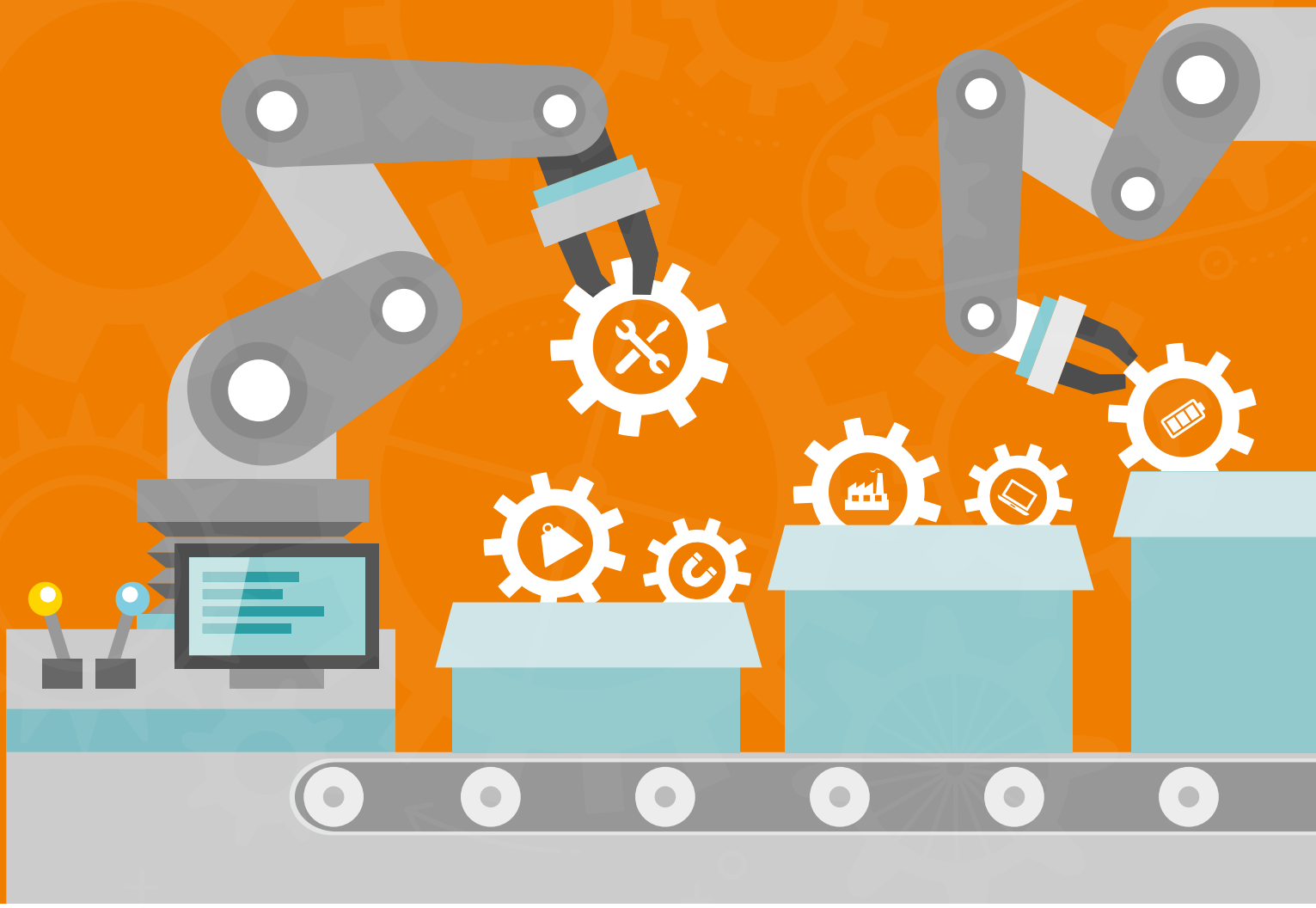
MAKE uk
The Manufacturers' Organisation

# SECTOR BULLETIN: MECHANICAL EQUIPMENT



In association with:

Santander

# MANUFACTURING ROUND UP

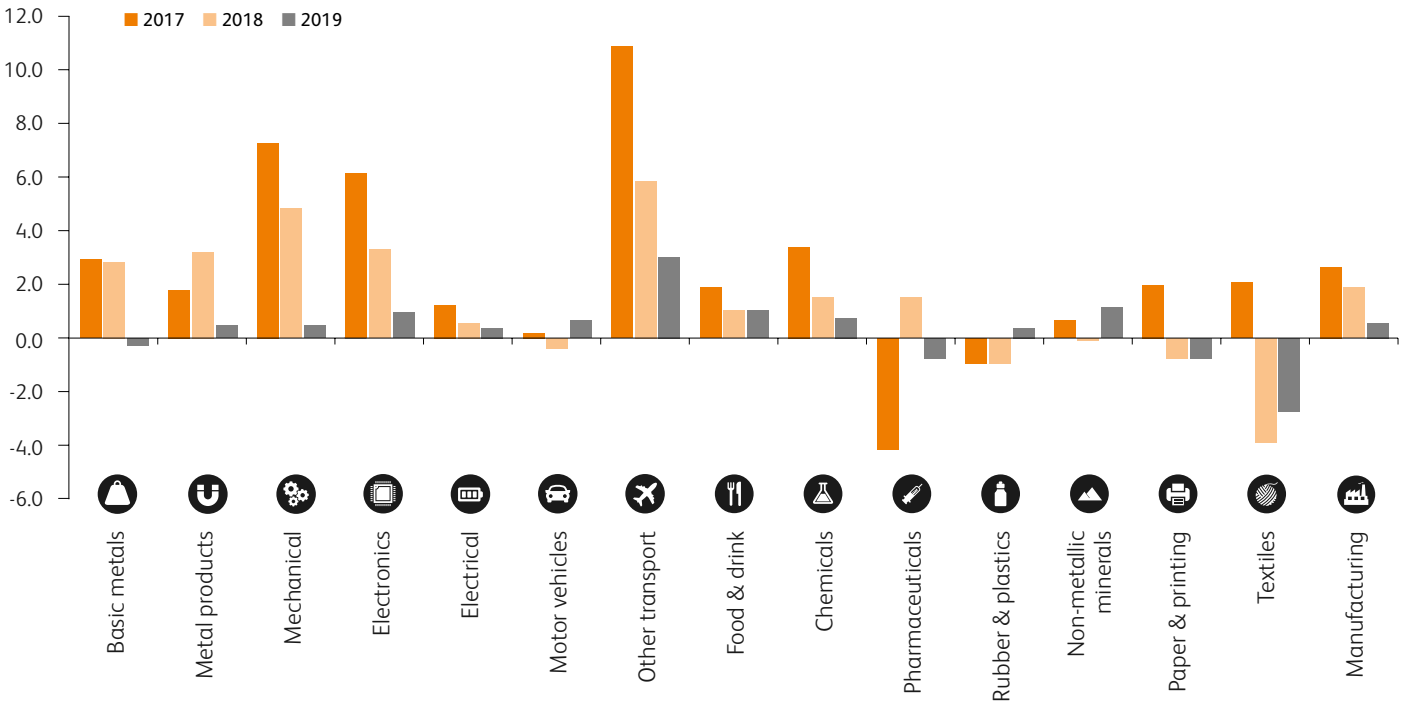
Welcome to our fifth Sector Bulletin report in partnership with Santander. Following on from our bulletins on the automotive, aerospace, food and drink and chemicals sectors, this time our focus is oriented towards the UK's mechanical equipment sector. Over the course of this report we will be delving into its components, structure, inputs, trade channels, characteristics, risk, opportunities and long-term trends.

Before we do this however, let's first take a look at how the manufacturing sector as a whole has fared over the past year, and the key trends that will affect its performance looking ahead.

Manufacturing enjoyed an excellent year in 2017, expanding by 2.8%, its strongest growth since 2014, and well above the sector's average annual growth rate. Encouragingly the healthy performance was broad based across sub sectors, and points to significant momentum being carried over into 2018.

The sector continues to benefit from the global economy upturn, which combined with the weak Sterling is providing a supportive boost to exports. While exports continue to thrive, the strong global economy is also bringing investment back online, supporting capital equipment manufacturers, and those in their supply chain. While these factors mean the sector is in fairly rude health, risks do remain, notably from the weakness in the construction sector, as well as of course uncertainty at the terms of the UK's exit from the EU. These dynamics should see growth slow over the next two years, but given that the strength in the global economy is showing no immediate signs of abating, we do not envisage this slowing to be as great as previously thought. We are forecasting healthy growth of 2.0% in 2018, and 0.6% in 2019.

## Manufacturing round up




Source: EEF & Oxford Economics (2018)

# UNDERSTANDING MECHANICAL EQUIPMENT

The mechanical equipment sector, and the development of machinery, was behind one of the greatest advances in human history, the Industrial Revolution. While the sector has gone into relative decline since then, especially compared to other, more contemporary sectors such as aerospace and pharmaceuticals, its importance and standing in UK manufacturing remains critical, given that nearly every workplace in every industry uses some form of machinery in production.

Indeed, the mechanical equipment sector encompasses a wide range of products and systems, from multi-million pound industrial turbines, to the common office printer. Broadly speaking we can split what the sector makes into five segments.

## What does the sector make?

GVA (£ billion) and % of total mechanical equipment GVA

**General purpose machinery**
**e.g. turbines, engines, pumps and compressors**
This segment refers to machines that transfer one type of work into another. For instance turbines use the energy from the motion of steam, gas, water or wind, to create mechanical power by turning a drive shaft. Attached to a generator, turbines also create electricity, which can be used to power assembly lines and industrial machines.

This industry segment also produces diesel and other internal combustion engines and their components (such as gears), as well as air compressors and pumps.

**GVA: £3.7bn**
**28.9%**

**Metal forming machinery**
**e.g. rollers and moulds**
The metal forming industry segment makes the machinery and tools that form, cut, and shape metals. The same properties that make metal a desirable component in many goods - strength and durability - also make it a difficult material to form. Therefore this segment encompasses drills, moulds, presses, and rollers needed to form metal, as well as the accessories used by these machines.

**GVA: £0.5bn**
**4.0%**

**Other special purpose machinery**
**e.g. machines used in specific sectors such as earthmoving equipment (diggers) in construction**
This segment refers to machines used in specific sectors, including construction, mining, quarrying, rubber and plastics, food and drink, and textiles. These machines tend to be more bespoke systems, which are differentiated in order to carry out specific tasks related to their sector's needs.

Examples include bulldozers and levellers, used in the construction of roads and buildings; grinders and borers, used for both surface and underground mining; and oil and gas extraction equipment.

**GVA: £3.7bn**
**29.1%**

**Other general purpose machinery**
**e.g. ventilation, heating and air conditioning equipment**
This segment refers to the production of machines that are used across many different industries.

Captured here include non-domestic cooling and ventilation equipment, ovens and furnaces, office equipment such as printers, and lifting and handling equipment e.g. fork lifts.

**GVA: £4.3bn**
**33.5%**

**Agricultural and forestry machinery**
**e.g. tractors**
Here special purpose machinery used in agriculture is classified. This includes the manufacture of agricultural tractors and other forestry machinery.

**GVA: £0.6bn**
**4.5%**

Source: ONS (2016)

### But what about robots?

In an era synonymous with automation, 4IR technologies and Artificial Intelligence, it would be reasonable to assume that the mechanical equipment sector would be at the forefront of the development and production of robotics, especially given the benefits they would provide to the sector's production processes.

While the sector does make some industrial robots, categorised under lifting and handling equipment, and other special purpose machinery, they make up a relatively low share of the sector's total output. This is due to the production of robots, instead of being focussed in one sector, being distributed across several, notably in the electronics and electrical equipment sectors, with no single classification. This has led to the recently coined "Electech" sector forming.

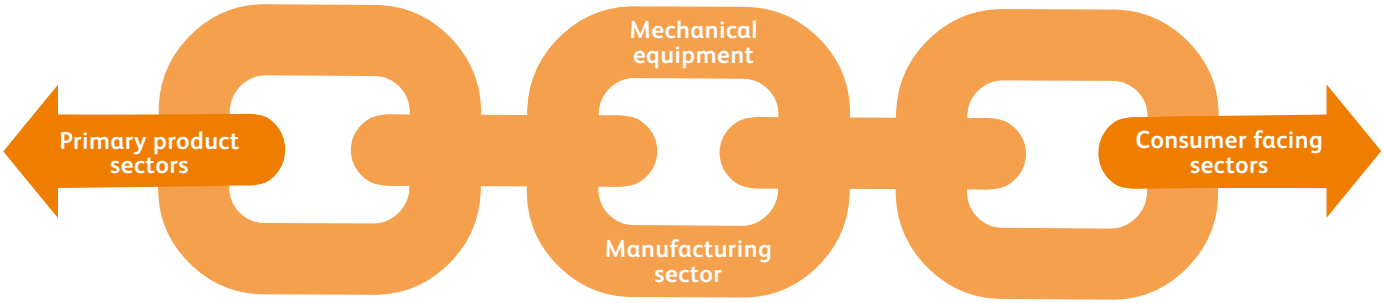
The "Electech" sector – which includes the electrical, electronics and embedded software industries, refers to the industrial application of electronics and software, and is a core part of the digitalisation of manufacturing, with a particular focus on automation and robotics. The production of robots are therefore primarily formed in this sector, and not the mechanical equipment sector.

## What is mechanical equipment manufacturing?

The chief process used through the mechanical equipment sector is assembly. Unlike other manufacturing sectors, such as chemicals, mechanical equipment manufacturers are not involved with the extraction of raw materials. Instead they take finished metal products, or mechanical equipment component parts, to form machines and equipment, which are then used to produce other goods or services. As such the sector is a key link between sectors at the source of the value chain e.g. basic metals and those at the consumer facing end e.g. automotive.

Broadly speaking the mechanical equipment sector produces goods for the following three purposes:

- A means of production for businesses in manufacturing, construction, agriculture and mining. They provide the equipment which help make the goods and services these industries provide.
- A means of production for public utilty, such as equipment for the production and distribution of water (e.g. pumps).
- A range of supporting equipment for all sectors of the economy, such as equipment for heating, ventilation, and air conditioning of buildings.



## Demand Structure

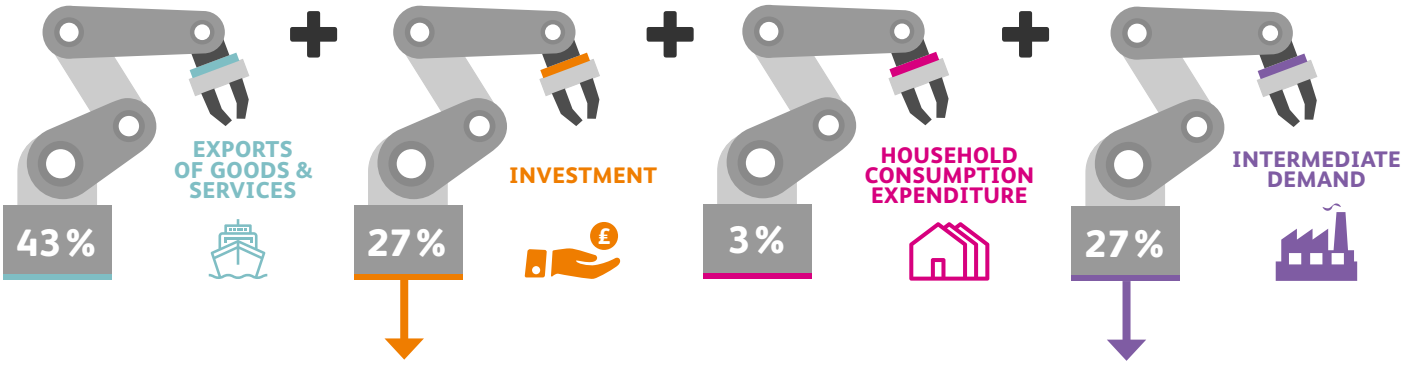
As we have seen, the vast majority of goods manufactured in the mechanical equipment sector are finished capital goods, used in other sectors to deliver an action or product. Consequentially, 27% of the sector's demand is derived from the investment needs in the UK market. For example if a company in the agriculture sector wants to expand production, it may invest in an extra tractor, or higher quality one, and this is captured under the investment subdivision of demand.

The remainder of products consist of components used in the production of these finished capital goods, as well as components used to make products in other sectors including construction, automotive and electrical equipment. This portion, the sector's intermediate demand, makes up a further 27% of the sector's final demand. Conversely, the sector produces very few goods for final consumption, with only 3% of total production destined for the final consumer. This is unsurprising given the heavy, industrial nature of products produced.

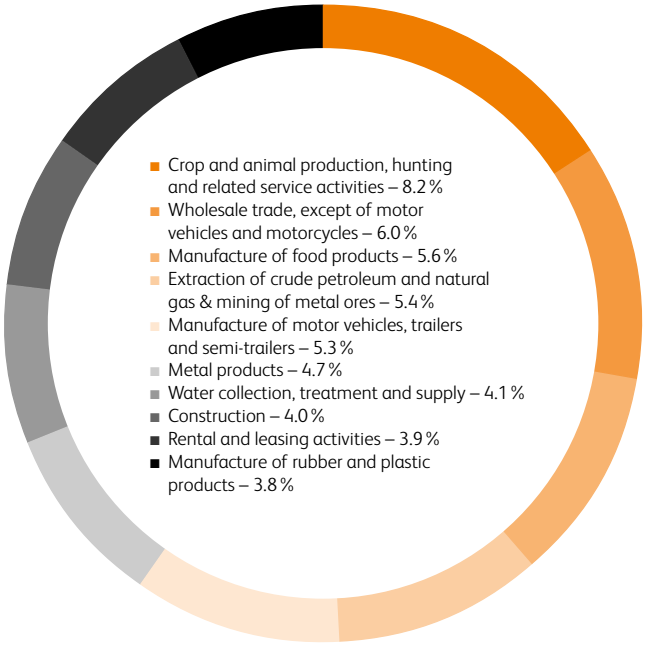
It is the export picture that is most striking however, with a hefty 43% of demand derived from overseas consumers and their investment needs, making the sector one of the most export intensive in UK manufacturing. The EU, as it is for the whole industry, is the sector's main trading partner, but there is also notable demand emanating from the US, China and Middle East (see export section).

## Mechanical equipment demand structure

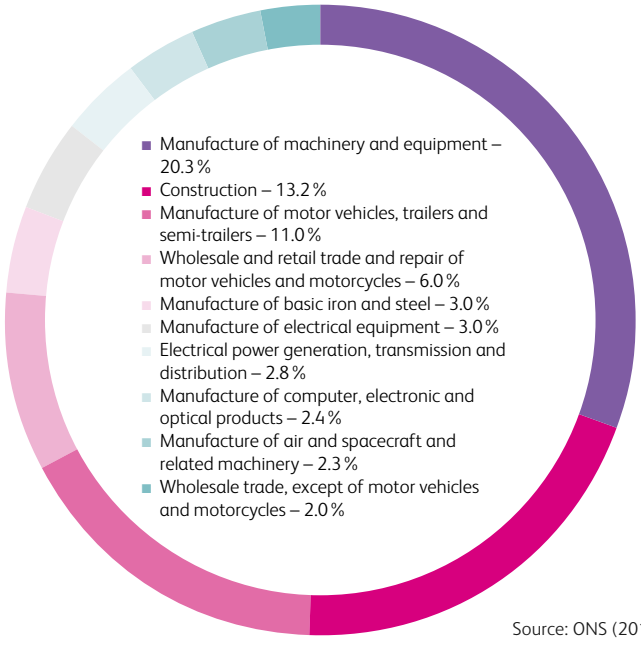
Demand structure, % of final demand




### TOP TEN SECTORS USING MECHANICAL EQUIPMENT AS AN INVESTMENT




### MECHANICAL EQUIPMENT'S TOP 10 INTERMEDIATE DEMAND MARKETS




Source: ONS (2015)

## Inputs

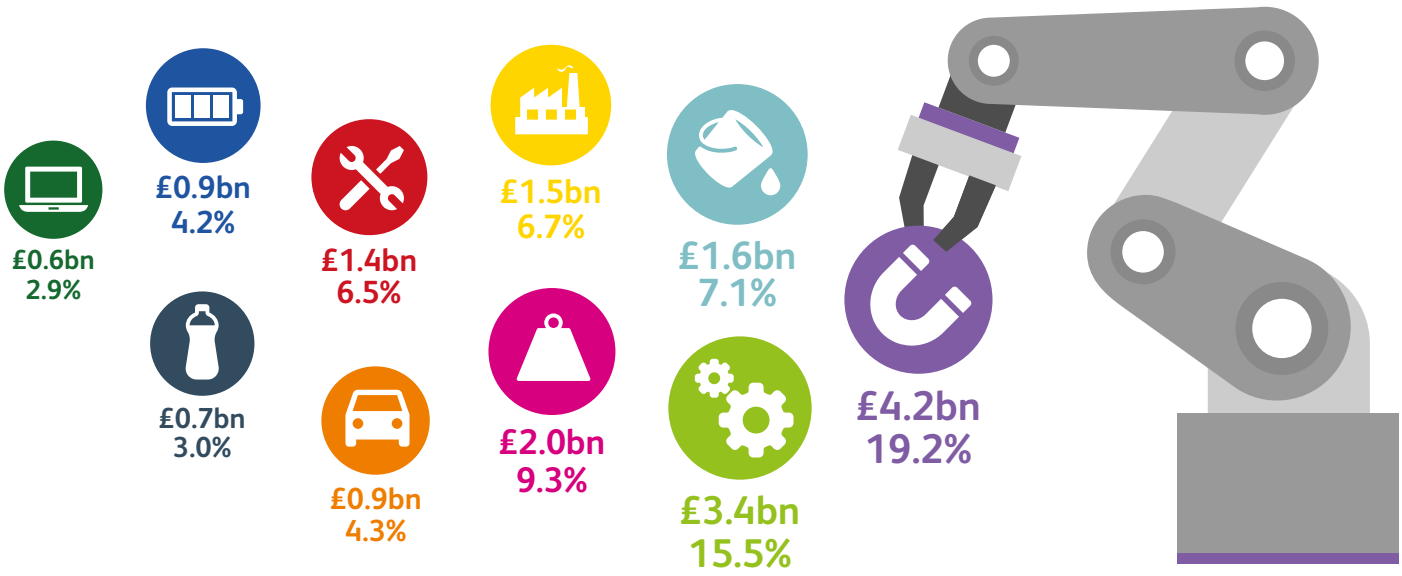
The mechanical equipment sector's final products, and the fact that its primary process is the assembly of finished metal goods and other mechanical equipment parts, means that unsurprisingly the majority of its inputs are from these two sectors.

The top input comes from the metal products sector, accounting for almost a fifth of all products going into mechanical equipment manufacturing, and is the main product used in creating large industrial machines. Taking into account the other metal sectors (including iron and steel) this figure rises to 36%. The second largest input, with a share of 16%, comes from the mechanical equipment sector itself, as smaller parts of machinery such as valves and taps are used to create larger pieces of equipment, such as engines and pumps.

Next up, are the other manufactured goods sector, repair and installation sector, motor vehicles, electrical equipment, rubber and plastics and electronics sectors, accounting for 28% of total inputs, while 56 other sectors complete the supplier "cake" with an overall share of 21%.

## Inputs into the mechanical equipment sector

Top 10 products going into the mechanical equipment sector (£ billion) and % of total




- Metal Products
- Machinery and equipment
- Basic iron and steel
- Other basic metals and casting
- Other manufactured goods
- Rest of repair; Installation
- Motor vehicles, trailers and semi-trailers
- Electical equipment
- Rubber and plastic products
- Computer, electronic and optical products

Source: ONS (2015)

# DEMAND DRIVERS

Given the nature of its products, and its high export intensity, the mechanical equipment sector's demand is driven primarily by the health of the global economy. There are three main global demand drivers in the sector: capital investment demand and commodity price fluctuations, which we will cover now, and its trade performance which we will dig in to later.

## 1) Capital investment demand

The mechanical equipment sector tends to experience sharper cyclical fluctuations than other branches of industry, due to its high dependence on investment in capital goods by other parts of the manufacturing industry.

Investment activity reacts very sensitively to the performance of the whole economy, magnifying fluctuations at the economy wide level. This in turn impacts on the mechanical equipment sector. For instance, following the financial crash, the UK economy contracted by over 4% in 2009. This led businesses and manufacturers to turn more cautious, deciding to hold off making investments until demand had recovered, as well as a general tightening in credit conditions, impacting smaller businesses in particular. Business investment was down 16% in the same period as a result, and the mechanical equipment sector saw demand for its products – predominantly capital goods – plummet. In 2009 its output was down by over a fifth.

This is in stark contrast to some other manufacturing sectors, such as food and drink, whose demand inelasticity of its products shields the sector from large contractions, and illustrates the degree to which the mechanical equipment sector reflects the health of the global economy, and in particular investment intentions.

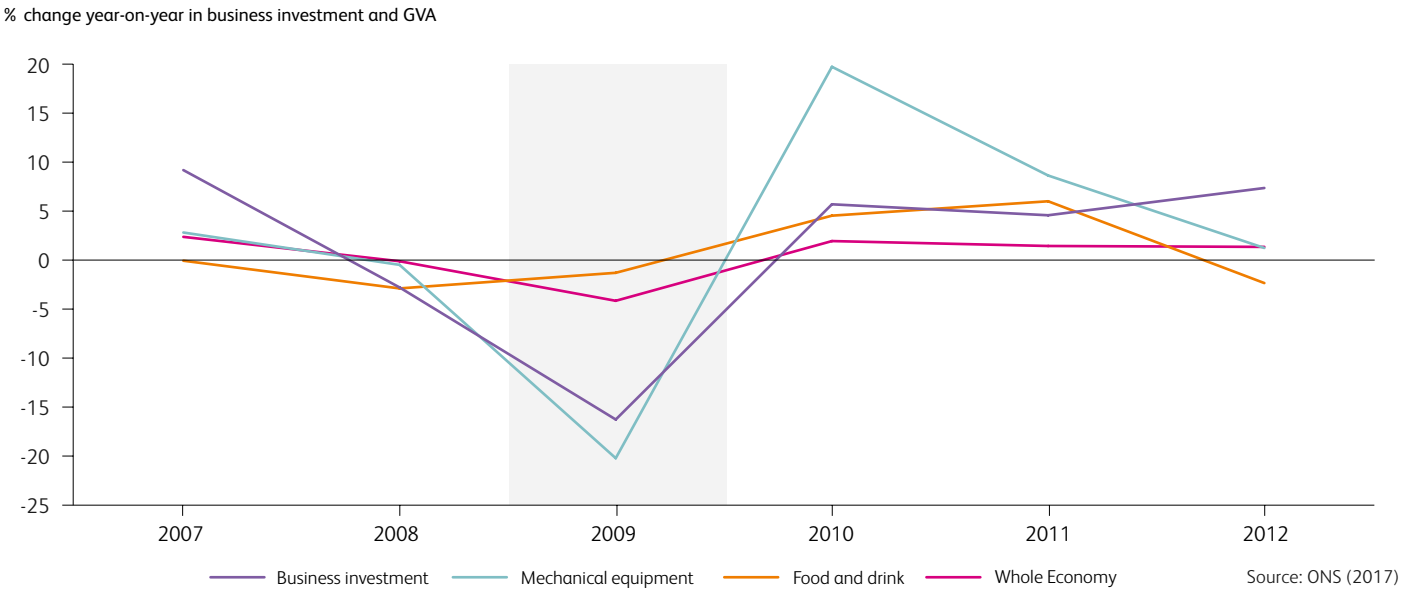
In 2009 the whole economy contracted by 4% following the financial crash

Investment in turn fell by 16%

The mechanical equipment sector collapsed, contracting by 20%

Source: ONS (2017)

## The mechanical equipment sector suffers from cyclical fluctuations




## 2) Commodity price fluctuations

While business investment is a driving force, the sector is also affected by other macroeconomic drivers, namely commodity price fluctuations, given the impact these have on the global economy, and investment intentions themselves.

### 1) Energy prices - oil, natural gas and coal

Energy prices impact on the demand and supply of international markets, and have become a key driver of the global economy. This is especially true for the oil price.

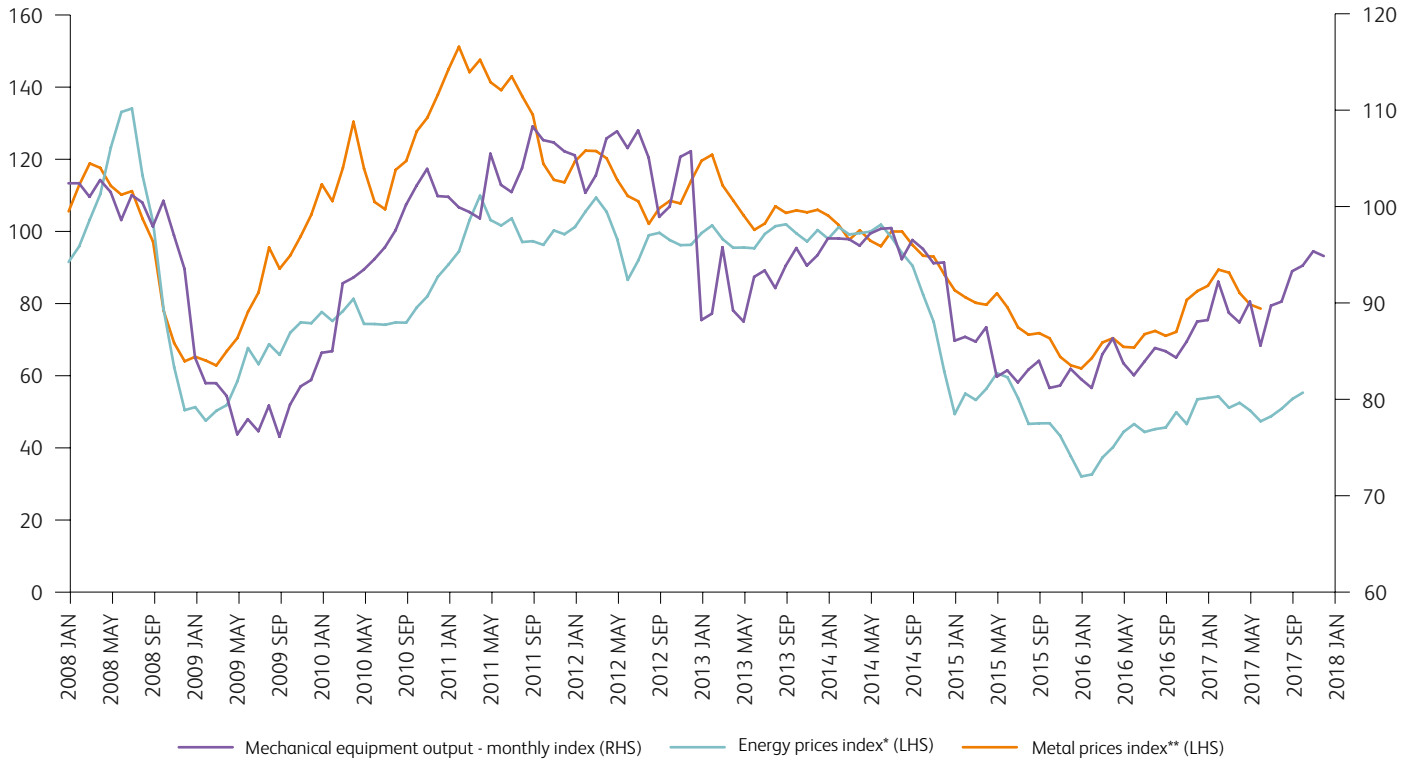
While for many sectors a lower oil price is seen as a benefit, as it cuts the cost of a key input into production, the results are less clear cut in the mechanical equipment sector. Indeed, while lower oil prices, as we have seen since the 2014 collapse, can reduce the cost of production for mechanical equipment manufacturers, this benefit is outweighed by the reduced activity in the oil and gas sector, with demand for extraction equipment falling. As a result a high oil price is seen as a benefit to the sector. This is backed up by our own members, with 53% of mechanical equipment members saying that an oil price recovery to $80/barrel would be a positive for them, and none saying it would have a strong negative impact on their business[1].

[1]EEF Exec Survey (2017)

This is also reflected in the official data; between July 2014 and January 2016, a 68% fall in the World Bank's energy price index coincided with output in the mechanical equipment sector falling by 16%. Since then, tentative rises in the oil price has corresponded with a pick-up in mechanical equipment output.

**Commodity price fluctuations impact the mechanical equipment sector's demand**

Mechanical equipment output, energy prices and metal prices (2008 = 100)




Source: ONS, World Bank and IMF (2017)

**2) Metal prices**

Another commodity that influences demand in the sector is metal, and specifically the steel price given it is the primary raw material used in production. Indeed, as mentioned previously, 36% of all products going into the mechanical equipment sector come from either the basic metal or metal product sectors.

While higher steel prices do raise the cost of production, the bespoke nature of mechanical equipment products mean that these input costs are better able to be passed on to customers. As such, higher steel prices accelerate price growth for mechanical equipment manufacturers and are seen as a benefit to the sector, with output broadly mirroring metal price fluctuations.

*Energy Prices include: coal, crude oil and natural gas.
**Metal prices include copper, aluminum, iron ore, tin, nickel, zinc, lead, and uranium.

# SECTOR CHARACTERISTICS

The mechanical equipment sector is a traditional manufacturing industry, with its roots founded in the Industrial Revolution. While its importance in terms of output and employment has declined since then, it still remains an important player in both the UK and global manufacturing markets.

There are a number of characteristics – namely size and foreign ownership – that have helped contribute to this.

**The UK is the 8th biggest mechanical equipment producer in the world in terms of gross value added. It comes after the remaining six G7 countries and South Korea.**

Source: OECD (2015)

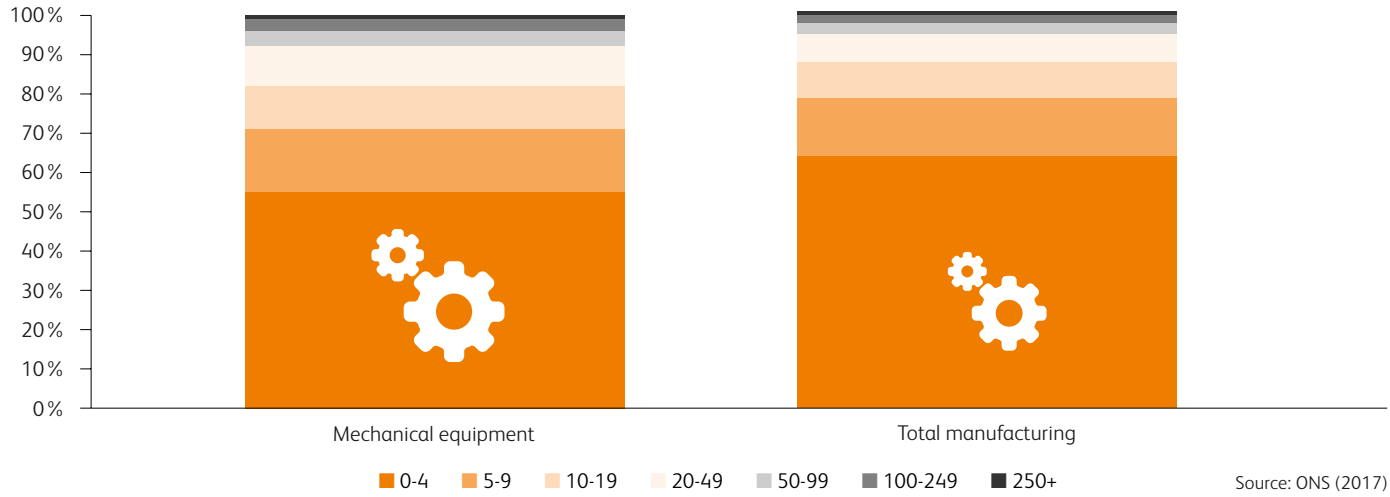
## Mechanical equipment producers are on average bigger

Mechanical equipment enterprises tend to be bigger than the manufacturing average. This is true both in terms of turnover and employment.

The mechanical equipment sector is the second biggest UK manufacturing employer after the food and drink industry, employing 8.6% of the manufacturing workforce, despite the sector only making up 5.7% of all manufacturing companies. Furthermore, at the beginning of 2017, only 55% of mechanical equipment companies had less than five employees compared to 64% of companies in manufacturing as a whole.

In terms of turnover, 29% of mechanical equipment companies were registered in the band of companies with a turnover of at least £10 million at the start of 2017, whereas the same figure for manufacturing as a whole is 10% smaller. This has important implications for mechanical equipment manufacturers. With size comes the opportunities for scale, greater diversification and at least the perception of stability – all of which have supported the sector through its cyclical fluctuations.

## Mechanical equipment sector structure by employment size band




Source: ONS (2017)

## High degree of foreign ownership

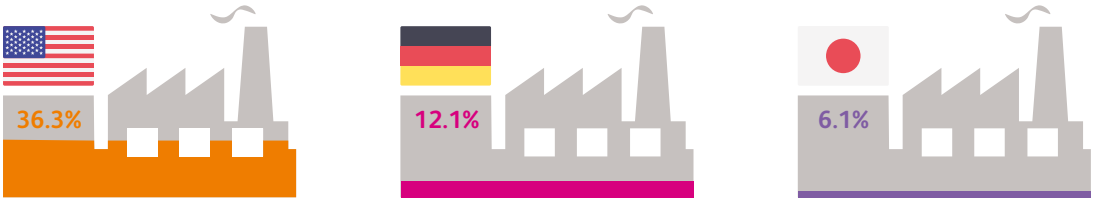
Another important factor to understand the make-up and characteristics of the sector, is its degree of foreign ownership. According to Eurostat, in 2014 7.4% of mechanical equipment companies were foreign owned, up from 6.2% in 2008 (first year of available data). This is a much higher share compared to the total manufacturing average, at just 3%. The biggest non-domestic investor in the UK mechanical equipment sector is the US with 36% of foreign owned companies, followed by Germany (12%) and Japan (6%).

Foreign owned companies operating in the UK mechanical equipment market bring with them a number of benefits. They are considerably bigger in terms of employment, turnover, value added produced, and profitability. These companies are also considerably more efficient, with productivity 37% higher than domestic mechanical equipment companies[2]. This is likely to have helped contribute to the sector's considerable R&D expenditure which stood at £912 million in 2016.

Despite these positive features, the mechanical equipment sector's performance, as we highlighted earlier in the demand drivers section, is more volatile than manufacturing on the whole. This is perhaps its most defining characteristic.

### Top 3 countries in terms of foreign ownership

% of foreign ownership in mechanical equipment sector




Source: Eurostat (2014)

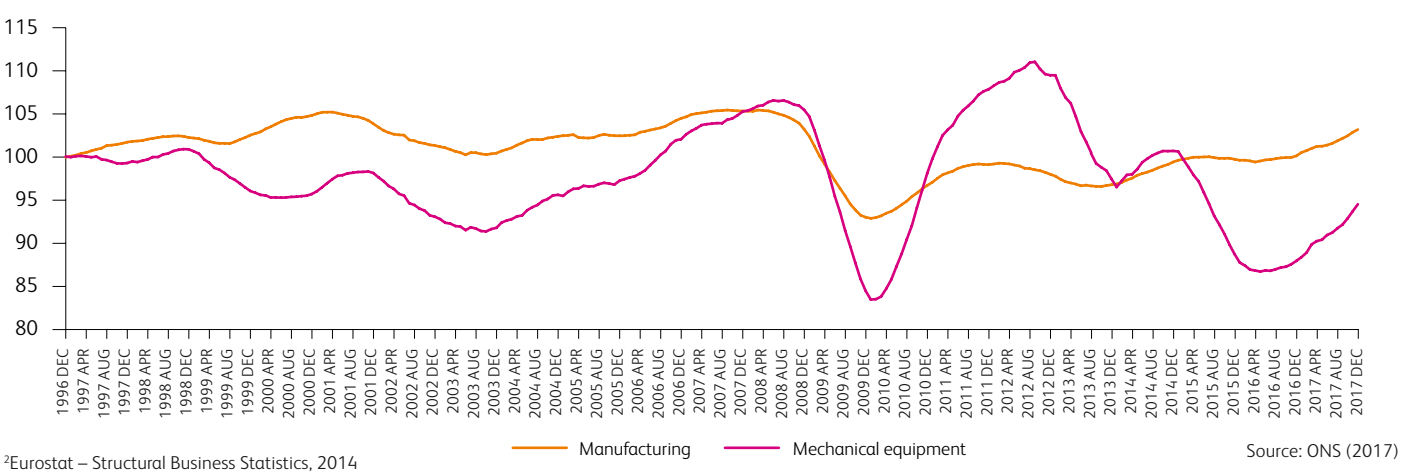
## Volatility

The mechanical equipment sector regularly experiences sharper fluctuations than the manufacturing average. This was perhaps most notable in the wake of the financial crash, in which large contractions in output were followed up by an impressive recovery, with the sector actually exceeding its pre-recession peak in 2012. Following 2012 however, the sector went into a period of sustained decline, which resulted in its share of manufacturing GVA shrinking to just 6.1%, down from 7.7% four years previously.

Recent months have seen a change in fortunes, as the sector recovers on the back of the global economy upswing, illustrated in our own *Manufacturing Outlook*. However the cyclical nature of the industry represents a challenge for manufacturers, who need to take steps to remain operational during times of economic downturn, in order to benefit later on when the economy picks-up.

### The mechanical equipment sector is more volatile than total manufacturing

Index of production (12 month moving average, 1997 = 100)




[2]Eurostat – Structural Business Statistics, 2014

Source: ONS (2017)

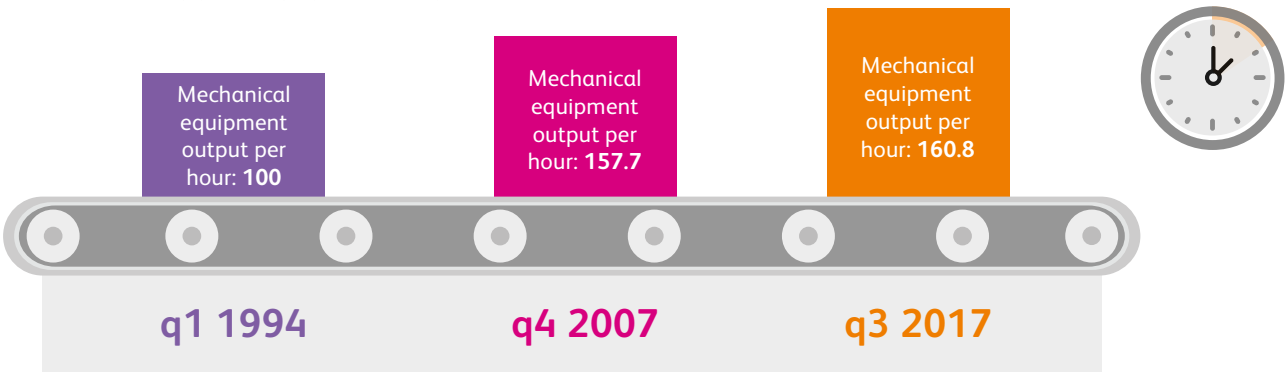
# COMPETITIVENESS

Crucial to any industry's performance is its competiveness. The mechanical equipment sector is no different, and given its high export intensity, maintaining its competitive edge over its international counterparts in particular remains a priority. The financial crash of 2008 has however seen an interesting change in trend and dynamics, in how mechanical equipment manufacturers retain their comparative advantage. These can broadly be split into two factors:

1) Mostly endogenous competitive factors in the pre-crisis period
2) Mostly exogenous competitive factors in the post-crisis period

## 1) Endogenous competitive factors - productivity

Index of mechanical equipment output per hour (1994q1 = 100)

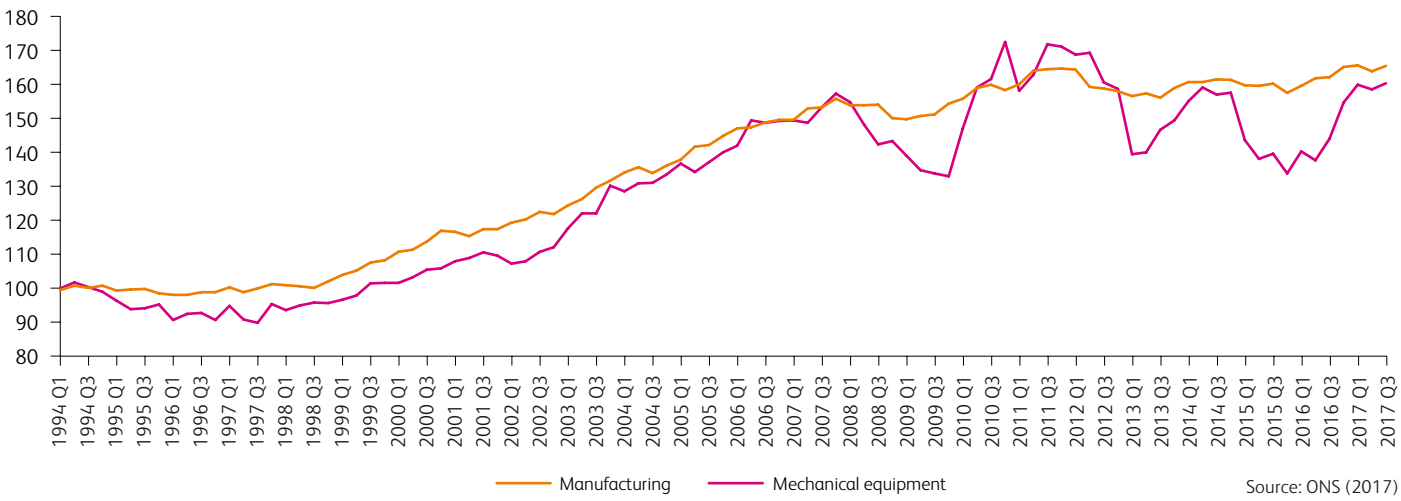



Source: ONS (2017)

Endogenous competitive factors relate to those which a firm is in control of, specifically their productivity performance. Pre-crisis, the sector saw large and consistent gains in its productivity. In fact between 1994q1 and 2007q4, the sector saw its output per hour increase by over 50%, in line with the manufacturing average, and exceeding the whole economy. This impressive performance, while boosted by improved production processes, is a likely result of falling employment. Indeed, while the sector remains a large employer in manufacturing, its employment level is actually 42% below its level at the end of 1997.

### Pre-crisis the mechanical equipment sector saw large gains in productivity

Manufacturing and mechanical equipment output per hour (1994q1=100)



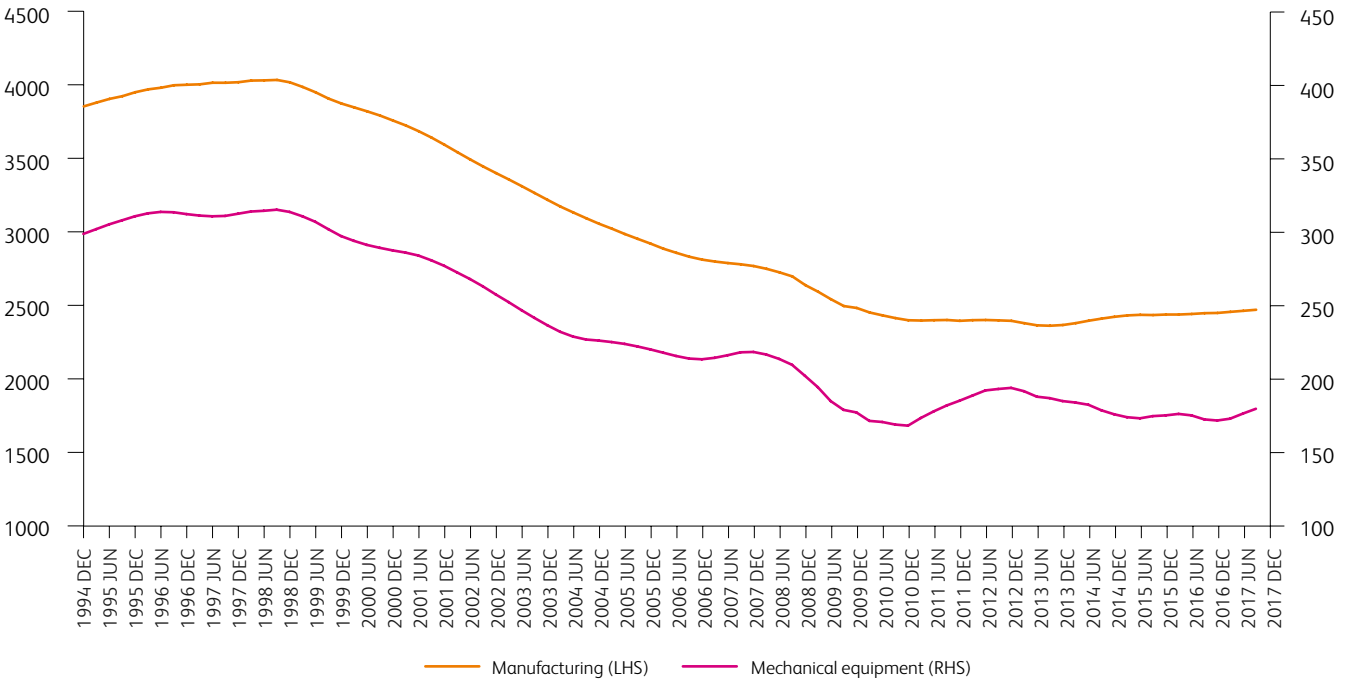

Source: ONS (2017)

Following the crisis however, we have seen a change in this trend. Employment has remained broadly flat at its lower level, while productivity has seen large fluctuations. These fluctuations have interestingly mirrored exchange rate movements. It appears therefore that following the crisis the sector's performance, in terms of trade and production, has been closely related to the exchange rate level. Prior to the crash, it appears the expansions were the outcome of productivity growth.

Exchange rate fluctuations are clearly out of the control of mechanical equipment manufacturers, and as such are exogenous competitive factors.

**The mechanical equipment sector has seen large falls in employment over the last 20 years**

Employee jobs in mechanical equipment sector (thousands, 4 quarter moving average)



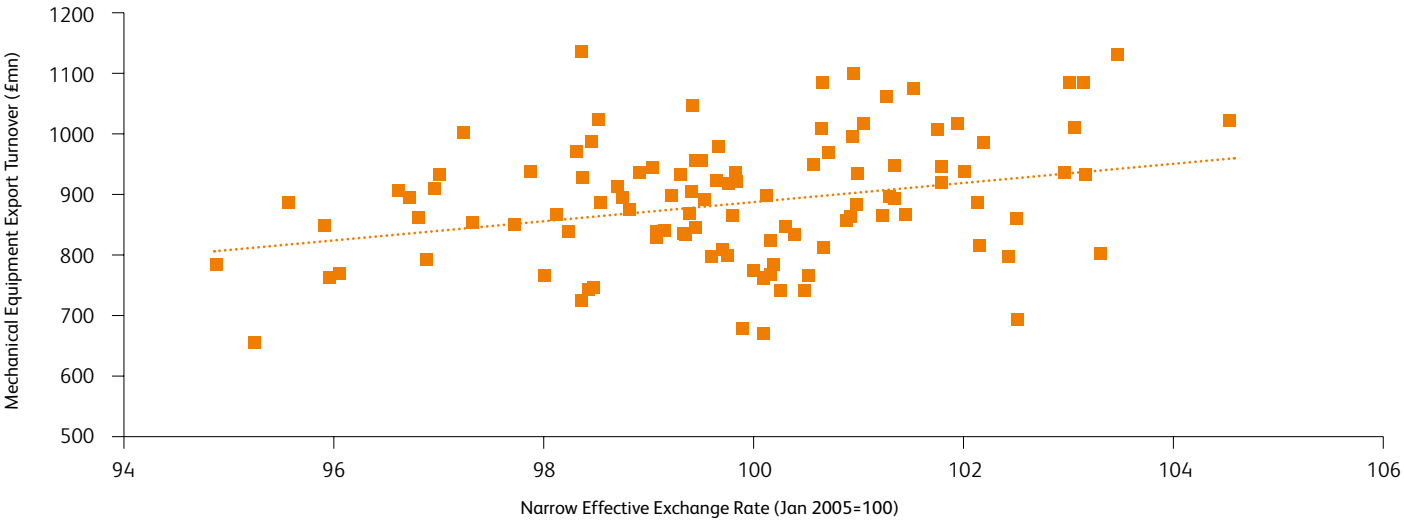

Source: ONS (2017)

## 2) Exogenous factors - Exchange rate elasticity effect on turnover

As we just highlighted, pre-crisis, the mechanical equipment sector's competiveness came on the back of some impressive gains in productivity. Since then however, it appears that as productivity growth has stagnated, mechanical equipment manufacturers have increasingly turned to exchange rate devaluations to provide the competitive edge they need on the export front. There is no better example of this than the Sterling devaluation following the EU referendum, which has resulted in the sector's export turnover share overtaking its domestic turnover share, and is currently floating around the 53 % mark. Conversely before the crisis, Sterling's weakness or strength had no apparent effect.

This changing trend is illustrated in the following graphs. The first of the two scatter plots, relating to the pre-crisis period, describes a situation of relative calm on the exchange rate front (notice the narrow scale on the X-axis) and an export turnover growth positively correlated with an appreciating Sterling. However correlation doesn't mean causation and this should not give the impression that a strong currency helped the sector grow. Indeed, the correlation is actually quite weak and the actual message to be taken is that the sector was able to grow even without the help of a weak currency i.e. its growth came on the back of productivity improvements.

## Mechanical equipment export turnover pre crisis (Jan 98-Dec 06)

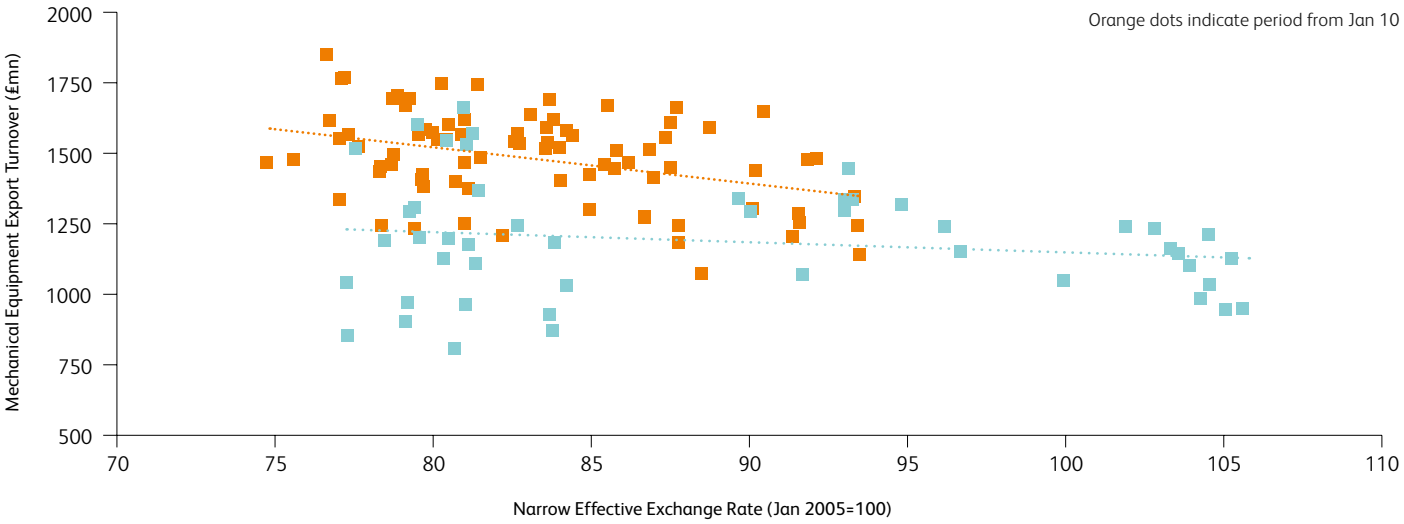



*Quarterly average productivity growth in the period: 1.3%

Source: ONS (2017) and Bank of England (2017)

In the second graph, relating to the period during and after the crisis, the situation is quite different. Both the scales are broader: the difference between the upper and lower limit in the Y-axis is twice the one reported in the previous period graph and the exchange rate scale is also greater denoting several shocks in the market. In this graph the correlation between exchange rate and export turnover is stronger, and this is particularly true when only the period after the crisis is taken into account (orange dots).

## Mechanical equipment export turnover post crisis (Jan 07-Nov 17)




*Quarterly average productivity growth in the period: 0.3%

Source: ONS (2017) and Bank of England (2017)

The correlation is even stronger following the crisis (period after 2010), when the turnover data are lagged by 8 months[3] compared to the prior period when the lag appears to be much longer. This indicates how the financial crash may have changed the sector's order processing dynamics, with manufacturers now trying to reduce the time between the order and the final invoice.

**Put simply, prior to the crisis mechanical equipment manufacturers got their comparative advantage from productivity gains. Since the crisis however, productivity growth has slowed, and the sector now appears to increasingly rely on a weak currency to remain competitive.**

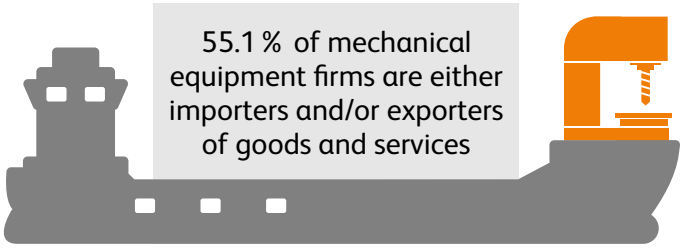
[3] It is important to remind ourselves that turnover data are tracking sales invoices so a stronger correlation when data are lagged is not surprising.

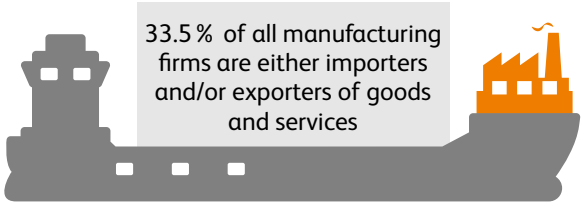
# TRADE

Following our look at the growing impact of the exchange rate on mechanical equipment manufacturers' competitiveness, naturally our attention moves towards trade.

Trade is essential to the mechanical equipment sector's standing and performance, with 55.1 % of all firms classified as either an importer and/or exporter of goods and services, considerably higher than the manufacturing average at 33.5 %. Despite this, the sector has seen its trade position deteriorate through the years, as other countries, both developed and developing, have expanded their mechanical equipment industries at the expense of the UK.

This is illustrated in the sector's trade balance, which has seen historically healthy trade surpluses during the 20th century eroded. Indeed, following a period of fluctuations around the perfect trade balance in the early part of the 21st century, the sector is now running a prolonged trade deficit, which equalled a considerable £3.1 billion in 2017.

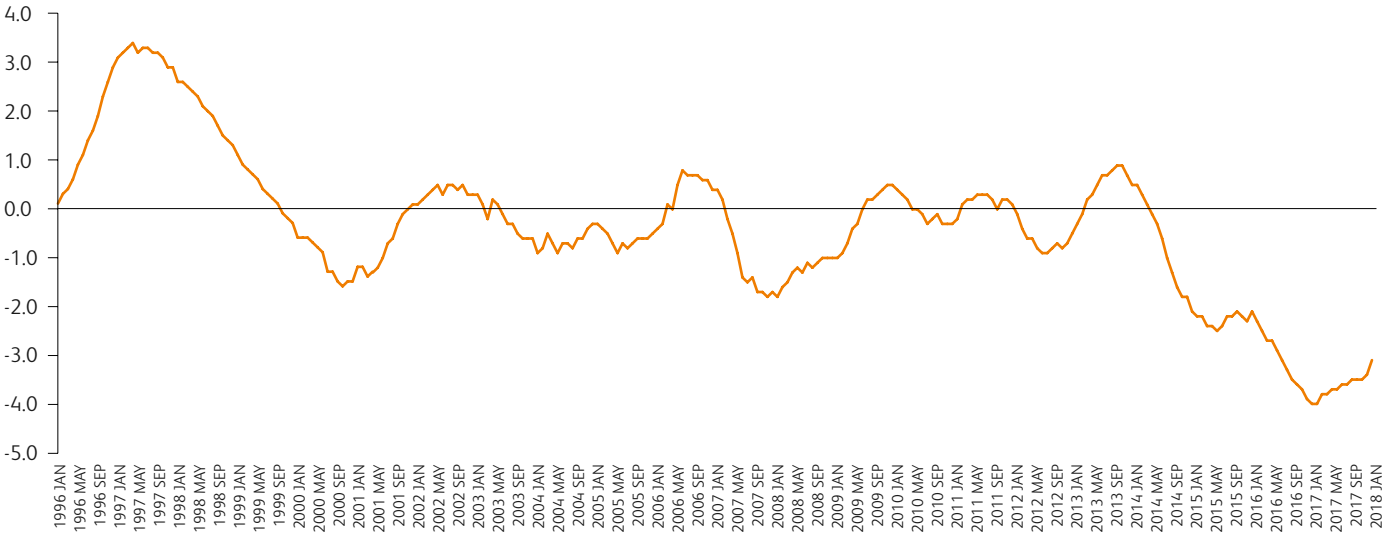



Source: ONS (2017)

## The mechanical equipment sector's trade balance has deteriorated

Mechanical equipment sector's trade balance (£ billion) - 12 month rolling average




Source: UKtradeinfo (2017)

Considering the product breakdown confirms the point. In 1996, each segment of the mechanical equipment sector was running a trade surplus. Fast forward twenty years, and now three of the five market segments are running deficits, with other general purpose machinery in particular seeing a huge swing. Even those sectors still recording surpluses – general purpose machinery and special purpose machinery – have seen a significant fall in their surplus size, confirming the deterioration in the sector's trade status.

## The deterioration in trade is reflected across mechanical equipment sub-sectors

Evolution in trade balances (£ billion) across products

### 1996

| | |
|---|---|
| General purpose machinery | £1.3 |
| Other general purpose machinery | £0.1 |
| Agricultural and forestry machinery | £0.7 |
| Metal forming machinery | £0.0 |
| Other special-purpose machinery | £0.7 |
| Total mechanical equipment | £2.9 |

### 2017

| | |
|---|---|
| General purpose machinery | £0.9 |
| Other general purpose machinery | -£4.1 |
| Agricultural and forestry machinery | £0.0 |
| Metal forming machinery | -£0.2 |
| Other special-purpose machinery | £0.3 |
| Total mechanical equipment | -£3.1 |

### 1996 - 2017

| | |
|---|---|
| General purpose machinery | -£0.4 |
| Other general purpose machinery | -£4.1 |
| Agricultural and forestry machinery | -£0.7 |
| Metal forming machinery | -£0.3 |
| Other special-purpose machinery | -£0.4 |
| Total mechanical equipment | -£5.9 |

Source: UKtradeinfo (2017)

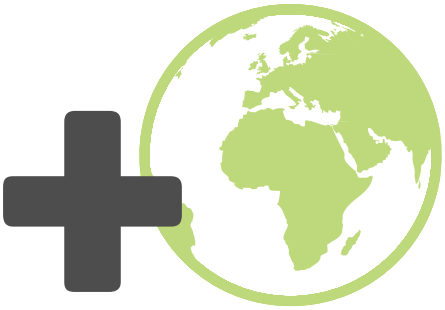
## Top trade partners

Before considering the UK's top import and export destinations, it is first interesting to note the sector's top trade partners in terms of surpluses and deficits.

The UK mechanical equipment sector is running its biggest trade surplus with Turkey, as machinery manufacturing continues to be one of the key growth drivers of the Turkish economy and wider manufacturing industry. Making up the rest of the top five are Ireland, which is unsurprising given the historic trade links and proximity, the US and perhaps most interestingly the UAE and Russia. This, as we will analyse in the export section, is a result of strong demand for oil extraction equipment, with demand in the Middle East in particular growing.

On the flip side, the top five deficit markets are Germany, China, Italy, the Netherlands and Japan. In Europe Germany and Italy in particular are running significant surpluses against the UK. Between 1996 and 2017, these two countries expanded their surpluses in this segment significantly (+£4 billion), indicating a comparative advantage in the production of these types of machines.

### TOP 5 SURPLUS MARKETS



**TURKEY £1.0BN**
**IRISH REPUBLIC £0.9BN**
**UNITED STATES £0.6BN**
**UAE £0.5BN**
**RUSSIA £0.5BN**

### TOP 5 DEFICIT MARKETS

**GERMANY £-4.1BN**
**CHINA £-1.9BN**
**ITALY £-1.5BN**
**NETHERLANDS £-1.1BN**
**JAPAN £-1.1BN**

Source: UKtradeinfo (2017)

## Why do German and Italian manufacturers run large surpluses with the UK?

As highlighted, the two biggest mechanical equipment producers in Europe, Germany and Italy (ranked third and fourth respectively in the world after Japan and the US) record strong surpluses in mechanical equipment with the UK. A possible explanation for this is the differing input structures between UK mechanical equipment manufacturers and their German and Italian counterparts.

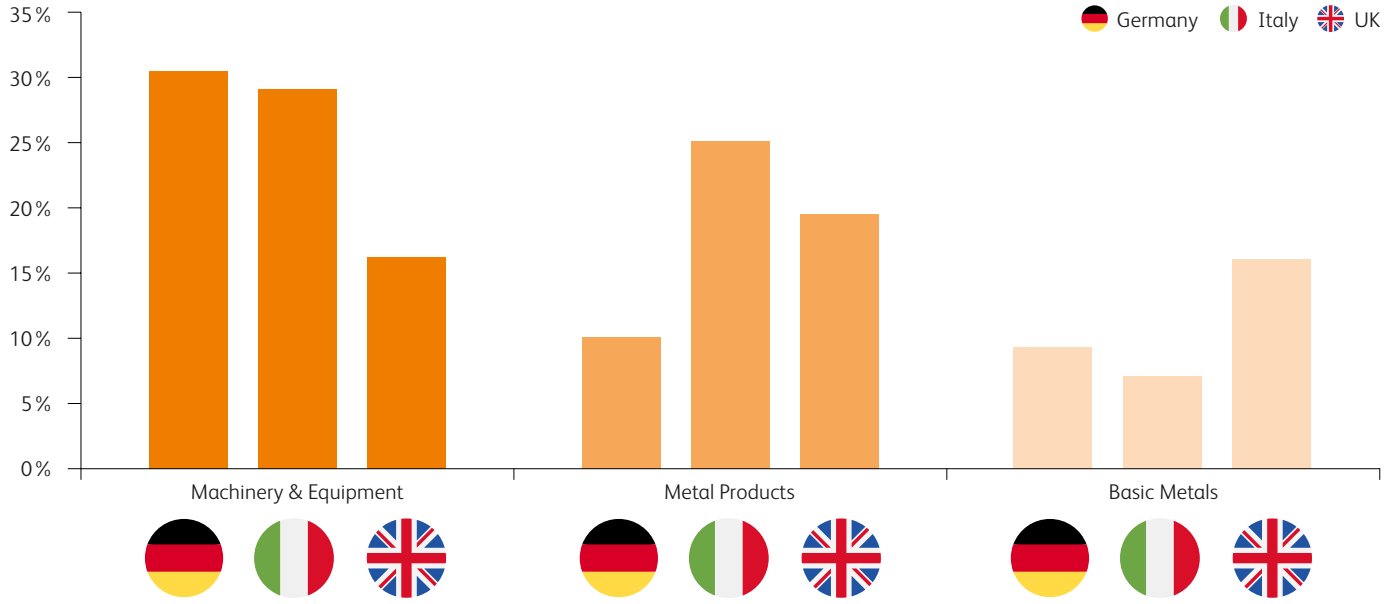
While all three countries have machinery and equipment, metal products, and basic metals as their top three inputs, both Germany and Italy rely much more on machinery and equipment as a main input rather than the metal sectors. Indeed in Germany and Italy, machinery and equipment make up 31% and 29% of total inputs, this figure drops to 16% for UK manufacturers. Conversely the UK relies more on basic metals (16% of inputs compared to 9% and 7% in Germany and Italy).

This would suggest that German and Italian manufacturers are building and selling more complex, sophisticated machines i.e. using machines to make other machines. Consequentially the UK is forced to outsource the production of such machines abroad, where these countries hold a comparative advantage.

This is a concern for UK manufacturers, as it indicates that they are being left behind in terms of higher value added work. However on a more positive note, when computer, electronics, and software inputs are analysed, the gap with Germany isn't as wide (4.1% of the UK inputs are in these categories whereas Germany's share is 5.2%) and we actually perform better than Italy (corresponding figure is 1.6%).

## Differing input structures could be behind the UK's trade deficits with Germany and Italy

Top inputs (% of total) into the mechanical equipment sector




Source: Eurostat (2013)

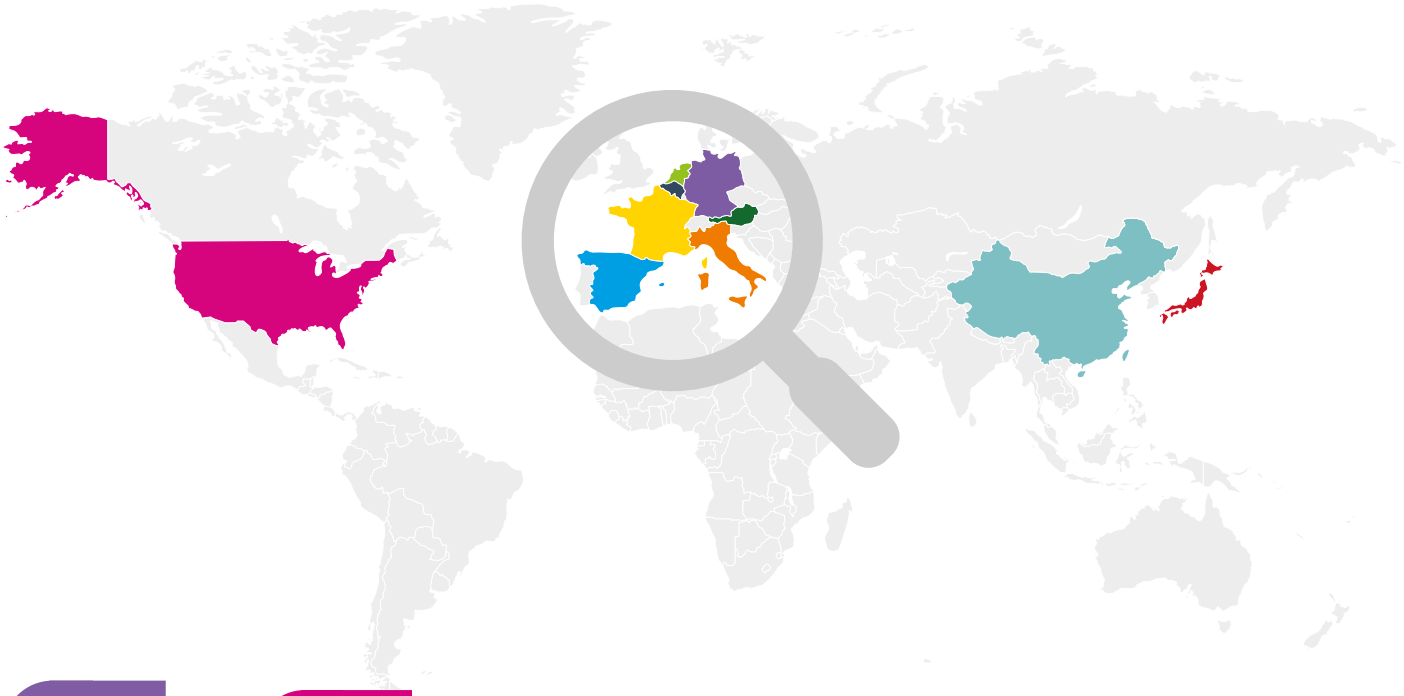
# IMPORTS

Since its heyday in the 20th century, the mechanical equipment sector has had to increasingly import products from across the world, in order to satisfy demand needs across industrial sectors. In 2017, the sector imported goods to the value of £36.3 billion. Perhaps more tellingly, a significant 44 % of total supply into the sector is imported, the second highest of all manufacturing sub sectors after electronics.

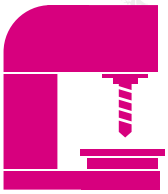
The sector's top import partner is Germany by some way, accounting for over a fifth of total imports. Next up is the US at 12 %, followed by China, the Netherlands and Italy. Barring the Netherlands, who owes its place in the top five to the Rotterdam effect, these countries make up a who's who of mechanical equipment producers globally, as their respective industries have taken off.

## Top 10 import markets

£ billion value and % of total mechanical equipment imports



**Germany:**
**20.9% | £7.6bn**



**United States:**
**11.8% | £4.3bn**

**China:**
**8.7% | £3.1bn**

**Netherlands:**
**7.4% | £2.7bn**

**Italy:**
**7.3% | £2.6bn**



**France:**
**5.7% | £2.1bn**

**Japan:**
**4.6% | £1.7bn**

**Belgium:**
**2.9% | £1.0bn**

**Austria:**
**2.1% | £0.8bn**

**Spain:**
**2.0% | £0.7bn**

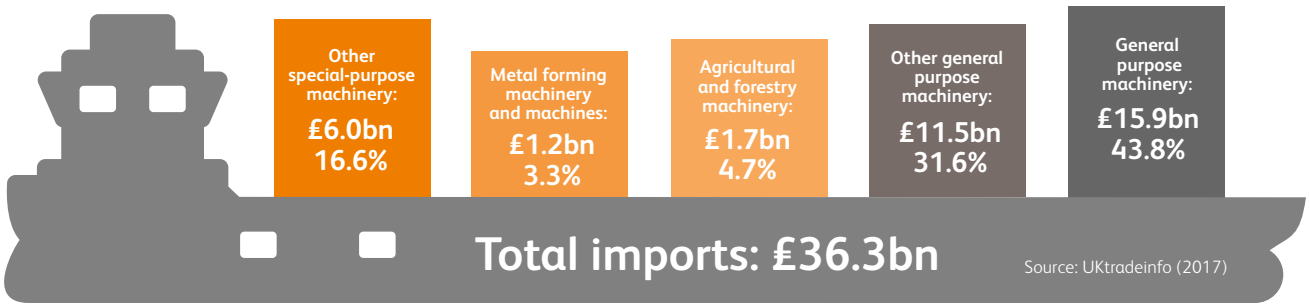
Source: Uktradeinfo (2017)

In terms of products imported, the general purpose machinery category makes up almost half of the total, followed by the similar other general purpose machinery, with a third.

The remaining share of imports is broadly accounted for by the other special purpose machinery segment with 17%, with only small amounts of agricultural and metal forming machinery coming from abroad. In each of these cases whole machines, as well as parts and components of machines are imported.

## Mechanical equipment sector's imports by product

£ billion value and % of total imports



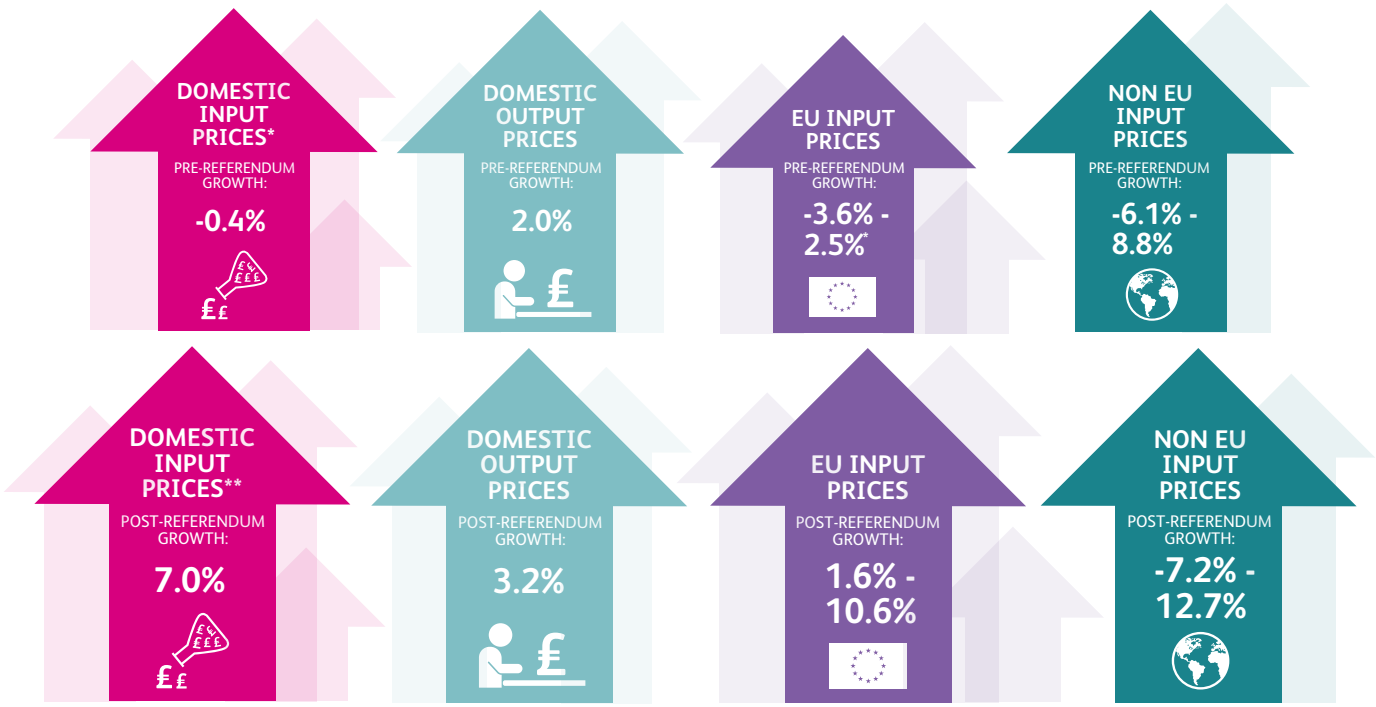

## Input costs hitting margins

As we highlighted in the previous section, the sector's performance has broadly been moving in line with the exchange rate since the financial crisis, and has been given a significant boost following the post EU referendum deprecation. However, as the sector is fully integrated in European and global supply chains, a weaker Sterling also means more expensive inputs. As input prices rise, manufacturers face a dilemma, raise prices and risk a fall in demand, or take the hit on their margins.

It appears that manufacturers have chosen the latter option, deciding to bear most of the brunt of rising costs on themselves, and have consequentially seen their margins squeezed. While input costs have been up 7.0%, output prices have only been up 3.2%, protecting consumers from the full rise in costs.

## PPI price growth pre and post referendum

% change in producer prices




* Average 19 months before referendum
** Average 19 months after referendum

Source: ONS (2018)

# EXPORTS

Despite the large portion of goods imported, the mechanical equipment sector is still one of the most export intensive in UK manufacturing, with almost half of its demand generated from overseas sales. In 2017, the sector generated £33.2 billion from exports and since 2000, the sector has seen foreign demand for its goods increase by almost a half (46 %).

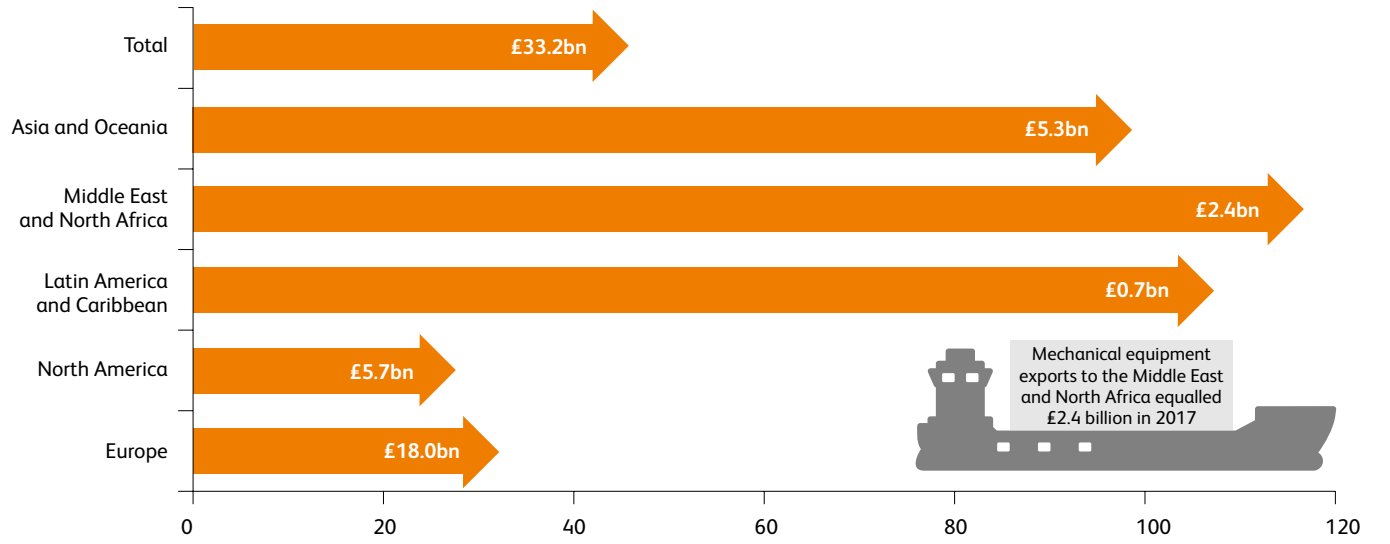
Like most UK manufacturing sectors, mechanical equipment's export demand is concentrated in the EU, with over 45 % of exports heading to the bloc. This is unsurprising given the EU's proximity, current ease of access, as well as the fact it is home to some of the biggest mechanical equipment industries in Germany and Italy. In fact seven out of the top ten export markets are located in the EU, with Germany our top European partner attracting 11 % of total exports.

It is the US however that is the leading single destination for mechanical exports, with 15 %, or £4.9 billion worth of exports heading across the Atlantic, and is indicative of the country's large manufacturing industry. China also makes the top ten list, a consequence of its continued drive to expand its industrial base, as well as its construction and property industry, the latter to satisfy a growing middle class.

One of the most striking export trends however is the growing importance of large oil and gas industries, in particular from the Middle East. This was illustrated earlier in the trade section, where we highlighted the significant trade surplus recorded with the oil rich UAE. Other notable regions include Saudi Arabia, Qatar and Oman, who all make the top 20 list for UK trade partners in terms of surpluses. These regions have grown in importance as they look to satisfy their oil and gas driven economies, by purchasing specialised extraction machinery. In fact, while export growth across regions has been positive, it is the Middle East and North Africa which has seen the greatest gains, with exports up 117 % from their level in 2000.

## Mechanical equipment sector's export growth by continent and value

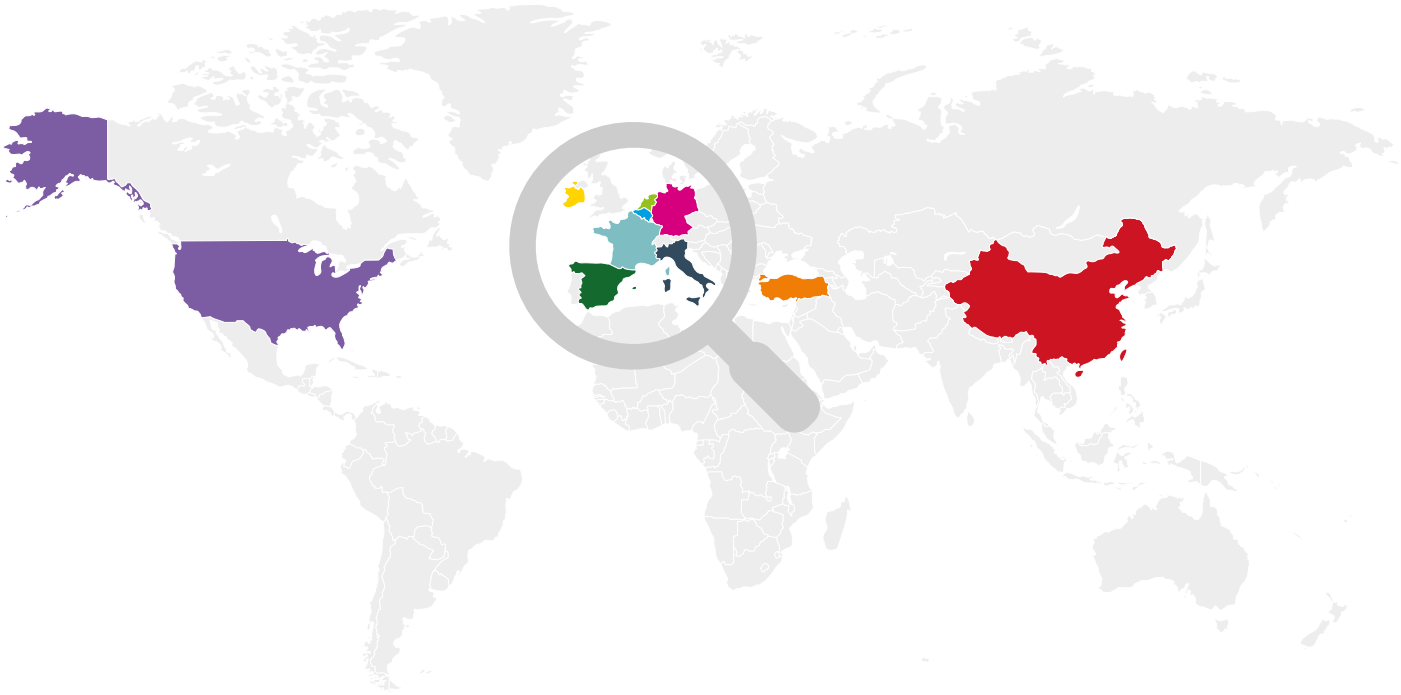
% growth (2000 - 2017), £ billion value of exports (2017)



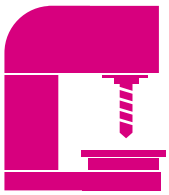

Source: Uktradeinfo (2017)

## Mechanical equipment sector's top 10 export markets

£ billion value and % of total mechanical equipment exports



**United States:**
**14.7% | £4.9bn**



**Germany:**
**10.7% | £3.5bn**

**France:**
**5.6% | £1.9bn**

**Netherlands:**
**4.8% | £1.6bn**

**Turkey:**
**3.9% | £1.3bn**



**Irish Republic:**
**3.9% | £1.3bn**

**China:**
**3.8% | £1.3bn**

**Italy:**
**3.3% | £1.1bn**

**Spain:**
**3.0% | £1.0bn**

**Belgium:**
**2.5% | £0.8bn**

Source: UKtradeinfo (2017)

## Top 10 high growth markets

| Country | % Growth in exports (2010-2017)* |
|---|---|
| Turkey | 201.5 |
| Mexico | 137.7 |
| Oman | 90.1 |
| Romania | 80.3 |
| United States | 78.4 |
| Qatar | 68.7 |
| Irish Republic | 65.4 |
| Hungary | 44.6 |
| Poland | 42.3 |
| UAE | 41.6 |

* >0.5% share of total exports

Source: UKtradeinfo (2017)

## The Middle East: a growing yet volatile market

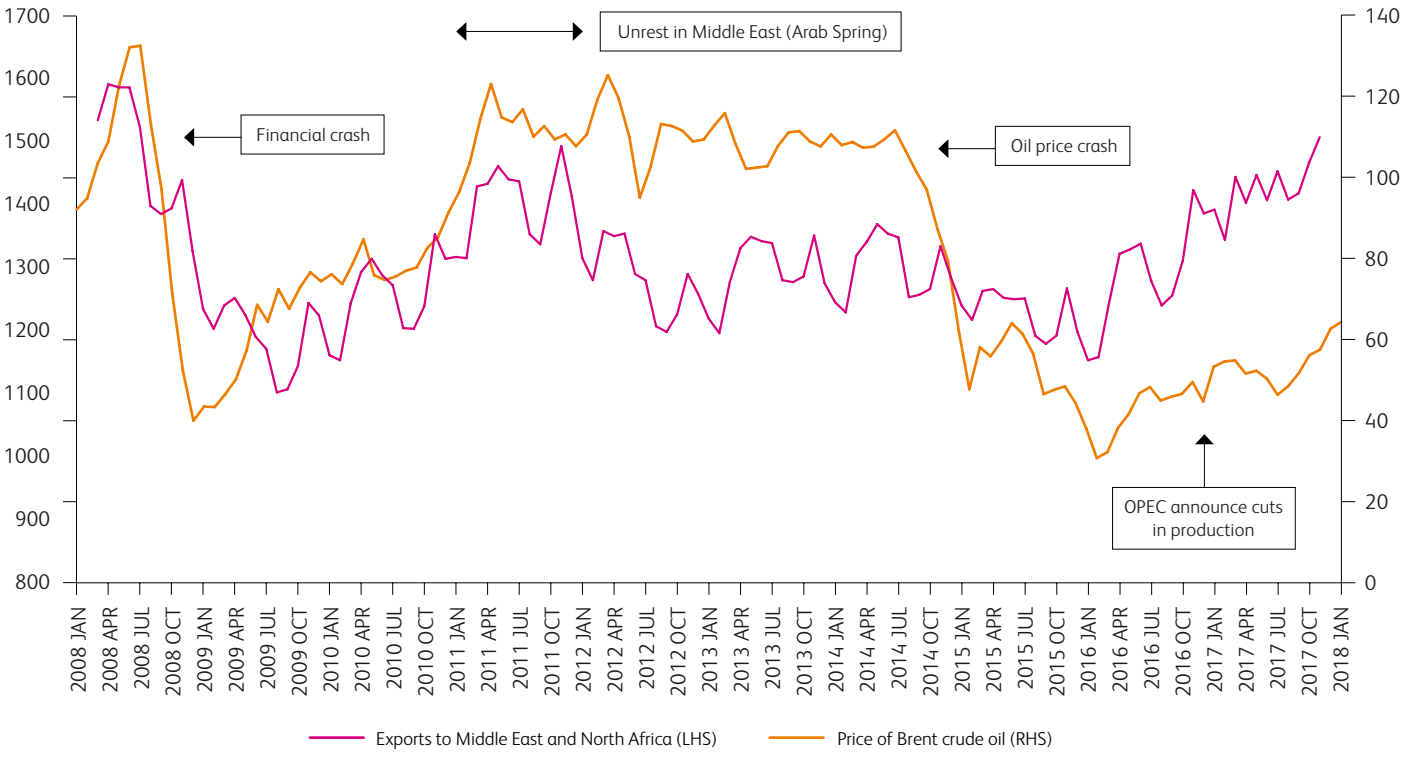
While UK mechanical equipment manufacturers should look to take advantage of the growing market for oil and gas extraction equipment, its volatile nature also makes it a risk. Fluctuations in commodity prices, as we have highlighted, will impact demand, but there are further risks concerning the politically unstable nature of the region. If for instance it became untenable for the UK to trade with specific countries in the Middle East, then new markets would need to be found, or the sector would see a fall in demand and orders.

A prime example of this is Iran. Following trade sanctions in light of its nuclear program, UK mechanical equipment exports to Iran in 2016 had fallen by over 87% from their level in 2000, from a value of £136 million to £17 million. While the nuclear sanctions have been lifted recently, and exports did pick up considerably in 2017 as a result, it nevertheless remains a difficult place to do business for UK manufacturers. This is in part due to other US sanctions remaining in place. These sanctions predate the dispute over Iran's nuclear activities, and given the UK's strong links with the US, British companies may face "secondary sanctions" as a result. British businesses must consider their US connections, including the presence of employees holding US citizenship, before undertaking trade activity with Iran.

Other notable examples of the region's instability can be seen during the Arab Spring of 2010-11.

### Oil price fluctuations and political instability impact demand in Middle East

Exports (£ million) to Middle East and North Africa (3 month rolling average) and price of Brent crude oil




Source: UKtradeinfo (2017) and EIA (2017)

# REGIONAL PERFORMANCE

The mechanical equipment sector is an important contributor to the UK economy, with a presence across every region.

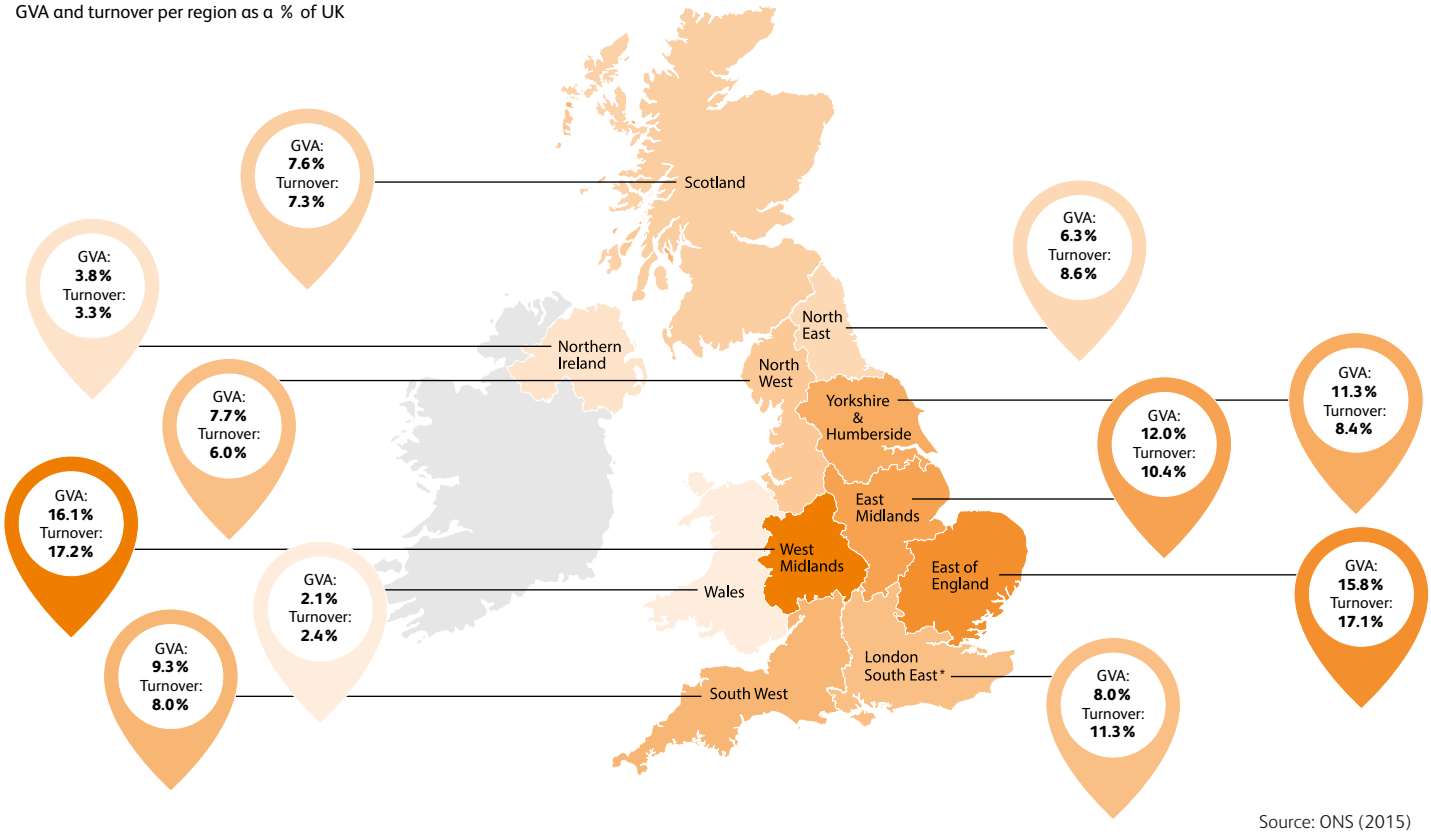
It is in the Midlands however –the UK's industrial heartland – that the sector has its greatest presence. A combined output and turnover of 28% each of the manufacturing total signals its importance, not just to mechanical equipment manufacturers in the two neighbouring regions, but to a host of other manufacturers in various supply chains, including automotive. These two regions are home to some major mechanical equipment manufacturers, including JCB and Caterpillar.

Other notable regions include the East of England, with an output and turnover of 16% and 17%, and London and the South East, which has grown in importance as more and more companies locate their operations and head offices in the capital.

Interestingly Northern Ireland, while not demanding a large share of the sector's total output, is regarded as a centre of excellence in the production of specialised manufacturing equipment, in particular the production of quarrying and crushing machines. Indeed specialised quarrying and crushing machinery manufactured in Northern Ireland is exported worldwide, for applications as diverse as iron ore mining in India, road construction in Peru, diamond exploration in South Africa and sand washing in the Arabian Gulf[4]. There is therefore great scope for the sector to expand in the coming years, and take advantage of its growing reputation.

## Output and turnover in mechanical equipment across UK regions

GVA and turnover per region as a % of UK




Source: ONS (2015)

*London and South East data suppressed - have therefore worked out values manually

[4] Invest in Northern Ireland – Materials Handling database

# RISKS

The mechanical equipment sector, as we have seen, remains an important pillar of UK manufacturing and the economy as a whole. However, while the sector's performance is primarily dependent on the health of the global economy, there are a number of risks on the horizon which could challenge its standing. Chief among these are of course, as it is for a number of other manufacturing sectors, Brexit and the terms of the UK's exit from the European Union. Other notable risks include commodity price and exchange rate fluctuations.


### i) Tariff and non-tariff barriers

The mechanical equipment sector is a highly globalised industry, importing and exporting goods across the globe, with the EU its main trading partner. As such, the imposition of any tariffs would clearly have a detrimental effect on the sector and its profitability.

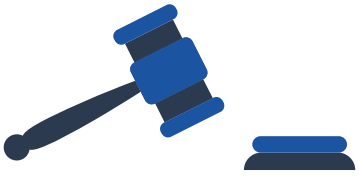
However there are other implications that a move away from frictionless trade will have on the sector. Rarely today is a piece of mechanical equipment sold in isolation. Service upgrades and after-sales services (see opportunities) are becoming increasingly common and are an important part of business models in the sector. These services require close relationships between customer and seller to function. Anything that slows down or impairs a response, be it through the movement of goods or the deployment of an engineer to carry out maintenance or repair, will reduce the competiveness of UK manufacturers.

The introduction therefore of visas, permits and other regulatory changes (non-tariff barriers) could result in companies deciding to set up subsidiaries on the continent to combat this, moving jobs and value abroad.


### ii) Regulation

As is the case with most sectors, the regulatory landscape for the mechanical equipment sector is designed at a European wide level, with the key piece of legislation being the Machinery Directive.

The Directive is not simply a list of technical standards with which products must comply. It prescribes a wide variety of areas in which machinery put on the European market must conform to a recognised standard and safety, in order to be CE certified. Increased bureaucracy and red tape as a result of the UK leaving the EU will represent an extra burden, in terms of costly delays for UK manufacturers. Unless a regime of mutual recognition is introduced across the single market, this will impact on the competitiveness of UK manufacturers, and is perhaps the most pressing issue facing the sector.



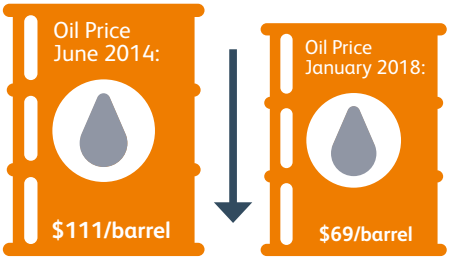
### Exchange Rate Volatility

As seen in the competitiveness section, it appears that the mechanical equipment sector's recent expansions have moved in tandem with the exchange rate path. This trend represents a risk to the sector, in terms of being overly reliant on competitive gains that are out of their control, as well as the impact of rising costs and how they are to be passed onto consumers. The sector should instead be focusing on re-gaining competitiveness through productivity gains, thereby avoiding leaving themselves at the mercy of exchange rate headwinds.


## Oil price fluctuations

A high oil price is a key demand driver for the mechanical equipment sector. The slump in oil prices in 2014 therefore impacted the sector, with demand from some of the sector's key export markets in the Middle East falling on the back of it. While the oil price has begun to pick-up again, helped by OPEC's agreement to restrict production, which was extended last year, it still remains well below the $100+/barrel recorded in the pre-2014 period.

Furthermore, OPEC's agreement to extend the cut backs came with the caveat of a review of the market in 2018, leading to scepticism amongst some economists and policy makers as to whether the cuts will be maintained for any significant period of time. Consequentially the coming years could see volatility in oil prices once again. This is perhaps even less desirable than low prices, as volatility can reduce planning horizons, cause firms to postpone investments or even change their business model.




Source: EIA (2018)

# OPPORTUNITIES

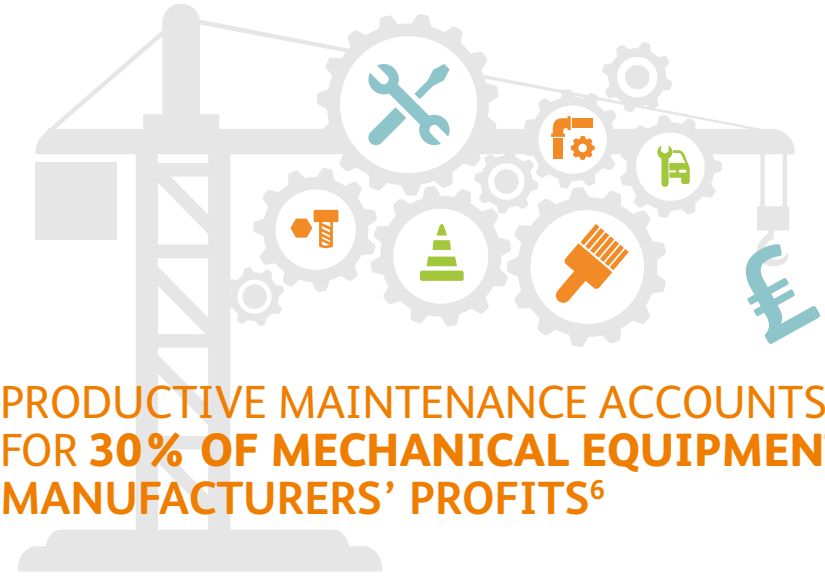
Despite the risks highlighted, there are a number opportunities on offer which mechanical equipment manufacturers should grasp in order grow their market share and output.

## After sales market

The nature of mechanical equipment products – namely their role as a capital investment by other businesses – means they tend to have longer lifespans than products in other branches of manufacturing. Indeed the average lifespan of machinery and equipment tends to be over 10 years[5]. This naturally limits the new sales opportunities on offer, and hence mechanical equipment manufacturers have had to find other ways to keep a steady flow of income.

This has led to the after sales industry, and "servitisation" business models growing in importance for the sector. Indeed after sales service – such as repair and maintenance – now accounts for up to 30% of mechanical equipment manufacturers' profits according to a study by Oliver Wyman[6]. Customers are now increasingly not just wanting to pay for the sole piece of equipment or the "base level", but guarantees on the running of machines and "productive maintenance", given the impact to their business of failure. This growing market therefore represents an opportunity to mechanical equipment manufacturers, in terms of a constant stream of incremental revenue, new business opportunities and the prospect of increased customer loyalty and differentiation to competitors.

Key to utilising this opportunity will be the Internet of Things and specifically machine embedded sensors. Sensors within equipment will be able to feed data back to the manufacturer and provide early warning of a looming failure. This should mean maintenance issues can be resolved before the problem occurs (see long run trends).



PRODUCTIVE MAINTENANCE ACCOUNTS FOR **30% OF MECHANICAL EQUIPMENT MANUFACTURERS' PROFITS[6]**

## Global construction equipment industry

The global construction equipment market is set to grow to a value of $180.7 billion by 2021. This would equal a 7% compound annual growth rate since 2015, and represents an opportunity for specialised construction equipment manufacturers in the UK.

The impressive growth forecasts are driven by emerging economies, and an increased focus in these regions on infrastructure projects and construction activity. China is leading the way in this regard, as the government continues to push fiscal stimuluses in the form of infrastructure investments as a means to sustain economic growth,

[5]Industrial Machinery Manufacturing: Trends, Insights and Opportunities – UPS (2015)
[6]Perspectives on Manufacturing Industries – Oliver Wyman (2017)

as well as growth in the real estate market. UK mechanical equipment manufacturers already have strong ties with China, illustrated by it being one of its top trading partners, and so should be able to utilise the growing opportunities in the region.

## THE **GLOBAL CONSTRUCTION** EQUIPMENT MARKET IS SET TO **GROW TO A VALUE OF $180.7 BILLION BY 2021**[7]

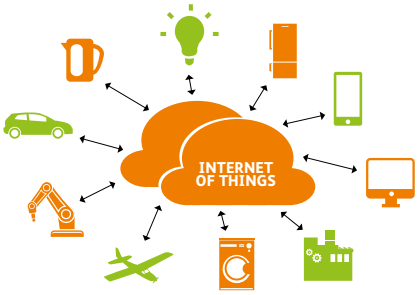
### New Financial models – leasing

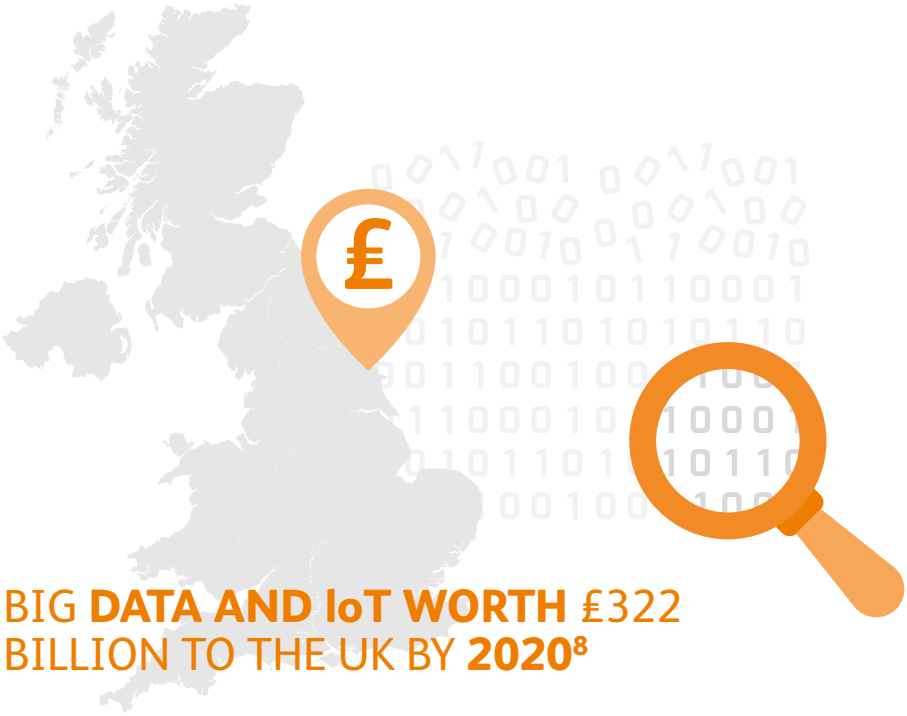
Purchasing mechanical equipment represents an important investment in terms of future productivity, but may not always be viable. For instance small firms may be cut out from this kind of investment if they are not able to find financing alternatives. This has led to some big companies in the mechanical equipment market starting to use their size, and financial clout, to offer finance plans in order to increase their sales and revenues, and to provide an additional service to clients. This is clearly an opportunity for mechanical equipment firms, however this is not risk free. Financing clients means that companies have to develop new financial expertise and know-how, as well as the ability to manage cash flow over an extended period of time. They will also be bearing the direct risk of clients' delinquency.

[7] Markets and Markets (2017)

# LONG RUN TRENDS

While the mechanical equipment sector is often described as an "old" industry, due to many of its products and processes being first invented over a century ago, this overlooks the fact that the sector has continuously evolved and moved with the times. Modern machinery successfully combines old principals with new technologies in fully integrated systems. The coming decades should see a continuation of these trends, as Industry 4.0, the IoT and Big Data continue to grow in importance. Away from digitalisation, the growing importance of renewable energy represents a further long run trend which will need to be harnessed by manufacturers in the sector.




BIG **DATA AND IoT WORTH** £322 BILLION TO THE UK BY **2020**[8]

## Intelligent manufacturing

At the centre of industrial digitalisation, and the move to smart factories, is the Internet of Things (IoT) and Big Data analysis. The IoT, and the associated move to cloud computing and smart sensors are revolutionising factory floors, providing real-time data and deliverable actions to mechanical equipment manufacturers. For instance, smart sensors embedded in machines can convert data into different units of measurement, track and analyse production quotas, monitor energy use, communicate with other machines, record statistics, and shut off devices if a safety or performance issue arises. These all help to improve efficiency and speed of production, as well as reduce waste. Furthermore Big Data analysis, can provide manufacturers with actionable metrics, allowing them to improve operations and reduce costs, for instance by identifying bottlenecks in production. The implementation of such technologies will therefore be crucial to improving the productivity of mechanical equipment manufacturers, which has lagged behind other sectors such as aerospace and chemicals.

## Automation/4IR technologies

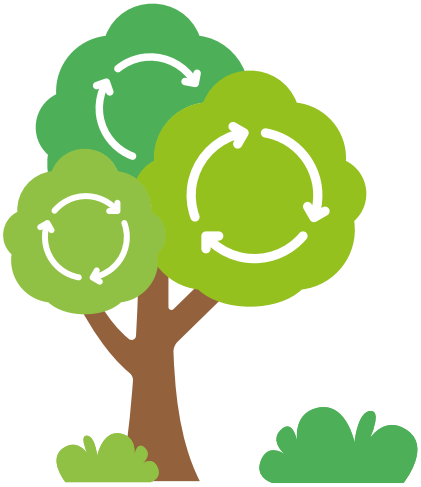
Automation is another aspect of the digital age that is transforming the sector. Industrial machines have traditionally been used to perform tedious and repetitive tasks, for example on assembly lines on factory floors. However with the development of technology, machines are becoming increasingly capable of mimicking human traits such as dexterity and memory, leading to higher value and higher skilled work. One of the greatest benefits of automation in the mechanical equipment sector however, is its ability to provide safer working environments for humans by switching places with them in dangerous or unsuitable situations. For instance, autonomous

[8] The Value of Big Data and the Internet of Things to the UK Economy - SAS and the Centre for Economics and Business Research (2016)

dump trucks used at mining and construction sites can be remotely controlled by operators, eliminating the need for human drivers.

## Renewable energy equipment to grow in importance

The growing move to a low carbon economy, on the back of environmentally conscious governments and populations could result in demand for specialised oil extraction equipment falling over the next 20 years. Indeed government schemes including the Clean Growth Strategy, and carbon budgets which have the ultimate aim of reducing greenhouse gas emissions by 80% by 2050, will see renewable energy technologies grow in importance. Mechanical equipment manufacturers, and specifically specialised oil extraction equipment manufacturers will therefore need to adapt and put greater emphasis on producing equipment needed for the production and distribution of renewable energy equipment – for example hydro-electrical turbines, fuel cells and biomass systems.



## ABOUT OUR SECTOR BULLETINS

Our sector bulletins give an insight into individual manufacturing sub-sectors. They offer commentary and data on how the sector breaks down, its geographic spread across the UK, as well as their outlook with regards to the UK and global economy. They provide an easy to read, and informative document, which should help to build understanding of specific sectors and how they connect to the rest of the economy.

Please note that all data cited in the report is correct as of February 2018.

If there is anything else you would like to see in our next bulletin, please email your suggestions and comments to mjenkins@eef.org.uk.

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