



THE MANUFACTURING TECHNOLOGIES  
ASSOCIATION

The background of the entire page is a close-up, high-angle photograph of a metal lathe. A sharp, multi-fluted cutting tool is positioned above a workpiece, with the tool's tip just above the surface. The lighting is dramatic, highlighting the metallic textures and the precision of the machinery. The background is slightly blurred, focusing attention on the tool and workpiece.

# The Manufacturing Technologies Association

**Basic Facts 2023**

A decorative graphic in the bottom left corner consisting of several blue circles of varying sizes connected by thin lines, resembling a molecular or network structure.

[www.mta.org.uk](http://www.mta.org.uk)





# Introduction to Manufacturing Technologies

Manufacturing technology is vital for the creation of all modern products, either directly or at some point in the manufacturing process. Machine tools and the directly associated cutting tools and work-holding equipment are used across engineering (including aerospace, automotive, defence, railways, medical equipment, construction equipment, agricultural machinery, oil & gas and consumer durables) and indirectly by almost every part of the manufacturing sector.

Other aspects of manufacturing technology such as metrology (measuring) equipment and computer aided design and manufacturing systems (CAD/CAM) combine with the machines, tooling and work-holding equipment to make up complete systems that are part of our daily lives, making the sector fundamental to the nation's economy, despite its relatively small size.

Manufacturing technology underpins much of the Engineering industry; a study for MTA by Oxford Economics showed that allowing for direct, indirect and induced effects, the Engineering industry supports just over 3 million jobs (about 9% of total employment) and £188 billion (about 10%) of UK GDP (in 2016 although the proportions will be similar).

## DEFINITION OF MACHINE TOOLS

**A metalworking machine tool is a power driven machine, not portable by hand when in operation, which works metal by cutting, forming, physico-chemical (or non-contact) machining (e.g. lasers or electrical erosion machines), or a combination of these techniques. Modern machine tools are controlled by sophisticated computers and these are referred to as CNC (computer numerically controlled) machine tools.**



## THE UK MANUFACTURING TECHNOLOGY SECTOR

We estimate that turnover for the manufacturing technology sector in the UK in 2021 was about £2.1 billion, of which about 90% was exported.

Data on the output of machine tools, cutting tools and tool/work-holding equipment gives a total of around £875 million, of which over 80% was exported. Our calculations for the metrology sector are complicated because it is less well defined than the other parts of the sector which makes it difficult to identify the elements that are relevant; output in 2021 was worth in the region of £1 billion with a very high direct export ratio. Estimates for other aspects of the manufacturing technology industry such as software is even more problematic, but we estimate output here to be worth around £225 million.

## THE UK MANUFACTURING TECHNOLOGY MARKET

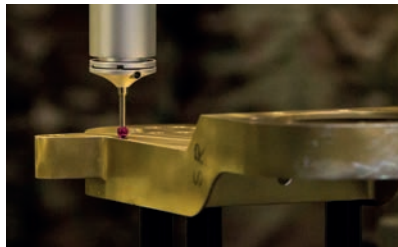
As MTA represents both manufacturers and importers, the size of the UK market is also relevant. Estimates of the UK market can be made using the formula “production minus exports plus imports”.

As the data tables for machine tools, cutting tools and tool/work-holding equipment show, there was a trade deficit of £123 million for the UK, but a surplus of £544 million for metrology products (although the situation here is also confused by indirect exports and imports of equipment which is fitted to machinery when it is traded). After making an allowance for other aspects of the sector, we estimate that the UK market for manufacturing technology equipment was about £1.7 billion in 2021.

## LOCATION & EMPLOYMENT

Machine tool manufacturers are located across the UK, with concentrations in the Midlands and West Yorkshire. Companies in the cutting tool sector are mainly based in the West Midlands and around Sheffield, but again, there is wide geographical spread. There are no significant concentrations of companies in other areas of the sector.

We estimate that the manufacturing technology sector in the UK employs about 10,000 people across both the manufacturing and distribution parts of the sector.





## BUSINESS CYCLE

The customers of the manufacturing technology suppliers are concentrated, although not exclusively, in the automotive, aerospace and other transport equipment, metal goods and machinery sectors. This means that those who supply capital goods (i.e. machine tools and some aspects of the metrology industry) suffer more than most from cycles of demand in the economy.

Being dependent on investment (see table 16) means that confidence, finance and capacity utilisation are the principal drivers of demand for machinery, with indicators of investment intentions also important to the outlook. There is often a time lag between the cycles for demand and investment and between orders and shipments within the industry. This makes large parts of the manufacturing technology sector highly cyclical and, therefore, significant percentage changes in business from year to year are common, even under “normal” business conditions.

Demand for cutting tools and some other “consumable” items within the sector are more closely related to the output levels of the user industries, although investment also influences overall demand for these products.

## MACHINE TOOL EXPORTS/IMPORTS

With the easing of the Covid pandemic, UK machine tool exports recovered strongly to reach £538 million – this is the highest value since 1998 and an increase of +37% on the admittedly depressed level of 2020 (it is +2% higher than 2019). The USA continues to be the largest export market although the European Union taken together is much larger and accounted for 46% of UK machine tool exports in 2021.

Similarly, imports of machine tools into the UK recovered from their low level in 2020 to reach £518 million, although growth was only +24% and this total was still some way short of the 2019 level. There was little change in the value of imports from the European Union so all of the recovery came from outside that area; while Germany remained the top source of UK machine tool imports, there was strong growth from China, USA, Switzerland, Taiwan and South Korea which were the next five countries in the list.

There is, however, a small note of caution because the methodology for collecting data on imports from the EU changed at the start of 2021 and, coupled with Brexit transition arrangements, this may have led to an under recording of this trade. On the basis of the data we have at the moment, the UK had a small trade surplus in machine tools with the EU and the USA but a deficit against Switzerland and all of the major Asian exporters.



## WORLD STANDING

Early estimates compiled by Gardner Intelligence, a division of Gardner Business Media, suggest that the UK was the 16th largest machine tool producer by value, sitting between Russia (although this figure looks over-stated) and Canada.

The UK was ranked 13th for machine tool exports and 17th for imports; calculations of the market size from these three data series puts the UK as the 18th largest machine tool market in the world. Globally, the top 5 machine tools markets are China, USA, Germany, Italy and Japan. All of these are based on data in US\$ and are, therefore, affected by changes in exchange rates as well as different experiences during the pandemic.

Data on the UK's position in the world is not available for any of the other sectors of manufacturing technology.



## OTHER MANUFACTURING TECHNOLOGY SECTORS

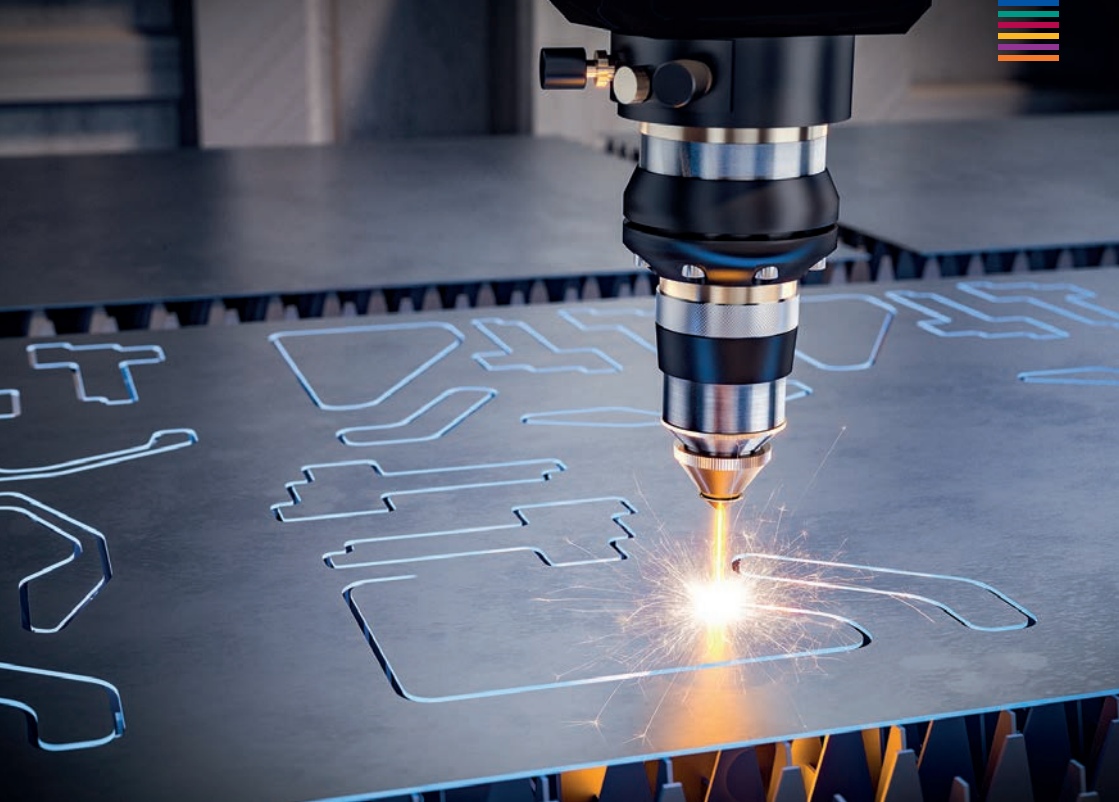
For the other elements of the manufacturing technology sector which we cover in Basic Facts, a similar analysis is available for cutting tools, tool/work-holding equipment and metrology equipment where we have data on the sector.

For cutting tools (tables 5, 7 & 8), there was only a marginal increase in production in 2021 and although the fall during 2020 had been less than in the other categories, we are still not back to the 2019 level of output. There is a similar trend for both exports and imports (and, therefore, consumption) of growth in 2021 but not yet back to the pre-pandemic level. Exports to the EU (52% of the total) actually fell again in 2020 with an increase for the rest of the world but it is not clear if this is driven by issues related to Brexit. For imports, there were modest increases for both the EU (65% of the total but which is boosted by warehousing operations) and the rest of the world,

For tool/work-holding equipment (tables 6, 10 & 11) there was a significant fall in production in 2021 (-18%) but with an increase in exports (+30%), the ratio increased to 43%. Imports also grew (+25%) but it was not enough to counter the fall in home deliveries from UK producers so consumption in this category declined by -15% compared to 2020. In 2021, the EU accounted for 53% of exports with the USA and China also important markets; for imports, 51% by value arrived from the EU with the USA, Japan and China featuring among the top five sources.

The other element of the manufacturing technology sector that we track is metrology equipment (see tables 12 to 14); here, the problem is that this is a wide ranging industry with relatively little detail in the statistical classifications – for example, the value of exports is more than twice that for machine tools but is spread across only 7 headings while machine tools have nearly 90. For this analysis we use headings which contain equipment of relevance to our sector, although they also cover a range of other items which distorts the trends, illustrated by the fact that the value of exports exceeds that for production.

Production of metrology equipment grew by +12% in 2021 but this was not quite enough to get back to the 2019 level. However, exports grew more strongly (+24%) and more than made up for the fall in 2020, reaching a new high. Imports grew more modestly (+4% compared to 2020) and did not get back to their pre-pandemic level – as a result, we saw a fall in consumption. The EU is relatively less important as a market, accounting for only 35% of metrology exports with the USA, Hong Kong and mainland China important markets. The import pattern is more like that of the other product groups with the EU accounting for 44% of UK arrivals (the same as for machine tools in 2021); again, the USA, Japan and China are the other main sources of goods coming into the UK.





## TRENDS FOR MANUFACTURING TECHNOLOGY IN THE UK 2013-2022

The following tables give an overview of the key statistics relating to the manufacturing technology sector. They cover machine tools, cutting tools, work/tool holding equipment and metrology equipment. Other aspects of manufacturing technology such as CAD/CAM systems are not well defined in official statistics, making it impossible to compile meaningful data.

For machine tools (see table 1), evidence from our own surveys (which cannot be used to replace the National Statistics because they measure different factors) suggests that there are a range of reasons why the export ratio is 100% or more in 2019 and 2021:

- Output data may be under recorded (this is impossible to estimate); the fall in output in 2019 is at odds with the strong growth in exports that year and a similar effect is seen for 2021;
- Machines manufactured abroad, imported into the UK for additional work and then being re-exported but which don't appear in the production data;
- Exports of second-hand goods (which cannot be identified from new machines) don't, of course, appear in the production figures;
- A significant proportion of exports are identified as "low value items" and at least some of these may be second-hand equipment;

In the tables for exports and imports, care is needed in identifying trade with countries which are members of the European Union. The methodology for collecting data on trade with the EU changed in 2021 and coupled with derogations on declaring imports associated with the Brexit process, this may have led to an under-recording of imports in particular.

Data on production is collected by the Office for National Statistics (ONS) under the PRODCOM system. Data on exports and imports is collected by HM Revenue & Customs (HMRC). Both of these methods are product based, but calculations of the size of those parts of the sector where these different classifications do not coincide is hard to achieve with any degree of accuracy.





## TABLE 1 – TRENDS FOR MACHINE TOOLS IN THE UK 2013–2022

(Values in £ million at current prices)

YEAR	SALES OF UK GOODS	EXPORTS	AS A % OF PRODUCTION	IMPORTS	AS A % OF CONSUMPTION	IMPLIED CONSUMPTION	CRUDE TRADE BALANCE
2013	575	505	88%	548	89%	618	-43
2014	550	498	91%	602	92%	653	-104
2015	476	432	91%	514	92%	558	-82
2016	461	436	94%	537	95%	563	-101
2017	497	451	91%	537	92%	582	-86
2018	564	498	88%	591	90%	657	-93
2019	467	526	113% *	591	111% *	532	-65
2020	447	393	88%	418	89%	471	-24
2021	488	538	110% *	518	110% *	469	+19
2022	<i>500 e</i>	564	<i>113% * e</i>	718	<i>110% * e</i>	<i>654 e</i>	-154

**Sources:** Office for National Statistics, HM Revenue & Customs and MTA calculations  
*Estimates (e) are shown in italics (and see introduction text)* \* see introduction text

Sales of UK Goods are for principal products of the metalworking machine tool industry manufactured in the UK. This excludes parts and accessories and is grossed-up to account for small firms not sampled by the survey.



## TABLE 2 – LEADING EXPORT MARKETS FOR MACHINE TOOLS 2020-2022

(by country of destination, values in £ million at current prices)

2020		2021		2022	
COUNTRIES	VALUE	COUNTRIES	VALUE	COUNTRIES	VALUE
All Countries	393.2	All Countries	537.6	All Countries	563.7
European Union	173.5	European Union	249.9	European Union	281.7
1 U S A	92.8	1 U S A	104.3	1 U S A	109.2
2 Belgium	47.6	2 Belgium	71.1	2 Belgium	88.2
3 Irish Republic	36.8	3 Germany	38.7	3 Germany	55.1
4 China	27.0	4 Brazil	35.1	4 China	40.3
5 Germany	21.9	5 France	24.8	5 Irish Republic	28.0
6 France	13.4	6 China	32.8	6 France	21.5
7 Brazil	11.0	7 Irish Republic	23.5	7 India	19.6
8 India	9.9	8 India	18.6	8 Brazil	19.3
9 Netherlands	7.1	9 Mexico	15.9	9 Italy	17.5
10 Italy	6.5	10 Italy	15.6	10 Turkey	15.2

Source: HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)

Figures include export of new and used machines



## TABLE 3 – LEADING IMPORT SOURCES FOR MACHINE TOOLS 2020-2022

(by country of origin, values in £ million at current prices)

2020		2021		2022	
COUNTRIES	VALUE	COUNTRIES	VALUE	COUNTRIES	VALUE
All Countries	417.6	All Countries	518.3	All Countries	717.9
European Union	226.2	European Union	226.3	European Union	389.5
1 Germany	94.5	1 Germany	114.1	1 Germany	132.4
2 Japan	42.9	2 China	66.2	2 Taiwan	59.7
3 China	35.4	3 U S A	53.9	3 Netherlands	55.7
4 U S A	32.2	4 Switzerland	41.0	4 China	54.1
5 Italy	29.9	5 Taiwan	36.3	5 Italy	49.9
6 Belgium	29.4	6 South Korea	30.3	6 Belgium	44.6
7 France	27.4	7 Japan	27.4	7 Switzerland	42.4
8 Taiwan	23.1	8 Belgium	25.8	8 U S A	41.8
9 South Korea	20.7	9 Italy	22.6	9 Japan	39.9
10 Netherlands	16.3	10 France	20.0	10 France	38.1

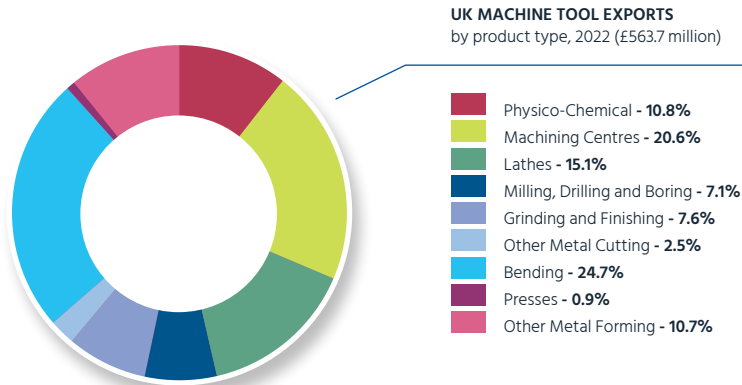
**Source:** HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)

Figures include export of new and used machines

Import figures from countries of the European Union based on data on country of consignment up to 2020



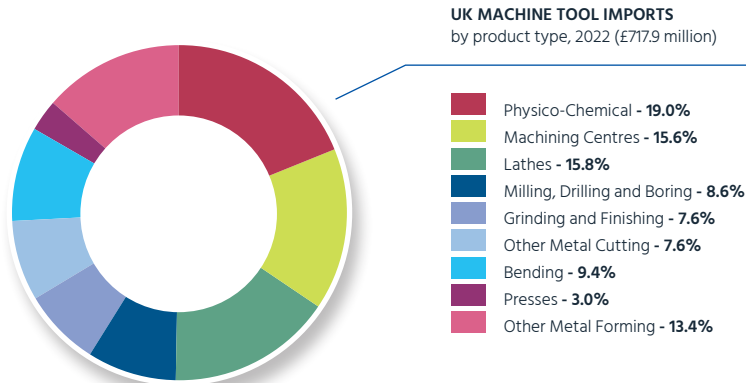
TABLE 4A – UK MACHINE TOOL EXPORTS BY PRODUCT TYPE IN 2022



Source: HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)  
Calculated by MTA



TABLE 4B – UK MACHINE TOOL IMPORTS BY PRODUCT TYPE IN 2022



Source: HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)  
Calculated by MTA



## TABLE 5 – TRENDS FOR CUTTING TOOLS IN THE UK 2013-2022

(Values in £ million at current prices)

YEAR	SALES OF UK GOODS	EXPORTS	AS A % OF PRODUCTION	IMPORTS	AS A % OF CONSUMPTION	IMPLIED CONSUMPTION	CRUDE TRADE BALANCE
2013	232	178	77%	264	83%	317	-86
2014	216	172	80%	281	87%	324	-108
2015	161	139	86%	232	91%	254	-92
2016	162	131	81%	228	88%	259	-97
2017	200	151	76%	255	84%	304	-104
2018	218	157	72%	287	83%	347	-130
2019	230	144	63%	287	77%	374	-143
2020	209	130	62%	225	74%	305	-95
2021	221	137	62%	255	75%	339	-119
2022	<i>400 * e</i>	335	<i>81% * e</i>	218	<i>77% * e</i>	<i>282 * e</i>	+118

**Sources:** Office for National Statistics, HM Revenue & Customs and MTA calculations  
*Estimates (e) are shown in italics (and see introduction text)* \* see introduction text

Sales of UK Goods are for products manufactured in the UK. This excludes parts and accessories and is grossed-up to account for small firms not sampled by the survey. For details of trade in cutting tools by type, see table 9.



## TABLE 6 – TRENDS FOR TOOL/WORK-HOLDING EQUIPMENT IN THE UK 2013-2023

(Values in £ million at current prices)

YEAR	SALES OF UK GOODS	EXPORTS	AS A % OF PRODUCTION	IMPORTS	AS A % OF CONSUMPTION	IMPLIED CONSUMPTION	CRUDE TRADE BALANCE
2013	254	87	34%	99	37%	266	-11
2014	266	76	29%	108	36%	298	-32
2015	228	67	29%	74	32%	235	-8
2016	245	61	25%	81	31%	265	-20
2017	212	82	39%	74	36%	203	+9
2018	241	82	34%	102	39%	261	-20
2019	299	76	25%	96	30%	319	-20
2020	220	58	26%	79	33%	241	-21
2021	187	75	40%	99	47%	210	-23
2022	<i>205 e</i>	83	<i>41% e</i>	191	<i>60% e</i>	<i>302 e</i>	-107

**Sources:** Office for National Statistics, HM Revenue & Customs and MTA calculations  
*Estimates (e) are shown in italics (and see introduction text) \* see introduction text*

Sales of UK Goods are for products manufactured in the UK. This excludes parts and accessories and is grossed-up to account for small firms not sampled by the survey.



## TABLE 7 – LEADING EXPORT MARKETS FOR CUTTING TOOLS 2020-2022

(by country of destination, values in £ million at current prices)

2020		2021		2022	
COUNTRIES	VALUE	COUNTRIES	VALUE	COUNTRIES	VALUE
All Countries	130.2	All Countries	136.8	All Countries	335.5
European Union	74.4	European Union	70.8	European Union	253.6
1 U S A	24.6	1 U S A	29.6	1 Belgium	54.9
2 Germany	21.4	2 Netherlands	17.3	2 Austria	41.6
3 Netherlands	11.8	3 Germany	13.7	3 Netherlands	21.8
4 Irish Republic	9.3	4 Italy	10.1	4 Sweden	18.1
5 Italy	7.1	5 Irish Republic	9.3	5 Germany	16.3

Source: HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)

Figures include export of new and used equipment





## TABLE 8 – LEADING IMPORT SOURCES FOR CUTTING TOOLS 2020-2022

(by country of origin, values in £ million)

2020		2021		2022	
COUNTRIES	VALUE	COUNTRIES	VALUE	COUNTRIES	VALUE
All Countries	225.4	All Countries	255.3	All Countries	217.8
European Union	158.9	European Union	166.0	European Union	86.0
1 Germany	67.8	1 Germany	86.6	1 U S A	22.2
2 Netherlands	39.1	2 China	45.9	2 Switzerland	19.8
3 China	33.9	3 Belgium	30.8	3 South Korea	17.8
4 Belgium	30.2	4 Netherlands	30.4	4 China	17.4
5 U S A	16.9	5 U S A	15.8	5 Irish Republic	13.9

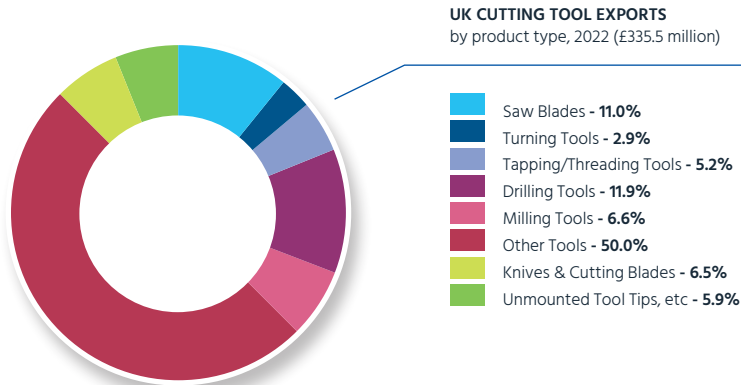
**Source:** HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)

Figures include import of new and used equipment

Import figures from countries of the European Union based on data on country of consignment up to 2020.



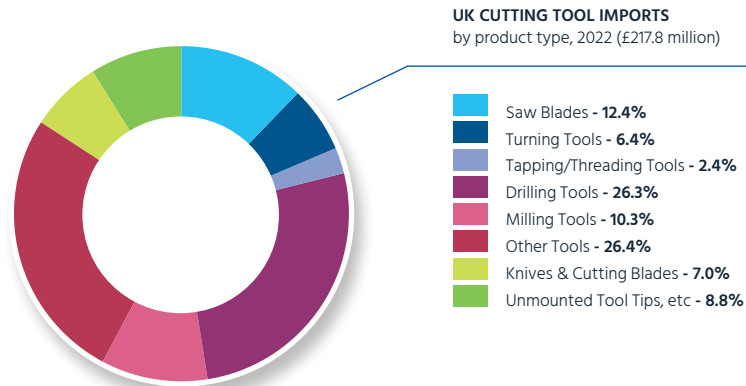
TABLE 9A – UK CUTTING TOOL EXPORTS BY PRODUCT TYPE IN 2022



Source: HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)  
Calculated by MTA



## TABLE 9B – UK CUTTING TOOL IMPORTS BY PRODUCT TYPE IN 2022



Source: HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)  
Calculated by MTA



## TABLE 10 – LEADING EXPORT MARKETS FOR TOOL/WORK-HOLDING EQUIPMENT 2020-2022

(by country of destination, values in £ million at current prices)

2020		2021		2022	
COUNTRIES	VALUE	COUNTRIES	VALUE	COUNTRIES	VALUE
All Countries	58.0	All Countries	75.5	All Countries	83.5
European Union	22.6	European Union	40.2	European Union	33.3
1 China	11.7	1 Germany	17.4	1 China	5.3
2 U S A	10.3	2 U S A	8.7	2 U S A	4.9
3 Germany	6.5	3 China	9.6	3 Germany	3.9
4 Italy	3.5	4 France	8.3	4 South Africa	3.7
5 Irish Republic	2.1	5 Italy	3.0	5 France	3.0

Source: HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)

Figures include export of new and used equipment



## TABLE 11 – LEADING IMPORT SOURCES FOR TOOL/WORK HOLDING EQUIPMENT 2020-2022

(by country of origin, values in £ million)

2020		2021		2022	
COUNTRIES	VALUE	COUNTRIES	VALUE	COUNTRIES	VALUE
All Countries	79.3	All Countries	98.8	All Countries	190.8
European Union	31.5	European Union	49.9	European Union	54.3
1 Japan	21.9	1 Germany	30.7	1 India	24.3
2 Germany	15.9	2 U S A	17.3	2 Turkey	13.8
3 U S A	12.1	3 Japan	11.6	3 Taiwan	13.8
4 China	6.1	4 China	7.4	4 China	13.7
5 Belgium	5.5	5 Belgium	5.6	5 Switzerland	11.1

Source: HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)

Figures include import of new and used equipment

Import figures from countries of the European Union based on data on country of consignment up to 2020.



## TABLE 12 – TRENDS FOR METROLOGY EQUIPMENT IN THE UK 2012-2021

(Values in £ million at current prices)

YEAR	SALES OF UK GOODS	EXPORTS	AS A % OF PRODUCTION	IMPORTS	AS A % OF CONSUMPTION	IMPLIED CONSUMPTION	CRUDE TRADE BALANCE
2013	1020	969	95%	631	93%	682	+338
2014	1157	1026	89%	719	85%	850	+307
2015	1251	1108	89%	690	83%	834	+417
2016	1308	1100	84%	771	79%	980	+328
2017	1043	1236	119%	777	133%	584	+458
2018	1037	1212	117%	805	128%	631	+406
2019	1082	1166	108%	877	111%	793	+289
2020	91	1020	111%	695	117%	595	+325
2021	1044	1269	122%	725	145%	500	+580
2022	<i>1250 e</i>	1528	<i>122% e</i>	1048	<i>136% e</i>	<i>770 e</i>	+480

**Sources:** Office for National Statistics, HM Revenue & Customs and MTA calculations  
*Estimates (e) are shown in italics (and see introduction text)*

Sales of UK Goods are for metrology products manufactured in the UK.  
This includes parts and accessories and is grossed-up to account for small firms not sampled by the survey.



## TABLE 13 – LEADING EXPORT MARKETS FOR METROLOGY EQUIPMENT 2020-2022

(by country of destination, values in £ million at current prices)

2020		2021		2022	
COUNTRIES	VALUE	COUNTRIES	VALUE	COUNTRIES	VALUE
All Countries	1020.1	All Countries	1269.0	All Countries	1528.2
European Union	299.4	European Union	439.0	European Union	540.1
1 U S A	189.6	1 U S A	224.6	1 U S A	300.1
2 Hong Kong	108.7	2 Hong Kong	158.0	2 Germany	160.1
3 Germany	77.7	3 Germany	127.5	3 Hong Kong	143.0
4 Saudi Arabia	59.8	4 Irish Republic	75.4	4 China	90.6
5 China	55.3	5 China	73.4	5 Irish Republic	86.7

Source: HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)

Figures include export of new and used equipment



## TABLE 14 – LEADING IMPORT SOURCES FOR METROLOGY EQUIPMENT 2020-2022

(by country of origin, values in £ million)

2020			2021			2022		
COUNTRIES		VALUE	COUNTRIES		VALUE	COUNTRIES		VALUE
All Countries		694.6	All Countries		724.5	All Countries		1047.9
European Union		338.6	European Union		317.0	European Union		582.9
1	Germany	125.4	1	Germany	124.7	1	Germany	235.9
2	U S A	93.6	2	U S A	106.8	2	U S A	134.3
3	Japan	49.4	3	Japan	53.6	3	France	68.7
4	Austria	43.9	4	China	41.5	4	Italy	65.6
5	China	37.7	5	Austria	36.2	5	Netherlands	62.6

**Source:** HM Revenue & Customs via [www.uktradeinfo.co.uk](http://www.uktradeinfo.co.uk)

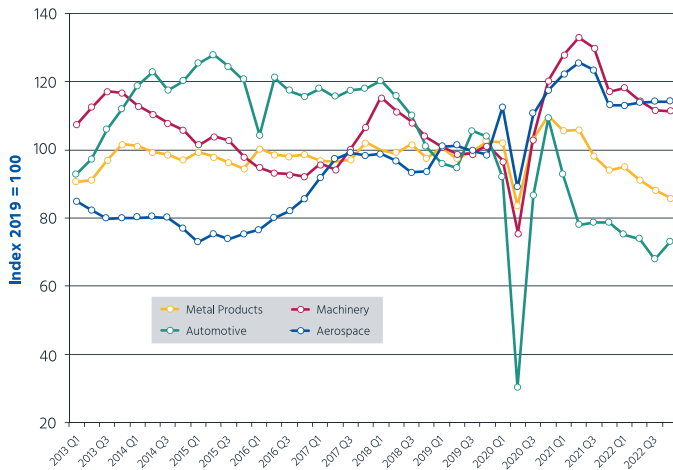
Figures include import of new and used equipment

Import figures from countries of the European Union based on data on country of consignment up to 2020.





TABLE 15 – OUTPUT BY INDUSTRY SECTOR 2013-2022

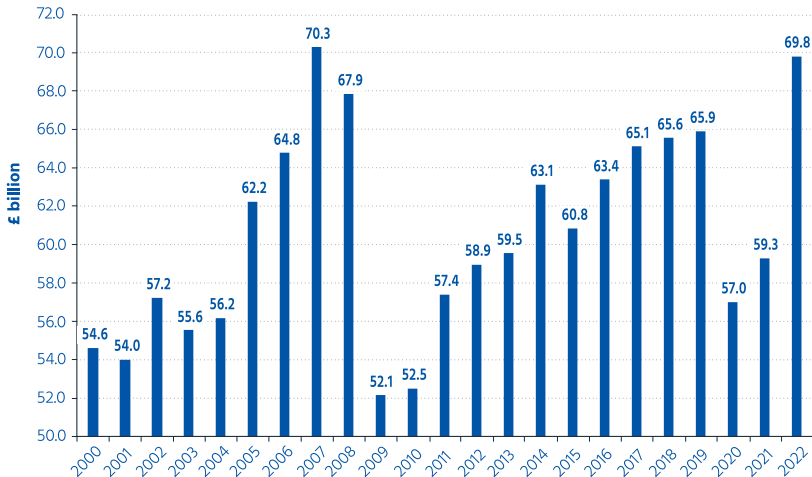


Source: Office for National Statistics



## TABLE 16 – UK INVESTMENT IN ICT & OTHER MACHINERY 2000-2022

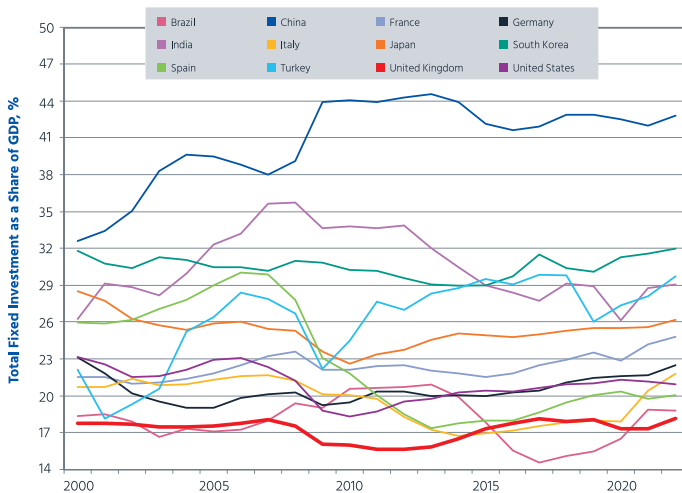
(in £ billion, at 2019 prices, including leased assets)



Source: Office for National Statistics, Statistical Bulletin (series DLWO)



TABLE 17 – COMPARISON OF INVESTMENT RATIOS 2000-2021



Source: Oxford Economics



# The Manufacturing Technologies Association



THE MANUFACTURING TECHNOLOGIES  
ASSOCIATION

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