The global HPDC-Industry in a multidimensional field of opportunities and risks (Focus Mexico)

Executive Circle, March 21, 2024

Opportunity ☑ **Risk** ☒

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Introduction

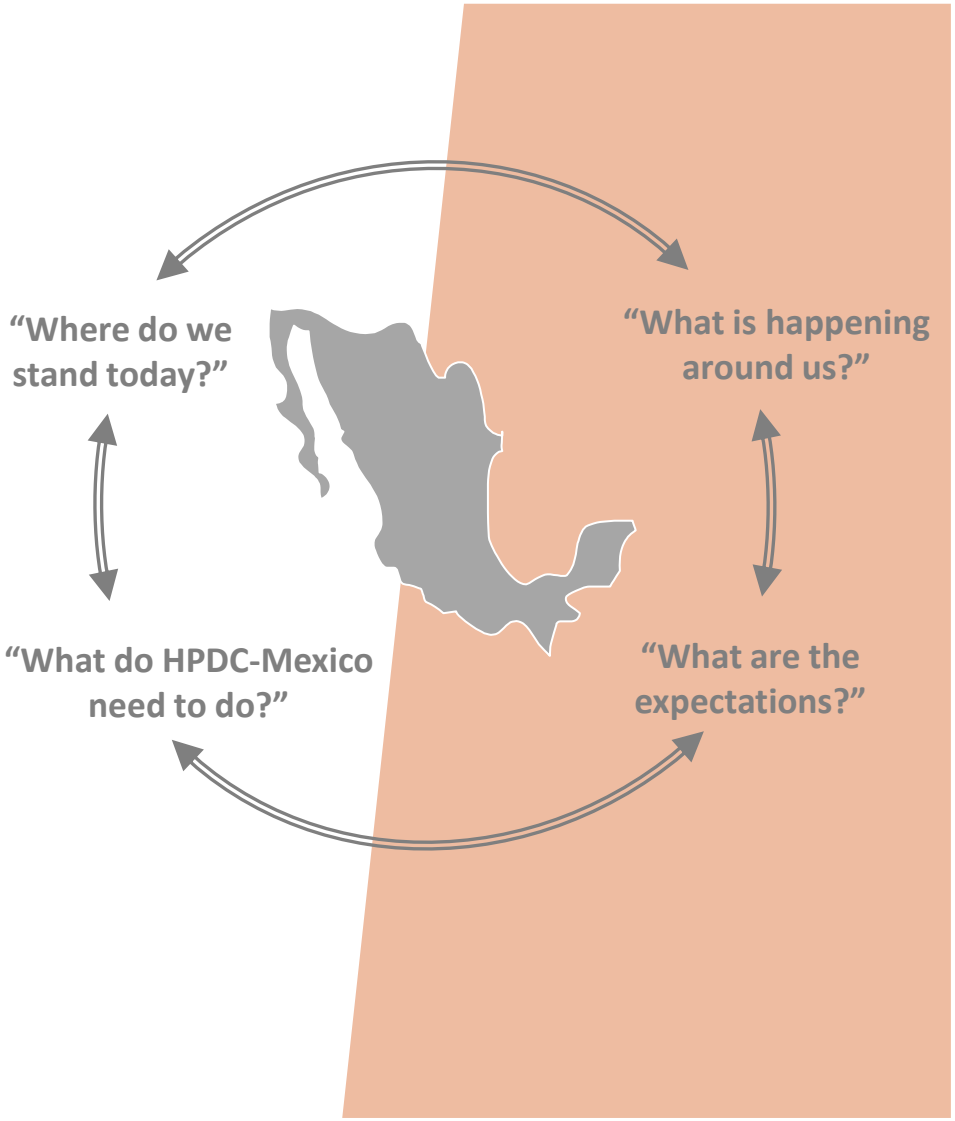
The Mexican economy has been growing rapidly for several years. Mexico is now the 12th largest economy in the world. By 2023, Mexico will have overtaken China as the USA's largest export nation for the first time.

International interest in direct investment in Mexico has played a major role in this development. The automotive sector is a key pillar. The Mexican aluminium foundry industry is also benefiting from this in particular.

Mexico is now one of 6 major aluminium foundry regions worldwide. In the period 2010-2016, 26 new foundries were built in Mexico. The development and current forecasts also make Mexico an interesting foundry location in the long term.

JMC has examined the Mexican aluminium foundry industry from an external perspective in the current multidimensional field of tension between opportunities and risks. The result is an **assessment**, **expectations** and **recommendations** for Mexico as a foundry location and the European foundry network.

Contents



The Lecture

Idea
Target

Multidimensional
field of opportunities and
risks

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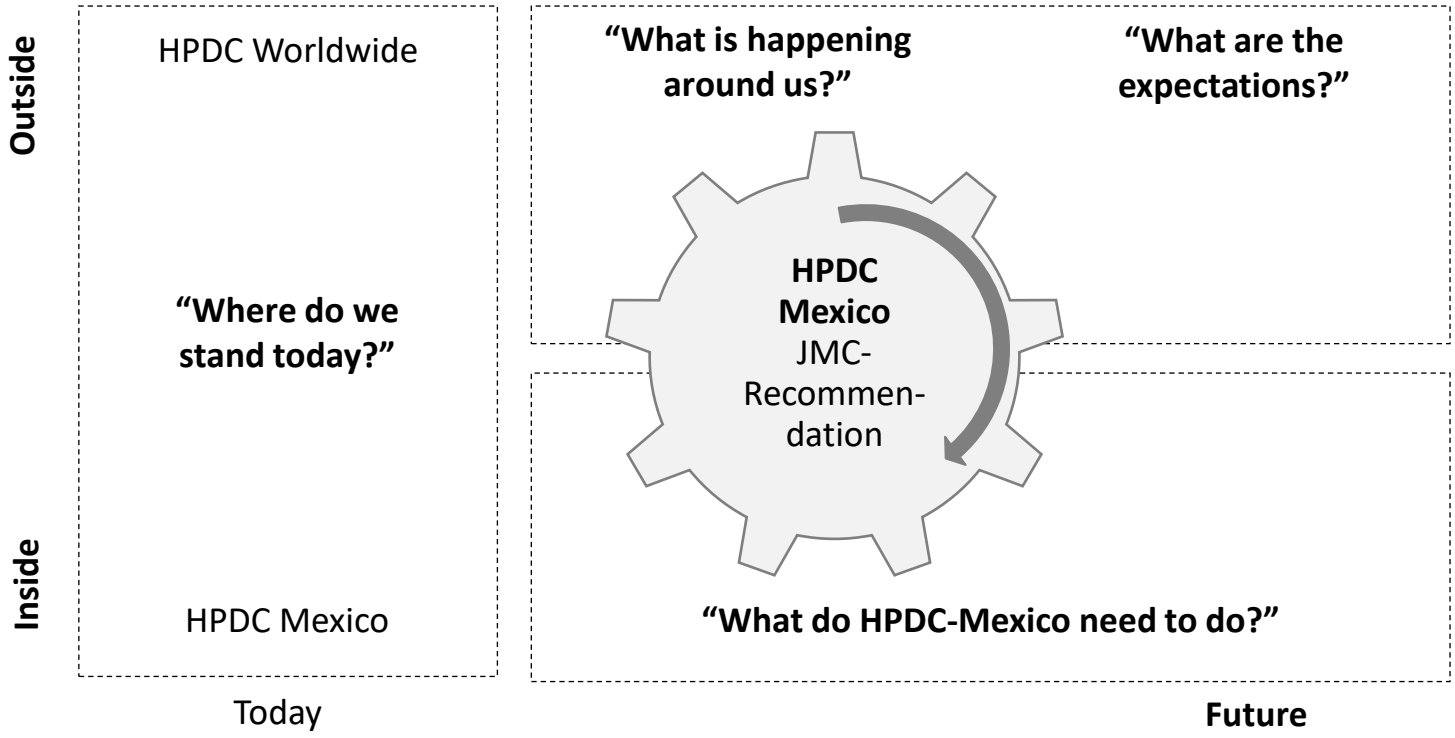
Idea of the lecture is to develop a **“strategic” recommendation** for the Mexican die casting industry from an **external perspective** (JMC) based on the current global multidimensional field of opportunities and risks.



Target of the “strategic” recommendation (JMC) is to develop **Mexico** as a **leading HPDC region** in the long term.

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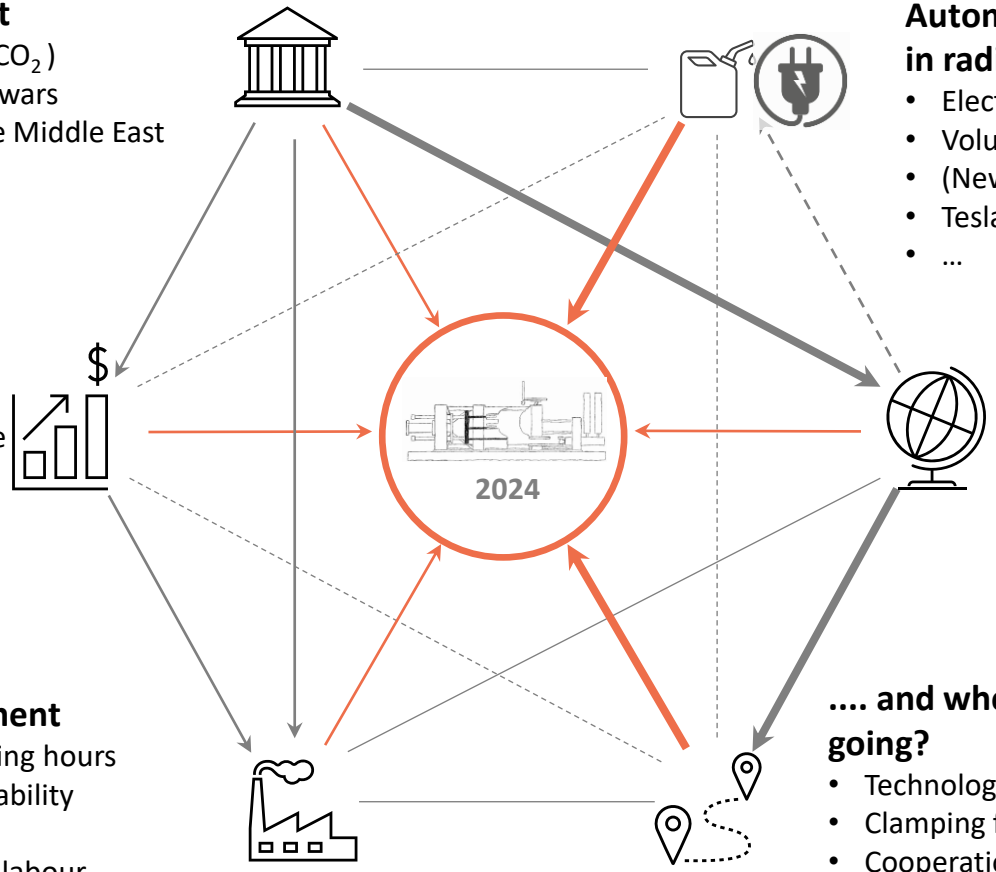
The global HPDC-Industry in a multidimensional field of opportunities and risks (Focus Mexico)

The global industry, and the automotive industry in particular, is currently in a very turbulent environment. This also and in particular affects the **aluminium die casting industry**. The challenge for everyone (worldwide) is to turn opportunities and risks into success.

Political environment
- Climate debate (Red. CO_2)
- Political unrest, trade wars
- War in Europe and the Middle East
- ..

Economic environment
- Inflation, higher interests
- Raw material shortage, chip shortage
- Volume declines since the end of 2018.
- Decrease in earnings
- Insolvencies (Focus on Europe)
- …

Industrial environment
- Labour costs/working hours
- Energy Costs/Availability
- Supply chains
- Shortage of skilled labour
- ….



Automobile industry in radical change
- Electrification (ICE→BEV)
- Volume
- (New) Providers
- Tesla and its effects
- …

HPDC Regions in Transition
- Europe, USA, Japan
- China, Mexico, India
- South Korea?
- …

…. and where is the HPDC journey going?
- Technology
- Clamping forces
- Cooperation, JV, Mergers & Acquisitions
- …

Assessment of the starting position

Inside
Industry Mexico
HPDC Mexico

Outside
HPDC Worldwide

“Where do we stand today?”

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Assessment of the starting position (inside) Press

Autos & Transportation | Technology | ADAS, AV & Safety | EV Battery

Volkswagen announces second phase of Mexico investment of around $1 billion

Reuters

February 17, 2024 12:01 AM GMT+1 · Updated 2 days ago

Chinese carmaker Jetour to invest up to US $3B in Mexico plant

MND Staff April 7, 2023

0

Audi Mexico, union reach agreement for salary increase

Reuters

February 16, 2024 5:11 PM GMT+1 · Updated 3 days ago

Mexico gives Tesla land-use permits for gigafactory, says state government.

Reuters December 13, 2023

Robert S. Miller January 9, 2024

3

Stellantis Mexico Reports An Increase Of 30% In Sales For 2023

In a year marked by challenges, Stellantis Mexico emerged triumphant, reporting significant growth and achieving record-breaking sales figures in 2023...

Published 7/3/2023

Haitian Inaugurates New Facility in Mexico

Representing an investment of $50 million, the 92,000-m2 (990,000-ft2) site outside Guadalajara will act as a regional headquarters and production center for the Americas.

Autos & Transportation | Technology

Carmaker BMW to invest around $870 million in Mexico in EV push

By **Kylie Madry**

February 4, 2023 2:10 PM GMT+1 · Updated a year ago

Automotive News China

BYD plans new EV assembly plant in Mexico, report says

Japan's Nikkei reported BYD has launched a feasibility study for the Mexican factory and is negotiating with officials over terms, including the factory's location.

February 13, 2024 07:25 PM | UPDATED 23 HOURS AGO

Nearshoring in Mexico on the Rise: Mexico Overtakes China as US's Leading Trade Partner

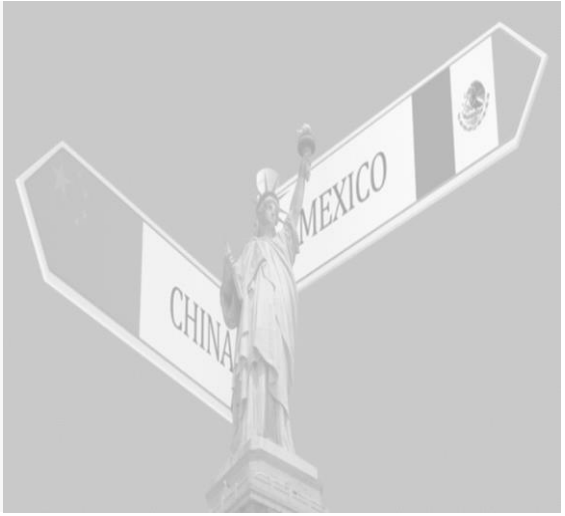
POR: QIMA

JAN 3, 2024

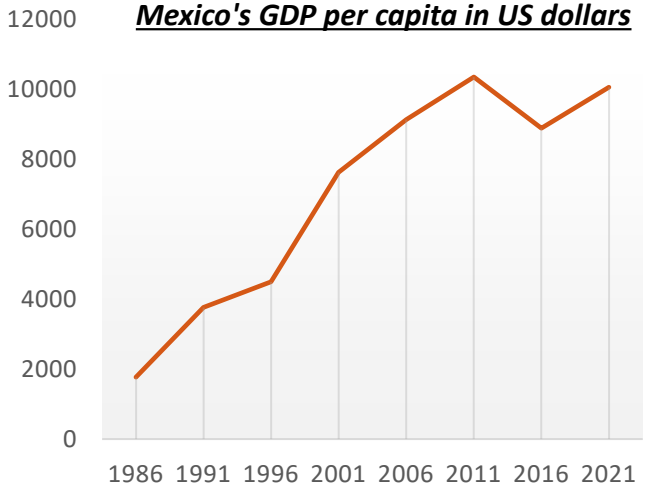
Assessment of the starting position (inside) Industry Mexico

Mexico's Industry, some numbers …

- Mexico 12^{h} economy worldwide (2023)
- Automotive is 4% of GDP and 23 % of manufacturing GDP
- No. 7 vehicle manufacturing country in the world
- Vehicle production grow 9.2 % during 2022, achieved 3.5 Mio of light vehicles
- **Mexico replaces China** as top exporter to U.S. in 2023
- ….

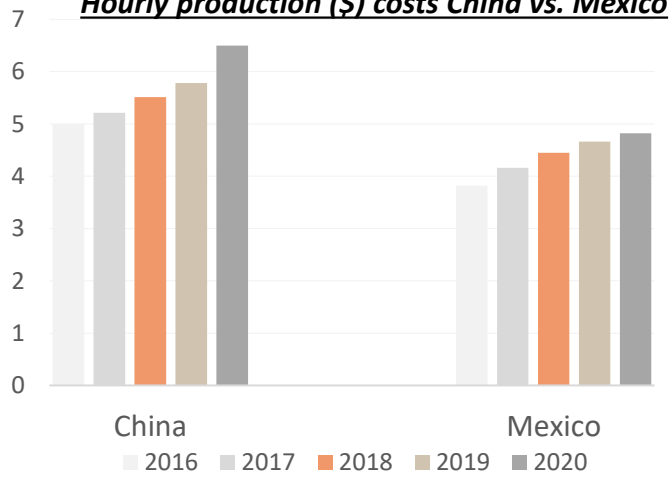


Mexico's GDP per capita in US dollars



Source:datacatalog.worldbank

Hourly production ($) costs China vs. Mexico



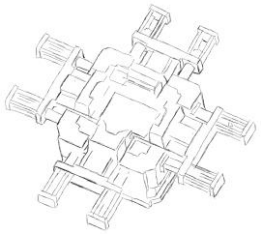
Source:Statista/tetakawi

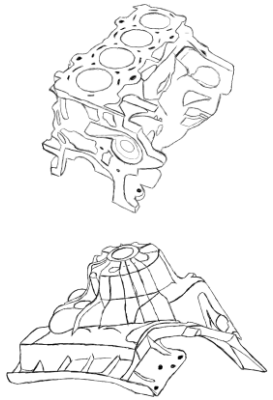
“Where do we stand today?”

Assessment of the starting position (inside) HPDC Mexico

…. and **Mexico's HPDC Industry**, in numbers

- Mexico is currently **one of six** major **aluminium die casting regions worldwide** (Mexico, USA, Europe, China, Japan, India).
- The Mexican aluminium die casting industry has **grown strongly** in recent years despite global crises. (Significantly stronger than all other regions)
- Technologically, the industry has **developed positively** in recent years.





- There are two large local and internationally very important aluminium foundries, **Nemak and Bocar**). In addition, there are **many** (≈ 100) smaller die-casting foundries. Mainly in the smaller clamping force range (< 1,500 t).
- In addition to the local foundries, **internationally noted foundries** from the USA, Europe, India, Japan and, most recently, China are represented in Mexico.
- Compared to die casting foundries, companies in the **rest of the aluminium die casting value chain** are **underrepresented** in Mexico (tool makers, die casting machine manufacturers, …).
- ….

“Where do we stand today?”

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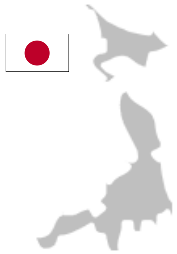
Assessment of the starting position (inside) HPDC Mexico

Foundries from the USA, Europe and Japan have had locations in Mexico for years. Companies in the rest of the value chain, such as tool makers, are underrepresented compared to the size of the Mexican die casting market.

USA

Europa



Japan

Foundries (HPDC)	Tool Maker (HPDC)
➢ Aludyne (USA)	➢ Exco (CAN) *has first activities in the field of GIGA Dies*
➢ Dynacast (USA)	➢ Aarkel (CAN)
➢ Meridien (USA)	➢ Walbert (USA)
➢ Pace Industries (USA)	
➢ Gibbs Die Casting (USA)	
➢ Martinrea Honsel (CAN)	
➢ Pacific Die Casting (USA)	
➢ Kopf Power Cast (DEU)	➢ Siebenwurst (Service tool making) (DEU)
➢ Voit Automotiv (DEU)	➢ Aurrenak (ESP)
➢ TRW (DEU)	➢ Lebario (ESP)
➢ Marchesi (ITA)	
➢ Faist Light Metals (ITA)	
➢ SAG (AUT)	
➢ CIE-Automotive (ESP)	
➢ Teknia (ESP)	
➢ Neapco (POL)	
➢ GMD Group Eurocast (FRA)	
➢ Anderton Casting (FRA)	
➢ Ahresty Corporation (JPN)	
➢ Hiroshima Aluminium (JPN)	
➢ Rioby (JPN)	

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Assessment of the starting position (inside) HPDC Mexico

The list of Mexican foundries is headed by the internationally important foundry companies Nemak and Bocar. What is **new** is the great interest of **Chinese foundries** and tool makers to **invest** in Mexico**.** Haitian (CHN) is also the first casting machine manufacturer to open a production facility in Mexico.

Mexico

Foundries (HPDC)

- Nemak (MEX)
- Bocar (MEX)
- Norcast (MEX)
- TEAM Industries (MEX)
- Siete Leguas (MEX)
- Platinadora Baja (MEX)
- Alupress (MEX)
- … and many small foundries

Tool Maker (HPDC)

- 5 D (MEX)

India

- Brahm Precision (IND)
- Sandhar Technologies (IND)
- Endurance (IND)
- Rockmann Industry (IND)

“New Mexico Investments”

China

- Rongtai Industry (CHN)
- Ningbo Xusheng (CHN)
- IKD (CHN)
- Mexico Kodaco, MKDC (South Korea)
- Millison (CHN) wants to build a foundry in Mexico
- Asiaway (CHN) wants to invest in Mexico

- GZ Mold (CHN) is in Mexico and also has a JV in Mexico
- ZDM is planning a „Production base“ in Mexico

“Where do we stand today?”

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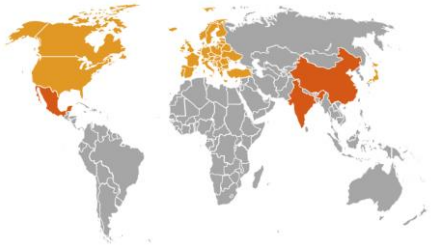
Assessment of the starting position (outside) HPDC Worldwide

A look at the worldwide development of the aluminium die casting industry shows that the former **3 important die casting regions** have now become **6 regions**. **Mexico is one of them**.

HPDC-**Past**

- Until the 1990s, **Europe,** followed by Japan and the USA, was the **world's centre of production, development and innovation** for aluminium die casting.
- The companies are predominantly locally based traditional companies, as well as the in-house foundries of the major automotive companies.
- At the end of the 1990s, European die-casting foundries in particular became the focus of **financial** investors and, somewhat later, **strategic investors.**
- **Since 2010, OEMs** have been investing in their own die casting capacities **again**. (Capacity bottlenecks for chassis and structural parts are expected).

HPDC-**Present**



- The current **crisis** (> 5 years) has left its mark on many foundries technologically and economically.
- The transformation **(ICE → BEV)** comes at the worst possible time for many die casting foundries (… especially in the US, Europe and Japan).
- The **“megatrend”** GIGA casting triggered by Tesla is mainly taking place in China. The USA, Japan and Europe are currently slowly following suit.
- **Chinese** companies currently look like the **“winners”** of the current changes.
- **Mexico** and **India** are becoming increasingly **important**.

Assessment of the starting position (outside) HPDC Worldwide - The “OLD HPDC WORLD”

The **formerly leading regions**, the USA, Europe and Japan, **have developed only slowly** technologically and economically in recent years.

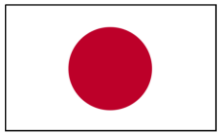
USA

- American companies do not play a role in the development of essential future technologies, for example to produce structural parts (exception: Tesla Giga Casting)
- Investments by foreign die-casters in production sites in the USA have largely failed.
- In the meantime, there is no internationally significant American market or technology leader.
- New providers come into the market (Linamar).

Europe

- The production declines since 2018 are greater than in all other regions and leave clear traces.
- Aluminium foundries currently often have financial problems (example: Germany current Ø EBITDA < 8%).
- Technologically, Europe is currently losing its previous leading role.
- Foreign foundries are increasingly investing in Europe (currently China, India).
- OEMs are strengthening their inhouse foundry activities.

Japan



- Ahresty, Hiroshima and Ryobi share a closed market with OEM in-house foundries (… hardly any international competition in Japan).
- Japan has somewhat lost touch with technology when it comes to GIGA casting and is currently trying to close the gap (… after an initial critical assessment).

Assessment of the starting position (outside) HPDC Worldwide - The "NEW HPDC WORLD"

Mexico, India and especially **China** are the **new strong market players**.

Mexico

- Bocar and Nemak are the best-known foundries with high international importance and recognition.
- Foreign foundries are strongly represented in the market. Chinese foundries, tool makers and casting machine manufacturers are currently looking for market access.
- The Mexican die casting industry has grown significantly in recent years. The forecasts for the next few years remain positive.

India

- Major Indian Al foundries Endurance, Jaya Hind, Oswal Casting, Rico, Rockmann Industries, Sandhar Technoligies, Sunderan Clayton and Tata Motors Foundry share the Indian market (… hardly any foreign foundries in India) .
- Indian foundries are currently increasingly looking for market and technology access in Europe.

China

- Incredible market growth (2000 = 0.8 million tonnes → 2022 = 7.5 million tonnes).
- The 50 largest Al foundries were "all" built in the last 20 years.
- Approximately 90% of all GIGA-DCM machines are currently invested in China.
- In China, there is currently a large overcapacity (... also GIGA-Casting) in the HPDC. The exact numbers are not known.

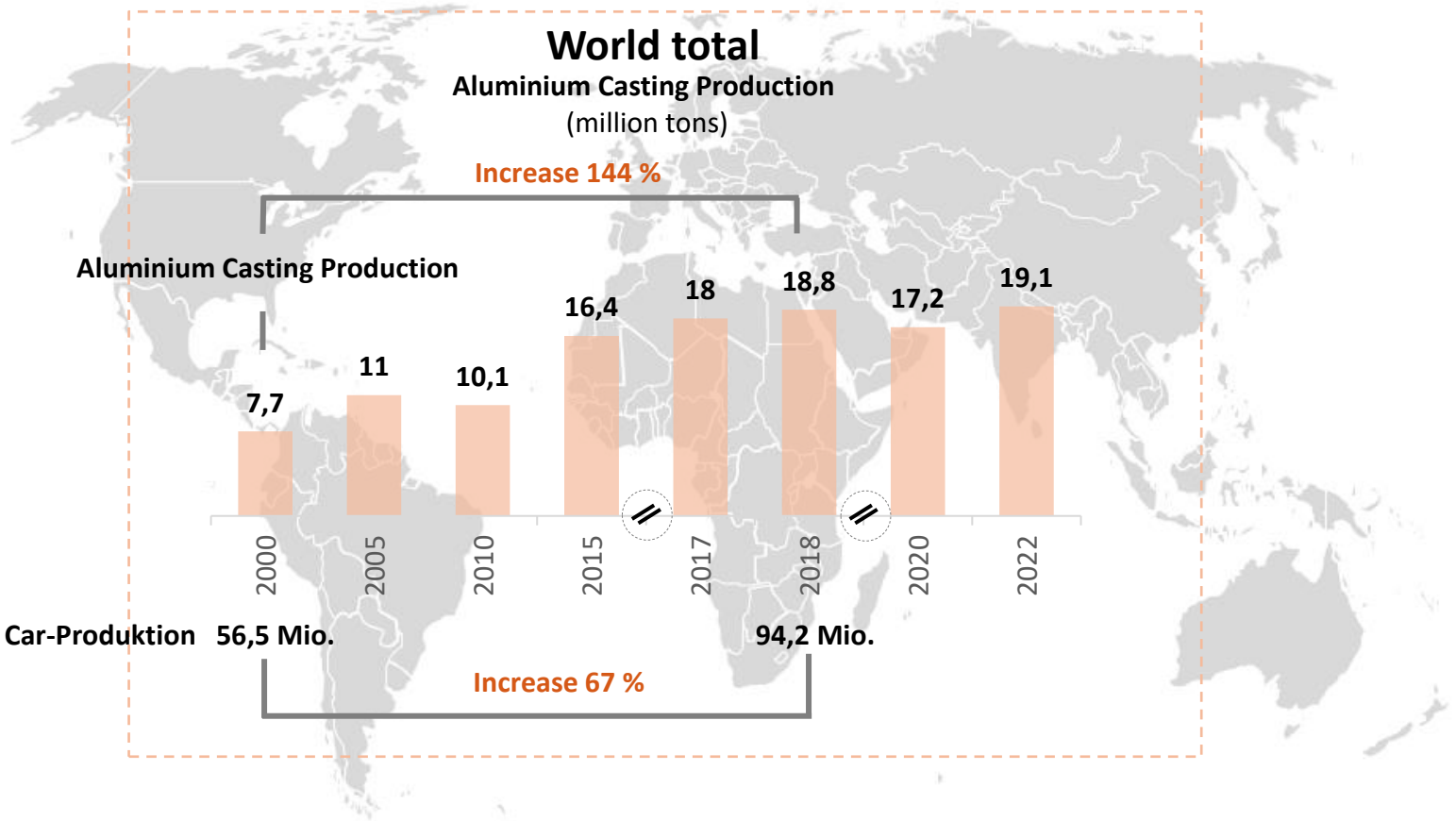
Asien + RoW

- **The rest of Asia** (e.g. South Korea) is becoming stronger and more important. In the short term, the 7th major HPDC region worldwide is expected there.
- The **"rest" of the world** doesn't matter when it comes to HPDC.

“Where do we stand today?”

Assessment of the starting position (inside/outside)

The **global trend towards lightweight automotive construction** has led to a 144% increase in aluminium casting production from 2000 to 2018. In the same period, however, automotive production, the main customer of the aluminium foundry industry, increased by only 67%. The **aluminium content per** car has **risen significantly**.



Source: IKB Global Foundry Industry December 2022

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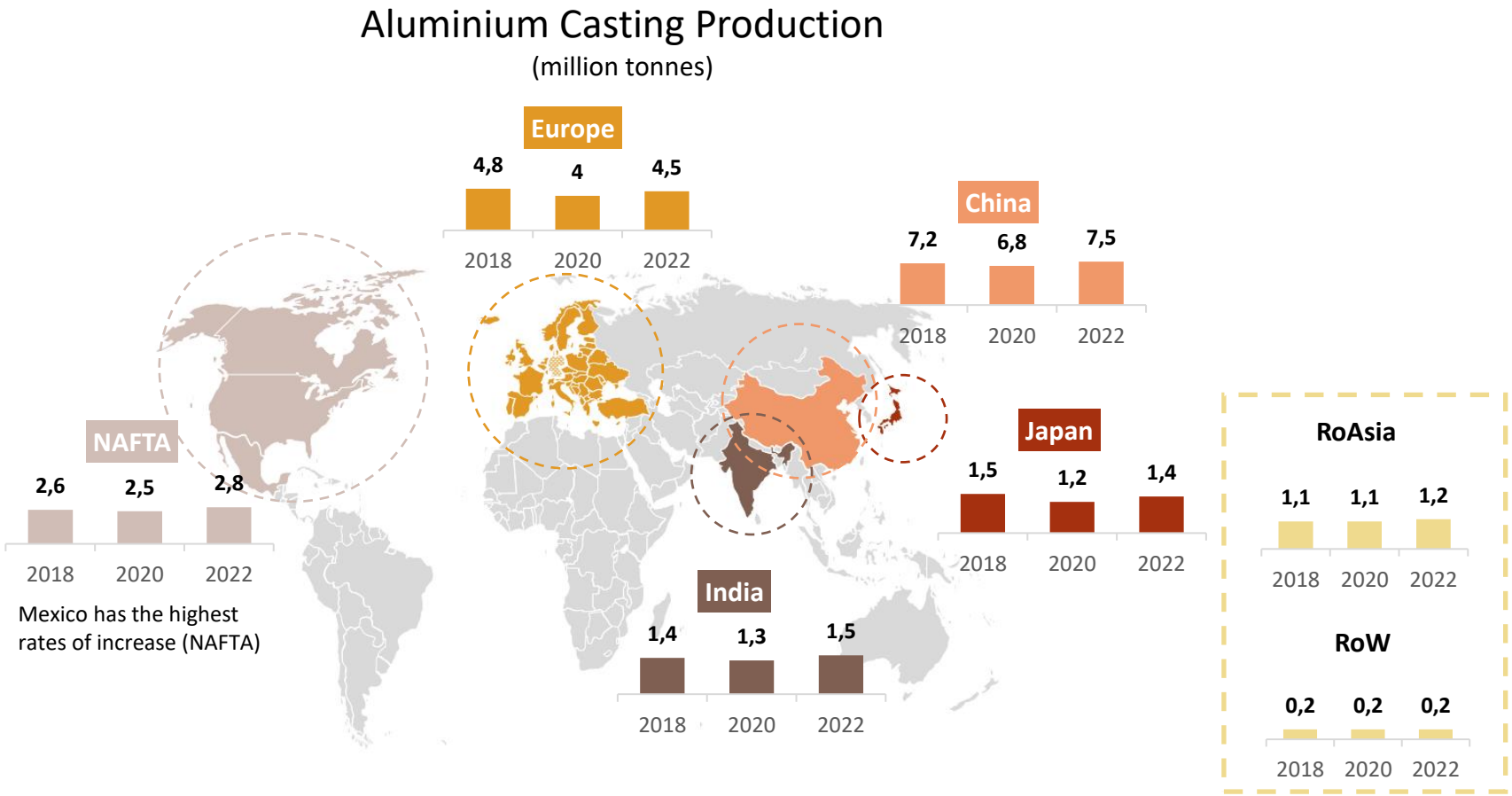
Assessment of the starting position (inside/outside)

After the sharp decline in 2020, aluminium casting production in China, India and NAFTA is already back above pre-crisis levels. Europe and Japan are still slightly behind, where the automotive industry has not yet reached the pre-crisis figures. All in all, it can be said that the trend towards **automotive lightweight** construction has **continued to increase**.



Source: IKB Global Foundry Industry December 2022

“Where do we stand today?”

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Assessment of the starting position (inside/outside) HPDC Mexico SWOT (Part 1)

Strengths and weaknesses of the Mexican aluminium HPDC industry from an **external perspective (JMC).**

Strengthen

- Aluminium Casting Know how and customer orientation
- Speed in setting up the foundry industry(e.g. from 2010 to 2016, 26 new foundries were built in Mexico)
- Wage level (... despite continuous increase)
- Working hours (workers → 6 days/week; 8 hours/day).
- Average age of the population (Ø 29 years, Germany Ø 44)
- International interest (further increase in international direct investment by 48% to $18.6 billion in the first quarter of 2023)
- Know-how, modern CIP methods
- Market presence of internationally important HPDC companies
- …..

Weaknesses

- Shortage of skilled workers along the entire value chain (high staff turnover)
- Few own technological innovations
- CIP potentials are used conservatively (... despite known methods and tools)
- Financial situation of smaller foundries (Ø EBITDA 8 % → low investments)
- Mainly small national (approx. 80-100) HPDC foundries, with the exception of Nemak, Bocar and foreign foundries.
- Partly missing value chain (e.g. tool making, high import share)
- ……

Opportunities and Risks

Customer, Earnings, Development, Technology

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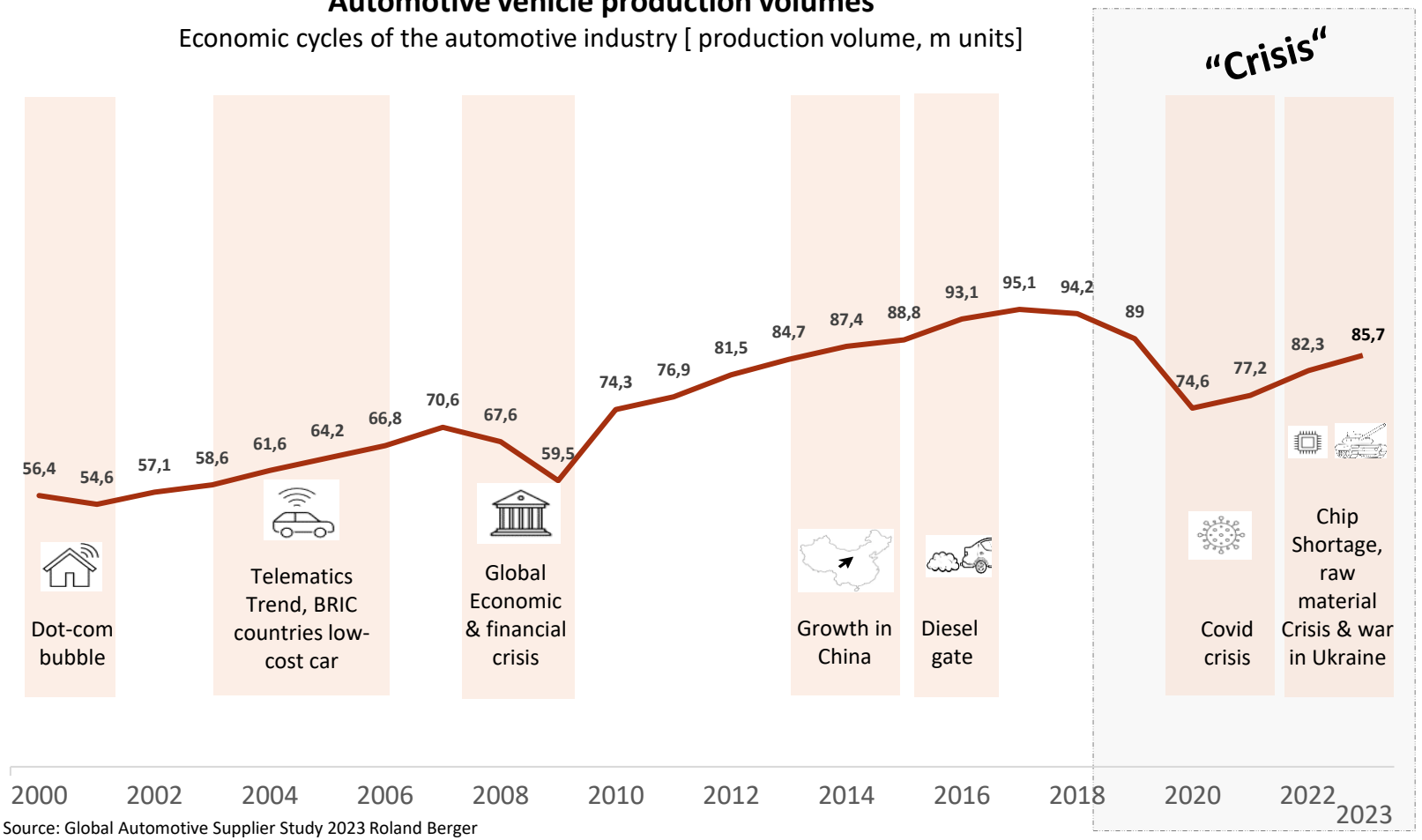
Opportunities and Risks Customers

After years of permanent growth (with the exception of 2008/09), production figures in the automotive industry fell dramatically at the beginning of the crisis in 2018. **The pre-crisis level has not yet been reached again** (end of 2023).

Automotive vehicle production volumes

Economic cycles of the automotive industry [production volume, m units]

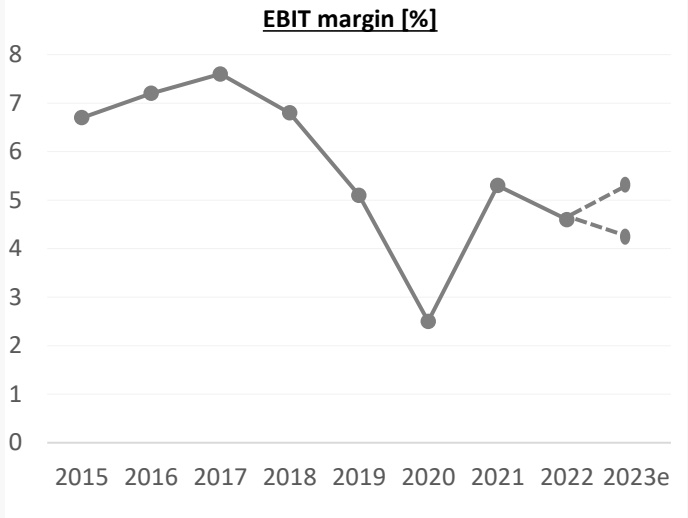


Source: Global Automotive Supplier Study 2023 Roland Berger

Opportunities and Risks Development

The decline in production figures has not led to a deterioration in the quality of earnings for all OEMs. However, the majority of automotive supplier companies experienced a dramatic drop in earnings The **foundry industry**, with its high earnings dependency on utilization volume, is particularly **frequently affected**.

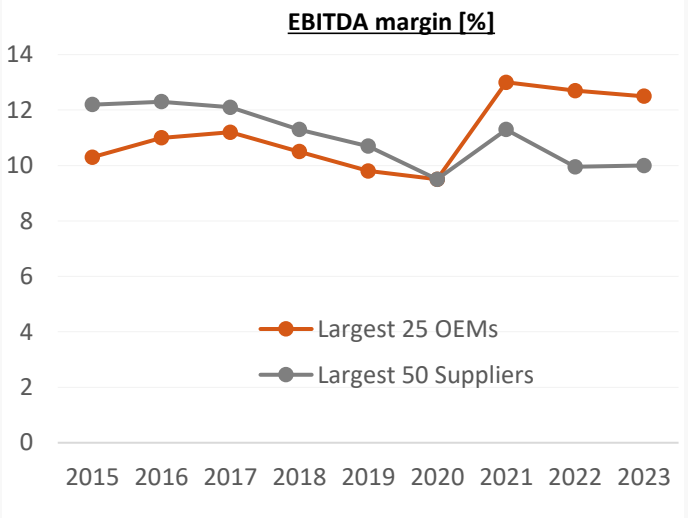
Key supplier performance indicators
(n= ~ 600 suppliers)



Compared with pre-crisis levels, the automotive supplier industry has structurally lost three percentage points on EBIT margin.

Source: Roland Berger | Lazard | Global Automotive Supplier Study 2023

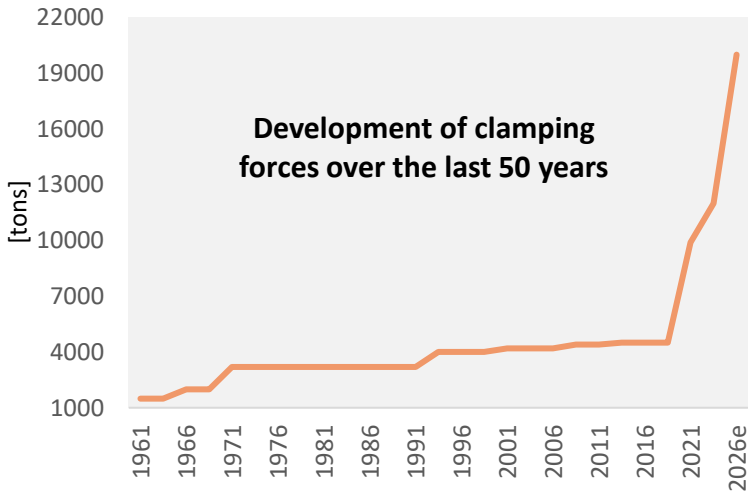
Auto supplier margins took pandemic hit
The pandemic hit EBITDA margins for suppliers, but boosted them for automakers

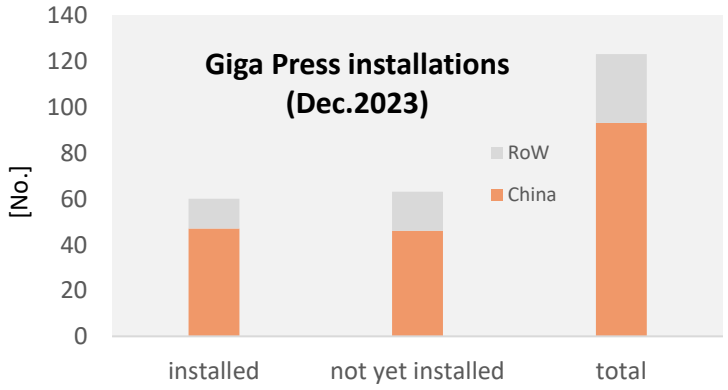


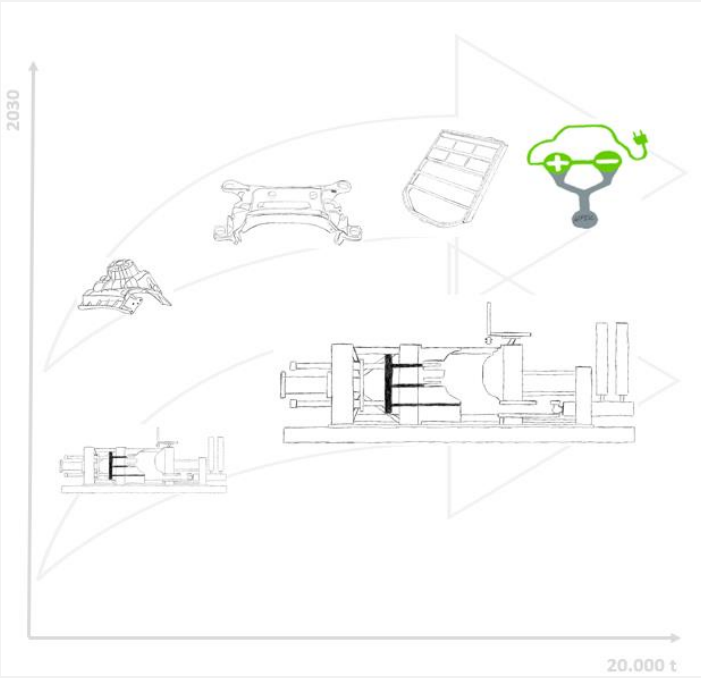
Source: Reuters Graphics

Opportunities and Risks Development

From an economic and technological point of view, the development in the growth markets of chassis and structural parts, as well as e-mobility in classic die casting, has been moving towards **greater clamping forces for years**. Since **Tesla**, this trend has **increased significantly in speed.**





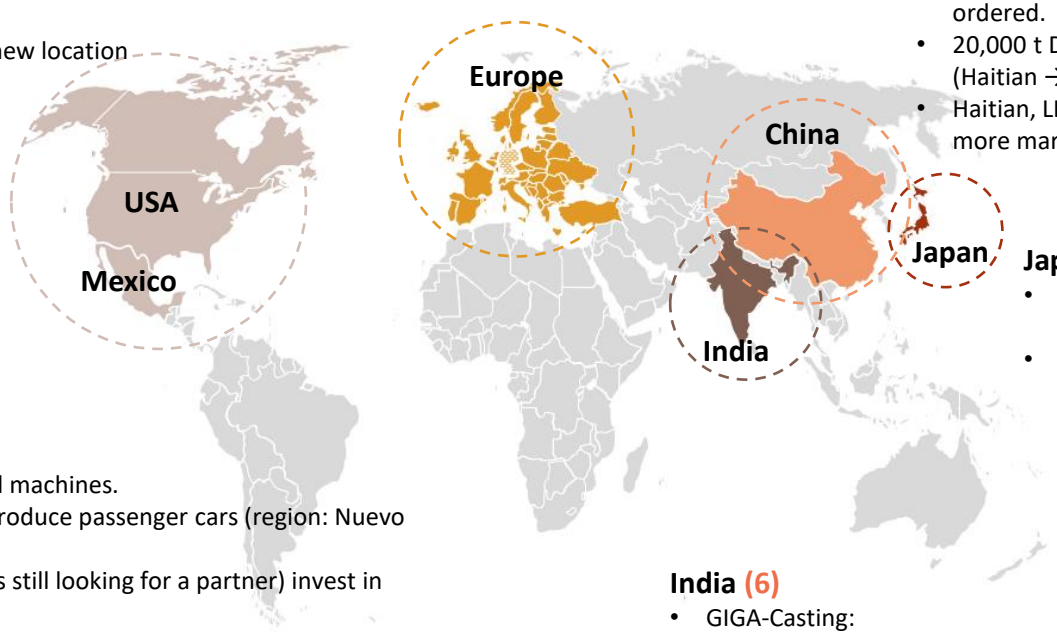


Opportunities and Risks Development

Currently, about **125 GIGA presses** (> 6000 t, Status 12/2023) have been sold or have already been installed, of which about 95 are in China and 30 in the remaining HPDC regions.

Europe (4)
- GIGA casting activities at: Volvo (also Hungary), Linamar (Paris), Magna (UK), Handtmann and Tesla (DEU)
- Minth has invested in GIGA casting in Serbia and plans further investments in Eastern Europe

USA (2)
- GIGA-Casting: Ford collaborates with Linamar (Invest. in Canada).
- Millison is planning a new location



China (1)
- GIGA-Casting: Approx. 95 machines installed or ordered.
- 20,000 t DGM probably under development (Haitian → Millison)
- Haitian, LK and Yizumi are gaining more and more market share

Japan (3)
- Japanese OEMs are currently working intensively on GIGA casting
- UBE (6.500 t)

Mexico (5)
- GIGA-Casting:
  - Currently no installed machines.
  - Tesla is planning to produce passenger cars (region: Nuevo León)
  - Ford wants to (... or is still looking for a partner) invest in GIGA-Casting.
- Millison is planning a new location

India (6)
- GIGA-Casting:
  - No known activities yet
  However, Tesla wants to set up car production in India (currently in negotiations)

Current ranking in terms of GIGA casting activities

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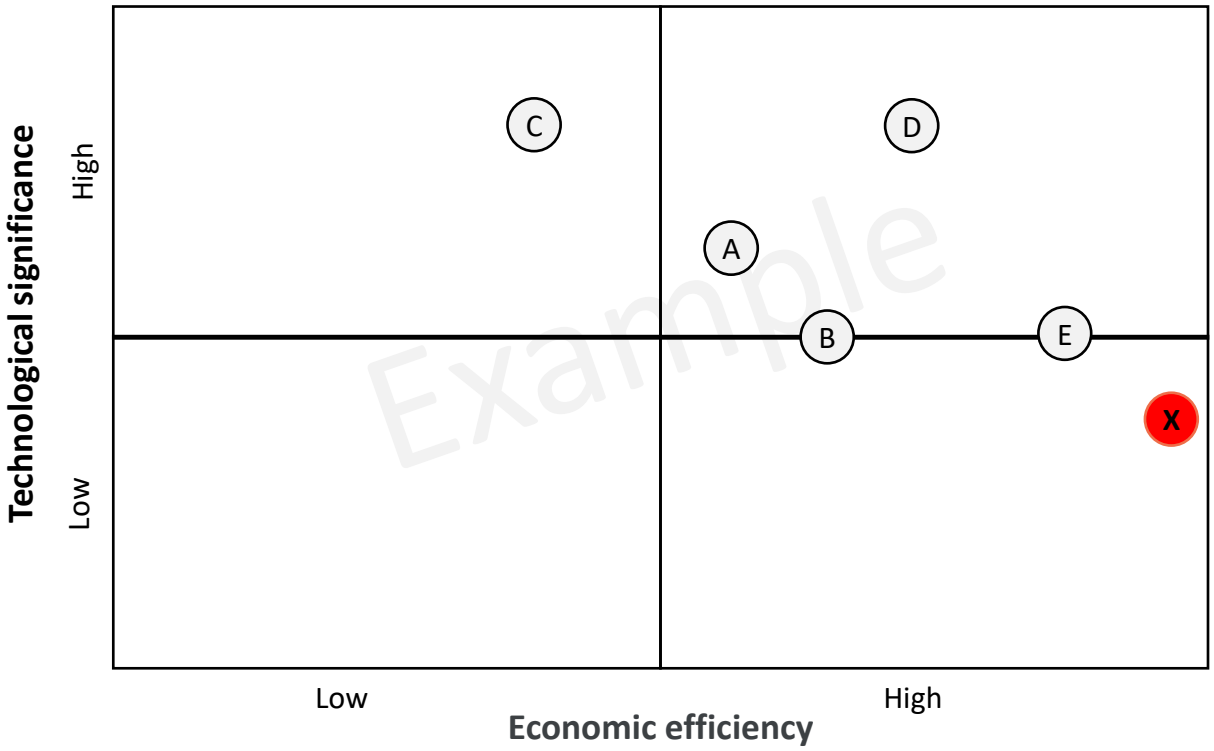
Opportunities and Risks Technology

Only **technologically** and **economically** leading companies will be **competitive** in the long term. Foundries that want to benefit from the growing market for chassis and structural parts and e-mobility must develop and implement their **individual** technology roadmap. Investments in high skilled employees and necessary technology equipment are required.

Technology-Roadmap
(Chassis, structural and e-mobility casting)



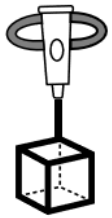
Technology/Development Topics

- A Additive Manufacturing
- B Minimum Quantity Spraying
- C Alloy development
- D Rheocasting (SSM-Casting)
- E Artificial intelligence
- F .....
- X OEE Optimisation

Note: The economic and technological significance depends individually on the company and the product portfolio of the company.

Opportunities and Risks Technology

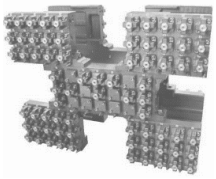
Additive Manufacturing



Additive manufacturing at HPDC currently takes place exclusively in tool making. The moulded parts produced are suitable for series production. The main advantages, extended service life, reduced cycle time and quality improvement are (mostly) confirmed in production use. The potentials (... depending on the use case) are large.

➢ In the economic assessment, the approach must be chosen: **Total Cost of Ownership**.

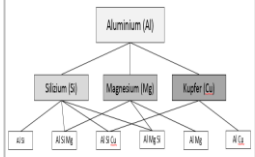
Minimum Quantity Spraying



The technology is suitable for series production and is used in many (... for individual castings) foundries. The benefits of extended tool life, reduced cycle time, and quality improvement have been proven. It is important that the thermal balance of the tool is adapted to the process.

➢ The **technology** should be **implemented** for suitable parts (e.g. thin-walled parts).

Alloy development

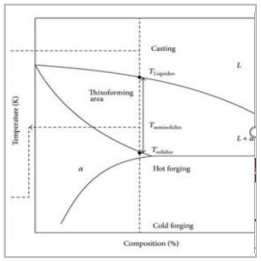


The mechanical properties (elongation at break, yield strength, tensile strength, ...) of castings are significantly influenced by the alloys used. This also applies to the technological properties (castability, tool life, shrinkage, ...). Alloys play an important role in competition with other materials (e.g. steel) and processes (e.g. extrusion).

➢ Development of the **alloy** together with the **metal manufacturer** and the **customer (OEM)**.

Opportunities and Risks Technology

Rheocasting



The industrialisation of the process is well advanced. Necessary equipment can be integrated into existing die-casting cells. Depending on the products, the advantages of the process are very great.
The process is now in series production at some companies. Achievements (... depending on the product) have been confirmed.

➢ The introduction requires **time, foundry know-how**, and **resources.**

Artificial intelligence

In the medium term, the use of artificial intelligence will support and influence the casting of aluminium castings. Productivity gains (OEE), reduction of emissions, energy reductions and knowledge conservation are at the forefront of current projects.

➢ **Industrialization** is currently still in its **early stages** at **HPDC.**

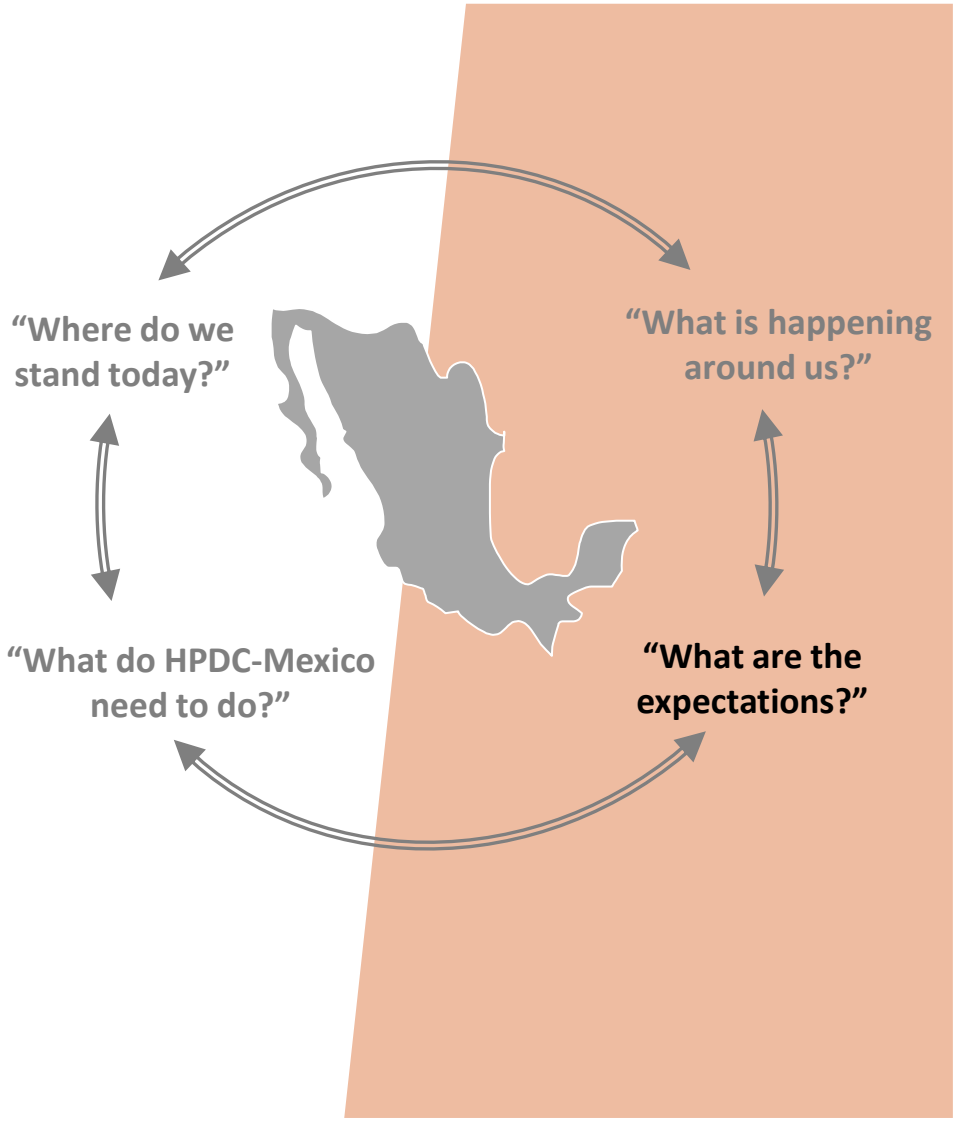
OEE Optimisation

Improving business results is a top priority. The OEE is the essential guarantee of success.

OEE = Quality-factor x Performance-factor x Availability-factor ⟶ **EBIT-Potential**

(Ø Value: 3 % OEE ≈ 1 % EBIT , depending on the company)

➢ The **To do`s** are **known**, the **know-how** is predominantly **available (.. do it!).**



Expectations

Scenarios and Hypotheses

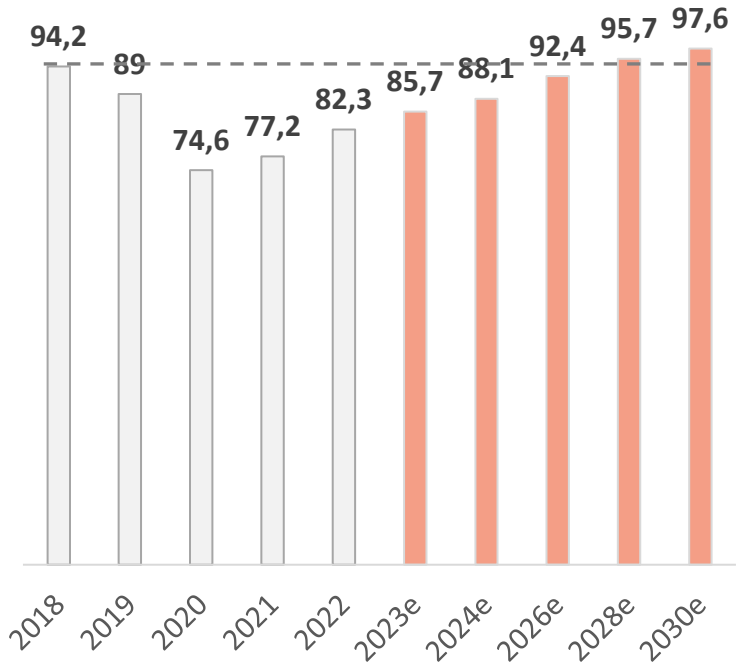
“What are the expectations?”

Expectations Scenarios and Hypotheses

Experts expect a **further increase** in **global passenger car** production figures in the **coming years**. While China and South Asia are expected to account for growth, Europe and North America are unlikely to return to peak volumes (2016/2017) until the end of the decade.

Production volume of passenger cars [1] Global [2] 2018 – 2030e [m units]

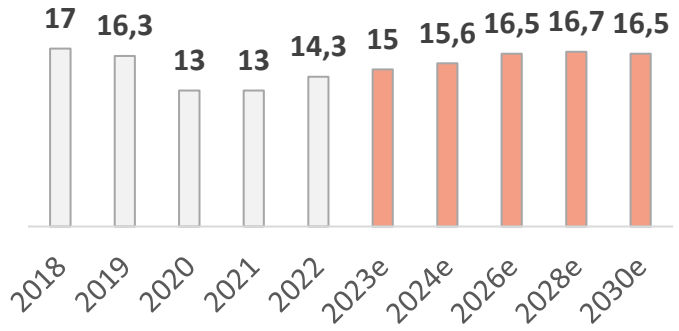
Peak volume: 95,1 (2017)



[1] Incl. LCV; excl. CIS [2] Incl. RoW

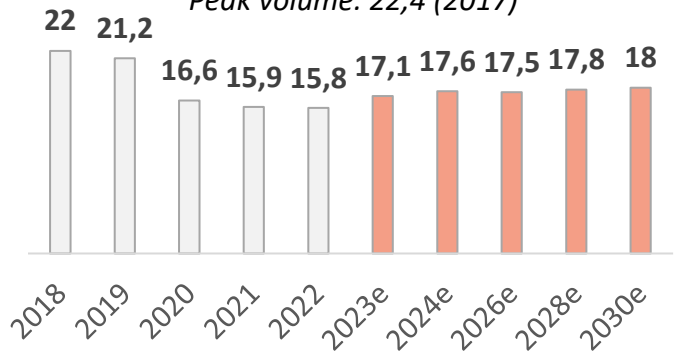
North America

Peak volume: 17,9 (2016)



Europe

Peak volume: 22,4 (2017)



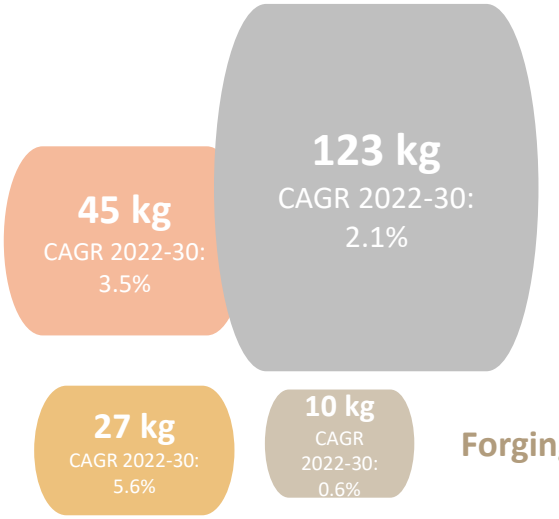
Source: Roland Berger | Lazard | Global Automotive Supplier Study 2023

“What are the expectations?”

Expectations Scenarios and Hypotheses

A recent Ducker study (12/2022) 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



Castings (+22,1 kg by 2030)

Remain the leading product form for aluminium 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 aluminium subframes

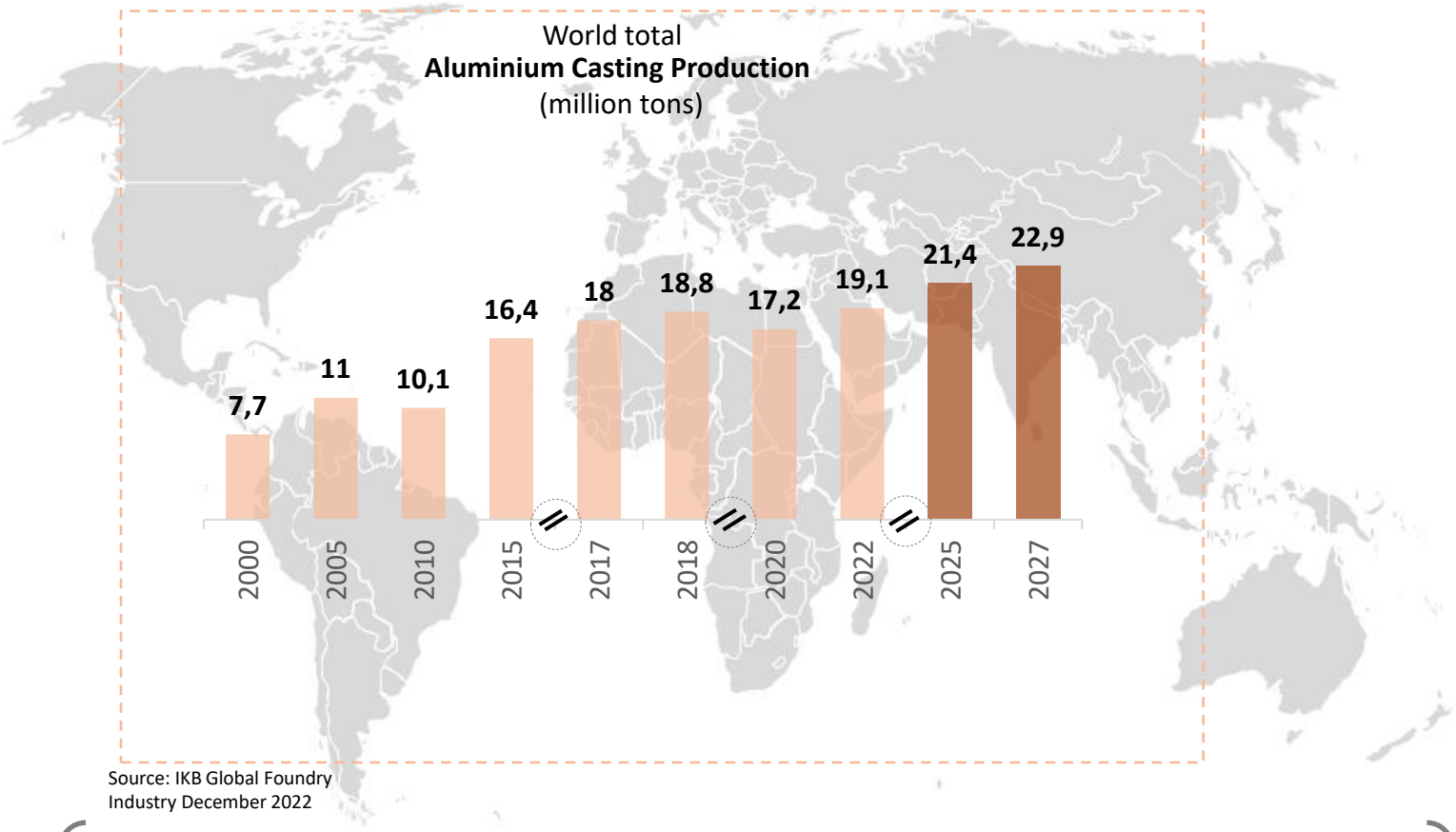
Source: Ducker Study 12/2022

There are **further opportunities** for the cast aluminium component in competition with the other processes (sheet, extrusion, forging) but also with other materials (steel).
The **increase in aluminium** per vehicle depends on the **transformation speed ICE → BEV.**

“What are the expectations?”

Expectations Scenarios and Hypotheses

Experts assume that the demand for **aluminium casting** will continue to **increase** **worldwide** (.. depends on the **transformation speed ICE → BEV)** even after the crisis.



Source: IKB Global Foundry Industry December 2022

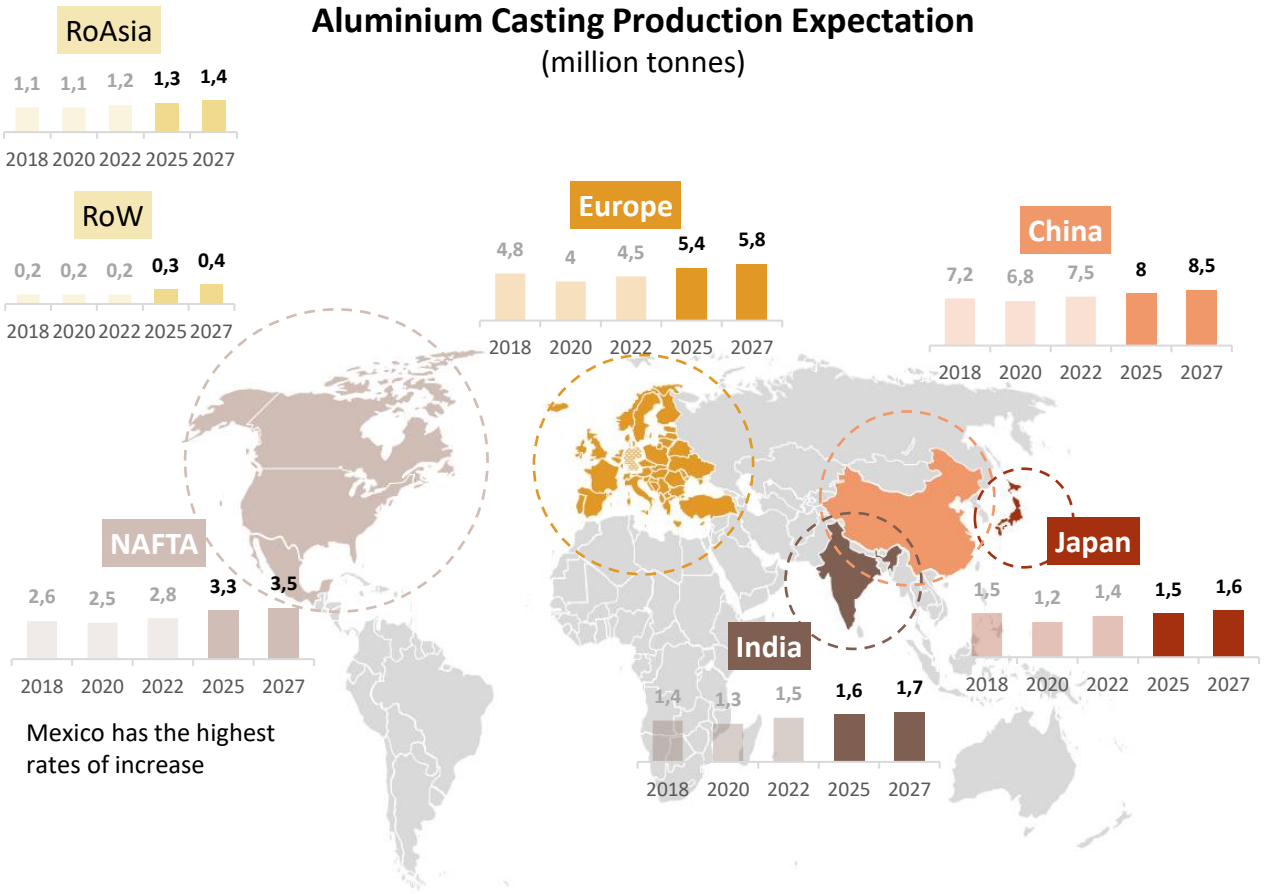
Aluminium Casting Production ≈ Volume of passenger cars x Aluminium content per passenger car

... simplified formula for rough orientation.

“What are the expectations?”

Expectations Scenarios and Hypotheses

Different growth is expected for the individual regions. In the NAFTA region, Mexico has the highest growth rate.



Source: IKB Global Foundry Industry December 2022

Experts say ...

The global aluminium die casting market was worth almost $73 billion last year and is projected to top $126 billion by 2032, according to an AlixPartners analysis based on Apollo Reports data.
Source: Apollo Reports

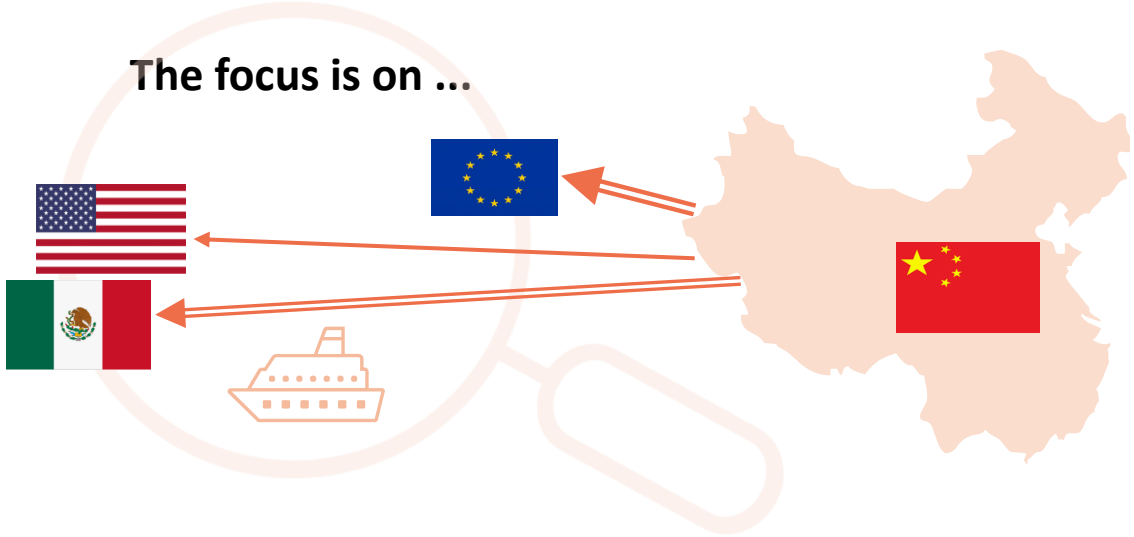
The global market for EV chassis integrated die-casting is projected to be worth $2.6 billion by 2030, from $751 million currently.
Source: Minsheng Securities

“The future of the automotive market is being shaped by various forces. The main factors today are reducing complexity, increasing productivity, and improving sustainability.”
Source **Cornel Mendler**, Bühler Group

“What are the expectations?”

Expectations Scenarios and Hypotheses

The Chinese foundry network has (over) invested massively in the last 20 years. As a result, huge overcapacities have been created, which are now available for export. In order to continue to grow and to avoid trade restrictions, Chinese companies are investing abroad.



Example: Automotive:

There are currently about 140 automotive companies, including 40 well-known. No other country has so many car manufacturers. These companies can produce 50 million cars in China, but only sell 23 millions of them in their home market. The 27 million are available for export.
There is also a large **overcapacity** of steel, **aluminium** and wind turbines

Source: Handelsblatt-Interview

BYD is the world's largest electric car manufacturer and is now commissioning the first ship in its fleet to bring the cars to Europe. Throughout the country, the construction of car freighters is booming. The ship is called BYD Explorer No.1 and is intended to transport around 7000 cars via cargo tour. In total, BYD has ordered up to eight freighters from the shipyard.

Source: FAZ NET 12.01.2024

“What are the expectations?”

Expectations SWOT HPDC Mexico (Part 2)

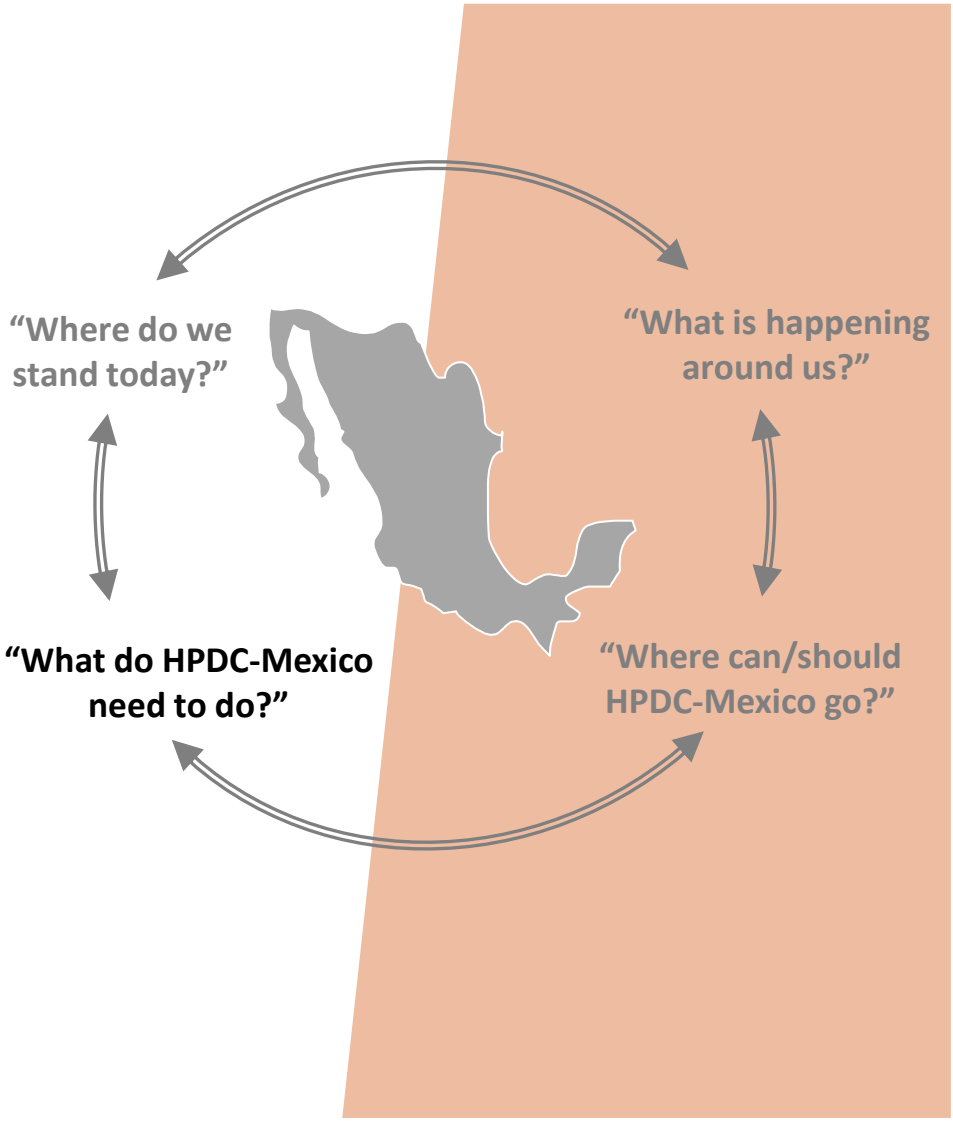
Opportunities and risks of the Mexican aluminium HPDC industry based on current challenges and long-term expectations from an external perspective(JMC).

Opportunities

- Transformation of the automotive industry (increasing volumes, new products)
- International willingness to invest in Mexico (conclude win-win agreements)
- Nearshoring (Use the current situation on the US market for better price quality and higher volumes)
- Continue to build up the foundry network in Mexico (know-how along the entire value chain)
- Build up the necessary technology know-how for structural parts, e-mobility and GIGA casting. (Tesla, Ford, BYD, ... bring new opportunities)
- Use existing CIP know-how to improve company results (EBIT)
- …..

Risks

- “Disproportionately?” rising costs (wages, energy,…)
- High dependence on the American market
- Chinese companies will aggressively export (low part prices) and invest (new competitors).
- Price war (profitability) for parts for e-mobility
- Lack of corporate financing for growth, manly smaller casting companies (interest rates 10-15%).
- High employee turnover
- Energy infrastructure is insufficient for projected growth
- Currently there is a lack of focus on sustainability
- …



If you can`t win, change the rules of the game.

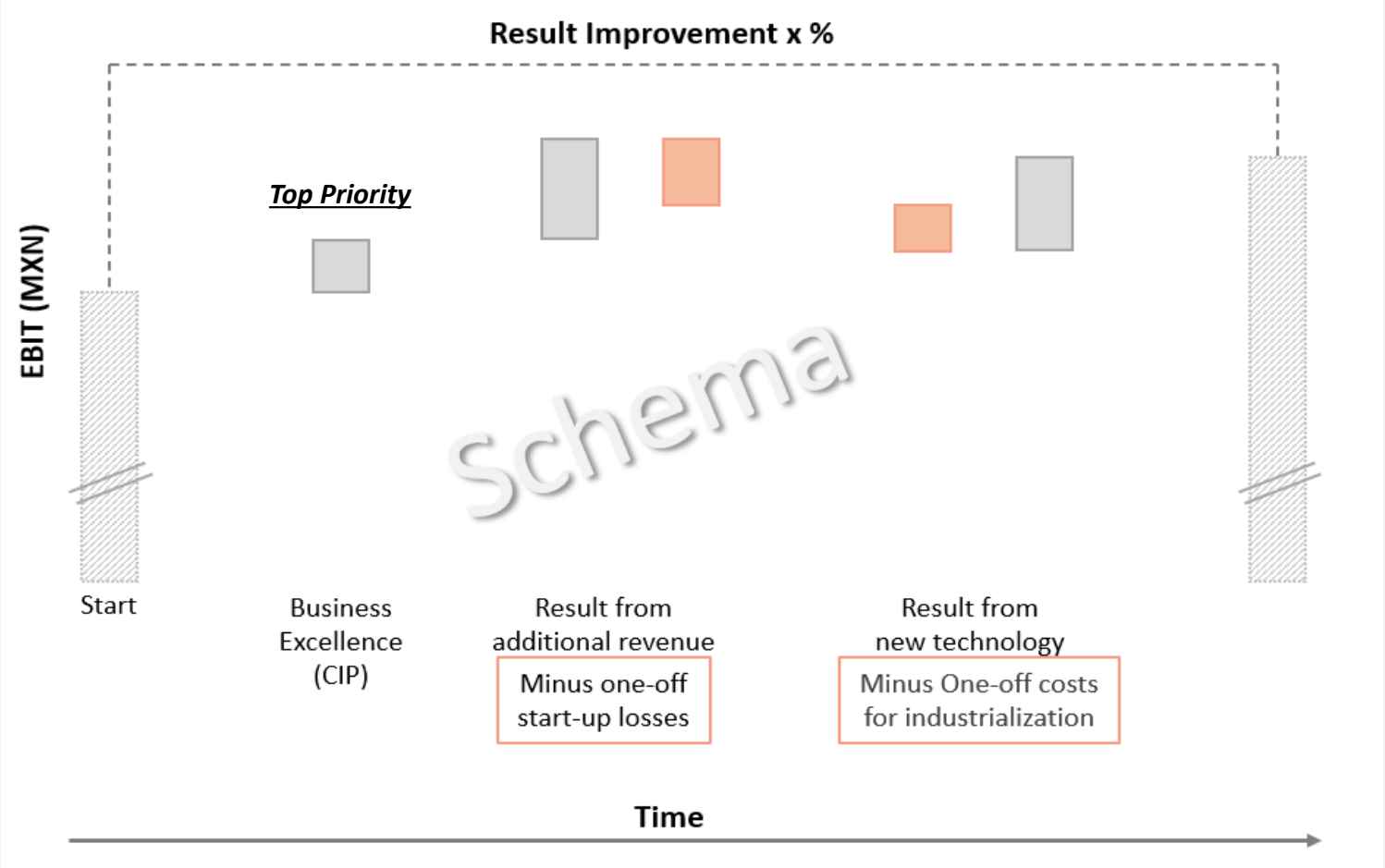
Success Factors
Recommendation

“What do HPDC-Mexico need to do?”

Johannes Messer - Consulting GmbH
Training Beratung Adaption

Success Factors Result improvement (EBIT)

Improving the company's results is a top priority (cash flow for future investments). **Increasing volumes, new technologies** and **business excellence** (CIP) are the keys to success.

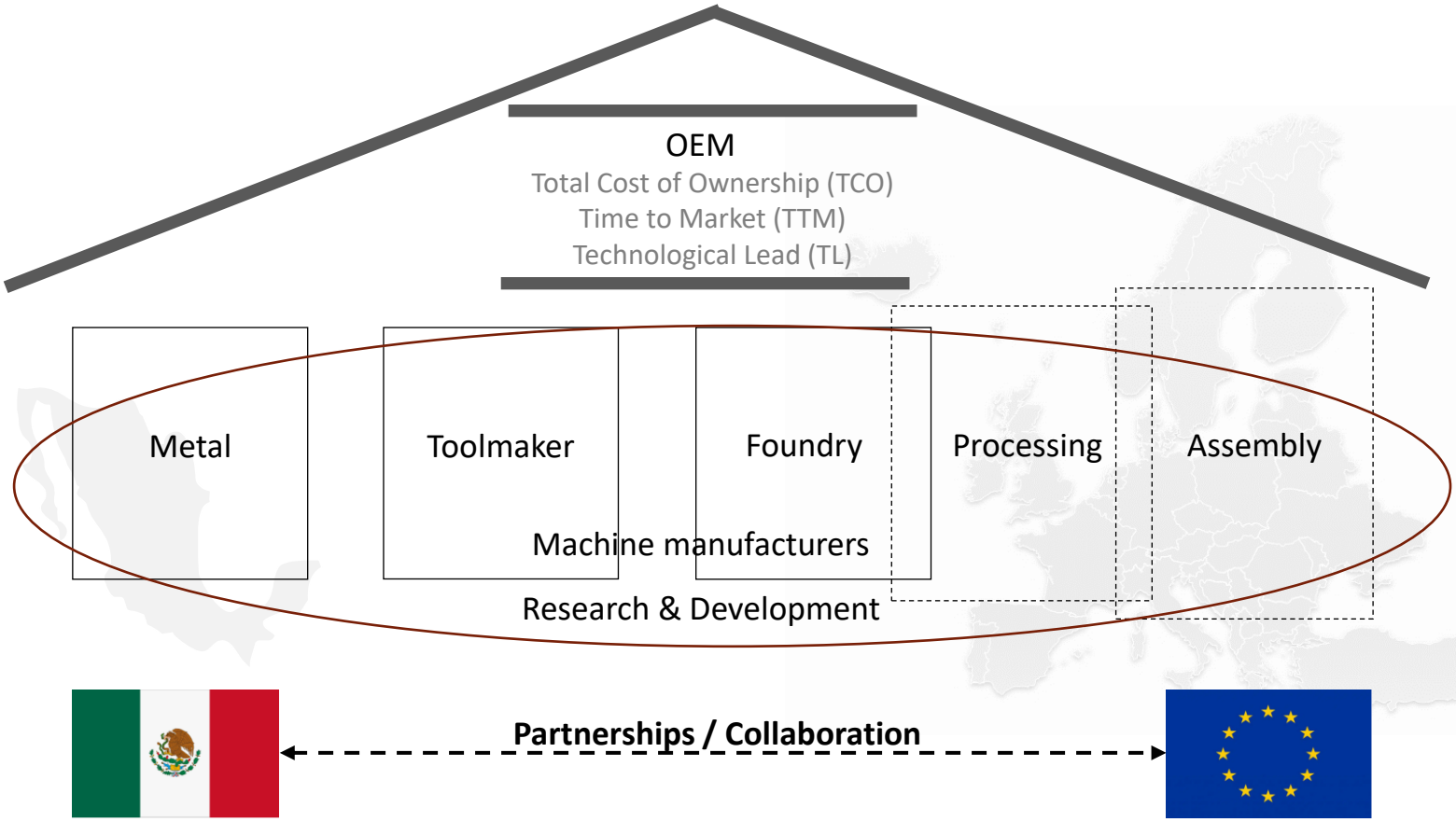


“What do HPDC-Mexico need to do?”

Johannes Messer - Consulting GmbH
Training Beratung Adaption

Success Factors Partnerships / Collaboration

Partnerships and **collaboration** (national and international) are the essential **guarantee of success** in the face of increasing competition (worldwide) and customer targets (TCO, TTM, TL).



“What do HPDC-Mexico need to do?”

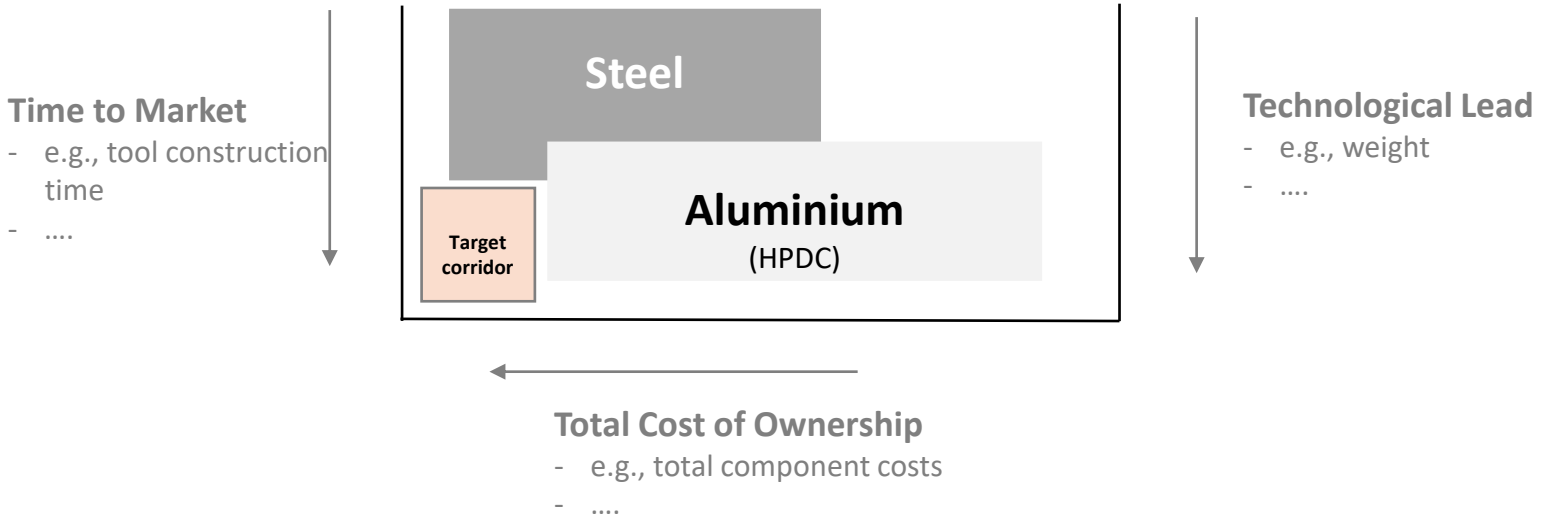
Johannes Messer - Consulting GmbH
Training Beratung Adaption

Success Factors Know-how & Skills (Company, Employees)

In the development of new products, the competitors of foundries, other processes (e.g. extrusion, sheet metal forming) and other materials (e.g. steel) . The **company's know-how** and the **skills of its employees** are the key success factor in the technological and economic development of foundry products.

Competition with other processes and materials

Example:
Aluminium vs. Steel
(schematic)



“What do HPDC-Mexico need to do?”

Johannes Messer - Consulting GmbH
Training Beratung Adaption

Recommendations HPDC-Mexico

Performance (EBIT, Operational Excellence)
International competition (new OEMs, new foundries) will continue to increase. Only foundries that are economically and technologically leading will survive in the long term. Result Improvement (EBIT) is essential. Increasing volumes, new technologies and business excellence (CIP) are the keys to success.

Partnerships (National, International)
Total Cost of Ownership (TCO); Time to Market (TTM); Technological Lead (TL) are the targets of the customers. Foundries will not be able to reach their targets without comprehensive process know-how along the value chain. National and international (Europe/Mexico) partnerships and cooperation are needed.

Know-how/Skills (Company, Employees)
With increasing demands and ever new challenges, company know-how and employee competence is often/mostly the decisive competitive advantage. Employees at all hierarchical levels must be empowered to do so.

Product Portfolio (ICE → BEV)
The transformation in the automotive sector (ICE → BEV) is being implemented. The product portfolio (Chassis, structural and e-mobility casting) will change. Volumes will increase. Know-how, technologies and machinery/equipment must be adapted to the changes.

Strategy (individual)
The individual corporate strategy must be adapted to current challenges and long-term expectations. Sustainability is becoming increasingly important.

Recommendations HPDC-Mexico

HPDC-Mexico

The current multidimensional challenges are real. The long-term effects are not always precisely predictable. There are **opportunities**, but also **risks.**

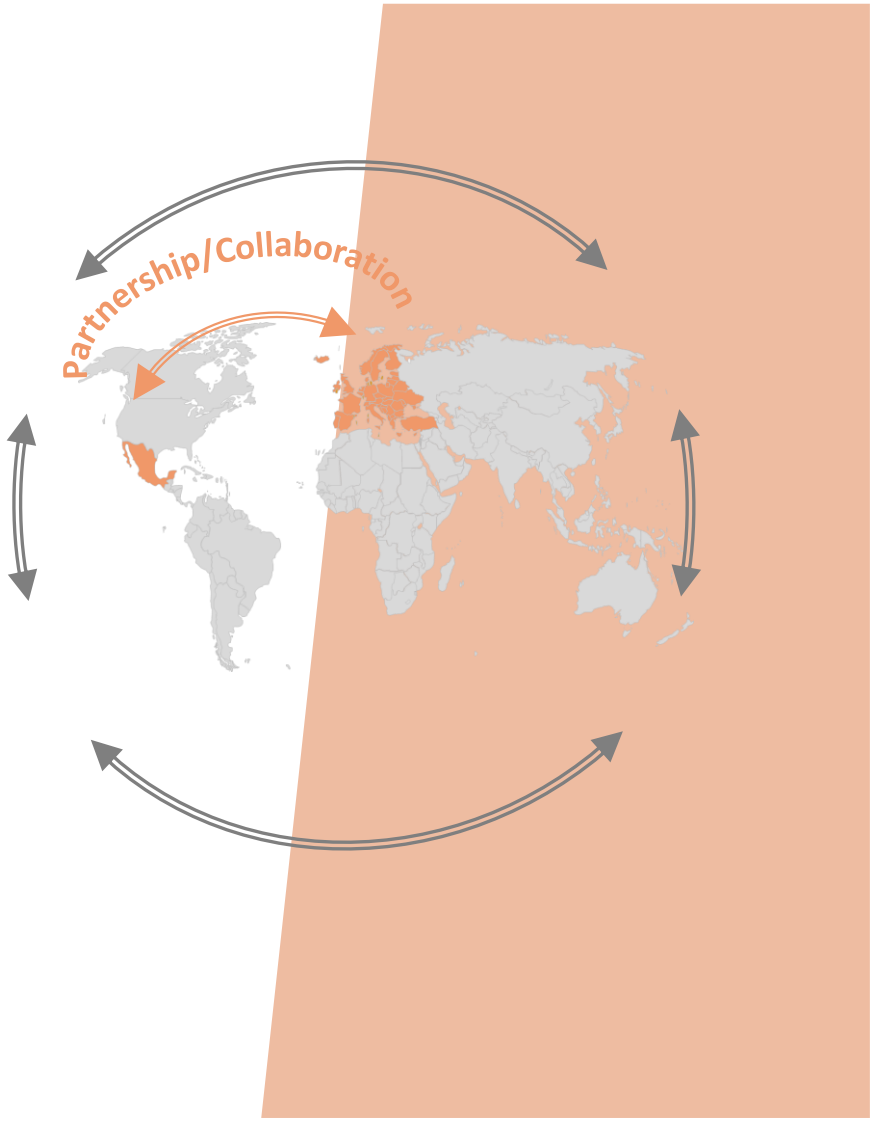
- The transformation is currently being implemented in the aluminium foundry industry's most important customer, the automotive sector.
- Many new companies have emerged in the automotive sector.
- The trend towards industrial and automotive lightweight construction continues.
- The product portfolio of foundries will change.
- Volume forecasts are positive.

In the long term, the companies that will be successful are those that immediately face the challenges, question the previous strategy and rigorously transform opportunities and risks into success. Partnerships and cooperation are an essential guarantee of success.

The aluminium foundry industry in Mexico will continue to be successful in the future. New products, customers and competitors will emerge. Foundries have to work out their long-term market position on an individual basis.

Johannes Messer - Consulting GmbH
Training Beratung Adaption

Recommendations Europe



"What do HPDC-Europe need to do?"

Success Factors
Partnership/Collaboration

If you can`t win, change the rules of the game.

Why is Mexico **now** so interesting for Europe?

- HPDC-Mexico has grown strongly in recent years and will continue to grow strongly in the coming years.
- The major OEMs, including the European ones (VW, Audi, BMW, Mercedes, Stellantis, ...), are already in Mexico and are continuing to invest there.
- Labour costs and weekly working hours are attractive (also in comparison to China).
- Nearshoring, USA (free trade agreement **US**A, **M**exico **Ca**nada).
- HPDC technologies: Good basis available. Introduction of the latest technologies would bring further improvements in results in the short term and with little effort.
- Compared to the number of local and international foundries, there are too few companies in the rest of the value chain in Mexico (consequence: high import quotas, know-how deficits, ...).
- International (partly important) die casting foundries are already in Mexico: USA (7); Europe (11); Japan (3), India (4), China (4 + 2 in planning). China is currently showing great interest in the Mexican HPDC market .
- Structural parts and GIGA casting: Technology is not yet available. However, demand will arise (Tesla, Ford, BYD, GM, ...).
- **Good, current and historical relationships/connections between Mexico and Europe** (EUROGUSS, Die Casting Congress, companies: Nemak, Bocar).

Why is Mexico **now** so interesting for Europe?

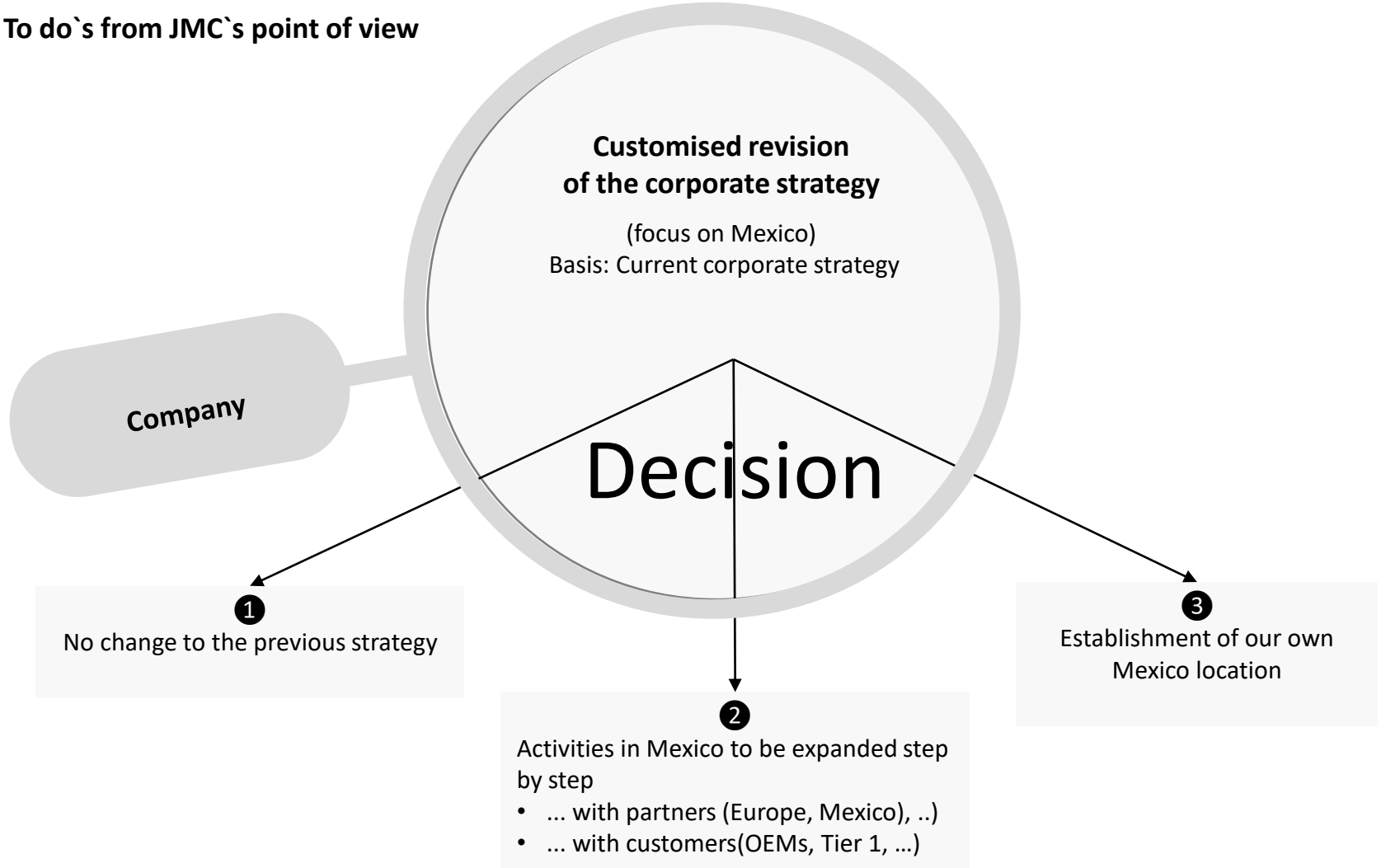
- As an entrepreneur/investor, where would you (JMC) currently **like to see an HPDC location?**

Region	Answer	Comment
Japan?	No	Japan is a locally "closed" market with currently low growth forecasts.
USA?	No	The USA is a difficult production location for foreign companies. The general conditions are also currently difficult, and growth is low.
China?	No	China will become more difficult for foreign companies in the long term. There is probably already a great deal of overcapacity in the HPDC sector.
Europe?	?	After the sharp decline in volumes, growth is likely from 2025. Europe has a good HPDC network (expertise). Volume and expertise (collaboration) could be the lever for success. Eastern Europe is predominantly more attractive for investments than Western Europe.
India?	Later	The market's requirements for the cast parts currently needed are well covered by the existing HPDC network in India. India will become very interesting in the medium term. (Possibly the basis for future investments should be laid now)
Mexico?	Yes	See Document

“What do HPDC-Europe need to do?”

Recommendations HPDC-Europe

To do`s from JMC`s point of view



“What do HPDC-Europe need to do?”

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Recommendations HPDC-Europe

To do`s from JMC`s point of view

➢ Joint activities of the European HPDC network

- EUROGUSS Mexiko 2025
- Exchange HPDC Mexico / HPDC Europe (Executive Level)
  Target: How can we transform the respective **strengths, weaknesses, opportunities** and **risks** of **Mexico** and **Europe** into **joint success**?

SWOT Mexiko (JMC)

Strengthen

- Aluminium Casting Know how and customer orientation
- Speed in setting up the foundry industry(e.g. from 2010 to 2016, 26 new foundries were built in Mexico)
- Wage level (... despite continuous increase)
- Working hours (workers → 6 days/week; 8 hours/day).
- Average age of the population (Ø 29 years, Germany Ø 44)
- International interest (further increase in international direct investment by 48% to $18.6 billion in the first quarter of 2023)
- Know-how, modern CIP methods
- Market presence of internationally important HPDC companies

Weaknesses

- Shortage of skilled workers along the entire value chain (high staff turnover)
- Few own technological innovations
- CIP potentials are used conservatively (... despite kno
  methods and tools)
- Financial situation of smaller foundries (Ø EBITDA 8
  low investments)
- Mainly small national (approx. 80-100) HPDC foundri
  the exception of Nemak, Bocar and foreign foundries.
- Partly missing value chain (e.g. tool making, high imp
  share).....

Opertunitis

- Transformation of the automotive industry (increasing volumes, new products)
- International willingness to invest in Mexico (conclude win-win agreements)
- Nearshoring (Use the current situation on the US market for better price quality and higher volumes)
- Continue to build up the foundry network in Mexico (know-how along the entire value chain)
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- Use existing CIP know-how to improve company results (EBIT)

Risiks

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- Partly missing value chain (e.g. tool making, high imp
  share)

SWOT Europa (JMC)

Stärken

- Kompetentes Gießerei-Technologie Netzwerk
- Gute Kundenbeziehung zu den lokalen OEMs und Tier 1
- Herausragendes praxisbezogenes Gießerei Know-how (Mitarbeiter) entlang der Wertschöpfungskette
- Gute Infrastruktur der gesamten Wertschöpfungskette
- Entwicklung wertvoller, neuer Technologien
- ....

Schwächen

- Alter der Gießereien (Unterschiede West- und Osteuropa)
- Industrielles Umfeld (Unterschiede West- und Osteuropa)
- Krise hat erhebliche Auswirkungen auf die aktuelle Ergebnis- und Finanzsituation
- Geringe Investitionstätigkeit (Schwerpunkt Westeuropa). Aktuell keine Investitionen beim Thema GIGA-Casting (Ausnahme: Handtmann und einige OEMs)
- Umsetzung industrialisierter, wertvoller, neuer Technologien
- Veränderungsbereitschaft, Veränderungsgeschwindigkeit
- .....

Chancen

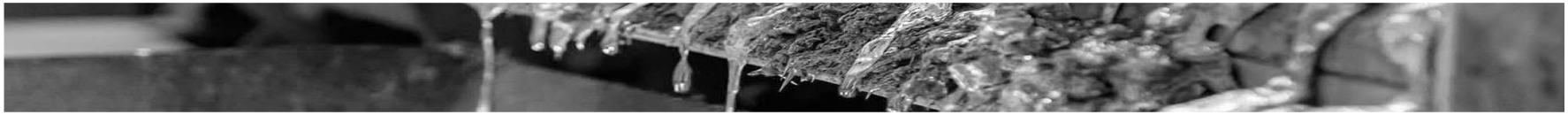
- Zusammenarbeit, entlang der gesamten Wertschöpfungskette
- Erwartetes Wachstum der Branche
- Branche wird wieder für Kapitalgeber interessant
- Substitution weiterer PKW-Teile durch AI-Guss technologisch und wirtschaftlich für die Kunden attraktiv machen
- Gemeinsame Initiativen und Strategien
- ....

Risiken

- Unternehmen sind mit der Komplexität der aktuellen Herausforderungen überfordert
- Internationale Bedeutung nimmt ab
- Fehlendes Kapital für prognostiziertes und erreichbares Wachstum
- ....

The To-do's are individual. We help you to find and implement the right ones.

Congreso Die Casting, Mexico



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

- Michael Jordan -

STRATEGY DEVELOPMENT

MANAGEMENT CONSULTING
INTERIM MANAGEMENT

NETWORKING

COMPANY ANALYSIS