Future Skills Requirements of the Manufacturing Sector to 2020

30th International Manufacturing Conference

Una Halligan, Chairperson EGFSN

4th September 2013
Expert Group on Future Skills Needs

EGFSN work based on Enterprise Developments, National Policy Objectives/Strategies

- Strategy for the Manufacturing Sector
- Food Harvest 2020
- Trade Tourism & Investment Strategy 2015

EGFSN Research & Analysis

- Sectoral, reports
- National Skills Bulletin, Vacancy Overview, Monitoring Skills Supply, National Skills Database
Objectives of the Study

“To undertake a detailed assessment of manufacturing skills needs and use of the new structures for training and skills development to address both the immediate needs of the manufacturing sector and to anticipate longer term needs”

Government’s Action Plan for Jobs 2012
Future Skills Requirements of the Manufacturing Sector to 2020

What the Study addresses:

1. Global drivers of change impacting on manufacturing & skills
2. Profile of Manufacturing in Ireland - economic, labour market & skills
3. Provision of manufacturing-related Education & Training
4. International evidence for dev. manufacturing skills & careers
5. Anticipated level of skills demand – 3 Scenarios to 2020
6. Future skills demand - qualitative assessment via consultations
7. Recommendations to ensure skills demand for 2020 are met
Research Methodology

- Steering Group – Intel, Dromone, Diageo, PWA Int., BC Gases, IBEC, ICTU, First Polymer Skillnet, UL, Sligo IT, FAS, IDA, EI,

- 35 companies interviewed across manufacturing sectors

- 3 workshops with 35 participants on 3 specific skills themes
  - Operatives, Technicians, crafts & supervisors
  - Skills for enterprise & innovation
  - Skills for Manufacturing Excellence

- 18 trade & industry groups interviewed
- Occupational employment in manufacturing, QNHS, CSO stats
- Education and Training provision, FETAC & HETAC
- Final report approved by 27 person EGFSN
Scope of the Study – Sectors covered

- Update previous EGFSN work in
  - Medical Devices;
  - Food and Beverage Manufacturing
  - Bio-Pharma/Pharma-chemicals and
  - Enterprises in the Green Economy

- Focus on manufacturing sectors not addressed in recent EGFSN sectoral studies
  - ICT hardware,
  - Engineering
  - Consumer Products
<table>
<thead>
<tr>
<th>Occupations</th>
<th>Number Employed 2012</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers, Directors and Senior Officials</td>
<td>16,900</td>
<td>8.2%</td>
</tr>
<tr>
<td>Professional Occupations</td>
<td>20,800</td>
<td>10.1%</td>
</tr>
<tr>
<td>Associate Professional and Technical Occupinations</td>
<td>29,900</td>
<td>14.5%</td>
</tr>
<tr>
<td>Administrative and Secretarial Occupations</td>
<td>15,700</td>
<td>7.6%</td>
</tr>
<tr>
<td>Skilled Trades Occupations</td>
<td>44,800</td>
<td>21.8%</td>
</tr>
<tr>
<td>Caring, Leisure, Travel, Sales, Customer Services and related occupations</td>
<td>4,000</td>
<td>1.9%</td>
</tr>
<tr>
<td>Process, Plant and Machine Operatives</td>
<td>55,100</td>
<td>26.8%</td>
</tr>
<tr>
<td>Elementary Administration &amp; Service Occupations</td>
<td>18,600</td>
<td>9.0%</td>
</tr>
<tr>
<td>Total</td>
<td>205,800</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
### Educational Attainment in Mfg. sub-sectors, Total Manufacturing & National Average

<table>
<thead>
<tr>
<th>Category</th>
<th>Lower secondary or less</th>
<th>Higher secondary/FET</th>
<th>Third Level</th>
<th>Other/Not state</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food &amp; Drink</strong></td>
<td>21%</td>
<td>48%</td>
<td>7%</td>
<td>32%</td>
</tr>
<tr>
<td><strong>Pharmachem</strong></td>
<td>10%</td>
<td>61%</td>
<td>10%</td>
<td>64%</td>
</tr>
<tr>
<td><strong>ICT Hardware</strong></td>
<td>15%</td>
<td>37%</td>
<td>26%</td>
<td>64%</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td>21%</td>
<td>31%</td>
<td>47%</td>
<td>31%</td>
</tr>
<tr>
<td><strong>Consumer products</strong></td>
<td>23%</td>
<td>50%</td>
<td>48%</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Remainder of manufacturing</strong></td>
<td>28%</td>
<td>50%</td>
<td>48%</td>
<td>38%</td>
</tr>
<tr>
<td><strong>Manufacturing Total</strong></td>
<td>16%</td>
<td>41%</td>
<td>38%</td>
<td>44%</td>
</tr>
<tr>
<td><strong>National Average</strong></td>
<td>15%</td>
<td>36%</td>
<td>31%</td>
<td>48%</td>
</tr>
</tbody>
</table>

Legend:
- Green: Lower secondary or less
- Blue: Higher secondary/FET
- Gray: Third Level
- Light blue: Other/Not state

Source: Forfás

For further details and data, please refer to the original report by Forfás.
Skills Supply

Higher Education
- 28% increase enrolments (2006 – 2011) programmes relevant to manufacturing
- Enrolments are over 45,000 - increased STEM graduates in the coming years
- Ratio of STEM to Engineering enrolments is 2:1
- Graduates sought after in other sectors - health, education, software & research

Further Education
- 18,000 FETAC awards across STEM fields in 2012
- Some are quite general & others are highly specific to manufacturing, e.g. pharmaceutical processing, materials manufacturing, injection moulding
- Good potential for upskilling low skilled given breadth & specificity of FE awards
- Significant declines in Apprenticeships since 2007 due to decline in mfg. employment – fitters, electricians, metal fabricators, toolmakers, sheet metal workers

Other Provision – Skillnets, Enterprise Ireland, Engineers Ireland, IDEAS, IMDA
Skills & Labour Market Needs - Drivers of Change

- Change Skills Needs
- Globalisation and Emerging Markets
- Scientific and Technological Advances
- Shifting Demographic and Consumption Trends
- Environmental and Energy Concerns
- Cost Competitiveness
- Managing the Global Value Chain
- Research, Development and Innovation (RDI)
- Impact of ICTs
- Sustainable Manufacturing Services Processes and Practices

Forfás
Key Skills Competencies identified

Operatives, Technicians, Crafts & Supervisors
• Tool making, machinists, polymer technicians, skilled trade/technicians in mechanical, electrical & IT fields

Skills for Manufacturing Excellence
• Lean, automation & data analytics to support mfg. processes & R&D
• Engineering skills – validation, quality, automation & supply chain engineering specialisms; knowledge of polymers

Skills for Enterprise & Innovation
• Researcher innovation skills for product development
• Key person with industry-leading skills to drive business performance improvements

Expert Group on Future Skills Needs
Recommendation 1 - Establishing career paths

**Issue**

- Lack of clarity re: career paths linked to education & training v other countries
  - Germany (dual system, Meister pathway, strong apprenticeship-HE links);
  - US Manufacturing Institute (stackable credentials)
  - UK SEMTA Sectoral Skills Council (career maps)

- Career Path Key Features
  - Main occupations mapped to the NFQ
  - Learning pathways meet occupation standards & provide progression routes
  - Pathways that match in-company & formal education learning pathways & provide opportunities for cross linkages or joint provision
  - Industry-based track to HE qualifications e.g. Meister or Time-served Engineer

- Multiple partners required but also industry leadership

**Recommendation:**
MDF lead a review of manufacturing career paths & engage with employee reps, education & training providers, QQI, industry, Fas, Skillnets & Higher Education
Recommendation 2 - Promoting Manufacturing Careers

Issue
- Attracting employees affected by lack of knowledge of career opportunities & negative perceptions of manufacturing
- Promotional programme targeted at all skills levels
- Existing role of DSE (SET careers) & Engineers Ireland (STEPs)

Recommendation
Manufacturing cos. & industry associations participate in future DSE campaigns to deliver initiatives promoting manufacturing careers using the career paths in recommendation 1 across the range of operative, technician, supervisor & professional roles

(Companies, Industry Associations, SFI & Engineers Ireland)
Recommendation 3 - operatives, skilled trades and technician levels

**Toolmakers (FAS)**

- Immediate shortage of toolmakers – increase apprenticeship intake by industry
  - Use accelerated apprenticeship scheme to increase apprentice toolmakers
  - Ensure 55-60 pa qualify over the period to 2016
  - Update tool making syllabus for advances in mfg materials & processes

**Polymer technicians (Skillnets/IOTs/Plastics Irl & IMDA)**

- Assess additional demand required from Sligo IT level 7 distance learning
- Springboard programme address future demand & jobseekers
- Share costs of new equipment – leasing/sponsorship by co cluster.eq. mfgs

**Machinists**

- Engineering training network for upskilling employees (Skillnets/MDC)
- CNC machining & programming Traineeship/Apprenticeship (FAS)
- Include in Springboard & Momentum for unemployed (DES, HES, FAS)
- Apprenticeship Review include mfg needs & cyclical nature of apprenticeships
Findings: Quantity & Quality of level 8+

- Demand by employers for graduates is mainly for core engineering skills with potential to develop
- Importance of work placements, problem solving & lean
- Advantages of 3+2 engineering
- Demand for Design, Validation, Quality, Polymer, Automation & Supply Chain Engineers - Level 9 up-skilling of experienced employees
- Mechanical & Electronic Engineers – demand strong for good honours degree mechanical engineers & those with experience to work on product development
Findings: Skills & Manufacturing Excellence

- **Process Improvement** - Lean has become a core part of firm strategies, from very small to large cos.
  - Engineers & scientists – as management structures flatten, need strong leadership
  - Employers argue that lean should become formalised within engineering curricula

- **Automation** – Skilled trades, technicians & engineers require increased skills in design, maintenance & computer programming

- **Manufacturing Process R&D** - emphasis on development at NFQ levels 9/10 with a focus on optimising the production system. Can involve partnering with HEIs to undertake applied research

- **Data Analytics** - production systems generate huge amounts of data. Need professionals with an understanding of manufacturing processes & statistical capability to analyse/interpret data to improve performance
Recommendation 4 - Undergraduate skills

- **Mechanical/Manufacturing Engineering Level 8**
  - 250 places in manufacturing skills (automation, dev. design) Springboard
  - Collaboration between providers & cos. incl. course content & work placements
  - Target jobseekers with Level 8 & below with previous work experience
    
    (DES, HEA, Industry Associations, Cos.)

- Future output from engineering to increase in next 3-4 years.

  **Content:**
  - HE providers focus on core. engineering (variety of titles can cause confusion about competencies developed)
  - Production engineering & process improvement should be standard in mechanical engineering
  - Polymer modules/options should be available within mechanical engineering
  - Substantial structured work placement should be offered 9-12 months
  - Automation and data analysis modules
Findings: Postgraduate Level Skills

- Recognise importance in driving product and process innovation. Highly important for future of manufacturing base in Ireland
- *Manufacturing Competitiveness* and *Novel Materials* are 2 research priority areas
- Good infrastructure in place to develop – Bio Innovate/UCD/UL/CIT
- Industrial PhD programmes/in-employment postgraduate programmes should be supported
- Enterprise Ireland should evaluate feasibility of replicating of BioInnovate model for ICT hardware and Engineering
- Linkages between HE & industry need to be strengthened. Existing best practice needs to be highlighted and replicated
Recommendation 5 & 6 – Postgraduate Skills & CPD and on going HEI/industry linkages

• Level 9 – 200 places in validation, quality, polymer, automation, supply chain engineering
  (HEA- Springboard, Skillnets, HEIs)

• Focus on Manufacturing SMEs in future Irish Research Council/Enterprise Partnership Scheme calls
  (IRC/HEA, HEIs, EI)

National Strategy for HE objectives & guidelines for enhancing industry/academic engagement in the provision of skills

– Clear points of contact for industry engagement
– Communication of HEIs relevant expertise, capacity & capabilities
– Demonstrate benefits of engagement through case studies
– Professionalise the interface & service level expectations
– Set targets & metrics for engagement within the broader HEI mission
### Core Professional Skills

- Mechanical & electrical engineering

### Other Technical Skills

- Commercial awareness
- Mathematical proficiency
- Foreign language fluency
- ICT proficiency
- Health & Safety
- Selling & Marketing

### Organisational Skills

- Project Management
- Decision making & analytical Skills
- Planning & Co-ordination
- Ability to apply theory to practice
- Team working
- Operational Performance
- Customer facing skills

### Personal Skills

- Entrepreneurship
- Leadership
- Critical Thinking
- Integrity
- Communication & Influencing
- Initiative & Adaptability
- Creativity & Innovation
Progress on recommendations

- **Springboard 2013 call**
  - Mechanical/Mfg engineers Automation, Development & Design 250 places, Level 8
  - Validation, Quality, Polymer, Supply Chain & Automation engineers 200 places, level 9
  - Polymers/plastics technicians (place nos. to be decided with industry)

- **FAS**
  - Apprenticeship Review underway by DE
  - Toolmakers Report re numbers
  - Momentum programme included Mfg occupations

- **Skillnets**

- **HEIs** – modules in engineering; conference in UCD

- **VECs** – Skills for Work programme to focus on Mfg

- **DSE/SFI** – developing career profile with industry

- **MDF** – work-in progress on career paths
Thank you!

Expert Group on Future Skills Needs
www.skillsireland.com

Forfás
www.forfás.ie