



# Future of manufacturing Ireland: Policy developments on apprenticeship

*Adaptation of national apprenticeship systems  
to advanced manufacturing*

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## Contents

Introduction .....	1
Scope of the research .....	1
Key terms at a glance .....	1
Economic and labour market context .....	3
Economic and employment role of manufacturing and key trends .....	3
Overview of industrial policy initiatives addressing advanced manufacturing .....	4
Employment and training challenges linked to technological change and automation .....	5
Overview of the apprenticeship system .....	5
Definition of apprenticeship .....	5
Regulatory framework and institutional context .....	7
Financing the apprenticeship system .....	8
Key actors involved and their governance role .....	9
Statistical data and trends .....	11
Key challenges .....	14
Apprenticeship policy and practice in the manufacturing sector .....	15
Apprenticeships in the manufacturing sector .....	15
Strengths and weaknesses of the system .....	15
Key requirements arising from technological and other changes in manufacturing .....	16
Advanced manufacturing: mapping reform processes and adjustments .....	17
Commentary and conclusions .....	19
References .....	20
Annex 1: Glossary .....	21
Annex 2: List of consulted national experts and stakeholders .....	22

## Introduction

### Scope of the research

This country report is part of the study ‘Policy developments and practices of apprenticeships in selected EU Member States and world competing regions’ carried out in five EU (Denmark, Germany, France, Ireland and Italy) and two non-EU countries (Australia and the USA). This study is conducted in the frame of the Pilot Project ‘The Future of Manufacturing’, proposed by the European Parliament and delegated to Eurofound by the European Commission (Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs).

One of the objectives of this study is to provide an analytical overview of apprenticeship systems in the selected countries and to review changes to the current systems following labour market shifts, changes in employment, career and mobility patterns and technological and structural change. Particular emphasis is placed on the impact of new technologies and the need for a high skilled and adaptable workforce in manufacturing and advanced manufacturing.

This research is carried out in response to the increasing interest in apprenticeships among policy makers to tackle skills mismatches but also to integrate young people into the labour market. The appeal of apprenticeships is also growing particularly in a context where new technologies are transforming work organisation and production processes across all sectors, particularly manufacturing.

The findings from this research will feed the policy discussions around the role of apprenticeships for the future of manufacturing and inform policy making in the context of current or planned reform of apprenticeship systems and the necessary links to be established between education/training and industrial policies.

### Report structure

With a view to investigating country specific issues, the first section outlines the wider economic and labour market context in which the national apprenticeship system operates. The links between education/ training and industrial policies are also explored.

The second section describes the key features of the national apprenticeship system, including the regulatory framework, the governance structure, and the financing mechanisms and it provides some statistical data on apprenticeships and pinpoints the key challenges to the implementation and the development of the current apprenticeship system.

The focus of the third section is on the specific role of apprenticeships in relation to the advanced manufacturing industry in Ireland. It examines the main requirements arising particularly from technological change in manufacturing and it explores recent reforms on apprenticeship systems together with the key drivers behind these policy changes. In doing so, it identifies success factors and barriers to the implementation and the development of the current apprenticeship provision.

This country report is based on a literature and document review, as well as on qualitative semi-standardised interviews with selected key actors and stakeholders, namely the Apprenticeship Council, the Irish Business and Employers’ Confederation, Jones Engineering Group, the Services Industrial and Professional Union, the Further Education and Skills Service and the Technical Engineering and Electrical Union (see list of consulted stakeholders in annex 2).

### Key terms at a glance

Ireland has a well-regarded system of apprenticeship training and is proud of the fact that it has produced the winner of a gold medal in the World Skills competition on the last four occasions in

a manufacturing category - Aircraft Maintenance, in Calgary (2009), London (2011), Leipzig (2013), and Sao Paolo (2015).

The Irish apprenticeship system has its roots in Articles 27 to 36 of the Industrial Training Act (1967) and following a recent review process is increasingly emphasising the importance of an industry-led approach to apprenticeship training. The *2013 Review of Apprenticeship Training in Ireland* has recently redefined the term ‘apprenticeship’, as a programme of structured education and training which formally combines and alternates learning in the workplace with learning in an education or training centre. In addition, the following criteria should pertain: at least two years duration; a minimum of 50% on-the-job training; apprentices are employed and paid under a contract of apprenticeship; the training should be substantial in depth and duration, in order to prepare apprentices to work autonomously and competently in a specific occupation (Department of Education and Skills, 2013)

The concept of ‘higher apprenticeship’ is not recognised as such, but an apprenticeship qualification could be placed on the Irish National Framework of Qualifications at Levels 5-10 – equivalent to Levels 4-8 on the European Qualifications Framework (EQF).

Ireland has traditionally offered a limited number of 27 designated craft apprenticeships, some of which are located in part or in full in the manufacturing sector. In its *Action plan for Jobs 2017* the Irish government plans to strengthen the apprenticeship system, provide more apprenticeships and increase the number of apprenticeship registrations, and this will target specific labour market needs in the manufacturing and advanced manufacturing sectors.

In Ireland manufacturing is described as ‘the making of things’. According to a report, commissioned by Forfás which until August 2014 was the national policy advisory board for enterprise, trade, science, technology and innovation in Ireland, manufacturing encompasses:

*‘a broad range of activities from research and development through design, production, logistics and distribution to marketing and after sales services. The Irish definition recognises that activities across the supply chain may be located in different countries and undertaken by different companies across the world, where it makes most strategic or economic sense. Within this context, this strategy emphasises the importance of retaining a focus on production – the making of things - at the core.’*

(Forfás, 2013, p. 4)

In Ireland the term ‘advanced manufacturing’ is not used as such, but there is an understanding that ‘*by 2020 manufacturing will be different from what it is today*’ (Forfás, 2013, p. 5) and that factories will be smart, virtual and digital. Although, according to the report, these concepts relate to a far too distant (and unrealistic) future for many manufacturers in Ireland,

*‘the fact is that Lean Principles, Sustainable Manufacturing and the pervasive use of ICTs cannot be ignored by any manufacturing firm in operation today – regardless of scale or ownership.’*

(Forfás, 2013, p.5)

## Economic and labour market context

### Economic and employment role of manufacturing and key trends

Ireland is not considered elsewhere as one of the leading manufacturing countries, but manufacturing is a critical component of the Irish economy. It provides employment, directly or indirectly, for a significant part of the workforce, across a broad range of occupations, from operatives, technicians and skilled workers to engineering and technology professionals, and, moreover, throughout the whole of Ireland. It is a major source of exports and a key driver of research, development and innovation. It has sourced significant quantities of materials and services from Irish-based suppliers and in this way has been a driver for economic development in Ireland (Forfás, 2013).

Over time, as can be seen from the Eurostat data in table 1, the number of enterprises has declined significantly from 2008 to 2013.<sup>1</sup> According to the latest figures (2015) provided by the Irish Central Statistics Office (CSO), the top 50 industrial enterprises by value in Ireland represented almost three quarters of the overall net selling value, which means that the manufacturing sector in Ireland is heavily reliant on a very small number of enterprises (Central Statistics Office, 2016).

Turnover in manufacturing declined until 2010, improved slightly for 2011 and 2012 and then declined again (table 1). The most important sector is pharmaceuticals, followed by food, chemical and computers. These four sectors account for 80% of turnover. The dominance of the chemical and pharmaceutical sectors has increased steadily and accounts for 51.5% of turnover in the manufacturing sector in 2015. The absolute value of the food sector has increased steadily since 2013, but its share of total turnover has fallen over the same period (Central Statistics Office, 2016). The number of persons employed has declined significantly but seems to have stabilised, according to 2012 and 2013 data<sup>2</sup>.

*Table 1: Number of enterprises, turnover and persons employed in the Irish manufacturing sector*

	2008	2009	2010	2011	2012	2013 (p)	2014 (b)	2015
<b>No. of enterprises</b>	4,989	4,449	4,161	4,516	3,998	4,056	14,628	:
<b>Turnover in billions €</b>	106	100	97	102	102	99	117	:
<b>No. of persons employed in thousands</b>	195	174	165	167	159	161	190	:

*Note: p = provisional, b = break in time series, n.a. = not available<sup>3</sup>.*

*Source: Eurostat: Annual detailed enterprise statistics for industry NACE section C20*

<sup>1</sup> The numbers for 2014 are difficult to interpret and the data for 2015 are not available yet.

<sup>2</sup> It is considered that one person directly employed in manufacturing creates employment for one person outside the sector.

<sup>3</sup> The delay in producing Irish statistics for manufacturing may be explained that at the national level the aggregate is industrial production, which includes mining and quarrying. According to employment figures for the 4<sup>th</sup> quarter of 2015, manufacturing makes up 89.8% of the total figure for industrial production (SOLAS, 2016a, p.30).

Given that ‘advanced manufacturing’ is not a readily used concept in Ireland, it is not possible to identify trends in the number of enterprises, turnover and the number of persons employed for this area of the economy. When presenting its statistics, Eurostat does not use the expression ‘advanced manufacturing’ as such, but high-technology manufacturing, which it defines as

*‘statistics on high-tech industry and knowledge-intensive services comprise economic, employment and science, technology and innovation (STI) data describing manufacturing and services activities, products traded and patents applied selected on the basis of their technological intensity.’*

*(Eurostat, 2016)*

On that basis it shows that since 2008 the number of high-tech enterprises has declined, turnover has yo-yoed, and, in spite of the fallout from the financial and economic crisis, the number of persons employed has declined initially and then remained more or less stable (Table 2).

*Table 2: Number of enterprises, turnover and persons employed in the Irish high-technology manufacturing sector*

	2008	2009	2010	2011	2012	2013	2014	2015
<b>No. of enterprises</b>	186	177	166	184	168	165	:	:
<b>Turnover in billions €</b>	49	55	47	50	44	40	:	:
<b>No. of persons employed in thousands</b>	60	58	58	55	56	57	57	61

*Source: Eurostat, Employment, economic data and enterprises in high tech manufacturing, htec\_eco\_ent2, htec\_eco\_sbs2, htec\_emp\_nat2  
: = not available*

SOLAS, the national authority which is responsible for funding, planning and co-ordinating further education and training in Ireland, takes a slightly different approach, using the term - ‘*manufacturing employment by technological intensity*’. In 2015, 62,800 persons were involved in high technology (28%); 39,200 in medium-high technology (18%); 35,400 in medium-low technology (16%); and 85,600 in low technology (38%). When compared to the same period five years before, there was an increase in manufacturing employment in all intensity levels, particularly in medium-high manufacturing (6.4%), followed by medium-low level (4.6); high-level (4.0%); and low-level (2.4%). Employment in high and medium-high level technology manufacturing was most prevalent in the pharmaceutical sector (38,100), in machinery and equipment (28,800) and in computer, electronic and optical (24,700) (SOLAS, 2016).

## **Overview of industrial policy initiatives addressing advanced manufacturing**

As part of its preparations for the Action Plan for Jobs 2012, the Irish government commissioned the report *Making it in Ireland: Manufacturing 2020*. The report highlighted the need to concentrate on four areas – redressing perceptions of manufacturing; addressing barriers to growth; undertaking a national step change initiative to strengthen Ireland’s manufacturing base; and improving infrastructures. This national step change initiative is to be built on four pillars -

enhancing productivity and competitiveness; improving connections to the customer and extending its international reach; broadening and deepening its innovative capabilities; and strengthening collaborative actions for economic growth.

The success of this approach would be measured by increasing the following:

- the levels of employment in manufacturing (which stood at + 11,000 net direct jobs in 2012), up to 22,000 in 2016 and 21,000 from 2017 to 2020; and levels of productivity (which was 5.6% on average over the 2007-2010 period), up to 6-8% annually by 2020
- the level of expenditure on research and development (which stood at 1.6% in 2011), up to 2% by 2020; the number of enterprises spending more than 250,000 euros per year on R&D, up from 20% in 2011 to 30% in 2020; the percentage of sales attributable to new product development up from 7.4% in 2011, to 7.5% to 10% by 2020
- Ireland's international reach by improving export intensity – up from 48% in sales in 2011 to 55% in 2020
- inter-enterprise linkages and sourcing and increasing the number of companies engaged in in R&D collaboration, up from 35% in 2009/2010 to 50% in 2020 (Forfás, 2013).

## **Employment and training challenges linked to technological change and automation**

Following on from the publication of the report *Making it in Ireland: Manufacturing*, Forfás and the Expert Group on Future Skills Needs produced a complementary report *Future Skills Requirements of the Manufacturing Sector to 2020*. It highlighted the fact that

*'lean manufacturing techniques and increasing automation are driving upskilling requirements for both generic skills and technical skills across virtually all occupations'*

and that

*'modern statistical software and more complex and sometimes novel manufacturing processes are together generating opportunities to use more sophisticated data analytic techniques in support of lean manufacturing, automated manufacturing processes and manufacturing process R&D'*

It concluded that there were skills shortages in manufacturing, 'though not of significant scale'. However, the shortages may be critical at an operational level to manufacturing firms, and '*it is therefore vital that they are addressed*' (Forfás and Expert Group on Future Skills Needs, 2013, pp. 2, 12).

## **Overview of the apprenticeship system**

### **Definition of apprenticeship**

Initial VET in Ireland includes the provision of apprenticeships which correspond, for the most part, to the Cedefop definition:

*'systematic, long-term training alternating periods at the workplace and in an educational institution or training centre, which leads to a qualification. An apprentice is contractually linked to the employer and*



*receives remuneration (wage). An employer assumes responsibility for the company-based part of the programme’.*

(Cedefop, 2015)

In Ireland it is systematic, long term training alternating periods at the workplace and in educational institution – apprenticeships have a minimum duration of two years, but often last three to four years, and the majority of the training is on-the-job, with substantial blocks of off-the-job training. Apprentices have a written contract with an employer and are paid a percentage of the wage of a skilled worker which is negotiated by the social partners and which increases as the apprenticeship progresses. The employer is not alone in taking on this responsibility, as VET institutions run by the Education and Training Boards and Institutes of Technology are also involved. Moreover successful apprenticeships lead to a nationally recognised qualification.

Ireland has traditionally offered a limited series of designated craft apprenticeships which in Ireland are classified in five different so called ‘families’, as follows:

- **construction:** brick and stonelaying, carpentry and joinery, floor and wall tiling, painting and decorating, pipefitting, plastering, plumbing, stone cutting and stone masonry and wood manufacturing and fitting
- **electrical:** aircraft mechanics, electrical, electrical instrumentation, electronic security systems, instrumentation and refrigeration and air conditioning
- **engineering:** farriery, industrial insulation, mechanical automation and maintenance fitting (MAMF), metal fabrication, sheet metalworking and toolmaking
- **motor:** agricultural mechanics, construction plant fitting, heavy vehicle mechanics, motor mechanics and vehicle body repairs
- **printing sector:** print media.

In May 2013, the Minister for Education and Skills announced a review of apprenticeship training in Ireland. Its terms of reference were

*‘to determine whether the current model of apprenticeship should be retained, adapted or replaced by an alternative model of vocational education and training for apprentices – taking into account the needs of learners, the needs of employers, the needs of the economy and the need for cost effectiveness into the future.’*

(Department of Education and Skills, 2013a, p.5)

A Review Group was established. It addressed directly 128 stakeholders – VET institutions, government departments, trade unions and professional bodies – and received 69 written responses, which were analysed and then formed the body of a number of subsequent recommendations.

It proposed, among other things, that new governance arrangements including the appointment of an enterprise- led Apprenticeship Council hosted by SOLAS with close cooperation from the Higher Education Authority should be established – this formed the basis of the Further Education and Training Act 2013.

It also proposed a review of existing apprenticeship curricula and a move away from a generic placement at level 6 – this is underway and it has produced two new apprenticeships which are

placed on level 7 on the Irish National Framework of Qualifications (polymer processing, technologist and industrial electrical engineer).

It favoured the expansion of the apprenticeship model into a range of new enterprise sectors - this is underway in insurance and international financial services.

It supported a call by the Apprenticeship Council for proposals from consortia of employers and education and training providers to develop new apprenticeships, supported by a ring-fenced fund – this has led to a decision to move ahead with 23 new apprenticeships in the first instance and the continuance of the allocation to be kept within the National Training Fund.

It agreed that new proposals should be assessed in terms of sustainability – this now forms part of the apprenticeship approval criteria.

It proposed that recruitment to apprenticeship should still be the responsibility of approved employers, but that there should be greater planning control of quotas for different apprenticeships – specific target registration numbers for apprenticeship programmes and apprentices up to 2020 are included in the SOLAS Action Plan to expand apprenticeship and traineeship in Ireland 2016-2020.

It agreed that apprentices should continue to be paid both on- and off-the job, with no reduction in earnings during periods spent in education and training institutions – this continues, even though employers will not be able to claim back the money to be paid to apprentices on ‘new’ apprenticeships for the off-the-job period of training (Department of Education and Skills, 2013a).

These recommendations led, in part, to the definition of apprenticeship which was presented in the introduction to this report, as follows:

*‘a programme of structured education and training which formally combines and alternates learning in the work place with learning in an education or training centre. In addition, the following criteria should pertain: at least two years duration; a minimum of 50% on-the-job training; apprentices are employed and paid under a Contract of Apprenticeship; the training should be ‘substantial in depth and duration, in order to prepare apprentices to work autonomously and competently in a specific occupation.’*

(Department of Education and Skills, 2013a)

## **Regulatory framework and institutional context**

The roots of the regulatory framework for apprenticeship training in Ireland are to be found in Articles 27 to 36 of the Industrial Training Act (1967). The overall consensus which emerged from the review was that any legislation should be in the form of an enabling framework which:

- did not require each apprenticeship to be individually designated by Parliament
  - set out the criteria for governing apprenticeships
  - provided for key protections for the apprentice and clarified his/her employment status
  - provided opportunities for the development of a variety of modes of delivery
  - presented the rights and obligations of the different stakeholders
  - ensured that all apprenticeships were covered by an approved contract of apprenticeship.
- (Ministry for Education and Skills, 2013, pp.74-75)

The criteria for governing apprenticeships are set out, as follows:

- The Further Education and Training Act 2013 established SOLAS (*An tSeirbhís Oideachais Leanúnaigh agus Scileanna*, Further Education and Skills Service), which has taken over the administration of the Irish apprenticeship system from the Training and Employment Authority (*An Foras Áiseanna Saothair*, FÁS). It also set up the 33 Vocational Education Committees, which had been in operation since 1930, would be wound up, and following the adoption of the Education and Training Boards Act 2013 16 regional bodies (Education and Training Boards, ETBs) were established, to take responsibility for curriculum development and programme delivery, under the authority of SOLAS.
- The Qualifications and Quality Assurance (Education and Training) Act 2012 established the Quality and Qualifications Ireland (QQI), which is responsible for maintaining the National Framework of Qualifications (NFQ) (Quality and Qualifications Ireland, 2017) and for the external quality assurance of further and higher education and training.
- The other relevant element of the regulatory framework is the National Training Fund Act 2000. Employers are required to pay a mandatory levy, equivalent to 0.7% of their payroll, into the National Training Fund. This levy is collected from all companies as part of their State Universal Social Charge. The money collected is used to fund training schemes and programmes for the employed (including apprenticeship training) and for those seeking employment.

### **Financing the apprenticeship system**

Financing of apprenticeship training in Ireland is shared between employers and the public authorities and thus bears witness to a high level of public-private partnership. Generally, the employers fund the on-the-job training, primarily apprentices' remuneration and social security contributions, and the time of the in-company mentors; and the public authorities fund the off-the-job training and the costs of VET institutions (via the ETBs).

A significant cost for employers is the remuneration of apprentices. Apprentices' pay is negotiated by social partners at the sectoral level and it is a percentage of the gross wage norms for skilled workers payable in the different trade sectors. So apprentice electricians, for example, receive 30% of the national rate for skilled workers in their sector in the 1<sup>st</sup> year; 45% in the 2<sup>nd</sup> year; 65% in the 3<sup>rd</sup> year; and 80% in the 4<sup>th</sup> year – as of January 2017, this comes to €6.53 per hour; €9.79; €14.15; and €17.41 respectively.

Another significant cost for employers is the mandatory levy paid to the National Training Fund. The fund generated approximately €382 million in 2016, and this would be enough to fund the operation of the apprenticeship system in full. However, the fund supports other activities, and only approximately €55 million is deployed to cover costs linked to apprenticeship training (Irish government, 2017, p. 26).<sup>4</sup>

Employers receive little in the way of incentives from public authorities, nor from the National Training Fund, to support apprenticeship training. They receive a subsidy for the wages of designated craft apprentices who are engaged in the off-the-job training and who are thus unable to participate in the production process. However, this incentive is denied to employers of all 'new' apprentices, who are required to pay the wages of apprentices during both periods – on- and off-the-job, without any subsidy. Clearly the public authorities did not want this to be a burden on the public purse. In addition employers of designated craft apprentices may receive a total grant of €2,667 for each female apprentice recruited, in order to promote the entry of women into the craft apprenticeships. However, given the numbers involved, this is not expected to place a heavy burden on the public purse.

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<sup>4</sup> The 2017 estimates are €405 million and €80 million respectively.

A new and comparatively unusual development in terms of funding is the requirement for apprentices enrolled on 'new' apprenticeships to pay fees for the off-the-job training, if this takes place in an Institute of Technology, which generally charge a fee of €3,000 per person per year for all their courses. It has however been decided that the fee for apprentices will be pro rata, and so has been fixed at €1,500 per year.

### **Key actors involved and their governance role**

The overall responsibility for the design and implementation of the Irish apprenticeship training policy lies with the Ministry of Education and Skills.

SOLAS, which was established in 2013, has overall responsibility for the promotion, planning, co-ordinating, funding and monitoring of the implementation of the Irish apprenticeship system. It maintains a national register of apprentices for the purpose of planning and management of overall apprenticeship numbers. It also maintains a publicly accessible national database of employers approved for apprenticeships, based on data provided by the ETBs.

QQI, which was established in 2012, is responsible for the external quality assurance of all further and higher education and training, including apprenticeship programmes. Training providers seeking access to QQI awards first have to establish quality assurance procedures in line with QQI guidelines and submit them to QQI for approval.

ETBs, which were established in 2013, manage and operate further education colleges that provide the off-the-job training for apprenticeships (ETBI, n.d.).

The Apprenticeship Council, which was established in 2014, is responsible for:

- developing a call for proposals for apprenticeships in areas outside of the current trades;
- examining and analysing the proposals arising from the calls for proposals;
- reporting to the Department of Education and Skills on viable new apprenticeships - having particular regard to the sustainability of the proposals received;
- monitoring the development by industry and education and training partners of the successful proposals into new apprenticeships, including the curriculum development, awarding arrangements, duration and entry level (SOLAS, 2016c).

The National Apprenticeships Advisory Committee remains responsible for the implementation of the designated trade apprenticeships.

At the time of the discussion regarding the Review of Apprenticeship Training, there was no consensus that social dialogue should be formally present throughout the system, in spite of comments made by Peter Rigney, the representative of the Irish Confederation of Trade Unions at the joint parliamentary hearing of the Committee on Education and Social Protection: *'there is ample evidence that the governance of vocational education and training systems works best when it is structured on a tripartite basis which focuses on ensuring the relevance of training offered and anchoring the training system to the enterprise stakeholders'* (Kildarestreet, 2014).

Social dialogue between employers and their associations and trade unions on the subject of apprenticeship training is limited. The social partners – employers' associations and trade unions - are represented on the Board of the Apprenticeship Council, along with representatives of training providers, and on the National Apprenticeships Advisory Committee. Employers, along with training providers, but not trade unions, are also represented on the Boards of SOLAS and QQI.

One of the best ways to understand what the key actors do is to follow the development of a qualification in the Irish system as illustrated by figure 1 below. The process starts off with an indication of skills needs; then develops and approves, among other things, an occupational

profile, standards, curriculum and assessment; then approves the validation and quality assurance of the apprenticeship programme; and finally the apprenticeship is ready to be launched, as follows:

- Step 1: apprenticeships are employer-led in Ireland, and the industry-led consortium is required to provide evidence of demand for an apprenticeship proposal on the basis of the anticipation of skills needs.
- Step 2: the Minister for Education and Skills is required to assess and approve the proposal for development. This is done with the support of the Apprenticeship Council, which is made up of representatives of employers' association, trade unions and training providers.
- Step 3: SOLAS, the public agency responsible, *inter alia*, for apprenticeship training, the Higher Education Authority and the Apprenticeship Council approve the development of the project plan and allocate the funding.
- Step 4: the industry-led consortium develops the programme, which should contain the occupational profile, the programme and standards including the curriculum and assessment; quality assurance for the on- and off-the-job training; and apprenticeship programme administration – in addition the industry-led consortium is required to provide key documents, such as the professional award type descriptors, the validation policies and criteria and the quality assurance guidelines for the apprenticeship.
- Step 5: the Apprenticeship Council reviews and approves the occupational profile, ensuring that there is no overlap with existing apprenticeships.
- Step 6: Quality and Qualifications Ireland, which is responsible for the external quality assurance of further and higher education and training, approves the validation and quality assurance of the apprenticeship programme.
- Step 7: SOLAS creates the Industrial Training Order.
- Step 8: SOLAS and, where appropriate the Higher Education Authority, agree the implementation plan and budget.
- Step 9: SOLAS approves the registration for apprentices presented by the employer.
- Step 10: the industry-led consortium launches the apprenticeship

Figure 1: National apprenticeships development in Ireland



Source: SOLAS (2017)

### Statistical data and trends

There was an expansion in the number of apprenticeship registrations, from 16,125 in 1998 to 29,801 in 2006 (Cedefop, 2008). However, as can be seen from table 3, since the onset of the financial and economic crisis, there has been another crisis in Ireland - in the area of apprenticeship training. The number of apprentices registrations, that is the number of apprentices with a formal contract, fell drastically overnight, as it were, from 2008 to 2009, declined again in 2010, 2011, 2012 and 2013, before gradually increasing in 2014 and 2015. Although recent comparative figures are unavailable, figures for 2008-2009 show the number of apprentices per 1,000 employees in Ireland was already low overall (11), as was the case in England, and less than in France (17), and significantly less than in Austria (33), Germany (40) and Switzerland (43) (Steedman, 2010, p.2). The drastic subsequent reduction in Irish figures in the intervening period can only have exacerbated the situation, comparatively.

Table 3: Number of apprenticeship registrations between 2008 and 2015

	2008	2009	2010	2011	2012	2013	2014	2015
<b>Apprenticeship Registrations</b>	23,092	15,024	10,171	8,328	6,223	5,711	6,913	8,317

Source: SOLAS, unpublished data

In Ireland apprenticeship training programmes mainly target young people upon completion of compulsory schooling, and in 2015 the majority of apprenticeship registrations, that is the number

of apprentices with formal contracts, are to be found in the 18-20 year old category but, as can be seen from Table 4, there are substantial numbers of older apprentices (21 and over).

*Table 4: Apprenticeship registrations by age profile (%), 2015*

	16	17	18	19	20	21+
<b>Apprenticeship registrations</b>	1%	5%	18%	19%	13.4%	43.7%

Source: SOLAS, unpublished data

As can be seen from Table 5, the vast majority of apprentices in Ireland have a school leaving certificate (67%), which is placed at level 4 or 5 on the Irish National Framework of Qualifications (EQF levels 3 or 4), with a minority having a junior certificate, placed at level 3 on the Irish NFQ (EQF level 3).

*Table 5: Apprenticeship registrations by educational profile (%), 2015*

	Junior Certificate	Leaving Certificate	Other
<b>Apprenticeship registrations</b>	25%	67%	8%

Source: SOLAS, SOLAS, unpublished data

The most striking, indeed shocking, statistic is the number of female apprenticeship registrations in 2015 – 0.25%, as can be seen from Table 6, and this was not an atypical year. Policy makers are conscious of this problem and have introduced grants of €2,667 for each female apprentice recruited to a designated craft apprenticeship. However, generally speaking, the designated craft apprenticeships relate to occupations in the construction, electrical, engineering and motor sectors that are traditionally ‘male-dominated’. One of the reasons for the creation of ‘new’ apprenticeships is to broaden the range of occupations, and this should increase the number of female apprenticeship registrations.

*Table 6: Apprenticeship registrations by gender (%), 2015*

	Male	Female
<b>Apprenticeship registrations</b>	99.75%	0.25%

Source: SOLAS, unpublished data

As can be seen from Table 7, in terms of the ‘families’ of occupations in the different sectors, electrical has the largest number of apprentices overall (3,099), followed by motor (2,106), construction (1,701), engineering (1,475) and printing (26). The ‘family’ most closely linked to the manufacturing sector would be ‘engineering’, but not completely. Farriery is in ‘engineering’, and ‘aircraft mechanics’ are in ‘electrical’. Moreover some apprentices in ‘electrical’ may well be in the manufacturing sector. In terms of occupations, electrical is the most numerous (2,491), then motor mechanics (1,130), plumbing (798), carpentry and joinery (657), and then two clearly

manufacturing occupations - metal fabrication (552) and mechanical automation and maintenance fitting (527).

*Table 7: Number of apprentices by 'families' and by occupations, 2015*

<b>Sector</b>	<b>Apprenticeships</b>
<b>Construction</b>	<b>1,701</b>
Brick and Stonelaying	54
Cabinet Making	5
Carpentry and Joinery	657
Floor and Wall Tiling	1
Painting and Decorating	40
Plastering	34
Plumbing	798
Stonecutting and Stonemasonry	28
Wood Machinist	
Wood Manufacturing and Finishing	84
<b>Electrical</b>	<b>3,099</b>
Aircraft Mechanics	132
Electrical	2,491
Electrical Instrumentation	211
Electronic Security Systems	48
Instrumentation	28
Refrigeration	189
<b>Engineering</b>	<b>1,475</b>
Farriery	20
Industrial Insulation	28
M.A.M.F.	527
Metal Fabrication	552
Pipefitting	34
Sheet Metalworking	81
Toolmaking	233
<b>Motor</b>	<b>2,016</b>
Agricultural Mechanics	140
Construction Plant Fitting	199
Heavy Vehicle Mechanics	429
Motor Mechanics	1,130
Vehicle Body Repairs	118
<b>Printing &amp; Paper</b>	<b>26</b>
Bookbinding	0
Printing	0
Print Media	26

**Disclaimer:** This working paper has not been subject to the full Eurofound evaluation, editorial and publication process.



<b>TOTAL</b>	<b>8,317</b>
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Source: SOLAS, unpublished data

As in nearly all apprenticeship systems there is a concern with early termination of apprenticeship contracts and non-completion rates. This is also the case in Ireland, but there is no contemporary data available to shed light on this issue.

## Key challenges

Ireland has a good reputation for the high quality of apprenticeship training, but there are a number of challenges that potentially limit its further development.

The first challenge, as in many other countries, is economic. Apprenticeship training is unique in that it is based on a commitment from employers and VET institutions. The major conditioning factor from the employers' side is the expectation of stable economic development and the need for skilled workers. If there are any doubts hanging over future economic development, then many employers are likely to be cautious and unlikely to want to take on supplementary responsibilities and less likely to offer apprenticeship places. This was particularly acute in Ireland when the financial and economic crisis struck in 2007-2008. The number of apprentices fell dramatically, never to recover again in the same proportions, and, FÁS, the precursor of SOLAS, with the support of Irish employers, was obliged to set up special measures, such as the Redundant Apprentice Placement Scheme, designed to give redundant apprentices the opportunity to complete the on-the-job phase of their apprenticeship in order to gain the required knowledge, skills and competence to successfully progress to the next off-the-job phase or to complete their apprenticeship. The consequences were felt for some considerable time, and there were still 1,117 redundant apprentices enrolled in the scheme in 2013 (FÁS, 2013).

The second challenge, as in many other countries, is socio-cultural. For many young people apprenticeship is not an attractive proposition. They may be put off by the working conditions, for example long unsocial hours. They may aspire to a university education, as do their parents on their behalf, and so they are generally not interested in taking up an apprenticeship, particularly as the lack of permeability between apprenticeship training and tertiary education makes onward progression difficult, or impossible. Some of the submissions to the Review of Apprenticeship Training in Ireland indicated that *'unless there was transparency about entry entitlements and progression routes, the attractiveness and public perception of apprenticeships as a valued career pathway would not be improved'* (Department of Education and Skills, 2013b).

The third challenge is more specifically Irish and refers to the limited choice of apprenticeship occupations, and more specifically the 25 designated craft apprenticeships in the construction, electrical, engineering and motor trades. This has meant that in these traditionally 'male-dominated' occupations young women have been more or less excluded from apprenticeship training.

## **Apprenticeship policy and practice in the manufacturing sector**

### **Apprenticeships in the manufacturing sector**

Apprenticeships in manufacturing are traditionally to be found in the two ‘families’ – electrical, and engineering, and more specifically for the following occupations - aircraft mechanics, electrical instrumentation, mechanical automation and maintenance fitting, metal fabrication, sheet metalworking and toolmaking.

As shown in Table 7, the number of apprentices in manufacturing in 2015 was modest. In terms of occupations, there are 132 aircraft mechanics, 211 in electrical instrumentation, 527 in mechanical automation and maintenance fitting, 552 in metal fabrication, 81 in sheet metalworking and 233 in toolmaking, with 2,491 in electrical, which may or may not be positioned in the manufacturing sector.

There is no provision for sector skills councils in Ireland, and so there is no formal opportunity for social partners – employers’ associations and trade unions - in manufacturing to meet to discuss the design and implementation of apprenticeship training in the sector. There may be however, and there has been, opportunities for an informal exchange of information, between IBEC, the employers’ association, and SIPTU, the trade union in the manufacturing sector, on the development of ‘new’ apprenticeships, particularly in manufacturing engineering and polymer processing technology.

### **Strengths and weaknesses of the system**

One clear strength of the system is the quality of the apprenticeship training. A comparatively small country, with a comparatively small manufacturing sector, and a comparatively small aircraft maintenance sector, has produced the winner of a gold medal in the World Skills competition on the last four occasions - in Calgary (2009), London (2011), Leipzig (2013), and Sao Paulo (2015). Traditionally a designated craft apprenticeship lasts four years, with seven phases: three off-the-job and four on-the-job. Phases 1, 3, 5 and 7 take place with the employer. Phases 2, 4 and 6 take place off-the-job, usually in a VET institution. The total duration of off-the-job phases is approximately 40 weeks, of which 26 are in a training centre (phase 2) and two seven week periods (phases 4 and 6) in an Institute of Technology. This is underpinned by a solid curriculum, good training materials and a high level of cooperation between the trainers in the VET institution and the in-company mentor.

Another obvious strength is the ability to involve many stakeholders in the development of apprenticeship training, so as to ensure that the training corresponds primarily, but not only, to the needs of the labour market. This is not based on the social partnership model that is to be found in Denmark and Germany but can be observed from the section on the development of a ‘new’ qualification in the Irish system. At the beginning of the process there is a need for the industry-led consortium, which includes training providers, to provide evidence of demand for an apprenticeship proposal on the basis of the anticipation of skills needs. Curriculum developed is guided by a Project Steering Group which is chaired by SOLAS and composed of social partners and training providers. Designated trade qualifications are approved by the National Apprentice Advisory Council, which has social partner representation.

The flipside of the debate on stakeholder involvement is of course that this process is often long and time-consuming, which clearly inhibits rapid changes to apprenticeship programmes and curricula in the light of swift technological change. Employers interviewed for this study have estimated, for example, that it has taken 2-3 years to prepare the polymer technician qualification. Moreover the opportunity to adjust and modernise designated craft apprenticeships, whether in the manufacturing sector or beyond, has traditionally been particularly limited, primarily because

apprenticeship occupations had to be individually designated by order placed before the Irish Parliament.

One weakness is the difficulty in measuring the balance between supply and demand for apprenticeships in Ireland in general and in the manufacturing sector in particular. The starting point for estimating demand for apprentices training is the skills anticipation work undertaken up by the Expert Group on Future Skills Needs, which (with Forfás) produced the Report *Future Skills Requirements of the Manufacturing Sector to 2020*, and, now by the *Skills and Labour Market Research Unit* of SOLAS, which produces the annual National Skills Bulletin, which contains information on the manufacturing sector. What is less clear is the demand for apprenticeships. On the *Careers Portal* website, for example, the advice for young people who want to become apprentices is to investigate apprentice job opportunities with local employers; to look for apprentice job advertisements in local and national newspapers as many large organisations advertise their apprentice vacancies; finally ‘*inform your local Employment Office of your interest in apprenticeship so that your details can be made available on request to employers*’<sup>5</sup>. Apprentices are also advised to visit their local ETBs to enquire if there are apprenticeship vacancies. However it is not possible to capture the number of potential apprentices and the number of young people who fail to be taken on by an employer in the manufacturing sector.

### **Key requirements arising from technological and other changes in manufacturing**

In terms of key requirements in manufacturing, the *Future Skills Requirements of the Manufacturing Sector to 2020* report noted that scientific advances and technologies, such as advanced materials, nanotechnology, biotechnology, phototonics, and advanced manufacturing ‘*are increasingly having a transformative effect on the manufacturing sector now and in the future*’ and have significant implications for skills (Forfás and Expert Group on Future Skills Needs, 2013).

The report went on to highlight a shortage of workers with toolmaking and/or machinist skills in engineering and medical devices enterprises and a shortage or potential shortage of polymer technicians at level 7 of in the National Framework of Qualifications (EQF level 6) in medical devices enterprises. There was also a concern as regards the supply of mechanical-electronic technicians and trades, but it was considered that the skills involved could be provided via training covering a combination of mechanical, electrical, electronic and software/IT skills, such as a level 7 (EQF level 6) qualification in mechatronic engineering or an apprenticeship-based qualification in electrical instrumentation.

The report also made a series of practical recommendations. For toolmakers it recommended that FÁS (and subsequently SOLAS) should set up an accelerated apprenticeship scheme so as to increase the number of apprentices qualifying as toolmakers every year, to at least 55-60 each year over the period to 2016. In addition, it proposed that the toolmaking apprenticeship syllabus should be updated to reflect recent advances in manufacturing materials and processes. For polymer technicians it recommended that an increase in the supply should be assessed and the possibility of pooling resources for the associated equipment requirements should be investigated. Training providers should also consider the possibility of funding equipment costs through leasing arrangements or sponsorship by clusters of companies or equipment manufacturers. For machinists it recommended that the potential for formal learning opportunities should be

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<sup>5</sup>[https://careersportal.ie/apprenticeships/traditional\\_apprenticeships.php?ed\\_sub\\_cat\\_id=215#Becoming%20an%20Apprentice](https://careersportal.ie/apprenticeships/traditional_apprenticeships.php?ed_sub_cat_id=215#Becoming%20an%20Apprentice)

examined, including the possibility of developing a machinist apprenticeship, with an emphasis on computer numerical control (CNC) machining and programming.

Later, in 2016, further shortages at technician level in engineering were identified in the following occupations: quality assurance technicians, injection moulding technicians, polymer engineering technicians, biotechnology technicians, extrusion technicians, process technologists and maintenance technicians (SOLAS, 2016).

### **Advanced manufacturing: mapping reform processes and adjustments**

Qualifications are in the process of being revised, or prepared from scratch, in the light of technological developments and the challenge presented by the demands of advanced manufacturing.

In terms of designated craft apprenticeships the mechanical automation and maintenance fitting (MAMF) apprenticeship was reviewed by the Apprenticeship Council in 2015/6 for introduction in April 2017. There was a proposal that the relatively cumbersome name should be changed to ‘mechanical fitting’. However in the end this proposal was not taken up, because one of the most important ingredients ‘automation’ would be possibly neglected. The main proposals for programme changes for the off-the-job training in the light of technological developments were, the introduction of the following:

- a generic team leadership and communications module for phases 2, 4 and 6
- new maths, science and drawing modules
- the combination of bench fitting, turning and milling into a workshop processes module in phases 2, 4 and 6
- the updating of the thermal processes module and the reduction of the Oxy-fuel welding content, and a more occupation-relevant focus on metal inert gas welding, tungsten gas welding and manual metal arc welding; a new digital manufacturing module in phase 4, with a greater focus on CNC (computer numerical control)
- a new digital manufacturing module, with a greater focus on CAD/CAM (computer-aided design and computer-aided manufacturing) in phase 6
- a new unit on industrial robotics in integrated automation and control module in phase 6
- more emphasis on digital manufacturing in the modules on drawing and solid modelling.

Qualifications for ‘new’ apprenticeships are also being prepared in the light of technological development and the demands of advanced manufacturing. As previously observed, the Apprenticeship Council approved the development of the first stage of ‘new’ apprenticeships – 25 in number. Two of these new apprenticeships relate to the manufacturing sector – polymer processing engineer and manufacturing technician. They are relatively well developed and have been presented to the Apprenticeship Council.

The typical tasks and responsibilities for the polymer processing engineer and manufacturing technician are described in the submission to the Apprenticeship Council (see Box 1).

#### **Box 1: tasks and responsibilities of new apprentices in new manufacturing related apprenticeships**

**Polymer processing engineer:** they would be responsible for the efficient set up and operation of polymer processing lines in the fields of injection moulding, blow moulding or extrusion

moulding for the production of plastic components relevant to industry standards; they would have a strong technical aptitude for processing characteristics and parameters for a broad range of polymer materials and would work cross-functionally with production team leaders, moulding managers, quality, the toolroom, the maintenance department, material suppliers and external customers to address machine, material, mould, die or tooling issues, including complex tooling assembly and breakdown.

**Manufacturing technician:** they would provide a technical support function for manufacturing operations, including troubleshooting equipment and process issues, validation and qualification activities of the manufacturing site through the creation and support of necessary validation documentation for equipment, process and product release; they would work both autonomously and cross-functionally with production, operations, engineering support, quality, facilities, and safety departments to ensure that the engineering activities and projects were completed as per the defined project schedule; they would also work in establishing and coordinating corrective and preventive maintenance activities for production and operations equipment within the manufacturing site.

It is expected that the qualifications for mechanical fitting and manufacturing technician will be placed on level 6 of the Irish NFQ (EQF level 5). However, it is expected that the qualification for the Polymer Processing Engineer will be placed at level 7 on the Irish NFQ (EQF level 6).

Given that apprenticeships have traditionally been placed at level 6 on the Irish NFQ, and the qualification for polymer process engineer is placed at a higher level, then it could be considered to be an example of a higher apprenticeship.

## Commentary and conclusions

According to the International Labour Organization (ILO), Ireland has a ‘*high quality well-regulated apprenticeship offer*’ (ILO, 2012, p.20), which corresponds well to the Cedefop definition. Ireland offers a systematic, long term training alternating periods at the workplace and in educational institution. Apprenticeships have a minimum duration of two years, but generally last three-four years, and the majority of the training is on-the-job, with substantial blocks of off-the-job training. Apprentices have a written contract with an employer and are paid a percentage of the wage of a skilled worker which is negotiated by the social partners and which increases as the apprenticeship progresses. Generally, there is a high level of stakeholder involvement, particularly between the public authorities, employers and VET institutions, which ensures that apprentices training responds to the needs of the labour market, whilst at the same time providing an overall learning experience that, when successfully completed, leads to a nationally recognised qualification.

Conscious of the very high levels of youth unemployment following on from the financial and economic crisis in 2007-2008, the Irish government set up a review process which, following on from the publication of the *Review of Apprenticeship Training in Ireland*, led to a series of reforms designed to improve the overall quantity and quality of apprenticeship training.

The system is more streamlined, in that there is no longer any requirement to obtain the approval of the Irish Parliament for each individual apprenticeship. Apprenticeships are now avowedly ‘industry-led’, within the context of a new set of governance arrangements, and the Apprenticeship Council, supported by a new agency, SOLAS, is charged with overseeing the design and implementation of apprenticeship training. There is a commitment to expand the number of apprenticeship programmes and to increase the number of apprentices. A process has begun to review the curricula of designated trade apprenticeships and to develop a series of new apprenticeships. Successful completion of these apprenticeships will be recognised with the award of a qualification placed at level 6 on the Irish National Framework for Qualifications (EQF level 5), and for the first time at level 7 (EQF level 6), which in the latter case announces the arrival of what could be considered ‘higher apprenticeships’.

One glaring weakness of the Irish apprenticeship system is the extremely low participation of young women, and it is clear that this extension of types of apprenticeship will in itself not deal with the challenge of increasing female participation. Other measures will be needed, beyond the grant of €2,667 for each female apprentice recruited to a designated craft apprenticeship.

In terms of the manufacturing sector, a strategy has been presented in *Making it in Ireland: Manufacturing 2020*, but a mid-term evaluation, which could provide guidance as to the progress made, does not exist. A more recent strategy (2015) on digitalisation in the public sector refers to skills needs in general terms but does not explain how these skills will be acquired (Department of Public Expenditure and Reform, 2015). In terms of apprenticeship training, it is however important to note that future skills requirements have been identified, and the sector has moved (relatively) quickly to revise designated craft apprenticeships in the light of technological developments, for example for mechanical fitting, and propose some new apprenticeships, notably polymer processing, engineer and manufacturing technician.

These developments will only bear fruit, of course, if economic growth and a certain economic optimism are maintained. On the supply side this will require a willingness on the part of employers to commit to the apprenticeship system, to see apprenticeship as an investment for the future and to provide a sufficient number of apprenticeship places. On the demand side, this will require a broader recognition among young people, and their parents, that apprenticeships form the basis for a valid career path.

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## Annex 1: Glossary

<b>Abbreviation</b>	<b>Original term</b>	<b>English translation/explanation</b>
<b>ETB</b>	Education and Training Board	-
<b>FÁS</b>	An Foras Áiseanna Saothair	Training and Employment Authority
<b>IBEC</b>	Irish Business and Employers' Confederation	-
<b>IOT</b>	Institute of Technology	-
<b>M.A.M.F.</b>	Mechanical automation and maintenance fitting	-
<b>QQI</b>	Quality and Qualifications Ireland	-
<b>SIPTU</b>	Services Industrial and Professional Union	-
<b>SOLAS</b>	An tSeirbhís Oideachais Leanúnaigh agus Scileanna	'Further Education and Skills Service'



## Annex 2: List of consulted national experts and stakeholders

Type of organisation	Name of organisation	Position/function of interviewed person
Government agency responsible for apprenticeships	Apprenticeship Council	Member of the Board of the Apprenticeship Council
Employer organisation	Irish Business and Employers' Confederation	Head of Training and Skills
Employer	Jones Engineering Group	Member of the Board of the Apprenticeship Council
Trade union	Services Industrial and Professional Union	Sector Organiser, Electronics, Engineering & Industrial Production
Government agency responsible for VET	<i>An tSeirbhís Oideachais Leanúnaigh agus Scileanna</i> , 'Further Education and Skills Service'	Director, Apprenticeship and Construction Services
Trade union	Technical Engineering & Electrical Union	General Secretary

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