Restart

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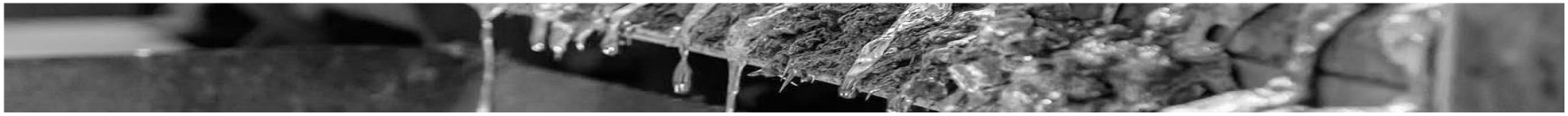

A

Management Summary

B

Past

Present

Knowing the past, Understanding the present

C

Future

Shaping the Future

D

!

Summary

Management Summary

The deindustrialization of Germany is currently the dominant topic of many economic experts. The current situation, but above all the future of German industry, is predominantly viewed critically. Germany is lagging in terms of economic growth and, according to current forecasts, could bring up the taillight in Europe in 2023.

This also affects the aluminium foundry industry in Germany/Europe in particular. Regarding the foundry industry, the transformation (ICE→BEV) and the rapidly rising energy costs are often identified as the causes of the crisis. This is true, but only part of the truth. It is also true that the aluminium foundry industry in Germany/Europe has been in an environment of unresolved challenges and risks for some time now. The increases in demand, which have been going on for years, have been able to cover up some of the problems, but unfortunately, they have not solved them.

Since the end of 2018, this positive trend has been interrupted. Dramatic declines in sales of up to 40% in combination with the unresolved challenges have led to critical economic difficulties for many companies in the entire foundry network. In contrast to the crises of 94/95 and 08/09, there is no longer “unrestricted” protection of these companies by customers (OEMs, Tier 1). As a result, companies or at least production capacities have already disappeared from the market.

But there are also positive signs. The trend towards lightweight automotive construction continues unabated. Experts even assume that the trend will continue to increase due to the transformation to e-mobility. Competing with other materials and processes, aluminum die casting can benefit from this trend.

In a recent study (12/2022), Ducker assumes that the Ø use of cast aluminium in vehicles in Europe will increase by 22 kg to 145 kg by 2030. This represents an increase of 18%.

Management Summary

Whether these increases come about at the end of the day and whether companies in Germany/Europe benefit individually from them is constantly being determined anew and predominantly by economic and technological factors.

It is worth fighting for the opportunities that arise.

The guarantee for **“secure” success** is **the full use** of the know-how and technologies available in Germany/Europe along the aluminium die casting value chain while at the same time focusing on a common goal.

> *The goal of the entire aluminum die casting value chain must be to develop and industrialize the economically and technologically best parts for the product (car) together with the customers (OEMs and Tier 1).* ***The focus*** *must be on the* ***product (car).***
>
> ***Total Cost of Ownership, Time to Market*** *and* ***Technological Lead*** *are the targets that influence success and make it measurable.*

To be successful, the industry needs a **restart.**

The scope of opportunities and risks justifies any effort. However, speed is essential.

- Knowing the Past: Review
- Understanding the Present: Analysis
- Shaping the future: assessments, expectations, and recommendations

Under the heading **Restart** you will find a review, an analysis, assessments, expectations, and recommendations.

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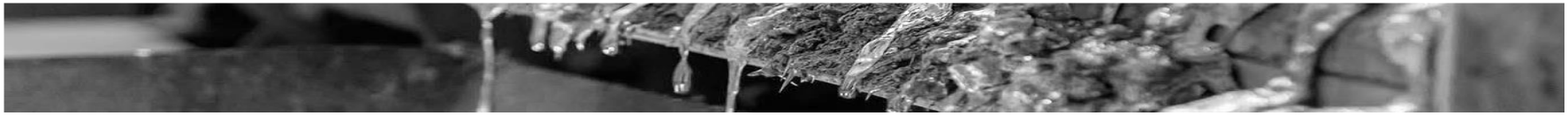
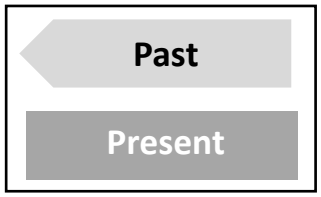


A

Management Summary



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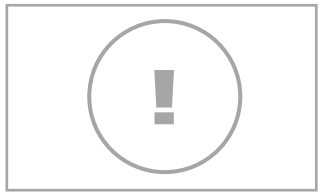
Knowing the Past, Understanding the Future

C

Shaping the Future



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Summary

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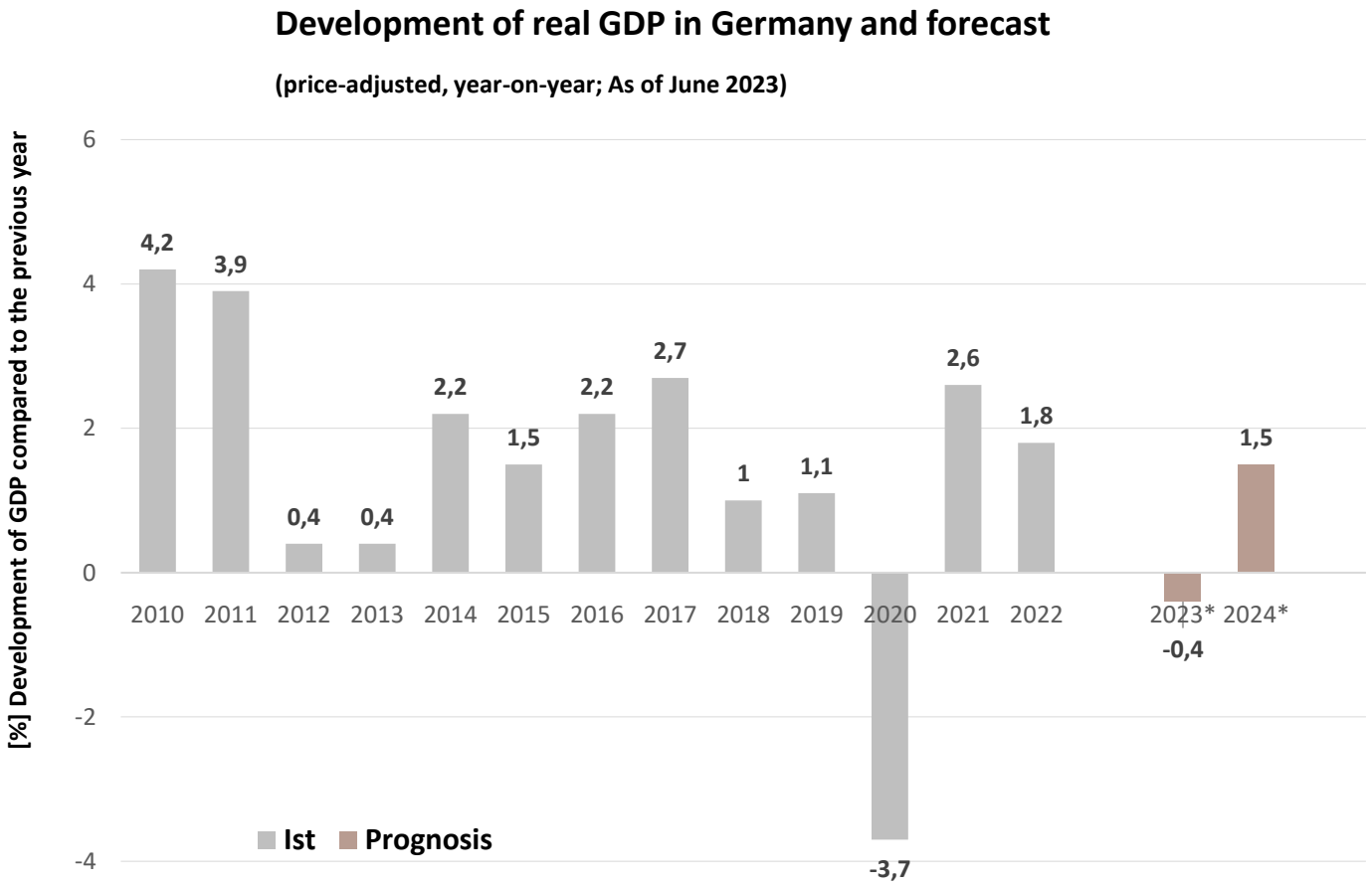
Knowing the past, understanding the present- Development of GDP in Germany

It is difficult to say whether we are currently in the phase of deindustrialization, as many experts say. However, it cannot be denied that the current situation is critical. The GDP forecasts for 2023 have been revised repeatedly in the current year and are currently in negative territory for 2023.



Source: Ist - Statistisches Bundesamt, *Prognosis – Ifo- Institut

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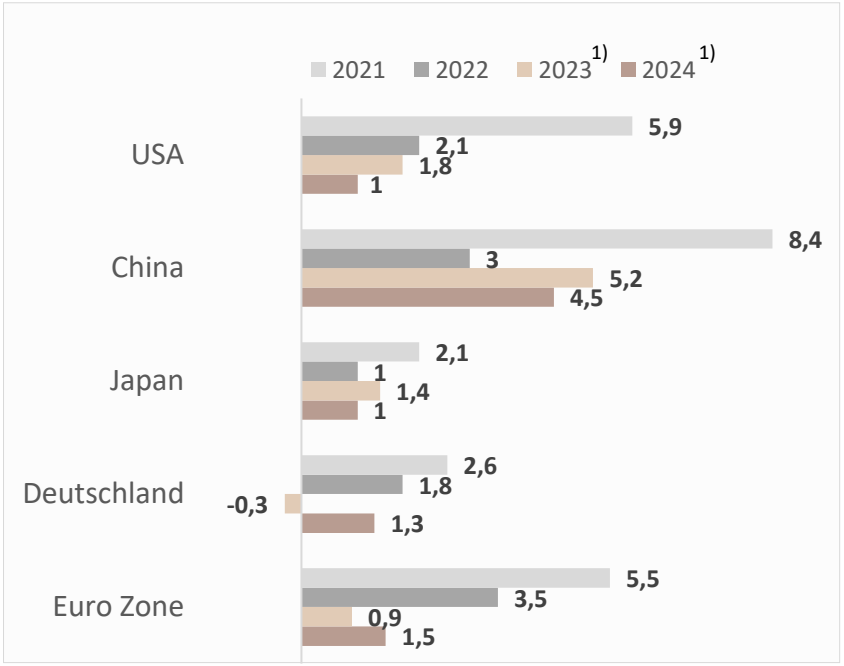
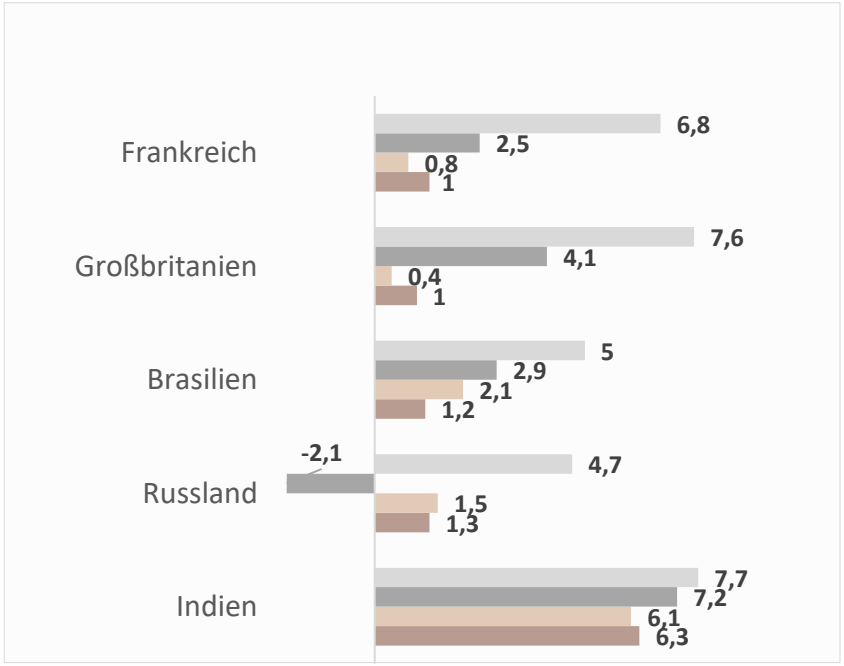
Knowing the past, understanding the present- GDP in international comparison

Compared to other major nations, Germany could bring up the rear in 2023, and not just in Europe. A prospect that should at least make you **think** and question **"business as usual".**

IWF-Prognosis

Year-on-year GDP growth in industrialised and emerging economies in %

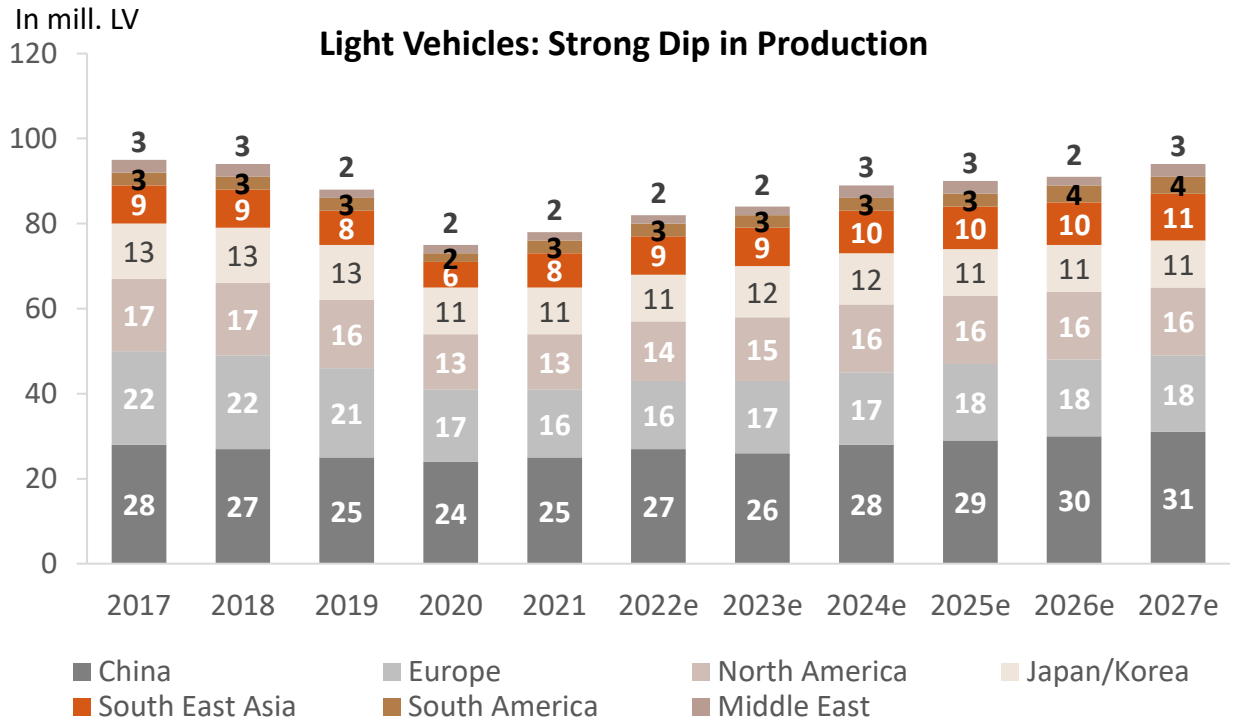




Source: Managermagazin April 2023
1) Prognosis Source : IWF

Knowing the past, understanding the present- Passenger car production Focus Europe

With a look at the **automotive industry**, the most important customer of the aluminum die casting industry, and the current forecasts, the impact on foundries is predictable. The analyses of recent years show that the production volumes of the die casting industry are based on the production figures of the automotive industry. However, due to the substitution of other parts (e.g., shock towers), aluminum casting production has increased disproportionately compared to vehicle production in recent years.



Note

- The high production volume of 17/18 is no longer achieved in Europe, almost all experts agree.
- Chinese OEMs are pushing into the European market and gaining share. This creates opportunities, but probably greater risks for European foundries.
- Europe is losing, at least in part, its proximity to OEMs

Source: IHS November 2022 e=estimated/ IKB

To compensate for the losses due to lower vehicle production (in Europe) and the long-term loss of the powertrain, other vehicle parts must be obtained from the foundry industry in competition with other materials and processes.

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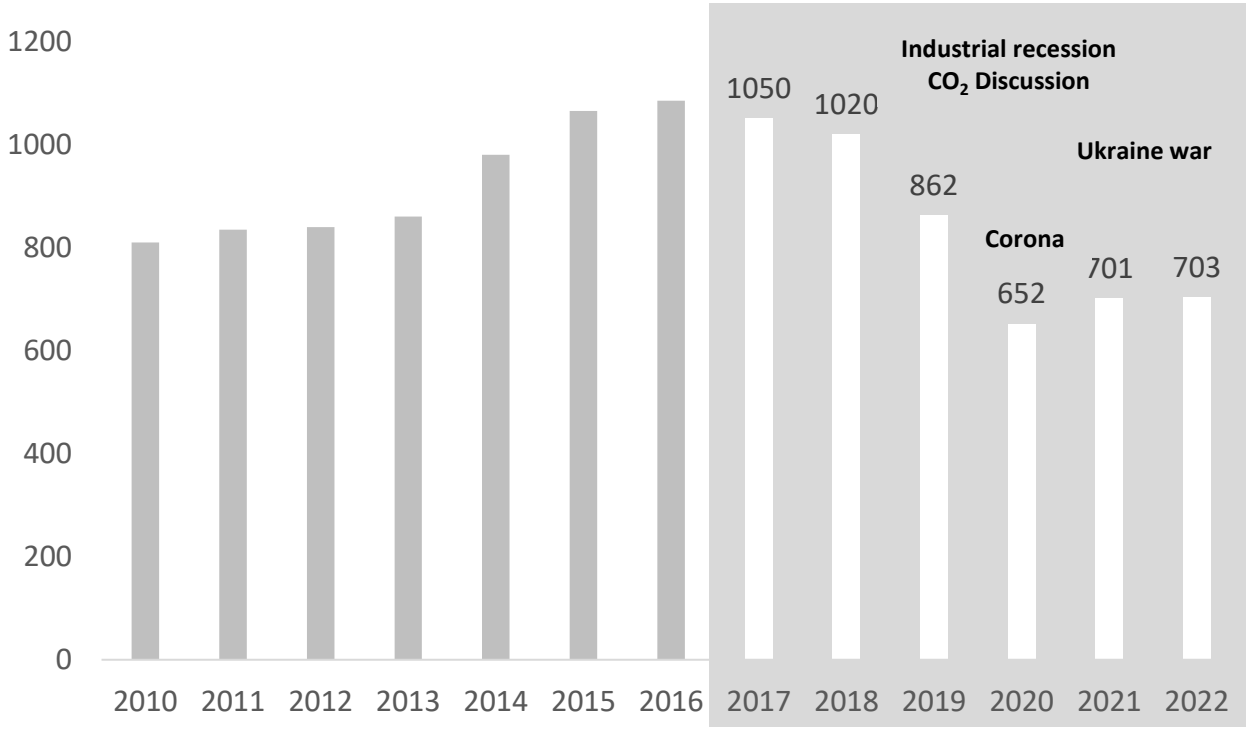
Knowing the past, understanding the present- Casting production in German aluminium foundries

As a result of the lightweight construction trend (substitution of e.g., steel by aluminium) and the increases in production in the automotive industry, there has been permanent **growth in the last 50 years**, with the exception of the crisis years 1994/95 and 2008/09. This **trend has reversed** since 2017/18.

Casting production, German aluminium foundries(Al casting in 1,000 t)



Note

- The essential lever (growth) to keep weak earnings quality (EBITDA Ø < 9%) in the industry at least stable is missing.
- There is a lack of additional funds for training, investment and expansion.
- In the context of the crisis, production capacities have disappeared from the market (insolvencies or capacity adjustments)

Source: BDG, CAEF

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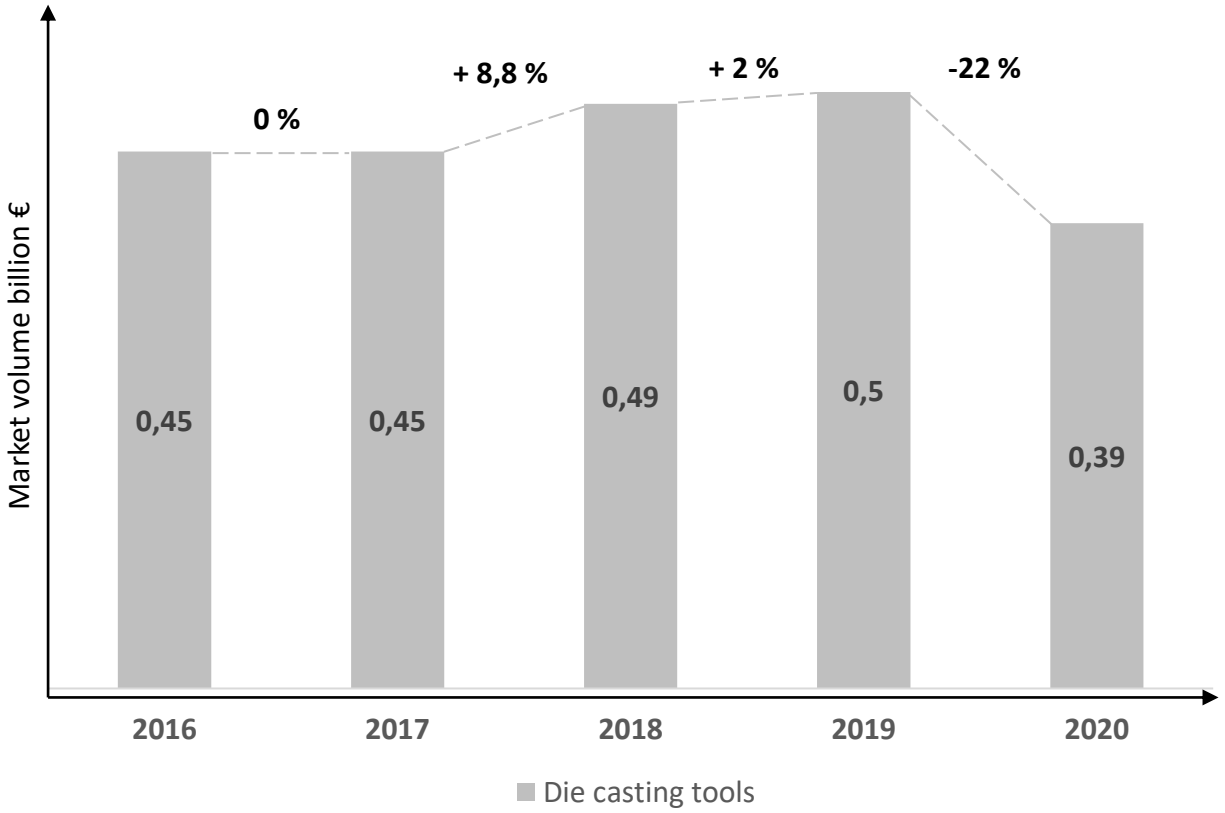
Knowing the past, understanding the present- Die casting tool production in Germany

The most important partner of the foundry industry and an essential pillar of success are the German/European die casting tool manufacturers. The tool making know-how is valued worldwide(Export share in Germany > 20%). There is also a trend reversal here.

Market volume die casting tools Germany



Source: Werkzeugbau Akademie/RWTH Aachen Campus

Note

- With a slight delay, production volumes and the corresponding effects follow the declining tonnage of the foundry industry
- The earnings situation of the tool makers also suffered greatly in the context of the crisis. Financial imbalances are partly the result (insolvency, sales)
- Chinese tool makers are getting better in quality and are a real competitor for German/European tool making in the long term

Knowing the past, understanding the present- Major German die casters in the 6 most important regions

Well-known German die casting foundries have been taken over by international competitors since the early 90s. Some companies have disappeared from the market altogether. The presence in the most important die casting regions is declining.

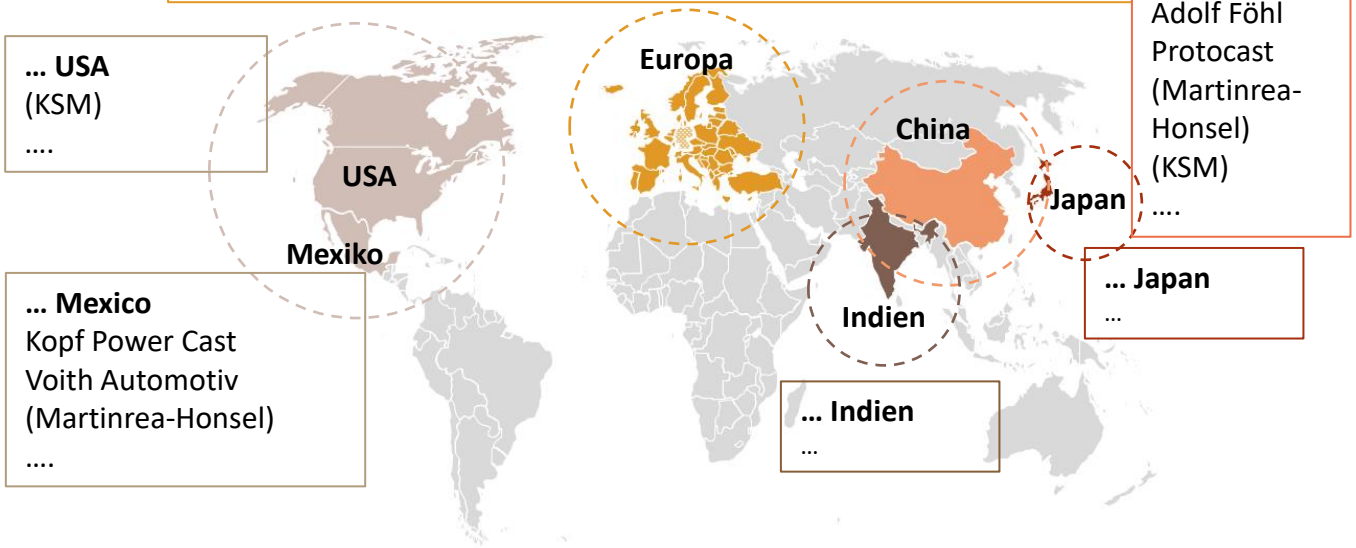
German die casters in ...

... Germany:
Well-known German die casters under foreign management
Some examples:
Magna → BDW; Martinrea → Honsel, Endurance → Amann; Jaya Hind → DGH Hoym, Citic → KSM; Bohai → Trimet; …

Others have disappeared from the market altogether:Alu Druckguss Brandenburg, Schweizer Group, Pressmetall, DGH, ….

… USA
(KSM)
….

… Mexico
Kopf Power Cast
Voith Automotiv
(Martinrea-Honsel)
….



… China
Handtmann
KS/HUAYU
Bock
Adolf Föhl
Protocast
(Martinrea-Honsel)
(KSM)
….

… Japan
…

… Indien
…

Source: JMC current state of knowledge

Note

- The international foundry industry is currently undergoing far-reaching and rapid change.
- Chinese and Indian foundries are increasingly pushing into the European market. Mexico and the USA are also in focus.

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Knowing the past, understanding the present- SWOT of the German aluminum die casting industry

Question: "How does JMC assess the current situation of the German aluminium die casting industry?“
Focus: Technology, Profitability, Products, Competitors, Trends, Strategy, Culture, Future, Status Transformation, ...

Location analysis

Strengthen

- Competent foundry technology network
- Good customer relationship with local OEMs and Tier 1
- Outstanding practice-oriented foundry know-how (employees) along the value chain
- Good infrastructure of the entire value chain
- Development of valuable new technologies
- ….

Weaknesses

- Predominantly older foundries (... often from the years before 1980)
- Industrial environment in Germany
- Often weak earnings and financial situation
- Low investment activity. Currently no investments in the topic of GIGA casting (exception: Handtmann)
- Lack of implementation of valuable new technologies
- Willingness to change, speed of change
- ……

Environmental analysis

Chances

- Collaboration, along the entire value chain
- The industry is becoming interesting again for investors
- Substitution of further car parts by aluminium casting to make it technologically and economically attractive for customers
- Joint initiatives and strategies
- ….

Risks

- Companies are overwhelmed by the complexity of the current challenges
- International significance is declining
- Lack of capital for predicted and achievable growth
- ….

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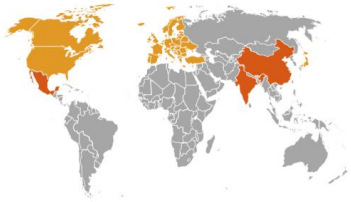
Knowing the past, understanding the present- Summary

Past

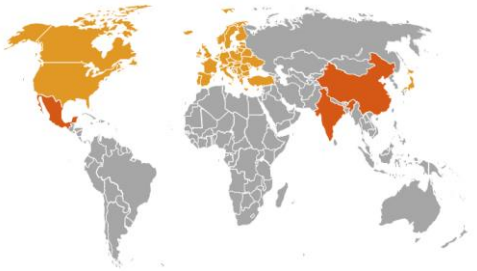
- Until the 90s, **Germany/Europe**, followed by Japan and the USA, was the **production, development and innovation center** for aluminium die casting. The market participants are mainly medium-sized and locally based traditional companies, as well as the in-house foundries of the major customers (automotive industry).
- At the end of the 90s, German die casting foundries in particular came into the focus of **financial a**nd, somewhat later, **strategic investors.**
- **Tier 1** and **OEMs** are again investing in their own die casting foundries (capacity bottlenecks are expected).

Present



- The unusually long **crisis** (> 4 years) has left technological and economic traces in many foundries, especially in Germany/Europe. The transformation **(ICE → BEV)** comes at the worst possible time.
- The “megatrend” GIGA casting triggered by Tesla is taking place mainly in China. The U.S. may be able to follow suit in the short term. The other regions are still hesitant.
- **China** takes on a significant role within a few years and currently looks like the **“winner”** of the aluminium die casting industry.

Future?



- **Scenario 1**
  Europe will no longer be the technological centre of the aluminium foundry industry and will become less important worldwide.
- **Scenario 2**
  The aluminium foundry industry in Germany/Europe transforms the current challenges into technological and economic successes and remains the technological centre in the long term.

The guarantee for the safe implementation of scenario 2 is the full use of the know-how and technologies available in Germany/Europe along the aluminium die casting value chain while at the same time focusing on a common goal.

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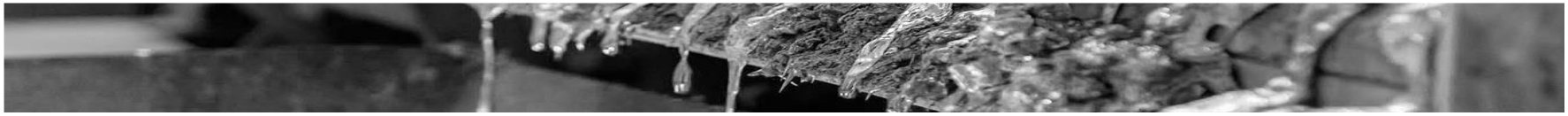


A

Management Summary

B

Past

Present

Know the past, Understand the present

C

Future

Shape the Future

D

!

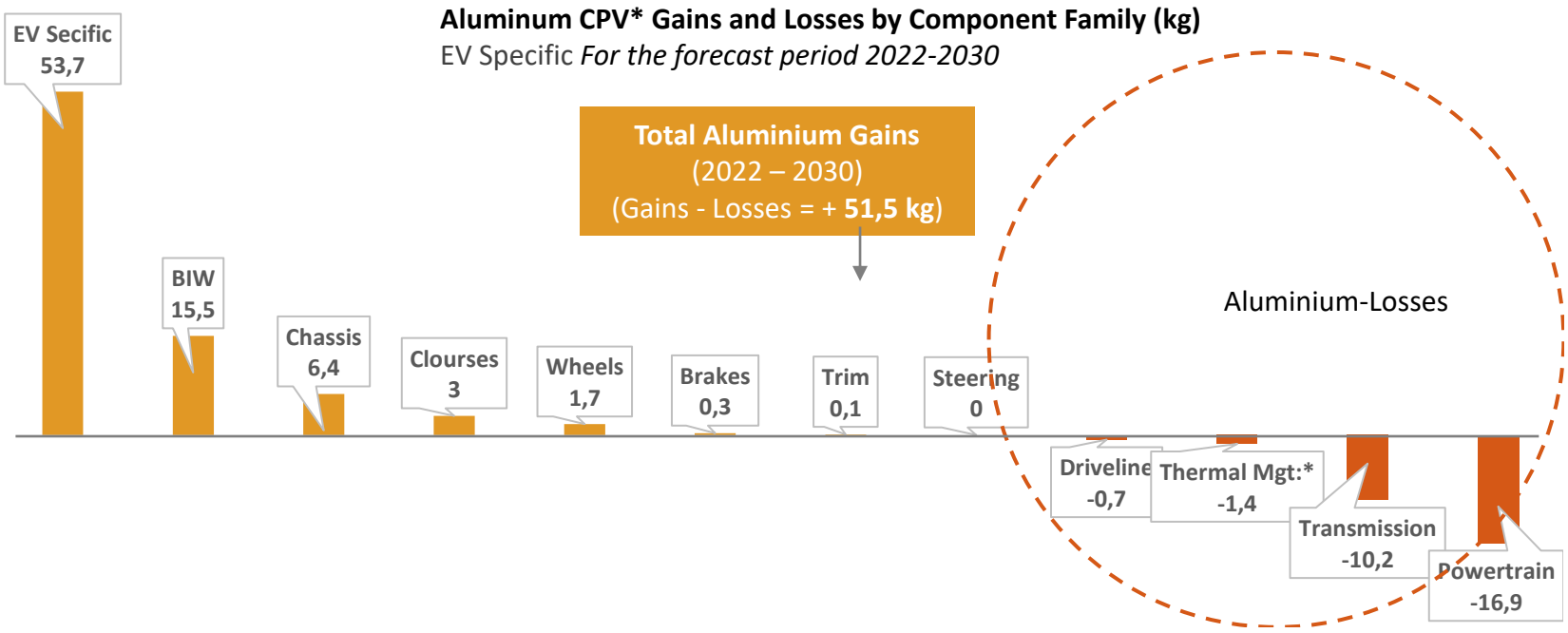
Summary

Shaping the future- Assessments, expectations

The trend towards lightweight automotive construction continues unabated. Experts even assume that the trend will continue to increase as a result of the transformation to e-mobility. According to a Ducker study from December 2022, the proportion of cast aluminium in passenger cars (Europe) will continue to grow despite major losses in the powertrain.

Aluminium content per passenger car

(Ducker Study Europe 2022-2030)



* The component family 'Thermal Management' does not include battery cooling plates, which are accounted in the component family 'EV Specific'. If battery cooling plates were included in the 'Thermal Management' component family, the Thermal Management CPV would show a growth from 20.5 kg in 2022 to 24.1 kg in 2030 (2.1% CAGR)

Sources: Ducker; *CPV = Content Per Vehicle; *Ducker applied the 2026–2029 CAGR to estimate the 2030 values

Shaping the future- Assessments, expectations

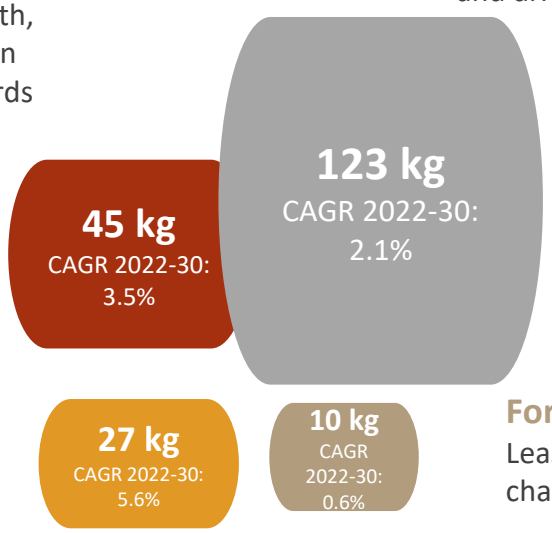
The Ducker study assumes that the proportion of aluminium per car will grow by 51.5 kg by 2030. According to the study, the proportion of cast aluminium is to increase by 22.1 kg to 145 kg of cast aluminium per vehicle (Ø Europe).

Aluminium content per passenger car

Sheet (+14 kg by 2030)

Aluminum sheet demand continues its growth, driven by electrification and weight reduction targets, as well as product mix leaning towards larger vehicles. Growth mainly comes from:

- EV Specific – primarily ballistic protection and battery cooling plates
- Closures - especially front and rear doors



Castings (+22,1 kg by 2030)

Remain the leading product form for aluminum components. Decreasing powertrain, transmission and driveline components are overcompensated by:

- new EV components (e-drive housings, battery pack housings, high voltage device housings, etc.)
- large and mega castings for body-in-white, and shock towers
- rising share of cast aluminum subframes

Extrusions (+15 kg by 2030)

The fastest growing aluminum product form due to increasing penetration in:

- EV Specific – battery pack housing
- BIW – mainly sills and CMS
- Brakes - electric brake booster one-box-system

Forgings (+0.5 kg by 2030)

Least growing product form. Only applicable for chassis, wheels and steering components

- stable in wheels and steering
- slightly increasing in chassis (for knuckles and 2-point links)

Source: Ducker Study 12/2022

There are further opportunities for the cast aluminum component in competition with the other processes but also with other materials.

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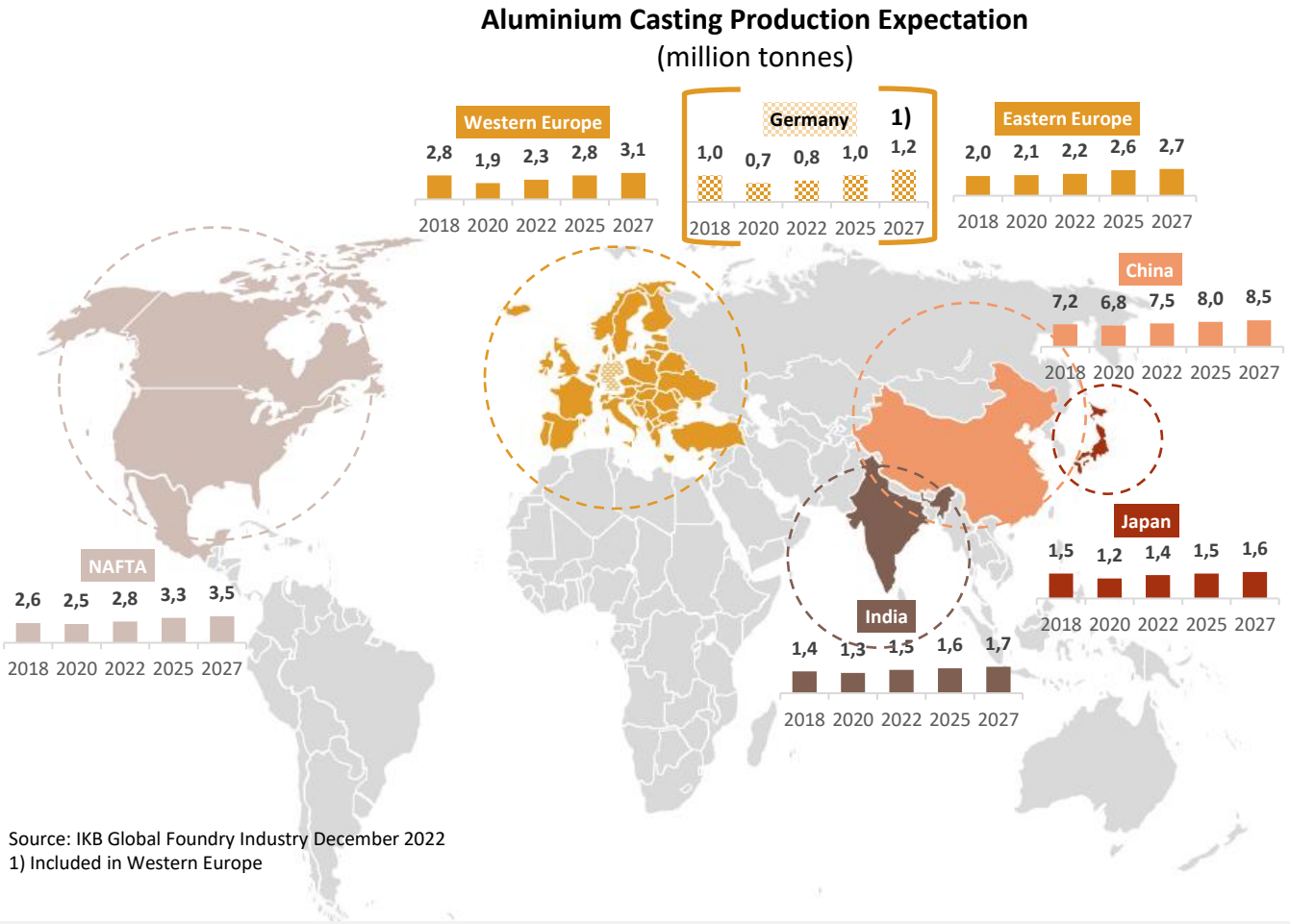
Shaping the future- Assessments, expectations

Experts assume that the demand for aluminum casting will continue to rise worldwide.



Growth in all major aluminium die casting regions. In Europe, a perceptible trend reversal is unlikely to begin until 2025.

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Shaping the future- Interim summary

Interim summary:

The aluminium die casting industry in Germany/Europe is in a challenging, multidimensional **risk environment**. Transformation (ICE → BEV) and energy costs are only part of the risk.

In addition to the risks, the current situation also offers **opportunities**. **New opportunities**, as far as the product portfolio is concerned, and **old opportunities**, because potentials that have been known for a long time have not yet been exploited or have not been used consistently.

The guarantee for **"secure" success** is the **full use** of the know-how and technologies available in Germany/Europe along the aluminum die casting value chain while at the same time focusing on a common goal.

*The goal of the entire aluminum die casting value chain must be to develop and industrialize the economically and technologically best parts for the product (car) together with the customers (OEMs and Tier 1). The **focus** must be on the **product (car).***

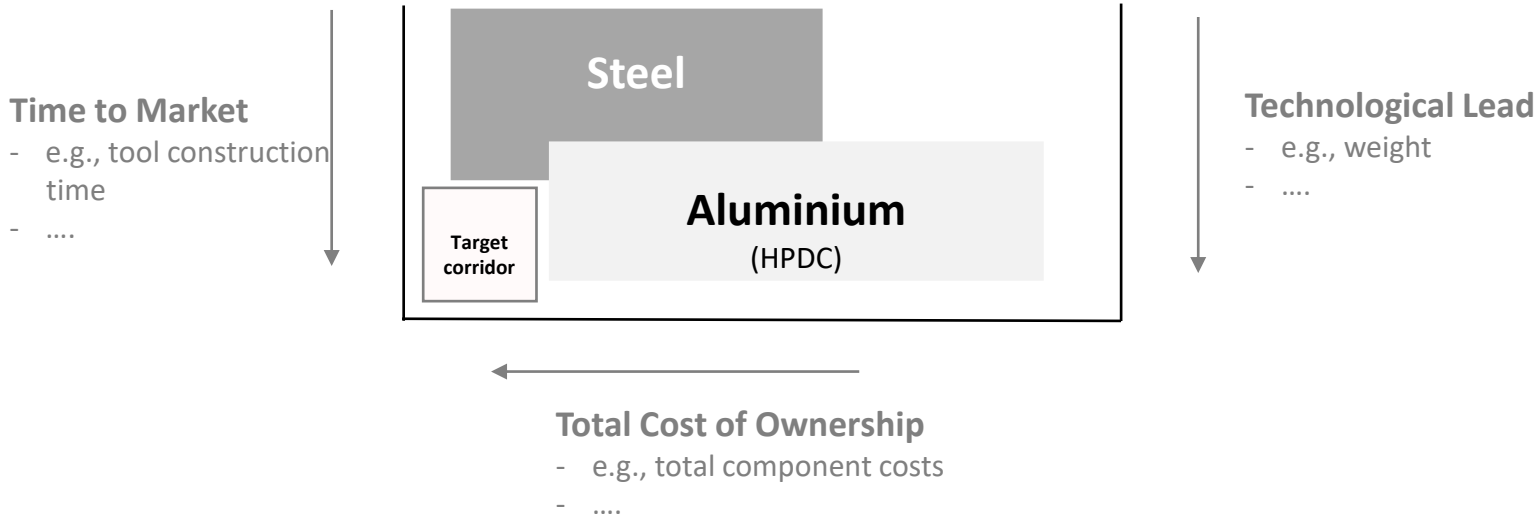
***Total Cost of Ownership, Time to Market and Technological Lead** are the targets that influence success and make it measurable.*

Shaping the future- Recommendations

However, **new products** and the associated opportunities must constantly **be won** in competition with other processes and materials.

Competition with other processes and materials

Example:
Aluminum vs. Steel
(schematic)



Total cost of ownership, time to market and technological lead must be the determining goals across the entire process chain and thus for all companies involved.

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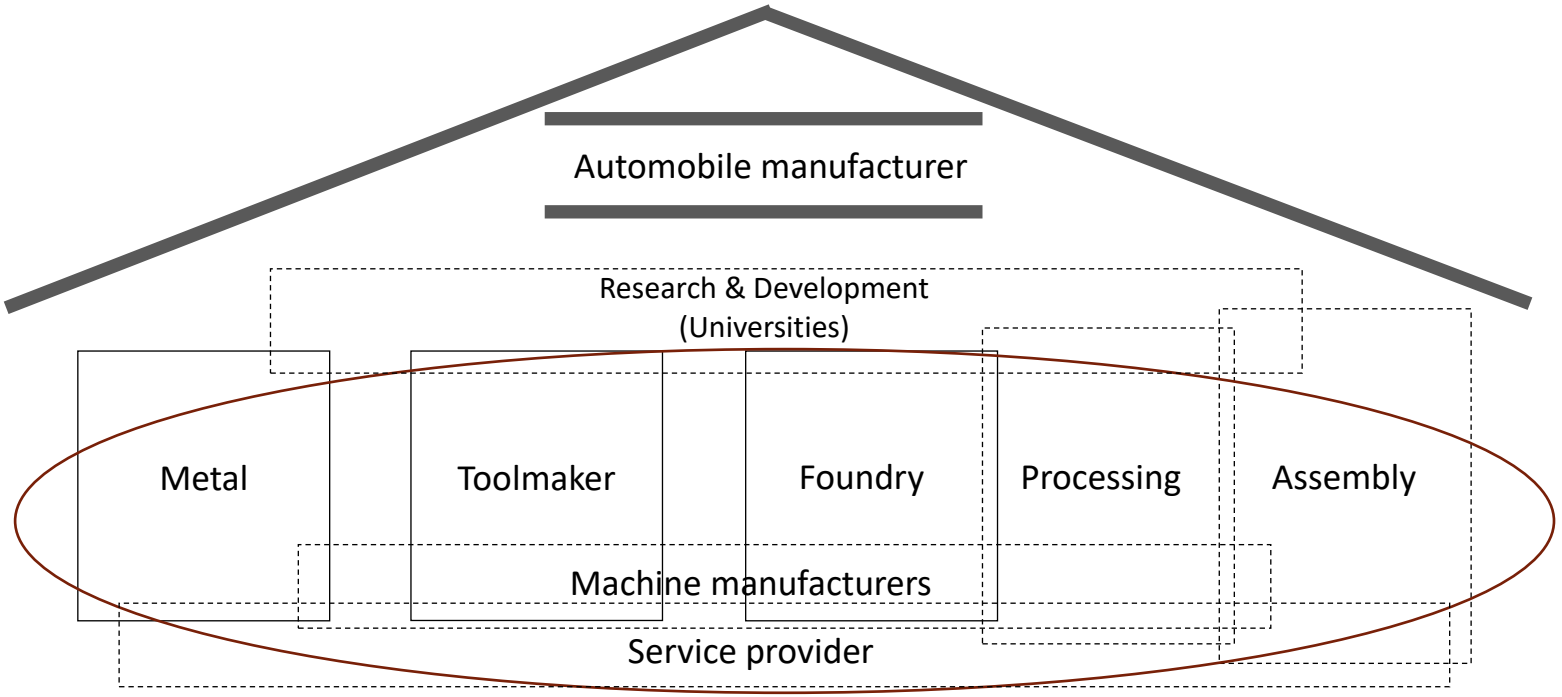
Shaping the future- Recommendations

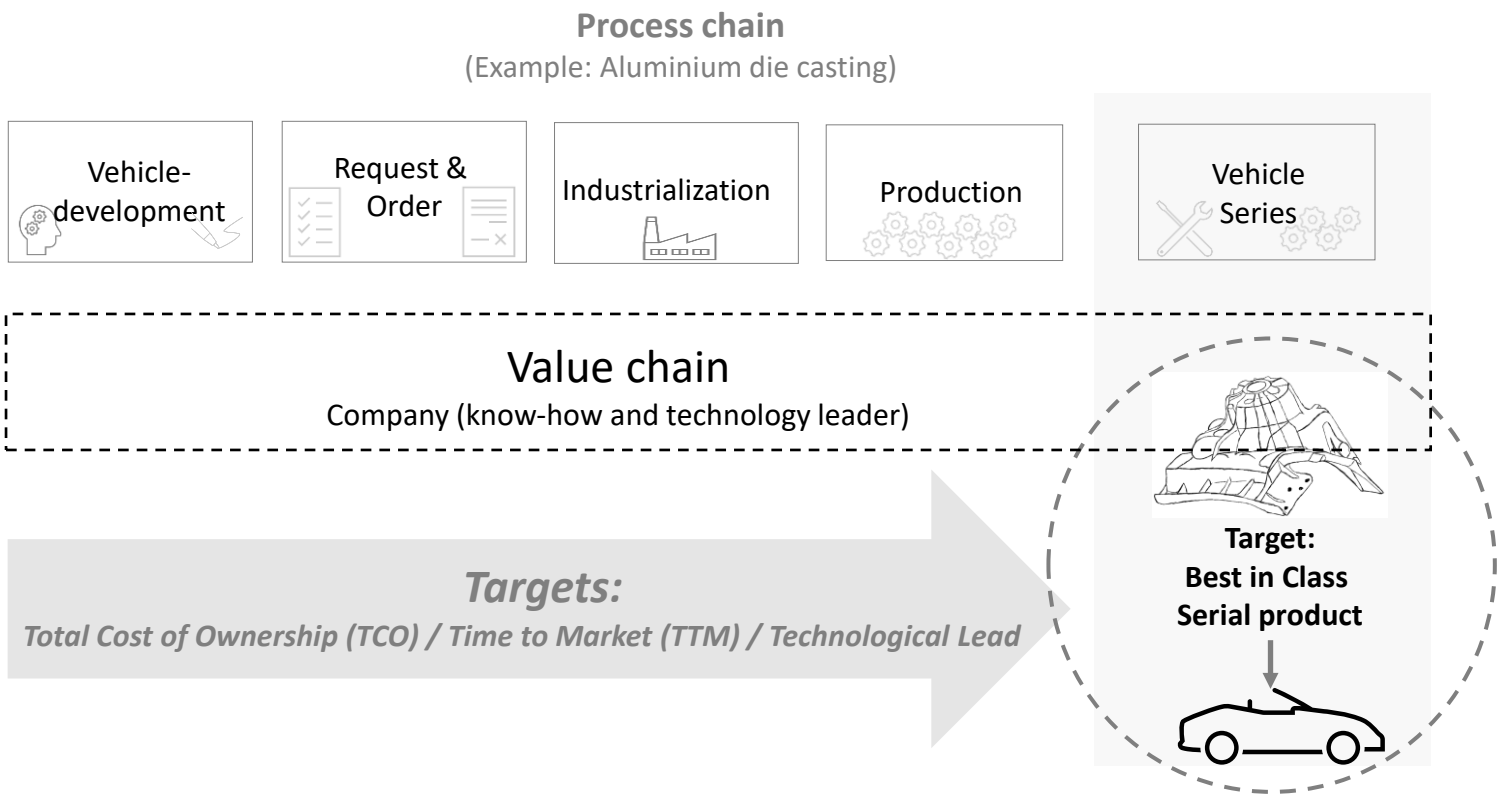
In addition to the right goals, it is the **companies** that make up the **success.** Germany/Europe has successful companies along the entire value chain with **valuable technologies** and **accumulated know-how.**



Compared to the other important die casting regions worldwide (USA, Mexico, China, Japan and India), Germany/Europe has a decisive advantage due to its excellent network and thus a significant **lever for success.**

Shaping the future- Recommendations

The decisive factor for success will be the extent to which it is possible to win over the right companies for development, industrialization, and series production, to call them up flexibly and to deploy them in a targeted manner.



Cooperation, partnerships, joint ventures and goal-oriented project organizations are possible solutions.

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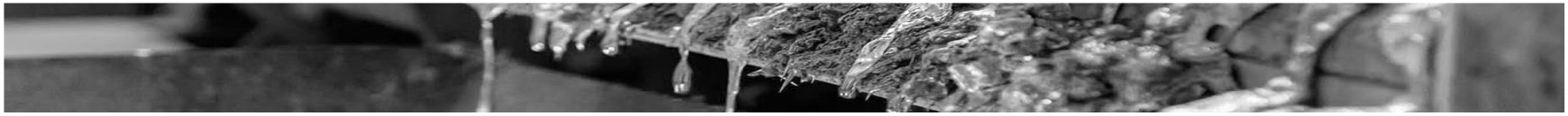


A

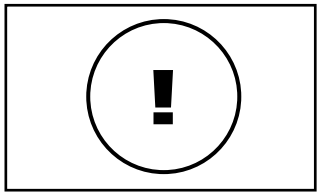
Management Summary

B

Know the past, Understand the present

C

Shape the Future



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Summary

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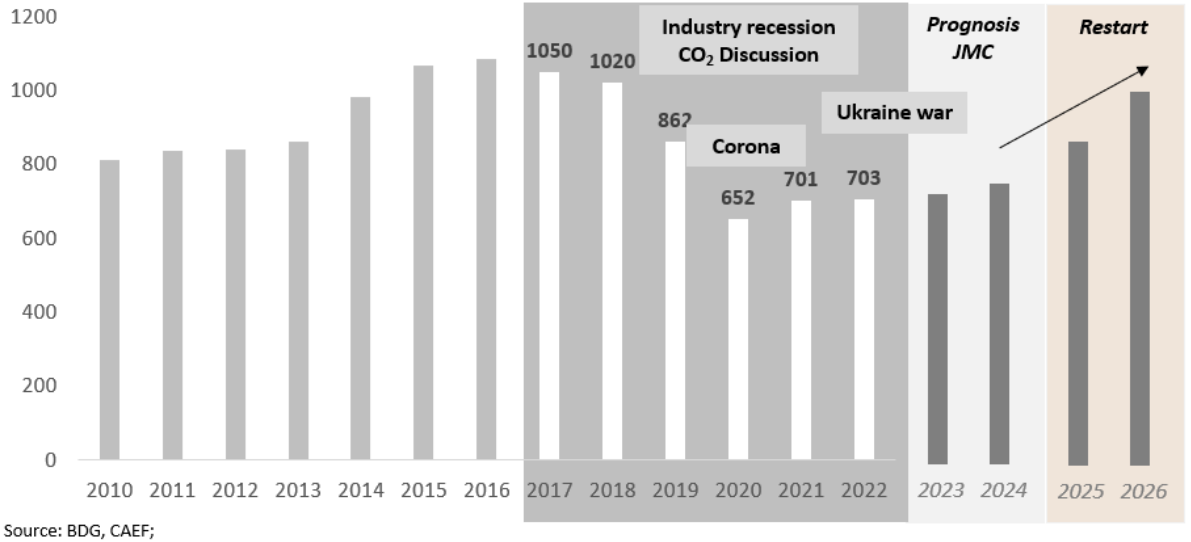
Summary

Risks are there, but the opportunities are worth fighting for.

- Aluminium die casting will continue to be the dominant casting process with robust growth potential in the future. New products offer opportunities for the entire industry and individually for all companies.
- In addition to the of success to transform opportunities and risks into success, right goals, die-casting know-how and valuable technologies are the guarantee
- Through successful, joint initiatives and strategies, stakeholders (customers, shareholders, shareholders, employees, etc.) can be won back to the foundry industry.

Casting production, German aluminium foundries
(Al cast in 1,000 t)



Source: BDG, CAEF;
Source: 2023-2026 Prognosis JMC

The entire aluminium die casting value chain in Germany/Europe has all the prerequisites to continue to be successful together.
Do it is the key to success.

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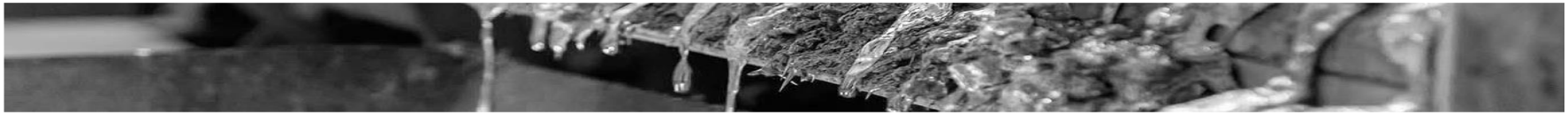

“Talent wins games, but teamwork and intelligence wins championships.”

- Michael Jordan -

STRATEGY DEVELOPMENT

MANAGEMENT CONSULTING
INTERIM MANAGEMENT

NETWORKING

COMPANY ANALYSIS