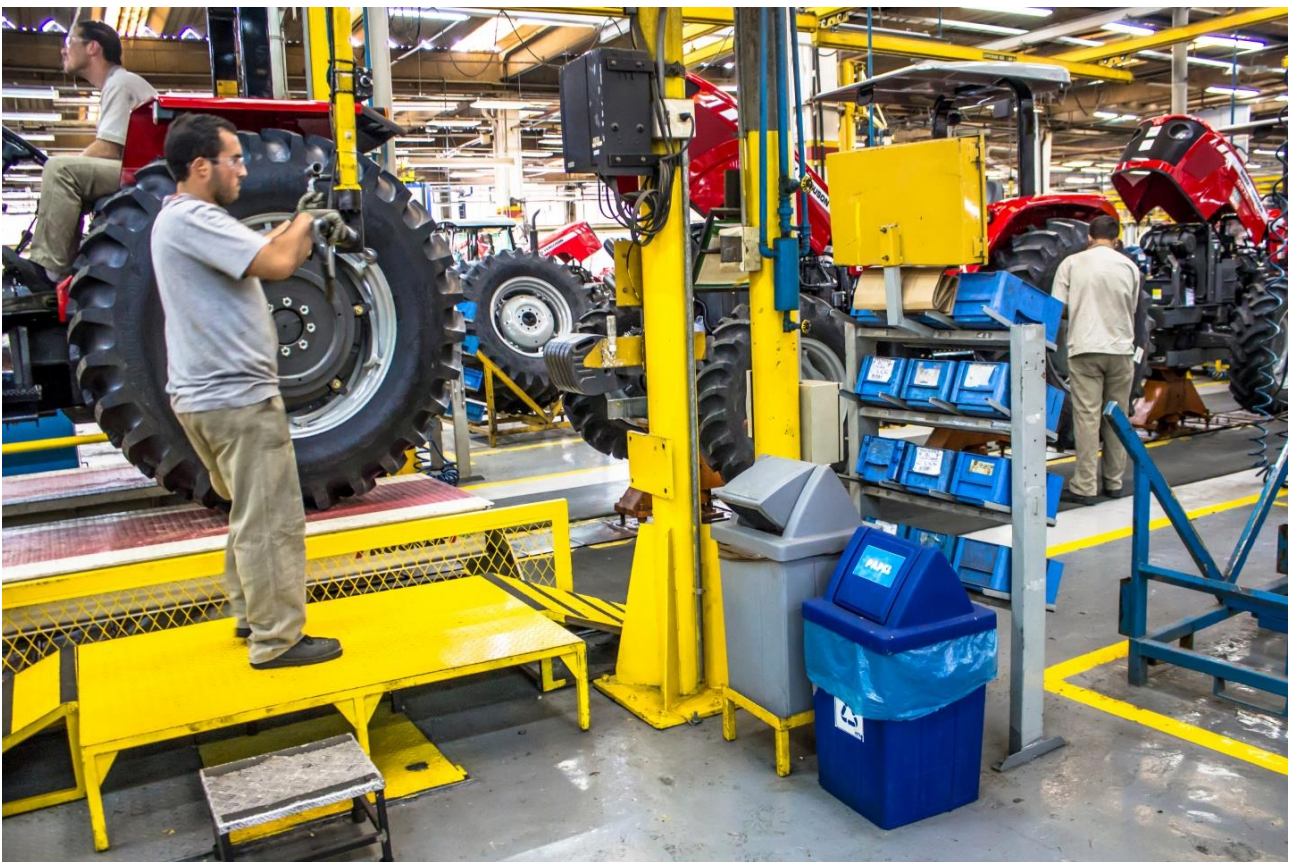


DIGITALIZATION, GREEN TECH AND OTHER NEW DEVELOPMENTS IN THE MECHANICAL ENGINEERING SECTOR



REPORT FOR THE WORLD CONFERENCE

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1. Introduction

Since the last global Mechanical Engineering conference in November 2015 in Bern, Switzerland, the world has been witness to dramatic changes:

- Political far-right movements have been in charge in many countries of the world, including USA, Brazil, Turkey, Philippines, Hungary and many others – the list is continues to grow. This development is a burden for democratic progress worldwide and hampers any positive development for the global workforce. Right-wing governments never act in favour of the working class, despite what their party leaders say. They always and without exception weaken labour and trade union rights in order to create economic advantage for “their” capital. Right-wing governments threaten “trade wars” and tariffs to put their respective country’s capital “first” and not their workforce.
- The Brexit discussion, which dragged on for many years, has resulted in chaos paralyzing the European Union for several years. Instead of discussing necessary progress in social and environmental cohesion, European leaders have been occupied with an unhealthy discussion over the parameters of a deal or no-deal Brexit. But at the same time, the European Union is forced to re-position itself in a changing global environment with new challenges, new players, and new risks that require new answers.
- Global warming and the discussions around the necessary CO₂ reductions have on the other hand mobilized a whole generation that fears for their future and demands a drastic change in climate policy which also requires a drastic change in the automotive industry, public transportation, energy production, new technologies, and other industrial sectors. The younger generation rightly demands that we work on a future for humankind in an environment where people can exist. The German word for sustainability – “Nachhaltigkeit” – refers to a way of running an economy without harming the opportunities for future generations. Originating in forestry, it meant not harvesting more trees in one year than could regrow in the same period. Reduction goals for CO₂ emissions are a big challenge for many industries (or rather the products), but this is not the whole picture. Global warming is but one element of environmental risk where mechanical engineering industries can deliver solutions. This includes better technical solutions, new products and also better working conditions.
- Technological developments have gained momentum and industrial production is changing with an enormous speed. The concept of digitalization is transforming not only the industrial setting but also the whole system of relations between producer, service provider, supplier and customer. Autonomous driving, digitalized processes in

production, service, and consumption revamp the whole setting for our industries. Besides, specific technologies such as digital three-dimensional (3D) printing, the interaction between man and machinery, artificial intelligence and others change the whole system of supply, production and product life cycle management. This requires new skills and tools. Also, new ethical discussions are needed about the limits of using artificial intelligence and moral categories in autonomous operating products.

- Multinational corporations (MNCs) going through mergers, restructurings, divestments and splits represent a huge challenge for the labour movement, on regional, national and global level. Siemens, General Electric, Caterpillar, thyssenkrupp are only some examples from our sector whose restructuring brings changes in our industrial settings. MNCs do not respect our views of sectors, borders, or workers' rights in these processes. They are driven by "active" shareholders who only want higher dividends leaving the interest of workers and their representatives out. Trade unions and global unions have the difficult task of safeguarding workers' interests in this process. Global Framework Agreements, campaigns and social dialogue are the main tools at the global level, while European Works Councils are the major tool at the European level.
- Multinational Corporations are not the only driving force of the global struggle for market share and profits. Competition between countries and regions drive it as well. We have seen ever stronger Chinese economic growth, which is now slowing considerably. Despite this, China is one of the most dynamic economies in the world, although often it does not care much for sustainability goals. The last one and a half decades made China and Asia very important players in the global economy, with China representing 50 per cent and more of market share in several sectors and products. China and Asia are now not only markets for North American, European and Japanese products any more, but also big producers and competitors, especially in our segments.

Workers' and trade union rights are under pressure in this socio-economic and political environment. The general trend for decades now is that the rich get richer while the poor get poorer. Global capital has lost any decency and prudence: tax paying is something only for workers, their families and customers. It is not for shareholders, billionaires, MNCs. Wealth inequality in the developed countries is today higher than in 1913.¹

This is fertile soil for rising nationalism, racism, fear and hate. Trade unions have always been on the forefront of fighting these anti-values, but recent developments make this fight even harder than in the past. This is why global unionism is a core asset of the labour movement.

¹ Thomas Piketty, Capital in the Twenty-First Century

Only global unions can organize cooperation between trade unions with different heritage, culture, power and means. This makes IndustriALL Global Union one of the major assets for its affiliates.

During its first eight years IndustriALL Global Union has launched a new era in global union solidarity. At the same time, we need the greatest possible unity to fight global capital. Unions need to grow and gain strength at sector, company and factory levels. We need to be strong for the benefit of workers. We need to build real industrial muscle.

In our sector, we are confronted with strong MNC's². To challenge their strength IndustriALL has developed our Action Plan, which was then translated into five strategic goals:

IndustriALL works to achieve its purpose through five key goals:



- **Defend workers' rights**
- **Build union power**
- **Confront global capital**
- **Fight precarious work**
- **Promote sustainable industrial policy.**

Any activity of our global union, in every sector, must be in line with these five strategic goals. In our sector it is crucial to build union power in order to confront global capital if we want to defend workers' rights. On the other hand, defending workers' rights has become crucial in the context of defending democratic and environmental rights of the whole population. Mechanical engineering is positioned to help making industrial and energy production more sustainable. IndustriALL Global Union also stands for safe working conditions and workplaces where workers do not ruin their health.

The 2016-2020 Action Plan, adopted in Rio de Janeiro in 2016, closes with the following call:

“IndustriALL Global Union will fight for its strategic goals, uniting workers and unions throughout the world in global solidarity.”

In the mechanical engineering sector, we did our best to translate this call into concrete aims and activities. We adopted strategic plans and developed campaigns, networks and GFAs. In spite of the socio-economic and political environment we made progress. In our sector, we launched strategic discussions on consequences for the entire manufacturing industry.

² MNC= Multinational Corporation

In this report we will talk about the tools, activities and campaigns we have so far conducted in line with IndustriALL's Action Plan and our strategic goals.

We present this report as a balance sheet of our activities over the past four years so that affiliates in the sector can discuss what has been achieved, where there are shortcomings and how we can improve. Sometimes, we need to be honest enough to admit that we do not have the answers at hand. But then it is crucial to ask good questions. Let's do that together.

Using our five strategic goals we translated the IndustriALL global strategy into policy and practice in the mechanical engineering sector.

With respect to the long-term goals, we decided for our sector in Bern 2015:

1. More effectively promote international solidarity and cooperation among workers in multinational companies and their supply chains
2. Fight against precarious work in all its form
3. Support and reinforce organizing efforts and activities of affiliates in multinational companies and their supply chains
4. Integrate more women and young people into our work
5. Continue with the work on MNC strategy, including global networks and GFAs, in order to enhance trade union presence and power in the MNCs
6. Promote a sustainable industrial policy in the mechanical engineering sector.³

These long-term goals in the sector became the basis of our strategic planning for the sector in coordination with the affiliates. Although we did not achieve everything we wanted, we made progress. Besides, some developments, especially concerning green tech, required new approaches and creative thinking from us.

³ IndustriALL Global Union's World Conference for Mechanical Engineering 23-24 November 2015, Berne, Switzerland Action Plan, as adopted 24 November 2015

2. General Economic Environment:

The socio-economic general and sectorial situation defines the framework of our activities. Without economic progress, not necessarily defined as growth, there is no progress in society. After a number of years with strong economic growth the situation is now more ambiguous. When we look into GDP development for the OECD countries and other larger national economies, the picture varies from country to country and region to region.

For the period between 2014 to 2020 (2019 and 2020 are still forecasts), the OECD has published GDP development for the larger economies as shown below:

REAL GDP: Growth rate per country (per cent)

	2014	2015	2016	2017	2018	2019 (e)	2020 (e)
Argentina	-2.5	2.7	-1.8	2.9	-2.8	-1.9	2.3
Australia	2.5	2.5	2.6	2.2	3.1	2.9	2.6
Austria	0.8	1.1	2.0	2.7	2.6	1.9	1.9
Belgium	1.3	1.7	1.5	1.7	1.5	1.4	1.4
Brazil	0.5	-3.6	-3.4	1.0	1.2	2.1	2.4
Canada	2.9	1.0	1.4	3.0	2.1	2.2	1.9
Chile	1.8	2.3	1.2	1.6	4.1	3.7	3.4
China	7.3	6.9	6.7	6.9	6.6	6.3	6.0
Colombia	4.7	3.0	2.0	1.8	2.8	3.3	3.4
Costa Rica	3.5	3.6	4.2	3.3	2.9	3.0	3.3
Czech Republic	2.7	5.4	2.4	4.5	3.0	2.7	2.6
Denmark	1.6	2.3	2.4	2.3	1.2	1.9	1.6
Estonia	2.8	2.1	3.5	4.7	3.3	3.5	2.3
Finland	-0.6	0.1	2.5	2.8	2.8	1.8	1.6
France	1.0	1.0	1.1	2.3	1.6	1.6	1.5
Germany	2.2	1.5	2.2	2.5	1.6	1.6	1.4
Greece	0.7	-0.4	-0.2	1.5	2.1	2.2	2.1
Hungary	4.1	3.5	2.2	4.4	4.6	3.9	3.3
Iceland	2.1	4.5	7.4	4.0	3.8	2.8	2.6
India	7.4	8.2	7.1	6.7	7.5	7.3	7.4
Indonesia	5.0	4.9	5.0	5.1	5.2	5.2	5.1
Ireland	8.8	25.0	4.9	7.2	5.9	4.1	3.4
Israel	3.9	2.5	4.0	3.4	3.6	3.5	3.3
Italy	0.2	0.8	1.0	1.6	1.0	0.9	0.9
Japan	0.4	1.4	1.0	1.7	0.9	1.0	0.7
Korea	3.3	2.8	2.9	3.1	2.7	2.8	2.9
Latvia	1.9	3.0	2.1	4.6	4.7	3.9	3.3
Lithuania	3.5	2.0	2.4	4.1	3.4	2.9	2.6

Luxembourg	4.3	3.9	2.4	1.6	3.0	2.9	3.2
Mexico	2.8	3.3	2.6	2.3	2.2	2.5	2.8
Netherlands	1.4	2.0	2.1	3.0	2.7	2.5	2.1
New Zealand	3.3	4.2	4.1	2.7	2.9	2.8	2.6
Norway	2.0	2.0	1.2	2.0	1.6	1.9	2.3
Poland	3.3	3.8	3.1	4.8	5.2	4.0	3.3
Portugal	0.9	1.8	1.9	2.8	2.2	2.1	1.9
Russia	0.7	-2.8	-0.1	1.5	1.6	1.5	1.8
Slovak Republic	2.8	3.9	3.3	3.4	4.1	4.3	3.6
Slovenia	3.0	2.3	3.1	4.9	4.4	3.6	2.7
South Africa	1.8	1.3	0.6	1.3	0.7	1.7	1.8
Spain	1.4	3.6	3.2	3.0	2.6	2.2	1.9
Sweden	2.7	4.2	2.5	2.4	2.5	1.9	1.9
Switzerland	2.5	1.3	1.6	1.7	2.9	1.6	1.6
Turkey	5.0	5.9	3.2	7.4	3.3	-0.4	2.7
United Kingdom	2.9	2.3	1.8	1.7	1.3	1.4	1.1
United States	2.5	2.9	1.6	2.2	2.9	2.7	2.1
Euro area	1.4	2.0	1.9	2.5	1.9	1.8	1.6
Total OECD	2.2	2.5	1.8	2.5	2.4	2.1	1.9
Total world	3.4	3.4	3.4	3.6	3.7	3.5	3.5

*Due to continuous update data variations with other publications may occur
Source: OECD Economic Outlook 104 Database*

The above figures show how volatile the global economic situation currently is. Overall (except for Turkey and Argentina) the OECD predicts economic growth in 2019/2020. But prospects are getting worse, as the interim reports in summer 2019 indicate. The big drivers are still China, India, and Indonesia with growth rates of over 5 per cent annually. The euro area is suffering from political insecurities, partly due to the Brexit debate. The UK economy is hit the hardest. Brazil is expected to recover after the 2015/2016 decline. But the overall situation is quite unclear so the estimations for 2019/2020 are to be taken with caution. All in all, the growth rates of 1.5 to 2 per cent seem more likely in the near future at the global level, rather than over 3 per cent.

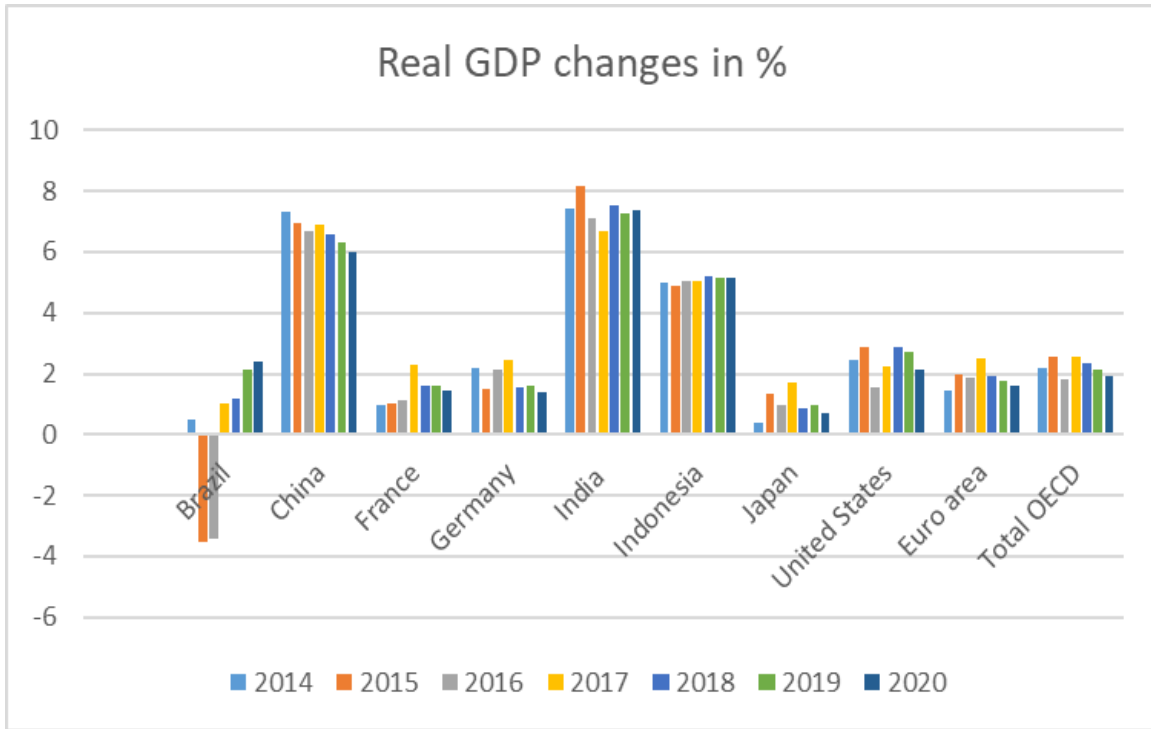
At the same time, governments compete with tax gifts for MNCs, lower wages, weaker labour rights in order to attract MNCs and to improve their countries' position in competition. This allows big MNCs to take the workforce of entire countries as hostages and push through their agenda. We describe this trend as the 'Race to the Bottom'.

Brazil is an area of major concern. With their annual growth rates between 1.5 and 2.5 per cent respectively, France, Germany together with other countries of the euro area, as well as Japan and the USA are more or less stable. The drivers remain India, China and Indonesia with expected annual growth rates above 5 per cent.

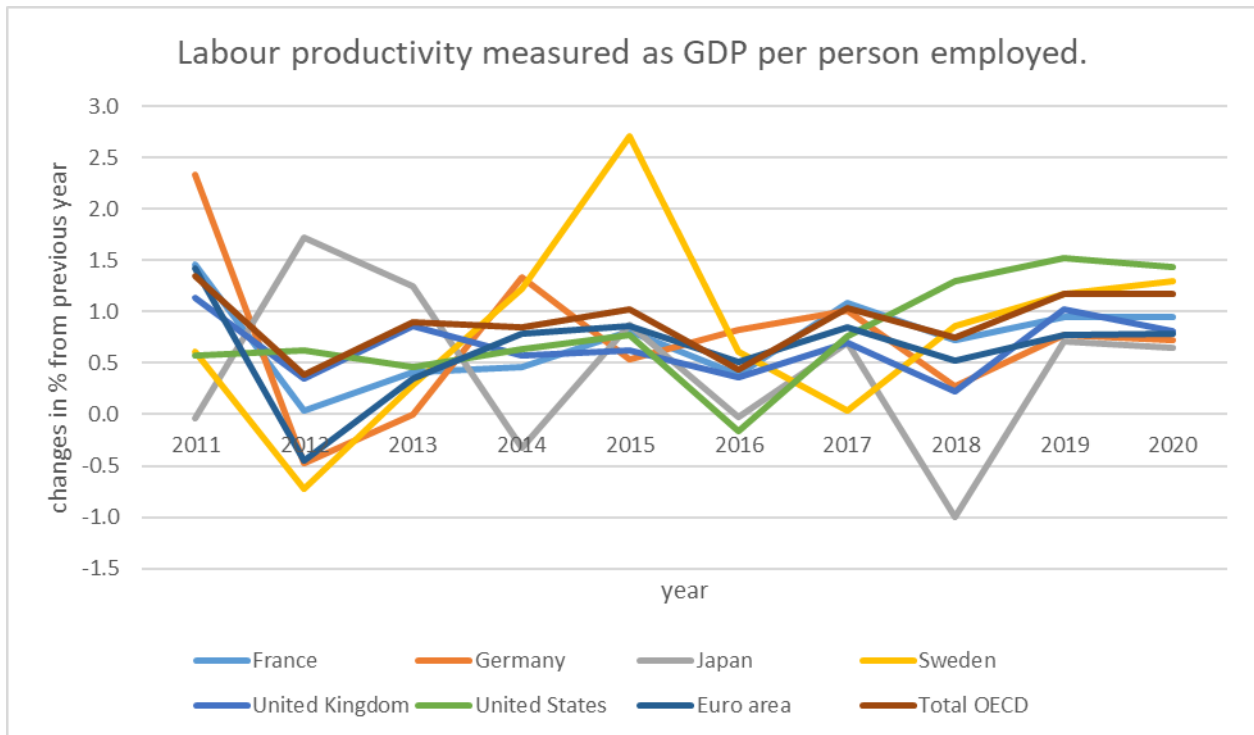
This volatile economic situation with a growing importance of Asian players is partly exploited by MNCs increasing pressure on the working conditions under the threat of relocating their production.

At the same time, it is still true that real value is only generated through real production, services and work. Women and men create and build tools, engines, machines, lifts, escalators, generators etc. It is crucial that the workers raise their voice in order to get their share. And this

does not only refer to payment but also to vocational training and skills management in order to be able to cope with future requirements in the labour market.



Source: OECD Economic Outlook 104 Database. Graphic: IndustriALL



Source: OECD Economic Outlook, 104 Database, own graphic

The previous table shows the labour productivity development over the last 10 years including projection for 2020. In the OECD countries together, the changes were between 0.4 and 1.3 per cent. Despite crises and political challenges, the general increasing trend remains. At the same

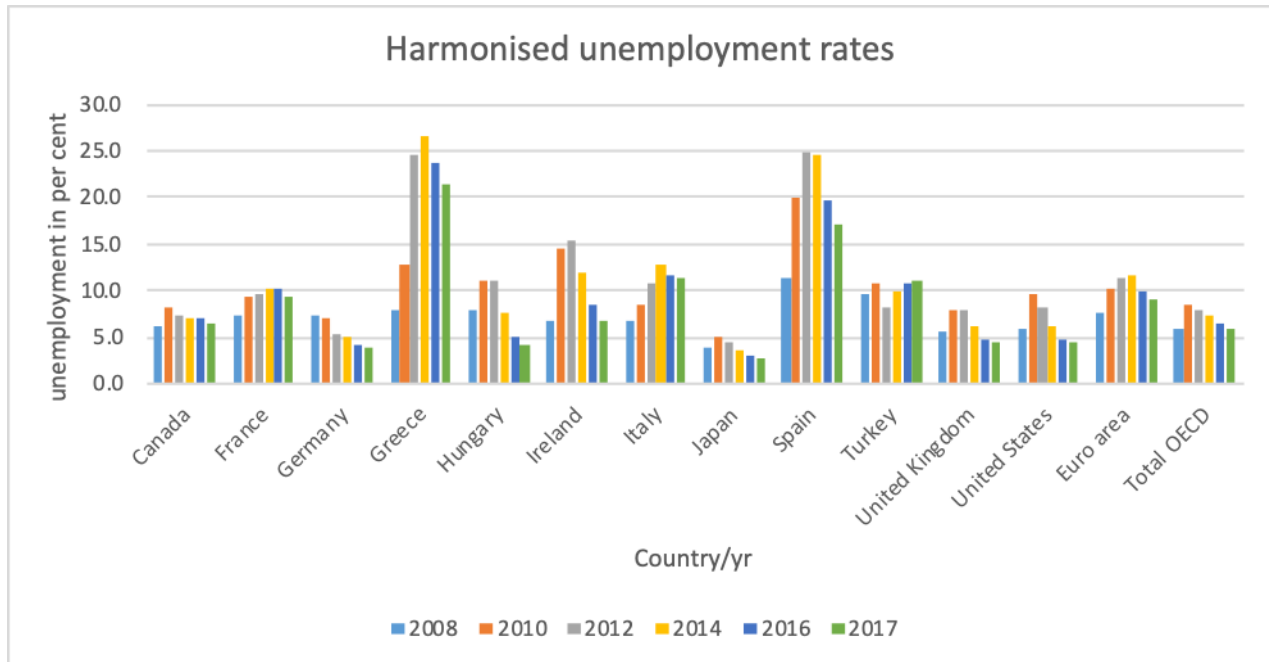
time, there is a growing labour shortage, namely in Japan, the USA and Europe.⁴ The employment rate goes still up in most areas of the world as the following table shows:

Development of employment: selected countries (per cent compared to previous period):

	2014	2015	2016	2017	2018	2019	2020
Canada	0.6	0.9	0.7	1.9	1.2	1.0	0.6
France	0.1	0.2	0.6	1.1	0.9	0.7	0.5
Germany	0.9	0.8	2.4	1.1	0.2	0.6	0.6
Japan	0.7	0.5	1.0	1.0	1.9	0.2	0.0
Turkey	5.1	2.8	2.2	3.6	1.9	-0.5	1.5
United Kingdom	2.4	1.7	1.4	1.0	1.1	0.4	0.3
United States	1.7	1.7	1.7	1.3	1.5	1.2	0.7
Euro area	0.6	1.1	1.7	1.5	1.2	1.0	0.8
Total OECD	1.4	1.5	1.6	1.5	1.5	0.9	0.8

Source: OECD Economic Outlook, 104 Database, own graphic

Although the unemployment rate has decreased over the last decade, the process is unequal, especially in some European countries like Greece, Spain, Ireland and Turkey where high unemployment rates were noted. At the same time the general trend of unemployment decrease does not tell us anything about working conditions and pay.



Source: OECD Economic Outlook, 104 Database, own graphic

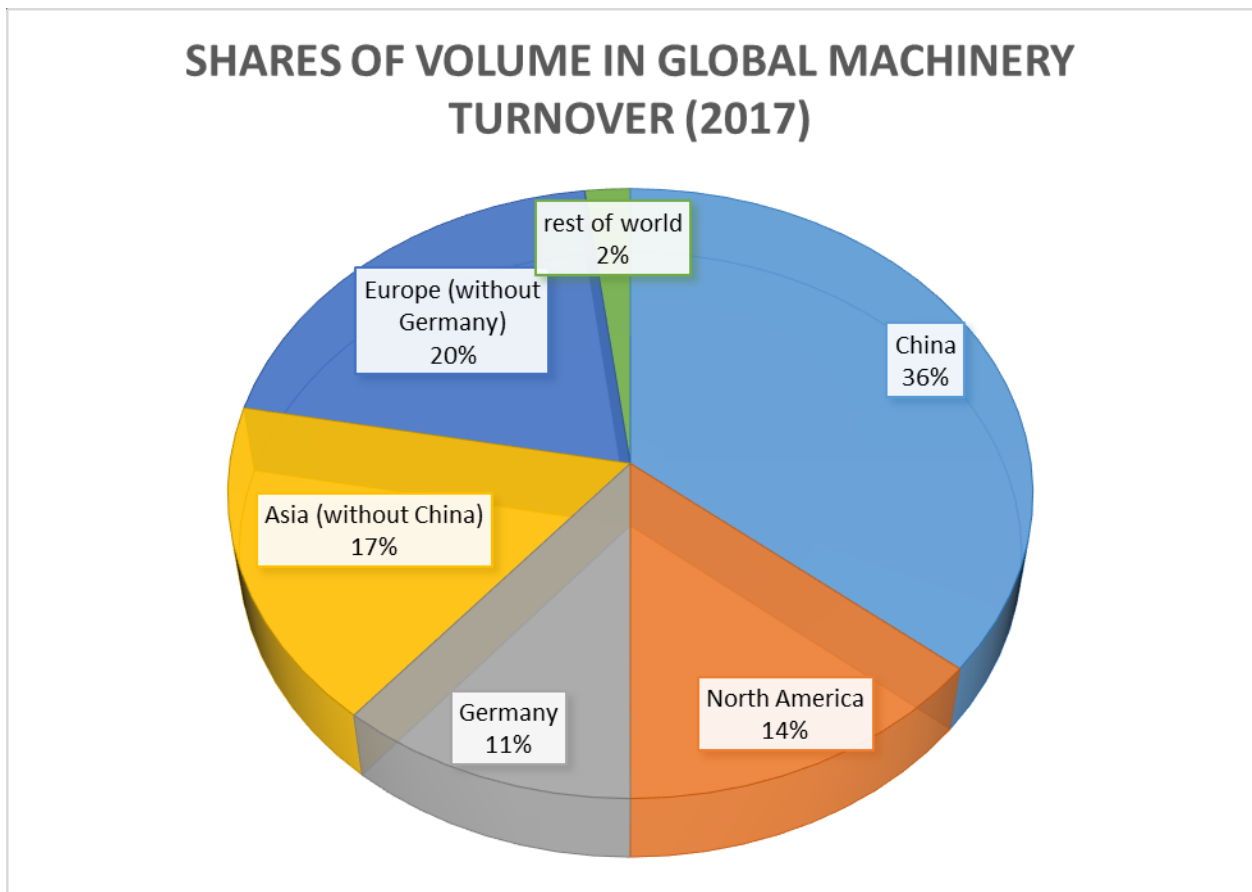
⁴ OECD economic outlook 104

3. A few facts about mechanical engineering on a global scale

The mechanical engineering sector on global level is focused on some regions in the world:

1. China (by far the largest market and the largest producer)
2. North America
3. Germany
4. Focus regions:
 - a. Europe (without Germany)
 - b. Asia (without China) – including Japan

According to the data about global turnover volume a handful of regions and countries share the entire global market (see diagram with annual turnover in the sector). The total value created by the sector in the year 2015 equalled approximately 2,55 trillion euro. Besides the huge size on its own, the sector incorporates many sub-sectors and a vast supply chain. The graphic below is based on the VDMA's data⁵.



Source: Own graphic based on the data from VDMA economic and statistic affairs, mechanical engineering, figures and charts.

⁵ VDMA= Verband Deutscher Maschinen- und Anlagenbau e. V., German employer's association in Mechanical Engineering

The table below shows the market shares by country and region based on annual turnover in per cent and its financial equivalent:

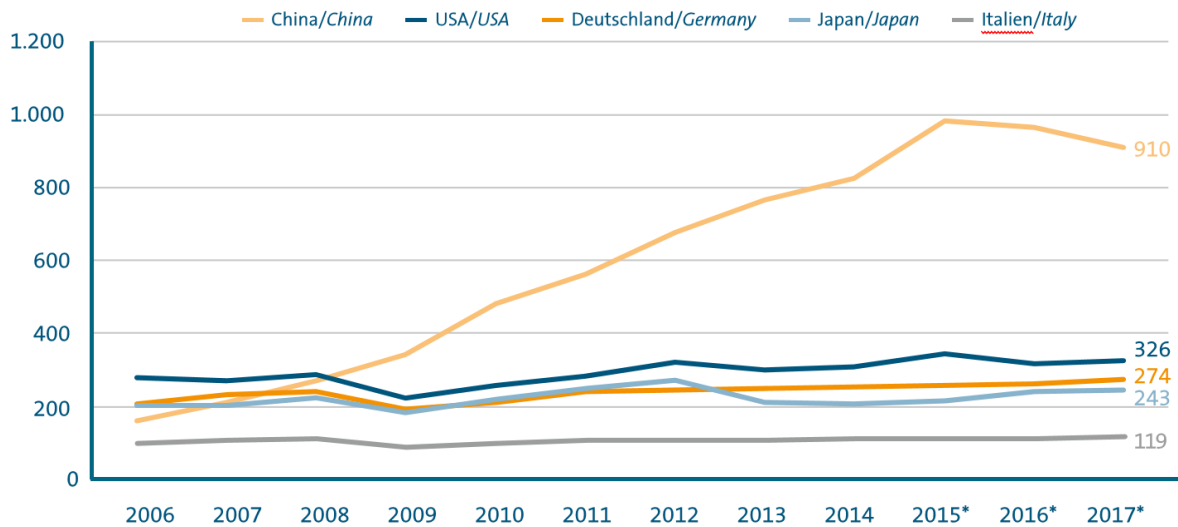
Country	per cent	bn €
China	36	919.80
North America	14	357.7
Germany	11	281.05
Asia (without China) + Japan	17	434.35
Europe (without Germany)	20	511
Rest of the world	2	51.1
total:	100	2'555.00

Source: VDMA for per cent and total sum of 2,555 trillion euro

Global development over recent years (since 2009) has been mostly driven by the development in China, as the following graphic shows. As in many other sectors China has become the number one player in mechanical engineering.

World machinery turnover

In Mrd. EUR/bn EUR



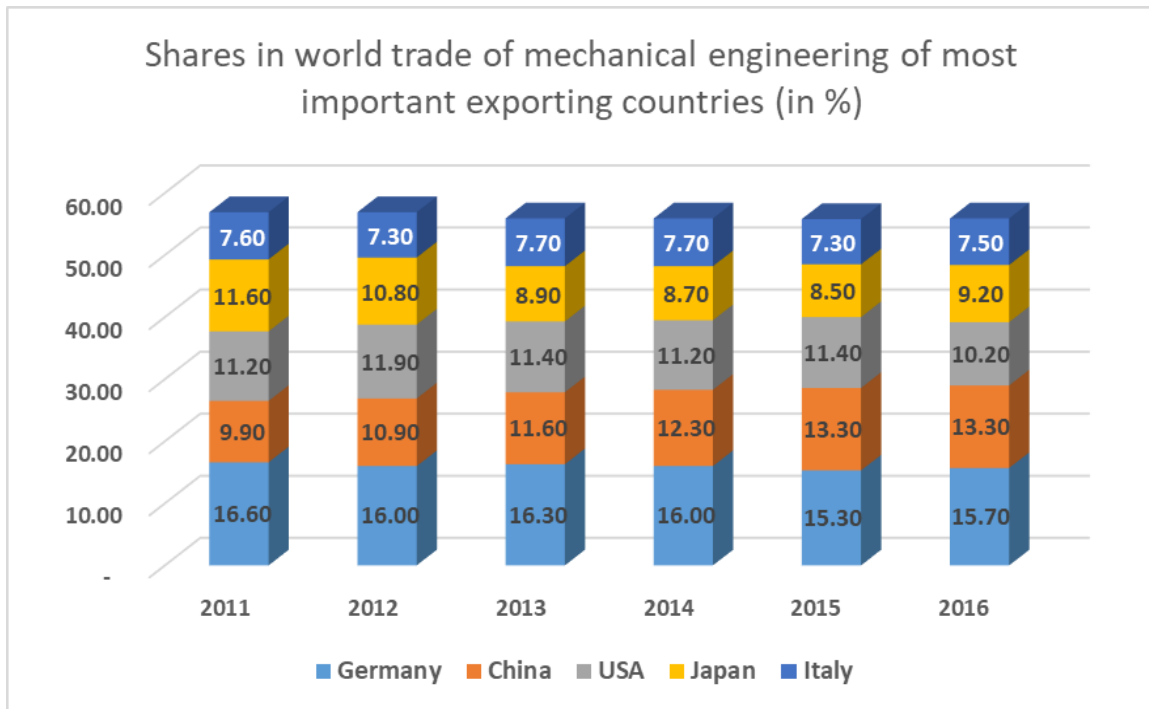
Source: VDMA

According to estimates, China kept its top position in 2017 although a total turnover of 910 (920)⁶ billion euro means a decrease of almost 6 per cent compared to 2016. The USA followed in rank 2 as in 2016, with an increase in turnover by 3 per cent to 326 billion euro. Germany reaffirms its position as the third largest machinery producer with a plus of 5 per cent compared to the previous year up to 274 billion euro. All the top five countries together account for 73.5 per cent of total global machinery turnover, while the top ten countries together hold 83 per cent of the market.⁷

⁶ Depending on which statistics the VDMA is referring to

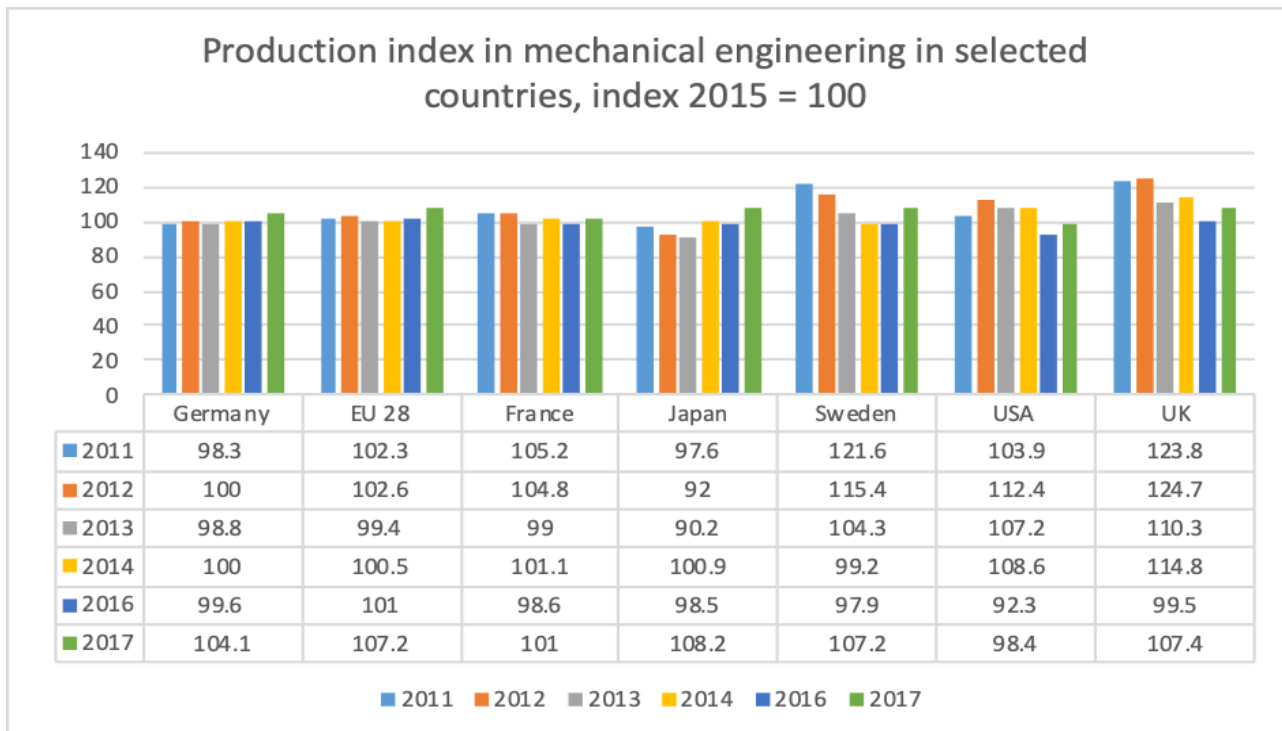
⁷ These figures are not always 100 per cent consistent as they are partly based on national statistics and estimations by VDMA analysts.

The top five mechanical exporting countries are responsible for almost 60 per cent of global mechanical engineering exports.



Source: VDMA, 2018

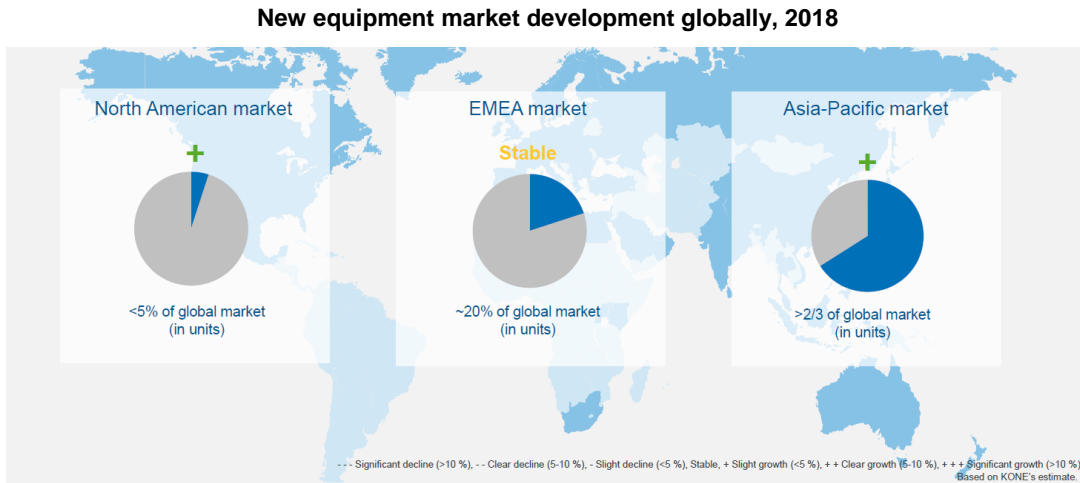
All in all, the mechanical engineering sector is growing worldwide. Even if China has slowed for the moment, the sector shows a strong dynamic and a stable development. These figures show that industrial production, including in “old economies” is not doomed, but has a chance if change is considered as an opportunity and not as a threat.



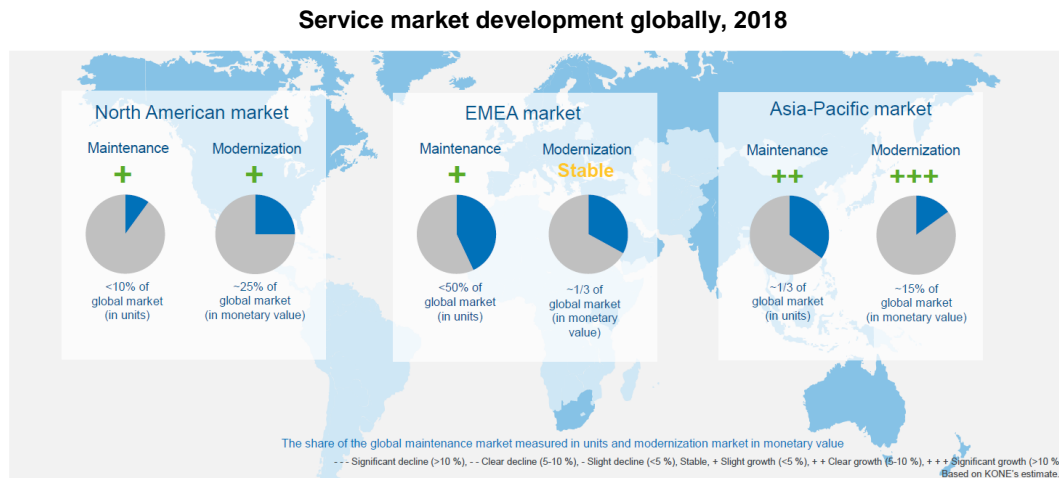
Source: Own graphic on the basis of the VDMA data

An example: Lifts and escalators

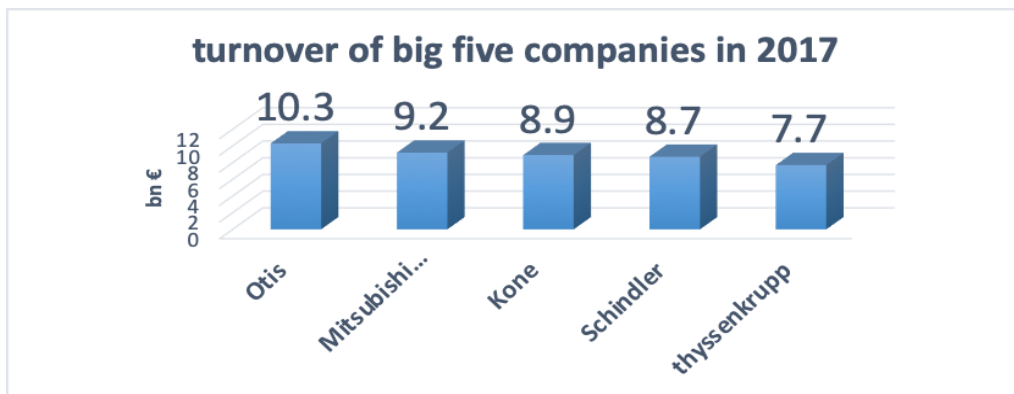
The market is dominated by the big five (Kone, Mitsubishi, Otis, Schindler, thyssenkrupp). In lifts and escalators, the market “goes east”, as the following charts show:



This is a general market tendency for companies to not only go for new installations, but also for service market, as the following diagram shows. The service market in Asia Pacific is even more dynamic because all the installations of the previous years need maintenance and service.

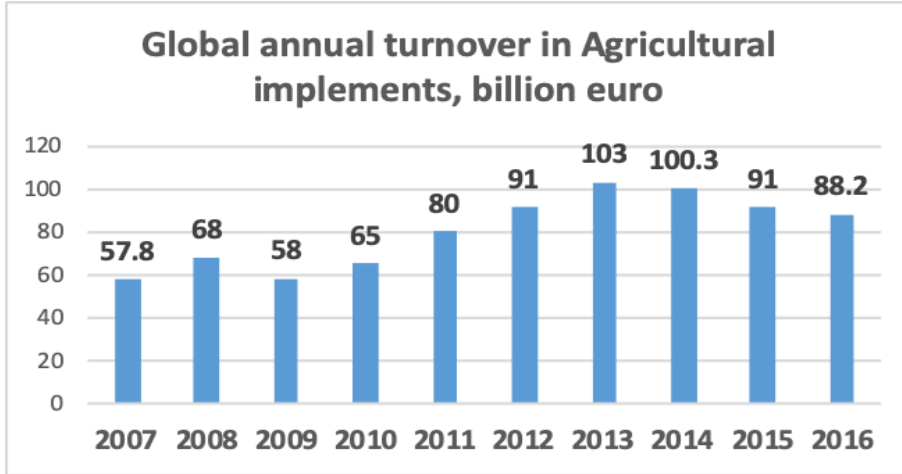


At the same time, the market altogether is dominated by the ‘big five’ who made over 40 bn € turnover in 2017 representing about two thirds of the global market:



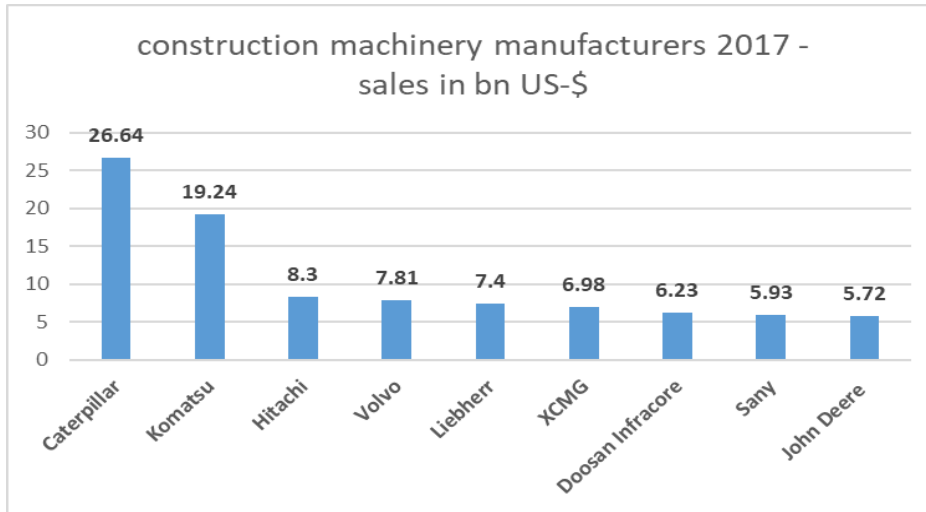
Second example: Agricultural implements and construction machinery

The agricultural implements sector partly overlaps the construction machinery and mining equipment subsectors. The big players like Caterpillar, John Deere, CNHi and Komatsu are very dominant in these market segments. The agricultural implements global market evolved strongly until 2013/2014 and then dropped. It has stabilized now as per the latest data from 2016.



Source: Own graphic based on the data from Jahrbuch Agrartechnik 2016

In this segment, John Deere and Caterpillar are direct competitors, whereas in construction machinery, Caterpillar is far ahead and holds the position number one worldwide.



Source: Own graphic based on KHL group and Statista data.

Overall, John Deere is gaining ground with their strong position in agricultural implements and their new engagement in construction machinery following the acquisition of the German Wirtgen group. This transaction is not part of the above quoted table yet, to be added and making Deere one of the top five in construction machinery providers worldwide, as the comparison table below shows based on respective annual reports.

	2017	2018
Caterpillar	45.5	54.7
John Deere & Company	29.7	37.4

Caterpillar and John Deere annual turnover in 2017/2018, US\$ billion

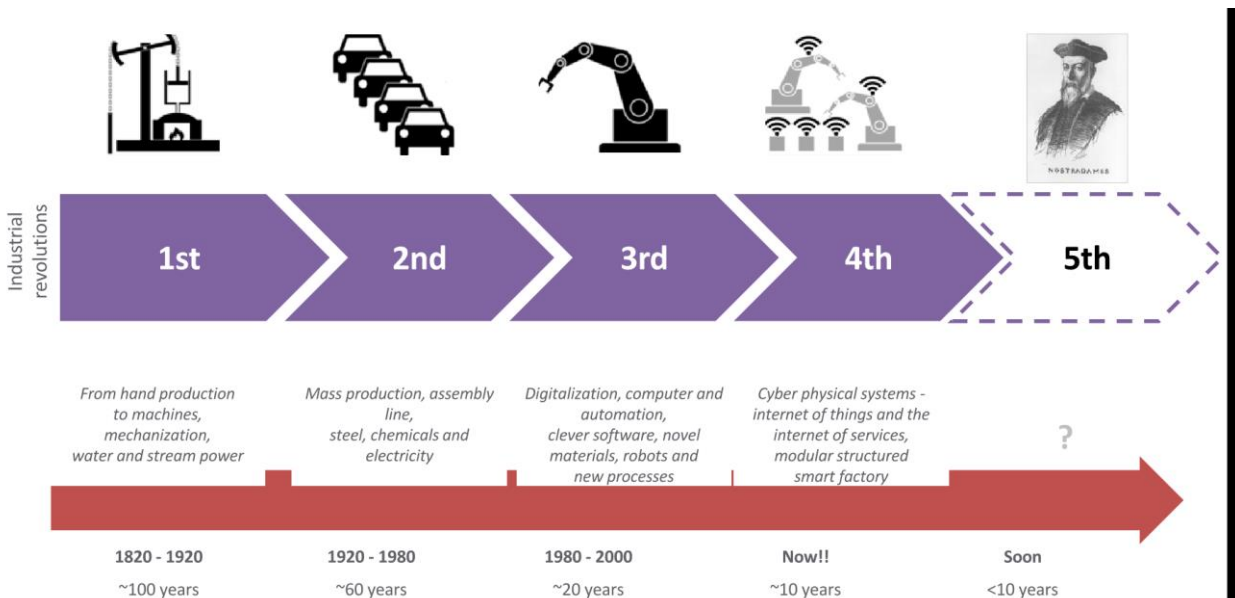
4. Digitalization and mechanical engineering

Digitalization or Industry 4.0 is in full swing. Although IndustriALL's sectors are affected differently, it is a major issue in every sector, including mechanical engineering. At production use, Internet of things, cooperation between human beings and machinery, use and integration of artificial intelligence; all these trends are leading to structural and socio-economic transformations.

As stated in IndustriALL's 2018 paper on digitalization and approaching changes in traditional industrial sectors:

“Aside from the ICT sector, mechanical engineering will be one of the most affected sectors by the digitalization of manufacturing. New production needs new machinery and so there will be an increased demand for high-tech mechanical engineering. The transformation of this sector has in fact many similarities with the systematics in ICT, because likely industrial design and industrial manufacturing will experience very different employment effects. When the production of mechanical engineering equipment can be digitalized, and other disruptive modern manufacturing techniques like 3D printing can be used to replace human labour, their production will experience job losses while in industrial design and various engineering disciplines, through the rising demand for advanced mechanical engineering equipment, jobs may be won. However, as mentioned in chapter 3, the job profiles between those lost and those won are in fact very different. A white-collarization of not only (but including) services but also in production, creation and maintenance itself is already visible: from technician to engineer, from engineer to full-service customer-care-person.”⁸

The following picture helps to understand the underlying dynamics of this megatrend in actual context.



Mechanical engineering provides for the tools and means that are drivers of development. Workers in this sector are at the forefront of the change. Changing production and interaction systems and new ways of customer relations also demand new skills. Traditional “operators” become more and more technicians, engineers and/or IT experts. This also leads to a

⁸ IndustriALL Global Union: The Challenge of Industry 4.0 and the Demand for New Answers, 2018, p.28

redistribution of work. Estimates show a lot of jobs will disappear. Trade unions will have to find new answers about working time systems, skills management, training, cooperation between blue- and white-collar unions and so on.

How technology can affect jobs: Different estimates

Organization	Estimates
University of Oxford	47% of workers in America at high risk of having jobs replaced by automation
PricewaterhouseCoopers	38% of jobs in US, 30% of jobs in UK, 21% in Japan and 35% in Germany at risk of automation
ILO (Chang and Huynh)	ASEAN-5: 56% of jobs at risk of automation in next 20 years
Mc Kinsey	60% of all occupations have at least 30% technically automatable activities
OECD	OECD average: 9% of jobs at high risk. Low risk of complete automation but an important share (between 50 + 70%) of automatable tasks at risk
Roland Berger	Western Europe: 8.3 million jobs lost in industry against 10 million new jobs created in services by 2035
World Bank	Two-thirds of all jobs in developing countries are susceptible to automation

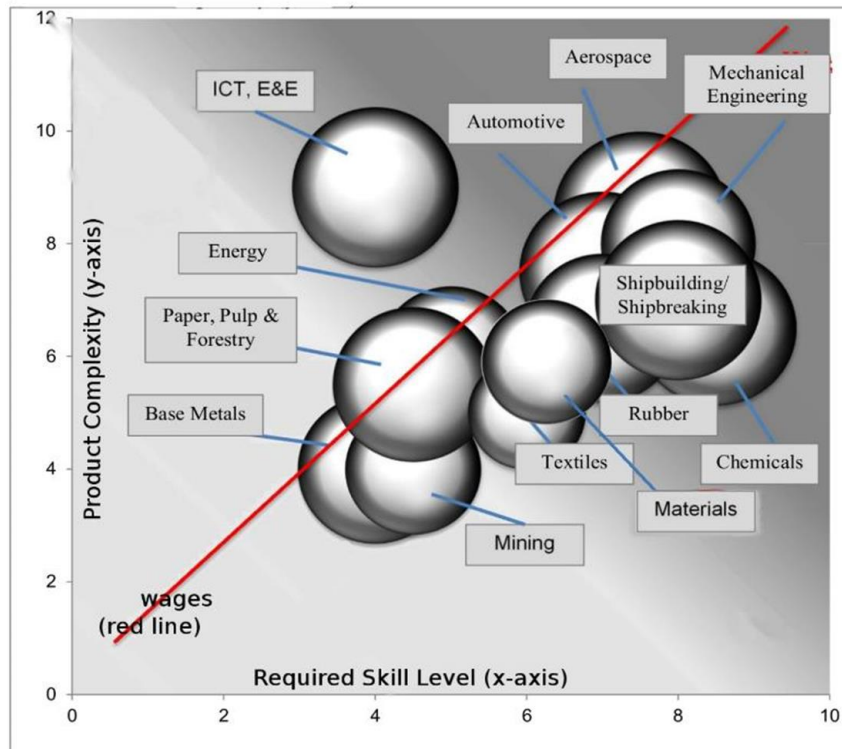
Source: Deborah Greenfield, Deputy Director-General for policy, International Labour Organization, 26 October 2017, Geneva

Even though this looks like a dark perspective and a bad future for labour, trade unions should focus on opportunities and positive aspects and take care of the employees’ interests. It is crucial that trade unions on plant, national, and also global level and in multinational corporations seek to safeguard the influence of organized labour.

It must be clear that under these circumstances, trade unions are as important as ever as while the world of labour faces new and drastic industrial transformation. Trade unions, shop stewards and works councils are crucial players in the socio-economic and political change. Otherwise, all the benefits of Industry 4.0 will flow entirely to employers and capital owners, which will inevitably result in political and social instability.

Although workplaces may be fundamentally transformed, it is crucial that workers’ and their trade unions’ fundamental rights are respected. These are freedom of association and the effective recognition of the right to collective bargaining, elimination of forced or compulsory labour, abolition of child labour and elimination of discrimination in respect of employment and occupation. They are all part of the International Labour Organization *Declaration on fundamental principles and rights at work*, and are often referred to as ILO Core Conventions.

The following picture shows how different sectors within IndustriALL’s footprint are exposed to the challenging developments that have already started. Mechanical engineering as the one of the most-affected sectors requires special attention from the trade unions operating in the sector when it comes to their future work. Workplaces, qualifications, skill requirements and vocational training will change, and trade unions will have to adapt to this change in order to be able to recruit in the new environment.



Source: IndustriALL Global Union, B. Kohler and J. Hilpert, 2017

As the digitalization of the workplace progresses, several issues will be crucial for the future of trade unions and of the self-determination of workers:

- the right to information and consultation for workers' representatives at the local, regional, national and international levels
- the right to education and training
- the right to defined levels of privacy at work and at home.

To ensure workers' rights, trade unions will need to adapt their structures and culture to the new realities of the Industry 4.0 workplace, e.g. by devising ways to organize isolated workers who may be on individual contracts in the so-called "gig economy".

In mechanical engineering, digitalization has two faces. On the one side, mechanical engineering is a driver in this process, as the sector delivers the tools and machinery that drives and transforms the industrial production process and service environment in many industries. On the other side, mechanical engineering is itself transforming, which means that traditional jobs will disappear or change, and that new and different tasks and activities are emerging. From 3D printing of tools, machinery to self-diagnosing lifts and escalators, wind rotors or bearings, all of these developments are changing production, service and customer relations in the mechanical engineering section.

Products are changing and thus the whole industrial setting. For instance, agricultural implements now include autonomous tractors, harvesters and other equipment, directed via GPS and/or cameras, deciding themselves when they need the feeder tractor or maintenance, service and so on. In the sector of lifts and escalators, a "turbolift" that moves through a building vertically and horizontally – until recently a matter for the distant future – is now a reality. Service and maintenance are digitalized and communicate with (currently human) service technicians via VR glasses, mobile devices and/or other interfaces and tell them where the problem is located and how to fix it.

Today, suppliers, manufacturers, customers, and service and maintenance people are connected, and service and maintenance people are connected. Connectivity is one of the core

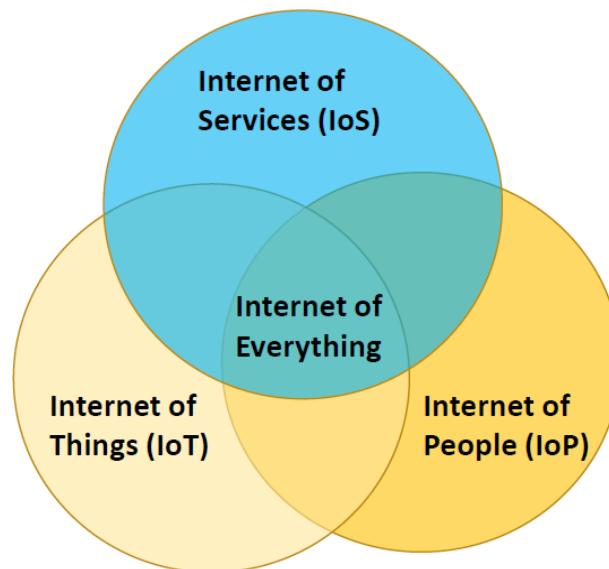
issues in mechanical engineering. If a lift is installed, it can announce the need for services directly to the lifts and escalators' company and they will send a specifically skilled technician who interacts with the lift in order to fix the problem.

A roller bearing in a railway locomotive wheel today can interact with the bearing producer and announce whether it needs service, maintenance or replacement. This interaction goes via the internet to the company that then can provide the demanded service. The same goes for wind rotors, rotating equipment and also lifts, escalators, mining and agricultural equipment. Service or maintenance technicians are thus increasingly becoming IT experts. They use apps in order to communicate with their tools and machinery and interact with the customer.

New technologies like digital design, virtual reality, 3D printing, cyber-human cooperation and artificial instruments in mechanical engineering are tools that will create new relations between human and machine. Activities that are complicated for human beings, like complex mathematics, are easy for machinery. Many tasks that are easy for humans, like understanding language or creative processes, can now increasingly be done by machinery or artificial intelligence.

To be very clear, digitalization or "the internet of everything" goes far beyond the presence of more robots. The new development and change is about the interaction between machinery, tools, materials, producers, operators and customers. 3D printing offers possibilities for the design of tools, machinery and parts with previously unknown accuracy and makes low-scale design and production efficient and cheap.

Trade unions will have to adapt since management may use digitalization and new technologies to interact with the workforce, especially when working in the cloud, directly and offering information and consultation, bypassing traditional trade union structures. This represents a big challenge for IndustriALL's affiliates who need to find good answers to the challenges posed by the "Internet of Everything" (IoE).



Source: FraunhoferInstitute Austria

5. Green Tech and energy generation

The vast majority of scientists is now convinced that climate change is a reality. Therefore, we have to be quick and inventive as we do not have a second planet Earth in our pocket. Most governments have committed to follow the goals of the Paris Agreement to combat climate change, which reads:

1. This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

(a) Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;

(b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and

(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

2. This Agreement will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.”⁹

Also, at the United Nations Sustainable Development Summit on 25 September 2015, world leaders adopted the 2030 Agenda for sustainable development, with a set of 17 Sustainable Development Goals to end poverty, fight inequality and injustice, and tackle climate change by 2030.

Therefore, climate change and global warming is a reality that requires a lot of effort in all countries and societies and in all sectors. Reduction of greenhouse gas emissions and reduction of the use of fossil, non-renewable energy sources is required. It is already on the agenda of many countries, and the rest of the will join sooner rather than later.

- Industries (i.e. automotive) are in the middle of a transformation. E-battery or fuel-cell powered vehicles, autonomous driving systems and artificial intelligence processes/assistant systems are on the rise. This will not only change the way of driving, but also the whole automotive industry.
- Also, social habits are changing rapidly. In the developed countries, the whole system of mobility is in a constant transformation process, with increased use of public transportation, especially in urban centres, sharing economies, less individual use of cars and so on.
- Energy generation, especially generation of electric power will evolve continuously. From the use of fossil sources like coal, oil and gas towards renewable energy sources from wind, water, sun, hydrogen from fuel cells will become increasingly important in the decades to come.

These developments also require new and adapted strategies for our work as trade unions. It is inevitable that some industries and therefore the jobs in these industries will shrink or disappear. Other industries are already developing and will grow, and trade unions must be careful not be

⁹ Paris Agreement of the United Nations, 12 December 2015, Art. 2

excluded from these new or “green” jobs. One should remember that green jobs are not necessarily good jobs. So, here is an important field of action for trade unions.

Strong trade unions providing for the protection of workers in green jobs in the 21st century are as necessary as they were in the 19th and 20th centuries. But the challenges are changing, and trade unions have to adapt their strategies and approaches.



Mechanical engineering companies are at the forefront of the struggle to fulfil the Paris goals. This sector delivers the technologies, tools and machinery to change and improve the general ecological footprint of industrial production.

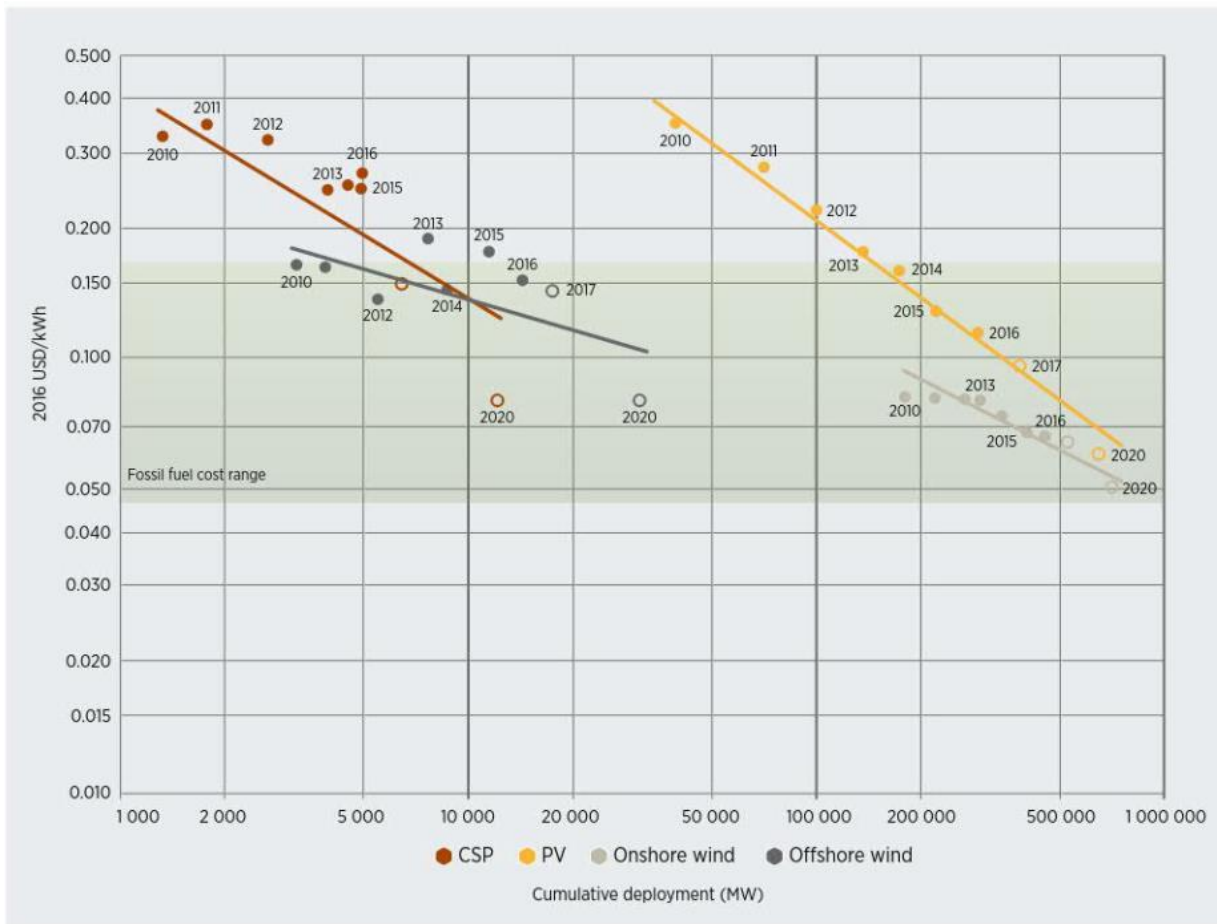
Following the concept of sustainability, which requires a proper balance between economy, ecology and social conditions, it will be crucial to change the industries and make them “greener”. So, less CO₂ and other greenhouse gas emissions, less pollution and less use of non-generative energy sources and eventually “cleaner” industrial production will become fundamental. But the future should not only be “greener” or “cleaner”, it also must be just and more socially oriented. Introducing smart plants and digitalized design, production and services (see chapter 4 of this report) will be crucial to reach these goals. Better and greener machinery, more efficient, less polluting, less resource consuming over the whole life cycle, is the key demand for a new green mechanical engineering section.

Greener industrial production and mechanical engineering go hand in hand with digitalization, small scale production and small units.

Mechanical engineering and energy generation:

One has to keep in mind a growing demand for energy and particularly electricity in future. People in many regions of this world, namely in Asia (India, China), Africa, and some regions in Latin America do not yet have access to electricity, but will soon get it, which will drive up global consumption. Also, in transportation and other applications (especially automotive) demand for electrical energy is growing. At the same time, it is important that this growing number of electricity consumers is fed with green(er) energy.

And “alternative” or “green” electricity becomes more and more competitive: as the following diagram shows, even CSP (“concentrated solar power”) is already available within the price range of fossil-based electricity generation.



Based on IRENA Renewable Cost Database and Auctions Database; GWEC (2017), MAKE Consulting (2017a), SolarPower Europe (2017), and WindEurope (2017).

The tools for (future) green electrical power generation are provided for by the mechanical engineering companies: rotating equipment, turbines, transformation equipment, wind generators, solar panels, PV and CSP installations.

So far, mechanical engineering has a future, and is a winner in the upcoming changes. The challenge will be to attract new groups of employees to the sector and to make sure that these developments are in line with the needs of democratic and open societies and respect workers' and trade union rights.

IndustriALL Global Union has initiated the necessary discussion among its affiliates; and although at this moment we sometimes have more questions than answers, we are going in the right direction. It is important that our affiliates in the sector (and beyond) contribute with all their expertise and experience to this important working area. IndustriALL will certainly continue to work on the matter.

In the important and growing “green tech” sub-sector we need to invest more than in the past.

2017 was another record-breaking year for renewable energy, characterized by the largest ever increase in renewable power capacity, falling costs, increases in investment and advances in enabling technologies. Reportedly, 10.3 million people were working in renewable energy in 2017, with 60 per cent of the jobs in Asia. Among the renewable energy jobs, solar power was the largest employer with nearly 3.4 million jobs.

It will be necessary to continue with the work and cooperate closely with neighbouring sectors like energy and ICT, Electrics and Electronics to organize and ensure union power in future-oriented workplaces.

To this end, IndustriALL conducted a first expert meeting in December 2018 in Gothenburg, in order to start the cooperation. We have been in close exchange with these sectors ever since. Additional information about this expert meeting is in chapter six.

Generally speaking, the segment of greener industries and mechanical engineering with a special view to the electricity generation companies is key. The related (sub-)segments are active in the following segments:

- *Wind turbines generating electricity (onshore and offshore)*
- *Photovoltaic (PV)*
- *Concentrated Solar Power*
- *Hydropower*
- *Biomass*

Here we do not only have the direct producers of these installations like Siemens Gamesa in wind or Meyer Burger in PV but also the full supply chain like thyssenkrupp for mechanical installations, generators, large-diameter anti-friction slewing rings, SKF when it comes to all rotating equipment, or Sulzer or ABB when it comes to turbines and generators and so on.

Mechanical engineering companies are the drivers of this development. Not only do they deliver greener electricity generation, but their own industrial production becomes greener, partly through the means of digitalization (3D printing, connectivity, smart applications and products – see chapter four.)

6. IndustriALL's Mechanical Engineering sector activities and focus since 2015

IndustriALL Global Union uses different approaches in its efforts to strengthen the work in sectors and in Multinational Corporations (MNC).

We work with global framework agreements (GFAs), social dialogue with management, trade union networks, campaigns, and solidarity activities including protest letters, web articles, coordination with trade unions in the country of the origin of MNCs etc.

When it comes to GFAs, we did not make much progress with (re-)negotiations of existing GFAs or possible new GFAs in the sector. At the same time, not every GFA at IndustriALL is really a living agreement. Some of the agreements in the sector of mechanical engineering are dormant. But work is ongoing and little by little the first generation GFAs will transform into real GFAs in line with IndustriALL Guidelines for Global Framework Agreements.

Social dialogue in general is easier with European MNCs than with corporations from North America or Asia. At the moment there are not many major MNCs in mechanical engineering coming from Africa or Latin America at all (see chapter three of this report). Hence, the focus in our work on MNCs coming from Europe and North America, as well as Japan and their subsidiaries in other regions of the world, mostly Asia-Pacific, Latin America and India.

IndustriALL's efforts in these areas of work are always related to the improvement of the working conditions for the employees of the MNCs and their suppliers. Networks, world union councils, GFAs and any other activity aim to contribute to these general goals, incorporated under our five strategic goals (see chapter 1).

Mechanical engineering is a very specific sector. Our employees, workers, engineers and operators deliver high tech that is required in every industrial sector. In times of accelerating globalization and digitalization in combination with green tech, there is no place to hide. We have to consider that if a company can get away with trade union busting in the USA without being challenged and resisted, the company will try the same tactics in Europe. So, nobody can lean back or feel safe. If global capital succeeds in the USA, most likely the European and Asian MNCs will copy these strategies. Extending solidarity through networks, World union councils, through GFAs or solidarity actions is not about showing solidarity with the poor guys under threat. It is a necessity in order to safeguard working conditions in every company and in every country.

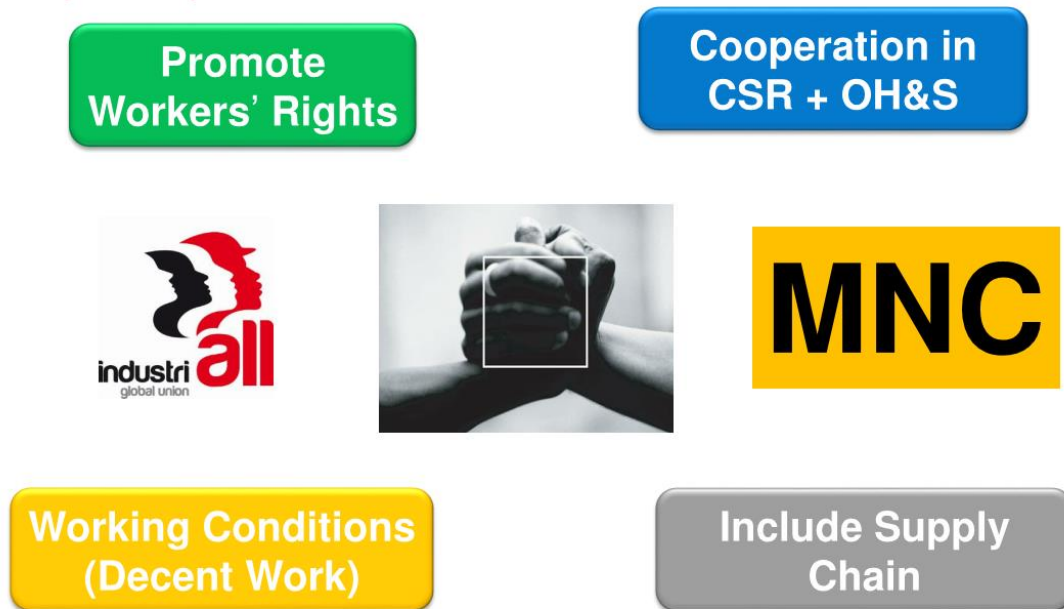
On the other hand, globalization also offers opportunities for trade union activities. The big MNCs are under surveillance by institutional shareholders like pension funds and rating agencies, with ethical rating increasingly important, especially for institutional shareholders. NGOs are scrutinizing behaviour, especially in preparation for AGMs. Countries like France and Switzerland have started discussing the obligation to publish reports on the non-economic results for MNCs.

EU directives instruct large public-interest entities, including listed companies, with more than 500 employees to disclose in their management report information on their policies, main risks and outcomes relating to environmental matters, social and employee aspects, respect for human rights, anti-corruption and bribery and diversity in their board of directors.

In addition, some MNCs also simply want to practice ethical business. The global labour movement should stretch out their hand and assist them in this endeavour. Some MNCs are struggling to improve their socio-ecological footprint, and it is up to the trade unions in the countries of origin, but also on global level to promote progress in this area.

Some companies want to improve their image without changing their practice. IndustriALL needs to be active at this point to challenge this attitude and bring about a real change of practice.

We need to convince management of the mutual advantage for all players.



In the Mechanical Engineering sector, we deal with some networks and some global framework agreements, but we do not have a structure that would be comparable with what we see in the automotive industry.

GEA

GEA is a Germany based MNC. This company is active in process technology and components for sophisticated production processes. The group employs a workforce of approximately 19,000 (2018) all over the world, with a strong footprint in Europe. Trade unions in the company are mostly active in Europe, and the group works council has the lead when it comes to the agreement with GEA. The original agreement (then "Code of Conduct") was signed in 2003 by the EWC. The International Metalworkers' Federation at that time only a co-signatory. The agreement was confirmed in 2007. It is a typical first-generation GFA. The agreement acknowledges the company's social responsibility, its support of and compliance with "internationally accepted human rights", and the basic right of all employees to establish and join unions and employee representations. More important, amongst other items, the GFA stipulates that ILO Conventions No. 87 (Freedom of Association) and No. 98 (Right to Collective Bargaining) will be respected. In late 2018, there was an attempt to re-negotiate and revive the existing agreement, but company management preferred a Code of Conduct being co-signed again. So far, there has not been any new negotiation over this agreement. But at least the IG Metall EWC coordinator, the German Group Works Council and IndustriALL are now in contact and exchange.

SKF

SKF is a Sweden-based MNC with approximately 48,000 employees all over the world. Major production sites focus on Sweden, China, Germany, North America, India. The company is active in Mechanical Engineering, mostly different types of bearings or – more generally – rotating equipment, “a world of reliable rotation”, as the company states. SKF has very strong trade union representation in Sweden and Germany, and also in Europe. In most countries where SKF is present, we find trade union representation, in Asia mostly company trade unions, in Mexico “protection” union; and all countries are represented in the world union council (WUC). In SKF, we have a strong and active WUC. The first GFA, again a co-signed Code of Conduct, was initiated, negotiated and signed by the WUC-chair together with the company CEO. The agreement is a typical “first generation GFA” and was renewed with another Code of Conduct in 2014 without IndustriALL’s participation. SKF has strong works council and trade union structures in the group including at supervisory board level. The WUC itself is also based on an agreement (“WUC-agreement”) which stipulates the right to information on global level and annual meetings. In 2019, the meeting will take place in Steyr, Austria. Since 2017, separate meetings of the also existing European Works Council (EWC) take place, always back to back with the WUC meeting. The WUC is led by the Swedish representatives from SKF Verkstadsklubb in close cooperation with the German representatives. IF Metall as well as IndustriALL Global Union both have advisory seats in the EWC and WUC.



SKF WUC, 2018 in Turin, Italy

thyssenkrupp

thyssenkrupp is a German multi-branch MNC with a strong footprint in mechanical engineering (lifts and escalators, technological solutions, machinery production, cement kilns), but also in other activities like steel and marine systems and others. The group currently employs approximately 161,000 people in 78 countries worldwide. The group has a strong workforce representation in Europe including trade unions and works council representation on different levels: in works councils, group works council, European Works Council (EWC). In addition, according to German legislation, there is a trade union supervisory board representation in place. The International Framework Agreement (IFA), another name for Global Framework Agreement, was signed in March 2015. IndustriALL is part of the international committee which monitors the agreement and follows up with the complaints that come in. In order to facilitate the work of the international committee a specific tool was created to deal with open conflicts. The thyssenkrupp IFA that was signed in March 2015 between thyssenkrupp, German affiliate IG Metall, the company Works Council and IndustriALL Global Union was awarded the silver medal at Germany’s “Works Council Day” in November 2016 in Germany. Dozens of cases have been solved with the help of the agreement over the last years. thyssenkrupp intends to split by the end of 2019 into two corporations. For the time being, the idea is to “mirror” every existing

means of codetermination and representation in both future companies. This means that there might be two separate international committees and two identical IFA's in the future. IndustriALL will do its best to ensure representation in both bodies and to safeguard the future of this ground-breaking agreement.

Networks and working groups (a small selection from the last four years):

IndustriALL works with several networks in the mechanical engineering sector. These networks are seen as a nucleus of future trade union networks in order to achieve a continuous social dialogue with MNCs and/or as starting point for a future GFA. Here is a small selection of meetings and related activities during the past years.

Lifts and escalators

This sub-segment was a major area of activity, especially in the years 2013–2016. In this sector, the concentration process is widespread. The four biggest companies hold a huge market share and use their market power. We work in this sector actively in thyssenkrupp and seek cooperation with the EWCs in the other groups, but this is not easy. Physical network meetings did not take place after 2016, but rather focused on the general cooperation and support for campaigns. If there is a demand for a renewal of the physical network meetings, IndustriALL has to check possibilities.

In general, IndustriALL's working group on lifts and escalators has developed joint position papers and joint core demands that were submitted to the respective CEOs. This happened in 2016.

In addition, IndustriALL supported the activities of affiliates in the sector, i.e. a long strike in Norway in 2018 finished with a victory for the Norwegian colleagues.



Strike at Orona in Norway, August 2018

Caterpillar

Caterpillar is number one in agricultural implements, mining and turbines as well as machines and engines. Caterpillar employs approximately 95,000 people worldwide and had an annual turnover of approximately US\$39 billion in 2017.

The company is suffering from the decision to heavily invest in mining equipment and "was hit hard by the downturn in coalmining CAPEX. From 2015, the company started a cruel restructuring process with a peak in 2016-2017. Between 15,000 and 20,000 of their workforce were dismissed and major plants were totally shut down. Focus areas for redundancies were USA, Belgium, Northern Ireland, Japan, Australia and some others.

The network had already been created and met regularly once a year. Company management is very anti-union and has never accepted any dialogue with the trade union network, so the main focuses in the network were:

- Exchange of information and experiences
- Coordination of joint solidarity activities and campaigns
- Coordination between UAW as hosting trade union and Japan and the European units, represented through the EWC at Caterpillar.



Caterpillar Network meeting, Sagamihara, Japan, June 2018

The network has lost momentum since 2017 and 2018 when some of its main drivers, the Belgian works council and EWC, faced major dismissals and aggressive anti-union activities from the employer. In Thailand, for instance, our local affiliate is not able to recruit members in a new plant because management is threatening the workers.

The 2018 meeting in Japan in a plant that was to be totally demolished was very touching. The Japanese affiliates were very concerned about this development, but very happy with the solidarity shown by the trade union network, also by holding the meeting in the plant. This also gave the opportunity to reach out to the Komatsu union in Japan once more.

Recently, the EWC has restructured its work and so we hope to make progress in this network and stabilize it. The 2019 meeting took place in July in Detroit, back to back with the John Deere network (see below) in order to facilitate the exchange between networks in companies in similar sectors, partly mirroring the agricultural implements structure.

John Deere

John Deere and Company employs approximately 60,000 people around the world and is expanding. Deere bought the German Wirtgen Group with approximately 8,000 employees recently. In 2017, Deere had an annual turnover of approximately US\$30 billion.

The John Deere network took a different direction compared to the Caterpillar network. The network was initiated to improve cooperation between the German IG Metall and US UAW to better coordinate activities in tractor production at Deere in the USA and Germany. It was soon discovered that Deere and Company (the official corporation name) is active in many different countries, and now IndustriALL has affiliates active in the group in countries including India, Finland, Germany, USA, Brazil and Spain, which have been the main drivers of this network since 2014.

The management at Deere is more open to dialogue and discussion with the network. In 2018, the network was even held at the company's headquarters in Moline, Illinois. In 2018 and 2019, back to back with the Caterpillar meeting, management also gave inputs to the network meeting.



John Deere trade union network meeting in Moline, USA, June 2018

The network itself is making great progress and a huge step was certainly the readiness of the corporate management to enter in discussion with the global trade union network. This might be a great step forward for this network and also for the whole sub-sector. During the 2018 meeting, the former UAW president, Dennis Williams, summarized his impression with the following words:

“For me to see the success of this network today, in how much it has grown, gives me happiness. Everybody is here, my Brazilian colleagues and other colleagues from around the globe. John Deere is hosting this meeting and I think it will be very successful.”

Renewables expert meeting on green tech

As described in chapter five of this report, Green Tech/Energy generation is one of the major challenges and at the same time opportunities for sustainable and future-oriented industrial policy. Mechanical engineering companies in particular can deliver added value not only for the economy but also for the environment, the workforce and society as a whole. However, one of the core questions will be whether the trade unions manage to make sure green jobs are also good jobs, in terms of pay, social and working conditions. One of the Swedish hosts who addressed the experts, defined the situation in mechanical engineering as follows:

“To paraphrase an old saying from the workers’ movement”, said local IF Metall president, Zarko Djurovic, “the worker of the future will program a machine in the morning, talk to

customers in the afternoon, and develop a new production process in the evening. This is an evolution of work.”

IndustriALL Mechanical Engineering section decided to start to tackle this matter: the first expert meeting “Experts’ Meeting of IndustriALL Global Union - Good Jobs and Technologies for Renewables: Mechanical Engineering - Building a Sustainable Future” took place on 10 and 11 December 2018 in Gothenburg, Sweden. Here, representatives from different continents discussed the above-described challenges and opportunities, and IndustriALL gathered a lot of expertise on this important matter.



Expert meeting on Renewables in Gothenburg, Sweden, in December 2018

The results of this first expert meeting are encouraging and IndustriALL needs to continue with this important work. Kemal Özkan, IndustriALL’s assistant general secretary, said:

“We need a network for the renewable sector that works in close cooperation with the energy and electronics sectors. The network must have a strong focus on organizing, and be able to respond with solidarity support where there is conflict.”

IndustriALL Global Union will continue working in this sub-sector also in the future. It is a challenging task but it is necessary for society, for the workforce and for the trade unions.

With respect to the chances and challenges, emerging from this sector work, the sector co-chair, Rainer Wimmer, who is also Austria’s PRO-GE president, stated during the meeting:

“As mechanical engineers and trade unionists, technology is the most important contribution we can make to mitigate climate change. We need wind, we need solar, we need biomass. And we need strong unions to ensure that energy transition is just.”

Outlook

In the years to come, we will face further changes in the sector. Companies like General Electric, Siemens, thyssenkrupp, Komatsu, Caterpillar, Deere and Company, SKF and many other companies are changing their industrial footprint and their structure.

Digitalization will gain momentum and will also reach the regions and sectors and suppliers where today it is still simply seen as “just more robots in the plants”.

In addition, the “greening” of all industrial production requires strong mechanical engineering companies who become “green” themselves.

With respect to the coming years, this means that IndustriALL Global Union will focus on two core areas:

1. Continue the work in the sub-sectors where we have already activities
 - Construction and mining machinery and agricultural implements: companies like Komatsu, Caterpillar, Deere and Company, eventually CNHi
 - Lifts and escalators: mainly the big four, including Kone, Schindler, thyssenkrupp and Otis, followed by two major Japanese players in the sector
 - Traditional networks, WUCs and GFAs, such as at SKF, thyssenkrupp etc.
 - Participation in campaigns and activities, namely in cooperation with IndustriALL’s European sister organisation, i.e. Caterpillar campaign
2. Add new areas of activity in order to gain and keep influence in future sub-segments:
 - Work on digitalization in the sector
 - Green tech will be a focus area in the years to come, especially, but not exclusively, in the field of alternative and renewable energy and electricity generation technologies.

To this end, the conference should adopt a new action plan on order to set the framework for IndustriALL’s activities in the years to come.