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„Turbulent times“

Aluminum foundry industry in flux

Lecture for the 19th Diecasting Day, Schorndorf the 26.02.2019

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Introduction

The automotive supply industry is the supporting pillar of the automotive industry. Within the supply industry, the foundries play a prominent role.

The foundries have made a significant contribution to the development of the entire car industry in recent years with their developments and innovations. Through permanent optimization of processes and procedures, essential components in the vehicle could be substituted by innovative aluminum castings. Aluminum castings for the engine and powertrain are milestones in this development and are shining examples of good cooperation between the automotive and foundry industries.

However, the foundries have not only developed the status of perceived suppliers through their valuable services, they have also become the focus of financial and strategic investors.

A look at the recent years, the current events and the emerging trends shows that a significant change in the aluminum foundry industry is to be expected.

The four big challenges

Internationalization
Product Portfolio
Technologies
Employees

will be the main topics of the foundry industry in the coming years.

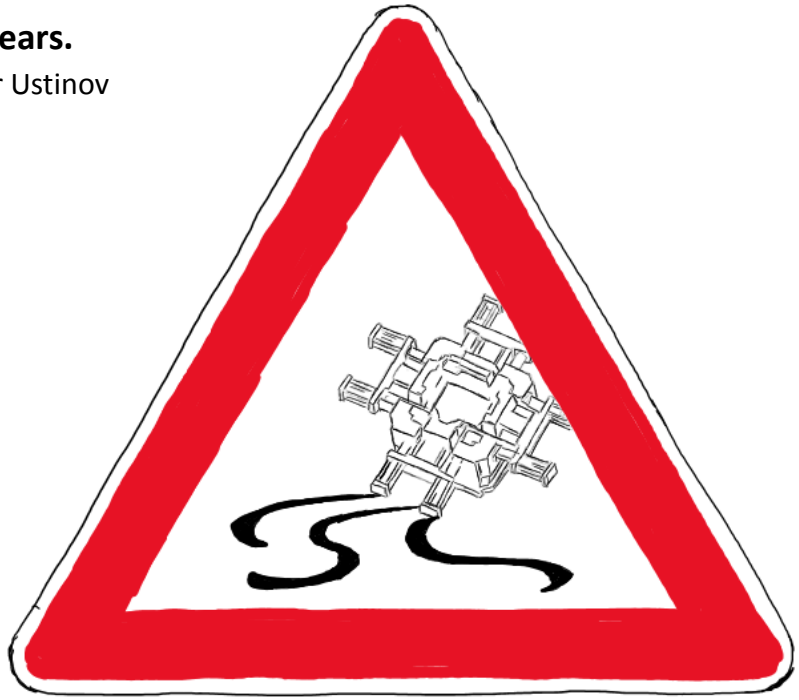
Turbulent times, with opportunities and risks lie ahead of us. Where the journey goes is still open for many foundries.

Aluminum foundry industry in flux

„Turbulent times“

Now are the good times,
after which we will long for in ten years.

Peter Ustinov



Aluminum foundry industry in flux

The 4 challenges in aluminum die casting

Internationalization

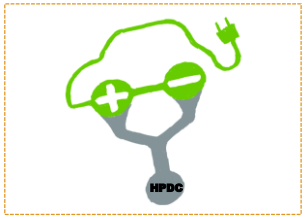
9 of the 10 large aluminum founder worldwide are globally positioned

The 10 large German HPDC founder have low-cost locations

Product Portfolio

Growth in the coming years

In its latest study, **McKinsey** estimates OEMs will **increase** the share of light metal components from **30% to 70% by 2030.**



HPDC

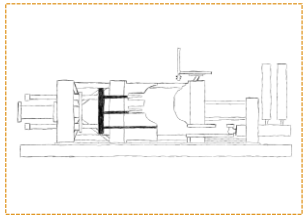
1990 → 2020 → 2030

10 Top expectations of employers

Top 1 – 58 % **good working atmosphere**

Employees

Top 4 – 37 % **high payment**



Investments (Foundries)

1995 - 1999 **7,5%**
2000 - 2004 **8 %**

Technologies

2005 – 2009 **5,5 %**
2010 - 2014 **< 5 %**

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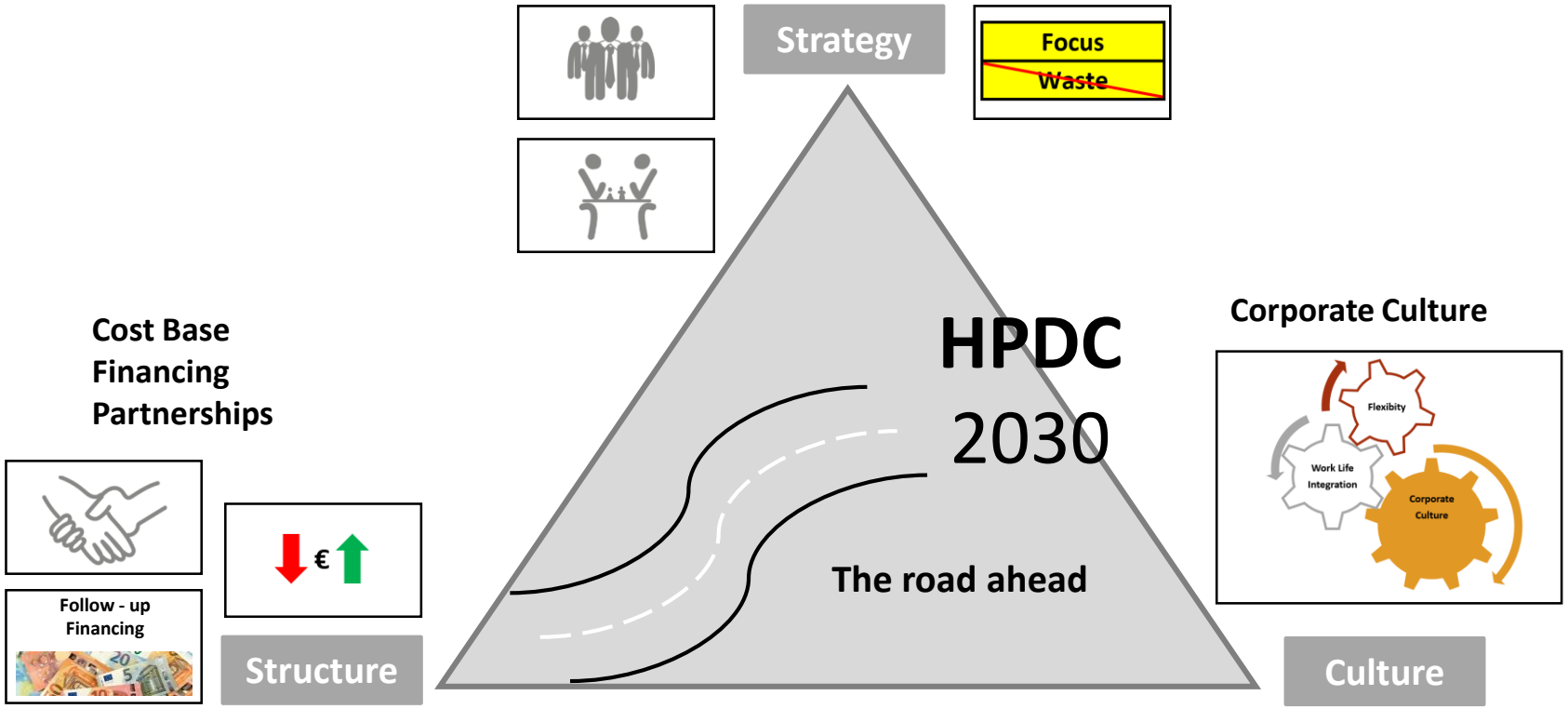
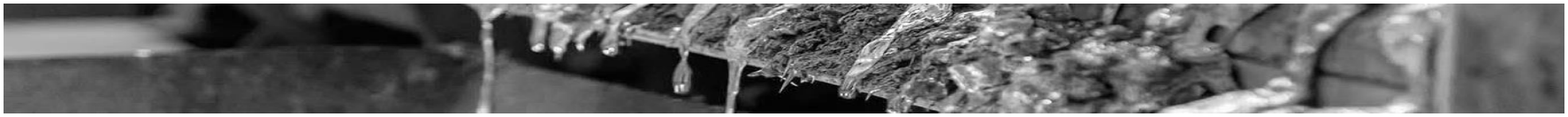
Aluminum foundry industry in flux

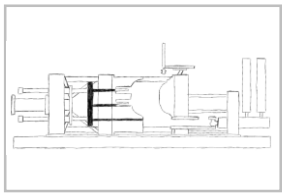
„Where is the journey taking us?“

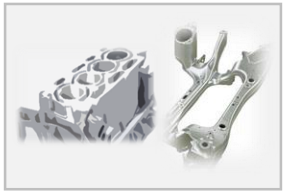
Strategie Roadmap, Managementquality, Technologie Roadmap

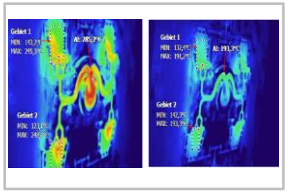


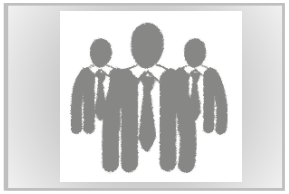
Aluminum foundry industry in flux











Initial Situation

Current Status (1990 → 2020 → 2030)

A

Inter-nationalization

B

Product-portfolio

C

Technologies

D

Employees

Summary

„Where is the journey taking us?“

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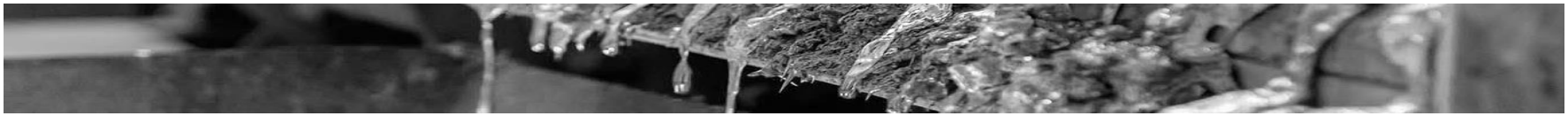
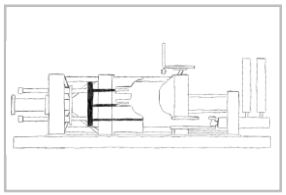
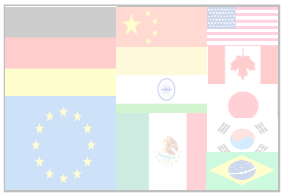
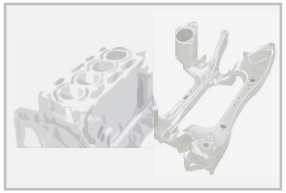
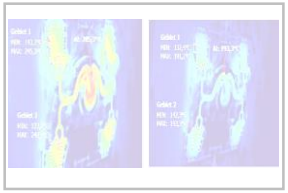
Aluminum foundry industry in flux











Initial Situation

Current Status (1990 → 2020 → 2030)

A Inter-nationalization

B Product-portfolio

C Technologies

D Employees

Summary

„Where is the journey taking us?“

Status

Looking back on the last 30 years, we can see that well-known German aluminum foundries have changed hands. The industry has come into the focus of financial and strategic investors. The old "order" has loosen significance.

If we look at the past half year, then a noticeable "unrest" in the environment of the foundries can be felt. Management changes, company sales and insolvencies are the indicators for this.

For the year 2019, there are clear signs that point to a decline in the economy. Leading economic institutes have repeatedly revised down the forecasts for the year 2019 at short intervals in recent months. The foundry industry judges the year 2019 even more critical than other industry associations. Possible effects of a slowing economy would be threatening for many foundries.

However, if we look further into the future, there are enormous opportunities due to rising aluminum casting requirements. Foundries that manage the upcoming challenges well, have a good chance of a successful future.

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Aluminum foundry industry in flux (Status)

Sale of German Aluminum Foundries

... since 1990

FOR SALE % %

Traditional Company MADE IN GERMANY		Financial Investor		Strategic Investor
ae Group *				2009 MITEC
Amann Casting				2006 Endurance Group
BDW				2011 Magna
DGH *		2014 Ohorizons + Oak Hill Advisors		
Erich Sydow *				2013 Wilms Gruppe Menden
Honsel *		1999 Carlyle Group; 2004 Rippelwood		2011 Martinrea (.... → ZF)
KSM		2005 Cognetas		2011 Citic Dicastal
Laukötter Dessau *				2015 Xi Wu
MTK *				2009 Frankenguss
Pressmetall		2012 Capital Management Partners		
TCG Hermann *				2014 Rupf Industries
Trimet Automotive				2018 Bohai Automotive Systems
Willy Voit		2013 Bieg Invest		
.....		.....		.....
Alu Druckguss Brandenburg, Insolvency		Tadir Group		Legend: Owner = from 75% of the shares * Insolvency in the past
Auer Guss, Insolvency				
Schweizer Group, Insolvency		2015 Endurance Capital		

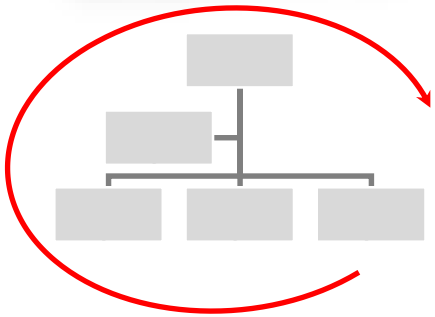
Aluminum foundry industry in flux (Status)

Strong turbulences

.... since the 3rd and 4th quarter of 2018

Insolvencies

Management Change



Company Disposals

- Slowdown of the economy. Repeated correction of growth forecasts for **2018** (2.2% → 1.8% → 1.6% → **1.5%**)
- **Sales decline** in parts of the automotive industry (diesel affair, Brexit, new test procedures (WLTP) for new car registrations, trade conflicts)
- **Management change** at major market participants in the HPDC in Germany
- **Insolvencies** of significant market participants
- **Company Disposals** of German die-casting foundries continue

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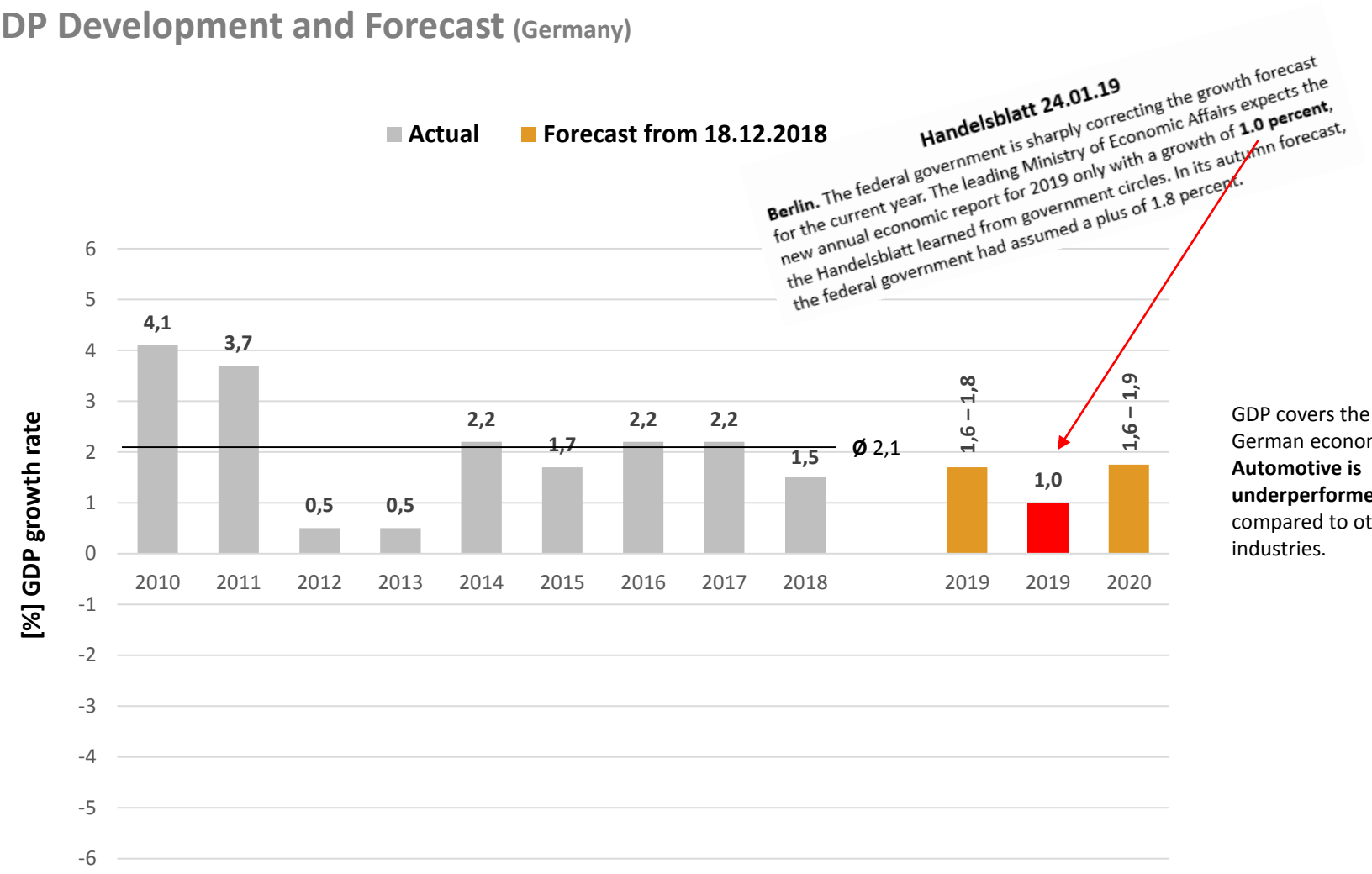
Aluminum foundry industry in flux (Status)

GDP Development and Forecast (Germany)



Handelsblatt 24.01.19

Berlin. The federal government is sharply correcting the growth forecast for the current year. The leading Ministry of Economic Affairs expects the new annual economic report for 2019 only with a growth of **1.0 percent**, the Handelsblatt learned from government circles. In its autumn forecast, the federal government had assumed a plus of 1.8 percent.

GDP covers the entire German economy. **Automotive is underperformed** compared to other industries.

Source: Actual - Federal Statistical Office, Forecast - Different economic research institutes

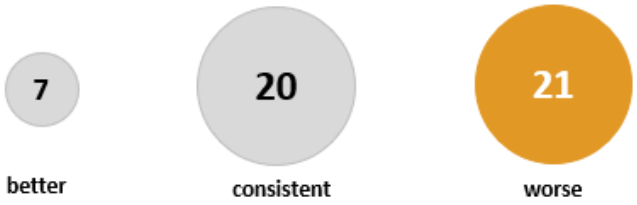
Aluminum foundry industry in flux (Status)

IW - Association survey for 2019 (survey of 48 business associations Dec./2018)

The "mood" in the foundries is particularly bad

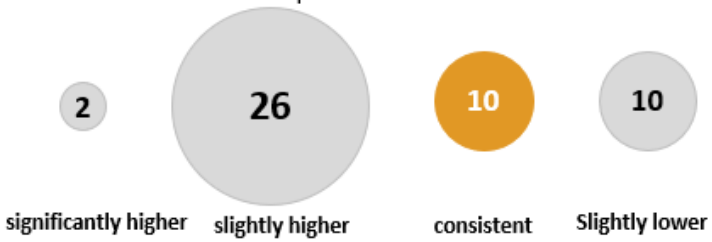
General mood

What do you think is the general mood in the companies of your industry compared to the turn of the year 2017/2018?



Sales

Which product result (possibly price-adjusted sales - or business results) your industry expects for 2019 compared to 2018?

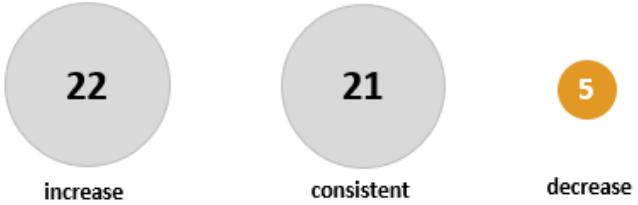


Number of employees

How will the number of employees 2019 develop in your business branch compared to 2018?

Investment

How will investment in 2019 develop compared to 2018 in your industry?



Source: IW Association Survey 27.12.18

Assessment of the foundries

Aluminum foundry industry in flux (Status)

Result effects if missing Turnover (2019),
or what happens if that is done ?

EBITDA Ø 8,1 %
(EBIT 3-4%)

(Average of German die casting foundries 2016 and 2017)

Between 2010-2015, the top 100 global automotive suppliers grew from **6.7% EBIT to 7.3% EBIT**.

Planning 2019
(Classic, simplified planning approach of the foundries)

- 2,6 % + 1,3 % + 1,4 % = **8,3%**

Planning 2019
(without additional quantities)

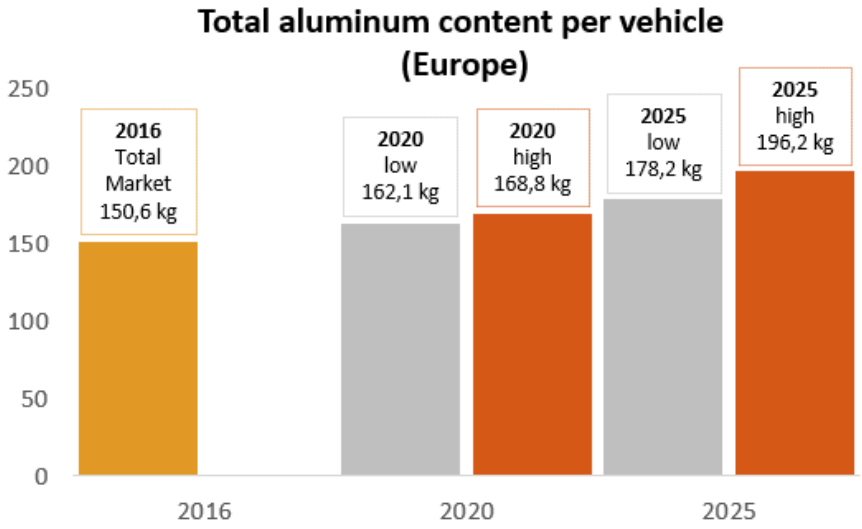
- 2,6 % + 1,3 % + 0 % = **6,8%**

Cost Increase	CIP Projekte	Additional Quantities

Result: Investments, R & D budgets and training costs are reduced.

Aluminum foundry industry in flux (Status)

The share of aluminum in the vehicle will continue to increase in the future,
the trend of recent years continues



	2020		2025	
	low	high	low	high
CAGR (2016 – Year)	1,9 %	2,9 %	1,9 %	3,0 %
Growth (Year compared to 2016)	7,7 %	12,1 %	18,3 %	30,3 %

Differences between the "low" and "high" scenarios are mainly caused by the penetration rates and the use of aluminum for chassis and structural parts.

Source: Ducker Worldwide

The amount of aluminium used per car produced in Europe almost tripled between **1990 and 2012**, increasing from **50kg to 140 kg** • This amount is predicted to rise to 160 kg by 2020, and could even reach as much as 180 kg if small and medium cars follow the evolution recorded in the upper segments
Ducker Worldwide 2016: Aluminium penetration in cars

In its latest study**, McKinsey** estimates that OEMs will increase the share of **light metal components from 30% to 70% by 2030**. Reason: compensate for weight increases, meet CO_2 requirements and build more efficient vehicles.

The demand of the automotive industry for aluminum has increased significantly in recent decades. This affects almost all areas: wheels, chassis, engine, equipment and body. For example, between **1978 and 2015**, the share of light metal in cars manufactured in Europe increased **from 32 kilograms to 160 kilograms.**
The assumed average growth until **2030 is six percent per year.**
McKinsey

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Aluminum foundry industry in flux (Status)

1990 → 2020 → 2030 (Summary)

TURBULENT TIMES

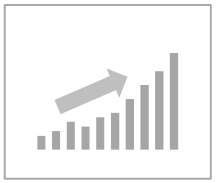
Foundry 2030

	Strength	Weaknesses
Opportunities	**Expand** (ausbauen)	**Catch up** (aufholen)
Threats	**Secure** (absichern)	**Avoid** (vermeiden)

- The **proportion of aluminum** in the vehicle will continue **to grow** in the next few years. Aluminum die casting remains the dominant process.
- The industry continues to be the focus of **financial and strategic investors**. New competitors will emerge through acquisitions.
- **2019** threatens a **turbulent year**, with uncertain volumes, changing products and financial challenges.
  - > The budget planning for 2019 has to be questioned. Early warning systems are to be activated.

Sale

Current Economic



Future Aluminium

In a turbulent environment there are great opportunities, but unfortunately also risks.

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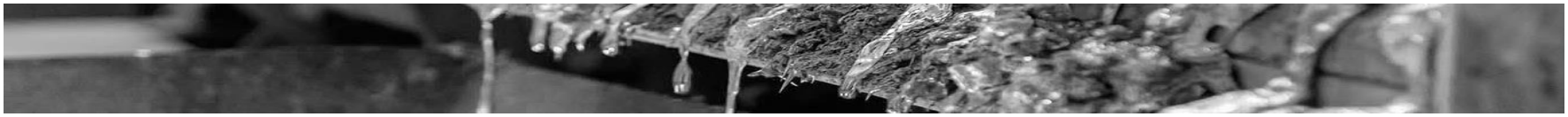
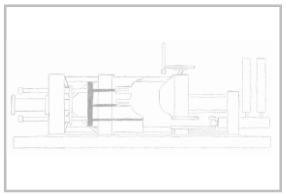
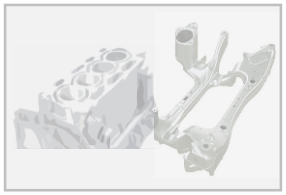
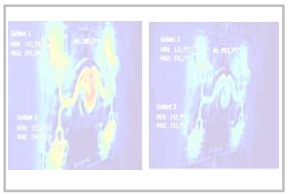
Aluminum foundry industry in flux









Initial Situation

Current Status (1990 → 2020 → 2030)

A

Inter-nationalization

B

Product-portfolio

C

Technologies

D

Employees

Summary

„Where is the journey taking us?“

Internationalization

In the long term, there is a growing need for aluminum worldwide, with good prospects for aluminum castings. Unfortunately, most of this growth takes place outside of Europe. The growth regions are China, India and Mexico. Following the growth regions, the internationalization of the automotive industry has been taking its course for years. In addition to the proximity to the markets, it is above all the labor costs that make many of these regions attractive for investment.

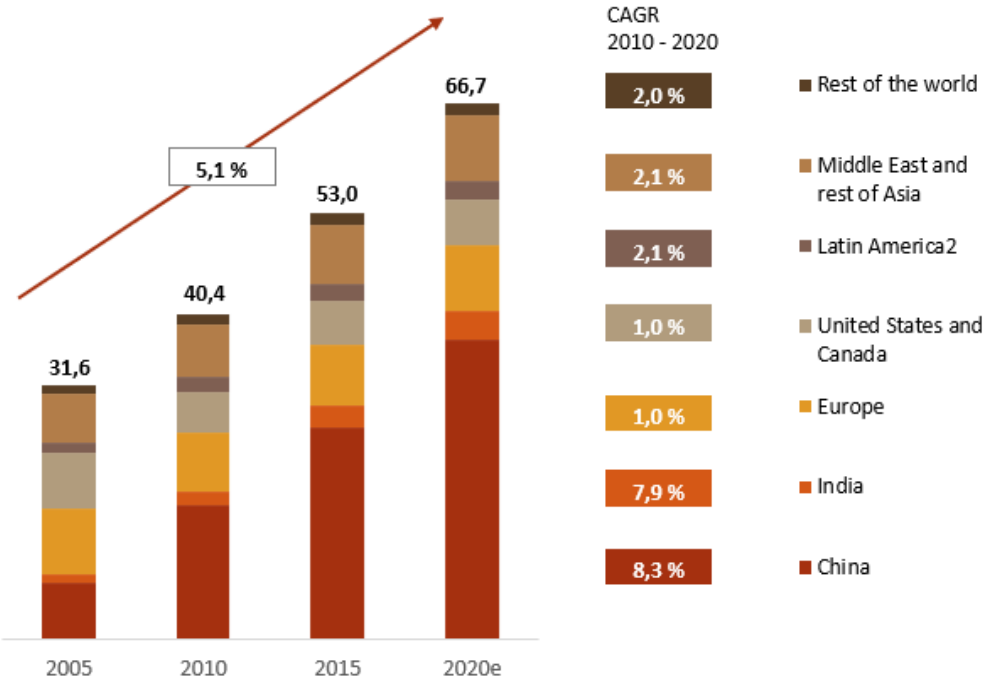
This trend can also be observed in the aluminum foundry industry. Major players have been investing in internationalization for years and are positioned worldwide. Small and medium-sized foundries often have at least one low-cost location.

In the long term, foundries around the automotive industry will not be able to avoid internationalization. If company size and financial strength are not enough, international partnerships or joint ventures are essential.

Aluminum foundry industry in flux (Internationalization)

Global demand for aluminum will continue to rise in the long term. However, the growth lies outside of Europe with a modified parts portfolio (India + 7.9%, China + 8.3%, currently the highest growth rates).

Global aluminium consumption (Million tons per annum)



Sources: RBC – Aluminium Market Outlook; U.S. Geological Survey Minerals Yearbook ; CRISIL; A.T.Kearnea analysis

Aluminum foundry industry in flux (Internationalization)

Major players have been investing in internationalization for years,
following the growth markets

Company	Sales 1) (Mio.€)	Home Country	Japan	USA Canada	Mexico	South America	China	India	Europe
Ahresty Corporation	1.000	Japan	✓	✓	✓		✓	✓	
Georg Fischer	800	Switzerland		✓ (JV Linamar)			✓		✓ CH & 5 others
Gnutti Carlo Group	?	Italy		✓			✓	✓	✓ 5 countries
Group Bocar	1.600	Mexico		2018 AI	✓				
Handtmann	900	Germany					✓		✓ Germany & SK
Hiroshima Aluminium	750	Japan	✓		✓		✓		
KSM (CITIC DICASTAL)	600	Germany/ China		✓			✓		✓ Germany & CZ
Magna International (COSMA)	?	Canada		✓			✓		✓ HU & 2 others
Martinrea Honsel	600	Canada			✓	✓	✓		✓ Germany & ES
NEMAK	4.400	Mexico		✓	✓	✓	✓	✓	✓ 8 countries
Ryobi Limited	1.900	Japan	✓	✓	✓		✓		✓ UK
Shiloh Industries	1.000	USA		✓			✓		✓ 3 countries

1) Turnover relates to all casting processes and is partly estimated

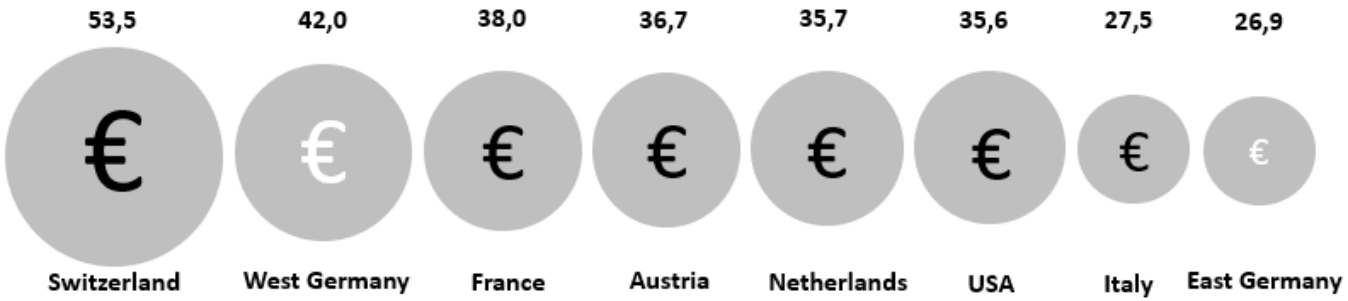
Aluminum foundry industry in flux (Internationalization)

Besides the growth markets, it is the costs that require internationalization

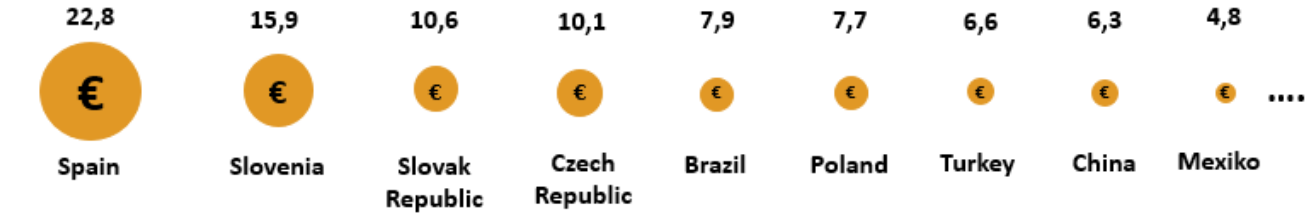
In the past year, industrial labor costs in Germany **increased by 3.3%** and thus more than in the other countries. In addition, we have witnessed a weak productivity development in Germany in recent years. As a result, unit labor costs rose more strongly, which further **worsened our competitiveness**.
Bavarian M + E employer 2018

Labor costs per hour in the manufacturing sector in € 2016

The most expensive Locations



The cheapest Locations

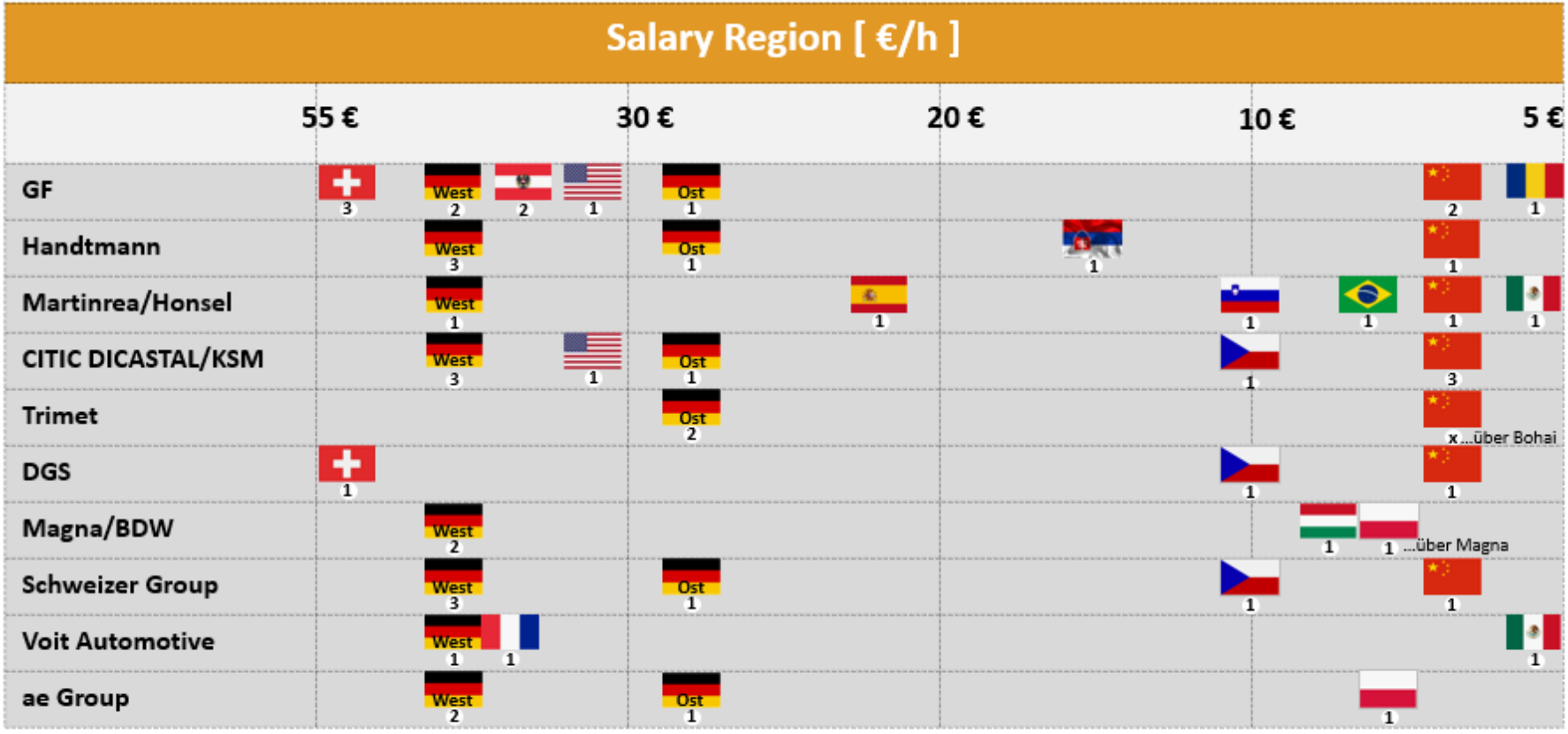


Romania 4,8 €
Russia 4,5 €
Georgia 2,3 €
Ukraine 1,9 €
Philippines 1,8 €
India is from the wage structure not comparable

Source: iwd

Aluminum foundry industry in flux (Internationalization)

The large die casting foundries from German-speaking countries have all foundry sites in low-cost countries

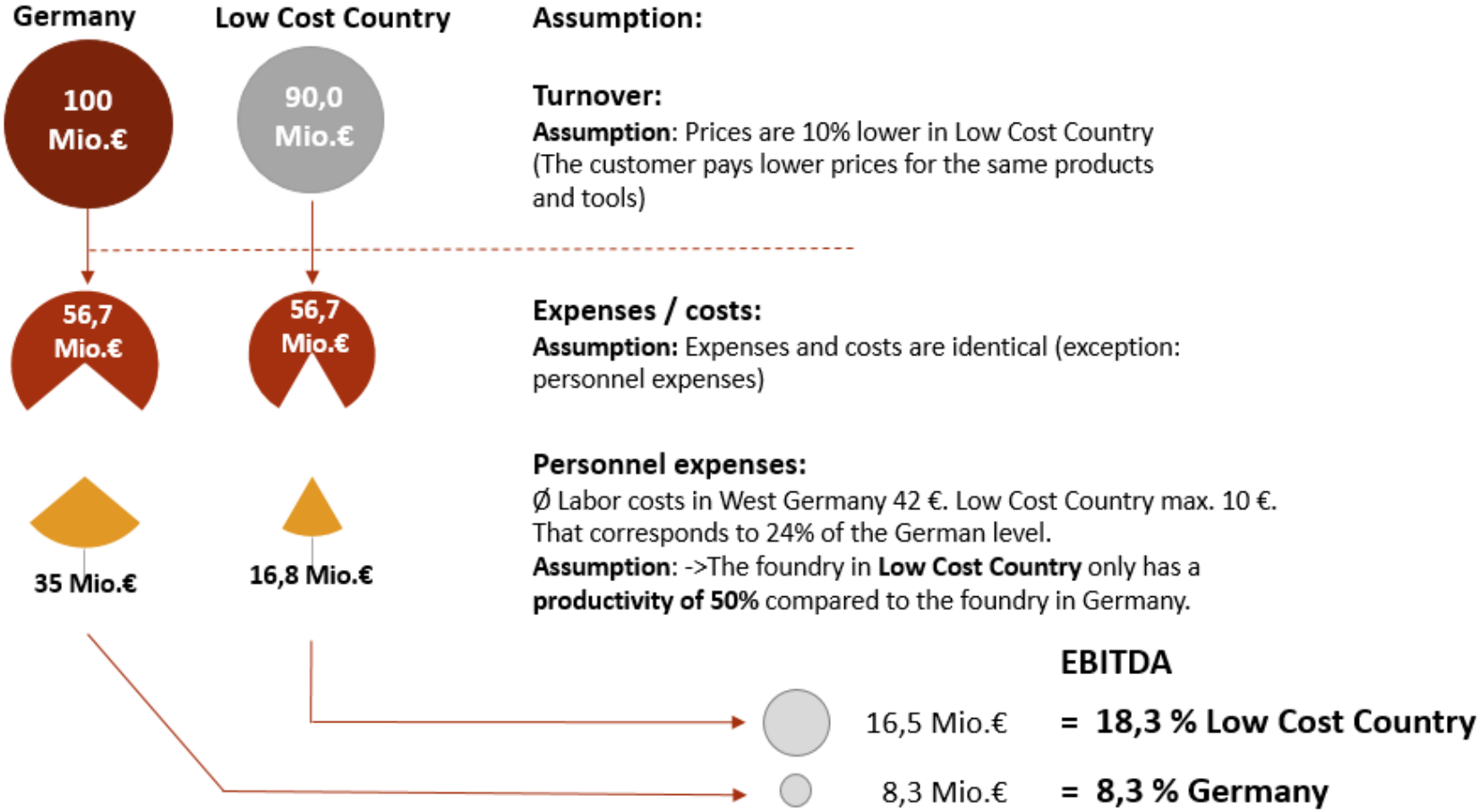


Status as of August 2018

2 = Number locations

Aluminum foundry industry in flux (Internationalization)

EBITDA comparison: Germany / Low Cost Country (... only personnel costs)



Assumption:

Turnover:
Assumption: Prices are 10% lower in Low Cost Country (The customer pays lower prices for the same products and tools)

Expenses / costs:
Assumption: Expenses and costs are identical (exception: personnel expenses)

Personnel expenses:
Ø Labor costs in West Germany 42 €. Low Cost Country max. 10 €. That corresponds to 24% of the German level.
Assumption: ->The foundry in **Low Cost Country** only has a **productivity of 50%** compared to the foundry in Germany.

EBITDA

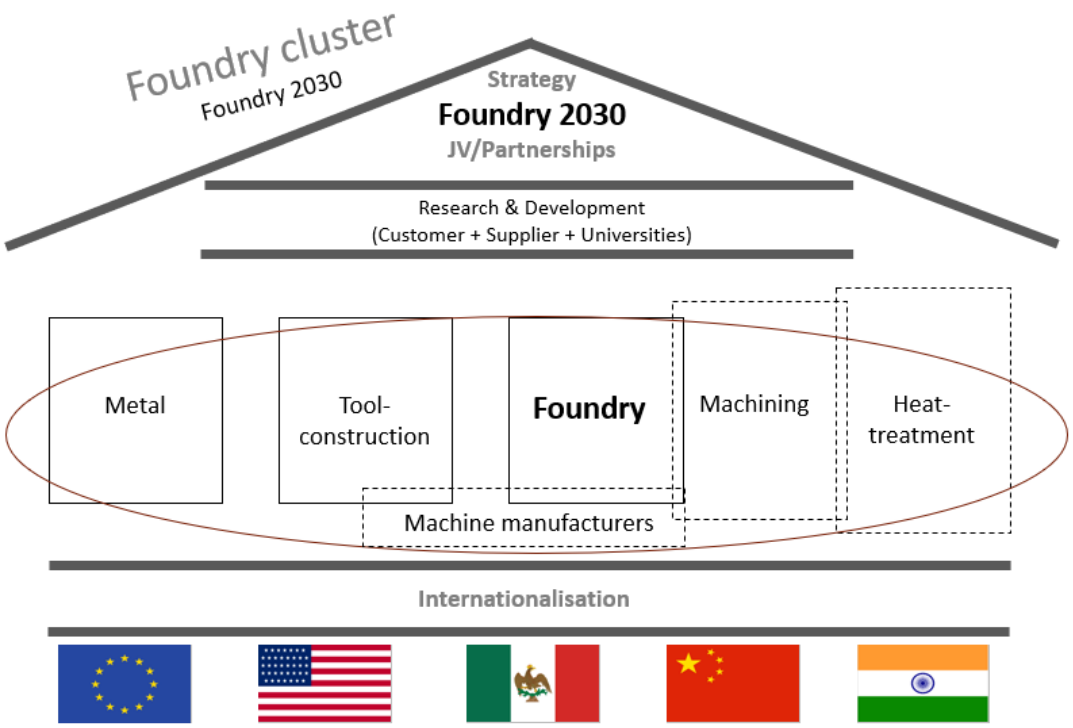
16,5 Mio.€ = **18,3 % Low Cost Country**

8,3 Mio.€ = **8,3 % Germany**

Despite 50% lower productivity and 10% lower prices (product, form), **EBITDA** in low cost country is more than **double** that of Germany.

Aluminum foundry industry in flux (Internationalization)

Internationalization (Summary)



- The growth regions of **China, India and Mexico** continue to gain fast, greater importance.
- The large market participants are growing disproportionately and are investing in **internationalization**.
- Tier 1 suppliers buy or invest in aluminum foundries (ZF, Magna, Linamar, Martinrea, ...) and are new strong market participants.
- In highly competitive markets, necessary cash flow can only be achieved in combination with low cost locations.
- International **JV and partnerships** with market competitors, customers and suppliers are becoming increasingly important.

The OEM-oriented foundries will not be able to avoid internationalization in the short term. For foundries below a critical size, JV / partnerships (national and international) along the value chain are essential.

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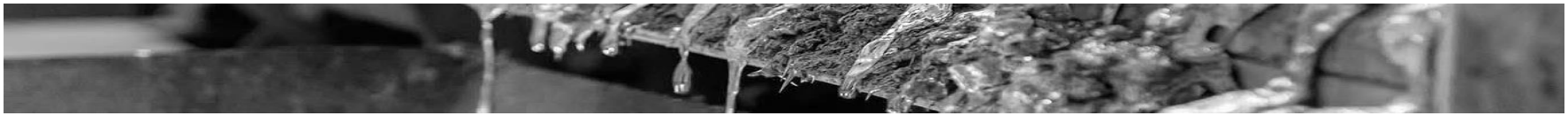
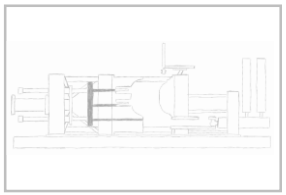
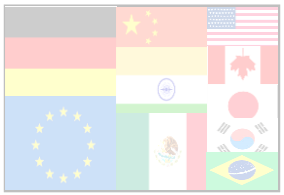
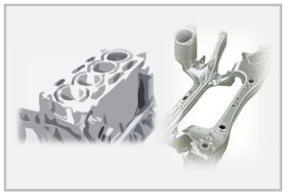
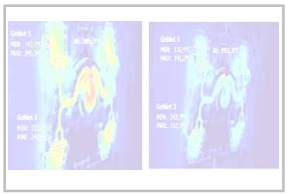
Aluminum foundry industry in flux











Initial Situation

Current Status (1990 → 2020 → 2030)

A

Inter-nationalization

B

Product-portfolio

C

Technologies

D

Employees

Summary

„Where is the journey taking us?“

Product Portfolio

The megatrends of the automotive industry

Autonomous driving
Car - Sharing
Digitalization
Electrification

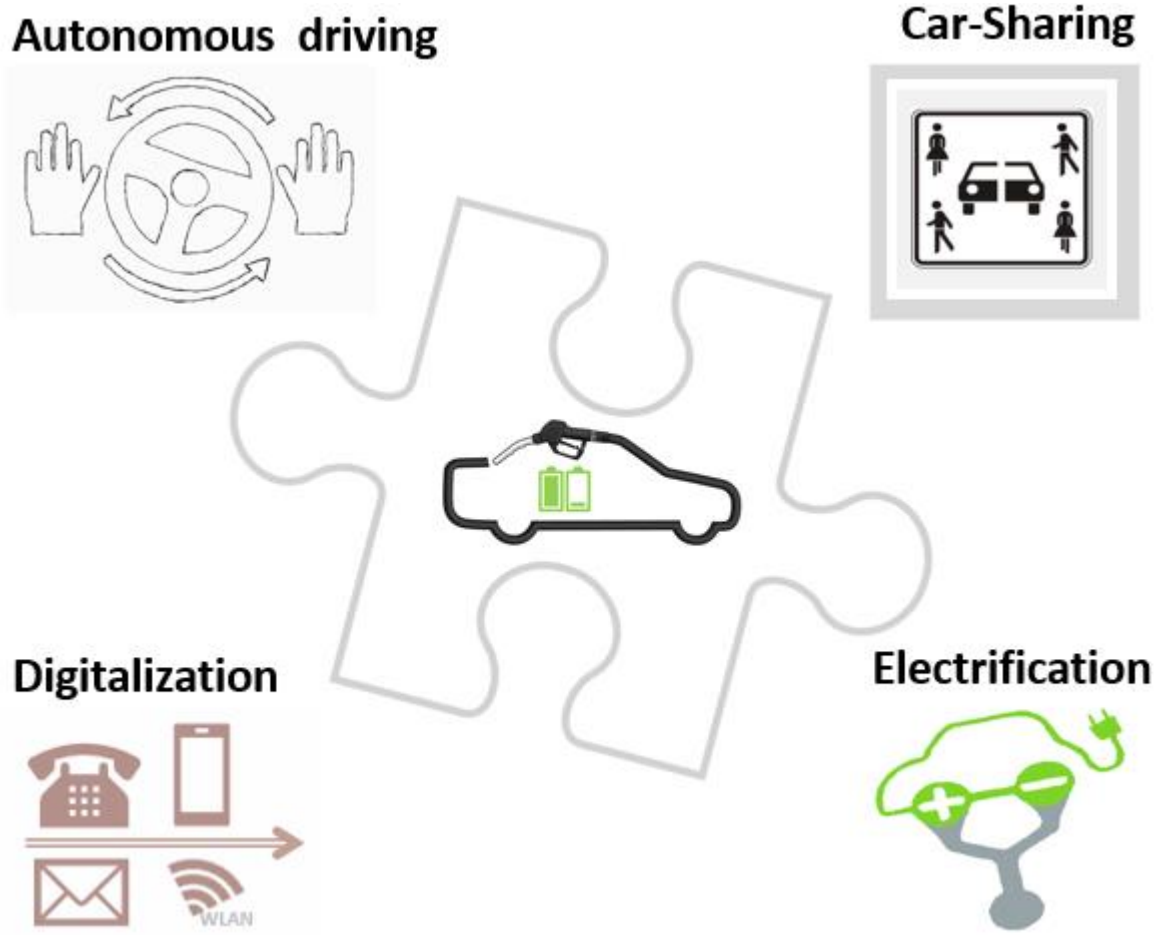
will revolutionize the product portfolio of aluminum foundries. The time horizon is difficult to predict and, at least in the case of electrification, depends largely on policy requirements.

Foundries with appropriate technology, the necessary know-how resources and long-term secured financial resources can benefit greatly from the opportunities presented.

Aluminum foundry industry in flux (Product Portfolio)

The four megatrends of the automotive industry

.... and what they mean for the foundries

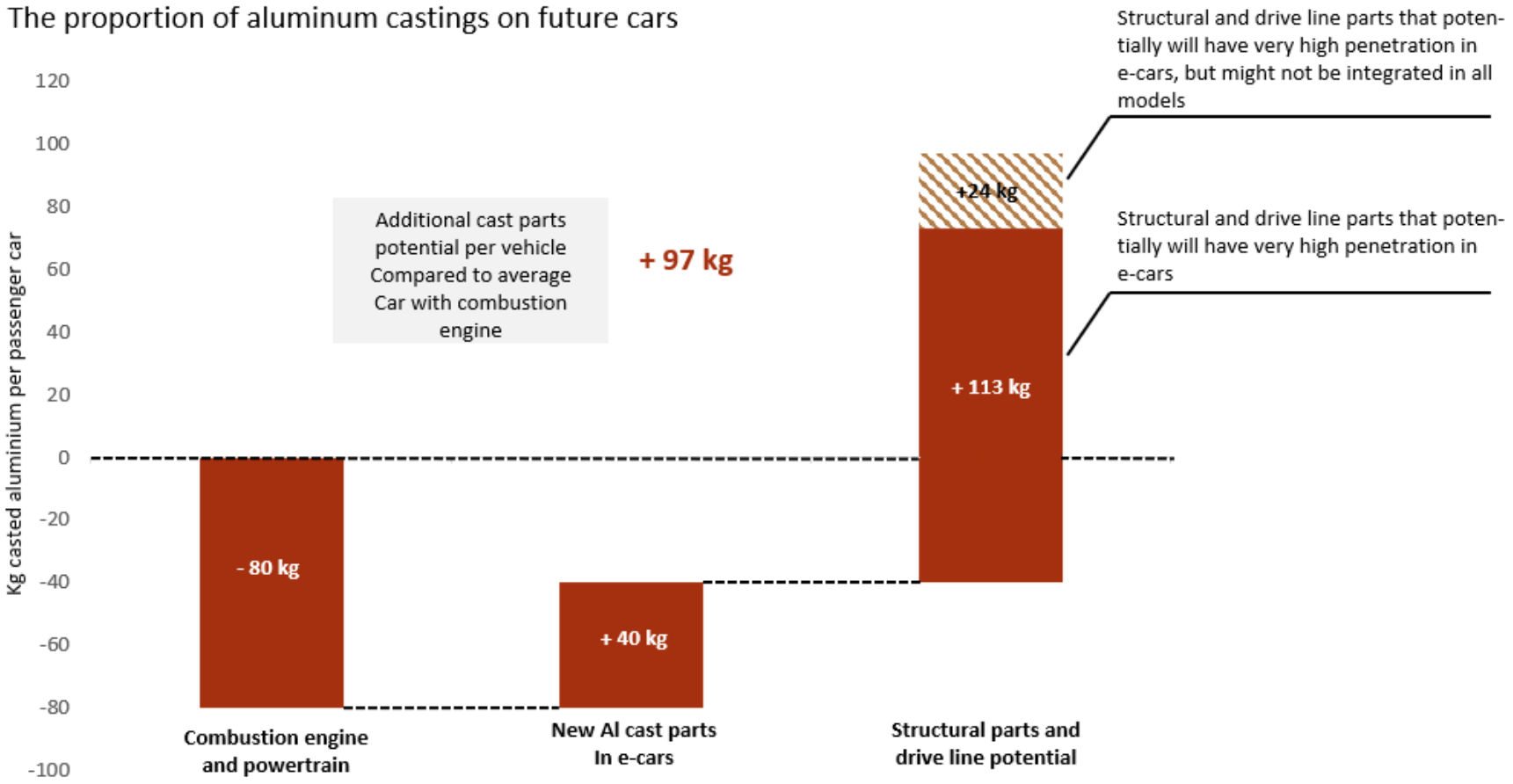


- New customers will emerge (Tesla, Uber, Waymo (sister company of Google))
  → Structured Market Processing
- New products are created, previous "bread and butter parts" are eliminated
  → Development competence, financial strength
- Trend towards smaller vehicles (profitable premium class will decrease)
  → Cost adjustment
- Product life cycles are becoming shorter (5-8 years -> 1-2 years), dynamics of change are increasing
  → Development Competence, Time to Market
- Development Center is not necessarily Europe
  → Internationalization

Aluminum foundry industry in flux (Product Portfolio)

Opportunities for example through e-mobility

The proportion of aluminum castings on future cars



Source: Striko Westofen Group

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Aluminum foundry industry in flux (Product Portfolio)

Risks due to high investments and R & D costs

Shock tower 1 – cavity

Shock tower 2 – cavity

Front and rear cross member

Front subframe cross member

Knots

Rear longitudinal member

A - Pillar

Doors & Rear tail gates

Growing
locking force ranges……

Italpresse Gauss (ITA): **up to 5600 to**

Idra (ITA): **up to 5500 to**

LK (CHN): up to 4500 to

Bühler (CHE): up to 4400 to

Frech (DEU): up to 4400 to

Maicopresse (ITA): up to 4200 to

Toshiba (JPN): up to 4000 to

OMS (ITA): up to 3500 to

UBE (JPN): up to 3500 to

Colosio (ITA): up to 3200 to

Zitai (TWN): up to 3000 to

Locking force ranges 1300 1600 2000 2200 2500 2800 3200 **3500 4000 4400** → **5600 to**

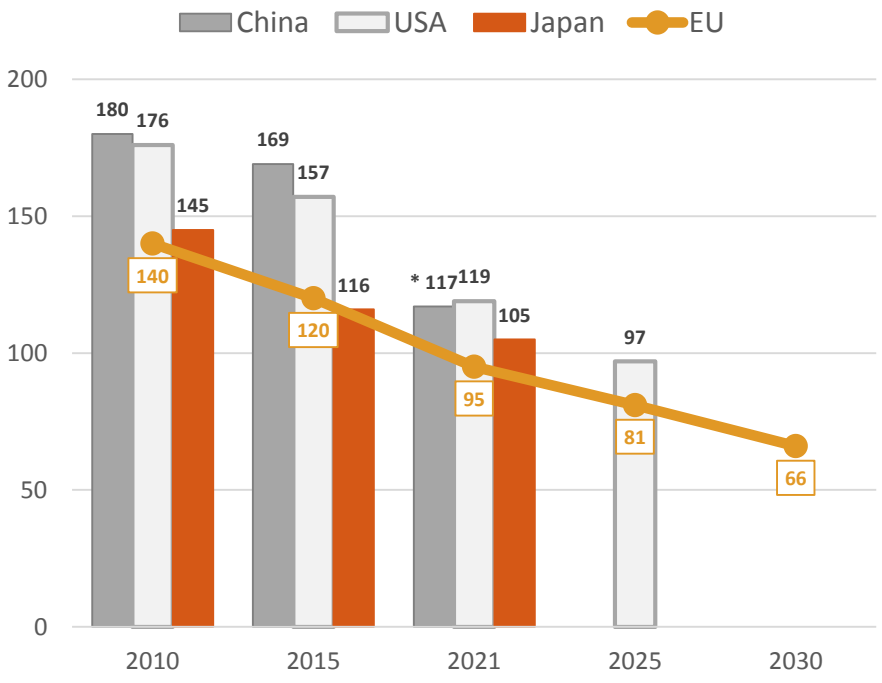
Source: CAEF – High Pressure Meeting Nürnberg 2018; Fa. Bühler

Aluminum foundry industry in flux (Product Portfolio)

Risks due to short-term changes. The pressure from politics is increasing.

Limits for cars: Europe is advancing (again)

CO2 - emissions of new cars in **grams per kilometer**, from 2016 legally prescribed limits



* China 2020

China: only gasoline
EU: 2025 and 2030 proposals of the EU Commission

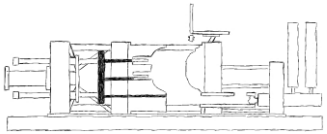
From **IG Metal's** point of view, the new tightened climate protection targets for Europe's carmakers are an immediate threat to many thousands of jobs in the German core industry. **Trade union leader Jörg Hofmann** said: "Vabanque is played with the jobs of the employees." In Brussels was "gambled again" and "without strategy and implementation concept announced a new target number". "The Federal Government has represented the interests of the **industrial location of Germany** completely inadequate.

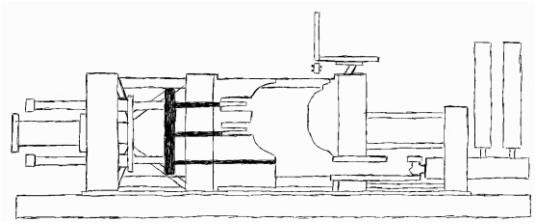
It is a heavy burden that weighs on the electric car. It should not only relieve the atmosphere of carbon dioxide and nitrogen. The auto industry and politics outdo each other in their targets, when and how many e-cars should be on the road. The salvaging electrical future is **nothing more than pure nonsense.**
"In popular opinion, e-mobility is a great thing," says the eloquent professor, "but it makes no sense ,if you look not at all aspects of the topic", **Prof. Jörg Wellnitz Technical University Ingolstadt**

Data Source : ICCT 2018 / iwd

Aluminum foundry industry in flux (Product Portfolio)

Product Portfolio (Summary)



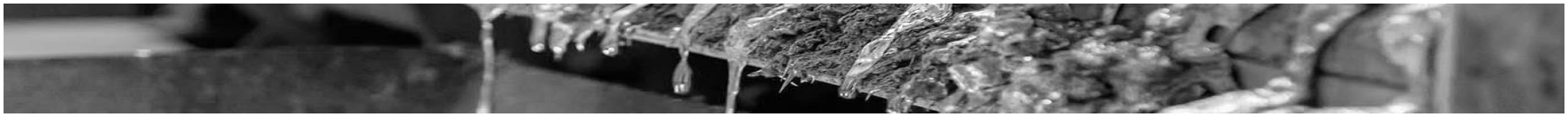


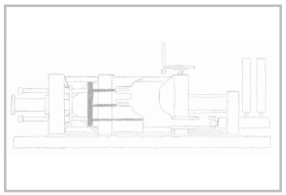
1990 → 2020 → 2030

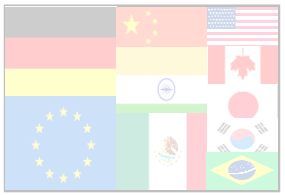
- Result "failures" (cash flow) by decreasing volumes of today's "bread and butter parts" (engine and powertrain).
- Strong competition due to overcapacities in the locking forces 1800 to - 2500 to (previously high proportion of engine and powertrain).
- High investment in growing locking force ranges.
- High costs for increasing product re-starts and required process developments.
- Large demand in the short term for employees with foundry know-how (development, industrialization).

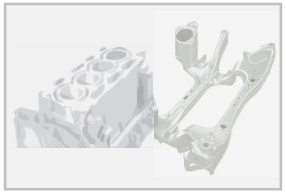
The changes in the product portfolio offer opportunities and risks. Only foundries with appropriate technology, financial strength, employees and ultimately strategy are able to seize the opportunities.

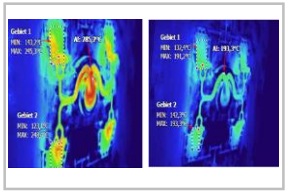
Aluminum foundry industry in flux











Initial Situation

A

Inter-nationalization

B

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C

Technologies

D

Employees

Summary

„Where is the journey taking us?“

Technologies

In order to take advantage of the opportunities offered by the new products, technology topics are again becoming more important in the short term. Investments in machinery and equipment but above all in research and development are given a high priority in the near future.

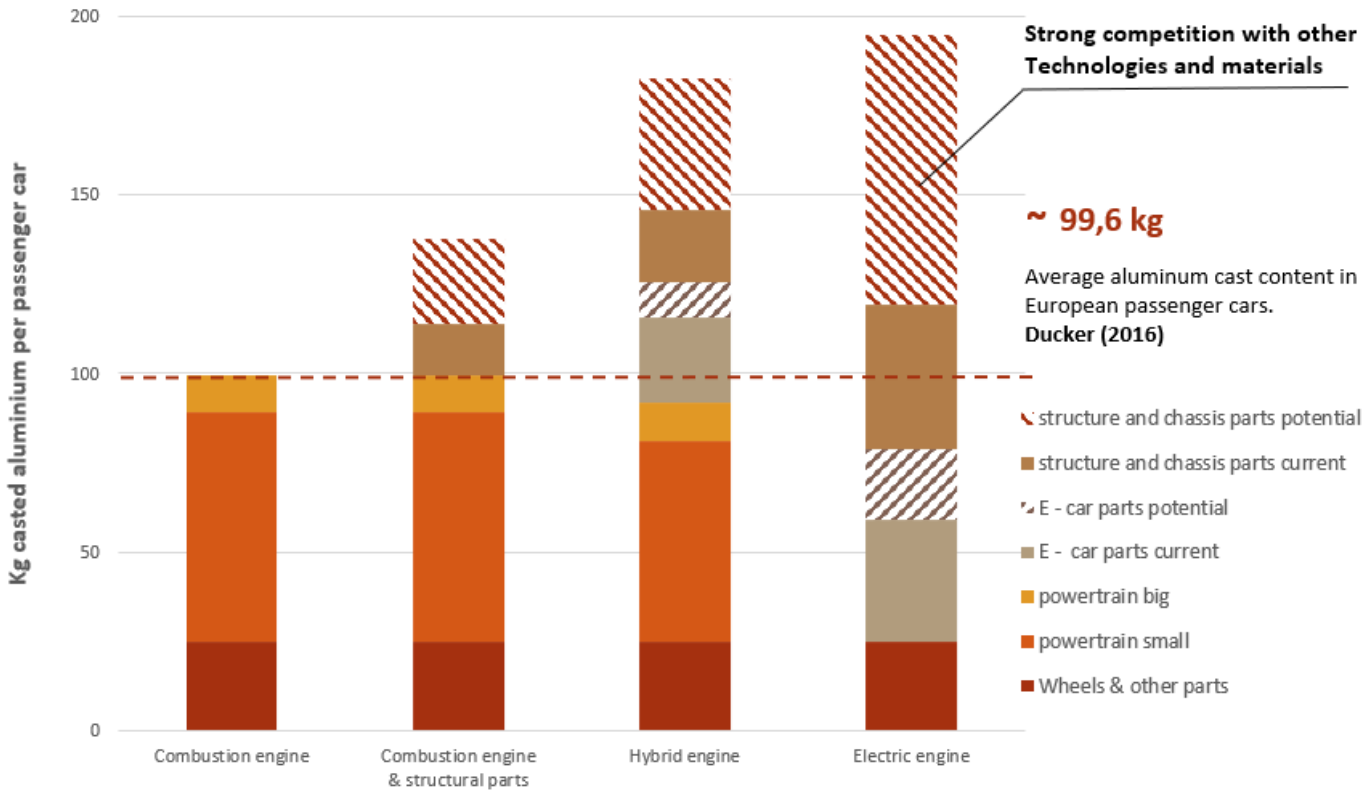
On the basis of the long-term corporate strategy and the individual know-how level of the foundries, technology roadmaps have to be created and prioritized.

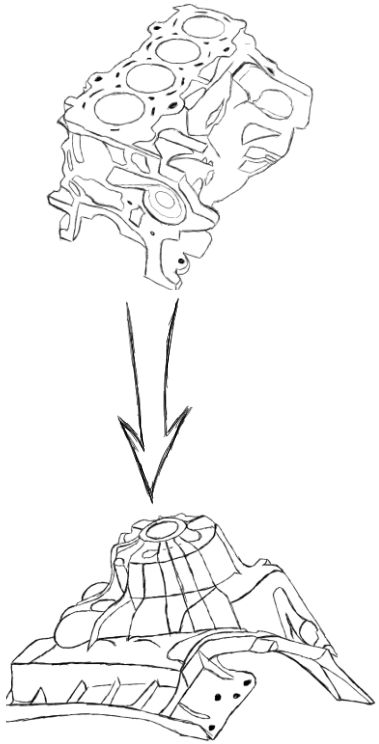
Partnerships with customers, suppliers, universities as well as market companions can save time, money and resources and make the necessary difference at the end of the day.

Aluminum foundry industry in flux (Technologies)

Over the next few years, there will be a revolutionary change in product portfolio

Today's "bread and butter parts" are being replaced by completely new products



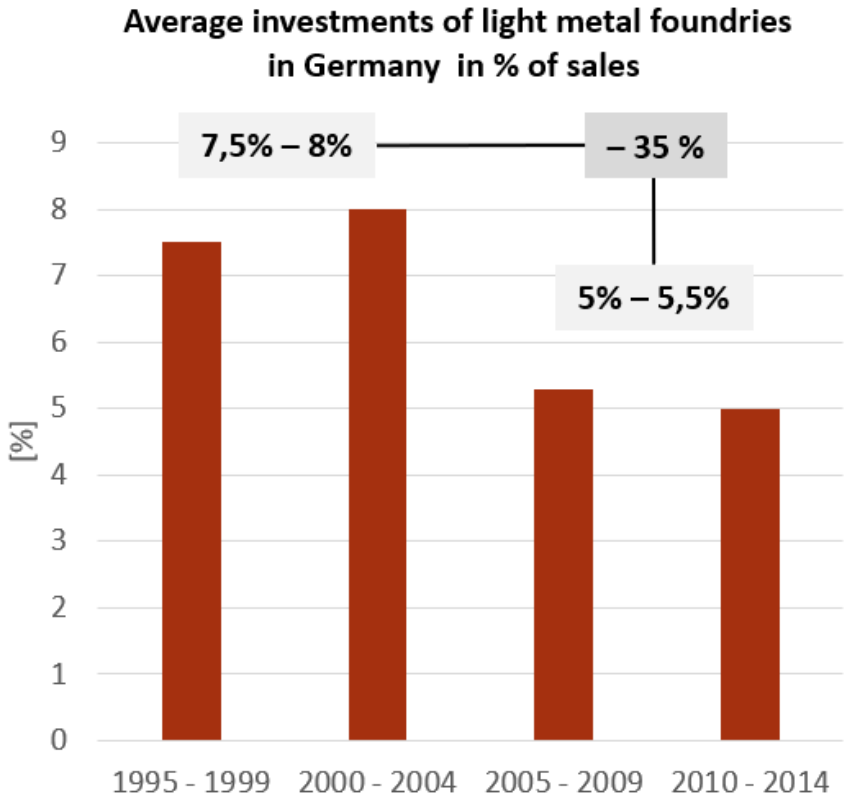


Source: Striko Westofen Group

Aluminum foundry industry in flux (Technologies)

Many foundries are not prepared for these changes

Investments in machinery and equipment, but also in R & D have been declining for years and are low compared to other automotive suppliers



Source: Bundesverband der deutschen Gießerei Industrie

Research & Development

5.6% of sales are invested by German top suppliers in R & D each year. Foundries are on the order of 1-1.5%.

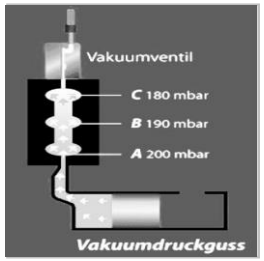
Machinery and equipment

The Ø investment ratio of the German automotive suppliers increased significantly from 6.4 (2016) to 7.2 percent (2017) → ... very high values.

Aluminum foundry industry in flux (Technologies)

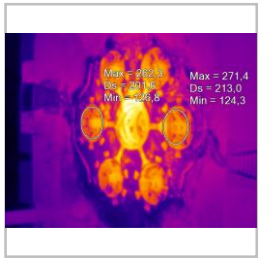
The essential technology topics in the context of the changing product portfolio must urgently be "addressed"

Vakuum Technology



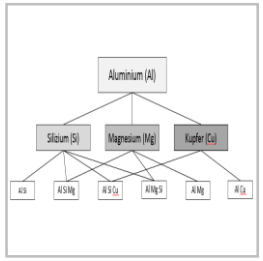
- For crash-relevant structural components inevitable (consistent quality)
- Prerequisite for the necessary heat treatment of the structural components
- Improved tool filling for thin-walled components
- For the weldability of components
- .....

Minimum lubrication



- Reduction of water consumption (... also wastewater)
- Significant reduction in cycle times
- Increasing the tool life
- Better process reliability / quality → high importance for chassis and structural parts
- Avoiding burr formation, warpage and tool cracks

Alloy Development

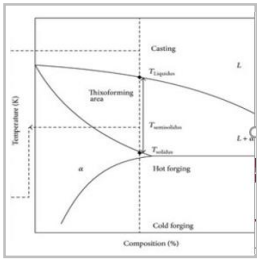


Alloy development is one of the key challenges in the development of chassis and structural parts for the casting process. The components have high requirements for elongation at break, yield strength and tensile stress. The casting process requires a basic castability (long flow paths), long tool life and a calculable shrinkage after demoulding the castings. The cast parts must be heat treated (T6, T7) and should not be warped there. In the final assembly, the parts are then often glued or welded.

Aluminum foundry industry in flux (Technologies)

The essential technology topics in the context of the changing product portfolio must urgently be "addressed"

SSM Casting

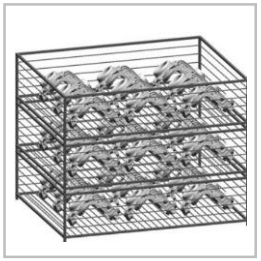


With the further increase in component requirements (mechanical properties, weight, wall thicknesses), thixocasting and rheocasting have become significantly more important. Worldwide, work is progressing on various developments, especially in rheocasting. The main goals of further development are primarily cost and process optimization. In the long run, SSM casting will play a role for highly stressed parts.

Salt Core Technology

The salt core technology has been around for a long time. The right breakthrough, however, has so far failed. For a long time, the closed-deck cylinder crankcases were seen as a promising future application. However, e-mobility will limit the costly development of this application. The use in the growing market of chassis and structural parts is conceivable. However, **further development of the technology** for these parts is **unlikely at the present.**

Heat Treatment



Crash-relevant components of the vehicle body with strains of > 10% must be heat-treated. The aim of the heat treatment is to adjust the tensile strength and elongation to the required part requirements. On the one hand, heat treatment increases the foundries value chain, on the other hand technology (such as distortion of castings) should not be underestimated.

Aluminum foundry industry in flux (Technologies)

The essential technology topics in the context of the changing product portfolio must urgently be "addressed"

Composite (Hybrid)-Casting

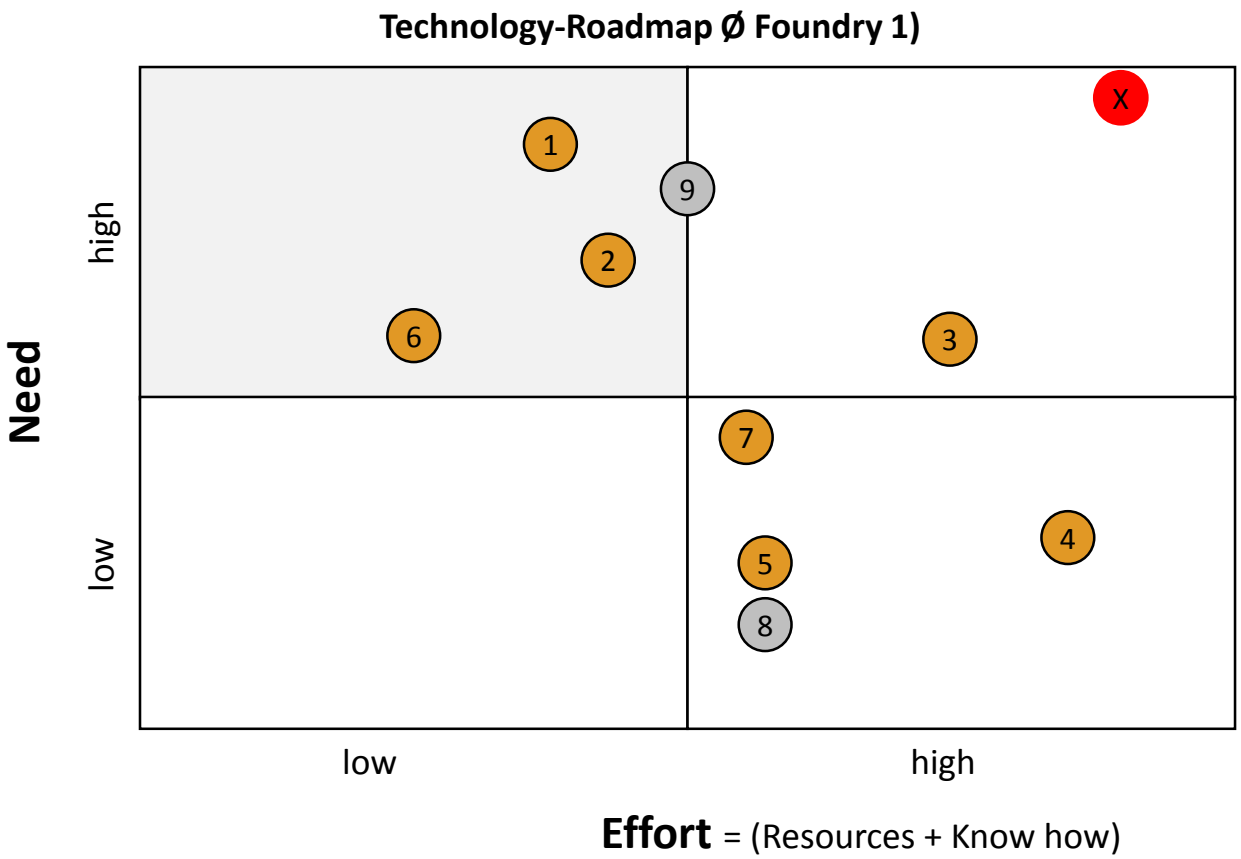
Composite casting is a casting process in which a single casting is made from a variety of materials. Composite casting is becoming increasingly important in modern lightweight construction. The composite casting can meet both, the highest technical and economic requirements for lightweight components.

..... and more topics

- Burr formation, radii -and surface wear of die casting tools especially for use in electro casting (forming steels, temperature maintenance of die-casting tools, ...)
- Time to market
- Foundry 3.0 → 4.0
- Additive manufacturing
- From the universal die-casting machine to the special machine (for example, chassis and structural parts)
- .....

Aluminum foundry industry in flux (Technologies)

The Technology Roadmap must develop each company individually



Technology-Topics

1 Vacuum die cast
2 MQL
3 Alloy Development
4 SSM Casting
5 Salt core
6 Heat Treatment
7 Hybrid-Cast

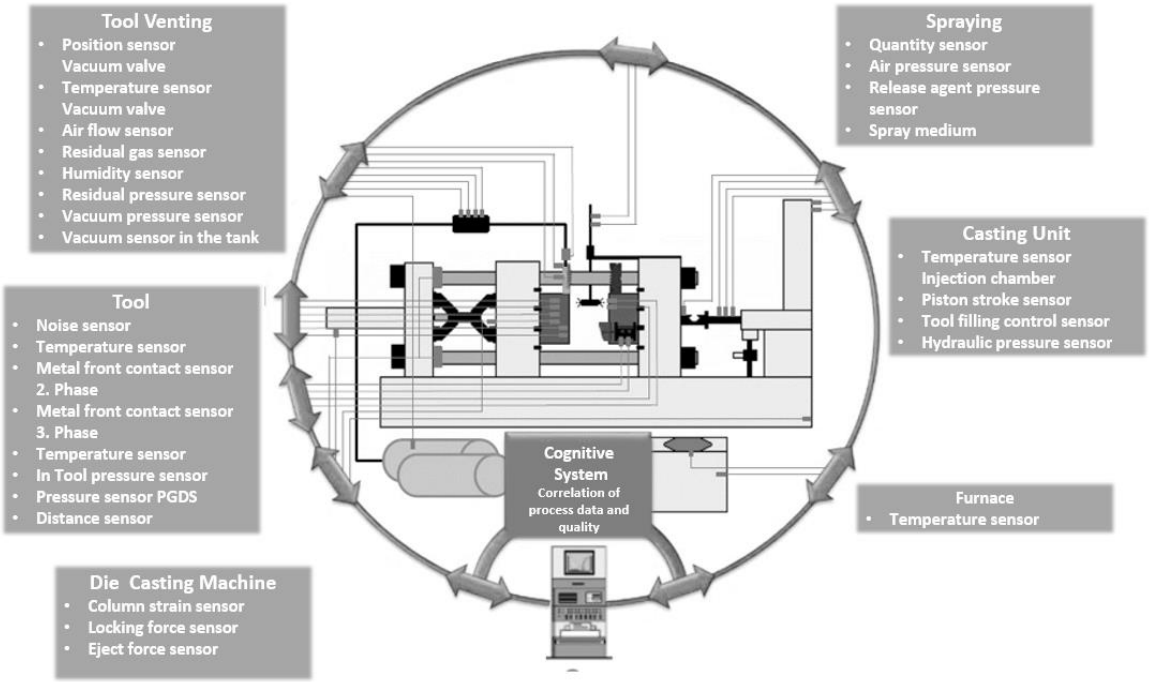
Organization-Topics

8 Foundry 4.0
9 Employees
X Profitability, Financial Base

1) Result of a survey of 10 die casting experts

Aluminum foundry industry in flux (Technologies)

Technologies (Summary)



Source: Gießerei-Spezial 01/2016 Grafik: Hochschule Aalen

- The **technology roadmap** has to be prioritized and focused.
- **JV / partnerships** should also be aimed at technology topics (foundry clusters).
- The financial base needs to be stabilized. **Financial resources** are to be secured in the long term.
- The need for **foundry know-how** must be secured.
- **Profitability** remains the top priority, regardless of all other projects.

The technology fields have high priority in the short term. Only foundries with expertise in these issues will benefit from the booming market of changing product portfolios. In the medium term, productivity improvements with these technologies are of vital importance.

Johannes Messer - Consulting GmbH
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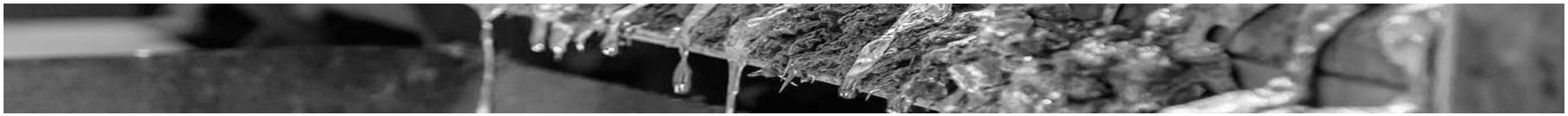
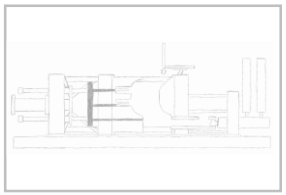
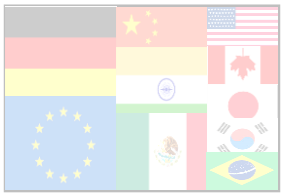
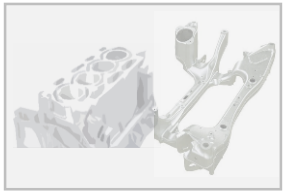
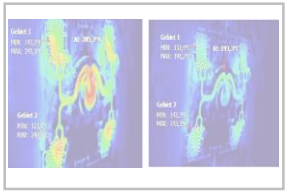
Aluminum foundry industry in flux











Initial Situation

Current Status (1990 → 2020 → 2030)

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Employees

Summary

„Where is the journey taking us?“

Employees

Rarely were market participants and experts as agreed as on the subject of employees. The assessment of the importance of this topic has developed dramatically in recent years.

Employee quantity and quality (skilled workers, managers and leaders in the entire organizational structure) is the future risk No.1.

This point now belongs to the priority list of top management.

Aluminum foundry industry in flux (Employees)

Shortage of skilled workers is the future risk No.1 in Germany,

along the entire organizational structure, up to the top management is already missing employees today

30 – 45

Percent increase in the share
the over 67 year old's at all Employment until 2034

1 / 3

Less labor force by 2060
(up to 16 million people) if Germany did not allow immigration.

352

of 801 professional categories
are currently facing shortage of skilled workers

61

Percent of the companies
see shortage of skilled workers already today as a risk

According to an EY study, more than 50% of all medium-sized companies in Germany say that the **shortage of skilled workers** is currently their **biggest business risk.**

Recently, a survey by German Chambers of Industry and Commerce (DIHK) of 24,000 companies revealed that **60 percent** of all companies rated the skills shortage as the **biggest business risk**. Eight years ago, it was only **16 percent.**

The shortage of qualified personnel reduces German economic growth by up to 0.9 percent per year. This is the result of a study by the Institute of German Business (IW Köln).
Accordingly, about 440,000 specialists are missing. Otherwise, **economic output** in Germany could be up to **30 billion euros higher**, according to the study.

Source: BMWi/ Fachkräftesicherung 2019

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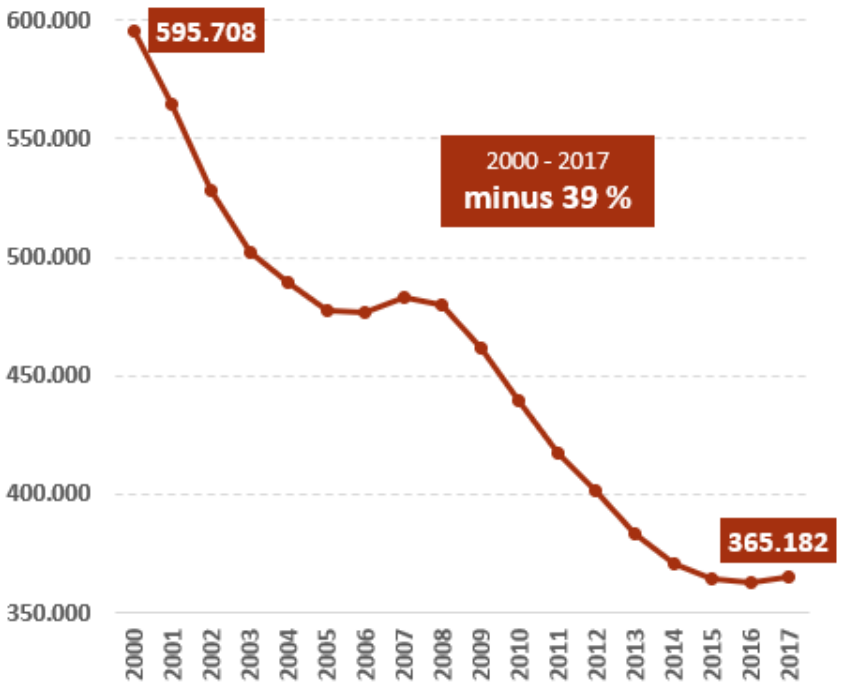
Aluminum foundry industry in flux (Employees)

The shortage of skilled workers is already evident in the training.

In 2000, there were nearly 600,000 apprentices in the craft, compared to only 365,000 in 2017

Number of apprentices in German crafts

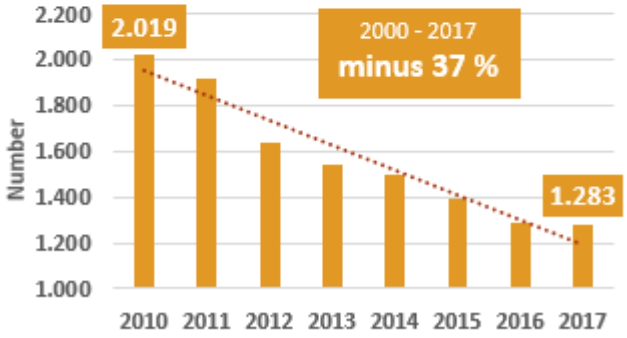


Source: Zentralverband des deutschen Handwerks

Foundry mechanics from **2.019** in 2000 to **1.283** in 2017

The industry provides pupils and students excellent professional and career opportunities. Every year, about 1,000 new apprentices are contracted in the professions of **foundry mechanics**, model construction mechanics, bell founders and technical model makers.

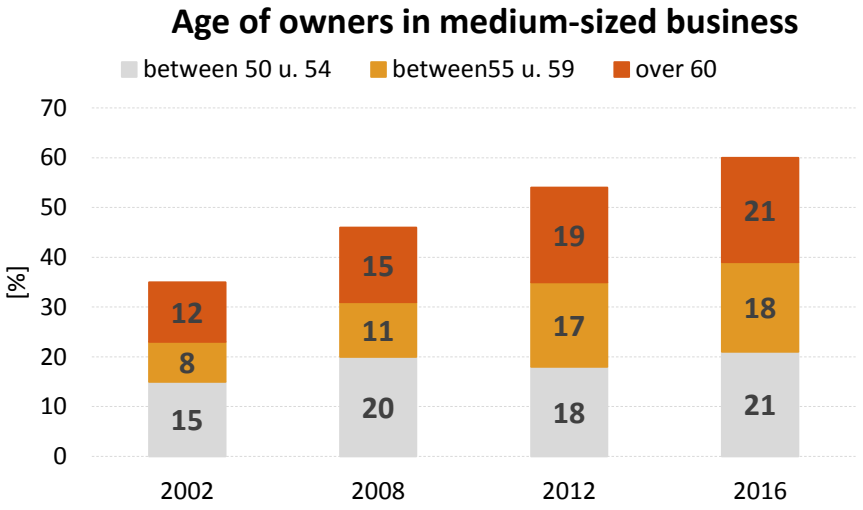
Training relationships foundry mechanics (total)

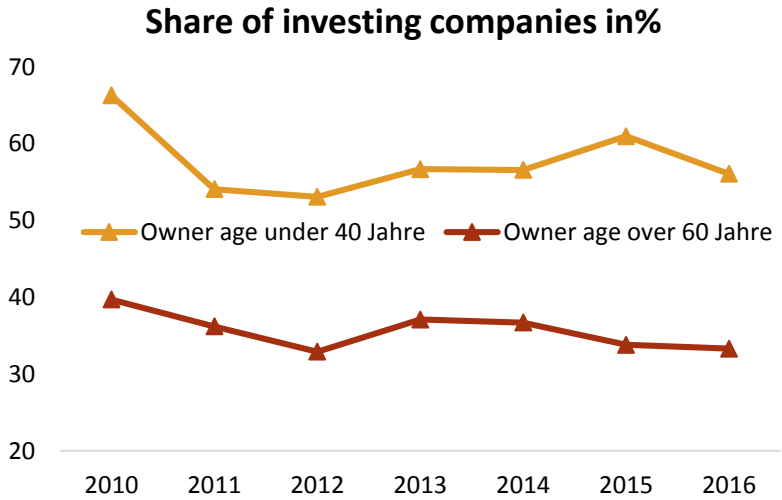


Source: BDG

Aluminum foundry industry in flux (Employees)

Aging of owner-managed companies. One in ten owners is 77 years old at the succession.





Source: KfW – Mittelstandspanel 2017

Investment brake succession

The closer the time of the planned handover or sale comes, the less investment projects will be implemented. If the successor is to succeed in the next five years, the willingness to invest averages around 41%. If the planned succession is more than five years in the future, the willingness to invest averages 56%, which is significantly higher.

"Aging" in top management

Preserve the old instead of daring to innovate. This is the motto of many medium-sized companies (95% of the 600 foundries in Germany). One quarter of the owners will be 72 years or older by the planned withdrawal date. One in ten owners will even be 77 years or older when leaving the company.

Aluminum foundry industry in flux (Employees)

Employees (Summary)

"Total quality management is important, but total management quality is ten times more important"

Prof. Dr. F.Malik

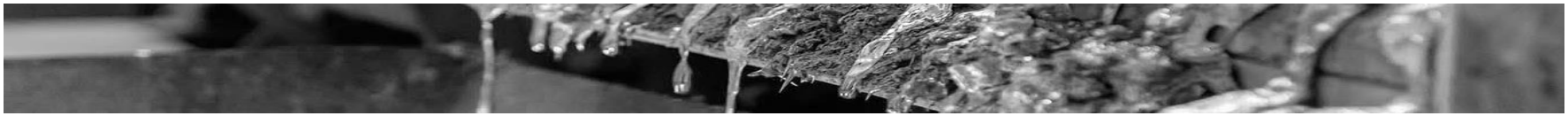
Lack of training, skills shortage as well as **aging** are the top issues. Companies now need:

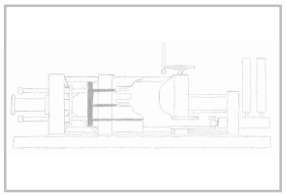
- **Strengthen** education and training, **develop** talented people.
- Develop and implement attractive **working models.**
- **Improving** leadership culture, **transferring** responsibility, allowing scope for action and decision-making.
- Apply respect and trust, involve Employees.

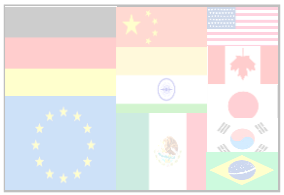
In the long term, only the foundries that have people in the company who accept and implement the company's vision and strategies with competence, passion, enthusiasm and conviction will be successful.

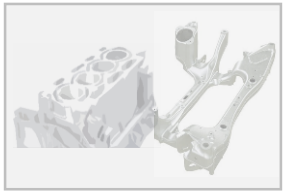
Johannes Messer - Consulting GmbH
Training Beratung Adaption

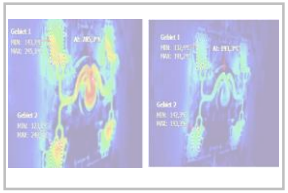
Aluminum foundry industry in flux











Initial Situation

Current Status (1990 → 2020 → 2030)

A

Inter-nationalization

B

Product-portfolio

C

Technologies

D

Employees

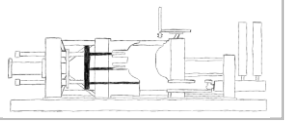
Summary

„Where is the journey taking us?“

Aluminum foundry industry in flux

Summary

Current Status



In a turbulent environment there are great opportunities, but unfortunately also risks.

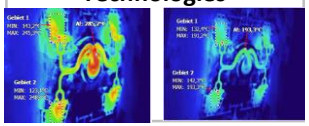
Internationalization

The OEM-oriented foundries will not be able to avoid internationalization in the short term. For foundries below a critical size, JV / partnerships (national and international) along the value chain are essential.

Product Portfilio

The changes in the product portfolio offer opportunities and risks. Only foundries with appropriate technology, financial strength, employees and ultimately strategy are able to seize the opportunities

Technologies



The technology fields have high priority in the short term. Only foundries with expertise in these issues will benefit from the booming market of changing product portfolios. In the medium term, productivity improvements with these technologies are of vital importance.

Employees

In the long term, only the foundries that have people in the company who accept and implement the company's vision and strategies with competence, passion, enthusiasm and conviction will be successful

„Where is the journey taking us?“

The emerging change in the aluminum foundry industry is significantly more serious in its impact than anything we have seen in recent years. Companies that are unable to cope with the challenges have no market position in the short to medium term.

Summary and To do´s

Turbulent times offer both opportunities and risks. Foundries that know the challenges, accept them and are open to change, have the best chance of winning in the long run.

The complexity of the emerging challenges and the resulting multi-dimensional action alternatives characterize the current situation. Only comprehensive strategic responses can do justice to this situation.

The aluminum foundry industry is facing a historical change.

Johannes Messer - Consulting GmbH
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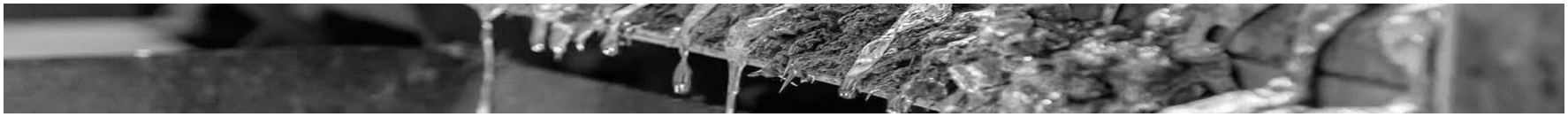
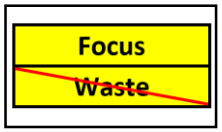
Aluminum foundry industry in flux (To do`s)



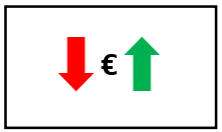
Foundries now have to adapt their business model to the new situation

The strategy (2030) needs to be revised



The technology roadmap has to be prioritized and focused

The corporate culture must be geared to the new requirements



The cost base is urgently to be optimized

Establish partnerships

Financing must be secured in the long term (financing roadmap)

The employees quantity and quality is the highest priority

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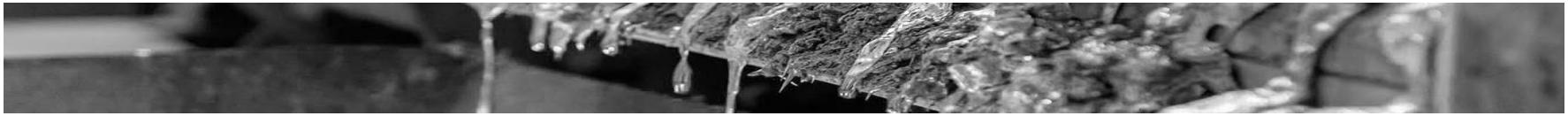
Aluminum foundry industry in flux (To do`s)



… we help you with the answers, and with the implementation.

"It's not said that it gets better when things get different.
But if it should get better, it must be different ".

Georg Christoph Lichtenberg

STRATEGY DEVELOPMENT

MANAGEMENT CONSULTING
INTERIM MANAGEMENT

NETWORKING

COMPANY ANALYSIS