Skills Investment Plan

For Scotland's engineering and advanced manufacturing sector

Foreword

John F. McClelland CBE,
Chair of Skills
Development Scotland

Scotland has a rich legacy and proud tradition in engineering and advanced manufacturing excellence, stretching back to the early 19th century. Scotland also has a world-leading reputation and was the trailblazer in the great age of invention and discovery.

While it is important to celebrate the great achievements made by Scottish engineers in the past, it is also vital that the contribution of those working today at the forefront of engineering and advanced manufacturing is also recognised.

There is no doubt that the engineering and advanced manufacturing sector is a key wealth generator for the Scottish economy. It is also a driving force for other growth sectors, and is an industry with a strong and positive future.

Scotland benefits from a skilled, productive and committed engineering and manufacturing workforce, with many outstanding businesses that continue to grow and make a positive contribution to the growth and development of the Scottish economy.

We have been proud to work in partnership with industry to develop the Skills Investment Plan (SIP) which has been facilitated by Skills Development Scotland, working with key skills groups, industry stakeholders and employers. The SIP development has involved reviewing future skills and employment demands and developing an action plan to help the sector respond to the skills challenges of today and the future.

The SIP has a pivotal role to play in ensuring that Scotland's engineering and manufacturing business base is promoted and nurtured. It confirms the importance of developing future skills and developing an action plan to help the sector respond to the skills challenges of today and the future.

It is important that we continue to encourage sustainable economic growth, by developing the talent pool and providing excellent career opportunities.

We need to inspire the next generation of young people to look towards a future and positive careers in engineering and advanced manufacturing.

Introduction

Selma Hunter,
Chair of Engineering
Skills Leadership Group

Scottish engineering companies have a strong reputation for excellence and legacy across the world.

The sector in Scotland is emerging from the recent global downturn and is now showing positive signs of recovery and making solid progress. Orders are being maintained at healthy levels and output volumes remain positive. This level of cautious optimism has seen modest increases in employment levels across the sector.

In recent years, Scottish engineering and advanced manufacturing businesses have been at the cutting-edge of productivity enhancement and effective skills development.

This SIP document sets out the strategy of sector engagement and how we plan to address some of the potential skills challenges the sector faces. There is a lot of positive work going on in the sector and over the next few years, replacement demand is expected to create employment opportunities for around 2,500 skilled people each year. The majority of these jobs will be in managerial, professional, skilled trades and process engineering, along with technician roles.

In addition, we must continue to encourage increased uptake in the Modern Apprenticeship programme in order to meet the skills needs of the sector. A number of Scotland's leading businesses already operate successful apprenticeship programmes, which help ensure they have the skills they need to sustain themselves into the future.

The skills and knowledge developed in Scotland continue to play a vital role in developing the future prosperity of the sector.

Let's focus on putting the talent pool in place that will maximise the opportunities available.

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Purpose of the Skills Investment Plan

The engineering and advanced manufacturing Skills Investment Plan (SIP) is a partnership document which has been facilitated by Skills Development Scotland (SDS) on behalf of Scottish Government. SDS has worked closely with industry to develop this engineering and advanced manufacturing[1] SIP and will continue to work with industry and public sector partners in its delivery and implementation.

The development of the SIP involved gathering and analysing a range of primary and secondary data. These findings were tested and validated with industry, education and training sectors and other public bodies.

These included employers and employer-led bodies such as:

- Technology Advisory Group (ILG)
- Aerospace, Defence and Marine Group (ILG)
- Scottish Manufacturing Advisory Service (SMAS)
- Glasgow Economic Leadership's (GEL) Engineering Design and Manufacturing Group
- Scottish Engineering
- Forum for Advanced Manufacturing and Engineering Skills (FAMES).

More than 15 universities, colleges and training providers were consulted during the development process. The SIP benefitted from advice from our close working partners including the Enterprise Agencies, the Scottish Funding Council, and SEMTA (Sector Skills Council for Engineering). The report also drew from a survey of 200 engineering employers commissioned by Scottish Enterprise[2].

The purpose of the SIP is to:

- **validate and bring clarity** to the scale and nature of the skills issues which face the sector

- **create direction and bring focus** to the nature of the response required by the public sector and industry, on the priority skills issues

- **provide a coherent framework** for public sector and private sector investment to develop skills provision to meet industry needs.

The key stages in the SIP development process are set out in Figure 1 below and the process is outlined in more detail in Appendix 1.

Figure 1: SIP development process

Scale of the sector / growth ambition
Review evidence of skills needs
Validate with industry
Secure buy-in for draft SIP
Provision mapping and action plan
Publish SIP and action plan

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[1] Will be referred as engineering for the rest of the document
[2] SQW report for Scottish Enterprise (2012) Increasing engineering capacity and capability: graduate recruitment and employment

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The importance of the sector

Scotland's engineering and advanced manufacturing sector is a key driver of the economy. It encompasses a wide range of activities contributing £9 billion a year to the nation's economy.

Scottish engineering companies have a strong reputation and legacy across the world. They have a strong international outlook, with the total value of engineering exports in 2012 reaching £8.7 billion. The latest Global Connections Survey showed that engineering and technical testing analysis activities (along with legal, accountancy, management and architecture) is one of the top five exporting industries of Scotland (£1.7 billion).

Defining the sector
A review of published industry documents highlighted a range of approaches in use to define 'Engineering'. For the purposes of developing the SIP, SDS engaged with partners including the Enterprise Agencies, SEMTA, and Scottish Government to agree a tight definition of the sector based on Standard Industrial Classification (SIC 2007) codes[3]. The definition agreed is similar to the SEMTA definition[4] of the engineering sector, and includes companies engaged in manufacture of basic metals, fabricated and metal products, electrical equipment, computers, optical products, machinery and equipment, motor vehicles, transport equipment, architectural and engineering activities and technical testing. The data quoted in this section of the report is based on this definition, except where stated.

Economic contribution
The engineering sector contributes £9 billion GVA, accounting for 9% of the Scottish economy. The average GVA per employee in the sector was £75,900 in the year 2010, well above the Scottish average of £59,900. This suggests that the sector is an important wealth generator for the Scottish economy and is instrumental in driving the competitiveness of other growth sectors. The total turnover is £20.1 billion representing 8% of total turnover in the Scottish economy.

Business base
There were approximately 13,300 engineering related enterprises in Scotland in 2010, equating to 8% of all enterprises in Scotland. The sector is dominated by sole traders and small enterprises (fewer than 50 employees). Around 4% of engineering enterprises (630 enterprises) have more than 50 employees and 1% of engineering enterprises (180 enterprises) have over 250 employees.

Employment
Employment levels dipped to 121,400 in 2010 but subsequently increased in 2011 to the current rate of 126,720, which accounts for 5.5% of the total employment in the Scottish economy. Almost three in ten of all engineering jobs are located in the north east (Aberdeen City & Aberdeenshire) closely followed by the west of Scotland.

Export activity
In 2012, the total value of engineering exports was £8.7 billion, with 46% of this made up of exports to the rest of the UK and the remainder to the rest of the world. The engineering sector contributed 12% of Scotland's overall export activity in 2012. The wider definition of the sector used by Scottish Engineering suggests total exports of £13 billion.

"The engineering sector contributes £9 billion GVA, accounting for 9% of the Scottish economy"

[3] SIC codes are used to classify business establishments by the main type of economic activity in which they are engaged. Scottish Government's growth sector statistics are also reported using SIC 2007 codes.
[4] The SEMTA definition additionally includes SIC codes 22: Manufacture of rubber and plastic products and other non-metallic mineral products;
46: Wholesale, retail trade; repair of motor vehicles and motorcycles; and 72: Scientific research and development.

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Key skills issues

A review of labour market research intelligence, secondary research and extensive consultation with employers and stakeholders has identified a range of key skills issues and challenges for the Scottish engineering and advanced manufacturing sector.

Future demand for skills

Engineering is now described as "a much smaller, leaner sector whose products are in demand; but which is suffering from shortages of high-skilled personnel, probably due in no small part to the sector's long-term record of decline in terms of overall job numbers"[5]. Replacement demand (i.e. due to workers moving into retirement) is expected to create a large number of employment opportunities in the future. The majority of these jobs will be in managerial, professional, skilled trades and process, along with plant and machine operative roles.

The characteristics of qualification levels in engineering are also expected to change in the coming years with a shift towards higher level qualifications. At present, 30% of the workforce has higher level qualifications and by 2020 this is expected to rise to 40%.

This issue is important in Scotland, where the age composition of the Scottish science, engineering and manufacturing technology sectors is slightly older compared to other Scottish sectors. Research suggests that approximately 11% of the workforce will need to be replaced over the 2010-2016 period.

This equates to approximately 15,000 people, or a need for 2,500 skilled people per year. In terms of qualification levels this means that:

• 40% or 1,000 of new recruits should be at SVQ Level 4-5 (degree/PG) and

• 40% of new recruits should be at SVQ Level 2-3 (Technician/MA).

Highly specialised and technical skills take significant time and resource commitment to develop; while the fall in the number of people aged 16 to 24 expected over the next decade will mean that there will be increased competition to source top talent.

Potential skills gaps and shortages in the sector

Nearly 18% of the sector reported a skills gap and had issues with technical and practical skills, which is 3% higher than other sectors[6]. Employers in the sector identified training and development support to existing staff as the most common approach to addressing skills gaps in the workforce. SEMTA data also indicates that hard-to-fill vacancies as a percentage of all vacancies is higher (38.6%) than other industries (35.2%). The main reasons for hard-to-fill vacancies were: low number of applicants with the required skills and lack of work experience the company demands. Skills shortages are reported for: project engineers; design engineers; IT specialists; technicians; welders; composite engineers; CNC machinists; fabricators and for specialist/niche positions (e.g. combustion engineering).

"Scotland's engineering sector is an important wealth generator for the Scottish economy and is instrumental in driving the competitiveness of other growth sectors"

[5] Working Futures 2010-2020, UKCES
[6] SEMTA (2011), Scottish Sector Profile: Science, Engineering and Manufacturing Technologies

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Key skills issues
continued

Encourage more graduates to enter the sector

The number of students enrolled to study engineering and technology at Scottish universities has increased by 13% over the period 2006-11 to reach 15,965 in 2010/11. However, over the period 2004-10, only around 41% of qualified engineering graduates entered the engineering profession, and in the year 2009/10 this dropped to 35%. A further 14% went on to work in oil and gas, however the same proportion went into retail occupations. This is a cause of concern for employers in the sector - especially smaller firms - as they find it increasingly difficult to recruit qualified graduates and report growing pressure and competition from other sectors.

It is important to fully understand what factors lead to graduates not taking up careers in the engineering sector.

Improve graduate skills by offering internships and placements

Employers say that some graduates can lack practical skills, niche/specialist skills and 'soft' skills (such as leadership, inter-personal and communication skills). Businesses agreed that more could be done to strengthen the links between classroom teaching and real-world work experience by focusing on internships, work placements and employers offering opportunities to work in live multidisciplinary projects.

However, evidence suggests only a small proportion of employers participate in internships and placement programmes. There appears to be a need for deeper engagement between employers and universities/colleges so that young people can gain real industry experience.

Increase the supply of skilled labour by focusing on apprenticeships

Apprenticeships are a principal pathway into the sector and interest in the Modern Apprenticeship (MA) programme is high, with demand for MAs in engineering having held up during the economic downturn. Between 2008/09 and 2012/13, 5,959 people started an MA in Engineering. In 2012/13, 1,429 individuals started their training in engineering and 924 completed their training[7]. Last year over £9.8 million was invested in MAs in Engineering Frameworks. SDS, through the Contracting Strategy for 2015/16, will be looking to support even more engineering apprenticeships at all levels.

Employers highlighted that MAs have better retention rates compared to graduates, and investing in apprentices can lead to a more engaged workforce, lower staff turnover and increased productivity. However, research indicates that only around 20% of employers in the sector offer apprenticeships[8].

Build capacity of SMEs

A survey of employers showed that micro enterprises are much more likely (36%) to be dissatisfied with the quality of graduates than larger firms (23%)[9]. A possible explanation for this is that micro enterprises tend to engage less with higher education, recruit graduates occasionally, and often have limited experience as to what to expect or how to utilise a graduate's skills. They also perceive constraints on their ability to hire technicians (from colleges or as an MA), yet have a need for such people. Large firms appear better placed to benefit and work within the current system of support, but have limited capacity to expand their recruitment further to meet the ongoing need in the sector.

Working with SMEs to help them better understand and navigate through the skills system is a priority. At the same time it is important to work with graduates to address their potentially negative perceptions of small companies.

"Apprenticeships are a principal pathway into the sector and interest in the MA programme is high"

[7]   This relates to starts in MA Engineering Framework and does not include numbers for associated frameworks
[8]   UKCES's Employer Perspective Survey 2012
[9]   SQW report for Scottish Enterprise (2012) Increasing engineering capacity and capability: graduate recruitment and employment

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Key skills issues
continued

Up-skilling the workforce

Up-skilling the existing workforce to embrace new opportunities in engineering is crucial to achieve better productivity and perform effectively in global markets. SDS's Our Skillsforce website offers a valuable resource to employers on up-skilling their workforce including specific routes such as transition training and getting staff started on a Modern Apprenticeship. SDS will work with partners to develop an industry hub page for the engineering sector.

Address gender imbalance within the sector

It is widely recognised that women are greatly under represented in the sector. The gender split within the current engineering workforce is 78% male and 22% female, in contrast, the wider UK workforce split is 53% male and 47% female. Evidence suggests women are lost from the engineering talent pool at three main stages:

• female learners are lost within the secondary education system as their subject choices restrict their participation in engineering subjects within universities and colleges

• of women who study a Science, Technology, Engineering and Mathematics (STEM) subject within universities and colleges, approximately only one third work in a STEM occupation, indicating that other employment opportunities are more appealing

• data on women who do work in a STEM occupation suggests that nearly two thirds of them do not return after a career break (e.g. maternity leave).

Focusing on one aspect of this continuum will not yield the desired results. At the school level, more girls should be encouraged to take up engineering related STEM subjects such as physics and mathematics. A targeted approach is needed to tackle negative perceptions of engineering and present a positive image of career options and the world of engineering to young girls during their primary school years.

More needs to be done to understand why women who pursue STEM subjects at higher education do not work in STEM related occupations and the factors that influence their decisions. The industry also needs to step up to this challenge by changing their employment practices and workplace culture to attract and retain more women in the sector; and specifically seek to address the issue of women returners.

Regional patterns of provision

A comparison of data on engineering employment by regions and the number of students reveals a misalignment of skills provision and employment, with the north-east seemingly under supplied in terms of Further Education (FE) provision. Further examination of this issue suggests it is complex, with issues around low unemployment, company capacity to recruit, and the availability of sufficient training provision locally all contributing factors. SDS is currently developing a refresh of the Energy SIP. As the sectors share a number of similar issues, the intention is to work collaboratively to support coherent planning and delivery to improve engineering skills.

Simplify the landscape

There is general consensus amongst stakeholders that there is a crowded landscape of initiatives and organisations operating in the engineering sector. There are reported to be over 190 educational initiatives, and while this momentum should be maintained, there is a need to simplify the landscape and develop a more coordinated approach at national level. The focus now needs to shift towards getting more girls and women interested in engineering as a career, and enabling them to remain in the sector and retaining more engineering graduates in the engineering profession.

Connecting education and industry

Scotland's colleges and universities have been a key driver of the engineering sector, enhancing the country's reputation for the availability of high class engineering talent. Scotland is home to a number of world class high profile engineering related innovation centres, including CENSIS at Glasgow University, the Technology and Innovation Centre and the High Value Manufacturing Catapult at Strathclyde University.

At the same time, however, the SIP development process highlighted the need to gather and share good quality labour market intelligence, future demand projections and monitor and track 'big bang' capital investment projects, to enable the skills system to keep abreast of the changing scale of skills demand. Similarly it is important to strengthen and sustain effective mechanisms to ensure industry input and involvement in curriculum development and delivery of education and training so that learners gain a deep and enriched understanding of real world engineering and of the range of career opportunities available in the sector.

Engineering Skills Partnership

During the SIP development process several stakeholders raised the issue of a crowded landscape with various engineering groups focusing on different aspects of the sector across different regions. These tend to have limited voice and influence on skills related issues with regards to influencing policy with the Scottish Government and mobilising key industry players. The SIP recognises that these disparate groups need to present a unified voice on the skills challenges and priorities for a positive and sustainable growth of the sector.

The SIP development process offered a unique opportunity for the sector in Scotland to bring together different roles that all key stakeholders play within the skills arena and set the context for developing a strong partnership with the industry.
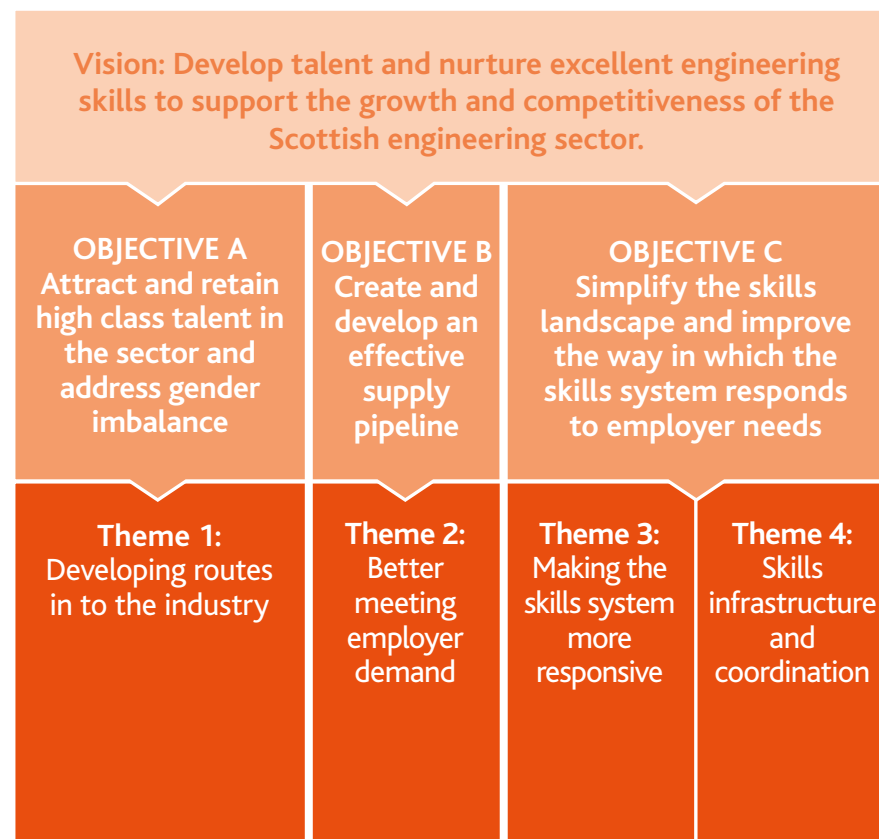
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Developing an action plan

The vision for the SIP is to develop talent and nurture excellent engineering skills to support the growth and competitiveness of the Scottish engineering sector.

An action plan to support this vision has been developed by working in partnership with industry and stakeholders.

It is structured around three strategic objectives set out in Figure 2 below:

"The sector currently employs 126,720 people, which accounts for 5.5% of total employment in the Scottish economy"

Figure 2: Skills Investment Plan vision

Vision: Develop talent and nurture excellent engineering skills to support the growth and competitiveness of the Scottish engineering sector.			
OBJECTIVE A Attract and retain high class talent in the sector and address gender imbalance	**OBJECTIVE B** Create and develop an effective supply pipeline	**OBJECTIVE C** Simplify the skills landscape and improve the way in which the skills system responds to employer needs	
Theme 1: Developing routes in to the industry	**Theme 2:** Better meeting employer demand	**Theme 3:** Making the skills system more responsive	**Theme 4:** Skills infrastructure and coordination

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Developing an action plan continued

OBJECTIVE A
Attract and retain high class talent in the sector and address gender imbalance

Theme 1: Developing routes in to the industry

A career in engineering is perceived by learners as very rewarding in terms of job opportunities, salary levels and career progression. Maintaining this momentum is vital to ensure a flow of talent into higher and further education and subsequently across the sector.

Key areas to be addressed include:

- **continue to raise awareness of career options:** industry should work with educators and career influencers to improve understanding of the career opportunities within the sector and improve awareness of engineering as a quality, long-term career

- **encourage industry to take ownership of talent development:** employers and industry groups need to work together and become more involved in skills development at local and regional levels

- **encourage more engineering graduates to enter the engineering sector:** graduates could benefit from a better understanding of the range of job opportunities available within the sector, along with the expectations of employers within the industry

- **address gender imbalance in the sector:** interventions are needed across the talent pipeline to encourage young girls at primary and secondary schools to make the right subject choices; target women pursuing STEM subjects at universities and colleges to pursue careers in the sector, and work with the industry to enhance the skills base and talent pool by focusing on women returners

- **promote different entry routes in to the sector:** to raise awareness and profile of vocational pathways through MAs, HNCs, and HNDs alongside more traditional routes offered at higher education institutions. More should be done to widen the talent base by developing and promoting transition training models to allow individuals to be re-skilled.

OBJECTIVE B
Create and develop an effective supply pipeline

Theme 2: Better meeting employer demand

Employers across the sector value qualifications gained at universities and colleges and equally prize industry experience and knowledge. While most employers are satisfied with the quality of graduates entering the sector, others say that graduate work readiness is an issue for them.

Key areas to be addressed include:

- **promote and enhance work placement and internship opportunities:** industry relevant work experience is an important attribute for employers and there is a need to enhance the number and quality of work experience places, internships and placements

- **develop capacity of SMEs:** small firms tend to engage less with higher education and are less likely to hire graduates on a regular basis. The make up of the sector with a large number of SMEs can limit its capacity to offer work placements, and partners together need to explore differentiated models of employer engagement

- **support skills development to improve industry readiness:** employers must offer opportunities for their staff to re-train and up-skill in order to compete effectively in global markets and ensure the future succession of their businesses. Demographic pressures mean that more needs to be done to up-skill and prepare the next generation of managers and leaders in the sector. This includes concerted effort to bring in women returners and also up-skill trained personnel from other sectors who show a strong aptitude for engineering

- **develop new entrants' soft skills:** new entrants need to build on skills such as leadership, management, multidisciplinary team working, commercial skills and communication skills in order to excel in a commercial engineering environment

- **continue to promote MAs in engineering:** employers value the skills and contributions of apprentices, and demand for MA places has remained strong. Employers who currently participate in MA programmes say retention levels are high compared with graduates. There is a need to explore employer demand for higher level and technical frameworks.

OBJECTIVE C
Simplify the skills landscape and improve the way in which the skills system responds to employer needs

Theme 3: Making the skills system more responsive

Building an accessible and responsive skills supply system is a fundamental objective for the SIP to deliver the skills required by industry.

Key areas to be addressed include:

- **review patterns of provision:** existing activity within the sector should be mapped with a view to obtaining more detailed supply side information relating to student numbers (across different geographies) and destinations, which can be compared to existing demand and future demand projections

- **enhance the availability and quality of FE data:** stakeholders observed a lack of FE data (particularly on student outcomes) compared to Higher Education (HE)

- **rationalise educational initiatives:** there is a need to simplify the range of educational initiatives, in conjunction with Education Scotland, as highlighted in the Commission for Developing Scotland's Young Workforce.

Theme 4: Skills infrastructure and coordination

Ongoing interaction between industry and education is vital to ensure that curriculum and provision reflects the current and future needs of the sector. A key recommendation of the Commission for Developing Scotland's Young Workforce report is to further enhance and strengthen two-way interaction between industry and the skills/education system. Businesses should be encouraged to actively participate in the curriculum and qualifications development process.

Key areas to be addressed include:

- **an industry-led skills leadership group:** a strategic approach to engagement with the sector is crucial given its importance to the Scottish economy. SDS has facilitated the creation of an industry-led skills partnership to ensure that the skills challenges and issues in the sector across Scotland are articulated by industry and addressed in collaboration with supply side providers

- **improve links between education and industry:** industry demand for engineering skills and needs to be collated systematically and communicated effectively to the education providers to build agility and responsiveness in the system. Good quality labour market information and forecast information needs to be tracked and communicated on a regular basis to supply side providers to keep abreast of changing skills demand

- **coordination of school activities:** a strategic approach is needed to manage the wide array of engineering initiatives that exist to promote and cascade messages about the sector. Stakeholders commented that this should be simplified and coordinated.

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Action plan

The action plan details the key actions that will be undertaken to support the growth ambition of the Scottish engineering and advanced manufacturing sector. It has been developed in conjunction with industry and other stakeholders in order to respond to the key skills priorities of the sector.

It has been designed to provide a framework for private and public sector intervention and the specific responses within the action plan will be accessible to engineering employers across Scotland, and will have a regional focus where a need for this is identified.

This includes existing activity which is either already underway or was already in the pipeline to take place. Activities have not necessarily been initiated as a result of the SIP, but are deemed to be an appropriate response to some of the skills issues which have been raised, to avoid duplication of effort and resources.

This has been developed around the four themes as set out in the last section:

• developing routes in to the industry

• better meeting employer demand

• making the skills system more responsive

• skills infrastructure and coordination.

A collaborative and joined-up approach is fundamental to the successful delivery of this strategy. This will involve a range of partners and industry working together to progress and implement the actions. In particular there will be an emphasis on industry input and industry-led interventions where appropriate.

"Over the next few years, replacement demand is expected to create employment opportunities for around 2,500 skilled people each year"

Theme 1: Developing routes into the industry

Action	Description	Expected outcomes	Key partners	Milestones
Improving awareness of engineering careers	Create an interactive exhibition area at Glasgow Science Centre (GSC) to bring to life STEM career opportunities, including in the engineering sector	Increase in awareness of the career opportunities within the sector	SDS, Industry, GSC	Underway
	Launch five awareness raising events for school pupils, using 'Building Better Futures' South Lanarkshire model	Increase in uptake of engineering programmes in FE and HE	SDS, DWP, Local Authorities (LAs), Industry	Q1 2015
	Support delivery of engineering initiatives in primary and secondary schools, enabling Young Engineers & Science Clubs to broaden its geographical provision in Scotland and Primary Engineer to formalise and accredit its teacher training	Increase in uptake of engineering related subjects such as physics and mathematics in schools	Primary Engineer, Young Engineers & Science Clubs, ADS, LAs, SSERC	Underway
		Teachers have an improved understanding of the sector and its career opportunities		
Encouraging more engineering graduates to enter the engineering sector	Provide industry relevant careers information, advice and guidance to undergraduates, highlighting career pathways and professional registration for engineers	Increase in number of employer-led career events and Professional Engineering Institutions visits to colleges and universities	Industry, FE, HE Professional Engineering Institutions, Regional Fora	Q3 2015
	Employers to collaborate with colleges and universities to offer industry relevant projects, placements, internships for students	Increase in number of live projects, placements, internships for students	ESLG, Scottish Engineering, Enginterns	Q4 2014
		More engineering graduates enter the sector		
Addressing the gender imbalance in engineering sector	Promote engineering as an exciting career for girls as well as boys to pupils and teachers in primary and secondary schools	Increase in numbers of females choosing subjects such as physics and mathematics relevant for engineering	SDS, Primary Engineer, Young Engineers & Science Clubs, ADS Scotland	Q4 2014
	Support project to get more women into engineering – and to return to engineering – and harness the full talents of those already there, creating positive changes in employment practices and workplace cultures which benefit everyone	Increase in number of women taking up engineering and technology subjects in FE and HE	Equate, SEMTA, SDS	
		Improvement in retention rates for women in the sector		

Theme 2: Better meeting employer demand

Action	Description	Expected outcomes	Key partners	Milestones
Improving work readiness of market entrants	Enhance and extend current provision of placements/internships by employers to colleges and universities	Industry cites less skills issues with engineering graduates	Industry, FE, HE, SDS	Q4 2014
	Offer more opportunities to gain industry relevant experience through placements, live project briefs, internships, to build on engineering skills as well as soft skills	Increase in number of employers offering work placements and internships	Scottish Engineering, FAMES, Regional Fora, Enginterns	Q4 2014
		Improvement in quality of work placements and internships		
Developing capacity of SMEs	Arrange four awareness raising events (through Scottish Engineering) for SMEs to improve their understanding of a graduate's capability	Increase in the number of SMEs participating in education related activities	SDS, Scottish Engineering, Regional Fora	Q2 2015
	Promote the opportunities and benefits of working for SMEs to students and apprentices	Increase in the number of SMEs recruiting MAs and graduates	SME employers	Q4 2016
	Prepare the next generation of managers and leaders in the sector by developing career pathways	Increase in the number of SMEs offering professional registration route to new recruits	Professional Engineering Institutions	Q4 2016
		Increase in the number of SMEs offering placements and internships	Enginterns, FE, HE	Q2 2015
Promoting Modern Apprenticeships in Engineering	Encourage wider employer participation in the engineering MA frameworks through a targeted promotional campaign	Awareness levels increased	SDS, SEMTA Scottish Engineering, FAMES, Regional Fora	Q2 2015
		Increase in number of employers participating in engineering MA programmes		
		Shared apprenticeship models make it simpler for SMEs to engage MAs		
		Reduction in the number of engineering businesses citing unfilled vacancies		
	Establish new advanced level MA frameworks for engineering in response to industry need	Industry gets the higher level skills required at an earlier stage in the training process	SEMTA, employers, training providers, LAs	Q3 2016
	Establish foundation apprenticeships in senior phase in up to three pilot locations in Scotland		SDS, LAs	

Theme 3: Making the skills system more responsive

Action	Description	Expected outcomes	Key partners	Milestones
Reviewing patterns of provision	Undertake a comprehensive mapping exercise to understand the supply of FE and HE, retention rates and graduate destinations	Better understanding of the skills supply pipeline Evidence to inform skills investment decisions	SFC, HE, FE	Q1 2016
	Increase capacity of providers to deliver more apprenticeships	Better alignment of supply and demand, at graduate and technician level		Q3 2015
Enhancing availability and quality of FE data	Build the evidence base and improve understanding of FE outcomes and destinations of leavers	Improvement in availability of data	SFC, FE	Q4 2016

Theme 4: Skills infrastructure and coordination

| Action	Description	Expected outcomes	Key partners	Milestones
Establishing an engineering skills group	Create an industry-led skills leadership group to articulate skills challenges and issues faced by the sector and oversee the implementation of the SIP's key priorities and actions	Present a unified voice on skills challenges and priorities across the sector	Industry bodies, Employers, SEMTA, SE, HIE, SDS	ESLG established Oct 2013
Improving links between education and industry	Increase the number of engagements and collaboration between industry and education through the Engineering Skills Leadership Group Share labour market intelligence reports on a regular basis to ensure that any surges in demand (either in the sector or in others which compete for recruits) are identified and a response developed promptly	Industry has better understanding of education and skills provision and the skills supply system has a better understanding of industry requirements Industry cites less instances of skills gaps and shortages	ESLG, Industry, SDS, HE, FE, SEMTA, LAs, FAMES, Regional Fora	Q1 2015
Coordinating school activities	Undertake mapping exercise of existing school activities Investigate where school activities can be simplified	Provide a more coordinated and simplified landscape for employers and schools Activities mapped to CfE	Industry, Education Scotland, SDS, SSERC, Initiatives, LAs	Q2 2015

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Monitoring and implementation

The action plan will be delivered under the guidance of the engineering skills leadership group, who will also have a role in monitoring its success and impact.

The coordination and delivery of the SIP will be led by the SDS engineering sector manager and overseen by the engineering skills group. Specifically SDS will facilitate the following:

- coordinate the range of activities in support of the action plan and report on progress to the skills group

- develop a performance framework including indicators of success to monitor progress of individual actions, as well as the overall performance of the SIP

- where required, secure resources to support the implementation of activities set out in the action plan

- coordinate the delivery of specific projects through working in partnership with industry and public agencies to ensure that they are delivered in areas of need.

It is proposed that a formal review of the SIP and action plan will be undertaken 18 months after the launch of the document and a statement of progress will be produced by SDS on behalf of the skills leadership group.
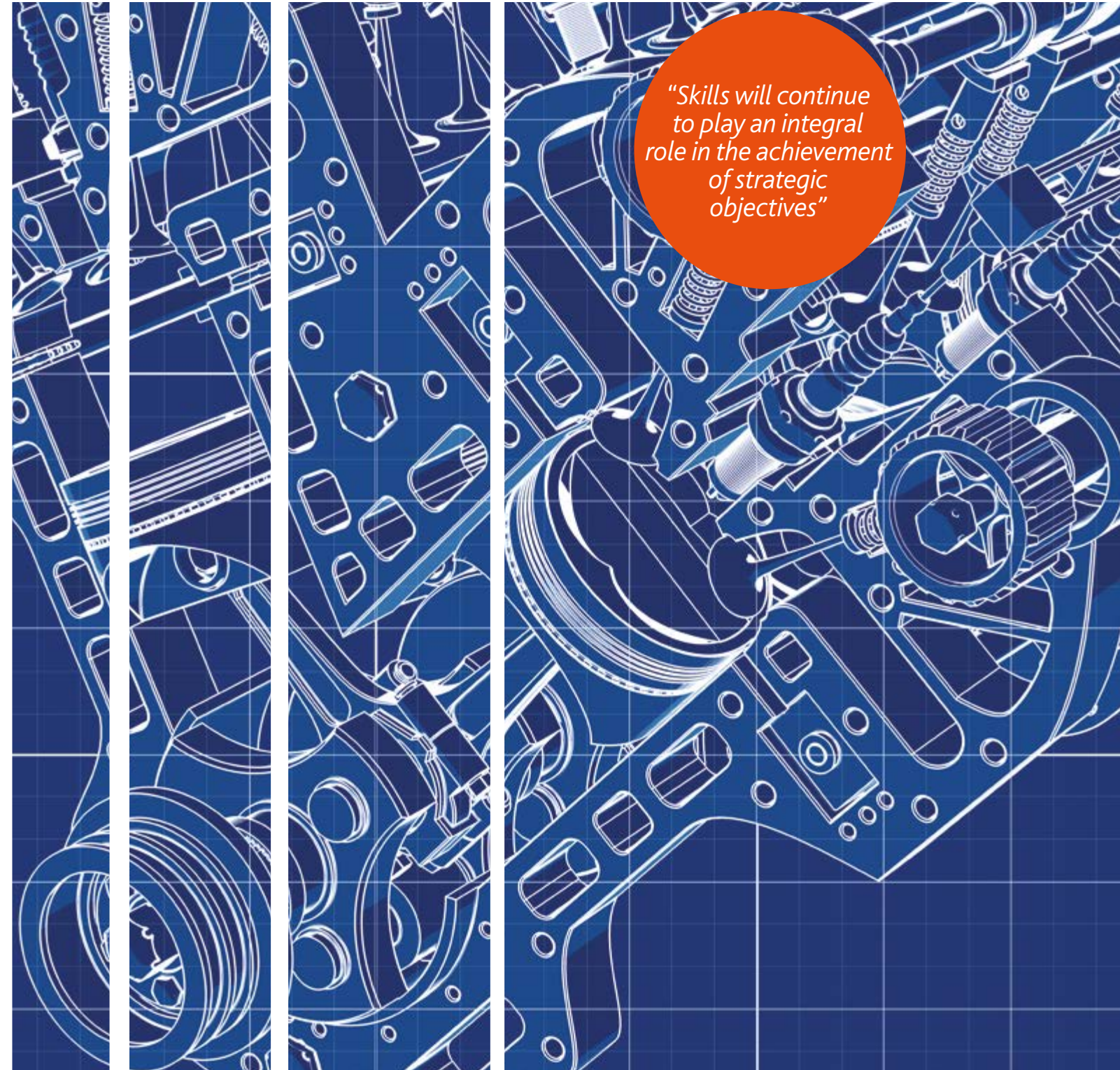
"Skills will continue to play an integral role in the achievement of strategic objectives"

Appendix 1 - SIP development process

The development of the engineering SIP has been an industry and employer-led process which was facilitated by Skills Development Scotland. The development of the SIP has involved an extensive programme of primary and secondary research including:

- agreeing with partners definition of the sector that describes to nature of the sector and aligns with those used to develop other SIPs

- a review of published research including an analysis of skills supply data and destinations of graduates and drawing insights from an extensive survey of over 200 employers (on graduate recruitment and employment)

- validation of findings with industry.

The SIP has benefitted from extensive consultation with employers and employer-led bodies such as the Technology Advisory Group (ILG), the Aerospace, Defence and Marine group (ILG), the Scottish Manufacturing Advisory Service (SMAS), the Glasgow Economic Leadership's Engineering Design and Manufacturing Group and the Forum for Advanced Manufacturing and Engineering Skills (FAMES).

More than 15 universities, colleges and training providers were also consulted with during the development process. The SIP benefitted with advice from our close working partners including the Enterprise Agencies, the Funding Council, and SEMTA (SSC for Engineering).

Appendix 2 - Defining the sector

A review of industry documents highlighted that there is a lack of consistency on how the Engineering sector is defined. Engagement with partners and industry representatives indicated that Standard Industrial Classification (SIC) codes[10] should be used to define the sector as it would allow for comparison over time. Scottish Government's growth sector statistics are also reported using SIC (2007) codes.

A total of 137 SIC codes covering Manufacturing, Energy, ICT, Construction and Consultancy were considered at the start of the process. Some SIC codes were then included or excluded from this list depending on a number of factors:

- areas which were seen to not focus predominantly on engineering

- areas which were seen to overlap with existing / planned SIPs mainly Energy, ICT and Construction (to avoid double counting).

After this process a total of 100 SIC codes remained. This is similar to the SEMTA definition of the engineering sector. The final list of SICs that are 'in scope' of our definition are summarised below:

- SIC 24: Manufacture of basic metals

- SIC 25: Manufacture of fabricated and metal products

- SIC 25: Manufacture of computer, electronic and optical products

- SIC 27: Manufacture of electrical equipment

- SIC 28: Manufacture of machinery and equipment not elsewhere classified

- SIC 29: Manufacture of motor vehicles, trailers and semi trailers

- SIC 30: Manufacture of other transport equipment

- SIC 33: Repair and installation of machinery and equipment

- SIC 71: Architectural and engineering activities: technical testing

- SIC 72190: Other research and experimental development on natural sciences and engineering

- SIC 13940: Manufacture of cordage, rope, twine and netting

- SIC 38310: Dismantling of wrecks.

[10] SIC codes are used to classify business establishments by the main type of economic activity in which they are engaged.

Appendix 3 - Evidence tables

Table 1: EU students studying for a qualification in an Engineering and Technology subject at a Scottish HEI (2006/07 to 2010/11)

2006/07	2007/08	2008/09	2009/10	2010/11	changes
14,170	14,207	14,326	15,512	15,966	13%

Source: HESA

Table 2: Number of students at Scottish colleges classed as studying a subject within dominant programme group (Engineering 2006/07 to 2011/2012)

Level of study at college	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	% change
Higher Education*	3,133	3,572	3,919	4,202	4,324	4,284	37
Further Education**	17,615	23,061	22,621	20,821	19,613	15,916	-10
Total	20,748	26,633	26,540	25,023	23,937	20,200	-3

Source: SFC Infact Database

*Note: SFC refers to 'Higher Education' as study at college with the aim of achieving Higher National (HN) units or greater,
**Further Education is study with the aim of SVQ/NVQ level 3 or lower).

Table 3: Number of Modern Apprenticeship (MA) starts 2008-2013

Year	Number of engineering MA starts
2008/2009	1,340
2009/2010	1,038
2010/2011	943
2011/2012	1,209
2012/2013	1,429

Source: SDS

Table 4: Number of active enterprises by size of business (2012)

No of employees	No of businesses
0 employees	6,725
1-49 employees	5,950
50-249 employees	450
250+ employees	180
Total number of registered enterprises	13,300

Source: Scottish Government (Business Activity)

Table 5: Employment in engineering sector 2008-2011 (based on 5-digit SIC definition)

Year	Employment
2008	137,131
2009	130,953
2010	121,389
2011	126,723

Source: ONS – BRES (2011)

Table 6: Engineering turnover and GVA – contribution by 2-digit SIC (2008-2010)

Year	Turnover (£bn)	% of Scotland	GVA (£bn)	% of Scotland
2008	22.3	8.8	9.2	8.9%
2009	21.2	8.9	9.3	9.9%
2010	20.1	8.1	8.7	9.0%

Source: SABS 2010 (Released by Scottish Government, 2012)

Appendix 4 - References

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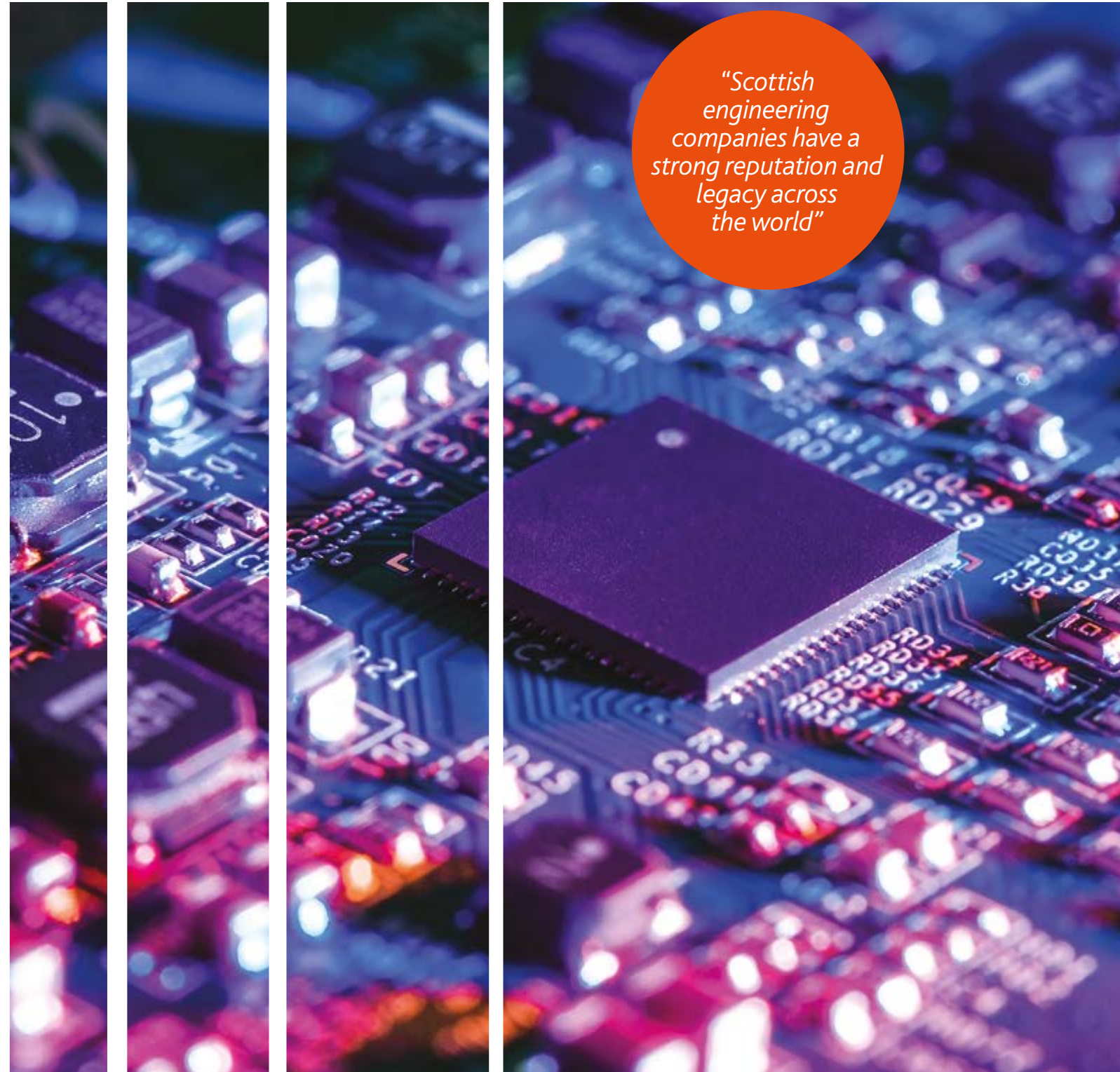*"The sector has 13,300 employers, equating to 8% of all enterprises in Scotland"*

"Scottish engineering companies have a strong reputation and legacy across the world"