

**2017**  
*Casting Industry*  
**CENSUS**



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# Preface

The publication of this **Census of the UK Foundry and Casting Industry** comes at a significant time of change for manufacturing in the UK. The negotiations, regarding the UK's exit from the EU, are continuing and the UK government is seeking to develop a more balanced economy with a greater focus on manufacturing and engineering.

The castings industry supplies all manufacturing and engineering sectors that are vital for a modern technologically advanced society, so has a vital role to play. The automotive, aerospace construction, defence and energy all rely upon castings and there are significant opportunities to increase the number and, more importantly, the value of the cast components produced in the UK through continued investment, increased productivity gains and reshoring.

In addition, the sector plays an important role in the circular economy taking scrap metal from a range of sources, and re-melting and processing it to make new engineered components. With resource efficiency and the management of waste having increased significance, an understanding of the state of the UK casting industry, with the opportunities and challenges that it faces has never been more important.

There are two striking findings from the census data. The first is very positive, with recent growth of 11% in sales revenue, as well as a continuing rise in productivity and high levels of capacity utilisation. Improvements in efficiency and value-added services have taken place, with more than half the firms reporting investments in capital equipment within the past two years, which is to be welcomed.

The second finding is not so positive, but is also not a surprise. 47% of firms in the sector report that recruitment and technical skills is one of their key challenges. This is mirrored by the recent report from *Engineering UK 2018 - the State of Engineering*<sup>(1)</sup> which reports an annual shortfall of between 37 and 59 thousand engineering graduates and technicians.

We know that the lack of investment in training, succession planning and knowledge capture is now starting to be a major obstacle to development of the sector at a time when the demands on the industry, for higher quality components, is growing. The automotive industry as an example, one of the major users of castings, is undergoing significant change through light weighting and the move towards hybrid and electrically powered vehicles.

Castings will be needed for these vehicles, but the industry will need to adapt to be able to help design and supply the new parts. Opportunities offered by additive manufacturing also require firms to be able to innovate and adapt. These new challenges require firms to have employees who are technically knowledgeable, with a good understanding of the opportunities and limitations of casting as a route to manufacture and who are adept at problem solving and innovating.

I would like to commend the Enterprise Research Centre, University of Warwick Business School, for their work in preparing this comprehensive, yet succinct report. I would also like to thank all the foundries who took time to supply information and data for this census which now provides invaluable and up to date information about the size and relevance of the castings industry. It is some time since a full census of the industry has been conducted and the information here will enable an informed strategic plan to be developed for the industry in the UK.

**Dr Pam Murrell, FICME**

Chief Executive, Cast Metals Federation.

<sup>(1)</sup> *The Engineering UK 2018: The State of Engineering* report can be downloaded at [www.engineeringuk.com/research](http://www.engineeringuk.com/research)

# Executive Summary

- The Casting Industry Census of 2017 suggests that UK foundries employ 16,900 people and generate sales revenue of at least £1.89bn. For many firms, sales revenue grew rapidly between 2015 and 2016 with sales growing an average of 11 per cent. Productivity in the cast metals sector has risen sharply and almost continuously since 2002. The Census collected data covering 159 foundries during late 2017.
- Trends in output volumes and employment in the cast metals sector have closely followed those in related sectors such as Forging and Pressing over the last decade. Office of National Statistics figures based on SIC codes suggest there are now around 480 foundries in the UK.
- Around 70 per cent of employment in the sector is concentrated in firms with more than 50 employees, and these larger firms account disproportionately in terms of apprenticeships. Of the 480 apprentices in the sector in 2016, 77 per cent were in larger firms. 80 per cent of planned apprentice recruitment in 2017/18 is also in larger firms. Smaller foundries with less than 10 employees were planning to recruit no new apprentices during 2017/18.
- The 2017 Census suggests firms in the industry export nearly 16 per cent of their output, a figure which rises to 41 per cent for those foundries with more than 50 employees. Around the same proportion of foundries – 17.8 per cent – also import castings from abroad. Brexit was seen as an important obstacle to future growth by around 1:6 foundries. Nearly three times as many firms cited obtaining and retaining skills as a key issue.
- Many foundries were taking significant steps to improve efficiency and value added. 53 per cent of firms made new capital investments in the last year, with 21 per cent conducting an energy audit. Around a quarter of foundries had applied for R&D tax credits, a figure which rose to 68 per cent among foundries with 50 or more employees. Current capacity utilisation is high, averaging around 82 per cent.
- Internal metal scrap averaged 5.0 per cent of production tonnage while customer returns were at 1.1 per cent. In sand foundries, sand reclamation averaged 48 per cent although this was higher among larger foundries.
- Key challenges for the sector are staff recruitment and skills, reported by 47 per cent of firms, regulations/red tape reported by 28 per cent of firms and issues around taxation, VAT etc. reported by 21 per cent of firms. Finance, premises and pensions were issues for fewer than 1: 10 firms.
- Future sentiment is strong with more than half of all foundries expecting a positive outlook over the next two years. Strong positive sentiments are particularly evident among larger firms. Around a quarter of firms sense 'challenging times ahead', however.

# Section 1

## Introducing the 2017 Casting Industry Census

Foundries play a critical role in a wide range of manufacturing supply chains, with successful businesses in all parts of the UK. The sector is diverse, ranging from small art and traditional foundries to large-scale, highly mechanised component casting in all alloys. In this report, we provide a detailed overview of the UK foundry sector based on a survey of firms conducted in quarter 4 of 2017.

The capacity and number of Foundries in the UK fell sharply during the recession, but the sector has stabilised over more recent years, halting previous declines in output volumes and employment. As of 2017, our analysis suggests the sector employs 16,900 people, generating sales revenue of £1.89bn. Productivity in the cast metals sector has risen sharply and almost continuously since 2002.

The 2017 Census suggests firms in the industry export nearly 16 per cent of their output, a figure which rises to 41 per cent for those foundries with more than 50 employees. Around the same proportion of foundries – 17.8 per cent – also import castings from abroad. Current capacity utilisation is high, averaging around 82 per cent, and more than half of firms see a positive future for their business. This positive outlook is strongest among larger firms.

Obtaining and retaining skills is a key issue for the sector, particularly for larger foundries. Regulatory issues are also seen as important. Other issues – most notably the intensity of competition and late payment – are seen as less important than in other sectors.

The remainder of this report provides an overview of the development of the sector in recent years and a detailed profile of the cast metals sector at the end of 2017:

- Section 2 looks back at trends over the last decade comparing the development of the cast metals sector to manufacturing as a whole and other related sectors.
- Section 3 reports on the Census in detail covering the scale and focus of the industry as well as issues such as apprenticeships and energy audits.
- Section 4 concludes with a summary of the key challenges facing the sector at present, compares this to other sectors and looks to the future.

Details of the Census itself and the technical aspects of the survey are included in Appendices.

# Section 2 Looking Back

## Capacity, sales and employment in Foundries and related sectors over the last decade

### 2.1 Introduction

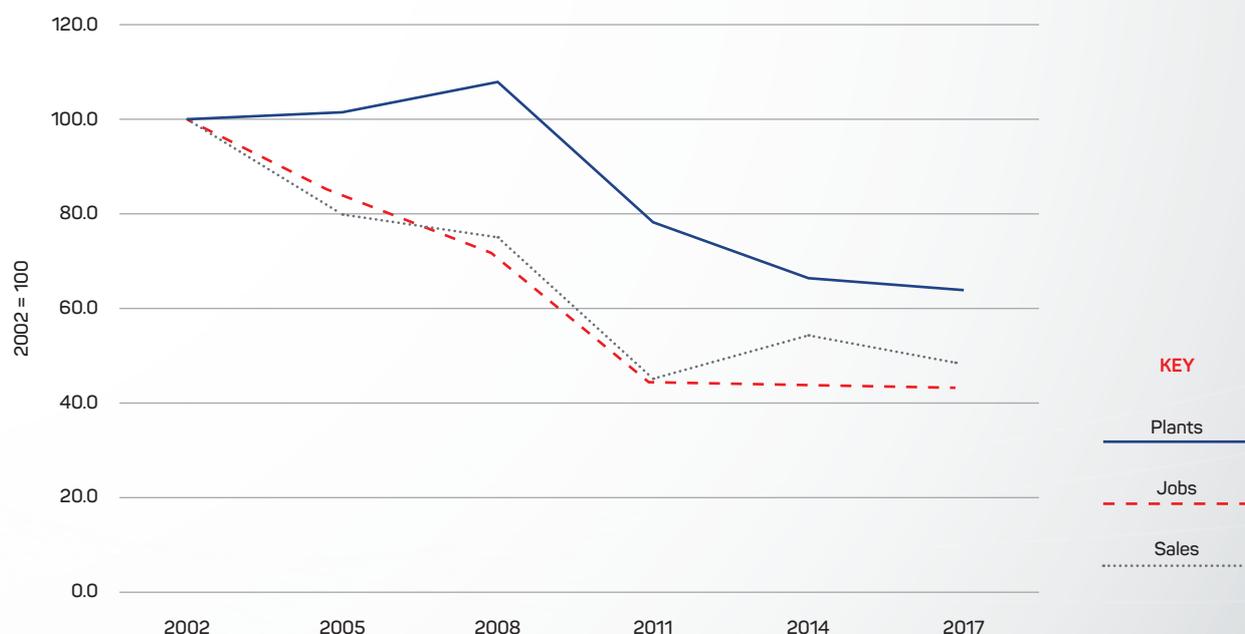
In this section we provide a brief overview of the performance of the UK foundry sector over the last two decades. The impact of the recession on capacity within the sector is clear. Since 2011, the sector has experienced more stability with little change in output volumes and employment. Over the longer term the number of foundries in the UK has fallen by around a third since 2002, with employment and output now around half their 2002 level.

Details of the data used in the analysis are provided in Appendix 1.

### 2.2 Sectoral Trends Since 2002

Figure 2.1 provides an overview of the number of plants, jobs and sales volume in UK foundries since 2002. Over 2002-17 the number of foundries in the UK fell by around a third with the latest official statistics from the Office of National Statistics based on SIC codes suggesting 480 foundries are operating across the UK (see Annex 1). Employee numbers and sales volumes in the sector fell more rapidly than the number of Foundries, with both now around half of their 2002 level. Some significant closures during 2007, specifically of two or three large foundries producing high tonnages of lower value parts (due to these being outsourced to lower cost economies) were a contributing factor here. However, the sector has stabilised over more recent years, focussing on near to market, higher value added components and greater degrees of automation, halting previous declines in output volumes and employment.

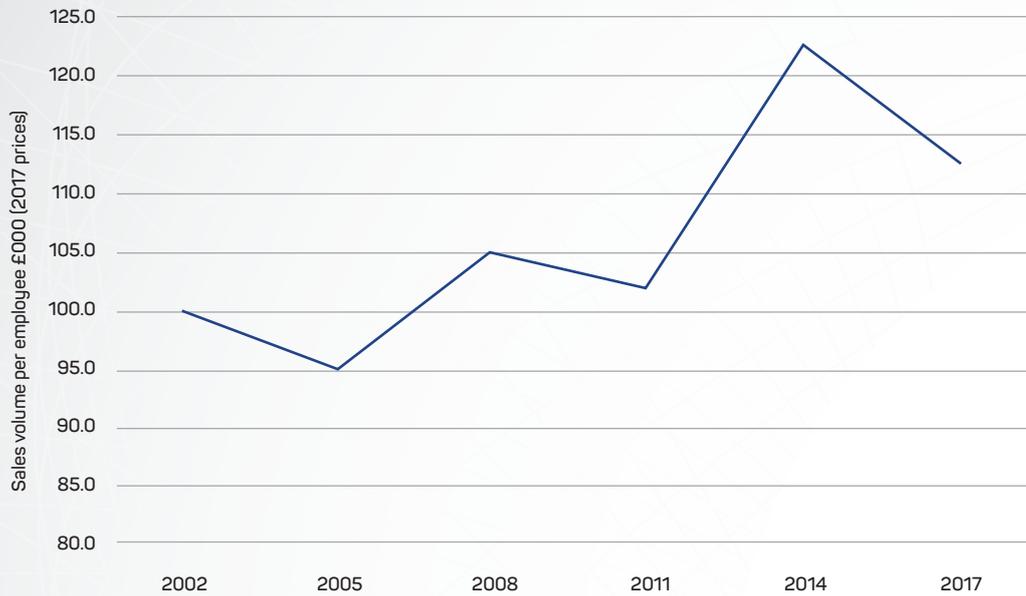
**Figure 2.1 Trends in UK Foundries: Plants, Jobs and Sales (2002 = 100)**



Source: Authors' analysis of Business Structures Database. Output is deflated (see text)

Over the post-recession period since 2011 sales volumes and employment in the foundries sector have been more stable and the decline in the number of foundries has slowed considerably. Sales volume per employee – an indicator of productivity – in the sector has improved consistently over the post 2002 period (Figure 2.2), a trend which may reflect both efficiency improvements and the closure of less efficient foundries.

**Figure 2.2: Sales Volume Per Employee: £000 pa**

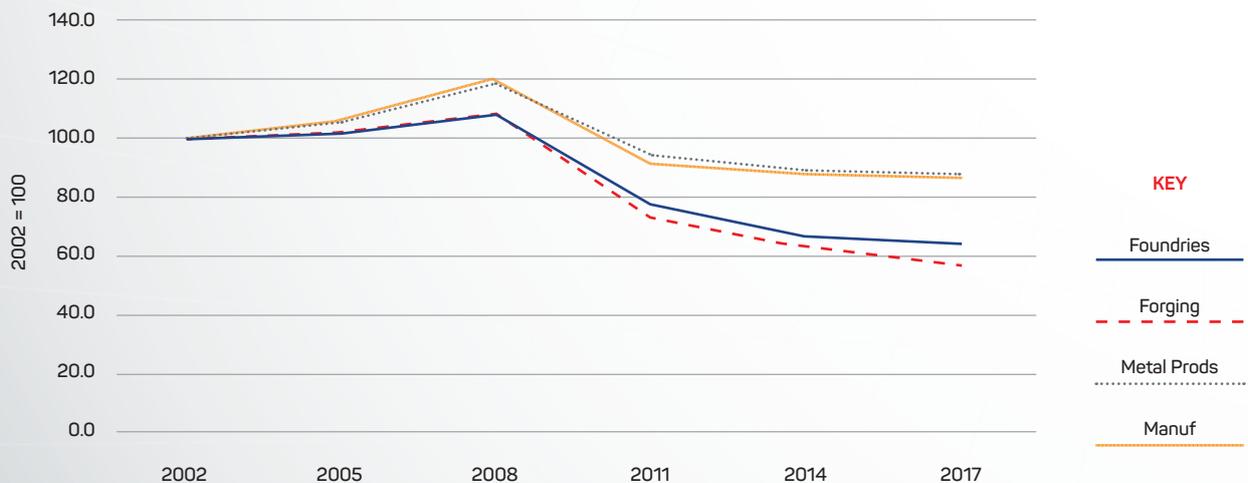


Source: Authors' analysis of Business Structures Database. Output is deflated (see text)

## 2.3 Benchmarking Performance

The pre-recession period (2002-08) witnessed a rise in the number of manufacturing plants and foundries operating in the UK. Recession effects were substantial, however, with the number of foundries and plants involved in forging and pressing falling more quickly than the broader sectors and continuing to fall slowly through the 2011-17 period (Figure 2.3). The decline in capacity in forging and pressing was marginally greater than that in the foundry sector.

**Figure 2.3: Trends in Plant Numbers: Foundries and Other Sectors**



Source: Authors' analysis of Business Structures Database. Output is deflated (see text)

# Section 3

## UK Cast Metals Industry Survey

In this section we provide a profile of the cast metals sector as of late 2017. Data is derived from the Census conducted by the Cast Metals Federation. Appendix 1 provides details of the survey conducted.

### 3.1 Employment

The weighted survey responses indicate that there were 16,873 employees in the cast metals sector at the end of 2016 (or latest full year). Table 3.1 shows that a large proportion of these employees – some 70.75 per cent – were employed in larger firms i.e. those with 50 or more employees. Over 80 per cent of this larger firm employment belonged to firms with 100 or more employees, representing some 58 per cent of the sector’s total employment. In terms of firms with fewer than 50 employees, more than half of the sector’s remaining employees – 15.56 per cent – were employed in slightly smaller firms (20 to 49 employees) with the remaining 13.69 per cent of employees being found in the smallest firms – approximately 8 per cent in micro firms (0 to 9 employees) and 5.68 per cent in firms with 10 to 19 employees.

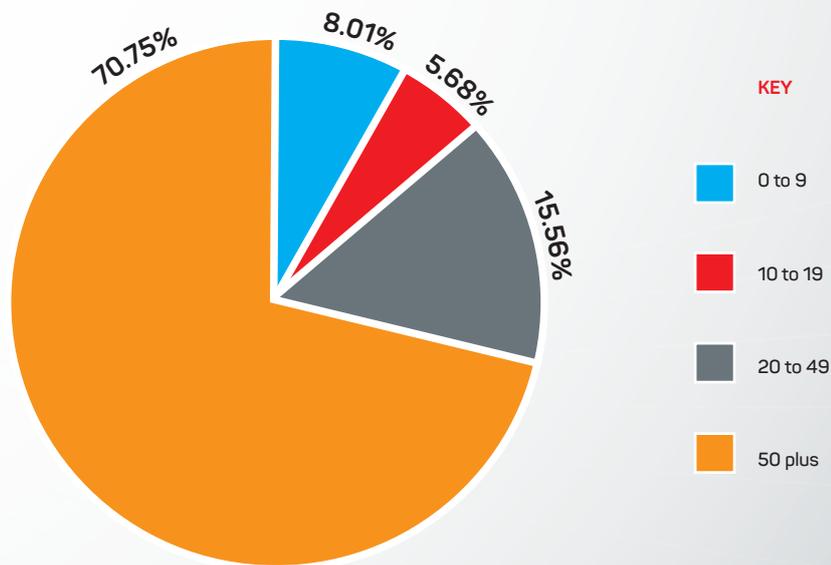
**Table 3.1: Employment**

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Number of employees at end of 2016 (or latest full year)	1351	957	2625	11938	16873
% of total employees in industry	8.01	5.68	15.56	70.75	100.00

Source: Company survey data, observations are weighted

**Figure 3.1**

Percentage of total employees in industry by company size



## 3.2 Employment Composition

Approximately 78 per cent of employees within the cast metal sector at the end of 2016 (or latest full year) were shop floor or foundry workers. Table 3.2 shows the proportion to be consistent across all sizebands, although in micro firms the value was slightly larger (79.61 per cent). The proportion of office, sales or technical employees within the sector was approximately 22 per cent. Again, the proportion is consistent across all sizebands although slightly smaller for micro firms (20.39 per cent).

Firms with 10 to 19 employees employed around 5 per cent of the sector's shop floor or foundry employees and office, sales or technical employees. Micro firms employed a higher proportion with 8.03 per cent and 7.27 per cent of the sector's shop floor or foundry employees and office, sales or technical employees respectively. Larger firms with 50 or more employees contributed most to the sector's shop floor or foundry employment and office, sales or technical employment with values equal to 71.41 per cent and 71.59 per cent respectively.

**Table 3.2: Employment Composition**

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Shop floor/Foundry employees at end of 2016 (or latest full year)					
% of total employees	79.61	77.32	77.54	77.92	77.96
% of total shop floor/foundry employees in industry	8.03	5.51	15.05	71.41	100.00
Office/Sales/Technical employees at end of 2016 (or latest full year)					
% of total employees	20.39	22.68	22.46	22.08	22.04
% of total office/sales/technical employees in industry	7.27	5.72	15.42	71.59	100.00

*Source: Company survey data, observations are weighted*

## 3.3 Apprentices in Employment

Table 3.3 shows that there were 484 apprentices in employment in the cast metals industry at the end of 2016 (or latest financial year) representing 2.87 per cent of the sector's employment. The majority of these apprentices, approximately 77 per cent, were employed in larger firms with 50 or more employees in contrast to just over 1 per cent of apprentices being employed in firms with 10 to 19 employees. Around 15 per cent of all apprentices were employed in micro firms (0 to 9 employees). These apprentices represented 5.5 per cent of micro firms' employment, the largest proportion of employment across sizebands. 3.11 per cent of employees in firms with 50 or more employees are apprentices compared to 1.22 per cent and 0.65 per cent for firms with 20 to 49 employees and firms with 10 to 19 employees respectively. Of the larger firms with 50 or more employees, firms with 100 or more employees employed some 66 per cent of the total apprentices within the sector – representing 3.29 per cent of the total employment in firms with 100 or more employees.

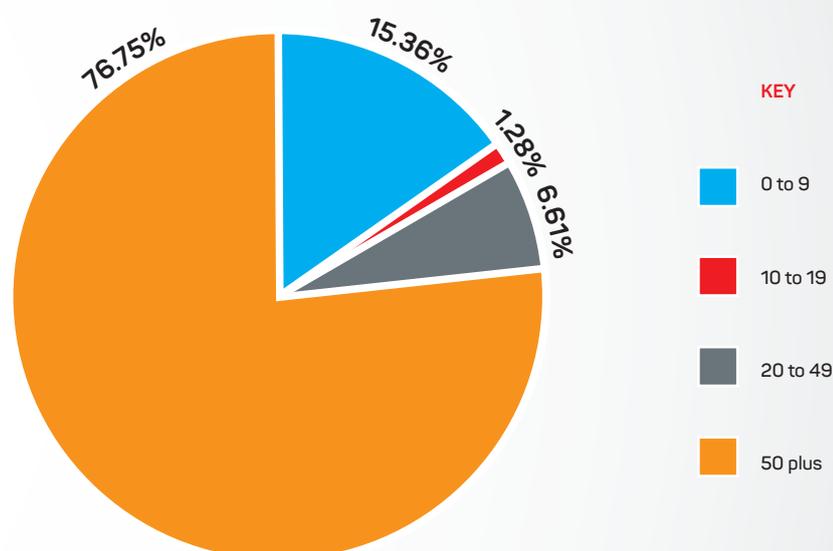
**Table 3.3: Apprentices in Employment**

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Number of apprentices in employment at end of 2016 (or latest financial year)	74	6	32	371	484
% of total employees in sizeband	5.50	0.65	1.22	3.11	2.87
% of total apprentices in industry	15.36	1.28	6.61	76.75	100.00

Source: Company survey data, observations are weighted

**Figure 3.3**

Percentage of total apprentices in industry by company size



### 3.4 Apprentices Hired in 2016

Table 3.4 shows that 176 apprentices were hired in the cast metals sector during 2016. This represents over a third of all apprentices in employment within the sector at the end of 2016 (Table 3.3). The majority of apprentices were hired in micro and larger firms i.e. those with 0 to 9 and 50 or more employees. Larger firms hired 118 apprentices, 67 per cent of the total hired during 2016 within the sector. Of the 118 apprentices hired in larger firms, 105 were hired in firms with 100 or more employees (1.07 per cent of the total employment in firms with 100 or more employees). Micro firms hired 37 apprentices, 21 per cent of the total hired within the sector, and this represented 2.75 per cent of employment within the micro-firm sizeband, the largest share of employment across sizebands. The remaining 12 per cent of apprentices hired during 2016 were hired in firms with 10 to 49 employees.

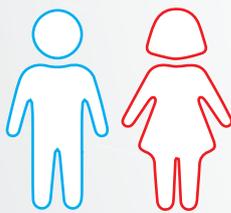
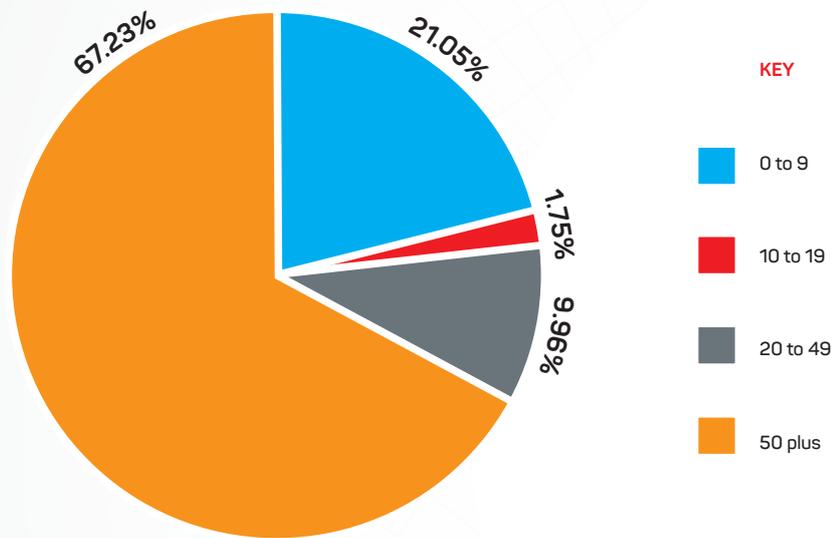
Table 3.4: Apprentices Hired in 2016

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Apprentices hired in 2016	37	3	17	118	176
% of total employees in sizeband	2.75	0.32	0.67	1.00	1.05
% of total industry apprentices hired during 2016	21.05	1.75	9.96	67.23	100.00

Source: Company survey data, observations are weighted

Figure 3.4

Percentage of total industry apprentices hired during 2016 by company size

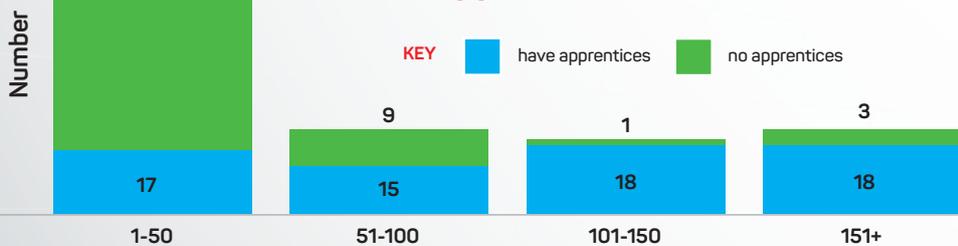


Total employment  
Tech, admin, office staff: 22%  
Shop floor: **78%**

Same in 2012

>> 20.8% in manufacturing in Auto

Companies with or without apprentices



**45%**  
Companies have apprenticeship scheme

Sources: Cranfield University MSc Group Project Report – MAN 14, 2018;

SMMT: Motor industry facts 2017; Peter N C Cooke - UK Cast Metals Industry Census and Expectations, 2013

### 3.5 Apprentices Planned for 2017

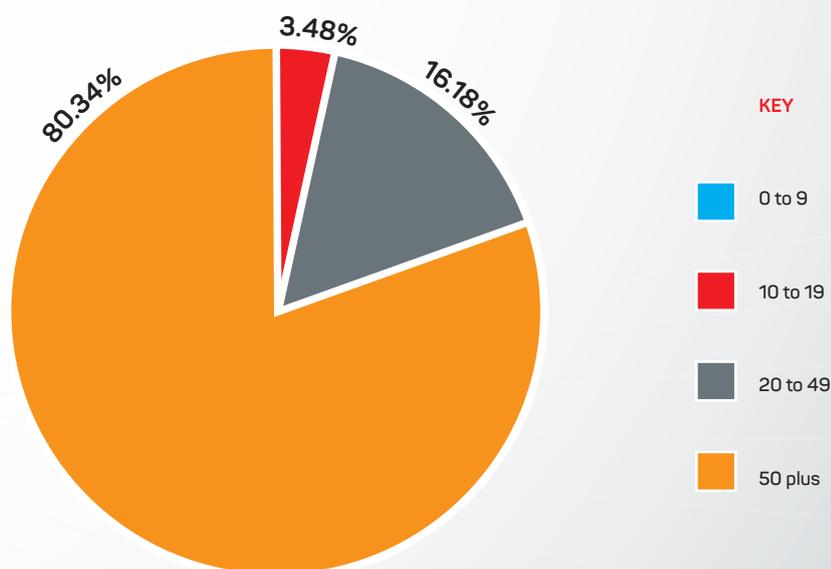
Firms in the cast metals sector plan to hire 178 apprentices in 2017. The majority of these planned apprentices (143) will be in larger firms (50 or more employees). Large firms with 100 or more employees plan to hire 129 of these – 70 per cent of the sector’s planned apprentices during 2017. These planned apprentices represent 1.31 per cent of total employment in firms with 100 or more employees. Table 3.5 shows that micro firms (0 to 9 employees) do not plan to hire any apprentices in 2017. This behaviour differs from that in 2016 where micro firms hired the second largest number of apprentices after firms with 50 or more employees (Table 3.4). Micro firms also had the second largest number of apprentices in employment at the end of 2016 (or latest financial year) (Table 3.3). Firms with more than 10 employees plan to hire more apprentices in 2017 than they hired in 2016. Plans for 2017 indicate that the distribution of apprentices may shift towards larger firms with those employing 20 or more employees hiring 96 per cent of apprentices planned for 2017.

**Table 3.5: Apprentices Planned for 2017**

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
New apprentices planned for 2017	0	6	29	143	178
% of total employees in sizeband	0	0.65	1.10	1.20	1.05
% of total apprentices planned for 2017 in industry	0	3.48	16.18	80.34	100.00

Source: Company survey data, observations are weighted

**Figure 3.5**  
Percentage of total apprentices planned for 2017 in industry by company size



### 3.6 Turnover in 2016

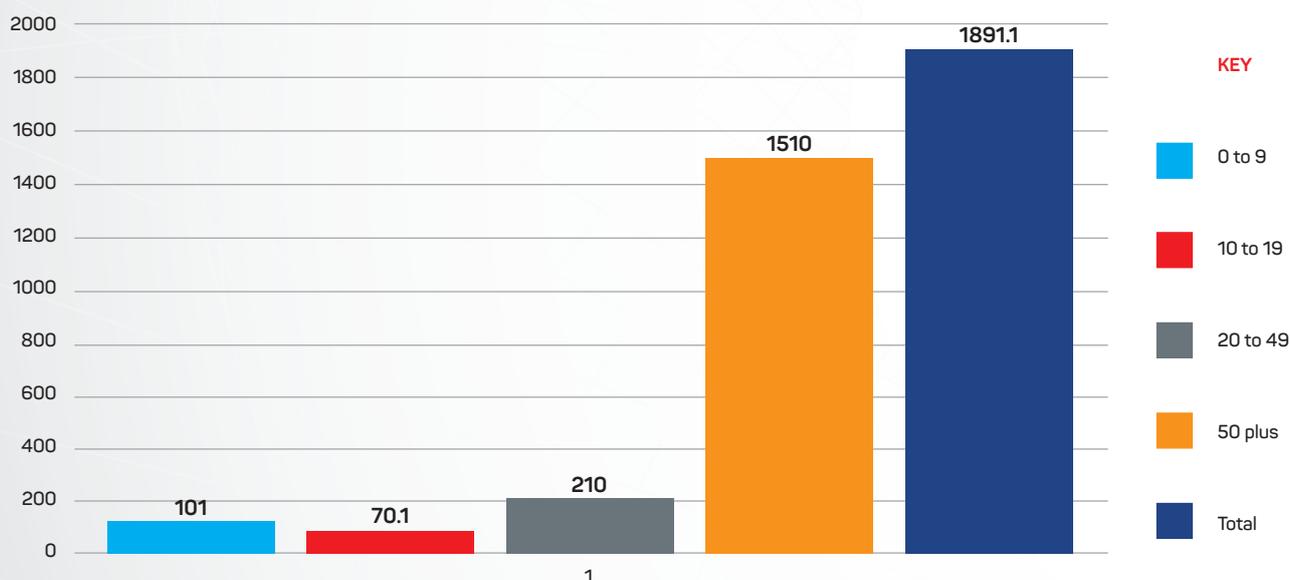
Total turnover in the cast metals sector in 2016 was £1.891 billion (Table 3.6). Turnover for firms with 50 or more employees was £1.51 billion, almost 80 per cent of the sector's total turnover. Micro firms' turnover was 5.34 per cent of total industry turnover (£101 million), greater than that of firms with 10 to 19 employees (£70.1 million) but smaller than that of firms with 20 to 49 employees (£210 million).

**Table 3.6: Turnover in 2016**

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Total turnover in 2016 (£m)	101.00	70.10	210.00	1510.00	1891.10
% of total industry turnover (2016)	5.34	3.71	11.10	79.85	100.00

Source: Company survey data, observations are weighted

**Figure 3.6 Total turnover by company size in 2016 (£m)**



### 3.7 Average Turnover Growth – 2015 to 2016

Average turnover growth in the cast metals sector between 2015 and 2016 was 11.21 per cent (Table 3.7). The smallest and largest firms within the industry experienced the highest average turnover growth. Firms with 50 or more employees experienced 18.61 per cent growth, the highest across the different sizebands, and micro firms with 0 to 9 employees experienced 15.86 per cent growth, higher than that for firms with 10 to 19 employees (5.61 per cent) and firms with 20 to 49 employees (0.73 per cent).

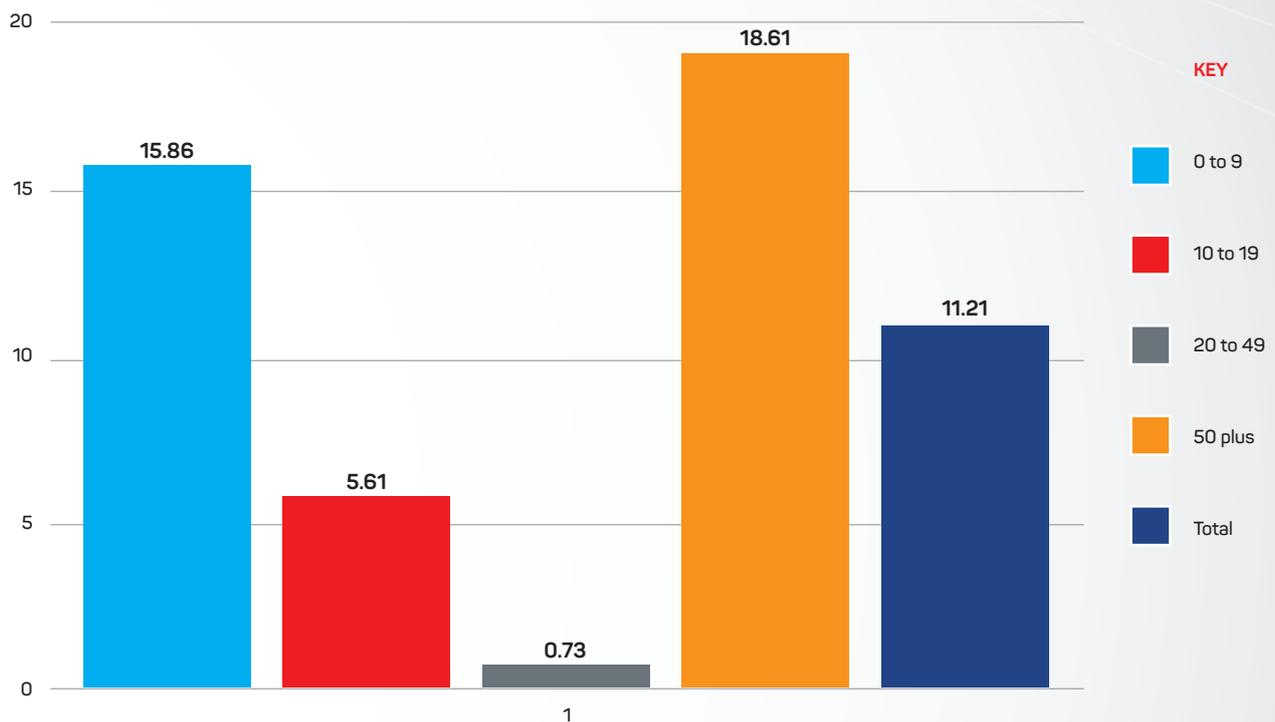
Of the larger firms, with 100 or more employees experienced an average turnover growth of 2.22 per cent – much smaller than that of firms with 50 or more employees (18.61 per cent).

**Table 3.7: Average Turnover Growth - 2015 to 2016**

	Firm size (employees)				
	0 to 9	10 to 19	20 to 49	50 plus	Total
Average turnover growth (%) 2015 to 2016	15.86	5.61	0.73	18.61	11.21

Source: Company survey data, observations are weighted

**Figure 3.7: Average turnover growth (%) 2015 to 2016 by company size**



### 3.8 Casting Processes (Percentage of Firms Using)

Table 3.8 details the casting processes available to firms in the cast metals sector, noting that some companies use more than one casting process.

Within the industry, chemically bonded sand is the most common process with 61.45 per cent of firms having this process. Chemically bonded sand is the most popular process for all sizebands, although the proportion of micro (0 to 9 employees) and larger firms (50 or more employees) having the process is less than that of firms with 10 to 49 employees.

43.33 per cent of firms within the sector have a greensand process available to them. The greensand process can be used for jobbing work but also can be used for very high volume production where high levels of automation and mechanisation are employed requiring high capital investment. The greensand process is most popular among micro firms (0 to 9 employees). As firm size increases, availability of the greensand process declines. Over half of all micro firms (0 to 9 employees) have the greensand process compared with around a quarter of firms with 50 or more employees.

Sand lends itself to internal re-use, so reclamation and re-use of sand in firms using both chemically bonded and greensand casting is common in the sector, see section 3.15.

The gravity die process is the third most popular within the industry (16.04 per cent of firms), but it is far less popular in micro firms (0 to 9 employees) than with firms in the other sizebands.

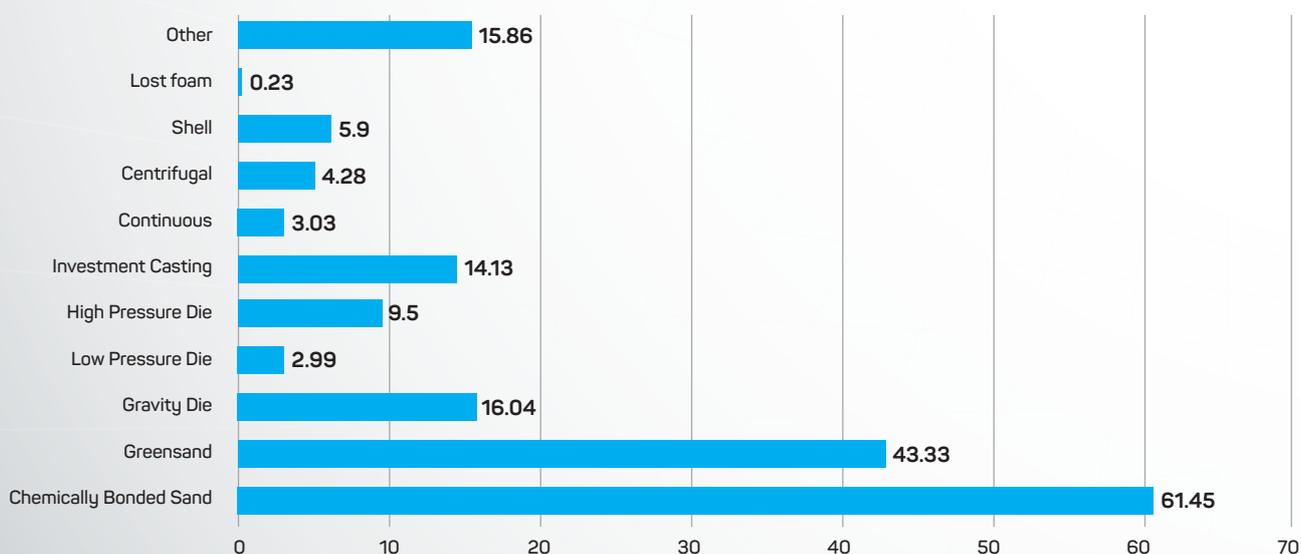
Around 3 per cent of the sector has a low pressure die process. All of these firms have 10 or more employees as no micro firms have this process available.

**Table 3.8: Percentage of Firms Using Each Casting Process**

Process	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Chemically bonded sand (% of firms)	57.14	72.73	68.00	59.09	61.45
Greensand (% of firms)	52.38	45.45	28.00	25.76	43.33
Gravity die (% of firms)	4.76	31.82	36.00	19.70	16.04
Low pressure die (% of firms)	0.00	9.09	2.00	9.09	2.99
High pressure die (% of firms)	4.76	9.09	16.00	19.70	9.50
Investment casting (% of firms)	14.29	4.55	14.00	22.73	14.13
Continuous (% of firms)	4.76	0.00	0.00	3.03	3.03
Centrifugal (% of firms)	4.76	0.00	2.00	9.09	4.28
Shell (% of firms)	4.76	4.55	12.00	4.55	5.90
Lost foam (% of firms)	0.00	0.00	0.00	1.52	0.23
Other (% of firms)	23.81	9.09	6.00	4.55	15.86

Source: Company survey data, observations are weighted

**Figure 3.8: Total percentage of firms using each casting process**



The high pressure die process, which is very capital intensive and highly automated, becomes more common as firm size increases. Only 4.76 per cent of micro firms (0 to 9 employees) have the process whereas 19.7 per cent of larger firms (50 or more employees) have the process.

Investment casting is most common in larger firms (50 or more employees) as is the centrifugal process. 1.52 per cent of these firms also have a lost foam process which firms in all other sizebands do not have. This lost foam process represents the least common process in the cast metals sector.

Micro firms (0 to 9 employees) and larger firms (50 or more employees) have a continuous process whereas firms with 10 to 49 employees do not.

23.81 per cent of micro firms (0 to 9 employees) have other processes available. As firm size increases, the proportion of firms having other processes falls (4.55 per cent of larger firms have other processes).

### 3.9 Production Value of Casting Processes

The total production value of all casting processes in the cast metals industry in 2016 (or latest full year) was approximately £1.83 billion (Table 3.9) Around 81 per cent of this value came from four casting processes: chemically bonded sand, greensand, high pressure die and investment casting (figure 3.9a). Chemically bonded sand contributed most to total production value across all sizebands with the proportion ranging from a maximum of 46.9 per cent of total production value for firms with 10 to 19 employees to a minimum of 30.45 per cent of total production value for micro firms (0 to 9 employees). Greensand contributed around one fifth of total production value for all sizebands apart from firms with 20 to 49 employees where the contribution was much less (5.83 per cent of total production value).

**Figure 3.9a Percentage of total value by casting process 2016**

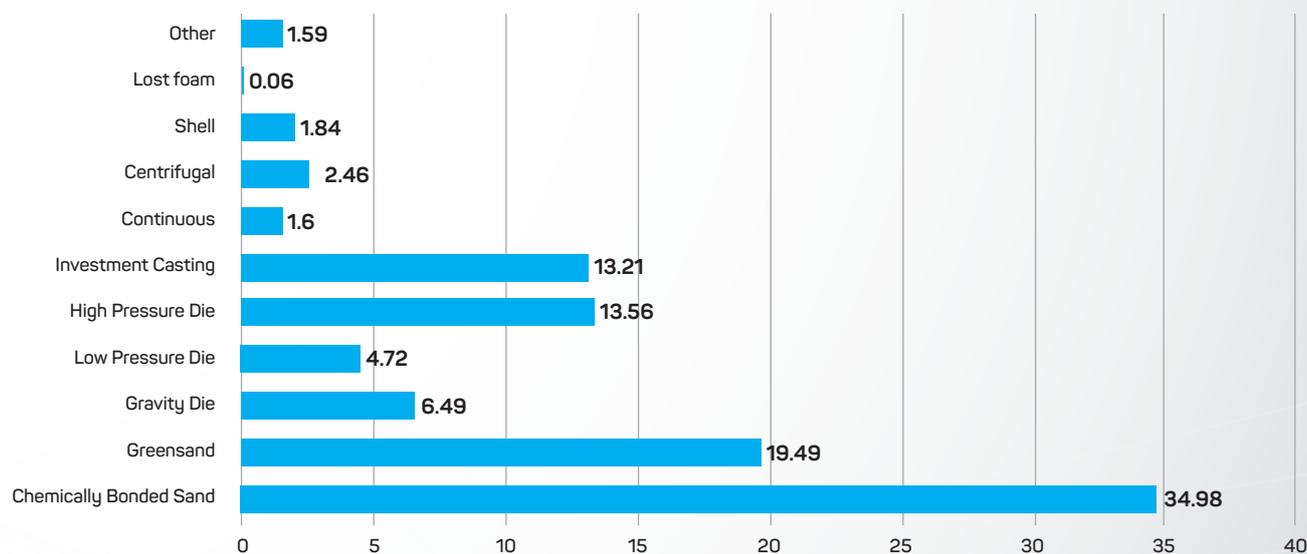


Table 3.9: Production Value by Casting Processes 2016, £m

	0 to 9	10 to 19	20 to 49	50 plus	Total
Chemically bonded sand (£m)	33.34	32.19	84.87	489.60	640.00
% of total value	30.45	46.90	41.53	33.83	34.98
Greensand (£m)	20.08	14.94	11.92	309.60	356.54
% of total value	18.34	21.76	5.83	21.40	19.49
Gravity die (£m)	12.21	11.20	22.57	72.84	118.81
% of total value	11.15	16.31	11.04	5.03	6.49
Low pressure die (£m)	0.00	2.78	0.00	83.52	86.30
% of total value	0.00	4.05	0.00	5.77	4.72
High pressure die (£m)	4.88	2.87	27.97	212.40	248.13
% of total value	4.46	4.18	13.69	14.68	13.56
Investment casting (£m)	6.96	1.30	36.62	196.80	241.68
% of total value	6.35	1.89	17.92	13.60	13.21
Continuous (£m)	3.26	0.00	0.00	26.04	29.30
% of total value	2.97	0.00	0.00	1.80	1.60
Centrifugal (£m)	4.07	0.00	0.00	40.92	44.99
% of total value	3.72	0.00	0.00	2.83	2.46
Shell (£m)	1.88	0.14	20.00	11.62	33.64
% of total value	1.71	0.21	9.79	0.80	1.84
Lost foam (£m)	0.00	0.00	0.00	1.01	1.01
% of total value	0.00	0.00	0.00	0.07	0.06
Other (£m)	22.84	3.23	0.40	2.70	29.17
% of total value	20.86	4.71	0.19	0.19	1.59
<b>Total value (£m)</b>	<b>109.5</b>	<b>68.64</b>	<b>204.35</b>	<b>1447.05</b>	<b>1829.55</b>
% of total value	100.00	100.00	100.00	100.00	100.00

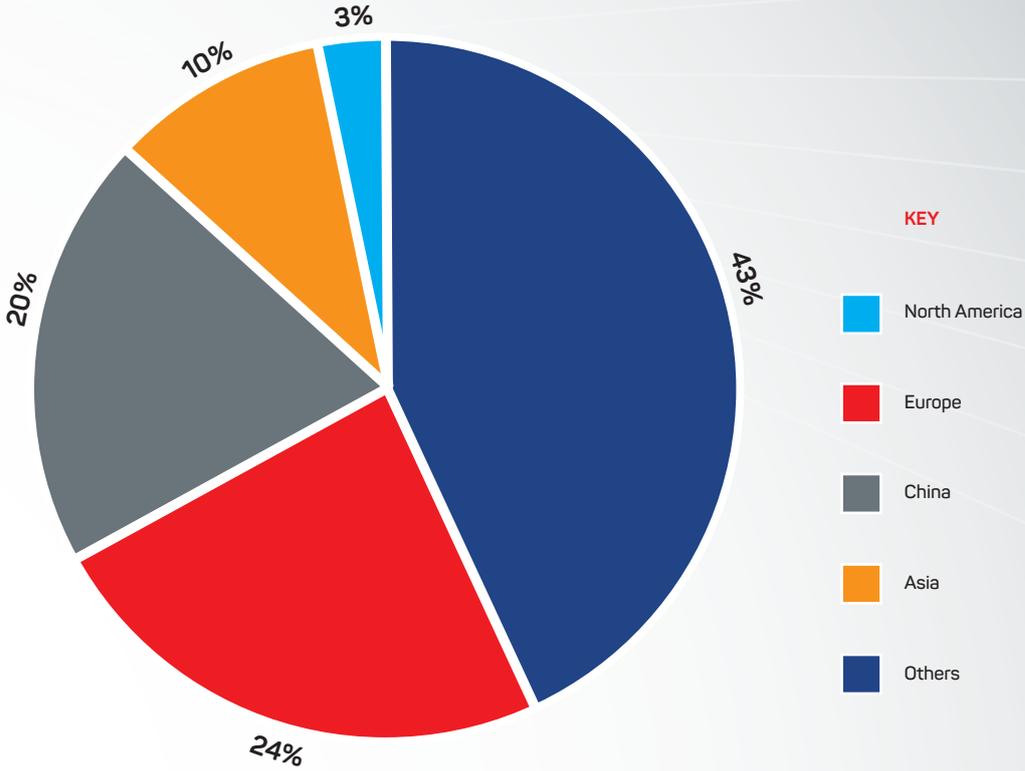
Source: Company survey data, observations are weighted

The high pressure die and investment casting processes contributed approximately 27 per cent of the total production value in the sector. The majority of this value came from larger firms i.e. those with 50 or more employees, although firms with 20 to 49 employees contributed over £64 million from these two casting processes towards the sector's total production value; over 30 per cent of the total production value for this sizeband came from these two processes.

Investment casting in particular is a high value-added process with the UK industry supplying 50% of the European market share, (figures 3.9b and c)<sup>(2)</sup>

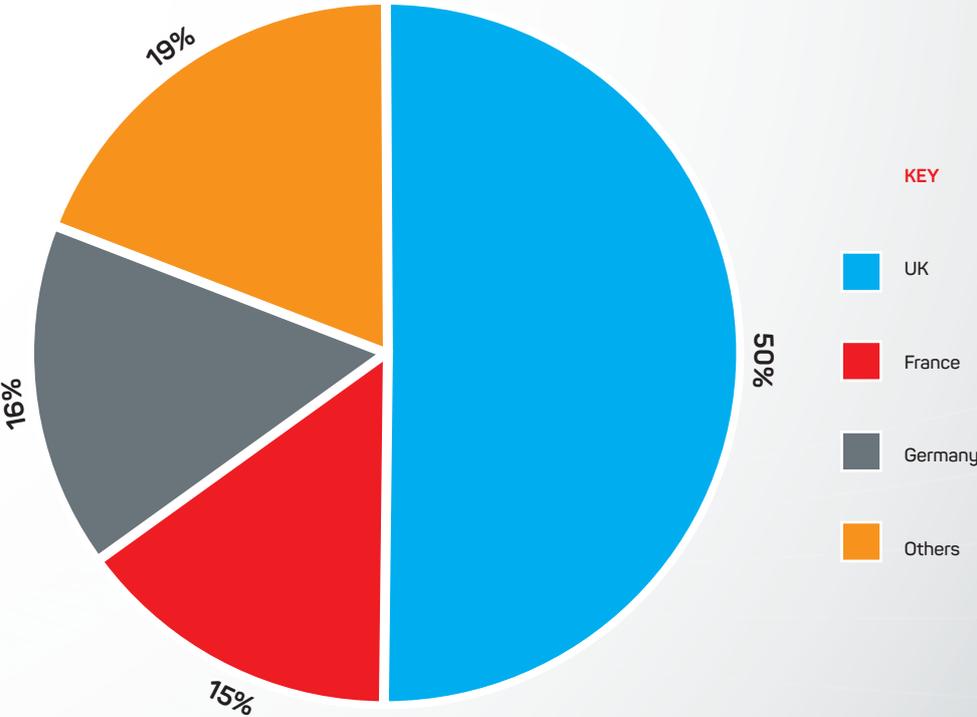
<sup>(2)</sup> *European Investment Casting Federation International Conference, Porto, Portugal, 23-25th April 2018.*

Figure 3.9b Investment Casting: percentage sales by global region 2017



Source: European Investment Casting Federation International Conference, Porto, Portugal, 23-25th April 2018

Figure 3.9c Investment Casting: european market percentage shares 2017



Source: European Investment Casting Federation International Conference, Porto, Portugal, 23-25th April 2018

Approximately one fifth of the total production value in micro firms (0 to 9 employees) came from other casting processes. The production value from other casting processes in larger firms is far less (0.19 per cent of total value for the largest two sizebands). The continuous and centrifugal casting processes contributed a small proportion towards the total production value in micro (0 to 9 employees) and larger (50 or more employees) firms. Neither production process contributed towards total production value in the other two sizebands.

### 3.10 Production Value by Metal Cast

The total production value by metal cast within the sector in 2016 (or latest full year) was £1.73 billion <sup>(3)</sup> (Table 3.10). Around 80 per cent of this value came from four categories: grey iron, ductile iron, aluminium and other metals. Aluminium contributed around 30 per cent of the total production value by metal cast within the industry, and across all sizebands, it represented a substantial proportion of the total production value by metal cast. Values ranged from 27.64 per cent in the larger firm sizeband (50 or more employees) to 39.45 per cent in the micro firm sizeband (0 to 9 employees). The trend towards light-weighting is driving the growth in the use of aluminium.

One fifth of the total production value by metal cast within the sector came from ductile iron. The proportion of production value from casting ductile iron was largest for larger firms (50 or more employees) – approximately 24 per cent of the total production value by metal cast came from ductile iron. The proportion was lower for other sizebands and represented only 5.75 per cent of production value by metal cast in micro firms (0 to 9 employees).

Grey iron was one of the main contributors to the production value by metal cast across all sizebands, although it was more important for firms with 10 to 49 employees. Values ranged from 11.36 per cent of production value in firms with 50 or more employees to 19.2 per cent of production value in firms with 10 to 19 employees.

Regarding other metals, Table 3.10 shows that the casting of zinc and copper is more important for smaller firms whereas the casting of magnesium is more important for larger firms. Low alloy steel is more important for micro firms (0 to 9 employees) representing 11.51 per cent of the sizeband's production value by metal cast. The casting of other metals is important for micro (0 to 9 employees) and larger firms (50 or more employees) representing 15.03 and 19.05 per cent of production value by metal cast respectively. The UK now has one facility that can cast titanium.

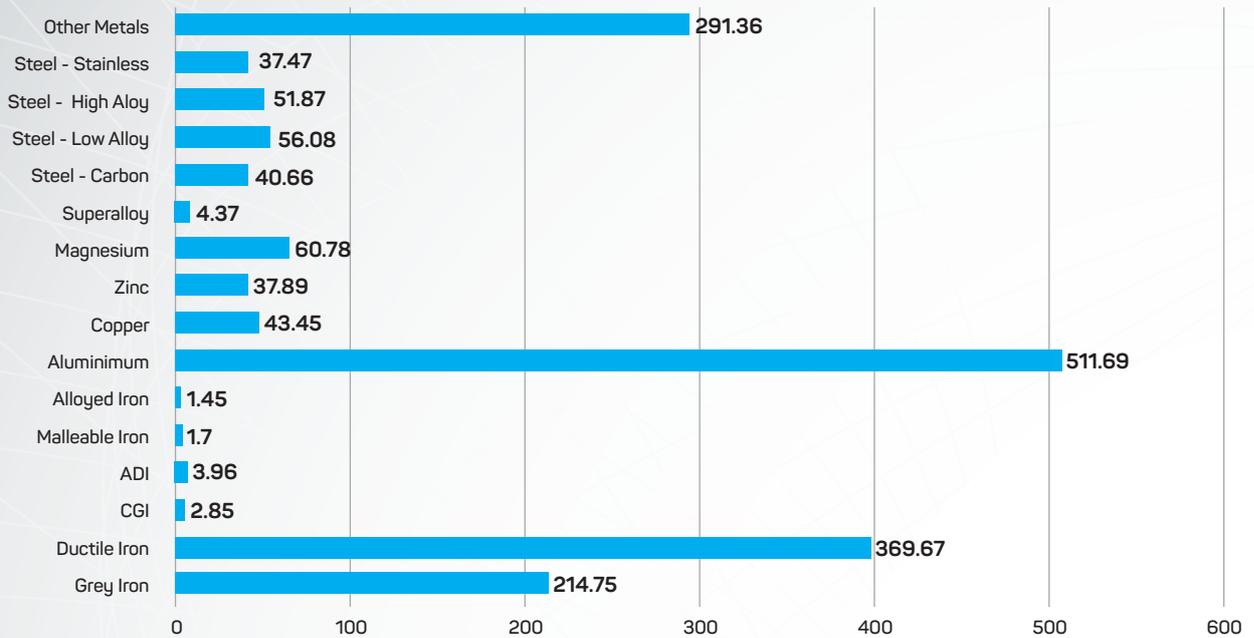
<sup>(3)</sup> The difference between total sales turnover (£1.89bn) and total production by process (£1.83bn) is due to value added processes.

Table 3.10: Cast Metal Production Value - by Metal Cast in 2016, £m

	0 to 9	10 to 19	20 to 49	50 plus	Total
Grey iron (£m)	10.42	12.29	33.91	158.14	214.75
% of total value	13.15	19.20	17.35	11.36	12.41
Ductile iron (£m)	4.56	8.14	19.53	337.45	369.67
% of total value	5.75	12.72	10.00	24.25	21.37
CGI (£m)	0.00	1.95	0.08	0.82	2.85
% of total value	0.00	3.05	0.04	0.06	0.16
ADI (£m)	0.00	0.01	0.15	3.79	3.96
% of total value	0.00	0.02	0.08	0.27	0.23
Malleable iron (£m)	0.00	1.70	0.00	0.00	1.70
% of total value	0.00	2.66	0.00	0.00	0.10
Alloyed iron (£m)	0.00	0.85	0.25	0.35	1.45
% of total value	0.00	1.33	0.13	0.03	0.08
Aluminium (£m)	31.24	19.17	76.72	384.57	511.69
% of total value	39.45	29.96	39.26	27.64	29.58
Copper (£m)	3.82	4.53	9.45	25.64	43.45
% of total value	4.83	7.08	4.84	1.84	2.51
Zinc (£m)	4.88	3.87	13.66	15.48	37.89
% of total value	6.17	6.04	6.99	1.11	2.19
Magnesium (£m)	0.00	0.00	1.25	59.53	60.78
% of total value	0.00	0.00	0.64	4.28	3.51
Superalloy (£m)	0.00	0.00	2.80	1.57	4.37
% of total value	0.00	0.00	1.43	0.11	0.25
Steel - Carbon (£m)	0.00	2.44	11.95	26.27	40.66
% of total value	0.00	3.81	6.12	1.89	2.35
Steel - Low alloy (£m)	9.11	2.44	1.25	43.28	56.08
% of total value	11.51	3.81	0.64	3.11	3.24
Steel - High alloy (£m)	2.60	2.44	0.00	46.83	51.87
% of total value	3.29	3.81	0.00	3.37	3.00
Steel - Stainless (£m)	0.65	1.22	12.88	22.72	37.47
% of total value	0.82	1.90	6.59	1.63	2.17
Other metals (£m)	11.90	2.95	11.50	265.02	291.36
% of total value	15.03	4.60	5.89	19.05	16.84
<b>Total (£m)</b>	<b>79.19</b>	<b>63.98</b>	<b>195.39</b>	<b>1391.47</b>	<b>1730.02</b>
% of total value	100.00	100.00	100.00	100.00	100.00

Source: Company survey data, observations are weighted

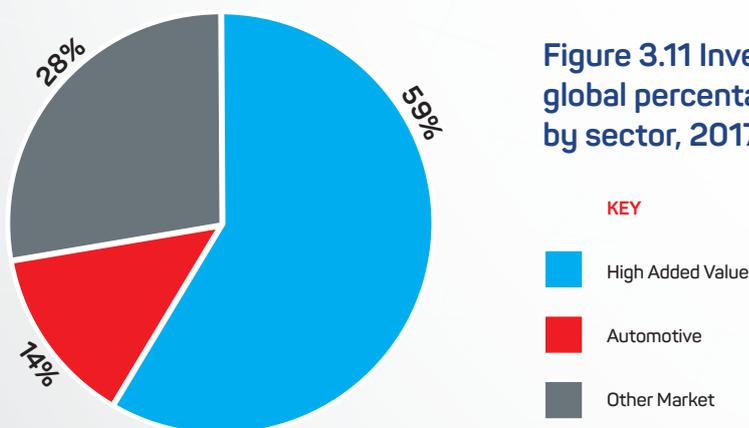
**Figure 3.10 Cast metal production value in 2016, by metal cast, £m**



### 3.11 Sectors Supplied by Cast Metal Firms

There are four sectors – automotive (cars), construction, creative/artistic/fine art and engineering – to which more than 30 per cent of cast metal firms supplied (Table 3.11). Of these sectors, engineering received castings from 59.83 per cent of firms in the cast metals industry – the highest proportion of casting suppliers in the industry as a whole. The proportion of firms supplying castings to the engineering sector within the separate sizebands was also high with three sizebands experiencing their highest proportion of suppliers in relation to the engineering sector. 52.38 per cent of micro firms (0 to 9 employees) supplied castings to the engineering sector, but this was not their highest proportion of suppliers as 66.67 per cent of the smallest sizeband supplied castings to the creative/artistic/fine art sector (around 174 firms).

For the investment casting sector specifically, the aerospace sector is the principal market with strong demand forecast and further sector growth expected. In addition, the sector supplies the industrial gas turbine, automotive and medical markets, figure 3.11. Overall global growth of 4.7% was seen during 2017<sup>(2)</sup>



**Figure 3.11 Investment casting: global percentage share of sales by sector, 2017**

**KEY**

- High Added Value
- Automotive
- Other Market

Source: European Investment Casting Federation International Conference, Porto, Portugal, 23-25th April 2018

<sup>(2)</sup> European Investment Casting Federation International Conference, Porto, Portugal, 23-25th April 2018.

More than 30 per cent of firms in all sizebands supplied castings to the construction sector. Firms with 10 to 19 employees had the highest proportion of suppliers to the construction sector (63.64 per cent), and firms with 50 or more employees has the lowest proportion of suppliers to the construction sector (30.3 per cent). 43.85 per cent of the industry as a whole supplied to the construction sector.

Micro firms (0 to 9 employees) did not supply castings to the mining/mineral/extraction and the automotive (yellow vehicles) sectors. Also, a bigger proportion of the larger sizebands supplied castings to many of the other sectors listed in Table 3.11 (for example, automotive – all types, chemical, defence and nuclear sectors). Although the proportions were much lower for the smaller-firm sizebands, the number of firms that supplied the different sectors was often greater than the number that supplied the sectors in the larger-firm sizebands (for example, 12.4 micro firms (4.76 per cent of the sizeband) supplied the steel industry, whereas 7.7 larger firms (10.61 per cent of the sizeband) supplied the same industry).

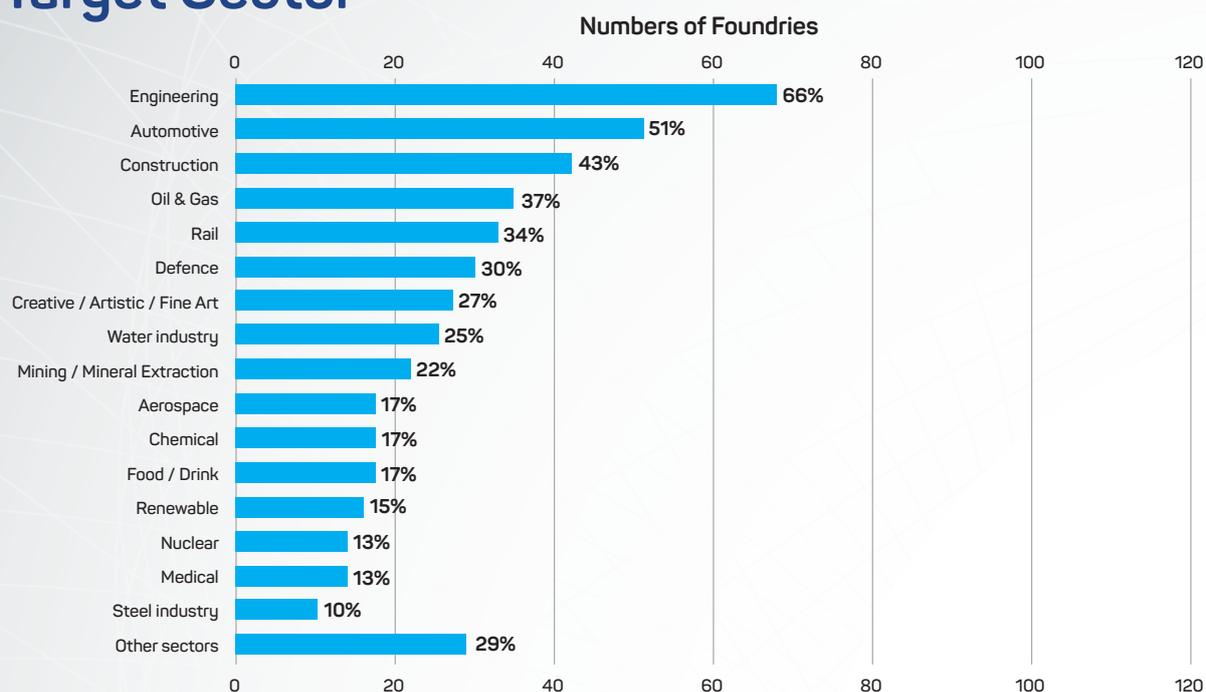
More than one third of firms in the cast metals industry supplied castings to sectors other than those listed in Table 3.11. Over 40 per cent of very small firms supplied to other sectors compared to almost 20 per cent of larger firms.

**Table 3.11: Sectors Supplied by Cast Metal Firms**

	Number of firms supplying to the sector				
	0 to 9	10 to 19	20 to 49	50 plus	Total
Aerospace (% firms)	4.76	4.55	18.00	24.24	9.87
Automotive - cars (% firms)	23.81	36.36	34.00	53.03	31.69
Automotive - commercial vehicles (% firms)	9.52	9.09	38.00	34.85	18.02
Automotive - yellow vehicles (% firms)	0.00	4.55	6.00	18.18	4.38
Chemicals (% firms)	4.76	4.55	26.00	16.67	10.06
Construction (% firms)	38.10	63.64	58.00	30.30	43.85
Creative/Artistic/Fine art (% firms)	66.67	18.18	26.00	12.12	44.80
Defence (% firms)	19.05	18.18	30.00	34.85	23.13
Engineering (% firms)	52.38	63.64	76.00	65.15	59.83
Food/Drink (% firms)	14.29	9.09	24.00	12.12	14.84
Medical (% firms)	4.76	4.55	14.00	15.15	7.83
Mining/Mineral/Extraction (% firms)	0.00	22.73	28.00	21.21	11.08
Nuclear (% firms)	4.76	0.00	12.00	19.70	7.54
Oil and gas (% firms)	9.52	45.45	52.00	36.36	25.73
Rail (% firms)	19.05	13.64	60.00	25.76	26.10
Renewable (% firms)	4.76	9.09	14.00	19.70	9.16
Steel industry (% firms)	4.76	27.27	8.00	10.61	9.37
Water industry (% firms)	4.76	18.18	38.00	22.73	14.90
Other industries (% firms)	42.86	27.27	42.00	19.70	37.01

Source: Company survey data, observations are weighted

## Target Sector



Source: Cranfield University MSc Group Project Report – MAN 14, 2018.

### 3.12 Percentage of Turnover Exported

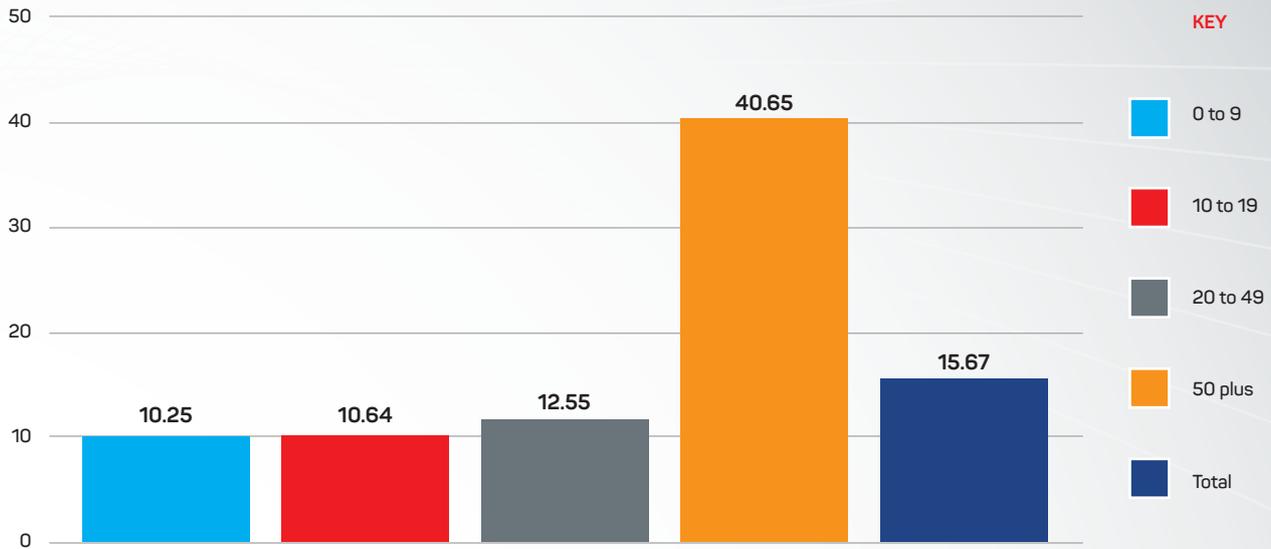
The average percentage of turnover exported in 2016 (or latest full year) for firms in the cast metals industry was 15.67 per cent (Table 3.12). Firms with 50 or more employees exported on average 40.65 per cent of their turnover compared with 10.25 per cent for micro firms (0 to 9 employees). Of the firms with 50 or more employees; those with 100 or more employees exported 50.68 per cent of their turnover, some 10 per cent higher than that of firms with 50 or more employees.

Table 3.12: Percentage of Turnover Exported

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Average percentage of turnover exported in 2016 (or latest full year)	10.25	10.64	12.55	40.65	15.67

Source: Company survey data, observations are weighted

Figure 3.12: Percentage of turnover exported in 2016, by company size



## Export

- Near 70% exported casting, bringing half of UK casting turnover
- More than half foundries exported to EU, with 80% of exports weight

## Import

- Less than 20% imported casting

Source: Cranfield University MSc Group Project Report – MAN 14, 2018.

### 3.13 Capacity Utilisation

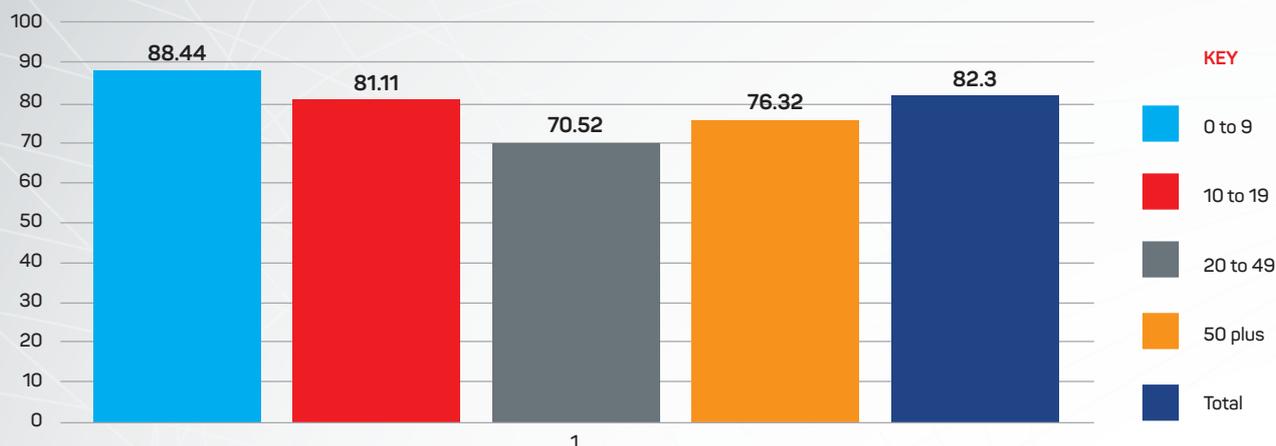
Average firm capacity utilisation for 2016 (or latest full year) in the cast metals industry was 82.3 per cent (Table 3.13). Firms in the smallest sizeband (0 to 9 employees) reported a larger capacity utilisation for the period giving an average value of 88.44 per cent. Larger firms with 50 or more employees had a lower average firm capacity utilisation of 76.32 per cent. Within this larger firm sizeband, the average firm capacity utilisation of firms with 100 or more employees was 76.52 per cent – a similar value to that of firms with 50 or more employees.

Table 3.13: Capacity Utilisation

	Firm size (employees)				
	0 to 9	10 to 19	20 to 49	50 plus	Total
Average firm capacity utilisation for 2016 (or latest full year) (%)	88.44	81.11	70.52	76.32	82.30

Source: Company survey data, observations are weighted

Figure 3.13 Average capacity utilisation for 2016 by company size



**24 HOUR**  
Capacity Utilisation in 2016



### Melting Technology Used

- 58% - Induction furnace
- 37% - Gas fired furnace
- 20% - Other electric
- 8% - Cupola

Proportion of foundries	Capacity Utilisation
28%	> 90%
24%	80% - 90%
48%	< 80%



**35%**  
undertook a formal energy audit

Source: Cranfield University MSc Group Project Report – MAN 14, 2018.

### 3.14 Capital Investment/Value-Added Services/Importing Castings/Energy Audit

53.13 per cent of firms in the cast metals sector invested in capital or were planning to invest in capital during 2016 (Table 3.14). Within different sizebands, this proportion varied. It was highest for larger firms with 50 or more employees (77.78 per cent) and lowest for firms with 10 to 19 employees (38.1 per cent)

Table 3.14 shows the proportion of firms within the cast metals industry providing value added services. 73.74 per cent of firms across the industry as a whole said that they provided value-added services. Within the separate sizebands, this proportion increased with firm size. It was highest for firms with 50 or more employees (96.83 per cent) and lowest for micro firms with 0 to 9 employees (60.0 per cent).

Table 3.14 shows that 17.8 per cent of firms in the cast metals industry imported castings. There is no clear trend across the different sizebands, although a much larger proportion of larger firms with 50 or more employees imported castings (30.16 per cent) than smaller firms with 0 to 9 employees (14.29 per cent).

Table 3.14 shows the proportion of firms in the cast metals industry that undertook a formal energy audit in 2016. For the industry as a whole, 20.68 per cent undertook a formal energy audit. Proportions varied substantially across sizebands and tended to increase with firm size. Micro firms with 0 to 9 employees had the smallest proportion of firms undertaking a formal energy audit (10.0 per cent) and larger firms with 50 or more employees had the highest proportion (58.73 per cent).

**Table 3.14: Capital Investment/Value-Added Services/Importing Castings/Energy Audit**

	0 to 9	10 to 19	20 to 49	50 plus	Total
Firms carrying out capital investment / planning capital investment in 2016 (%)	45.00	38.10	70.21	77.78	53.13
Firms providing value-added services (%)	60.00	81.82	89.80	96.83	73.74
Firms importing castings (%)	14.29	22.73	14.29	30.16	17.80
Firms undertaking a formal energy audit in 2016 (%)	10.00	13.64	27.08	58.73	20.68

Source: Company survey data, observations are weighted

### 3.15 Recycling/Resource Efficiency

Table 3.15, and figures 3.15a to c, show recycling and resource efficiency indicators for firms in the cast metals industry. Across the whole sector, the average internal metal scrap was 4.97 per cent of production tonnage. Individual sizeband figures show that this percentage was smallest for smaller firms with 0 to 9 employees (3.64 per cent) and tended to rise as firm size increased. Larger firms had the highest average internal scrap metal as a percentage of production tonnage, 7.2 percent and 6.75 per cent for firms with 20 to 49 employees and 50 or more employees respectively.

Average customer casting returns were 1.14 per cent of production tonnage within the cast metals sector. Again, there was a tendency for this proportion to increase with firm size. Micro firms with 0 to 9 employees had the lowest average customer casting returns (0.29 per cent of production tonnage) and firms with 20 to 40 employees had the highest (3.98 per cent of production tonnage).

The average level of sand reclamation/re-use (sand foundries only – greensand and chemically bonded, figure 3.15c) within the cast metals sector was 47.95 per cent of production tonnage. This proportion was noticeably different for smaller and larger firms. Smaller firms with 0 to 9 employees had the lowest average level of sand reclamation/re-use (sand foundries only) as a proportion of production tonnage (42.79 per cent) and larger firms with 50 or more employees had the highest proportion (61.31 per cent).

**Table 3.15: Recycling/Resource Efficiency**

	0 to 9	10 to 19	20 to 49	50 plus	Total
Average internal metal scrap (% of production tonnage)	3.64	5.92	7.20	6.75	4.97
Average customer casting returns (% of production tonnage)	0.29	0.57	3.98	1.27	1.14
Average level of sand reclamation/re-use - sand foundries only (% of production tonnage)	42.79	36.25	63.47	61.31	47.95

Source: Company survey data, observations are weighted

### 3.16 R&D Tax Credits

Table 3.16 shows the outcomes of R&D tax credit applications for firms in the cast metals sector. 25.67 per cent of firms within the sector made successful applications for R&D tax credits during the last three years. Across sizebands, the proportion of firms that made successful applications varies widely, and this proportion increased with firm size. Only 4.76 per cent of micro firms with 0 to 9 employees made a successful application for R&D tax credits during the last three years compared with 68.18 per cent of larger firms with 50 or more employees. Within this larger firm sizeband, 67.5 per cent of firms with 100 or more employees made a successful application for R&D tax credits – a value consistent with that of firms with 50 or more employees.

The proportion of firms within the sector that made unsuccessful applications for R&D tax credits during the last three years is very low (0.33 per cent). In three of the four sizebands, there were no unsuccessful applications.

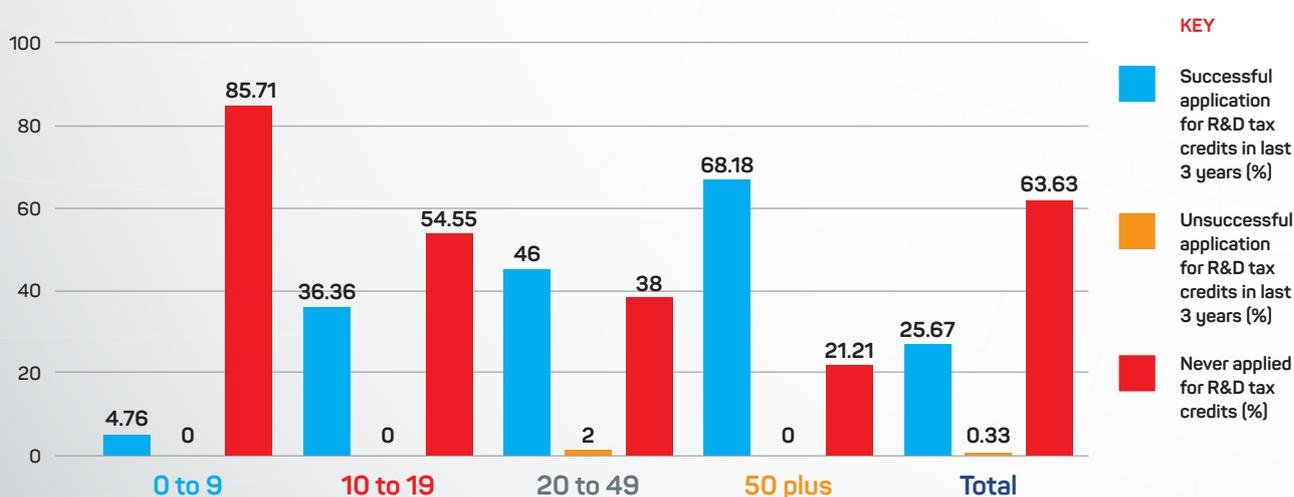
The proportion of firms within the sector that had never applied for R&D tax credits was 63.63 per cent. Across sizebands, this proportion fell as firm size increased. The proportion of micro firms with 0 to 9 employees that had never applied for R&D tax credits was high at 85.71 per cent. In contrast to this, the proportion of larger firms with 50 or more employees that had never applied was much lower (21.21 per cent). Of these firms, 22.5 per cent of those firms with 100 or more employees had never applied for tax credits – a proportion similar to that of firms with 50 or more employees.

**Table 3.16: Percentage of Firms Using R&D Tax Credits**

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Successful application for R&D tax credits in last 3 years (%)	4.76	36.36	46.00	68.18	25.67
Unsuccessful application for R&D tax credits in last 3 years (%)	0.00	0.00	2.00	0.00	0.33
Never applied for R&D tax credits (%)	85.71	54.55	38.00	21.21	63.63

Source: Company survey data, observations are weighted

**Figure 3.16: Percentage of firms using R&D Tax Credits**



# Section 4

## Looking Forwards: Obstacles to Growth and Future Outlook

### 4.1 Introduction

In this section we report further evidence from the Census of the cast metals sector relating to the obstacles firms in the sector currently face and their view of the prospects for future growth. We use data from another government survey – the Longitudinal Small Business Survey – to compare the obstacles to growth faced by foundries to those of other smaller firms.

### 4.2 Obstacles to Growth in the Cast Metals Sector

Table 4.2 shows what firms in the cast metals industry believe to be obstacles to their future business success. A main concern across the industry as a whole was staff recruitment and skills; 46.59 per cent of all firms in the sector viewed this as an obstacle to business success. The staff recruitment and skills obstacle tends to affect a larger proportion of firms as firm size increases. 75.76 per cent of larger firms with 50 or more employees identified staff recruitment and skills as an obstacle to business success compared with 28.57 per cent of micro firms with 0 to 9 employees.

Regulations and red tape were also identified as a barrier to future business success. In the complete sector, 27.51 per cent of firms identified regulations and red tape as an obstacle. Approximately one fifth of the smallest and largest firms identified regulations and red tape as an obstacle, whereas a much greater proportion of firms with 10 to 49 employees (over 40 per cent of firms) identified it as barrier to future success.

One fifth of firms in the cast metals sector identified taxation, VAT, PAYE, national insurance and business rates as obstacles to future business success. Across the different sizebands, this was viewed as less of a hindrance to future business success by larger firms with 50 or more employees; just 6.06 per cent of firms identified it as a major obstacle.

Firms in the sector recognised competition in the market place as being a relatively large obstacle to future business success. As firm size increases, the proportion of firms recognising competition in the market as a barrier to future success increases. 9.52 per cent of micro firms with 0 to 9 employees viewed competition in the market as a major obstacle to future business success compared with 30.3 per cent of larger firms with 50 or more employees.

Late payment was identified as an obstacle to future business success by approximately 15 per cent of firms. It does not seem to be a significant issue within the sector but does affect all sizes of firm.

UK exit from the EU was identified as a barrier to future business success by 14.32 per cent of firms in the sector. 40.91 per cent of larger firms with 50 or more employees identified UK exit from the EU as a major obstacle compared with 4.76 per cent of smaller firms with 0 to 9 employees.

Over one fifth of all firms in the largest two sizebands in the industry identified the national living wage as a major obstacle to future business success. No firms in the smallest two sizebands (0 to 19 employees) identified the national living wage as a barrier to their future business success.

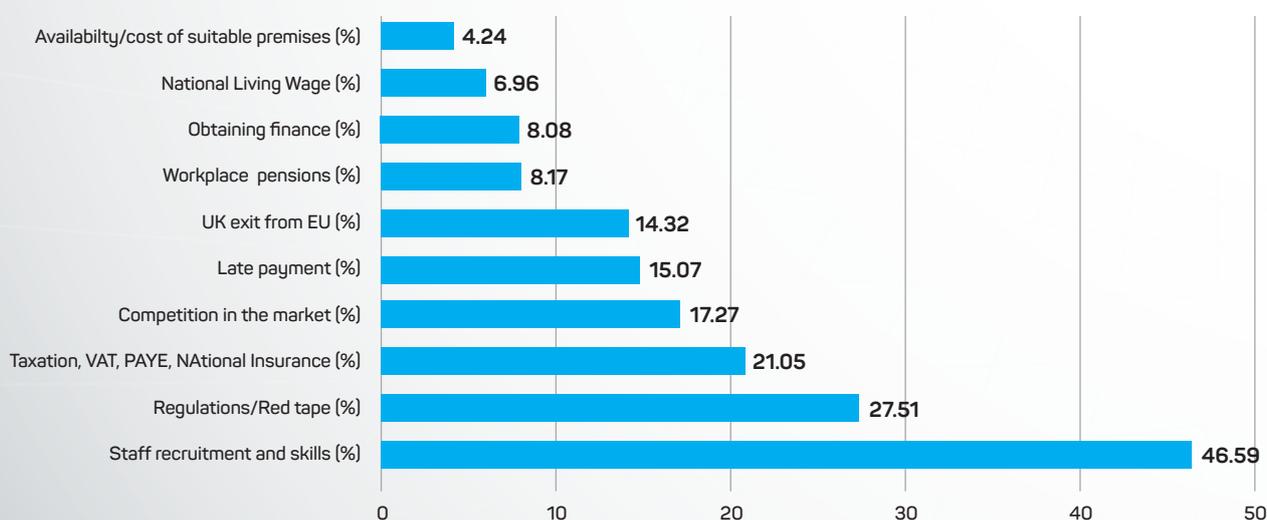
Approximately one fifth of all firms in the cast metals sector said that there were other major obstacles to the future success of their businesses. This proportion varied slightly across sizebands, although a higher proportion of larger firms (some 25 per cent) identified other obstacles to the future success of their businesses.

**Table 4.2: Obstacles to Future Success of Business  
(Percentage of Firms Reporting Each Obstacle)**

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Staff recruitment and skills (%)	28.57	54.55	72	75.76	46.59
Regulations/Red tape (%)	19.05	40.91	48	22.73	27.51
Taxation, VAT, PAYE, National Insurance (%)	23.81	13.64	32	6.06	21.05
Competition in the market (%)	9.52	22.73	26	30.3	17.27
Late payment (%)	14.29	9.09	24	13.64	15.07
UK exit from EU (%)	4.76	18.18	18	40.91	14.32
Workplace pensions (%)	9.52	0	14	4.55	8.17
Obtaining finance (%)	9.52	0	8	10.61	8.08
National Living Wage (%)	0	0	24	19.7	6.96
Availability/cost of suitable premises (%)	4.76	4.55	2	4.55	4.24

Source: Company survey data, observations are weighted

**Figure 4.2 Obstacles to the future success of business (all firms)**



### 4.3 Benchmarking Obstacles to Growth in the Cast Metals Sector

Table 4.2 compares the obstacles to growth cited by firms in the cast metals sector and all UK SMEs using data from a national survey undertaken in late 2016 <sup>(4)</sup>. The timing of this comparison is important in terms of some items – particularly UK exit from Europe. Other issues are perhaps less time sensitive and so more direct comparisons are possible.

Skills was ranked significantly more highly as an issue by cast metals firms than by the general population of firms. This was true of all size bands except micro-businesses where skills were reported as a less common obstacle to growth by cast metals firms. Conversely, competition in the marketplace was said to be an issue by 47 per cent of firms in the general population of SMEs but only by 17 per cent of cast metal firms. Both regulation and late payment were also highlighted as issues by significantly larger proportions of firms in the general population than in the cast metals sector.

**Table 4.3: Benchmarking Obstacles to Growth in the Cast Metals Sector**

	Cast Metals Sector				All sectors			
	0 - 9	10-49	50plus	Total	0 - 9	10-49	50plus	Total
Staff recruitment and skills (%)	29	64	76	47	27	44	51	30
Regulations/Red tape (%)	19	45	23	28	42	43	42	42
Taxation, VAT, PAYE, National Insurance (%)	24	24	6	21	36	37	30	36
Competition in the market (%)	10	25	30	17	46	52	61	47
Late payment (%)	14	17	14	15	30	30	27	30
UK exit from EU (%)	5	18	41	14	19	23	29	20
Workplace pensions (%)	10	8	5	8	20	23	13	21
Obtaining finance (%)	10	4	11	8	18	18	13	18
National Living Wage (%)	0	13	20	7	15	25	27	17
Avail./cost of premises (%)	5	3	5	4	15	16	16	15

*Source: Company survey data, observations are weighted. Longitudinal Small Business Survey, 2016*

In general terms firms in the cast metals sector report fewer obstacles to growth than similar firms in the general population of small businesses.

<sup>(4)</sup> Longitudinal small business survey 2016: panel report

<https://www.gov.uk/government/publications/small-business-survey-2016-panel-report>

## 4.4 Future Outlook

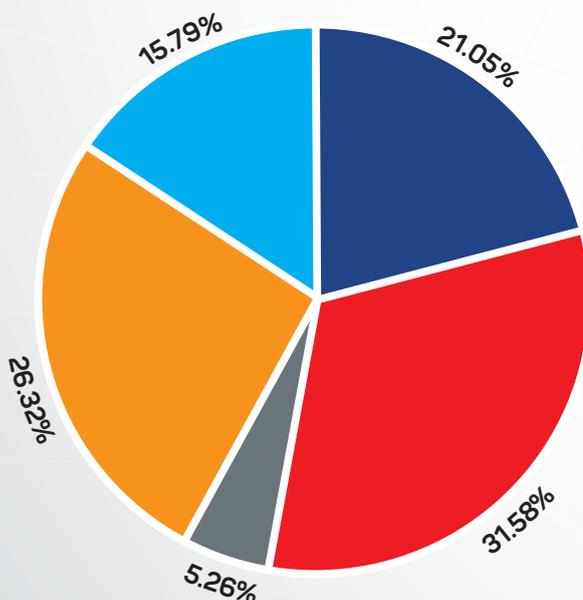
Table 4.4 shows cast metal firms' opinions on the future outlook of their businesses over the next two years. Across the total industry, 26.14 per cent of firms said that the future outlook was very positive. Examining the different sizebands reveals that a higher proportion of larger firms than smaller firms feel that the future outlook is very positive (36.51 per cent compared with 21.05 per cent). Within the two smallest sizebands, over 30 per cent of firms either expect some improvement (the 0 to 9 employee sizeband) or have no concerns (the 10 to 19 employee sizeband). A higher proportion of micro firms than in any other sizeband have some worries about the future, whereas a higher proportion of larger firms expect challenging times ahead compared with smaller firms. Within the larger firm sizeband (50 or more employees), firms with 100 or more employees are slightly less positive than firms with 50 or more employees. Some 31 per cent of firms with 100 or more employees are very positive about the future – compared with 36.51 per cent of firms with 50 or more employees – and some 26 per cent said that some improvements are expected – compared with 20.63 per cent of firms with 50 or more employees.

The proportion of firms with 100 or more employees signalling no concerns, some worries or challenging times ahead is broadly similar to that of firms with 50 or more employees (5.26 per cent, 15.79 per cent and 21.05 per cent respectively).

**Table 4.4: Future Outlook**

	Firm size (employees)				Total
	0 to 9	10 to 19	20 to 49	50 plus	
Very positive (%)	21.05	22.73	35.42	36.51	26.14
Some improvements expected (%)	31.58	22.73	22.92	20.63	27.07
No concerns (%)	5.26	31.82	8.33	4.76	9.74
Some worries (%)	26.32	18.18	12.50	14.29	20.87
Challenging times ahead (%)	15.79	4.55	20.83	23.81	16.18
Total (%)	100.00	100.00	100.00	100.00	100.00

Source: Company survey data, observations are weighted



**Table 4.4a: Future Outlook: Firm size 0 to 9 employees**

KEY

- Very positive (%)
- No concerns (%)
- Challenging times ahead (%)
- Some improvements expected (%)
- Some Worries (%)

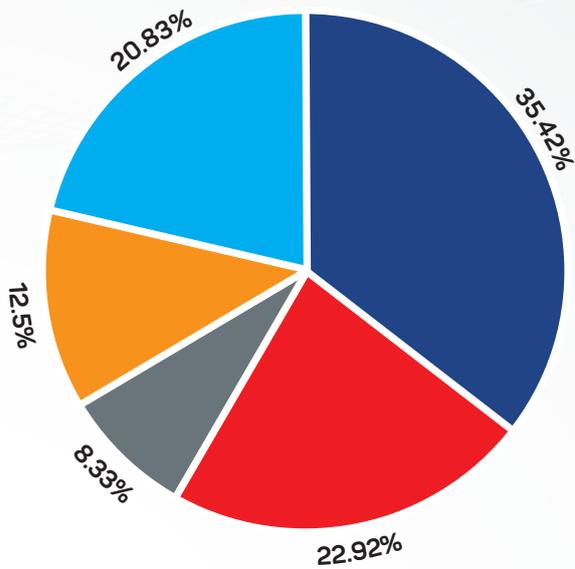


Figure 4.4b Future outlook: firm size 20 to 49 employees

KEY

- Very positive (%)
- No concerns (%)
- Challenging times ahead (%)
- Some improvements expected (%)
- Some Worries (%)

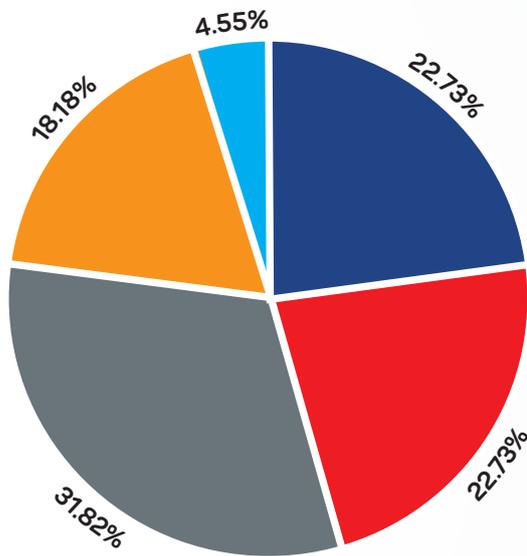


Figure 4.4c Future outlook: firm size 10 to 19 employees

KEY

- Very positive (%)
- No concerns (%)
- Challenging times ahead (%)
- Some improvements expected (%)
- Some Worries (%)

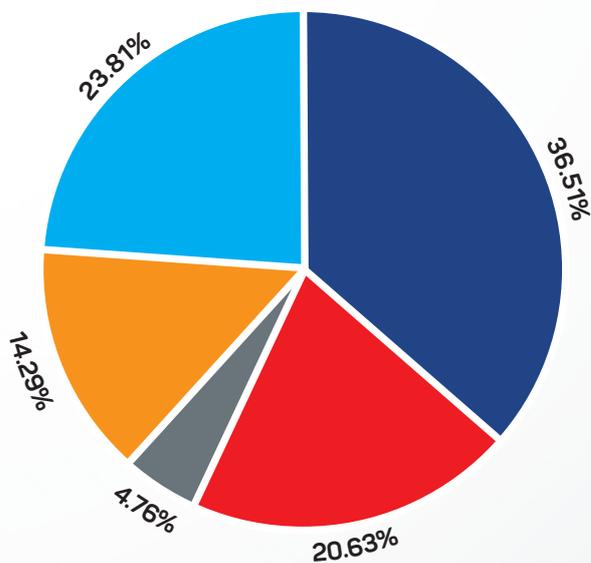


Figure 4.4d Future outlook: firm size 50 plus employees

KEY

- Very positive (%)
- No concerns (%)
- Challenging times ahead (%)
- Some improvements expected (%)
- Some Worries (%)

# Appendix 1: Data and Methods

## A1.1 Data for Trends Analysis

This trends analysis is based on information from the Business Structure Database (BSD) which provides anonymised information on the employment and turnover of all UK firms over the 1998-2007 period. The BSD itself is based on VAT and PAYE data and therefore provides a reliable indication of trends in jobs and sales value.

For the analysis we identify foundries by their primary SIC code (SIC 92: 275) and provide comparisons with forging and pressing (SIC 92: 284), a broader metal products sector (SIC 92: 25), and manufacturing (SIC 92: 10-37) as a whole. To derive a sales volume indicator we deflate sales for each sector using a common producer price index relating to the manufacture of metals, machinery and equipment <sup>(5)</sup>

## A1.2 Census Data

Data collection was undertaken by staff from the Cast Metals Federation between September and December 2017 using an on-line survey (see Appendix 2) and extensive telephone follow-up. Questionnaire design reflected the desire to maintain some comparability with data from earlier industry surveys and external benchmarks, particularly the Longitudinal Small Business Survey. 149 usable responses were obtained covering 159 foundries across the UK. In Table A1 these are allocated to sectors based on their primary activity.

Data from the Office of National Statistics suggests that in 2016 there were 480 foundries in the UK (local units) in SIC 2007 categories 2451, 2452, 2453 and 2454 (Table A1). The number of foundries identified in official figures (480) is 30-40 firms larger than numbers suggested by industry sources. Discrepancies here are likely to relate primarily to smaller production units and so industry aggregates are likely to be only marginally impacted. To allow comparability with other official statistics we use the official ONS numbers as the basis for grossing-up. Due to small cell sizes, it was decided to weight on sizeband alone. These weights are given in Table A1.

**Table A1: Population and Survey Response Weighting**

A. Population (local units)	0 to 9	10 to 19	20 to 49	50 plus	Total
SIC07: 2451 : Casting of iron	60	20	20	15	115
SIC07: 2452 : Casting of steel	60	10	15	15	100
SIC07: 2453 : Casting of light metals	70	20	30	30	150
SIC07: 2454 : Casting of other non-ferrous metals	70	15	15	15	115
Total foundry sector	260	65	80	75	480
B. Survey response (establishments)					
SIC07: 2451 : Casting of iron	9	8	18	29	64
SIC07: 2452 : Casting of steel	2	3	6	11	22
SIC07: 2453 : Casting of light metals	4	6	16	23	49
SIC07: 2454 : Casting of other non-ferrous metals	6	4	9	5	24
Total foundry sector	21	21	49	68	159
Weights (by size only)	12.4	3.1	1.6	1.1	

Source: Office of National Statistics, Activities of UK Businesses, Dataset UKBABB

<sup>(5)</sup> Producer Price Index for the output from Manufacture of Metals, Machinery & Equipment n.e.c, series: MC6F.

Source: Office of National Statistics

# Appendix 2: Survey Questionnaire

## Why this census is important to our industry

UK business arguably face some of the biggest changes in a generation. With the UK leaving the EU and its associated treaties, a rise in 'protectionist' policies in markets such as the US, the UK government's change in economic strategy suggests a desire to increase local government powers and develop a more balanced UK economy.

The castings industry is a foundation industry, part of the advanced manufacturing supply chain, providing the components needed for most other sectors within a modern, technologically advanced society. The completion of this census, to collect up to date information from the industry, will enable the Cast Metals Federation, CMF, to compare results with previous census, to identify trends as well as areas for concern or where strategic focus or action is required to take advantage of opportunities for growth and improvements in productivity.

Please complete as much information as possible, on a best endeavours basis, using estimates where necessary.

Note that all individual company information provided to CMF as part of this survey will be treated as confidential and only average data and total tonnages for sectors and metals will be used for reporting purposes.

1. Please provide the name of Company, Foundry or Group you are responding for?

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2. Are you responding for a single site foundry, or multi-site foundry?

- a. Single Site foundry
- b. Multi-Site foundry

Please advise the locations and/or name of sites you are responding for:

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3. Initials of the individual completing this survey?

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4. How many employees were there at your Company/Site/Group at the end of 2016 (or latest full year)?

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5. Of these employees, how many are:

- a. Shop floor/Foundry
- b. Office/Sales/Technical

6. We would like to ask you about how your company uses apprentices.

Could you please answer the following if relevant.

- a. Total number of apprentices in employment at the end of 2016 (or latest financial year)?
- b. How many apprentices did your company hire in 2016?
- c. How many apprentices do you plan to hire during 2017?
- d. Which areas of your business do you appoint apprentices to work in?
- e. Which training provider do you currently use for apprentice training?

7. What was the turnover of your company in 2016 (or latest full year)?

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8. What was the turnover of your company in 2015 (or the previous full year)

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9. Which of the following casting processes does your company have? (please tick all options that apply)

- |    |                        |                          |    |                        |                          |
|----|------------------------|--------------------------|----|------------------------|--------------------------|
| a. | Chemically Bonded Sand | <input type="checkbox"/> | g. | Continuous             | <input type="checkbox"/> |
| b. | Greensand              | <input type="checkbox"/> | h. | Centrifugal            | <input type="checkbox"/> |
| c. | Gravity Die            | <input type="checkbox"/> | i. | Shell                  | <input type="checkbox"/> |
| d. | Low Pressure Die       | <input type="checkbox"/> | j. | Lost Foam              | <input type="checkbox"/> |
| e. | High Pressure Die      | <input type="checkbox"/> | k. | Other (please specify) | <input type="checkbox"/> |
| f. | Investment Casting     | <input type="checkbox"/> |    |                        |                          |

---

10. Please provide your production tonnage split by casting process in 2016 (or latest full year).

- |    |                        |                          |    |                        |                          |
|----|------------------------|--------------------------|----|------------------------|--------------------------|
| a. | Chemically Bonded Sand | <input type="checkbox"/> | g. | Continuous             | <input type="checkbox"/> |
| b. | Greensand              | <input type="checkbox"/> | h. | Centrifugal            | <input type="checkbox"/> |
| c. | Gravity Die            | <input type="checkbox"/> | i. | Shell                  | <input type="checkbox"/> |
| d. | Low Pressure Die       | <input type="checkbox"/> | j. | Lost Foam              | <input type="checkbox"/> |
| e. | High Pressure Die      | <input type="checkbox"/> | k. | Other (please specify) | <input type="checkbox"/> |
| f. | Investment Casting     | <input type="checkbox"/> |    |                        |                          |

---

11. Please provide (estimate) your production value split by casting process in 2016 (or latest full year).

- |    |                        |                          |    |                        |                          |
|----|------------------------|--------------------------|----|------------------------|--------------------------|
| a. | Chemically Bonded Sand | <input type="checkbox"/> | g. | Continuous             | <input type="checkbox"/> |
| b. | Greensand              | <input type="checkbox"/> | h. | Centrifugal            | <input type="checkbox"/> |
| c. | Gravity Die            | <input type="checkbox"/> | i. | Shell                  | <input type="checkbox"/> |
| d. | Low Pressure Die       | <input type="checkbox"/> | j. | Lost Foam              | <input type="checkbox"/> |
| e. | High Pressure Die      | <input type="checkbox"/> | k. | Other (please specify) | <input type="checkbox"/> |
| f. | Investment Casting     | <input type="checkbox"/> |    |                        |                          |

---

12. Please provide your production tonnage by metal cast in 2016 (or latest full year).

- |    |                |                          |    |                  |                          |
|----|----------------|--------------------------|----|------------------|--------------------------|
| a. | Grey iron      | <input type="checkbox"/> | j. | Magnesium        | <input type="checkbox"/> |
| b. | Ductile Iron   | <input type="checkbox"/> | k. | Superalloy       | <input type="checkbox"/> |
| c. | CGI            | <input type="checkbox"/> | l. | Steel            | <input type="checkbox"/> |
| d. | ADI            | <input type="checkbox"/> | m. | Carbon Steel     | <input type="checkbox"/> |
| e. | Malleable Iron | <input type="checkbox"/> | n. | Low Alloy Steel  | <input type="checkbox"/> |
| f. | Alloyed Iron   | <input type="checkbox"/> | o. | High Alloy Steel | <input type="checkbox"/> |
| g. | Aluminium      | <input type="checkbox"/> | p. | Stainless        | <input type="checkbox"/> |
| h. | Copper         | <input type="checkbox"/> | q. | Other metals     | <input type="checkbox"/> |
| i. | Zinc           | <input type="checkbox"/> |    |                  |                          |

13. Please provide (estimate) your production value breakdown by metal cast in 2016 (or latest full year).

- |                   |                          |                     |                          |
|-------------------|--------------------------|---------------------|--------------------------|
| a. Grey iron      | <input type="checkbox"/> | j. Magnesium        | <input type="checkbox"/> |
| b. Ductile Iron   | <input type="checkbox"/> | k. Superalloy       | <input type="checkbox"/> |
| c. CGI            | <input type="checkbox"/> | l. Steel            | <input type="checkbox"/> |
| d. ADI            | <input type="checkbox"/> | m. Carbon Steel     | <input type="checkbox"/> |
| e. Malleable Iron | <input type="checkbox"/> | n. Low Alloy Steel  | <input type="checkbox"/> |
| f. Alloyed Iron   | <input type="checkbox"/> | o. High Alloy Steel | <input type="checkbox"/> |
| g. Aluminium      | <input type="checkbox"/> | p. Stainless        | <input type="checkbox"/> |
| h. Copper         | <input type="checkbox"/> | q. Other metals     | <input type="checkbox"/> |
| i. Zinc           | <input type="checkbox"/> |                     |                          |

14. Which sectors do you currently supply castings to? (please tick all that apply)

- |                                     |                          |                   |                          |
|-------------------------------------|--------------------------|-------------------|--------------------------|
| a. Aerospace                        | <input type="checkbox"/> | k. Medical        | <input type="checkbox"/> |
| b. Automotive - Cars                | <input type="checkbox"/> | l. Mining/Mineral | <input type="checkbox"/> |
| c. Automotive - Commercial Vehicles | <input type="checkbox"/> | m. Extraction     | <input type="checkbox"/> |
| d. Automotive - Yellow Vehicles     | <input type="checkbox"/> | n. Nuclear        | <input type="checkbox"/> |
| e. Chemical                         | <input type="checkbox"/> | o. Oil & gas      | <input type="checkbox"/> |
| f. Construction                     | <input type="checkbox"/> | p. Rail           | <input type="checkbox"/> |
| g. Creative/Artistic/Fine art       | <input type="checkbox"/> | q. Renewable      | <input type="checkbox"/> |
| h. Defence                          | <input type="checkbox"/> | r. Steel industry | <input type="checkbox"/> |
| i. Engineering                      | <input type="checkbox"/> | s. Water industry | <input type="checkbox"/> |
| j. Food/Drink                       | <input type="checkbox"/> | t. Other sectors  | <input type="checkbox"/> |

15. If your company directly exports castings, what percentage of your 2016 (or latest full year) turnover was exported (please estimate if not known)?

---

16. If your company exports castings, to which destinations do you currently export?  
Please answer with an approximate tonnage of exports.

- |                     |                          |                        |                          |
|---------------------|--------------------------|------------------------|--------------------------|
| a. EU               | <input type="checkbox"/> | g. North America       | <input type="checkbox"/> |
| b. Europe (non EU)  | <input type="checkbox"/> | h. South America       | <input type="checkbox"/> |
| c. Middle East      | <input type="checkbox"/> | i. Australasia/Oceania | <input type="checkbox"/> |
| d. Africa           | <input type="checkbox"/> | j. Caribbean           | <input type="checkbox"/> |
| e. Asia (non China) | <input type="checkbox"/> | k. Other               | <input type="checkbox"/> |
| f. China            | <input type="checkbox"/> |                        |                          |

17. What was your capacity utilisation for 2016 (or latest full year) as a percentage?

---

18. Considering Capital Investment in the sector, were any investments in plant or equipment made at your foundry during 2016 or are there plans that started in 2016? Yes/No Please specify how much was invested and in what areas of your business, where possible.

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19. Do you provide any 'Value-Added Services' (design, CNC machining, painting, heat treatment etc.)?

Yes  / No  Please list details of services offered: .

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20. Does your company import castings? (eg possibly through a JV, or partner in a low cost economy)

Yes  / No  Please provide detail of origin and amounts, if known

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21. Did your business undertake a formal energy audit in in 2016? This is an assessment by an energy expert of the energy you use, and ways in which energy consumption can be reduced. Yes  / No  Comments

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22. Which energy source does your company use to melt metal?

- |                   |                          |                           |                          |
|-------------------|--------------------------|---------------------------|--------------------------|
| a. Induction      | <input type="checkbox"/> | d. Gas fired furnace      | <input type="checkbox"/> |
| b. Other Electric | <input type="checkbox"/> | e. Other (please specify) | <input type="checkbox"/> |
| c. Cupola         | <input type="checkbox"/> |                           |                          |

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23. Regarding recycling and resource efficiency in the industry, please answer the applicable questions below with your best estimate, as a percentage, of your production tonnage.

a. Estimated levels of internal metal scrap, %

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b. Estimated levels of customer casting returns, %

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c. For sand foundries only: Please indicate the approximate level of sand reclamation/re-use in your foundry, %

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