +1.9%.
For steel foundries too, the fierce pressure on production costs and their necessary transfer onto sales lists generated a good turnover performance, which recorded an average annual growth of almost +20% in 2021. The satisfaction, for this segment, of at least transferring the inflation of production input to sales prices was combined with a growing fear that a prolonged increase in production costs could give rise to continuous pressure on sales prices, affecting the competitiveness of the Italian industry in international markets and slowing down recovery in domestic consumption, already slower than that experienced in the main European countries. In terms of production mix, 2022 basically confirmed the percentages of the various alloys. Alloy steels accounted for 62% of last year's steel castings, or 36,472 tonnes, with an average annual growth rate of +6.2%. The remaining 38% of production was shared almost equally between carbon steel (20%, 11,667 tonnes) and stainless steel (18%, 10,801 tonnes).
In 2022 all of the target markets of steel castings made a positive contribution to the segment’s result with the sole exception of construction.

Investment casting foundries

The investment casting industry is a hybrid between ferrous and non-ferrous by casting alloys that belong to both categories: steel, aluminum, super alloys, and nickel- or cobalt-based alloys. This market segment managed to keep pace better in 2022 than in the corresponding period in 2021. Production output (tonnes) rose by 23%, while in terms of value (turnover) the average annual increase was +25%. Making a contribution to the vigorous growth was mainly the non-ferrous alloys which rose by 31%, while that of steel alloys was +15%.

Non-ferrous Metal Castings

Even 2022, in its earliest months, benefitted from the positive driving effect inherited from 2021. From the second quarter of the year, however, a widespread weakening in demand was observed, one that affected all target sectors to some degree. The slowdown was partly normal, given the brilliant recovery of 2021, but also accounted for greater uncertainty due to the outbreak of the conflict caused by Russia's invasion of Ukraine, to the resurgence of the virus and to bullish pressures on commodity prices, especially of electricity and gas. In addition, the downturn, which affected almost all the main target sectors of non-ferrous castings, was in line with the normalisation phase of world growth and impacted by the more uncertain demand conditions brought about by the shortage of intermediate inputs, in particular electronics, which above all affected the automotive sector. The production of non-ferrous castings in 2022 thus stopped at 820,582 tonnes, representing an average year-on-year decrease of -6.8% compared to 2021. Rising inflation, resulting from the carryover of price increases right along the supply chain, supported the consistent increase in turnover at current prices (+15.9% annual average in 2022) to 4.5 billion euro. This growth, considering the average increases in metal and energy raw materials of last year, could nonetheless entail some sacrifices in terms of the industry's margins (EBIDTA margin at 9.8% for the aluminum segment, for 2021). The production capacity utilisation rate was 75%, 8 percentage points below the use in 2021.

Table 2: Non-Ferrous Metals Castings

	2021	2022	Change 2022/2021 (in%)
Production (t)	880 453	820 582	-6,8
Turnover (b. €)	4,6		
Production capacity	82%	82%	0%

Non-ferrous alloys and production technologies

In the analyses of these two dimensions, the units under observation belong to 'multi-metal' and 'multi-technology' realities, i.e. foundries dedicated to the simultaneous production of several metals using different production technologies. Within non-ferrous castings, the average result for the sector in 2022 were mainly influenced by the trend in aluminium castings production which dominated the total volume of non-ferrous metals with a weight of 82%, but the wave of negative signs affected, albeit to varying degrees, all other non-ferrous alloys. The production of aluminium castings stood at 681,904 tonnes in 2022, with a loss of over 45,000 tonnes (-6.2%) on the volumes for 2021.
Of the most important ferrous metals in terms of volumes, thus leaving out magnesium, zinc alloys (Zama...) which account for 11% marked the pace heavily with a drop of 7.3%. The most severe decrease was recorded by copper-based alloys (bronze, brass...) with a fall of 9.8%. This production represents a 6% share of non-ferrous volumes. Although magnesium alloy diecasting is predicted to be the most developed casting technology and in recent years there have been several important openings in favour of greater development in the use of this alloy, especially in the automotive sector, the production of Italian foundries is still modest, at less than 1% of all non-ferrous castings. In 2022, moreover, there was a further downsizing of this niche market, which experienced a vertical drop in production to 3,143 tonnes, down by 40.5%. Magnesium castings can play a key role in a design when a high degree of lightness is required; from this perspective, they are a candidate as similar castings in aluminium, but also to parts for moulding plastic materials, especially in applications where lightness is very important, like in aerospace or in niche sectors such as sports equipment, which seek extreme

performance in the materials. In these sectors, magnesium has actually always been taken into consideration, but the results have almost meant rather reduced quantities for the Italian market. Probably for this sector, even today, there are still difficult obstacles to be overcome, both technical and related to production criticalities due to the flammability of the product in certain conditions. Lastly, and still in the field of non-ferrous castings, there was still an excellent growth in micro-castings in cobalt and nickel alloys. In the area of technologies adopted for the production of non-ferrous castings, diecasting took the top spot (77% of the total). With this type of casting,around 632,000 tonnes of non-ferrous castings (+5.6% compared with 2021) were produced in 2022 in various alloys: around 519,000 tonnes of aluminium and alloys, 3,000 tonnes of magnesium, 88,000 tonnes of zinc and 22,000 tonnes of copper alloys. Of the most common types of casting, after diecasting, second place is taken by gravity die-casting in shells and low pressure, with a share of 21%. Overall, production in 2022 stopped at 173,000 tonnes, a decrease of -10.6% on 2021. The most conspicuous drop was recorded in diecasting in shells (-11.7%), while low pressure technology held up better, managing to stem the drop to below -4% on 2021. Finally, the remaining 2% of total production of non-ferrous castings of around 16,000 tonnes (+11.5% compared with 2021) was produced by sand casting, a production technology which in 2022 reported the biggest drop. The Italian non-ferrous castings market is not completely dependent on the transport, or rather, “automotive”, industry. In the past decade, on the total production of non-ferrous castings this segment fluctuated between 51% and 58% (56% in 2022), whereas the percentages rose considerably, even to over 70%, specifically for aluminium alloys.
In 2022 almost 460,000 tonnes were allocated to this sector, basically in line with the results achieved in 2021, but 8% in less than in 2018.
Again, in the past decade, volumes hit the record levels in 2018, when production reached 500,000 tonnes, to then fall again in 2019. The average annual rate for the period 2013-2022 was 1%.
Construction is the second reference market for non-ferrous casting foundries in Italy. The non-ferrous components destined for this sector in 2022 represented 16% of production by volume, or 131,000 tonnes, down by 5.6% on 2021.
All the other three sectors closed 2022 in highly negative territory. Electrical engineering accounted for 9% of the production of non-ferrous castings. This category includes applications for electric motors, components for interior lighting and for urban design. Overall, production intended for this application fell by 16.1% and volumes dropped to below 74,000 tonnes.
Even the use of non-ferrous castings in process machine manufacturing and miscellaneous mechanical engineering was also in sharp decline. A change of -17.2% compared with 2021 allowed around 66,000 tonnes of non-ferrous castings to be directed to this industrial sector.
The durable goods category, which includes parts for household appliances, household items and metal furniture (pots and other accessories) reduced its uptake of non-ferrous metals, from 10% to 8% in 2022 due to the intensity of the collapse, which was almost +22%. The statistical classification “miscellaneous applications” includes a series of products that do not fit into the categories reviewed above and for which ISTAT does not currently provide details. We believe that this item includes innovative applications in atypical markets for foundry production, artistic castings, etc. In 2022, the percentage for this market stood at around 3%, while the registered decrease was -15.3%.

Production of non-ferrous castings by customer industries

The year 2022 was undoubtedly the ”annus horribilis” in terms of input markets. A truly dramatic scenario, characterised by a first four months that witnessed an exceptional run-up in the price of raw materials, in many cases reaching peaks never before seen in recent decades. The price increased affected different commodities right across the board: not just iron and scrap, but also iron alloys and other auxiliary materials in some cases reached double figure increases as early as the end of 2021. In particular, pig iron between February and May registered a leap from between +30% and +50% depending on the quality, while the jump in scrap stayed between +10% and +15% on average. From May, there was a fallback in prices and a gradual drop from the peaks of late April, thanks to which the annual average for 2022 for the different categories of pig iron (basic, hematite and for ductile iron) closed with price increases of between +20% and +40% on the previous year. However, the difference with the lows of 2020 were still big (between +90% and +120%).
2022 was a record year even for scrap. In this case the significant descent in the second half of the year meant that the average annual growth for 2022 on 2021 was about +10%; the price difference between the annual average for 2022 and 2020 was at around +60%.

With regard to the raw materials used by non-ferrous foundries, 2022 was a year marked by significant inflationary pressure, due to a series of factors. The Russian-Ukraine conflict, particularly in its initial phase, amplified the difficulties in sourcing materials from the countries involved, with bottleneck effects that were gradually transmitted down through the entire supply chain.
Russia and Ukraine, besides their fossil fuel energy sources, are in fact world leaders in the production of some basic raw materials for the foundry industry such as cast iron and aluminium, and numerous other commodities: coal, nickel, copper and iron alloys.
Russia's invasion of Ukraine immediately created great alarm and panic: Italian foundries initially tried to quickly replace Russian and Ukrainian raw materials, triggering a race for supplies which, together with the normal speculation that is generated on the market in such cases, caused an unprecedented price shock for those commodities.
As regards aluminium and zinc in particular, we notice that between March and April of last year the already scorching prices did in fact hit all-time peaks. The second part of 2022 saw a gradual exhaustion of the impact of the increase, even if price levels were still very high compared to the previous years
While a normalisation of metal raw materials markets was still in progress, particularly with regard to the return of the panic about pig iron supplies placated by the good availability of the material from different sources (excluding Ukraine), the segment received a second shock - energy - of unprecedented magnitude and complexity. Global markets registered record prices for all energy commodities, but the absolute star of this tsunami was the flare-up of natural gas, whose prices even in January 2022 had risen by 514% on January of 2020 and between August and September chalked up a further +124% on the start of the year.
The drop in prices in the last four months of 2022 contained the annual growth of gas compared to 2021 to +217%, but the difference with 2020 stood at over 1,000%.
Electricity, measured with the trend of the monthly PUN (National single price) in 2022 had an increase of +140% on 2021. In this case, average prices for 2022 exceeded those for 2020 by over 670%.
Still in the area of energy commodities, even prices of foundry coke experienced significant hikes, albeit with much smaller increases than gas and electricity: about +70% on the 2021 average.
Sources: Assofond Study Centre

Figure 1: Italian Ferrous Casting Production (volume)

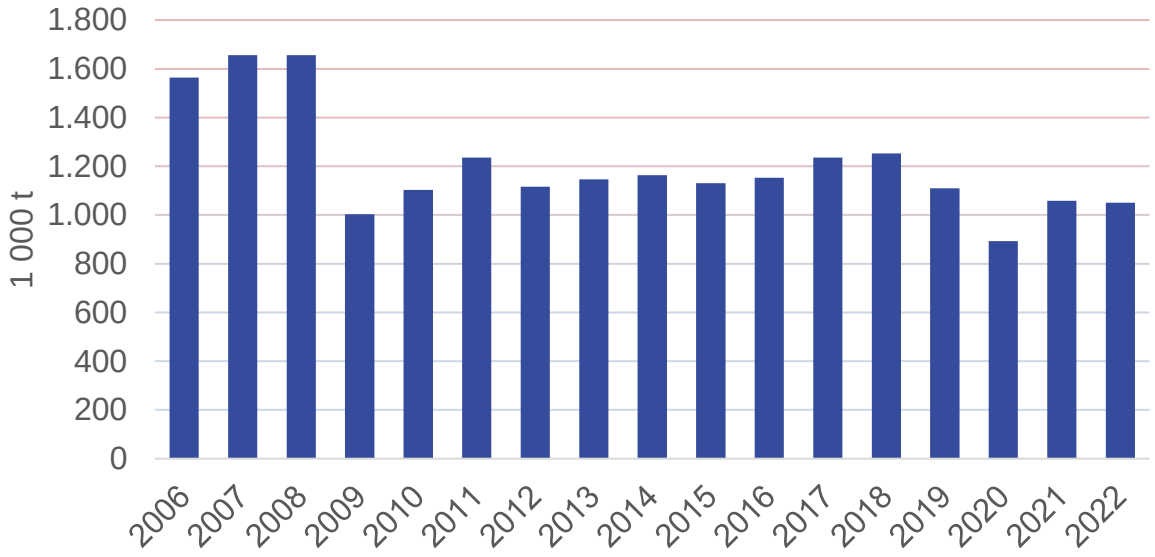
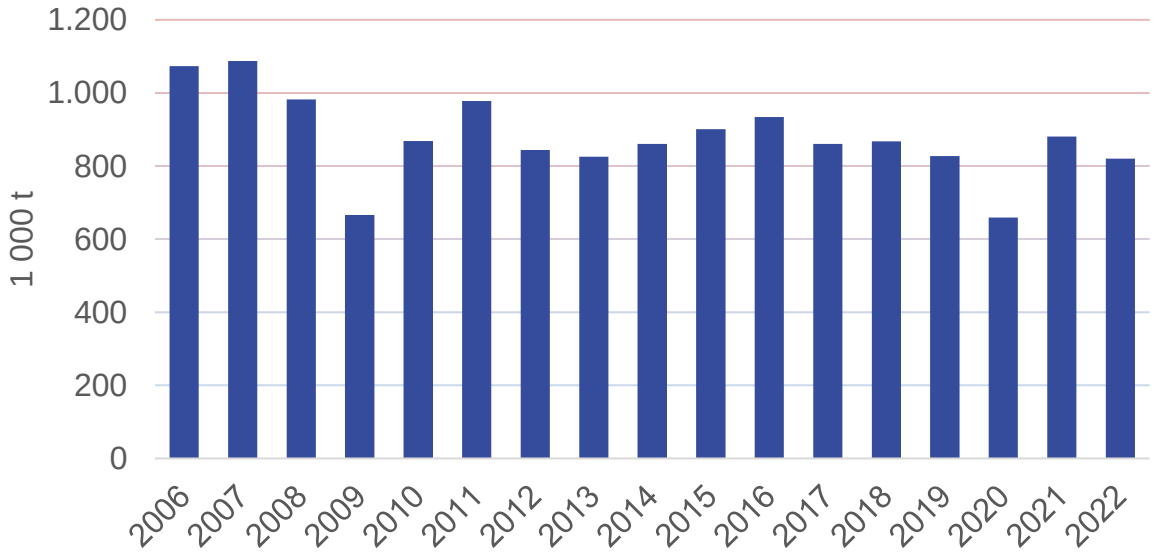


Figure 2: Italian Non-Ferrous Production (volume)



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Poland's economic performance in 2022

Gross domestic product was by 5.1% higher compared to the previous year (in 2021, after the decline related to the COVID-19 pandemic, GDP growth amounted to 6.8%).

Domestic demand was the main factor of the economic growth. The impact of both consumption and investment demand was positive. Domestic demand was by 5.5% higher than in 2021. Final consumption expenditure increased by 2.1%, of which in the household's sector rose by 3.0%. Gross fixed capital formation increased by 4.6% (compared to growth of 2.1% a year before). The investment rate was 16.8% (compared to 17.0% in 2021).

Gross value added in the national economy was by 4.6% higher than in 2021. A significant growth was recorded in industry – of 7.0%. In construction gross value added increased by 4.5%, and in trade; repair of motor vehicles – by 2.0%.

The employment in the national economy, according to preliminary estimates, was slightly higher than at the end of the previous year (in 2021, the growth of employment was higher, after a decrease caused, among others, by the pandemic). The average paid employment in the enterprise sector increased in the second year in a row, and its scale was higher than in 2021. The number of registered unemployed and the registered unemployment rate at the end of 2022 were below the previous year's level.

There was a significant increase of sold production of industry, although lower than the very high recorded in 2021. In units with more than 9 persons employed, in the fourth quarter of 2022, the year-on-year growth in production significantly slowed down. The production sold in 2022 was higher than in 2021 in all the sections of industry, most of all in mining and quarrying. The growth rate in manufacturing was close to the average in industry. An increase in sales was also observed in most of the main industrial groupings, including the highest one in the production of capital goods; only in the production of durable consumer goods sales were slightly lower than in 2021.

Construction and assembly production was higher than in the previous year. In the total population of construction entities its increase was lower than in 2021, while among entities employing more than 9 persons – higher. The dynamics of production, high in the first quarter of 2022, weakened in subsequent periods. In all the divisions of construction production in 2022 was higher than in the previous year, with the largest increase in entities specialising in construction of buildings. Sales of restoration works grew significantly, while those of investment works – to a small extent.

A high increase in foreign trade turnover was noted, similar to that observed in January–November 2021. The exchange closed with a negative balance compared to a positive one a year before. At current prices, turnover in all groups of countries increased. In January–October 2022, the terms of trade index developed more unfavourably than a year before. Turnover at constant prices in January–October 2022 increased in annual terms, but to a much lesser extent than in January–October 2021. A large drop in the volume of trade with Central and Eastern European countries was noted.

Entrepreneurs assess the general business climate mostly better than in December 2022. The opinions of accommodation and food service enterprises worsened while those in manufacturing remained similarly unfavourable as a month before.

More often than three months ago, entrepreneurs in the presented activities predict in general that the growth in prices of services, materials and raw materials will slow down in the near future (such opinion is expressed by 30%–46% of the surveyed entities). Among the factors causing the growth in costs of running of the company, entities still include mainly energy and fuel prices, costs of employment, prices of components and services as well as costs of renting the premises.

Still according to most companies (over 70%), the impact of the war in Ukraine on their activity will be insignificant or imperceptible. Serious consequences are most often feared by manufacturing units, and effects threatening the stability of the enterprise – by accommodation and food service as well as transportation and storage entities. Among the negative effects of the war, enterprises most often include an increase in costs (mentioned mainly by entities in construction – by 83% of them) as well as disruptions in the supply chain (most often indicated by manufacturing companies – by 41% of them) and drop in sales (reported by 26% of manufacturing as well as of accommodation and food service entities each). Enterprises employing workers from Ukraine in December 2022 continued to experience their fluctuations due to the war. Both, the outflow and inflow to the greatest extent concerned manufacturing entities (it was reported by approx. 30% of them). The inflow of employees from Ukraine was recorded also by 30% of accommodation and food service enterprises.

Foundry industry in Poland in 2022

Due to Russian invasion on Ukraine, the beginning of 2022 was very dramatical for all Polish enterprises. Rising prices of materials and energy reached the earlier unknown levels. Polish Foundry Chamber of Commerce implemented the energy and material indexes (ETZ, MTZ published at www.oig.com.pl website), which were useful and helpful tools for companies dealing with current problems. The situation changed slightly in the second half of 2022, when the slow decrease of prices was noticed. The main problem for foundries in 2022 then became the unsatisfactory level of incoming orders.

The production of castings in Poland in 2022 decreased by 15% in comparison to 2021.

Iron castings: 333 540 t
Nodular iron castings: 114886 t
Steel castings: 37060 t
Copper alloy castings: 4448 t
Aluminum castings: 252008 t
Zinc castings: 5559 t
Other alloy castings: 2224 t
Total production of castings in Poland in 2022: 749725 t

The structure of Polish foundry branch:
180 ferrous foundries
36 steel foundries
240 non-ferrous foundries
More than 90% of foundries belong to SME sector. SMEs are responsible for 40% of total production in Poland.

Export of castings:
iron castings – 49%
steel castings – 40%
non-ferrous castings – 45%

The main markets for Polish castings:
Automotive industry – 60%
Building industry – 10%
Machines and constructions - 10%
Iron and steel industry – 10%
Energy industry – 3%
Other – 7%

Source: Central Statistical Office - www stat.gov.pl

Figure 1: Polish Ferrous Casting Production (volume)

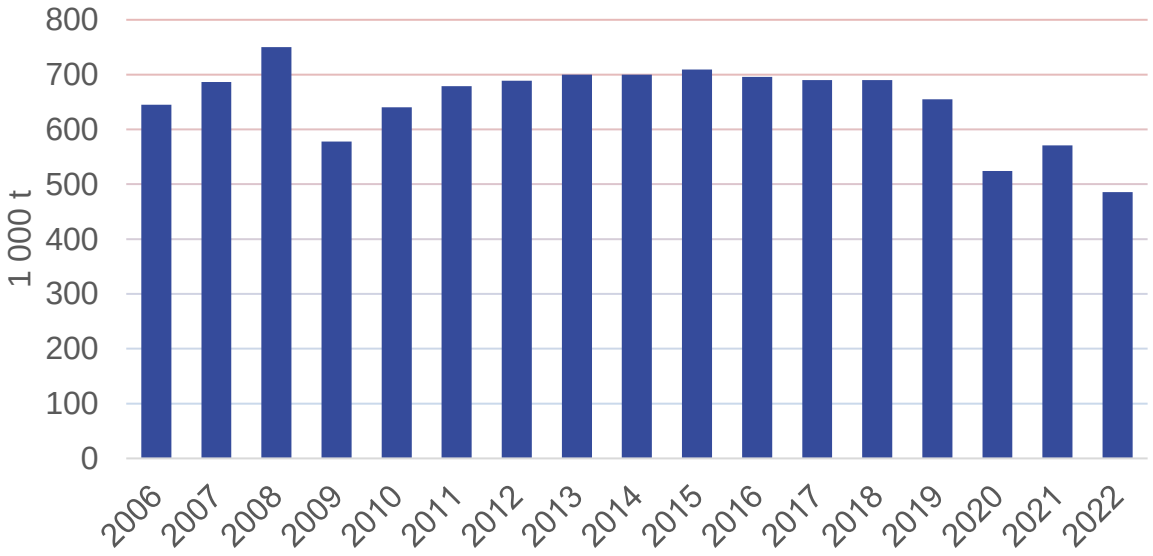
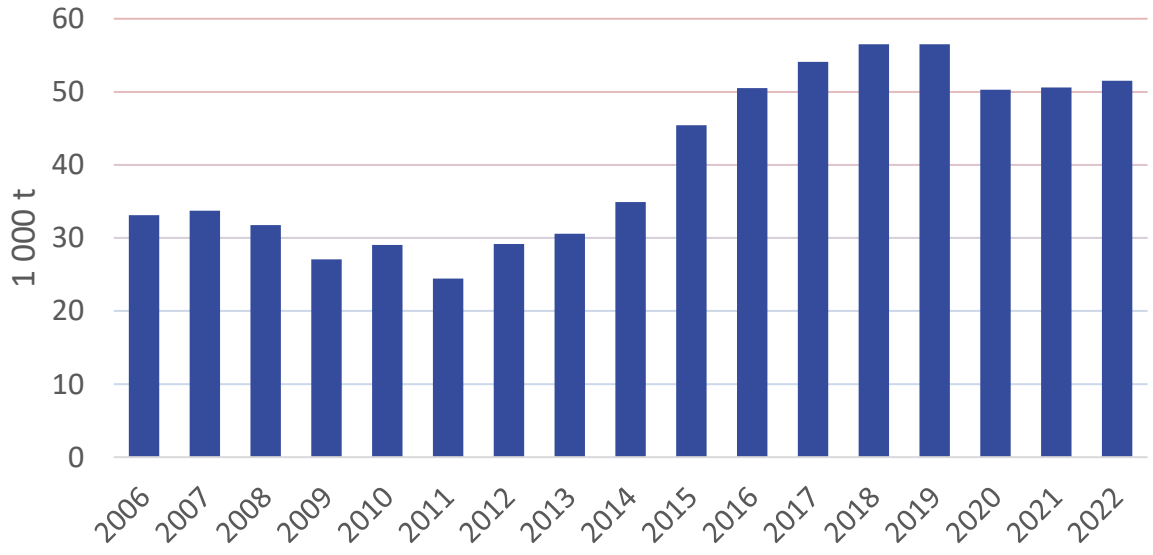


Figure 2: Polish Non-Ferrous Casting Production (volume)



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General Economic Situation

The year 2022 was marked by the beginning of the conflict in Ukraine. The global economy was under tension, Europe experience moments it has not faced for decades and the increases in energy and raw material prices broke records.

According to the latest results of the INE (National Statistical Institute) in 2022, Gross Domestic Product (GDP) registered an increase of 6,7%, in relation to the previous year.
In 2022, exports and imports of goods and services grew by 23.1% and 31.2%, respectively, compared to increase of 13% in exports and 12.8% in imports, recorded in 2021.
Exports of goods in volume increased by 8.7% in 2022 (11.2% in 2021), while exports of services registered a significant acceleration, changing from a growth of 18.6% in 2021 to 37.7%.
In 2022, imports of goods increased by 9.8% (12.9% in 2021) and imports of services grew by 17.2% (15.1% in 2021).

The employment situation

In 2022, the active population in Portugal amounted to 5 222.2 thousand people and the employed population was estimated at 4 908.7 thousand people. The unemployment rate reached in 2022, 6% of the active population.

In the foundry area, the demand for skilled technicians, operators and maintenance staff has been increasing every year. Companies have difficulties in attracting talent and keeping it in their organisations.

Foundry Industry

The automotive industry remains the main customer market, which absorbs about 71% of the Portuguese global production of foundry products.

The Portuguese foundry sector exports 86% of the total production (by weight) mainly to the European market.

Production

In 2022, the outcome of the Portuguese foundry industry was roughly 166 thousand tons, 114 thousand tons from the ferrous sector and 52 thousand tons from the non-ferrous sector. Which means a decrease of 5.3% for the ferrous sector and an increase of 1.8% for non-ferrous sector.

Table 1: Casting Production

	2021 (t)	2021 (share in %)	2022 (t)	2022 (share in %)	2022/2021 (in%)
Ferrous	120,689	70.5	114,348	69.0	-5.3
Non Ferrous	50,578	29.5	51,503	31.0	1.8
TOTAL	**171,267**	**100**	**165,851**	**100**	**-3.2**

Sales grew by 13.5% overall, with a more pronounced increase in non-ferrous metals.

Table 2: Casting Turnover

	2021 (t. €)	2022 (t. €)	2022/2021 (in%)
Ferrous	243,269.12	267,090.03	**9.8**
Non Ferrous	323,430.71	376,223.77	**16.3**
TOTAL	**566,699.83**	**643,313.80**	**13.5**

Ferrous Production

The following table shows the values for the ferrous sector, where we can see a decrease in iron and nodular subsector and an increase in steel sector.

Table 3: Ferrous Casting Production

	2021 (t)	2021 (share in %)	2022 (t)	2022 (share in %)	2022/2021 (in%)
Iron Casting	39,699	33	35,277	31.0	-11.1
Nodular Iron	76,586	63	73,699	64.0	-3.8
Steel	4,404	4	5,372	5.0	22.0
TOTAL	**12,0689**	**100**	**114,348**	**100**	**-5.3**

Steel foundries had a production increase of 22%. Iron and nodular foundries had a decrease of 11.1% and 3.8% in their production, which was reflected in a global decrease in the ferrous sector of 5.3% against 2021.

Non-Ferrous casting Production

The following table shows the values for the non-ferrous sector, where we can see a decrease in copper and zinc subsector and an increase in light castings subsector.

Table 4: Non-Ferrous Casting Production

	2021 (t)	2021 (share in %)	2022 (t)	2022 (share in %)	2022/2021 (in%)
Light Castings	33,050	65.3	34,859	68.0	5.5
Copper	14,699	29.1	14,225	28,0	-3.2
Zinc	2,829	5.6	2,419	5.0	-14.7
TOTAL	**50,578**	**100**	**51,503**	**100**	**1.8**

Light castings foundries had a production increase of 5.5%. Copper and zinc foundries had a decrease of 3.2% and 14.7% in their production, which was reflected in a global increase in the non-ferrous sector of 1.8% against 2021.

New casting plants and investments

In 2022, no new foundries were installed in Portugal, although there were several investments in existing foundries, aiming at process improvement.

Global investments in the non-ferrous sector during 2022 were around 15 m€, mainly in aluminium foundries. In 2023, investments are estimated to reach the amount of 14 m€.

Overall investments in the ferrous sector in 2022 were around 18 m€, carried out mainly by iron foundries. In 2023, planned investments are expected to reach a total amount of 14.5 m€.

Industrial Cost

Raw materials - In the first semester of 2022, the price of raw materials in the foundry sector increased because of the war in Ukraine, stabilizing in the second half of the year.

Energy - The war in Ukraine caused a sharp increase on energy prices in 2022. This upward trend, which was already visible at the end of 2021, was strongly boosted by this conflict. This increase was more pronounced in the first semester of the year, with occasional values above €500/MWh.

Incoming orders

Globally, the needs of the automotive sector had an increase in 2022. This increase was more accentuated in the non-ferrous sector, where there was an increase in production output for this sector from 50 577 ton in 2021 to 51 503 ton in 2022. This increase was also reflected in billing values, in which there was also a good increase, from 323 m€ in 2021 to 377 m€ in 2022.

Foundry vocational training

The Portuguese Foundry Industry has its own Professional Training Centre, CINFU, in a partnership between APF - Portuguese Foundry Association and the Institute for Employment and Professional Training. CINFU promotes professional training for the workers of the sector and for those who will join it in the future. There is also a long partnership with the University of Porto - Faculty of Engineering, for the training of future foundry engineers.

Figure 1: Portuguese Ferrous Casting Production (volume)

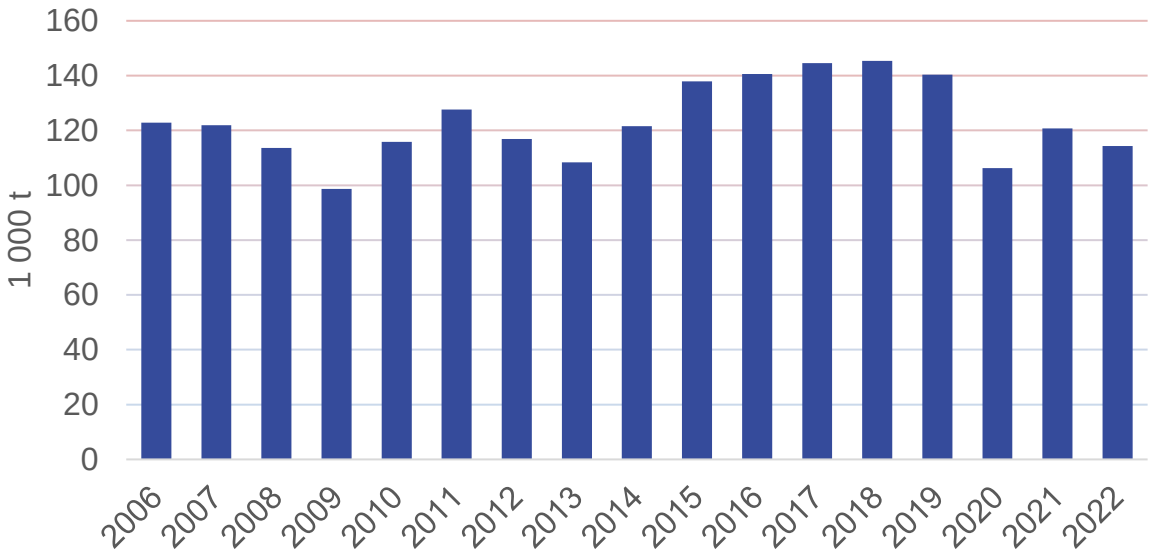
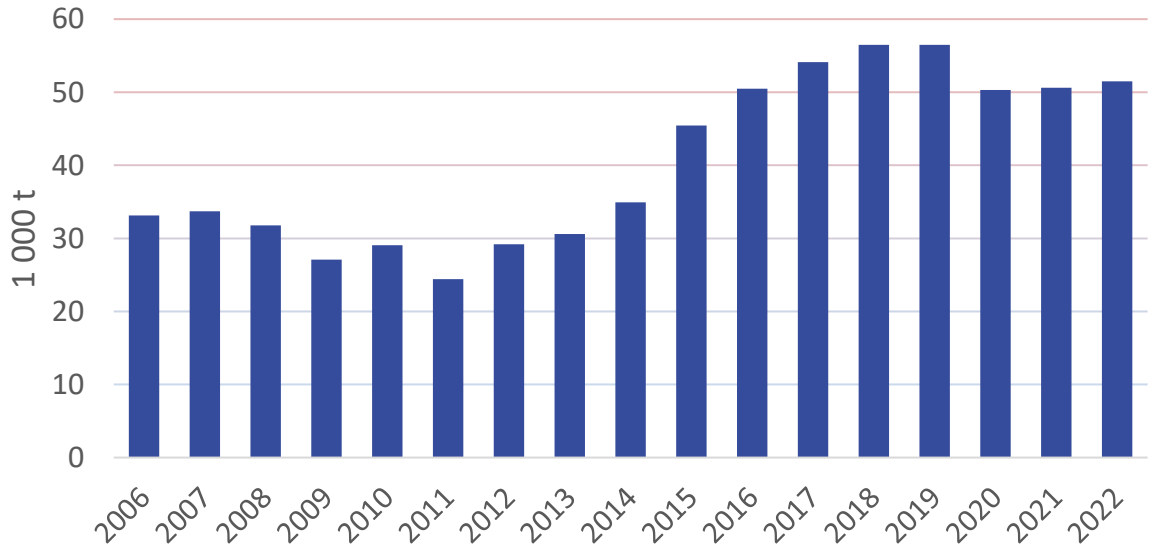


Figure 2: Portuguese Non-Ferrous Casting Production (volume)



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Spring Forecast of Economic Trends 2023 for Slovenia

Economic growth is expected to weaken significantly this year (1.8%) but will still be higher than expected in the autumn (1.4%). At the beginning of this year, confidence indicators were still at a low level, while signals from the international environment point to significantly lower uncertainty about energy supply and energy prices, and a gradual improvement in the outlook compared to the autumn forecasts. Data on GDP growth in the fourth quarter of last year is also encouraging. In Slovenia and the euro area, it was slightly above expectations, mainly due to the resilience of the economies and the impact of the agreements and measures to mitigate the energy crisis on confidence indicators, along with the moderation in energy prices. In addition to the international economic environment, fiscal stimulus will also have an impact on economic activity in Slovenia this year.

We expect investment growth to remain moderate, supported by public and EU funds, and private consumption and exports to show weak growth before picking up in the second half of the year. Growth in external trade and the export sector will slow this year in line with the slowdown in economic growth in our main trading partners and continued cost pressures, which, however, have been easing in the international environment. Growth in exports of goods and services (2.7%) will be slightly lower than growth in external demand, which we attribute to the structure of Slovenian exports and the impact of the deterioration in the cost competitiveness of manufacturing that already occurred last year. In manufacturing, high-technology industries will continue to be the main driver of growth, while we expect output to decline, especially in the more energy-intensive industries. After a strong recovery from the epidemic, we expect a slowdown in services trade growth, especially in tourism-related segments. Growth in imports of goods is expected to weaken more than growth in exports this year, mainly due to a sharper slowdown in domestic (especially private) consumption. Growth in gross fixed capital formation will be moderate this year (2.8%), supported mainly by government investment. We expect continued growth in investment in buildings and constructions, supported by a further increase in government investment, also related to the absorption of EU funds, and a further increase in housing investment. Private investment activity will be lower in 2023 as a whole than last year due to lower capacity utilization in manufacturing, rising interest rates and continued uncertainty. The growth in private consumption will be much slower this year (1.2%) than last year, which was still marked by a strong recovery from the epidemic. Relatively high inflation, especially in the first half of the year, and tighter credit conditions will continue to weaken household purchasing power and hamper faster consumption growth. Private consumption growth, which will be modest, will be supported by high employment and moderate wage growth, a somewhat lower (albeit still high) current savings rate, and government measures to mitigate the rise in energy prices. Government consumption growth (1.2%) will again be subdued in 2023, similar to 2022. The relatively low growth will be due to a further reduction in expenditure for measures to mitigate the impact of the epidemic and subdued employment growth, while health expenditure will increase.

In the next two years, GDP growth is expected to return to slightly higher levels (2.5% in 2024 and 2.6% in 2025). Higher growth in total exports (slightly above 4%) and related activities will follow higher growth in external demand, and investment in machinery and equipment will also recover. In 2024, the volume of government investment is expected to decline, mainly related to the absorption cycle of EU funds. Total gross fixed capital formation growth will therefore weaken in 2024 (to 2.2%) before picking up again as government investment increases (5.0%). Private consumption growth will strengthen to 1.8% amid higher real disposable income growth and a slightly higher propensity to save, which will, however, remain lower than before the epidemic. Government consumption growth will strengthen to 1.8% or 1.9%, mainly due to continued growth in health expenditure, also related to the planned implementation of the long-term care system.

This year, employment growth (1.0%) and the decline in unemployment will continue to weaken, more markedly in the first half of the year; however, severe labour shortages will not allow for stronger employment growth in the next two years. Demographic trends, i.e. the long-term decline in the population aged 15-64, will also be a factor limiting growth in value added. Labour market participation will continue to increase gradually, especially in the 55-64 age group, and slightly also in the 20-24 age group, where it is below average.

Growth in the average real gross wage will be positive again this year (1.1%) and will strengthen towards the end of the forecast horizon. In the private sector, average wage growth (0.8% in nominal terms and 0.9% in real terms) will be affected by continued labour market pressure in the face of labour shortages and, to a considerable extent, by the minimum wage increase in January. The relatively high wage growth in the public sector (8.7% in nominal terms and 1.5% in real terms) will also be influenced by the implementation of last year's agreement with the public sector unions. Over the next two years, total nominal wage growth will weaken somewhat, while real wage growth will be slightly above its long-term average. The forecast for gross wage growth is subject to significant risks related to labour market pressures and the announced reform of the public sector wage system after 2023, the impact of which on wage growth cannot be accurately assessed at this stage.

We expect inflation to ease gradually this year, but to remain relatively high on average; we estimate that it could only gradually decline towards 2% after 2024. Higher service prices will still contribute significantly to inflation, and the contribution of food prices will also remain relatively high, although growth in food prices is expected to ease gradually. The contribution of energy prices is expected to be smaller this year in the absence of external shocks, and the increase in non-energy industrial goods prices is also expected to ease off gradually. As price increases are gradually slowing, inflation is expected to be 5.1% at the end of 2023 and average 7.1% in the year, mainly due to the high level at the beginning of the year. For next year, we expect inflation to weaken further in the absence of external shocks, falling below 3% by the end of the year, supported by monetary policy measures.

Uncertainty in the international environment is lower than in the autumn but remains high and is related mainly to the course of the war in Ukraine and the energy market conditions. Risks to the forecast are therefore less pronounced and more balanced than a few months ago. The downside risk to economic growth is also related to a possible persistence of high inflation, which could lead to an acceleration of monetary tightening. Other downside risks to economic activity at the global level are related to economic activity in China, the impact of climate change, social unrest amid high energy and food prices, and the geopolitical and pandemic situation. However, there are also some upside risks to the baseline projections of economic growth at global, EU and national level. A faster-than-expected decline in inflation would lead to less severe tightening of monetary policy, which would have a positive impact on economic activity. International institutions also cite higher private consumption, boosted by the unwinding of savings accumulated during the pandemic, as a possible reason for the higher growth. A more effective absorption of the full package of EU funds and effects of reform measures on public finances, both in Slovenia and in its main trading partners, would also have a positive impact on economic growth, providing an opportunity to strengthen the development dimension.

Slovenian Foundry Industry in 2021 and 2022

Production of Foundry Industry in tons

The complete production of the foundry industry in Slovenia in the year 2022 was 178.500 tons, compared to the complete production in 2021, this is smaller by 6%. The production of grey iron in 2022 was 65.860 tons which in comparison to the production in the previous year is smaller by 10%. The production of ductile iron and malleable iron is similar to the production of grey Iron as both values in production are smaller, for ductile iron the production in 2022 amounts to 39.172 tons, which is smaller by 12% compared to the previous year and the production of malleable iron amounts to 2.800 tons in 2022, which is smaller by 10% compared to 2021. The production of steel castings in Slovenia has seen a positive growth as compared to 2021 it has grown by 12%, with the amount of steel casting production in Slovenia in 2022 being 4269 tons. The casting production of copper alloys and aluminum alloys has also grown since 2021. Copper casting has grown by 12% with the number in tons in 2022 being 1.125

tons, and aluminum casting by 5% with the number in 2022 being 55.576 tons. The production of magnesium alloys is the same as in 2021, with the fact that Slovenia has no foundry production in both years for the alloy. The production of zinc in the year 2022 was 7.103 tons, which has fallen since 2021 by 13%. The amount of other casting production in 2022 amounts to 2.595 tons, which is bigger by 9% compared to the previous year of 2021.

Production value (in million Euro)

The value of the Slovenian casting industry is as follows: In 2021 the total value was 820.086.614 million, this number has since grown by 24% with the total value in 2022 being 1.018.943.419. Export has grown in 2022 but only by a small margin of 0,1%, with the final number being 82,4%.

The production value of iron casting (grey iron, ductile iron, malleable iron) in 2022 was 170.122.439 with the value growing by 28,5% compared to the previous year and the export being 77,9%. The value of steel casting was 45.800.375 EUR with the export being 75,1%.

The complete value of light metal casting in 2022 was 729.952.690 with the value growing by 24,6% compared to the previous year. The export has grown as well, with the final number being 85,8%. The casting of other non-ferrous metals in 2022 reached the value of 73.067.915 million EUR, which in comparison to the previous year is higher by 12,4%, It's export in 2022 was 63,6%.

Sources:
IMAD - the Institute of Macroeconomic and Development
Chamber of Commerce and Industry of Slovenia, Association of Metals and Nonmetals
Slovenian Foundrymen Society

Figure 1: Slovenian Ferrous Casting Production (volume)

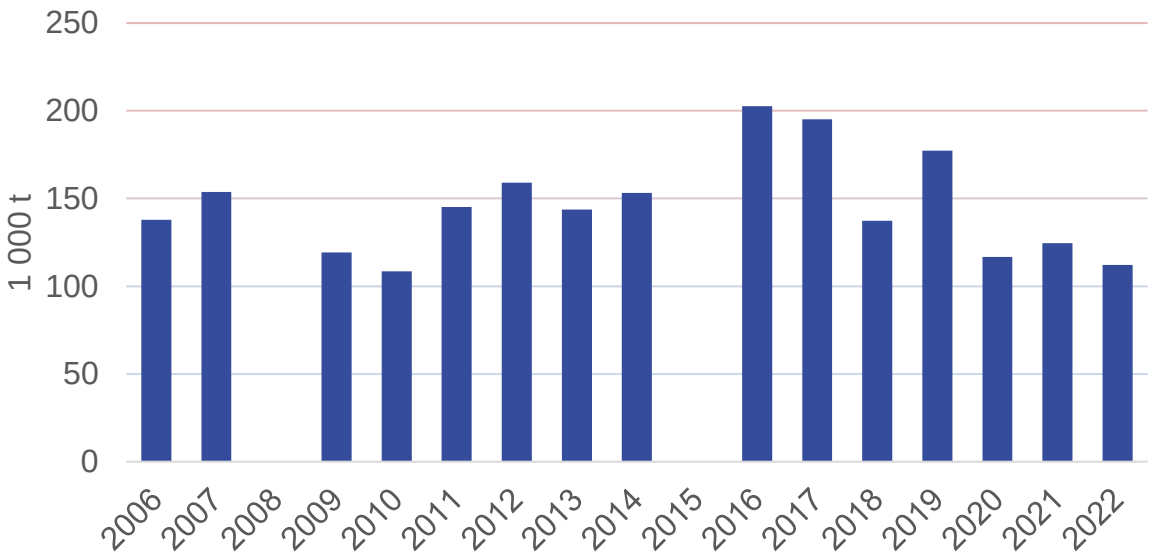
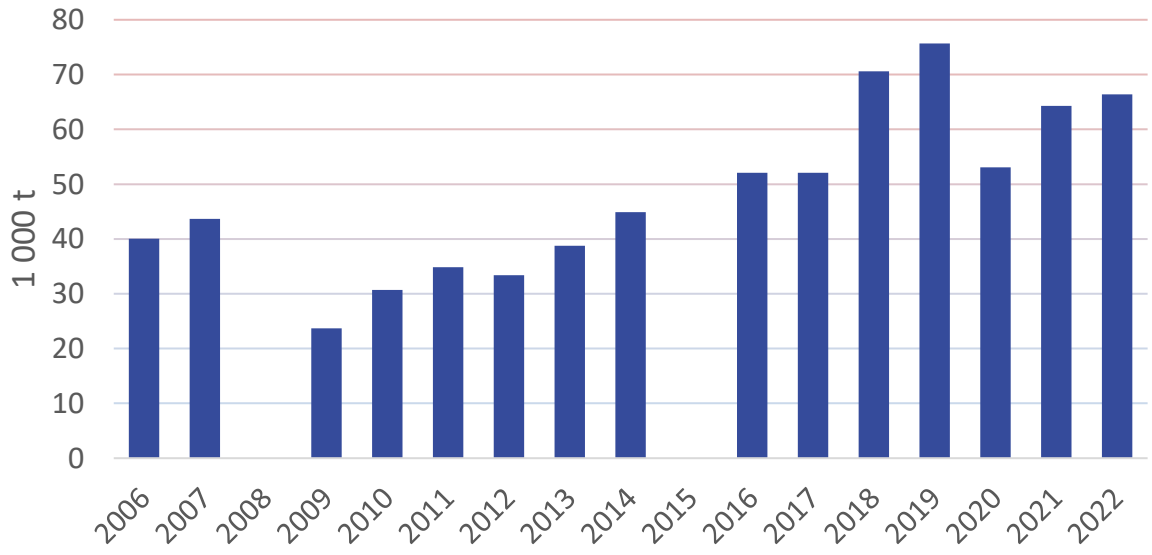


Figure 2: Slovenian Non-Ferrous Casting Production (volume)



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The Economy in General and Industrial and Metal Sector in particular

On the international scene, according to the IMF, world GDP has increased by 3.4% and is forecast to grow by 2.8% by 2023. For the Eurozone a GDP of 3.5% has been recorded and the forecast for 2023 is that it will grow by 0.8% and 1.6% in 2024.

The year 2022 has been characterized by a strong recovery until the second quarter and a very pronounced slowdown since summer, due to the consequences of the war in Ukraine on the rise in commodity prices, as well as their transmission to inflation. This very high and widespread inflation in all European countries has led the ECB to raise interest rates to 2.5%. In the year 2022, GDP in Spain registers a variation of 5.5% in terms of volume. GDP at current prices stands at 1,327,108 million euros, 10.0% higher than in 2021. The Commission´s forecast is that Spanish GDP will have a growth of 1.4% in 2023. In 2024, real GDP growth is expected to rise to 2%.

2022 has been a challenging year marked by high inflation and tightening monetary policy. In 2022, prices have risen by 8.4%, the highest since 1986, almost three times as much as in 2021 (3.1%). There is uncertainty for the beginning of 2023 about the intensity of the slowdown. A recession in Spain seems to be ruled out by 2023, mainly due to an improving outlook in the energy sector.

Industrial Sector

In 2022, the Industrial Production Index (IPI), in the accumulated year, has recorded a variation rate of 2.4% compared to the 7.1% recorded in the same period of 2021.

The Industrial Turnover Index accumulated for the year 2022 has shown a growth rate of +20.6% (+16.1% in 2021).

Metal Situation

Metal Industrial production, measured by the Metal Production Index (IPIMET), has closed the year 2022 with a growth rate of 3.9% (7.4% in 2021) and the Metal Industry Turnover Index increased by 13.6% (up by 12.7% in 2021). On the other hand, the Industrial Price Index of the Metal Industry (IPRIMET) has recorded an annual growth rate of 11.1% (8.7% in the same period last year).
Exports of the Metal Sector, in the accumulated year 2022 have registered a rate of +14.2%, compared to the rate of +15.4% of the same period of the previous year. As for Metal imports, in the year 2022 they registered an increase of 23.8% compared to the rate of 17.2% in the same period of the previous year.

Labour Market

Registered unemployment rises by 2,618 persons. In total there are 2,911,015 people unemployed, almost three and a half million if we count those excluded from the official lists. In year-on-year terms, the average number of people affiliated to the Social Security rose by 475,870, this is a +2.42% increase in the rate.

Metal Labour Market

An annual average of 781,470 members was reached in the first nine months of the year, an increase of +1.9% compared with the average for the previous year.

Foundry Sector

We began the 2022 fiscal year with a situation of volatility and uncertainty. The crisis in some industrial sectors due to the disruption of supply chains because of the pandemic had been compounded since the second half of 2021 by the tremendous growth in energy costs. Thus, Russia's aggression against Ukraine at the end of February 2022 only exacerbated the problems, putting all European companies and foundries into an even more difficult situation. Along with a growth of natural gas and electricity costs, we had to adapt to the difficulty of stockpiling many basic raw materials: iron ingot, aluminium, nickel, ferroalloys, whose prices doubled in a few weeks. We had no choice but to adapt and work hard to overcome these complicated situations. During 2022, Spanish foundries have maintained employment despite the economic situation.

In general terms 2022 has met the expectations. The automotive sector (the main customer of the foundry sector, which represents 58% of the sector's sales) has not behaved as good as the industrial engineering sector. Although there is still tremendous uncertainty about how the key markets for the foundry industry will perform, we believe that the markets will evolve upside in 2023, but with a very low increase. There is a lot of uncertainty for 2023 and there is concern about high inflation. Despite the worrying macroeconomic situation due to inflation, high costs in auxiliary materials, raw materials and energy, the sector demonstrates resilience and capacity to adapt to change, as it has done throughout its history.

In addition to the aforementioned and the ambitious challenge of decarbonisation of the industry, the foundry continues to suffer from a serious lack of personnel. After a 2021 year in which the Spanish foundry sector registered an increase in production of +6.89%, the increase in 2022 has not been as much as the previous one: +2.21%. All materials have recorded an increase in production and turnover for 2022 year. The increase has been +1.40% for iron castings, +11.77% for steel castings and +2.88% for non-ferrous castings. For turnover: +29%, +22.51% and +16.35% respectively.

Sector Situation Report elaborated by FEAF as of September 30th, 2022, showed the following scenario. Comparing data of the common enterprises, 2021 vs 2022, the occupancy rate increased from 71% to 76%. The order book, from January to September 2022, it has been increased from 93 to 101 days. During 2022 the overall employment has increased by +1.1% and prospects for the first half of 2023 are to increase a bit or almost maintain (+0.13% in June 2023). Meanwhile, regarding the overall business situation at the end of 2022, 43% of companies consider the situation to be normal, 47% serious and 10% very serious.

Iron Casting Section. Automotive Casting

In terms of production there is a bit of everything. Some comment that 2022 has been better than 2021, for others however, 2022 has been worse than 2021. For the automotive sector, it has been a year with many ups and downs. The industrial vehicle has performed well during 2022.

There has been an inflation never seen in history and there is concern about it.

Iron Casting Section. Manual Molding

During 2022, in general, there has been a lot of work, but very low margins. The occupancy rate in the last quarter of 2022 has been 78%. There has been a slowdown at the end of this year 2022.

There is lot of uncertainty for 2023.

Iron Casting Section. Mechanical Molding

The wind sector has remained stable, same as the agricultural sector, that has had a normal activity. On the other hand, the die sector has been missing throughout the year 2022 and machine tool sector has not been as positive as in other years.

The occupancy rate in this last quarter of 2022 has been 71%. There has not been much movement at the end of the year.

Stainless Steel

Many of the foundries of this material work with projects. The oil & gas sector has been with good workload during 2022, ending the year optimistically. With the same feeling, chemical and naval industry sectors have been very strong. On the other hand, the automotive sector has had a downward trend. As happens with other materials, there are personnel recruitment problems.

Steel Castings. Carbon and alloy steels

At the end of the year foundries have been working with higher volumes than at the beginning of it. There has been a lot of work, but the accounts are not so good.

Naval and railway sectors have worked well during 2022 (railway sector was still up at the end of 2022). Machinery and public works have finished 2022 well but in general there is uncertainty for 2023.

Non-Ferrous

Aluminium foundries have produced more than in 2021, there has been an increase of +4.1% regarding production volume. However, for the Zamak a decrease of -6.04% is recorded.

For 2023 investments are expected, but less than in the previous year.

Raw Materials prices and Auxiliaries in 2022

Scrap prices ended 2022 with prices lower than those at the end of the previous year. Nevertheless, if we compare the scrap prices of the year 2021 with the ones in 2022, on average, the scrap has had a growth of +10.77%.

Pig iron ingot prices have evolved upwards too, being at the end of 2022 well above than those of December a year earlier and recorded +40.57% on average of the year. In the case of nodular iron, the price was increased from December 2021 to December 2022 too, a rise of +32.92% was recorded, which means +53.29% on average of the year 2022.

It must be highlighted the high upward trend in all ferroalloys too (average 2022 vs 2021): FeSi Stone: +36.41%, FeSiMg (5-7%): 43.81%, FeMn Stone (6-8%): +12.20%, FeCr (0.05% C): +111.51%, FeMo: +35.13%.

Energy

We reached the summer with record high prices for gas and electricity. The measures taken by the Government to contain energy costs during 2022 have had little impact on Spanish foundries and all companies have had to work without margins during practically the whole year. FEAF has had to work intensively in the management of energy indicators, both for electricity and natural gas. The Iberian Agreement for the gas capping has been a small tourniquet in the bleeding of companies, but it has also meant an extra effort in the monitoring and management of these energy indicators with customers.

Unfortunately, during the whole 2022-year, Spanish electricity market prices have been monthly higher than the average of the previous year. The Spanish electricity market (OMIE) has recorded an average increase of +88.26% compared to average 2021. The Spanish gas market (MIBGAS) has had an increase of 117.38% compared to average 2021. Regarding the energy situation at the end of 2022, only 7% of companies consider it a normal situation, 48% of companies consider it serious and 45% of companies consider it very serious.

Figure 1: Spanish Ferrous Casting Production (volume)

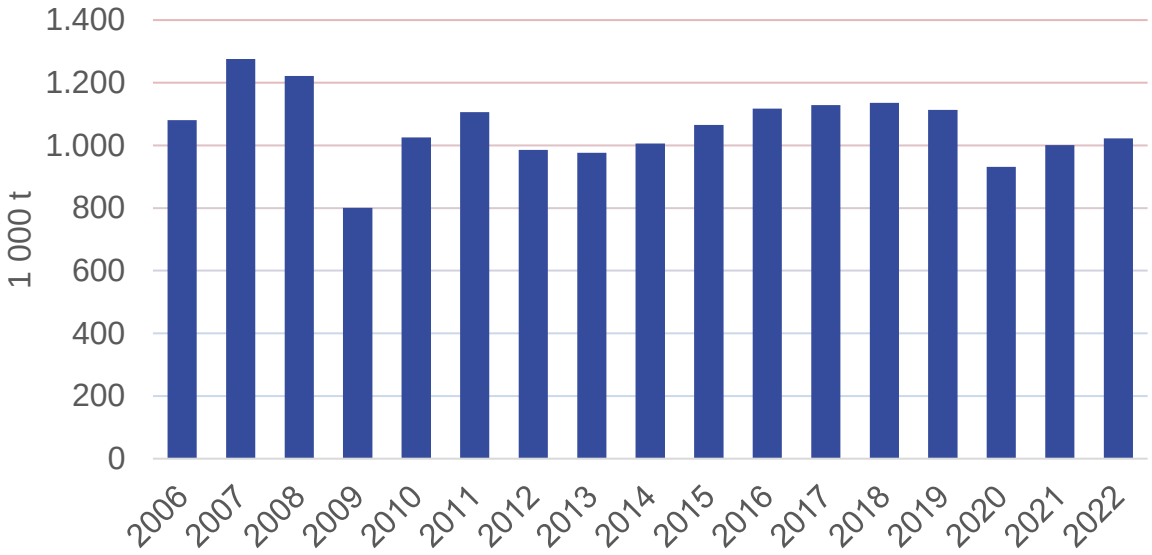
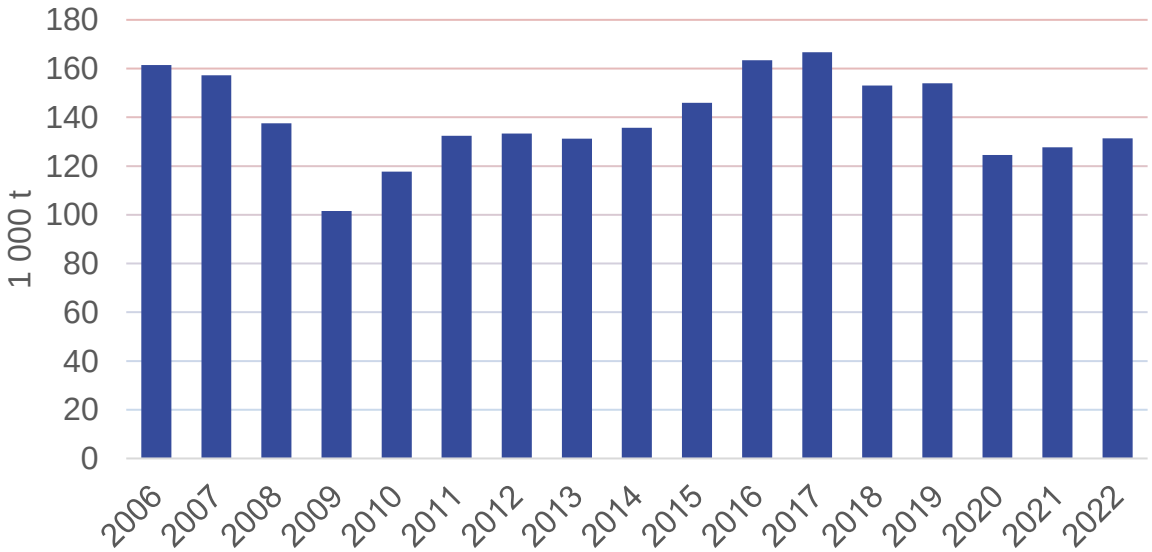


Figure 2: Spanish Non-Ferrous Casting Production (volume)



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Economic situation and main indicators for 2022

The Swedish economy continued its recovery throughout 2022 following the coronavirus pandemic. GDP (Gross Domestic Product) is expected to have grown by around 2.5 percent during the year, which represents a slightly lower growth rate compared to the 5.1 percent increase in 2021. Despite the somewhat subdued growth, the economy continues to develop at a stable level.

The employment rate in Sweden also improved in 2022. At the end of the year, the unemployment rate stood at 7.2 percent, showing a decrease compared to 8.8 percent at the end of 2021. This indicates an increased demand for labour and a stronger labour market.

An important driver behind the Swedish economy in 2022 was the export sector. The export of Swedish goods and services showed a positive trend, with increased demand from foreign markets. Imports of goods and services also increased, suggesting increased domestic consumption and investments.

One crucial sector contributing to economic growth was the Swedish industry. The manufacturing sector experienced a steady recovery from the effects of the pandemic, with several industries witnessing increased production and sales in 2022. Cars, vehicles, and electronics were some of the sectors showing strong growth.

General casting industrial structure

The number of foundries in Sweden remain stable. This means that during 2022 we still had just less than 100 foundries; 25 iron foundries, 11 steel foundries and some 60 metal foundries, mainly aluminum. During the year there have been no bankruptcies or reconstructions. As usual the customer side is dominated by the automotive sector, and nearly 70 % of the total production ends up in the transportation sector as components in trucks, light vehicles, and construction equipment.

During 2022, the Swedish foundry industry has shown signs of recovery and growth. After a steady rebound from the lower production levels during the pandemic, several foundry companies have increased their production and achieved good results. The overall economic growth in Sweden has also contributed to increased demand for cast components, particularly in the automotive and construction sectors. A positive aspect for the Swedish foundry industry in 2022 has been the significant investments made by companies such as Scania, Volvo Trucks, and Volvo Cars. These investments aim to modernise and expand the production capacity within the industry. It is expected that these investments will lead to increased production and competitiveness for the Swedish foundry industry in the long run. Swedish foundries have been impacted by the high electricity prices during 2022. The surge in electricity costs has posed significant challenges for the industry. Foundries heavily rely on electricity for their operations, and the increased expenses have had a direct impact on their production costs and overall competitiveness. As a result, the profitability of these businesses has been negatively affected, and they have faced difficulties in maintaining competitive pricing in the market.

Furthermore, the high electricity prices have also created uncertainty for the future investments and expansion plans of Swedish foundries. The additional financial burden has made it more challenging for them to allocate resources for modernisation, innovation, and the adoption of new technologies.

To mitigate the effects of the high electricity prices, Swedish foundries have been exploring various strategies such as implemented energy-saving measures by optimising production processes and upgrading equipment to improve energy efficiency.

Opportunities and challenges for 2023:

Looking ahead there are both opportunities and obstacles for the Swedish foundry industry in 2023: Continued economic growth and increased demand for cast components, especially in the automotive sector, can create opportunities for increased production and sales for foundry companies. Additionally, technological advancements such as additive manufacturing and digitalisation present new opportunities for innovation and efficiency within the industry.

The Swedish foundry industry may face obstacles in the form of rising raw material prices and energy costs. Difficulties in the availability and price stability of raw materials such as iron, steel, and aluminum can impact production and costs for foundry companies. Energy-intensive processes within the foundry industry can also be adversely affected by high energy prices. Furthermore, the transition to electric drivelines could be a challenge for the Swedish foundry industry, as the automotive sector accounts for 70% of the overall production. An important challenge for the foundry industry is ensuring the availability of skilled and qualified employees. Technical expertise and knowledge in casting processes are crucial to maintain competitiveness and meet customer requirements. Continued education and recruitment of qualified workforce will be crucial to meet the industry's needs. The Swedish foundry industry will need to manage and adapt to stricter environmental requirements and regulations, both nationally and within the EU. In the coming years, SF-BREF and the renewed Industrial Emissions Directive (IED) are expected to have a significant impact on the industry. It will be important for foundry companies to invest in sustainable production methods and reduce their environmental footprint to comply with these requirements.

In summary, the Swedish foundry industry has shown positive signs of recovery in 2022. Looking ahead there are opportunities for increased production and competitiveness through investments, increased demand, and technological advancements. However, the industry also faces challenges related to raw material prices, energy costs, talent acquisition, and stricter environmental requirements. By addressing these challenges and leveraging the opportunities available, the Swedish foundry industry can continue to be a significant and competitive sector within the national and global economy.

Figure 1: Swedish Ferrous Casting Production (volume)

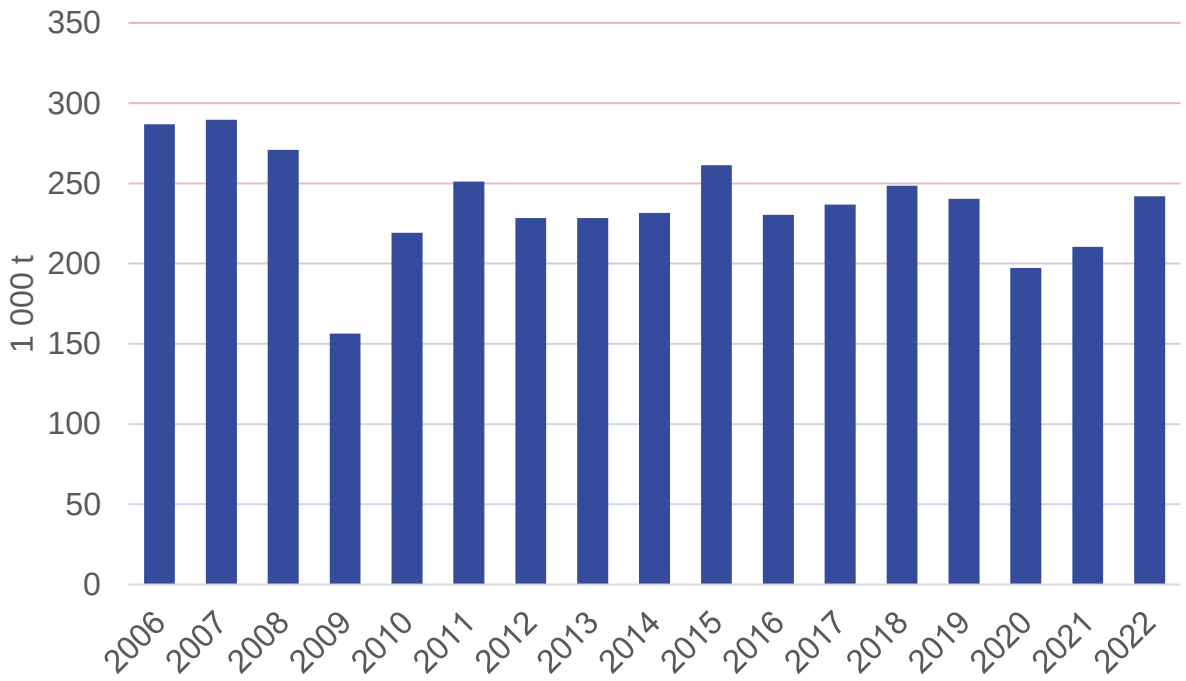
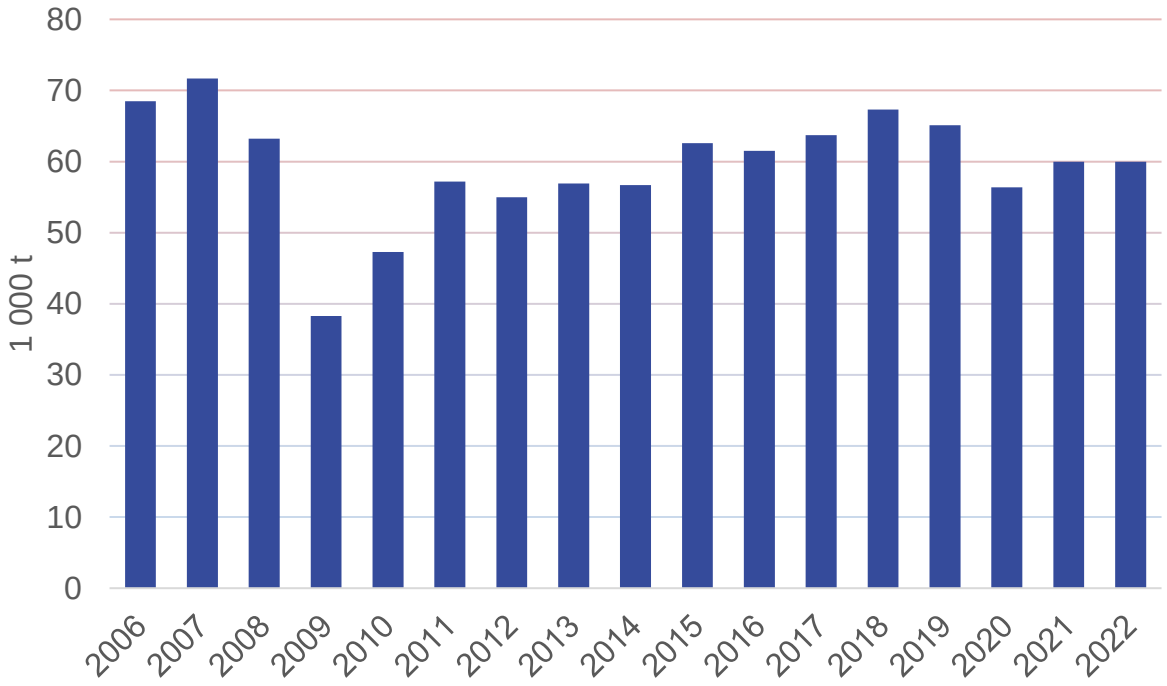


Figure 2: Swedish Non-Ferrous Casting Production (volume)



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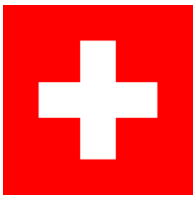


Situation of Foundry Industry

Good level of stable growth in 2022

2022 was a successful year for the Swiss foundry industry. Production in light metal casting was up 5.4 per cent, and in cast iron up by 6.9 per cent. Across all materials, total production volume rose by 5.8 per cent to 41,006 tonnes delivered from 38,767 tonnes in 2021. Utilisation of production continued to be extremely high, despite the globally fluctuating economic trend. The export business increased markedly. And the current year also started on a positive note for the Swiss foundries with order books full. The 46 companies amalgamated in the Swiss Foundry Association (GVS) have proved strong in innovation and investment, for existing and new customers, as a reliable contractual partner in the economically stable environment. Last year already started on an above-average good level for the Swiss Foundry Industry. The first half of the year was constantly on an overwhelmingly positive trend, continuing the recovery initiated after the coronavirus crisis in Europe. In the second half of 2022, however, the slowdown in the global economy was palpable, increasingly creating a volatile course of business. Orders were placed at increasingly short notice, calling for entrepreneurial flexibility to be able to cope with uncertainties in sales volumes and fluctuations in utilisation of production. At the same time, the good utilisation and employment situation in the Swiss foundries remained stable. It was because of the severe lack of specialists that towards the end of the year order volumes could not be processed in full in some places. Although in the home market less new business was generated, the export business grew. However, it was not possible to achieve the budgeted growth everywhere. The huge rises in energy costs and materials impaired the amalgamated companies' margins and results.

High level of demand from electric mobility for innovative cast solutions from Switzerland

Altogether, the economic trend in practically every user market was better than in 2021. The 46 amalgamated companies of the GVS, decidedly strong in innovation, financially well established and ever ready to invest, were able to develop and sell many new sophisticated cast parts. The automotive sector, particularly the high demand for electric vehicles, provided the biggest growth. The Swiss foundries are well on the way to positively co-shaping technological change in individual mobility and the upheaval in every economic sector for climate protection with increasingly complex cast solutions.

Production stable on customary level, material stores are well equipped

A change in the customer structure is also evident this year. Small, innovative firms are deliberately targeting Swiss foundries with their ambitious orders. Bigger customers are also placing their orders increasingly in Switzerland, as some foundries abroad are finding themselves in financial difficulties or even bankrupt. There is considerable need for negotiation to be able to assert realistic prices in the market. An additional aggravating factor now is the energy price cap in Europe. These non-level playing fields are a manifest competitive disadvantage. The Swiss foundries would certainly prove to be an even more reliable contractual partner for many customers in an extraordinarily stable economic environment with a low inflation rate and constant wages. The amalgamated GVS companies are producing on the customary level, the material stores are well equipped, and delivery deadlines are reliably met. These strengths – stability, reliability, and top delivery performance – are crucial plus points. And competitiveness could even possibly increase as the consequence of lower inflation compared to the EU.

Sustainable business concepts, attractive foundry occupations

As increasingly large components are outsourced by the manufacturers of vehicles and mechanical engineering, for instance, there is increasing demand for the expertise of the Swiss foundry industry in innovative welding, including casting and sheet metal, or the application of new technology such as

friction stir welding. In economic and technological terms, the Swiss foundries likewise continually carry on pursuing their sustainable business concepts in favour of a positive CO2 balance: with substantial investments in automation processes and optimal resource management as well as savings on energy and costs. At the same time, the sector is committed on every level of staff development to acquiring more apprentices and thereby future skilled workers for the attractive occupations in the modern Swiss foundries.

Cautiously optimistic outlook

It is difficult to make a prediction for this year. In the short term the continuing good order situation makes us feel confident, despite the adverse global circumstances. In the second half of 2023, however, we are expecting an economic downturn. More than ever, the Swiss foundries are preparing flexibly for volatile, severely fluctuating incoming orders. With a favourable development of the uncertain parameters to the geopolitical stage and sufficient availability of raw materials, the SFA is expecting a similar economic trend to that of 2022.

Figure 1: Swiss Ferrous Casting Production (volume)

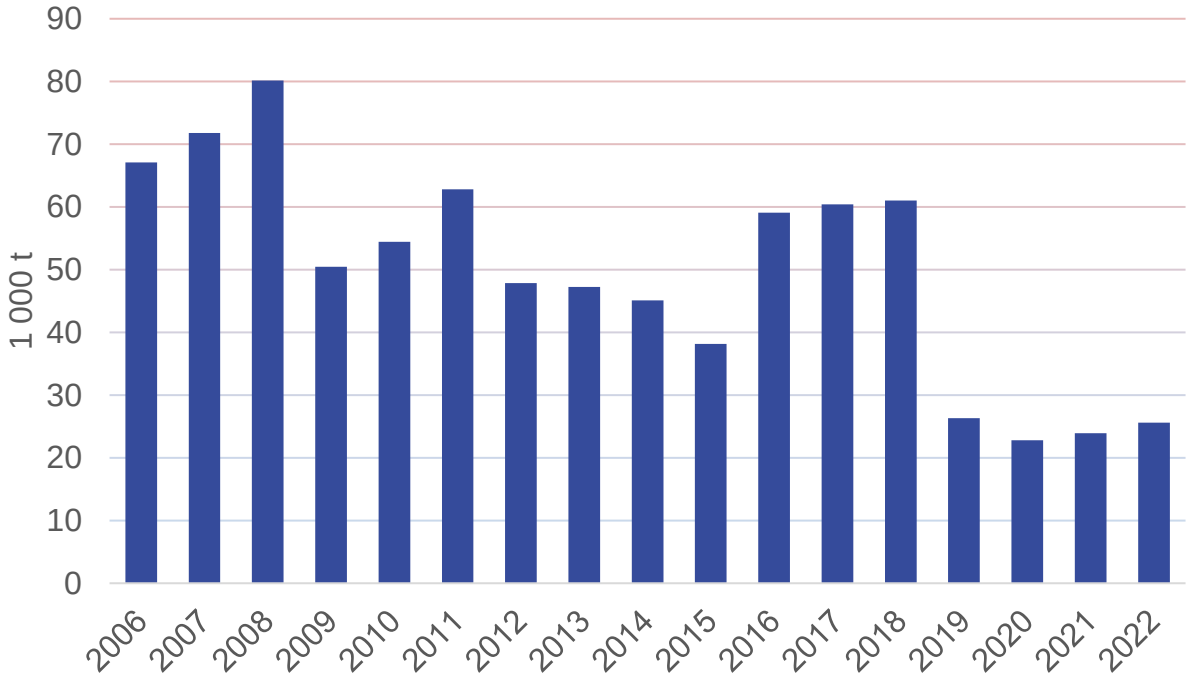
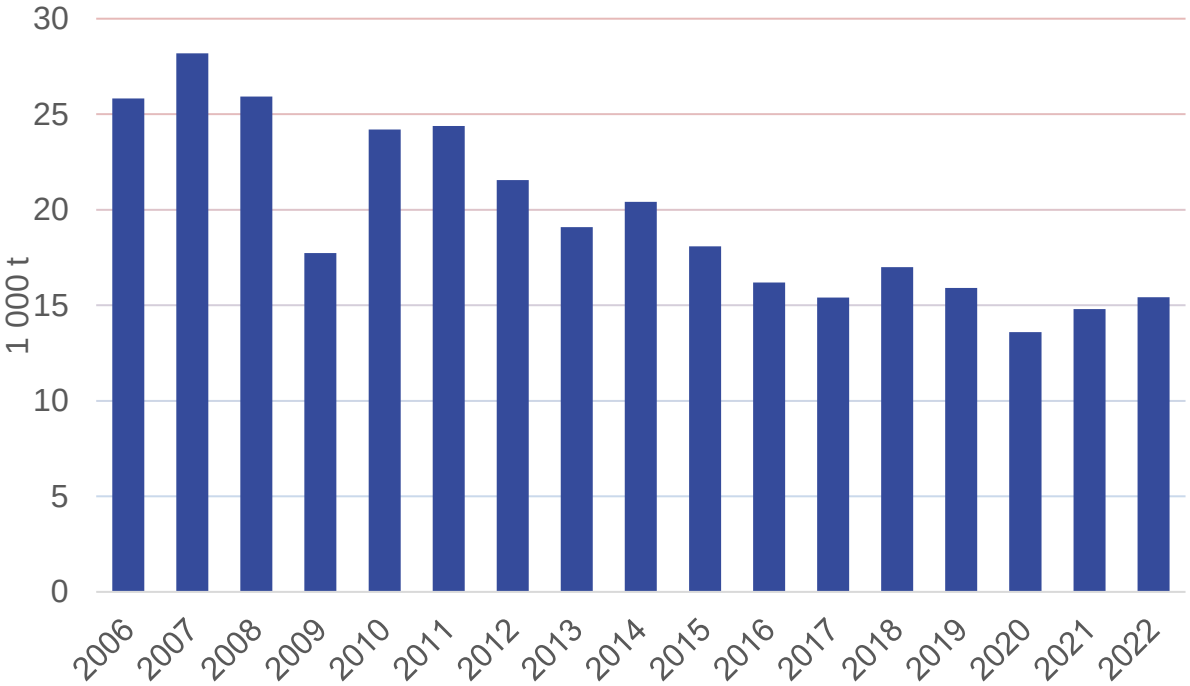


Figure 2: Swiss Non-Ferrous Casting Production (volume)



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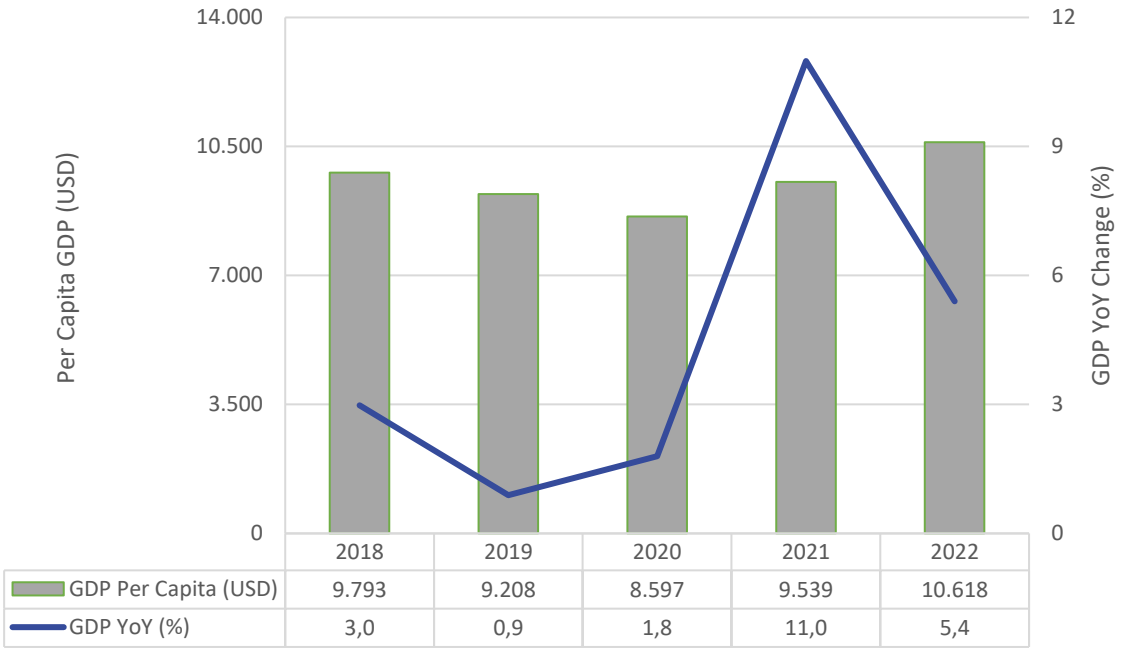
Macroeconomic Developments

Turkish economy grew by 5.6% in 2022, mostly supported by the domestic demand on the back of accelerating private consumption. The contribution of the investments remained very limited despite the government's ambition. As a result of a stronger trend in aggregate demand than aggregate supply, inventories posted the highest depletion of all time.

On the production side, the total contribution of industry, construction, and agriculture was almost equal to zero whereas the broad-based services sector especially on trade, transportation, and accommodation was the main driver of growth, thanks to strong tourism season and financial and insurance activities.

Net exports showed a weaker contribution to annual growth due to both slow-down in exports led by poorer external demand and real appreciation of the currency, and acceleration in imports on top of robust domestic demand.

Figure 1: Gross Domestic Product and Gross Domestic Product Per Capita

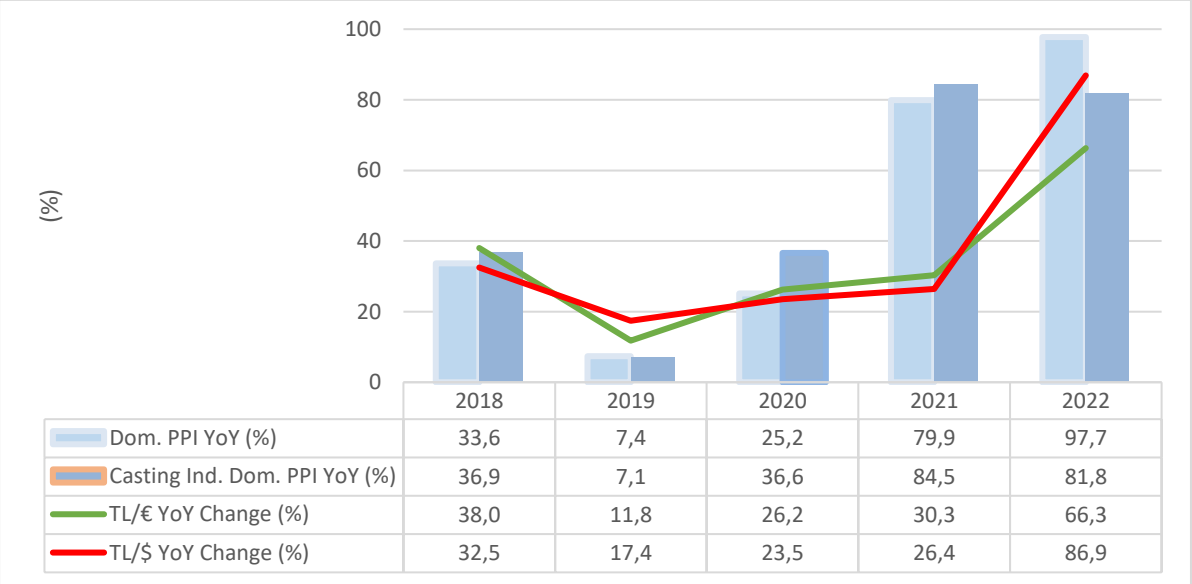


	2018	2019	2020	2021	2022
GDP Per Capita (USD)	9.793	9.208	8.597	9.539	10.618
GDP YoY (%)	3,0	0,9	1,8	11,0	5,4

[1] The figures for 2022 are the sum of four quarters; subject to be revised when the annual figures will be published.
[2] GDP Per Capita calculation is based on the mid-year populations taken from the annual results of the Address Based Population Registration System.
[3] GDP YoY is calculated by the production approach in chain-linked volume percentage change [2009=100].
Source: Turkish Statistical Institute

In the 12 months leading up to December, the current account posted a 48.8 billion USD deficit. Notably, the ever-increasing energy import bill remained the key drag on the external position; the current account, excluding energy, posted a 910 million USD surplus in December.
After the upside trend at the beginning of the year, economic activity lost dynamism in the second half of the year due to the context of increasing fiscal and monetary stimulus. The relative strength of demand, high commodity prices, and the sharp depreciation of the Turkish Lira in the context of negative interest rates in real terms contributed to keeping inflation at particularly elevated levels (Figure 2).

Figure 2: Producer Price Indices vs Currency Rates

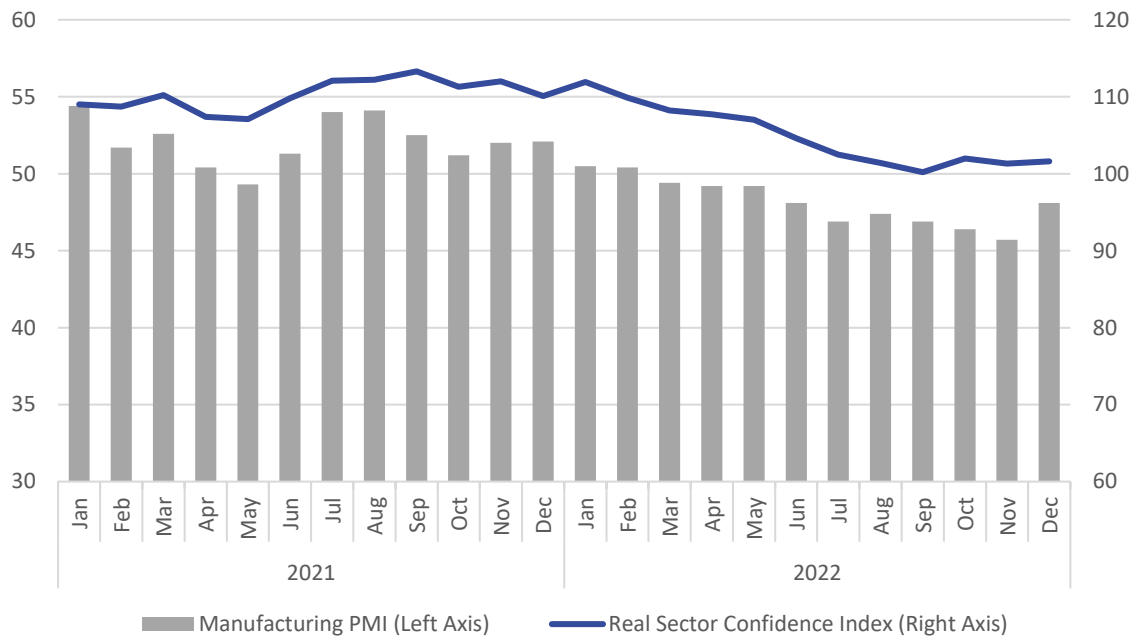


	2018	2019	2020	2021	2022
Dom. PPI YoY (%)	33,6	7,4	25,2	79,9	97,7
Casting Ind. Dom. PPI YoY (%)	36,9	7,1	36,6	84,5	81,8
TL/€ YoY Change (%)	38,0	11,8	26,2	30,3	66,3
TL/$ YoY Change (%)	32,5	17,4	23,5	26,4	86,9

Source: Turkish Statistical Institute

The seasonally adjusted real sector confidence index remained above 100 points level throughout 2022 but gradually decreased until September. Thanks to the rapid rise in the total order index for the last three months, it was at 101.6 at the end of the year (Figure 3).
Manufacturing PMI kept its course below the threshold value for ten consecutive months after February. In the last quarter, while the contraction in new orders and production decelerated, the rise in employment was at the highest level of the last ten months. Supplier delivery times improved in the last month of the year, close to the record in the survey history. Consequently, in December the index reached its highest level since June (Figure 3).

Figure 3: Manufacturing Purchasing Managers' Index vs. Real Sector Confidence Index



[1] Real sector confidence indices are seasonally adjusted.
Source: Turkish Statistical Institute; Central Bank of the Republic of Turkey; Istanbul Chamber of Industry; IHS Markit

The Situation In The Major Casting Customer Industries

In the January-December period of 2022, total automotive production increased by 6% and automobile production increased by 4%, compared to the previous year. In this period, total production was realized as 1,352,648 units and automobile production as 810,889 units. The total domestic market increased by 7% and reached 827,147 units. In this period, the automobile market decreased by 6%, totaling 592,660 units.

In the commercial vehicle group, production increased by 10% in 2022; 26% in the heavy commercial vehicle group, and 8% in the light commercial vehicle group. Compared to 2021, the commercial vehicle market increased by 11%, the heavy commercial vehicle market increased by 24% and the light commercial vehicle market increased by 9% in twelve months period.

Tractor production decreased by 10.7% to 49,541 units.

Despite the slowdown in global markets and the negative impact of EUR/USD parity, Türkiye's exports broke a record and rose to 254.2 billion USD in 2022. In terms of sectors, "Chemicals and chemical products" became the export champion of the year with 33.5 billion USD. The "Automotive" industry ranked second with 31 billion USD and "Ready-to-wear and apparel" sectors ranked third with 21.2 billion USD.

Germany, the USA, Iraq, the United Kingdom, and Italy were the top 5 countries with the highest exports. The countries with the highest export growth were Russia, Iraq, the USA, Germany, and Romania.

General exports to Germany in 2022 were worth 21.1 billion USD, followed by the USA with 16.9 billion USD, Iraq with 13.8 billion USD, the United Kingdom with 13.1 billion USD, and Italy with 12.4 billion USD. The ratio of the first five countries in total exports was 30.4% in 2022.

Based on sub-sectors, Turkish machinery manufacturing export data registered a sustained upward trend in 18 out of 23 sub-segments. "Electric motors and generators" were the product group that exhibited the highest export increase at 55%, which was followed by "Rubber, plastic, and tire

processing machinery" at 34%, "Turbine, turbo jet, and hydraulic systems" at 29%, "Air conditioning and systems" at 26% and "Office machinery" at 25%.
Based on the building permits given by the municipalities in 2022, the number of buildings and dwelling units decreased by 7.9% and 4.2%, respectively. The floor area of buildings also dropped by 3.8%.
The decline in the annual production and domestic sales of the cement industry was 6.6% and 9.3%, respectively. On the contrary, Türkiye's cement export grew by 4.2%.
In 2022, Turkey's steel industry output was 35.1 million tons with a decline of 12.9%. Together with the market contraction due to geopolitical conditions, high energy prices harmed the sector's competitiveness in the international market. Compared to the previous year, steel export decreased by 23.5% to 15.1 million tons in volume and by 15.7% to 13.9 billion USD in value.
The Turkish Electricity Transmission Corporation (TEİAŞ) reported an increase of 4.2% in the installed electricity capacity in 2022, which rose from 99,609 to 103,757 megawatts, as compared to the previous year. The highest contribution to this growth was from renewable energy sources.
Production in the white goods sector recorded a decrease of 3.6% in 2022; with a slight decrease of 0.6% in the export volume.

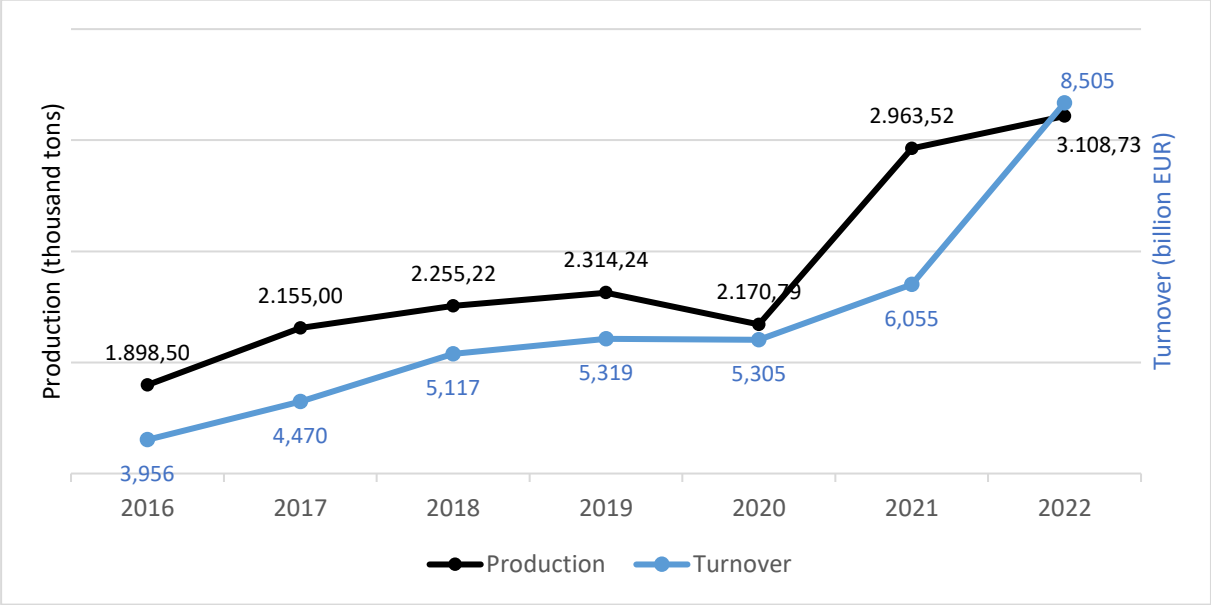
Developments In the Foundry Industry

Industry Overview

The Turkish metal casting industry experienced a growth of 4.9% in 2022, which brought the total production volume to an all-time high level of 3.1 million tons.
Despite the difficulties experienced during the first period of the pandemic, the industry's performance had been exceptionally well in 2021, thanks to the remarkable resilience and adaptability of the industry, together with its geographic advantage. This innovative approach and investments were also maintained in 2022 and despite the recessionary pricing and the negative impact of the USD/EUR cross-currency, along with the global challenging developments, Türkiye's metal casting export grew by 9% year-on-year to 6.4 billion EUR, with the export volume reaching to 2.2 million tons (Figure 4).

Growth was mainly driven by increases in non-ferrous castings production, which grew nearly 13% to 740 thousand tons from around 650 thousand tons in 2022. On the ferrous side, gray iron casting production fell by 2% to around 900 thousand tons, while nodular iron casting production increased by 7% to nearly 1 million 200 thousand tons.
Together with the effect of high inflation rates, the total production value rose by 41% year-on-year to 8.5 billion EUR. The share of export to total production value reached 75%.
The capacity utilization rate of the Turkish metal casting industry in 2022 was 72.2%, down 1.5% year-on-year. This decline was attributed to the orders for over 30 new production lines on the ferrous casting side and over 100 new production cells on the non-ferrous casting side in Türkiye during the last two years. In 2022 the overall production capacity increased by more than 7% year over the previous year, as these new lines and cells started to be commissioned. For the last 5 years, the Turkish foundries have been making significant machinery investments to meet the increasing castings demand and orders for finished components/spare parts, and to comply with the desired quality criteria. In 2022 the share of capacity investments declined to its pre-pandemic levels (nearly 37% of total investments); yet it has the greatest share, followed by investments in machining (around 26%).

Figure 4: Annual Metal Casting Production Volume and Turnover



Source: TUDOKSAD – Turkish Foundry Association

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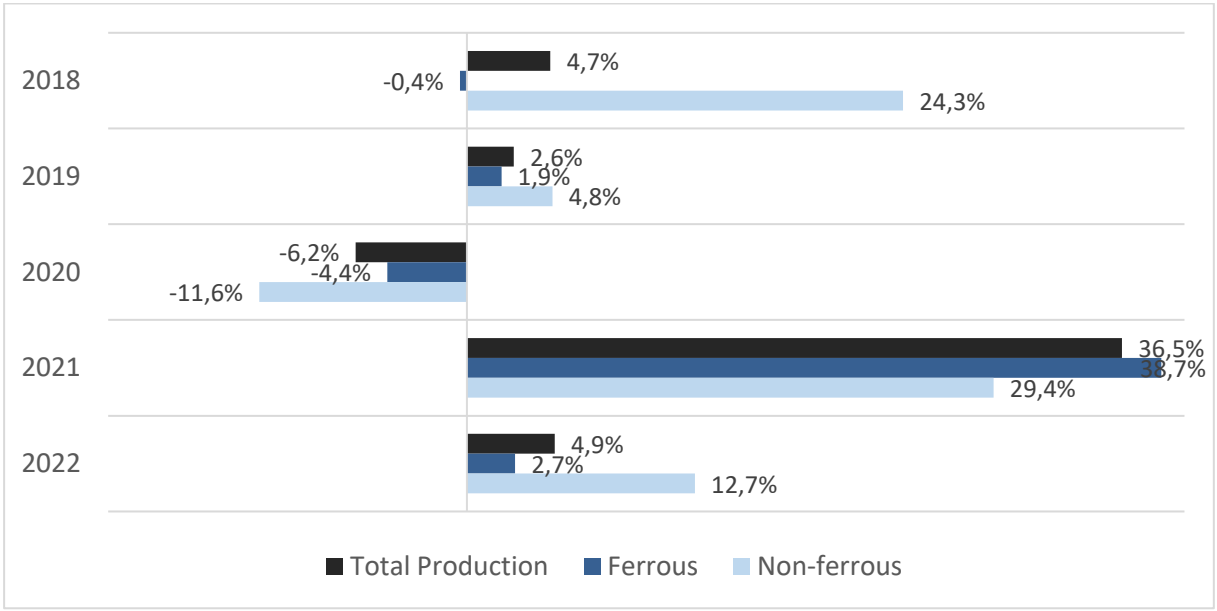
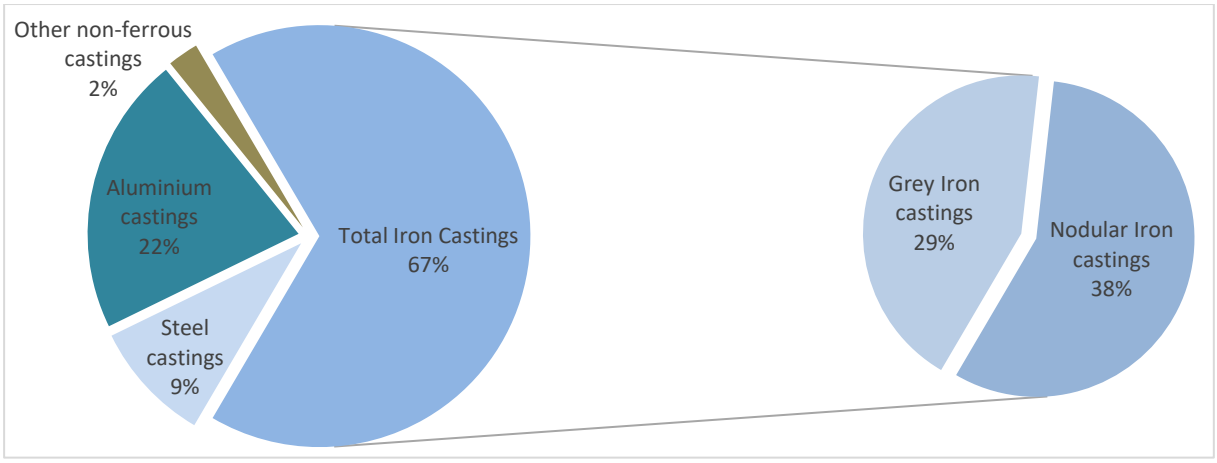
Figure 5: YoY Production Growth



Source: TUDOKSAD – Turkish Foundry Association

Figure 6: Electricity and Natural Gas Prices



Source: TUDOKSAD – Turkish Foundry Association

The Situation in the Material Sectors

Iron Castings

The gray iron castings production nearly remained stable compared to 2021, with a slight decrease of 2% at 901,331 tons, whilst nodular iron castings production increased by 6.5% to 1,178,491 tons. On the other hand, foreign demand presented an opposite pattern; the export ratio of gray iron castings recorded a slight increase from 47.4% to 49.7% in 2022; however, the export volume of nodular iron castings decreased by 1% and the export ratio fell to 76.3%. Capacity utilization was down 1.9 points to 73.9% due to the increased capacity as a result of new investments.

Steel Castings

In 2022, steel castings production reached 290 thousand tons, showing an upward trend of 4%. The main drivers were increased demand from the general machinery sectors, both domestically and especially abroad, and growth trends in the mining and energy sectors. Capacity utilization was stable (-0.6%) and exports increased by nearly 36% to 225 thousand tons and the export ratio rose significantly to 78%.

Aluminum Castings

Aluminum castings production volume, which had been around 650 thousand tons the previous year, increased by 13% to 740 thousand tons in 2022. As a result of the transition to electric and hybrid vehicles, the goal of producing vehicle bodies with fewer components using high-pressure aluminum die-casting techniques creates an extraordinary growth potential for aluminum castings. Thus, high-capacity injection molding machine investments are increasing day by day. In 2022, capacity investments constituted more than half of the total investments for the total non-ferrous castings, which yielded a 14% increase in the total aluminum castings capacity. Consequently, aluminum castings ensured their capacity utilization at around 68%.

Other Non-ferrous Castings

In 2022, the production volume of other non-ferrous metal castings fell by 4.6%. Copper alloys, which accounted for 35% of non-ferrous metal castings other than aluminum, contracted by 27%, while zinc castings increased by 13%. Export volumes fell by 17% overall, with exports of copper alloys almost halving, while zinc exports grew by 32%.

Figure 7: Turkish Ferrous Casting Production (volume)

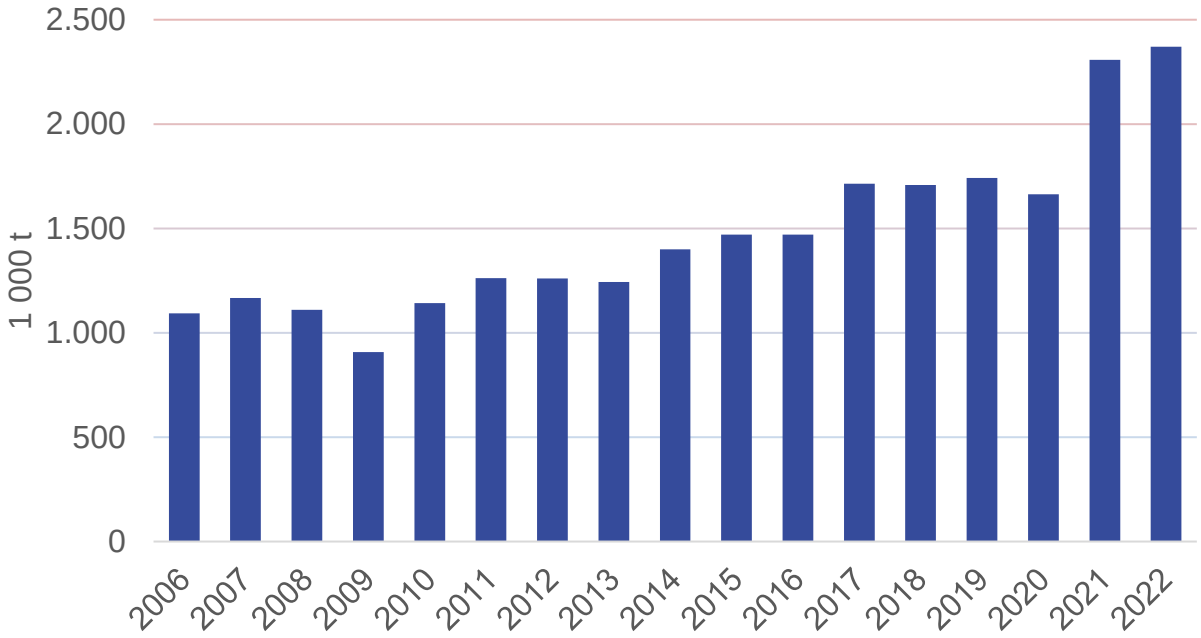
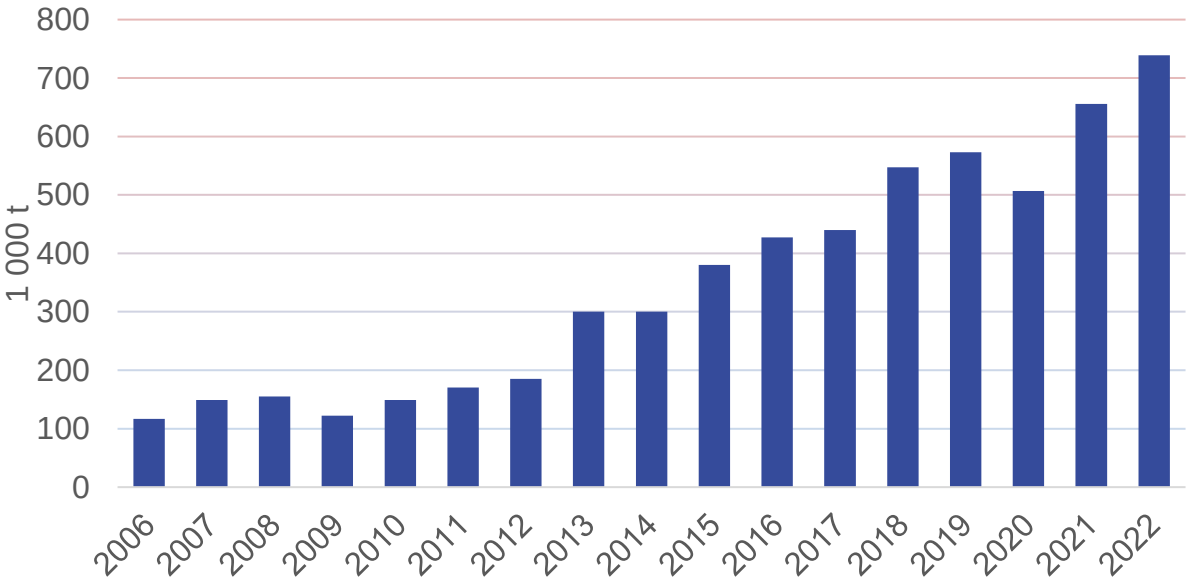


Figure 8: Turkish Non-Ferrous Casting Production (volume)



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Economic Situation

The gross domestic product of the United Kingdom in 2022 increased to just over 2.2 trillion pounds compared to 2021. This was an increase of 86.3 billion pounds compared with 2021 (1).

The UK economy continued to experience dragging factors arising as a result of the Covid-19 pandemic, while many businesses also cited problems with trading with the EU, caused by new regulations and associated paperwork following the decision to vote to leave the EU in 2016, although the scale of the impact was lessening as more businesses became better skilled at complying with rules trading with the EU and other nations globally.

The turmoil caused by decisions of the UK Government in September 2022 with its mini budget has had knock-on effects that affected the overall performance for the year, as any marginal growth that had been made was set back by unfunded budgets and promises. As a result of actions taken by the current Chancellor and Government, the UK narrowly avoided going into recession at the end of the year, but there have been impacts on borrowing costs and inflation (in addition to the war in Ukraine and global energy prices), with trading on stocks and shares impacted and taking time to recover.

In 2022, UK manufacturing was worth £183 billion pounds to the UK economy, employing slightly more than 2.5 million people. Wages remained strong due to a number of factors including the war in Ukraine, energy and food inflation, forcing employers to have to pay more to counter cost of living issues and to be able to retain personnel. Wages in the manufacturing sector were 12 per cent higher than those for the whole economy.

With the average wage in the manufacturing sector being £37,277 pounds (compared with the UK average of £31,447 for the whole economy (all industries and services and before taking into account last minute salary increases in December) and circa £31 billion pounds in investment (2), the picture for manufacturing in 2022 is almost identical to 2021 (3). This reflects the general lack of growth in the UK economy in 2022, as the UK narrowly avoided recession.

Manufactured goods accounted for 51 per cent of the UK's exports in 2022, with metals accounting for 7.7 per cent. Metals accounted for 10 per cent gross value added. Overall the manufacturing sector accounted for 64 per cent of research and development expenditure in the UK, with metals contributing two per cent of the overall figure (2). Manufacturing therefore continued the trend of being the leading sector for research and development. Manufacturing accounted for 15 per cent of all business investment in the UK in 2022.

The UK exports globally, with the top destination countries being the United States (£43.2bn), Germany (£32.4bn), the Republic of Ireland (£21.6bn) and the Netherlands (£19.7bn) (2).

Many sectors within UK manufacturing saw a decrease in new recruits with most sectors struggling to recruit, other than in the hi-tech industries. Heavy traditional manufacturing saw many struggles to recruit personnel to replace those leaving or retiring. Overall, in the second half of the year, the UK employment rate for August to October 2022 increased by 0.2 percentage points on the quarter to 75.6%, but this remained below pre-coronavirus (COVID-19) pandemic levels. Over the latest quarter, the number of employees increased, while self-employed workers decreased. By the end of the year the UK unemployment rate was estimated at 3.7 per cent, 0.2 percentage points higher than the previous three-month period and 0.3 percentage points below pre-coronavirus levels. The UK employment rate was estimated at 75.6 per cent, largely unchanged compared with the previous three-month period and 1.0 percentage point lower than before the coronavirus pandemic. The UK economic inactivity rate was

estimated at 21.5 per cent, 0.1 percentage points lower than the previous three-month period and 1.3 percentage points higher than before the coronavirus pandemic (4).

Labour remained tight in the UK with employers across all sectors struggling to recruit and some suffering quite pronounced skills shortages. The restrictions on freedom of movement as a result of the UK leaving the EU impacted on the ability of businesses to recruit workers from overseas and this impacted on the ability to fill vacancies.

The number of people who were 'economically inactive' and not adding to work or the UK GDP, remained stubbornly high with only little movement, of around 0.2 percentage points, to 21.5 per cent during quarter 3 of 2022, compared with the quarter from August to October 2022. The decrease in economic inactivity during the latest three-month period was driven by those aged 50 to 64 years. Looking at economic inactivity by reason, the quarterly decrease was driven by those inactive because they were retired (5). The effects of the Covid-19 pandemic included changes to where people wished to work and more people seeking to leave work, as well as an increase in people not looking for work or entering further/higher education.

As companies sought to reduce their operating costs by not replacing personnel who had left or by investing in increased levels of automation, the number of vacancies advertised by businesses reduced. Although the vacancy levels progressively dropped throughout the year, the overall number of vacancies in the UK reached record levels. The UK Office for National Statistics reported that in September to November 2022, the estimated number of vacancies fell by 65,000 on the quarter to 1,187,000. The fall in the number of vacancies reflects uncertainty across industries, as respondents continue to cite economic pressures as a factor in holding back on recruitment.

Political Uncertainty: The Effect on Manufacturing

September 2022 minibudget

In what was described by the UK Government as 'necessary to get the UK economy moving again to promote growth and investment' the then Chancellor of the Exchequer produced a mini budget, which was stated as a new way and a new approach for a new era. The government believed it would inject extra life and growth into the UK. Unfortunately, it had the reverse effect with the Bank of England launching an immediate emergency £65bn bond-buying program to stem the crisis triggered by the unfunded growth plan, which put entire pension funds at risk of insolvency. UK Government borrowing rose sharply by almost 1 per cent before the Bank of England actions. The effect of the budget increased the cost of borrowing for business and also impacted on food inflation. The British pound fell against the dollar and other major global currencies to record low levels and the stock market also saw some of the biggest falls on record as investors became wary of buying shares in the UK (6).

As a direct result of the actions of the Chancellor and then Prime Minister, there was further political upheaval as the Conservative Party chose their third leader and UK Prime Minister within seven weeks in quarter 3. A further budget was produced rolling back on several of the plans and pledges within the previous budget, which, while it settled the markets, left the cost of borrowing high in the UK and interest rates have continued to rise every month since the start of the year when it was 5.46 per cent, peaking at 11.05 per cent in October before reducing to 10.53 per cent in December. Thus left the annual rate of inflation increase at 9.07 per cent. These were the highest inflation rates seen in the UK for 40 years.

It was expected that, due to the costs of energy, food and the war in Ukraine, inflation would continue to rise during 2023, and that the Bank of England would have to push the base interest rate up to record levels not seen in over 20 years in the UK, in order to help combat inflation.

Strategy for Manufacturing

With the advent of an increase in the use of technology and automation, coupled with the emergence of the decarbonising agenda, the UK Government has, for a number of years, focused its attention towards these areas for the UK. This has detracted from the importance of general manufacturing in the UK and the need for a clear strategy required to support it.

While saying it wants to boost green jobs, most jobs in the UK have been for the assembly and installation of items such as wind turbines. The UK has been lacking in progress towards electric

vehicles and decarbonisation of housing, which is having the effect of increasing imports of components and whole articles into the UK.

Foundry Industry

2022 was a mixed but improved picture compared with 2021 for UK foundries. To the best of the Cast Metals Federation's knowledge, there were 5 foundry closures and no new foundries opened. Three of the closures were of small to medium sized ferrous foundries; one magnesium high pressure diecasting business closed due to moving its work overseas and one small non-ferrous foundry closed. Two of the closures were deemed as being due to competition from others. This was the same number as the previous year and the smallest number since 2014.

Overall CMF members reported increased order books compared with 2021 across all sectors although for those who produced for the automotive car sector, especially in aluminium foundries, the impact of silicon chip shortages and reduced range of vehicles offered by manufacturers as a result did mean significantly reduced work for some throughout the year. Those foundries producing parts for commercial vans and large goods vehicles as well as for the rail sector all reported very strong order books. Throughout the year CMF members reported that order books were strong with a lot of enquiries but in a large proportion of cases, the time from quoting to either receiving an order or a rejection were increasing. Where orders were placed, there was an increase in technical parts required for projects where exacting standards would need to be met and a lot of quality systems work plus approvals of products by testing required before full production could commence. The increase in enquiries was proving to be challenging for sales teams as a result.
CMF members experienced an increase in enquiries from companies seeking to re-shore back to the UK for a variety of reasons including technical competence and closer proximity to the customers, such that a reduction in transport costs, time and carbon emissions could be achieved by the customers. This was reported to be across many sectors. The CMF office itself reported an increase in people looking to purchase from UK foundries from only one or two enquiries a month to three to four enquiries per week. The largest volume of enquiries the CMF received were for parts to be in non-ferrous metals including aluminium and brass, for a wide range of domestic and none-traditional sectors such as kitchen ware, decorative lighting and leisure products. This was followed by iron and steel across the more traditional industries such as automotive or machinery components.

Overall tonnages produced for the UK in 2022 were approximately 5.4 per cent higher than in the previous year. It was a mixed picture between ferrous and non-ferrous production, with ferrous production up circa 11 per cent on 2021, while non-ferrous production tonnages were approximately 15 per cent lower. The higher production in ferrous castings came from foundries producing products for light and heave commercial vehicles, the rail sector and general engineering. Non-ferrous foundries, especially in light alloys were impacted by reduced production for the automotive sector as well as for the aerospace sector, especially in the first three quarters of the year. As with other European countries, record prices on energy prices, significant raw materials cost increases did place pressure on employers to review operating costs and investment. The cost-of-living situation with inflation and Bank of England interest rate rises further added pressure as employees sought greater pay. The UK saw an increase in the National Minimum wage for all workers and as a result skilled long serving employees sought increases in pay to maintain the difference between themselves and non-skilled new recruits to businesses. Foundries reported that due to difficulties in getting fresh workers to even apply for roles, their starting pay had had to increase beyond the minimum level, but that in many cases it was still a struggle to recruit. Salaries was identified as one of, but not the only, reason for the problems in growing the UK foundry workforce.

Hidden costs of recruitment, such as having people start employment then almost immediately leave, were identified, as the costs of providing the necessary inductions, training and correct standard of personal protective equipment and respiratory respective equipment also increased. With personnel leaving businesses in traditional manufacturing, either due to retirement or a change in willingness to work longer hours in a 'harsher environment' such as a foundry, this has resulted in a skills shortage with foundries regularly advertising for recruits for both semi-skilled, skilled and hi-tech roles within operations as well as struggling to find replacements for office work and management positions. More

foundries also reported people failing to turn up for interviews or commenting that they had looked their businesses up beforehand, but as soon as they were shown to the shopfloor, they decided the work was not for them.

Costs and Raw Materials Prices

Throughout 2022, CMF members reported that some costs were increasing, particularly around energy but also for some consumables, as a few industry suppliers closed, therefore reducing availability of certain products. Other aspects, including logistics, improved with regards to the availability of shipping containers, but costs associated with paperwork for exporting had increased due to the UK leaving the EU. Prices for raw materials, including IPA, stabilized throughout the year but failed to fall in general due to the costs of manufacture and shipping faced by the suppliers. This was a continuation of cost pressures seen in 2021. By the end of the year a number of metals had significantly increased in cost (aluminum, nickel, chromium) and alloying elements for ferrous metals also increased but at a lower rate than in 2021. The availability of scrap metal, such as aluminum due to less vehicle scrappage, and from other scrap sources had improved as more vehicles were scrapped, but overseas prices for scrap continued to see large volumes shipped out of the UK and was driving up prices internationally and having an impact on the UK secondary smelters, who in turn had to pass the costs onto the foundries. Several members reported that by Q3 conventional quoting models and price escalators were no longer working due to the ever-changing prices; prices were only being held on quotes for a matter of days in some cases.

At a time when business expenses for both foundry and supplier members were increasing, in a small number of cases customers were reported to be seeking price reductions, and even significant reductions in a few instances. Quarters 3 and 4 of 2022 saw significant increases in energy costs for some members and a small number reported being subjected to penalties for not taking the amount of power agreed in their contracts (‘take or pay’ clauses being invoked). Members of the CMF’s Cost Advisory Committee reported an overall increase in energy costs for the year as 10.17 per cent. Individual members coming out of fixed term contracts in the last quarter of the year reported increase of up to 160 per cent compared to their previous contracts. Insurance costs rose for a few and increases in wage costs in the devolved nations also impacted some members.

To help with the costs of energy, the UK Government continued to offer subsidies and assistance to businesses via a refresh of the Energy Intensive Industries scheme and with the addition of a new scheme ETII (Energy and Trade Intensive Industries). However, both schemes were primarily focused towards local businesses in hospitality, leisure and retail or for domestic markets. The thresholds that were set for prices at which assistance would kick in were not reflective of the volatility in the energy markets, such that for most businesses (such as foundries that compete on the international market) their prices paid per Mega Watt hour would not trigger any assistance payments via the schemes. As a result, the UK foundry industry, like many others, continued to be at the mercy of the wholesale market and broker trading of energy. This continued to impact on foundries who were advised to get into longer term contracts due to concerns over increasing prices and were then unable to renegotiate reductions in their energy costs, when energy market prices subsequently reduced.

The CMF established a new Advisory Panel on net-zero to help the industry transition towards the UK Government’s 2050 target for achieving net-zero and published a roadmap for UK foundries to help aid them in this journey (8). Waste disposal costs and the availability of landfill has become a concern for some foundries depending upon their geographic location in the UK, with some landfill sites not taking waste sands at least partially and, in some cases, completely. This is therefore increasing transport costs for tackling wastes as well as gate costs at waste transfer stations or landfill sites. The Cast Metals Federation has therefore become a partner in a project led by the UK Transforming Foundations Industry network, working with foundries and a number of UK universities to help establish better classification of spent foundry sands and investment casting shells, with the aim to find alternative uses for the spent sands and shells to prevent them from going into landfill.

Outlook for 2023

The industry outlook for 2023 is positive as many UK foundries are reporting significant increases in requests for quotations, both domestically and because of other global effects. The cost of international shipping and an increase in awareness from customers about climate change, combined with the work required by them to reduce their own and their supply chain emissions, were all contributory factors in some reshoring being seen. The situation with shipping containers out of place globally has almost reduced to zero, but the issue of transporting items half-way round the world using heavy fuel oil, continues to be something to be addressed as the world looks towards net-zero. It may be that international shipping costs could rise significantly if offsetting becomes the only short-term viable option. It is believed therefore that a continued review of where products are manufactured, and the transport miles involved will continue to play a part in where items are sourced from. For UK manufacturers of automotive products, the need to ensure that most of the components and assembly is undertaken in the UK, will by default increase the number of companies looking to source a supply of castings closer to home, placing less stress on their available supply and inventory.

For the UK decisions on having battery manufacturing capabilities for electric vehicles in the UK to be able to supply into Europe and some other countries remains a significant concern, for the OEM's but also for the supply chain and the communities that they are located in. A failure to install manufacturing capacity for batteries will present OEM's with challenges as to where vehicles are manufactured. Significant growth in the EV market is expected over the next few years with the UK government setting targets for the transitioning to zero emission cars and vans. The 2035 delivery plan states the UK's aim to be the fastest G7 nation to decarbonise vehicles. Petrol, diesel car and van sales will be phased out by 2030 and all new cars and vans must be fully zero emission at the tailpipe by 2035 (7).

The policy will require significant investment in design of new vehicles and for the manufacture of plant and machinery to make EV's which in turn is expected to offer potential new markets for foundries that will need to manufacture the infrastructure that will manufacture the EV's or produce the tooling that will directly manufacture the EV's as well as contributing castings to the automotive sector for use in EV's both domestic and commercial.

The investment casting sector, which produces a large volume of castings for the aerospace sector remains under pressure, but the situation is easing at a faster pace as more airlines place orders for new aircraft with the key OEM's, especially for mid to long-range aircraft where fuel efficiency towards net-zero becomes a primary concern.
The costs of energy and gas are expected to remain at higher levels than have been seen before and while there is no threat to supply to the UK industry as far as can be foreseen, it nonetheless places pressure on the foundries, particularly where it is not possible to pass these costs onto customers due to contractual agreements in place for cast parts.

Business investment is continuing, albeit at lower levels, as foundries have to consider where monies can best be invested into the kinds of technologies which should lessen their impact on carbon and other emissions, as pressure grows to avoid climate change and meet net-zero targets.

The Cast Metal Federation's members remain optimistic about the longer-term future, with the use of technologies such as 3D core printing, simulation software and other technologies playing a greater role, enabling the production of very complex castings more readily than could have been envisaged just a few years ago. CMF members are also reporting a greater number of enquiries where rapid prototyping is being used in the early stages by customers to get early trials of parts and also to refine the component design. More members report that they are being involved much earlier in the design stage of components to help reduce the time taken to get to production and to help reduce tooling costs before production starts by being able to cut a finalized tool or pattern that is ready for production.

With members expecting to see issues around bringing fresh talent into UK foundries (based on current recruitment concerns across the whole range of jobs available in UK foundries) the CMF and its members are also expecting to see a greater introduction of automation to help with labour shortfalls and to assist employees to stay longer in the workplace as the current workforce ages. However, the pace at which this may occur varies due to the individual makeup and floor plan of each foundry and the

level of expertise within each foundry. Where automation is put into place, this is expected to lead to upskilling of the UK workforce, which not only benefits those at work personally, but also is in-line with the UK Government's policy of creating a hi-tech, high value jobs economy.

Sources of Information:

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5. The Guardian - https://www.theguardian.com/uk-news/2022/sep/30/how-kwasi-kwarteng-mini-budget-hit-uk-economy-in-numbers
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7. HM Government - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005301/transitioning-to-zero-emission-cars-vans-2035-delivery-plan.pdf
8. Cast Metals Federation - https://www.castmetalsfederation.com/net-zero-road-map

Figure 1: UK Ferrous Casting Production (volume)

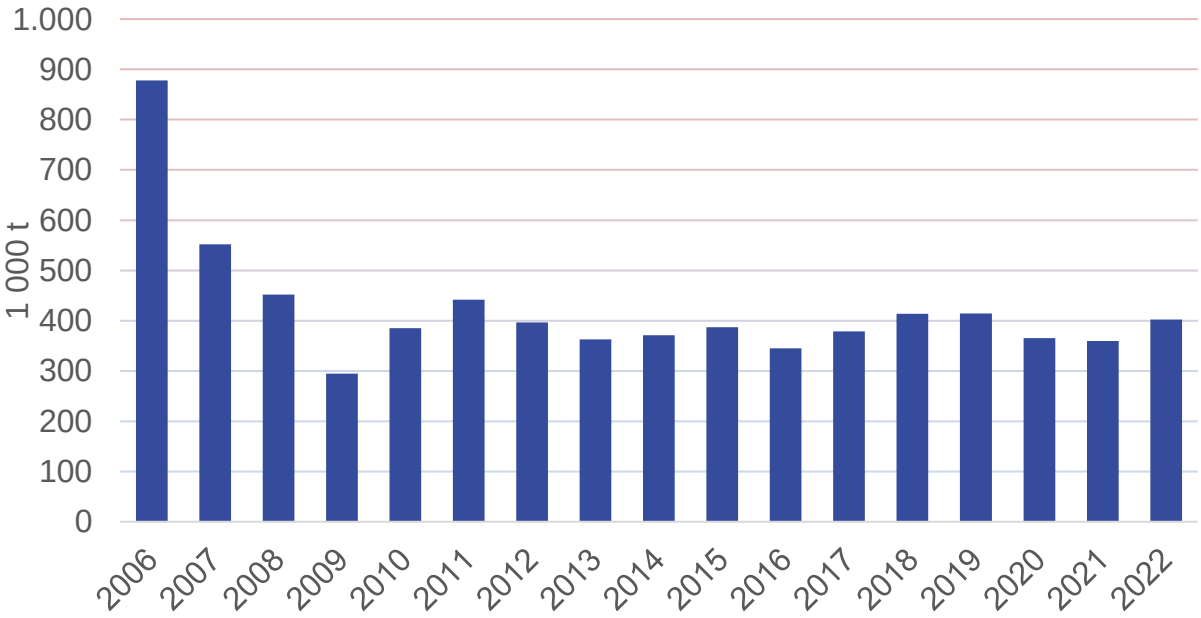
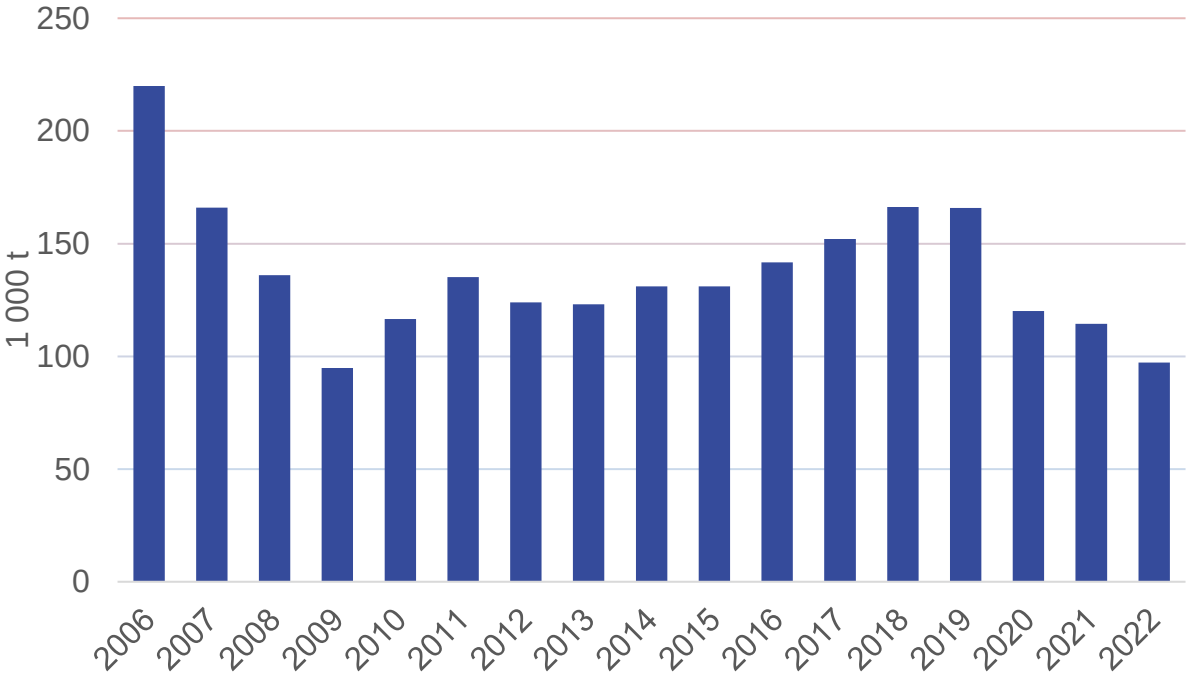


Figure 2: UK Non-Ferrous Casting Production (volume)



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TABLES

IRON, DUCTILE IRON AND STEEL CASTINGS

Table 1
Total production in 1000 t - Iron, Steel and Malleable iron castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	164,2	158,5	134,7	152,3	149,5	13,0	-1,8
Belgium	85,2	67,6	52,4	54,2		3,5	
Bulgaria				42,1	43,7		3,6
Czech Rep.	295,5	268,5	192,5	225,5	222,5	17,1	-1,3
Denmark	91,5	86,9		82,0			
Finland	64,6	57,8	47,1	51,8	52,8	10,0	2,1
France	1.339,9	1.304,3	1.067,4	1.212,4	1.244,4	13,6	2,6
Germany	4.256,2	3.804,9	2.714,8	3.158,4	3.116,4	16,3	-1,3
Hungary	88,3	76,2	76,4	75,2	74,9	-1,6	-0,4
Italy	1.253,1	1.108,9	893,1	1058,8	1.051,0	18,6	-0,7
Norway	31,2	31,2		29,4			
Poland	690,0	655,0	524,0	571,2	485,5	9,0	-15,0
Portugal	145,4	140,4	106,3	120,7	114,3	13,5	-5,3
Slovenia	137,4	177,2	116,7	124,5	112,1	6,7	-9,9
Spain	1.135,7	1.113,3	931,1	1.000,8	1.022,0	7,5	2,1
Sweden	248,6	240,4	197,2	210,4	242,0	6,7	15,0
Switzerland	61,0	26,3	22,8	23,9	25,6	5,0	6,9
Turkey	1.708,2	1.741,2	1.664,0	2.308,0	2.369,9	38,7	2,7
United Kingdom	413,6	414,2	365,6	359,4	402,0	-1,7	11,9
Total CAEF	**12.209,8**	**11.472,8**	**9.106,1**	**10.861,0**	**10.728,7**	**17,6**	**0,3**

Table 2
Production value in Mio. € - Iron, Steel and Malleable iron castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	427,3	431,8	382,4	436,3	511,8	14,1	17,3
Belgium	165,0						
Bulgaria				187,4	196,8		5,0
Czech Rep.							
Denmark							
Finland	203,0	177,7	142,8	154,3	198,8	8,0	28,8
France	2.862,0	2.769,0	2388,4	2758,1	3.434,7	15,5	24,5
Germany a)	7.503,0	6.874,6	5.448,0	6432,9	7.619,0	18,1	18,4
Hungary	235,0	226,0	232,0	247,0	225,0	6,5	-8,9
Italy	2.055,4	1.979,0	1.709,0	2232,0	2.862,0	30,6	28,2
Norway	36,0	36,0					
Poland			816,0				
Portugal	265,5	253,2	210,5	169,2	267,1	-19,6	57,8
Slovenia			136,6	243,3	215,9	78,1	-11,2
Spain	1.949,0	1.913,0	1.731,0	1936,0	2.470,0	11,8	27,6
Sweden							
Switzerland							
Turkey	2.486,6	2.628,2	2.774,4	3347,6	4.670,7	20,7	39,5
United Kingdom	1.944,0	1.950,0	2.340,0	2.200,0	2.240,0	-6,0	1,8
Total CAEF	**20.131,8**	**19.238,6**	**18.311,2**	**20.344,1**	**24.911,8**	**15,2**	**22,5**

a) foundries > 50 employees, turnover

Table 3
Number of foundries (Production units) - Iron, Steel and Malleable iron castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	15	15	15	15	15	0,0	0,0
Belgium	13	13	13	13	13	0,0	0,0
Bulgaria				39	37		-5,1
Czech Rep.	71	71	70	69	69	-1,4	0,0
Denmark	8	8					
Finland	16	18	16	15	15	-6,3	0,0
France							
Germany	239	232	225	220	220	-2,2	0,0
Hungary	29	39			32		
Italy	a) 185	a) 172	172	176	171	2,3	-2,8
Norway	5	5					
Poland	215	215	216	216	216	0,0	0,0
Portugal	31	31	31	31	30	0,0	-3,2
Slovenia	13	11	11	10	10	-9,1	0,0
Spain	75	71	74	74	74	0,0	0,0
Sweden	38	36	36				
Switzerland	17	15	15	13	14	-13,3	7,7
Turkey	546	550	556	564	570	1,4	1,1
United Kingdom	210	207	202	197	194	-2,5	-1,5
Total CAEF	**1.726**	**1.709**	**1.652**	**1.652**	**1.680**	**-0,2**	**-0,2**

a) including investment casting

Table 4
Employment in the foundry industry - Iron, Steel and Malleables iron castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	2.257	2.215	2.158	2.165	2.218	0,3	2,4
Belgium	b) 1.757	1.766	1.727	1.633		-5,4	
Bulgaria				2.548	2.439		-4,3
Czech Rep.	11.000	10.500	9.500	9.400	9.000	-1,1	-4,3
Denmark	1.079	1.047					
Finland	1.363	1.264	1.170	995	1.084	-15,0	8,9
France							
Germany a)	42.019	39.675	35.385	34.657	34.985	-2,1	0,9
Hungary	3.850	3.720	3.620	3.506	3.340	-3,1	-4,7
Italy	9.248	9.040	9.432	9.587	9.310	1,6	-2,9
Norway							
Poland	16.000	16.000	11.125	10.600	10.600	-4,7	0,0
Portugal	2.444	2.582	2.181	2.380	2.380	9,1	0,0
Slovenia	1.135	1.110	1.277	1.321	1.355	3,4	2,6
Spain	10.928	11.162	10.808	10.869	10.881	0,6	0,1
Sweden		7.000	7.000				
Switzerland	1.058	1.012	1.012	764	807	-24,5	5,6
Turkey	20.100	20.100	20.500	20.995	21.525	2,4	2,5
United Kingdom	14.600	14.150	13.850	13.700	13.510	-1,1	-1,4
Total CAEF	**138.838**	**142.343**	**130.745**	**125.120**	**123.434**	**-0,9**	**0,0**

a) foundries >50 emp b) only workmen

Table 5
Direct exports total in 1000 t - Iron, Steel and Malleable iron castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				33,4	30,2		-9,7
Czech Rep.							
Denmark							
Finland	21,4	14,5	13,9	16,5	15,9	18,6	-3,4
France	433,2	448,0	384,3	432,1	459,8	12,5	6,4
Germany	1.669,8	1.553,6	1.046,2	1.248,7	1.288,3	19,4	3,2
Hungary	53,2	45,1	64,9	61,5	57,7	-5,2	-6,2
Italy	520,9	488,4	386,6				
Norway	16,1	16,1					
Poland	311,9		253,0	258,5	219,7	2,2	-15,0
Portugal	137,0	128,0	97,7	110,5	99,3	13,0	-10,2
Slovenia					86,7		
Spain	746,8	746,7	621,8	659,4	655,9	6,0	-0,5
Sweden							
Switzerland							
Turkey	1.024,3	1.086,6	981,2	1.456,6	1.572,7	48,5	8,0
United Kingdom							
Total CAEF	**4.934,7**	**4.527,0**	**3.849,5**	**4.277,2**	**4.486,1**	**22,5**	**2,9**

IRON CASTINGS

Table 6
Total production in 1000 t - Iron castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	43,0	42,3	33,4	37,1	38,6	11,1	4,0
Belgium	69,9	55,9	43,0	44,5		3,4	
Bulgaria	29,9			26,3	27,3		4,1
Czech Rep.	176,5	166,5	117,0	140,0	138,0	19,7	-1,4
Denmark	29,6	28,9					
Finland	18,4	18,2	17,3	20,6	20,5	19,2	-0,7
France	597,4	537,2	431,9	503,9	505,6	16,7	0,3
Germany	2.435,6	2.189,0	1.618,7	1.873,7	1.822,8	15,8	-2,7
Hungary	22,0	18,4	16,5	16,3	16,6	-0,9	1,9
Italy	767,6	667,8	534,4	616,2	616,1	15,3	0,0
Norway	8,8	8,8					
Poland	480,0	450,0	360,0	392,4	333,5	9,0	-15,0
Portugal	43,4	41,1	26,1	39,7	35,3	52,1	-11,1
Slovenia	106,5	130,5	59,3	73,2	65,9	23,5	-10,1
Spain	357,6	362,6	283,1	322,8	338,5	14,1	4,9
Sweden	161,7	154,9	126,0	141,7	154,2	12,4	8,8
Switzerland	36,7	9,3	8,4	8,6	9,9	3,1	15,0
Turkey	603,0	614,3	617,3	920,7	901,3	49,1	-2,1
United Kingdom	144,9	144,5	128,4	128,4	136,1	0,0	6,0
Total CAEF	**6.132,6**	**5.640,0**	**4.420,7**	**5.306,1**	**5.160,1**	**19,4**	**-1,9**

Table 7
Production value in Mio. € - Iron castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				94,5	99,2		5,0
Czech Rep.							
Denmark							
Finland	37,7	34,4	31,9	36,1	46,9	13,2	29,7
France							
Germany a,b)	6.348,4	5.721,0	4.519,9	5.511,8	6.661,0	21,9	20,8
Hungary							
Italy							
Norway	11,0	11,0					
Poland			816,0				
Portugal	73,6	68,1	50,7	70,9	76,6	40,0	8,1
Slovenia			108,9	132,4	170,1	21,6	28,5
Spain a)	1.622,0	1.537,0	1.338,0	1.514,0	1.953,0	13,2	29,0
Sweden							
Switzerland							
Turkey	607,3	626,0	765,6	1.028,9	1.387,3	34,4	34,8
United Kingdom							
Total CAEF							

a) incl. nodular and malleable iron c; b) foundries >50 empl., turnover

Table 8
Production of iron castings in 1000 t / subdivided by the major customer industries

Country	Year	1 Pressure pipes and fittings	2 Drain pipes and fittings	3 Building and domestic goods	4 Ingot moulds and bottoms	5 Rolls	6 Eng. Plant and machinery	7 Vehicle industry	8 Any other iron castings	Total iron castings
Austria	2021									37,1
	2022									38,6
	in %									4,0
Belgium	2021									43,0
	2022									44,5
	in %									3,4
Bulgaria	2021		2,2				17,9		6,1	**26,3**
	2022		2,3				13,2		11,9	27,3
	in %		1,8				-26,3		93,9	4,1
Czech Rep.	2021									140,0
	2022									138,0
	in %									-1,4
Denmark	2021									
	2022									
	in %									
Finland	2021					3,3	0,5	1,1	15,7	20,6
	2022					3,0	1,5		15,9	20,5
	in %					-8,1	203,2		1,3	-0,7
France	2021									503,9
	2022									505,6
	in %									0,3
Germany	2021						381,4	1.220,4	226,9	1.873,7
	2022						379,6	1237,8	205,4	1822,8
	in %						-0,5	1,4	-9,5	-2,7
Hungary	2021									16,3
	2022									16,6
	in %									1,9
Italy	2021			32,1	14,0		328,0	186,0	56,1	616,2
	2022			29,4	13,3		329,7	185,6	58,1	616,1
	in %			-8,4	-5,2		0,5	-0,2	3,6	0,0
Norway	2021									
	2022									
	in %									
Poland	2021									392,4
	2022									333,5
	in %									-15,0
Portugal	2021		1,1	1,1			1,1	33,9	2,6	39,7
	2022		0,9	1,9			1,2	29,1	2,1	35,3
	in %		-22,0	68,2			3,4	-14,2	-21,0	-11,1
Slovenia	2021									73,2
	2022									65,9
	in %									-10,0
Spain	2021	2,0		16,1			46,7	250,3	7,8	322,8
	2022	1,6		19,0			37,3	274,9	5,7	338,5
	in %	-21,9		17,9			-20,1	9,8	-26,6	4,9
Sweden	2021									141,7
	2022									154,2
	in %									8,8
Switzerland	2021									8,6
	2022									9,9
	in %									15,3
Turkey	2021	22,5	21,5	111,4	37,5	27,1	351,1	284,5	65,2	920,7
	2022	18,2	17,3	108,4	33,3	24,2	353,0	287,8	59,1	901,3
	in %	-19,0	-19,8	-2,7	-11,2	-10,6	0,5	1,2	-9,4	-2,1
United Kingdom	2021									128,4
	2022									136,1
	in %									6,0

Table 9
Number of foundries (Production units) - Iron castings (incl. nodular and malleable castings)

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	12	12	12	12	12	0,0	0,0
Belgium	5	5	5	5		0,0	
Bulgaria				29	28		-3,4
Czech Rep.	56	56	55	54	54	-1,8	0,0
Denmark	8	8					
Finland	11	11	11	11	11	0,0	0,0
France							
Germany a)	150	144	140	134	134	-4,3	0,0
Hungary	27	27	27	27	27	0,0	0,0
Italy	147	134	134	136	136	1,5	0,0
Norway	5	5					
Poland	180	180	180	180	180	0,0	0,0
Portugal	23	23	23	23	22	0,0	-4,3
Slovenia		11	8	7	7	-12,5	0,0
Spain	46	42	43	43	42	0,0	-2,3
Sweden	26	25					
Switzerland	15	13	13	10	11	-23,1	10,0
Turkey	441	443	447	452	455	1,1	0,7
United Kingdom							
Total CAEF	**1.152**	**1.139**	**1.098**	**1.123**	**1.119**	**-0,4**	**0,1**

a) foundries >50 employees

Table 10
Employment in the foundry industry - Iron castings (incl. nodular and malleable castings)

Country	2017	2018	2019	2020	2021	2020/19 in %	2021/20 in %
Austria							
Belgium							
Bulgaria							
Czech Rep.							
Denmark	1.095		1.047				
Finland	741	800	724	645	629	-10,9	-2,5
France							
Germany a)	35.006	35.398	34.096	29.496	29.276	-13,5	-0,7
Hungary				3450	3.340		-3,2
Italy	6.869	6.990	6.736	7.119	7.256	5,7	1,9
Norway	640						
Poland	12.500	12.500	12.500	8.010	7.400	-35,9	-7,6
Portugal	1.815	1.848	2.064	1.684	1.861	-18,4	10,5
Slovenia			1.110	1.066	1.120	-4,0	5,1
Spain	8.752	8.600	8.800	8.182	8.199	-7,0	0,2
Sweden							
Switzerland		951	910	910	527	0,0	-42,1
Türkiye	14.000	13.600	13.600	13.875	14.225	2,0	2,5
United Kingdom							
Total CAEF	**81.418**	**80.687**	**81.587**	**74.437**	**73.833**	**-11,9**	**-0,8**

a) foundries >50 employees

Table 11
Direct exports total in 1000 t - Iron castings (incl. nodular iron castings)

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				30,0	26,9		-10,2
Czech Rep.							
Denmark							
Finland	18,5	12,9	11,9	15,2	15,6	28,0	2,4
France	409,4	429,2	371,2	418,7	446,0	12,8	6,5
Germany a)	1.589,0	1.455,2	978,2	1.179,4	1.218,3	20,6	3,3
Hungary			64,9	61,5		-5,2	
Italy							
Norway	16,1	16,1					
Poland	295,0		237,0	258,5	219,7	9,1	-15,0
Portugal	133,3	124,3	94,6	107,4	95,3	13,5	-11,3
Slovenia							
Spain a)	696,4	693,0	569,6	603,1	594,6	5,9	-1,4
Sweden							
Switzerland							
Turkey	875,8	936,8	862,0	1.291,2	1.348,0	49,8	4,4
United Kingdom							
Total CAEF	**4.033,5**	**3.667,5**	**3.189,5**	**3.964,9**	**3.964,4**	**23,4**	**1,6**

a) incl. malleable iron castings

DUCTILE IRON CASTINGS

Table 12
Total production in 1000 t - Ductile iron castings (Nodular and Malleable iron castings)

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	109,7	104,7	91,7	104,8	104,1	14,3	-0,7
Belgium	7,8	5,1	3,9	4,5		14,4	
Bulgaria				11,0	11,6		5,2
Czech Rep.	57,0	50,0	34,5	41,0	40,5	18,8	-1,2
Denmark	61,9	58,1					
Finland	36,2	29,3	23,1	25,5	27,1	10,4	6,0
France	682,1	711,4	593,6	665,5	691,1	12,1	3,8
Germany	1.636,0	1.433,7	957,1	1.140,9	1.126,5	19,2	-1,3
Hungary	63,4	55,6	58,0	57,2	56,6	-1,3	-1,1
Italy	428,6	381,3	300,6	385,9	376,0	28,4	-2,6
Norway	22,3	22,3					
Poland	160,0	155,0	124,0	135,2	114,9	9,0	-15,0
Portugal	96,8	94,4	76,1	76,6	73,7	0,6	-3,8
Slovenia	46,6	46,7	39,8	47,4	42,0	19,2	-11,5
Spain	711,6	663,0	582,8	608,8	606,2	4,5	-0,4
Sweden	64,0	62,0	51,0	47,5	65,9	-6,8	38,7
Switzerland	22,1	14,7	11,9	12,9	13,1	8,4	1,8
Turkey	912,9	934,4	854,7	1.108,1	1.178,5	29,6	6,4
United Kingdom	219,5	220,5	195,6	195,6	228,7	0,0	17,0
Total CAEF	**5.338,5**	**5.042,3**	**3.998,4**	**4.668,2**	**4.756,4**	**16,5**	**2,0**

Table 13
Production value in Mio. € - Ductile iron castings (Nodular and Malleable iron castings)

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				43,8	46,0		5,0
Czech Rep.							
Denmark							
Finland	89,2	71,5	52,0	63,0	83,8	21,2	33,1
France							
Germany a)							
Hungary							
Italy	1.602,6				2358,0		
Norway	25,0	25,0					
Poland							
Portugal	150,4	143,5	121,7	129,5	144,6	6,4	11,7
Slovenia							
Spain a)							
Sweden							
Switzerland							
Turkey	1.304,5	1.382,5	1.401,2	1.665,9	2.462,9	18,9	47,8
United Kingdom							
Total CAEF							

a) contained in: Tab. 7

Table 14
Production of Ductile iron castings (Nodular and Malleable iron castings) in 1000 t subdivided by the major customer industries

Country	Year	1 Pressure pipes and fittings	2 Eng. plant and machinery	3 Vehicle industry	4 Any other nodular iron castings	Total nodular iron castings
Austria	2021					104,8
	2022					104,1
	in %					-0,7
Belgium	2021					3,9
	2022					4,5
	in %					14,4
Bulgaria	2021	2,2	5,2		3,5	11,0
	2022	2,3	4,8		4,5	11,6
	in %	1,8	-9,0		28,2	5,2
Czech Rep.	2021					41,0
	2022					40,5
	in %					-1,2
Denmark	2021					
	2022					
	in %					
Finland	2021		6,1		19,5	25,5
	2022		4,7		22,4	27,1
	in %		-23,5		14,8	6,1
France	2021					665,5
	2022					691,1
	in %					3,8
Germany	2021		424,5	428,0	246,5	1.099,0
	2022		405,8	477,3	243,4	1.126,5
	in %		-4,4	11,5	-1,2	2,5
Hungary	2021					57,2
	2022					56,6
	in %					-1,1
Italy	2021	42,1	213,1	109,6	21,1	385,9
	2022	43,1	205,3	107,5	20,1	376,0
	in %	2,4	-3,6	-2,0	-4,7	-2,6
Norway	2021					
	2022					
	in %					
Poland	2021					135,2
	2022					114,9
	in %					-15,0
Portugal	2021	7,9	0,8	66,3	1,6	76,6
	2022	6,5	0,6	62,7	3,9	73,7
	in %	-17,3	-19,0	-5,5	136,5	-3,8
Slovenia	2021					47,2
	2022					42,0
	in %					-11,1
Spain	2021	135,2	162,8	293,1	17,7	608,8
	2022	133,1	141,6	319,9	11,7	606,2
	in %	-1,6	-13,0	9,1	-34,2	-0,4
Sweden	2021					47,5
	2022					65,9
	in %					38,7
Switzerland	2021					12,9
	2022					13,1
	in %					1,9
Turkey	2021	137,8	370,8	462,5	137,0	1.108,1
	2022	136,8	392,9	487,0	161,9	1178,5
	in %	-0,7	5,9	5,3	18,1	6,4
United Kingdom	2021					195,6
	2022					228,7
	in %					16,9

STEEL CASTINGS

Table 15
Total production in 1000 t - Steel castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	11,4	11,4	9,6	10,3	6,8	7,7	-34,1
Belgium	7,5	6,6	5,5	5,3		-3,7	
Bulgaria				4,9	4,7		-2,7
Czech Rep.	62,0	52,0	41,0	44,5	44,0	8,5	-1,1
Denmark							
Finland	10,1	10,4	6,7	5,7	5,3	-15,1	-5,9
France	60,4	55,7	41,9	43,1	47,8	2,8	10,9
Germany	184,7	178,2	138,0	143,8	167,1	4,2	16,2
Hungary	2,8	2,2	2,0	1,7	1,7	-15,8	2,6
Italy	56,9	59,9	58,0	56,8	58,9	-2,1	3,8
Norway							
Poland a)	50,0	50,0	40,0	43,6	37,1	9,0	-15,0
Portugal	5,3	4,9	4,1	4,4	5,4	6,7	22,0
Slovenia	2,1		17,6	3,8	4,3	-78,3	12,1
Spain	66,6	71,4	65,3	69,2	77,3	6,0	11,8
Sweden	22,9	23,5	20,2	21,2	21,9	5,0	3,3
Switzerland	2,3	2,3	2,5	2,4	2,5	-5,0	5,1
Turkey	192,4	192,5	192,0	279,3	290,1	45,4	3,9
United Kingdom	49,2	49,2	41,6	35,4	37,1	-15,0	5,0
Total CAEF	**786,5**	**770,2**	**686,0**	**775,3**	**812,1**	**12,3**	**5,5**

Table 16
Production value in Mio. € - Steel castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				49,1	51,5		5,0
Czech Rep.							
Denmark							
Finland	76,1	71,9	59,0	55,2	68,1	-6,4	23,4
France							
Germany a)	1.154,3	1.137,2	945,4	921,1	958,0	-2,6	4,0
Hungary							
Italy	452,8				504,0		
Norway							
Poland							
Portugal	41,6	41,6	38,2	42,9	45,8	12,2	6,9
Slovenia			27,7				
Spain	327,0	376,0	393,0	422,0	517,0	7,4	22,5
Sweden							
Switzerland							
Turkey	574,8	619,7	607,6	652,8	820,5	7,5	25,7
United Kingdom							
Total CAEF	2.626,5	2.246,4	2.070,8	2.143,1	2.965,0	1,1	14,8

a) foundries >50 employees

Table 17
Production of steel castings in 1000 t / subdivided by the major customer industries

Country	Year	1 Eng. plant and machinery	2 Vehicle industry	3 Steel castings for railways, locomotives, carriages, wagons and trams	4 Any other steel castings	Total steel castings
Austria	2021					10,3
	2022					6,8
	in %					-34,1
Belgium	2021					5,3
	2022					
	in %					
Bulgaria	2021	1,0			3,9	4,9
	2022	1,0			3,8	4,7
	in %	-2,0			-2,8	-2,7
Czech Rep.	2021					44,5
	2022					44,0
	in %					-1,1
Finland	2021	0,9	0,7		4,0	5,7
	2022	2,9			2,5	5,3
	in %	218,1			-38,6	-6,6
France	2021					43,1
	2022					47,8
	in %					10,8
Germany	2021	23,0	9,9		110,8	143,8
	2022	24,3	9,5		133,3	167,1
	in %	5,8	-4,0		20,3	16,2
Hungary	2021					1,7
	2022					1,7
	in %					2,6
Italy	2021	9,9	3,0	1,4	42,4	56,8
	2022	33,3	10,1		15,5	58,9
	in %	236,4	237,9	-100,0	-63,4	3,8
Poland	2021					43,6
	2022					37,1
	in %					-15,0
Portugal	2021	2,3	0,3	0,1	1,7	4,4
	2022	1,7	0,3	0,2	3,3	5,4
	in %	-26,9	-2,7	58,3	94,4	22,1
Slovenia	2021					3,8
	2022					4,3
	in %					12,3
Spain	2021	45,5	2,0	15,3	6,4	69,2
	2022	48,7	2,8	23,0	2,9	77,3
	in %	7,0	39,2	50,3	-55,3	11,7
Sweden	2021					21,2
	2022					21,9
	in %					3,3
Switzerland	2021					2,4
	2022					2,5
	in %					5,7
Turkey	2021	113,4	29,5	39,2	97,3	279,3
	2022	115,1	31,3	41,2	102,5	290,1
	in %	1,5	6,0	5,0	5,4	3,9
United Kingdom	2021					35,4
	2022					37,1
	in %					4,9

Table 18
Number of foundries (Production units) - Steel castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	3	3	3	3	3	0,0	0,0
Belgium	8	8	8	8			
Bulgaria				10	9		-10,0
Czech Rep.	28	28	27	27	27	0,0	0,0
Denmark							
Finland	7	7	7	6	6	-14,3	0,0
France							
Germany a)	40	41	39	38	38	-2,6	0,0
Hungary		12		6	5		-16,7
Italy	38	38	38	40	35	5,3	-12,5
Norway							
Poland	35	35	36	36	36	0,0	0,0
Portugal	8	8	8	8	8	0,0	0,0
Slovenia	5		3	3	3	0,0	0,0
Spain	29	29	31	31	32	0,0	3,2
Sweden	12	11					
Switzerland	2	2	2	3	3	50,0	0,0
Turkey	105	107	109	112	115	2,8	2,7
United Kingdom							
Total CAEF	**286**	**320**	**329**	**331**	**320**	**-4,3**	**-0,9**

a) foundries >50 empl.

Table 19
Number of persons employed total - Steel castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				579	546		-5,7
Czech Rep.							
Denmark							
Finland	563	540	525	366	386	-30,3	5,5
France							
Germany a)	6.621	6.657	5.889	5.386	5.110	-8,5	-5,1
Hungary			170	166	130	-2,4	-21,7
Italy	2.258	2.304	2.313	2.331	2.332	0,8	0,0
Norway							
Poland	3.500	3.500	3.115	3.200	3.200	2,7	0,0
Portugal	596	518	497	519	519	4,4	0,0
Slovenia	352		211	201	201	-4,7	0,0
Spain	2.328	2.362	2.626	2.670	2.737	1,7	2,5
Sweden							
Switzerland	107	102	102	237		132,4	
Turkey	6.500	6.500	6.625	6.770	7.000	2,2	3,4
United Kingdom							
Total CAEF	**22.825**	**22.483**	**22.073**	**22.425**	**22.161**	**-1,0**	**-0,1**

a) foundries >50 empl.

Table 20
Direct exports total in 1000 t - Steel castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				3,5	3,3		-5,8
Czech Rep.							
Denmark							
Finland	2,9	1,6	2,0	1,2	0,3	-37,8	-74,3
France	23,8	18,8	13,1	13,5	13,8	2,8	2,8
Germany	80,8	83,6	67,6	69,3	70,0	2,5	1,0
Hungary							
Italy							
Norway							
Poland	16,0	16,0	16,0				
Portugal	3,7	3,7	3,1	3,1	4,0	-1,2	28,1
Slovenia							
Spain	50,4	53,7	52,2	56,3	61,3	7,9	8,8
Sweden							
Switzerland							
Turkey	140,5	149,8	119,2	165,4	224,7	38,8	35,9
United Kingdom							
Total CAEF	**318,1**	**327,2**	**273,2**	**312,2**	**377,3**	**20,1**	**20,8**

NON-FERROUS METAL CASTINGS

Table 21
Total production in 1000 t - Non-ferrous metal castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	163,4	144,8	121,4	139,6	141,9	14,9	1,7
Belgium	2,2	1,0	1,7	1,6		-2,2	
Bulgaria				6,0	6,1		0,8
Czech Rep.	124,2	116,0	94,5	108,3	105,5	14,6	-2,6
Denmark	4,0	3,5		3,2			
Finland	5,5	5,3	4,1	6,1	6,3	47,5	2,8
France	441,3	392,4	330,7	339,9	340,4	2,8	0,1
Germany	1.176,7	1.019,2	769,4	806,1	791,8	4,8	-1,8
Hungary	139,2	124,0	121,7	121,6	126,0	0,0	3,6
Italy	867,5	827,3	659,2	880,5	820,6	33,6	-6,8
Norway a)	6,5	6,5		5,9			
Poland	346,5	356,5	285,2	310,9	264,2	9,0	-15,0
Portugal	56,5	56,5	50,3	50,6	51,5	0,5	1,8
Slovenia	70,6	75,7	53,1	64,3	66,4	21,0	3,3
Spain	153,1	153,9	124,6	127,7	131,4	2,5	2,9
Sweden	67,3	65,1	56,4	60,0	60,0	6,4	0,0
Switzerland	17,0	15,9	13,6	14,8	15,4	9,0	4,1
Turkey	547,0	573,0	506,8	655,5	738,8	29,4	12,7
United Kingdom	166,3	165,8	120,1	114,5	97,3	-27,6	-15,0
Total CAEF	**4.354,8**	**4.102,6**	**3.312,8**	**3.817,0**	**3.763,5**	**14,8**	**-1,1**

a) without copper (only 2 foundries = no data collection)

Table 22
Production value in Mio. € - Non-ferrous metal castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	1.123,4	973,7	811,7	959,7	1150,3	18,2	19,9
Belgium							
Bulgaria				27,6	30,3		10,0
Czech Rep.							
Denmark							
Finland	62,1	51,0	45,2	53,7	62,5	18,7	16,4
France	2.727,0	2.373,0	1.882,6	2.095,5	2.459,1	11,3	17,4
Germany a)	6.127,8	5.558,2	4.429,0	5.190,0	6.209,0	17,2	19,6
Hungary	395,0	387,0	390,0	408	450,0	4,6	10,3
Italy	4.680,0	4.390,0	3.569,0	4646	3.053,4	30,2	-34,3
Norway		51,0					
Poland	51,0						
Portugal		381,1	324,7	323,4	376,2	-0,4	16,3
Slovenia	334,9			650,9	803,0		23,4
Spain		1.020,0	803,0	893,0	1.039,0	11,2	16,3
Sweden	951,0						
Switzerland							
Turkey		2.690,8	2.530,4	2.707,6	3.834,0	7,0	41,6
United Kingdom	2.628,7	1.050,0	950,0	920	840,0	-3,2	-8,7
Total CAEF	**19.080,8**	**18.925,7**	**15.735,6**	**18.875,5**	**20.306,9**	**15,6**	**7,6**

a) foundries >50 employees

Table 23
Number of foundries (Production units) - Non-ferrous metal castings

Country	Total		thereof: Pressure die casting		Other Light casting		Other Heavy metal alloy casting	
	2021	2022	2021	2022	2021	2022	2021	2022
Austria	22	22						
Belgium	6	6						
Bulgaria	23	22	22	21	1	1		
Czech Rep.	37	37						
Denmark								
Finland	13	12	5	4	4	4	4	4
France								
Germany	322	323						
Hungary	32	32	20	20	8	8	4	4
Italy	843	820						
Norway								
Poland	240	240	240	240				
Portugal	57	57	28	28	12	12	17	17
Slovenia	45	43						
Spain	52	53	35	35	17	18		
Sweden								
Switzerland	30	30						
Turkey	404	409	305	308	62	64	37	37
United Kingdom	191	189						
Total CAEF	**2.317**	**2.295**	**655**	**656**	**104**	**107**	**62**	**62**

Table 24
Employment in the foundry industry - Non-ferrous metal castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	5.029	4.718	4.380	4.357	4.239	-0,5	-2,7
Belgium	496	496	494	466	466	-5,7	0,0
Bulgaria				595	587		-1,3
Czech Rep.	4.000	4.000	4.000	4.000	4.000	0,0	0,0
Denmark		372					
Finland	413	381	344	350	361	1,7	3,1
France							
Germany a)	36.845	35.522	32.473	31.242	33.662	-3,8	7,7
Hungary	5.650	5.230	5.250	5.333	4.800	1,6	-10,0
Italy	18.312	18.815	18.813	18.878	14.524	0,3	-23,1
Norway	287	287					
Poland	8.300	8.300	7.387	11.200	11.200	51,6	0,0
Portugal	3.461	3.365	3.293	3.339	3.289	1,4	-1,5
Slovenia	4.138	4.032	3.669	3.576	3.547	-2,5	-0,8
Spain	5.321	5.242	4.623	4.597	4.753	-0,6	3,4
Sweden		7.000					
Switzerland	1.504	1.450	1.450	1.166	1.165	-19,6	-0,1
Turkey	13.750	13.750	13.850	14.150	14.250	2,2	0,7
United Kingdom	13.650	13.150	13.000	12.560	12.390	-3,4	-1,4
Total CAEF	**121.156**	**126.110**	**113.026**	**115.809**	**113.233**	**1,9**	**-2,2**

a) foundries > 50 employees

COPPER ALLOY CASTINGS

Table 25
Total production in t - Copper alloy castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				320	340		6,3
Czech Rep.	20.500	20.000	16.000	18.000	17.000	12,5	-5,6
Denmark	1.285	1.188					
Finland	3.031	3.124	2.415	2.508	2.678	3,9	6,8
France	19.307	17.409	16.118	17.705	18.459	9,8	4,3
Germany	79.278	77.225	46.076	48.425	46.633	5,1	-3,7
Hungary	705	483	729	701	310	-3,8	-55,8
Italy	50.587	48.232	38.168	51.947	46.869	36,1	-9,8
Norway							
Poland a)	6.100	6.000	4.800	5.232	4.448	9,0	-15,0
Portugal	16.496	17.054	16.203	14.699	14.225	-9,3	-3,2
Slovenia	755	872	990	1.005	1.125	1,5	11,9
Spain	14.400	14.634	15.279	12.807	12.617	-16,2	-1,5
Sweden	8.792						
Switzerland	2.086	2.131	2.023	2.039	1.935	0,8	-5,1
Türkiye	30.709	29.285	24.851	33.388	24.337	34,4	-27,1
United Kingdom	8.670	8.650	8.300	7.885	7.860	-5,0	-0,3
Total CAEF	**262.701**	**246.287**	**191.952**	**216.660**	**198.836**	**12,7**	**-8,2**

Table 26
Production value in Mio. € - Copper alloy castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				1,6	1,7		9,6
Czech Rep.							
Denmark							
Finland	27,5	29,7	27,0	28,5	31,2	5,4	9,7
France							
Germany a)	895,2	865,6	777,4	925,5	1020,0	19,0	10,2
Hungary							
Italy							
Norway							
Poland							
Portugal	105,5	114,6	105,1	104,0	113,1	-1,0	8,7
Slovenia							
Spain			168,0	89,0	106,0	-47,0	19,1
Sweden							
Switzerland							
Turkey	246,5	237,1	190,7	207,4	159,9	8,8	-22,9
United Kingdom							
Total CAEF	**1.274,7**	**1.247,0**	**1.268,2**	**1.355,9**	**1.431,9**	**6,8**	**5,6**

a) copper and zinc; foundries >50 employees

Table 27
Copper alloy castings in t

Country	Year	Sandcast and gravity die castings					Pressure die casting (Messing, Laiton, Brass)	general engineering	automotive industry	other	Total production
		Total	thereof: Copper	Aluminium Bronze	other Bronzes	Brass					
Austria	2021										
	2022										
	in %										
Belgium	2021										
	2022										
	in %										
Bulgaria	2021						320,0				320,0
	2022						340,0				340,0
	in %										6,3
Czech Rep.	2021										18.000
	2022										17.000
	in %										-5,6
Denmark	2021										
	2022										
	in %										
Finland	2021	2.508,0		343	1.102	1.063					2.508
	2022	2.678		580	1.416	682					2.678
	in %	6,8		69,1	28,5	-35,8					6,8
France	2021										17.705
	2022										18.459
	in %										4,3
Germany	2021	29.271					19.153,6			48.363	48.425
	2022	19.144					27.489,0			46.552	46.633
	in %	-34,6					43,5			-3,7	-3,7
Hungary	2021										701
	2022	310,0			310,0						310
	in %										-55,8
Italy	2021										51.947
	2022										46.869
	in %										-9,8
Norway	2021										
	2022										
	in %										
Poland	2021										5.232
	2022										4.448
	in %										-15,0
Portugal	2021	14.699		1.750	2.960	9.989		3.100		11.599	14.699
	2022	0		1.675	2.810	9.740	9740,0	2.950		11.275	14.225
	in %	-100,0		-4,3	-5,1	-2,5		-4,8		-2,8	-3,2
Slovenia	2021										1005
	2022										1125
	in %										11,9
Spain	2021	12.807						9.949	207	2.651	12.807
	2022	12.617						9.826	204	2.587	12.617
	in %	-1,5						-1,2	-1,4	-2,4	-1,5
Sweden	2021										
	2022										
	in %										
Switzerland	2021	2.039									2.039
	2022	1.935									1.935
	in %	-5,1									-5,1
Turkey	2021	16.576	5.259	3.985	1.754	5.578	7.767	6.355	2.690		33.388
	2022	12.652	4.213	3.011	1.172	4.256	5.471	4.236	1.978		24.337
	in %	-23,7	-19,9	-24,4	-33,2	-23,7	-29,6	-33,3	-26,5		-27,1
United Kingdom	2021										7.885
	2022										7.860
	in %										-0,3

LIGHT AND ULTRALIGHT CASTINGS

Table 28
Total production in t - Light and ultralight castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria	150.559	133.406	111.302	127.971	131.859	15,0	3,0
Belgium	799	683	539				
Bulgaria				5.700	5.730		0,5
Czech Rep.	102.500	95.000	77.700	89.400	87.600	15,1	-2,0
Denmark	2.566	2.224					
Finland	2.395	2.184	1.730	3.604	3.604	108,3	0,0
France	394.727	348.062	293.529	299.016	299.255	1,9	0,1
Germany	1.038.211	1.011.599	673.227	716.616	716.465	6,4	0,0
Hungary	136.791	122.675	119.186	119.304	124.013	0,1	3,9
Italy	724.300	685.584	543.972	732.537	685.046	34,7	-6,5
Norway	6.525	6.526					
Poland	330.000	340.000	272.000	296.480	252.008	9,0	-15,0
Portugal	37.612	37.009	31.966	33.050	34.859	3,4	5,5
Slovenia	61.315	54.625	44.618	52.692	55.576	18,1	5,5
Spain	127.159	129.345	101.317	106.185	110.522	4,8	4,1
Sweden	48.000	48.000	39.195	45.000	48.000	14,8	6,7
Switzerland	13.790	12.699	10.815	11.726	12.362	8,4	5,4
Turkey	476.253	504.328	450.264	579.124	665.930	28,6	15,0
United Kingdom	149.540	149.100	104.522	99.296	87.649	-5,0	-11,7
Total CAEF	**3.803.043**	**3.683.049**	**2.875.882**	**3.317.701**	**3.320.479**	**15,2**	**0,1**

Table 29
Production value in Mio. € - Light and ultralight castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria				26,0	28,6		10,0
Czech Rep.							
Denmark							
Finland	33,6	21,3	18,2	25,2	31,3	38,5	23,9
France							
Germany a)	5.232,6	4.705,2	3.933,1	4.264,6	5.189,0	8,4	21,7
Hungary							
Italy							
Norway	51,0	51,0					
Poland							
Portugal	211,0	247,0	200,6	200,3	244,1	-0,1	21,9
Slovenia							
Spain			571,0	680,0	748,0	19,1	10,0
Sweden							
Switzerland							
Turkey	2.207,4	2.289,4	2.223,8	2.374,1	3.435,1	6,8	44,7
United Kingdom							
Total CAEF	**7.735,6**	**7.313,9**	**6.946,7**	**7.570,2**	**9.676,1**	**8,6**	**27,8**

a) foundries >50 employees

Table 30
Light and ultralight castings in t

Country	Year	Aluminium			Magnesium			general engineering	automotive industry	other	Total Production
		Sandcast and gravity die casting	Pressure die casting	Total	Sandcast and gravity die casting	Pressure die casting	Total				
Austria	2021	18.294	104.210	122.504							111.302
	2022	18.753	106.991	125.744							131.859
	in %	2,5	2,7	2,6							18,5
Belgium	2021										
	2022										
	in %										
Bulgaria	2021	380,0	5.320,0	5.700,0							5.700,0
	2022	390,0	5340,0	5730,0							5730,0
	in %	2,6	0,4	0,5							0,5
Czech Rep.	2021			89.000			400				89.400
	2022			87.200			400				87.600
	in %			-2,0			0,0				-2,0
Denmark	2021										
	2022										
	in %										
Finland	2021	704	1.098	1.802							3.604
	2022	1.155	537	1.802							3.604
	in %	64,1	-51,1	0,0							0,0
France	2021										293.529
	2022										299.255
	in %										2,0
Germany	2021	309.512	385.609	695.121		15.498	15.498	8.933	586.180	99.010	694.123
	2022	304.469	392.916	703.275		13.181	13.190	8.930	613.380	94.130	716.465
	in %	-1,6	1,9	1,2		-15,0	-14,9	0,0	4,6	-4,9	3,2
Hungary	2021	48.265	70.761	119.026			278				119.304
	2022	52.453	71.300	123.753			260				124.013
	in %	8,7	0,8	4			-6,5				3,9
Italy	2021			727.254			5.283				732.537
	2022			681.904			3.143				685.046
	in %			-6,2			-40,5				-6,5
Norway	2019										
	2020										
	in %										
Poland	2021										296.480
	2022										252.008
	in %										-15,0
Portugal	2021	1.719	30.359	33.050							33.050
	2022	1.789	34.947	34.859							34.859
	in %	4,1	15,1	5,5							5,5
Slovenia	2021			52.692							52.692
	2022			55.576							55.576
	in %			5,5							5,5
Spain	2021	1.500	104.685	106.185							106.185
	2022	1.592	108.930	110.522							110.522
	in %	6,1	4,1	4,1							4,1
Sweden	2021										45.000
	2022										48.000
	in %										6,7
Switzerland	2021	2.079	9.647	11.726							11.726
	2022	2.165	10.197	12.362							12.362
	in %	4,1	5,7	5,4							5,4
Turkey	2021	62.399	515.714	578.113	396	615	1.011				579.124
	2022	77.303	587.869	665.173	178	580	758				665.930
	in %	23,9	14,0	15,1	-55,1	-5,7	-25,0				15,0
United Kingdom	2021			97.396			1.900				99.296
	2022			86.549			1.100				87.649
	in %			-11,1			-42,1				-11,7

ZINC

Table 31
Total production in t - Zinc

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria							
Czech Rep.	1.200	1.000	800	900	900	12,5	0,0
Denmark							
Finland	100						
France	24.854	24.486	18.880	20.739	20.324	9,8	-2,0
Germany	59.205	57.182	49.761	41.095	28.748	-17,4	-30,0
Hungary	1.610	763	1.662	1.542	1.576	-7,2	2,2
Italy	91.287	92.161	75.834	95.089	88.151	25,4	-7,3
Norway							
Poland a)	7.500	7.500	6.000	6.540	5.559	9,0	-15,0
Portugal	2.440	2.464	2.165	2.829	2.419	30,7	-14,5
Slovenia	8.510	9.665	7.477	8.187	7.103	9,5	-13,2
Spain	9.020	8.426	7.304	7.973	7.491	9,2	-6,0
Sweden							
Switzerland	1.118	1.051	762	1.054	1.127	38,3	6,9
Turkey	40.025	39.432	31.644	42.981	48.536	35,8	12,9
United Kingdom	8.085	8.090	7.300	7.300	1.800	0,0	-75,3
Total CAEF	**254.954**	**252.220**	**209.589**	**236.229**	**213.734**	**12,7**	**-9,5**

Table 32
Production value in Mio. € - Zinc

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria							
Czech Rep.							
Denmark							
Finland	1,0						
France							
Germany a)							
Hungary							
Italy							
Norway							
Poland							
Portugal	18,4	19,5	19,1	19,2	19,0	0,5	-0,5
Slovenia							
Spain			56,0	63,0	69,0	12,5	9,5
Sweden							
Switzerland							
Turkey	174,8	164,3	115,9	126,1	239,0	8,8	89,6
United Kingdom							
Total CAEF							

a) included in Table 26

Table 33
Zinc in t

Country	Year	Pressure die casting	general engineering	automotive industry	other	Total Production
Austria	2021					
	2022					
	in %					
Belgium	2021					
	2022					
	in %					
Bulgaria	2021					
	2022					
	in %					
Czech Rep.	2021					900
	2022					900
	in %					0,0
Finland	2021					
	2022					
	in %					
France	2021					20.739
	2022					20.324
	in %					-2,0
Germany	2021		161	1.359	39.575	41.095
	2022		226	1.350	27.172	28.748
	in %		40,4	-0,7	-31,3	-30,0
Hungary	2021					1.542
	2022					1.576
	in %					2,2
Italy	2021					95.089
	2022					88.151
	in %					-7,3
Poland	2021					6.540
	2022					5.559
	in %					-15,0
Portugal	2021		2.829			2.829
	2022		2.419			2.419
	in %		-14,5			-14,5
Slovenia	2021					8.187
	2022					7.103
	in %					-13,2
Spain	2021		3.788	3.117	1.068	7.979
	2022		2789,0	3786,0	916,0	7.491
	in %		-26,4	21,5	-14,2	-6,1
Sweden	2021					
	2022					
	in %					
Switzerland	2021					1.054
	2022					1.127
	in %					6,9
Turkey	2021		8.086	8.406	26.489	42.981
	2022		11.298	9.023	28.215	48.536
	in %		39,7	7,3	6,5	12,9
United Kingdom	2021					7.300
	2022					1.800
	in %					-75,3

OTHER ALLOY CASTINGS

Table 34
Total production in t - Other alloy castings

Country	2018	2019	2020	2021	2022	2021/20 in %	2022/21 in %
Austria							
Belgium							
Bulgaria							
Czech Rep.							
Denmark	89,0	112,0					
Finland							
France	2.424,0	2.486,0	2.180,3	2.395,0	2.315,2	9,8	-3,3
Germany	5,2	5,2	19,0				
Hungary	93,0	86,0	99,0	77,0	63,0	-22,2	-18,2
Italy	1.370,0	1.324,0	1.235,0	880,5	515,0	-28,7	-41,5
Norway							
Poland	2.900,0	3.000,0	2.400,0	2.616,0	2.224,0	9,0	-15,0
Portugal							
Slovenia				2.374,0	2595,0		9,3
Spain	2.516,0	1.502,0	683,0	719,0	736,0	5,3	2,4
Sweden							
Switzerland							
Turkey							
United Kingdom							
Total CAEF	**9.397,2**	**8.515,2**	**6.616,4**	**9.061,5**	**8.448,2**	**1,4**	**-6,8**

WORLD PRODUCTION

Table 35

World production 2021, selected countries - Iron and Steel castings in t

Country		Iron castings	Nodular iron castings	Malleable iron castings	Steel castings	Total
Austria		37,100	104,800		10,300	**152.200**
Belgium		44,500	4,500		5,300	**54.300**
Brazil	*	1,148,123	468,952		269,512	**1.886.587**
Canada	****	330,841			90,091	**420.932**
China		22,550,000	15,950,000	600,000	6,600,000	**45.700.000**
Croatia	*	19,465	6,161		120	**25.746**
Czech. Rep.		140,000	41,000		44,500	**225.500**
Denmark	**	28,900	58,100			**87.000**
Finland		20,600	25,500		5,700	**51.800**
France		503,900	665,000		43,100	**1.212.000**
Germany		1,873,700	1,140,900		143,800	**3.158.400**
Hungary		16,300	57,200		1,700	**75.200**
India		8,623,822	1,259,850	50,000	1,049,827	**10.983.499**
Indonesia		94,680	156,360		49,872	**300.912**
Italy		616,200	385,900		56,800	**1.058.900**
Japan		1,831,186	1,339,165	29,834		**3.200.185**
Korea (Republic of)		850,200	670,100		145,400	**1.665.700**
Mexico	***	816,160	560,270		336,250	**1.712.680**
Norway	**	8,800	22,300			**31.100**
Pakistan	**	181,000	24,540		48,750	**254.290**
Poland		392,400	135,160		43,600	**571.160**
Portugal		39,699	76,586		4,404	**120.689**
Romania		12,832	1,349		2,864	**17.045**
Russia	**	2,184,000		1,134,000		**3.318.000**
Slovenia		73,236	44,315	3,100	3,808	**124.459**
Spain		322,800	608,800		69,200	**1.000.800**
Sweden		141,700	47,500		21,200	**210.400**
Switzerland		8,600	12,900		2,400	**23.900**
Taiwan		642,411	212,354		69,387	**924.152**
Türkiye		920,700	1,108,100		279,300	**2.308.100**
United Kingdom		128,420	195,600		35,373	**359.393**
United States	*	7,616,824				**7.616.824**

Source: Modern Casting, data can differ from CAEF data

* 2020 Results

** 2019 Results

*** 2017 Results

**** 2015 Results

Table 36

World Production 2021 selected countries - Non-ferrous metal castings in t

Country		Copper	Aluminum	Magnesium	Zinc	Others	Total
Austria			127,971				**127.971**
Belgium							
Brazil	*	20,524	160,464	4,534	1,064		**186.586**
China		900,000	7,200,000			250,000	**8.350.000**
Croatia	*	202	65,606			131	**65.939**
Czech. Rep.		18,000	89,000	400	900		**108.300**
Denmark	**	1,188	2,224			112	**3.524**
Finland		2,508	3,604				**6.112**
France		17,705	299,016		20,739	2,395	**339.855**
Germany		48,425	701,118	15,498	41,095		**806.136**
Hungary		701	119,026	278	1,542	77	**121.624**
India			1,465,158				**1,465.158**
Indonesia			65,919			320,800	**386.719**
Italy		51,947	727,254	5,283	95,089	881	**880.454**
Japan		59,585		374,042	16,927	904,440	**1.354.994**
Korea (Republic of)		23,500	620,400	10,000			**653.900**
Mexico	***	215,500	832,770		79,500	15,200	**1,142.970**
Norway	**		6,526				**6.526**
Pakistan	**	14,200	21,200			2,730	**38.130**
Poland		5,232	296,480		6,540	2,616	**310.868**
Portugal		14,699	33,050		2,829		**50.578**
Romania		1,143	49,393	2,000	250	13	**52.799**
Russia	**	117,600	588,000	75,600		100,800	**882.000**
Slovenia		1,005	52,692		8,187	2,374	**64.258**
Spain		12,807	106,185		7,973	719	**127.684**
Sweden	*		56,400				**56.400**
Switzerland		2,039	11,726		1,054		**14.819**
Taiwan		29,997	527,946	5,375			**601.102**
Türkiye		33,388	578,113	1,011	42,981		**655.493**
United Kingdom		7,885	97,396	1,900	7,300		**114.481**
United States	*	304,279	1,425,120		47,786	354,802	**2.131.987**

Source: Modern Casting, data can differ from CAEF data

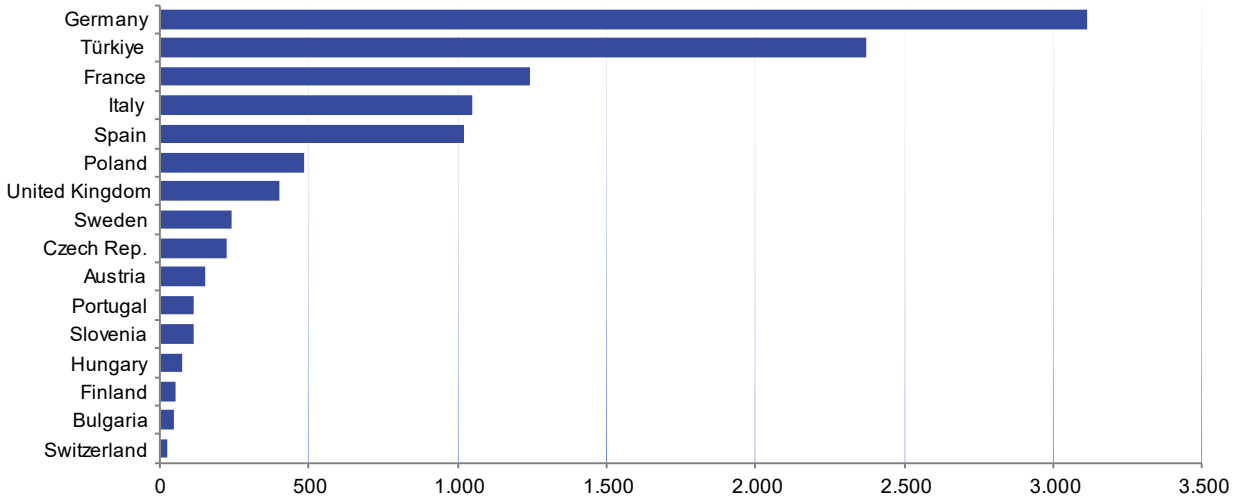
* 2020 Results

** 2019 Results

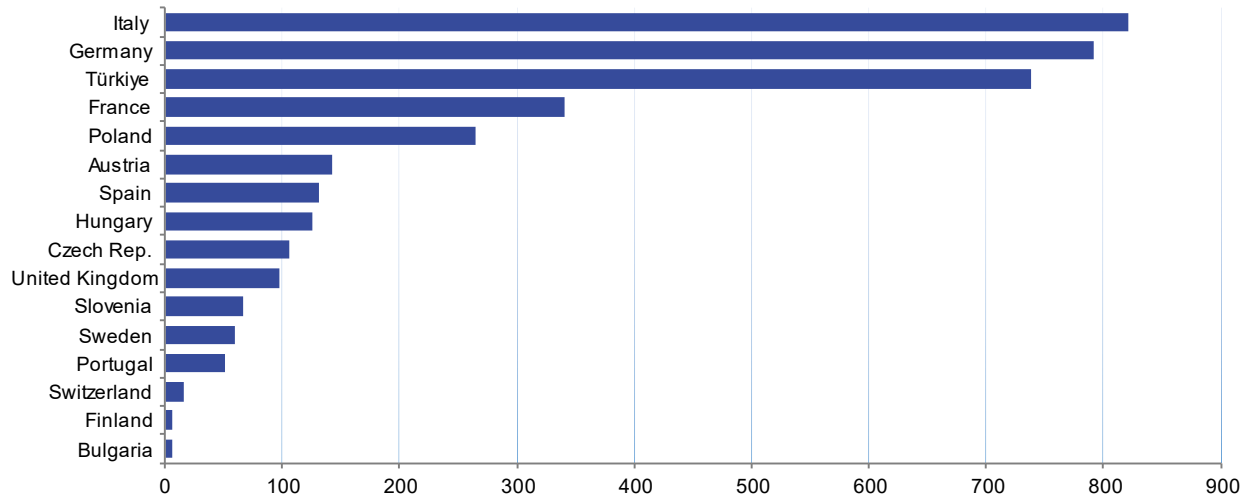
*** 2017 Results

GRAPHS

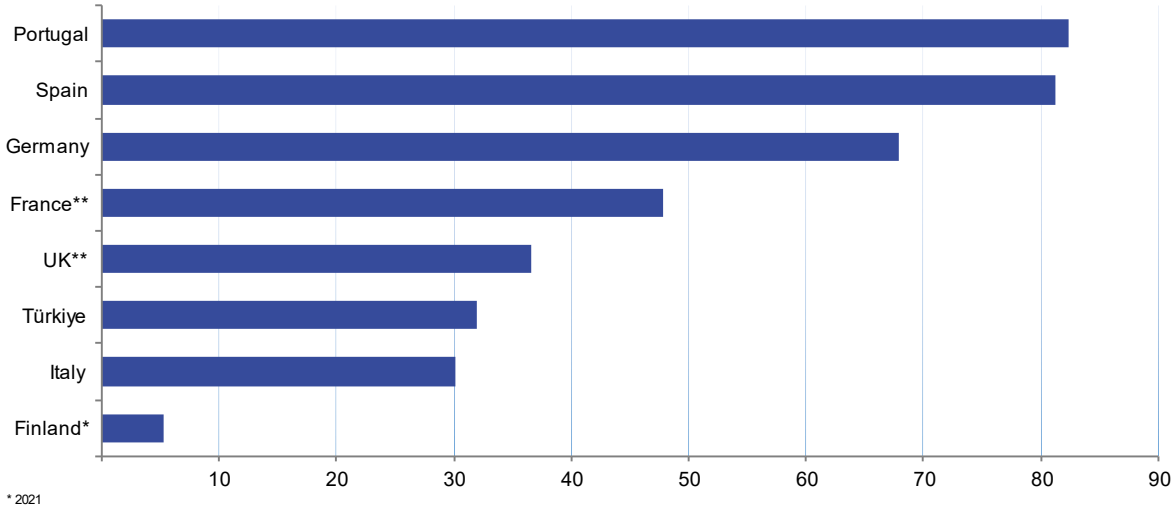
Production of Iron, Ductile Iron and Steel Castings in the European Foundry Industry 2022 (in 1.000 t)



Production of Non-Ferrous Metal Castings in the European Foundry Industry 2022 (in 1.000 t)

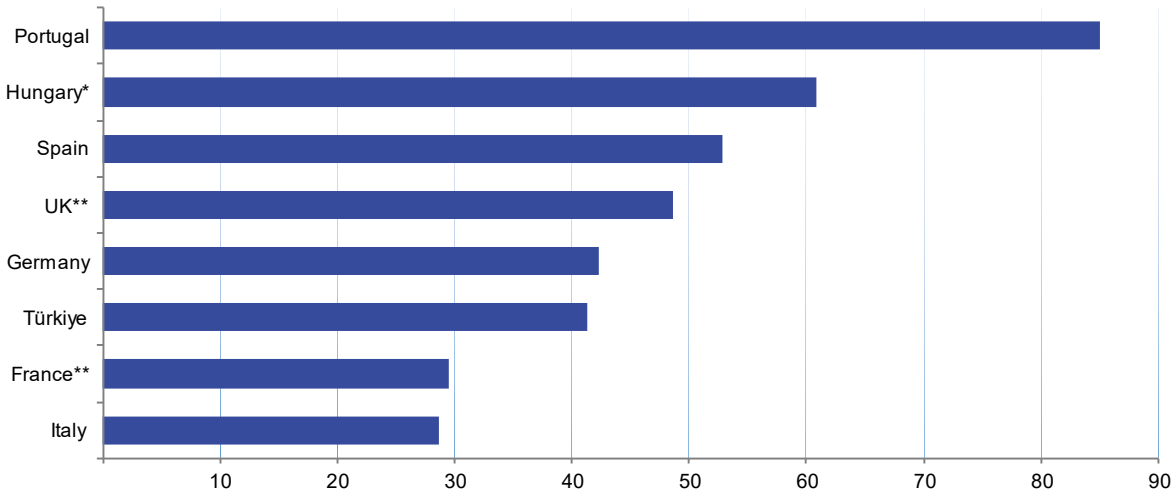


Iron Castings for the Vehicle Industry
National Production Share 2022 (in %)



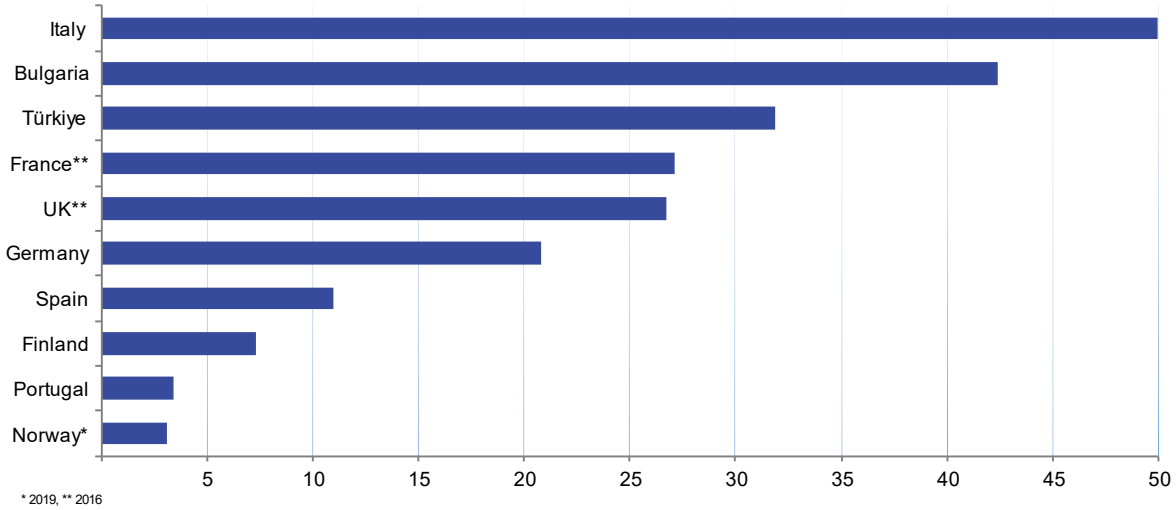
* 2021
** 2016

Ductile Iron Castings for the Vehicle Industry
National Production Share 2022 (in %)



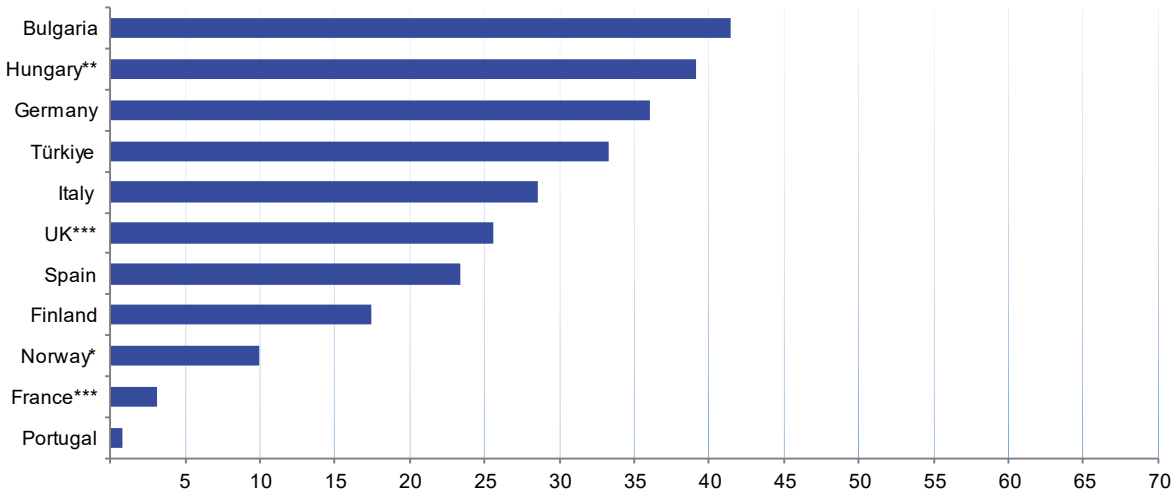
* 2017, ** 2016

Iron Castings for Engineering Plant and Machinery
National Production Share 2022 (in %)



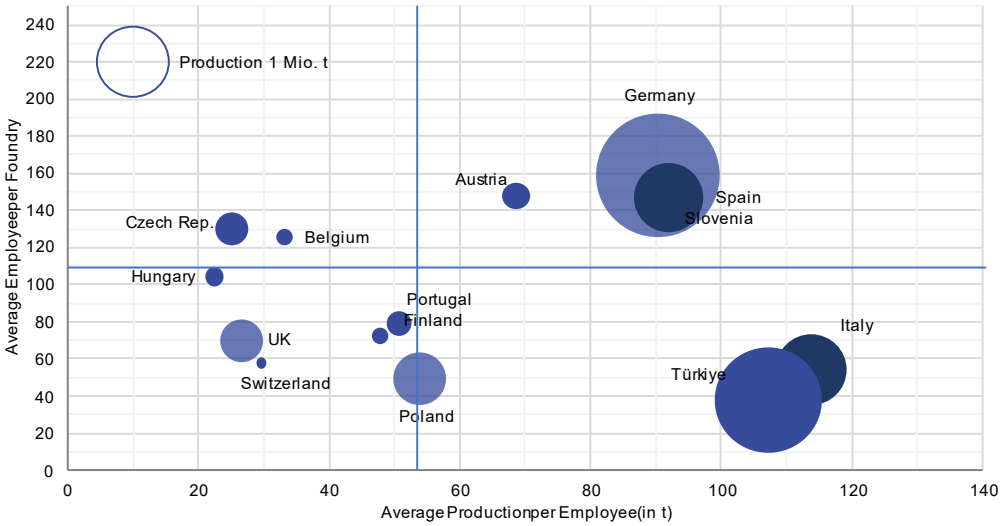
* 2019, ** 2016

Ductile Iron Castings for Engineering Plant and Machinery
National Production Share 2022 (in %)

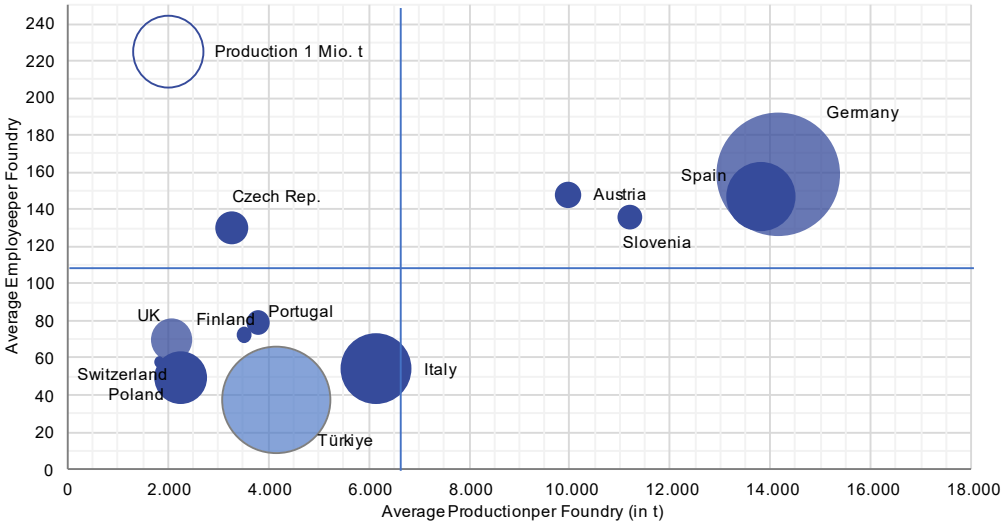


* 2019, ** 2017, *** 2016

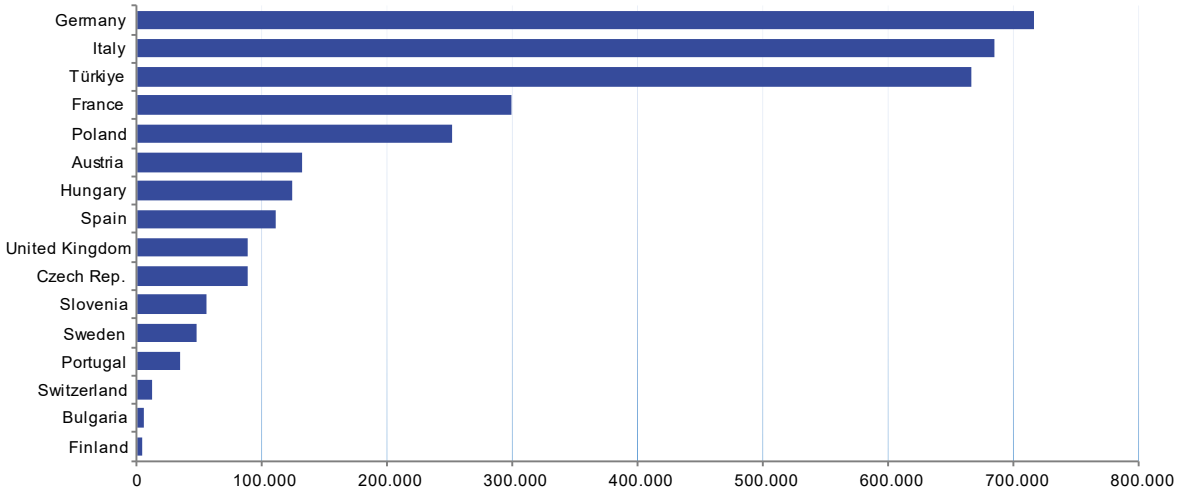
Production of Iron, Ductile Iron and Steel Castings in the European Foundry Industry 2022 (in t)



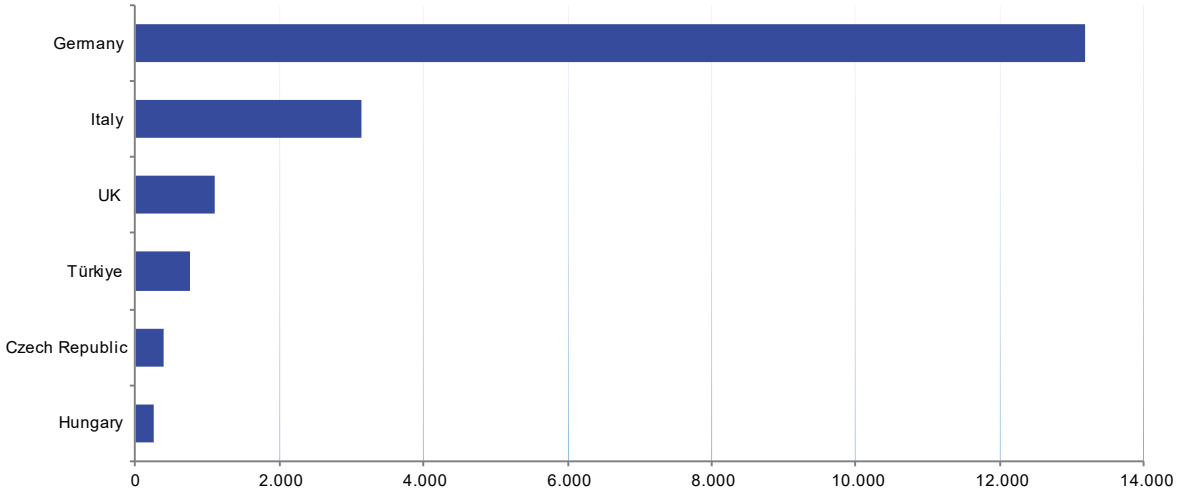
Production of Iron, Ductile Iron and Steel Castings in the European Foundry Industry 2022 (in t)



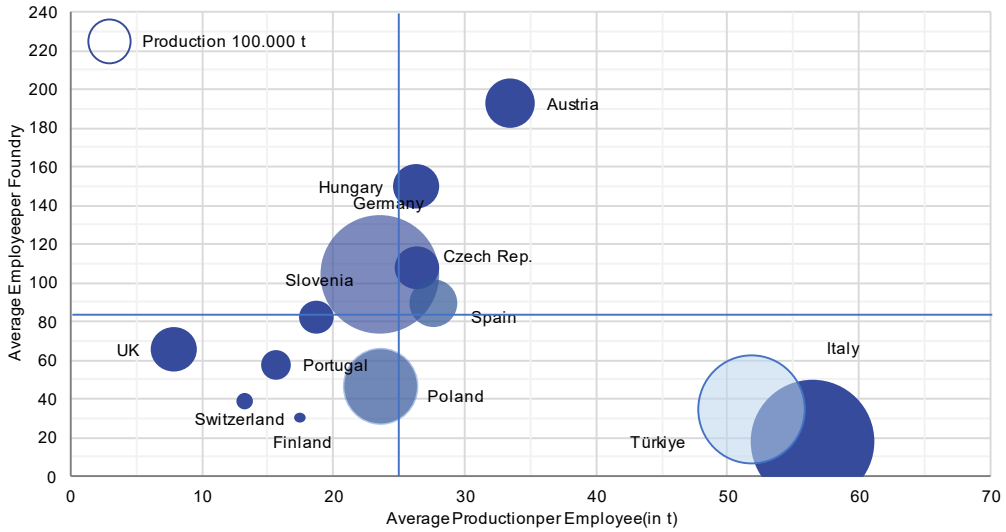
Production of Light and Ultralight Castings in the European Foundry Industry 2022 (in t)



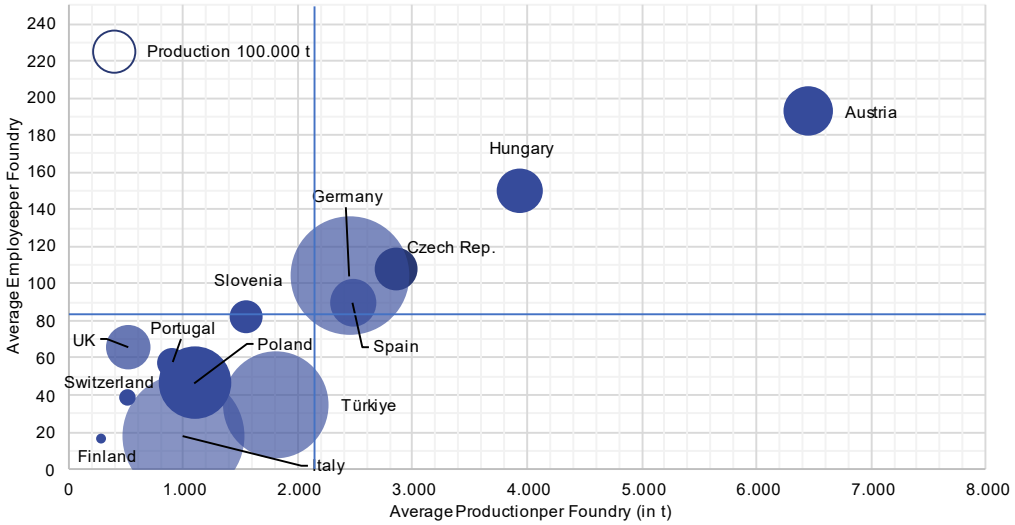
Major Producers of Magnesium Castings in the European Foundry Industry 2022 (in t)



Production of Non-Ferrous Metal Castings in the European Foundry Industry 2022



Production of Non-Ferrous Metal Castings in the European Foundry Industry 2022



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