Forecast 2025 for the global Foundry Industry

Düsseldorf, June 2019
Dr. Heinz-Jürgen Büchner
## Agenda

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Lower Growth Rates

The US-GDP grew by 3.1 % (qoq) during the first quarter of 2019. In total, the economic development was very strong. Therefore, IKB forecasts a growth rate of 2.6 % in 2019.

China's economy had a strong start into the current year. The GDP grew by 6.4 % yoy. The consensus forecast had expected a lower growth in relation to the last quarter. We expect an average growth of the industrial production between 5 and 6 % in the current year.

Eurostat confirms for the euro zone a GDP growth of 0.4 % qoq for the first quarter of 2019: A significant improvement in relation to the previous quarter. IKB forecasts for the euro zone a GDP growth of 1.2 % in 2019.

Sources: Bloomberg

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In Detail

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- China’s economy had a strong start into the current year. The GDP grew by 6.4 % yoy. The consensus forecast had expected a lower growth in relation to the last quarter. We expect an average growth of the industrial production between 5 and 6 % in the current year.
- Eurostat confirms for the euro zone a GDP growth of 0.4 % qoq for the first quarter of 2019: A significant improvement in relation to the previous quarter. IKB forecasts for the euro zone a GDP growth of 1.2 % in 2019.
Crude Oil: Geopolitical Disturbances

1) In 2018 a strong rise of the **worldwide demand** for crude oil was seen: On average the demand rose by 1.4 mbd (million barrel per day) to 98.75 mbd

2) For 2019, we expect another rise in the global crude oil demand of 1.15 mbd to nearly 100 mbd

➢ In addition to a higher oil production in Non-OPEC countries, an **OPEC production of 35.4 mbd will be necessary.** Around 4.8 mbd will come from the **OPEC NGL grades**

➢ As a result an OPEC production of around 30.5 mbd is necessary in the current year. This equals the OPEC monthly production in the **first quarter of 2019. But in April and May 2019** the monthly production of the OPEC was below this level

➢ We have seen a **rise in geopolitical disturbances**, e.g. the war in **Yemen**, the war in **Syria** and the political instability in **Venezuela**. But the highest risk in our point of view is the conflict after the cancellation of the **nuclear agreement with Iran by President Trump**

➢ The number of **active oil rigs** in the United States of America equal 788, significantly below the peak

➢ Therefore, we forecast a **crude oil price** fluctuating between 60 and 70 US-$ per barrel Brent for the next three months of 2019. **WTI** will be around 8 US-Dollars per barrel below the Brent price

Sources: 1) Bloomberg 2) Baker Hughes North America Rotary Rig Count
Higher Geopolitical Risks

Crisis in the Middle East

- The main geopolitical risks are the wars in Yemen and Syria, the political instability in Venezuela and the cancellation of the nuclear agreement with the Iran including strong sanctions
- We see no process of democratization in Saudi-Arabia
- Iran's threat to close the Strait of Hormuz – an important part of the crude oil exports from the Gulf region is passed through the Strait of Hormuz – could induce an explosion
- The attacks on several oil tankers lead to a rise in insecurity in the region

Brexit: Is it time to say “Good bye”?

- The retirement of Prime Minister May raises the possibility of a hard Brexit
- We could see a rising uncertainty in the British sentiment indicators, which have been going down since the summer of 2018
- For the second quarter of 2019 a decrease in the British GDP is expected as a result of anticipatory effects of the Brexit
- A hard Brexit will induce a reduction in economic growth in the countries of the EU

Tweets and Trade Wars

- For President Trump there are threats concerning tariffs on imports and other sanctions, an instrument to sharpen his domestic political profile
- Even very newly closed agreements (e.g. with Mexico) are no longer reliable
- The conflict with China has more and more negative impacts on the major trading partners
- Does it make sense to close agreements and contracts with the US government, if a quick cancellation via tweets is possible?

Tariffs on Automotive Imports

- Trump is threatening to impose tariffs on imports of European light vehicles as a possible reaction in the trade conflict. His main focus is on deliveries from Germany
- The EU proposal to eliminate tariffs on light vehicles was rejected by Trump as insufficient. Reason: Europeans are used to buying European cars, thus American OEM’s do not have a real chance
- The US-American car manufacturers are in total against tariffs on car imports
The European automotive industry recovers. The growth is stronger in the Eastern European countries.

Within the NAFTA we see a rising importance of Mexico: The new manufacturing plants of several global OEM’s will not reduce their production volume as a result of “America First”.

Japan and Korea will lose production volume to new manufacturing plants in China.

Source: IHS March 2019
Stronger emission regulations in the European Union and the US induce a reduced fuel consumption
This stimulates investments in a new generation of trucks and commercial vehicles

Source: IHS January 2019
Global Electrical Vehicle Stock with strong Growth

Outlook to 2030

In Detail

- The following forecast is the basic scenario of the International Energy Agency (IEA). The scenario is based on the announced policies and measures that governments all over the world put in place.

- In 2020, the global stock will rise to 13 million vehicles from 3.7 million in 2017.

- Between 2020 and 2030, the total stock of vehicles will nearly tenfold to around 130 million in this scenario.

- The increase will result primarily from the private passenger light vehicles market.

- In the commercial sector, we see – with the exception of buses – only a very slight rise.

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1) PLDV = Passenger light duty vehicle; LCV = Light Commercial vehicle; BEV = Battery electric vehicle; PHEV = Plug-in hybrid electric vehicle.

Source: International Energy Agency; Picture credit: Lynk & Co 01
Mechanical Engineering: Slight Recovery in Europe, Growth in Asia

- Globally, we expect further increases in demand for mechanical engineering products
- Sales in China will show a further growth within the next years. Chinese sales will be higher than the combined sales of the rest of Asia and North America
- In Europe, Germany and Italy will gain market share compared to other western European states
- In the mechanical engineering industry there is a movement towards lightweight construction (robotics, machine tools, etc.)

Sources: VDMA, IKB estimates
➢ The global market for electric products and electronics was estimated with around €4,500 billions in 2016. By 2025 we see a production volume of above 5,600 bn. Euros
➢ During the next years a stable growth is expected. The growth rate in China will fluctuate between 5 and 7 per cent after double-digit rates in previous years
➢ We expect an increasing production in all major sub-segments of the market

Sources: ZVEI, IKB forecast
Construction Sector: Further Growth Prospects

Urbanization and Development of Megacities

- Megacity in 2014
- Megacity in 2030

Forecast Global Construction Sector

Total: 10.2 trillion US$
- Americas: 22%
- Europe: 47%
- Asia / Pacific: 26%
- Middle East / Africa: 5%

Recovery of the European Construction Sector

In Detail

- The global construction industry will be on a stable growth path during the next five years. We do not only expect a strong urbanization process in the emerging markets. By 2030 several new “megacities” will have been developed.
- Between 2017 and 2021 the global construction output will grow at an average of 2.8% a year to more than 10 trillion US$.
- China, the US, Japan, India and Germany will account for more than half of the global construction output in 2021.
- Therefore we forecast a rising demand for construction-related casting products in the major markets. Mainly iron cast will profit from this development.

1) Megacity: > 10 million inhabitants
Sources: Euroconstruct, UNEP, CIC
### Challenges in major Customer Industries

#### Challenge Automotive Industry
- For 2019 we forecast a small **dip** in the global **automotive production**. This is the result e.g. of:
  - the impact of **trade conflicts**
  - the secondary effects of the **diesel crisis problems with new testing methods** in Europe
- The **Brexit** has a negative impact in Europe
- In the middle and long run the trend towards E-Mobility has a negative impact on foundries. The light-weight construction reduces the part weights and the change in the power train has impacts on the supply chain

#### Challenge Digitalization
- The digital transformation will **strengthen existing supply chains**. Customers with digital requirements for casting products will have a look on geographical proximity
- The development in **lightweight construction** in the automotive industry could only be realized together with foundries
- Medium-sized foundries will be successful if they are able to strengthen their own **USP between niche players and commodity producers**

#### Challenge Emerging Markets
- We forecast **new capacities for foundries** mainly in the emerging markets, e.g. **India, Brazil and Mexico**
- We see a rising importance of **Eastern Europe**. Especially countries with new or **extended automotive production**, e.g. **Slovakia, Poland or Romania**
- In the long run countries like Indonesia or Vietnam have an increased potential for casting production

#### Challenge Climate Protection
- We expect rising energy costs in Europe. Therefore, **high needs for investments into energy efficiency** are necessary in Europe
- The **regulation on emission reductions** will increase during the next years
- **As a result a loss of competitiveness mainly for medium-sized foundries is possible**
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Cast Iron: Growth only in China?

The global iron cast production rose from 54.5 million metric tons in the year 2000 to over 85 million tons in 2017.

In 2000, China produced around 9.9 million tons of iron cast products in total. Until 2017, the country expanded its foundry production output to around 41 million tons.

During the same time, the cast iron production in the rest of the world stabilized.

While some of the leading producers in the western world (e.g. USA, Japan, France, Italy) as well as Russia lost market shares, the production in some emerging markets (e.g. India, Brazil, Turkey) expanded.

Between 2000 and 2017 the output of grey iron cast rose by around 40% while the production volume of ductile iron cast doubled worldwide to around 27 million tons. The steel cast production grew by 65%.

China showed a similar trend: While grey cast nearly quadrupled, the output of ductile iron cast sextupled and the steel cast output became three times higher.

Sources: CAEF, Modern Census, IKB Research
**Aluminum Cast Production on a stable Growth Path**

**Cast Aluminium Production from 2000 to 2017**

- **In Detail**
  - The global aluminum foundry production rose from 8 million metric tons in the year 2000 to 19 million tons in 2017.
  - China’s aluminum cast output equaled only 0.8 million tons in 2000.
  - But in the year 2017 the Chinese aluminum foundries manufactured a new all-time record with 7.3 million tons of casting products: Within 17 years their aluminum foundry production increased by a factor of over nine.
  - In the rest of the world the aluminum cast output rose from 7.2 million tons to over 12 million tons in 2017.
  - While the global growth of the iron cast production mainly resulted from an increase of the Chinese production with a stable output level in the rest of the world, the aluminum cast production rose in all major regions of the world.
  - Between 2000 and the year 2017 the production level stabilized in the USA, France and Russia. During the same period Japan and Italy realized a slight growth of around 20 per cent, while the German output grew by around 75 per cent.
  - As a result of new plants for aluminum wheel rims the Turkish foundry production expanded tenfold, while the Indian output sextupled.

Sources: CAEF, Modern Census, IKB Research
Global Production of Iron and Ductile Iron Cast stabilizes\textsuperscript{1)}

in mill. tons

- Production in Western Europe will move sideways by 2025 with a slight decline from 2020 on
- Despite the partly re-industrialization of the US economy and temporary lower energy costs the foundry production in the NAFTA declined between 2014 and 2016. Development will level off from 2022 onwards
- China will dominate the world market but India will catch up. Japan and Korea will lose cast production to these countries

Sources: World Census, CAEF, IKB forecast; 1) Including Steel Cast
Iron Cast recovers in Eastern Europe°)

In Eastern Europe a large part of growth will take place in Turkey but we also expect a recovery after sharp declines in Russia and Ukraine.

Western European production shows a tendency towards declining volumes. Spain could show stronger growth.

We see chances for Germany in case of a stronger recovery of mechanical engineering activities.

Sources: World Census, CAEF, IKB forecast; 1) Including Steel Cast
Global Aluminum Cast Production will strengthen

The trend towards electrical vehicles and light-weight production induces a rising aluminum foundry production. In addition to the higher production volume in Western Europe some of the leading foundry groups invest in Eastern Europe, too. We see a recovery in Russia and Ukraine and a catching-up process in Turkey. The majority of growth in the NAFTA region will be fueled by investments of foreign OEMs and global foundry groups. Korea and Japan will lose market shares to China.

Sources: World Census, CAEF, IKB forecast
European Aluminum Cast Production shows stronger Growth

For Eastern Europe we see a steady recovery within the next years (e.g. Russia, Ukraine)

In the medium-term an expansion of aluminum rim production in Turkey as well as increased capacities in Slovakia, the Czech Republic and other countries will stimulate European production

After a strong growth in the past years German aluminum foundries are expected to produce 1.2 million tons from 2018 on

Sources: World Census, CAEF, IKB forecast
The global copper die casting production increased by 11.7% from 2010 to 2017.

By 2025 we expect global copper die casting production to rise to about 1.95 million tons.

While copper die casting production will slightly recover in Western Europe and Northern America, more than half of the global copper die casting production will take place in Asia.

Sources: World Census, CAEF, IKB forecast
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Consequences for the global Foundry Demand

1. The trend towards e-mobility has tremendous consequences for the supply chain. Mainly the suppliers of powertrain components are negatively affected.
   - If we assume the weight of an average engine block of around 50 kg and expect a shift of 10 million light vehicles from combustion engine to e-battery-vehicles …
   - … this will result in a reduction of around 500,000 tons of iron cast.

2. Hybrid vehicles are a better solution for foundries under the aspect of the necessary volume of casting production:
   - They do not only need a battery but also an engine block.
   - The average engine block for an e-vehicle is smaller in relation to a traditional combustion engine, but the battery leads to a higher total weight of the car.

3. A higher usage of copper (autonomous driving) and higher battery weight will intensify the trend towards light-weight production:
   - This will result either in a reduction of the specific weight of a cast part (as a result of a change in the geometry of the cast product) …
   - … or in a substitution of iron cast by aluminum cast.
## Strategic challenges of foundries

### Globalization
- Emerging markets will account for the majority of demand growth
- The automotive industry in particular demands local production outside of Europe
- Increased requirement of a global presence close to the customer will raise logistics costs

### Technological challenges
- Preservation of technology leadership is of high importance, especially for the foundry industry
- Pressure on weight reduction will continue (e.g. in automotive and machine construction)
- The E-Mobility discussion will significantly change the supply chain, especially in powertrain

### Retaining qualified personnel
- Many qualified employees will retire in the upcoming years (primarily in Western Europe)
- Competition for qualified personnel intensifies due to changing demographics
- Need for new employee retention programs (e.g. balance between work and family) and training

### Investment requirements
- Trend towards delivery of completely processed castings will demand corresponding investment
- Increased complexity of metal alloy will also demand investment
- High costs of energy will have to be managed

### Margin pressure
- International competition in vehicle construction will go up
- This limits the possibility of cost transfer to the end customer
- OEMs could pass on cost pressure to suppliers

### Industry consolidation
- Continuation of industry consolidation is expected
- Main reasons are globalization pressure and increased investment requirements
- Many family businesses face problems in terms of company succession in our point of view

The global foundry industry is facing increased investment requirements. In combination with technological changes this should intensify industry consolidation.
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Iron Cast in Asia: India with high Growth Potential

The Indian foundry industry will have a high growth potential: The infrastructure has an enormous investment backlog in relation to China and an improving car production will induce a rising demand for foundry products.

The losses of car manufacturing in South Korea and Japan to Chinese car production plants result in a declining iron cast output, which cannot be compensated by other customer segments.

From 2020 on the increasing importance of electrical vehicles will reduce the casting output in China.

Sources: World Census, CAEF, IKB forecast; including steel cast
The Chinese aluminum cast production shows a continuously strong growth. The main driver is the demand from the car manufacturing industry. In addition we see a substitution of iron cast by aluminum foundry parts in the mechanical engineering industry.

India will catch up, but will start from a relatively low level.

The production level in Japan and South Korea will remain relatively constant.
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