Executive Summary

Ireland’s medical technology industry:

- Employs over 27,000 people.
- 50% of its companies engage in R&D.
- It has a strong regional presence with an excellent geographic spread.
- Salaries and benefits are competitive and have largely remained stable over the last 12 months.
- Engineering skills are in strong demand; process engineers, automation engineers, lean six sigma engineers, validation engineers, quality engineers, NPD engineers, and polymer engineers are all sought after.
- Future talent pool looks strong; educational trends show an increase in STEM graduates over the last 5 years as well as greater enrolment in engineering and other STEM courses. Level 8 Engineering applications have increased by 23.9%, science applications by 17.2%.
- Government support for the industry includes the creation of 14 new Springboard courses, a national programme to increase STEM course applications, and Science Foundation Ireland funding support for several R&D centres.
- The fastest growing subsectors of the industry are in-vitro diagnostics, connected health, and combination devices.
- There is a very strong pool of indigenous senior and executive talent within the industry, both in Ireland and globally of Irish expats.
- We expect the sector to continue to grow over the next few years due to increased demand for medtech products globally. Ireland’s competitive cost base, strong talent supply and track record in the industry provides a positive outlook for the future of medtech in the country.
INTRODUCTION

Ireland’s medical technology sector employs over 27,000 people, hosts 18 of the 25 largest medtech companies in the world, and has €9.4bn worth of exports annually. Ireland is the fifth largest exporter by value in Europe. The European medical technology market is worth roughly €100bn, and accounts for 31% of the world market, making Ireland a major contributor to the global medtech industry. Ireland develops some of the most sophisticated products in the industry, with particular strengths in high value manufacturing and R&D. Half of all medtech companies in Ireland now have a dedicated R&D function. Ireland continues to receive major international investments and has generated continuous employment growth in recent years. There are over 350 medtech companies in Ireland and 60% of these are indigenous SMEs. Producing an adequate supply of qualified graduates will determine the ability of the sector to expand in future years.

Collins McNicholas believes the outlook for the medical device industry in Ireland to be very positive and anticipates strong growth in the years ahead as the industry takes advantage of expanding global demand and the convergence of technologies that will allow for new and better products to be developed.

RECENT INVESTMENTS

Most of the biggest companies in the medical device industry have a presence in Ireland. Companies such as Abbott, Medtronic, Johnson & Johnson, Baxter, Boston Scientific and Stryker all have major operations in the country. Indigenous companies are also important contributors to the Irish medical device sector. Creganna, Trulife, Vistamed, and Steripack are just a few of the Irish medtech companies exporting their products globally.

Ireland produces a wide range of medical device products. Products manufactured in Ireland include pacemakers, stents, pregnancy tests, HIV tests, orthopaedic hips and knees, ventilators, and contact lenses. In the last 2 years medical technology companies have invested €652 million in Ireland. Ireland also secured one third of all medtech investment into Europe in 2015. This has resulted in strong job growth in the sector over the previous two years. Investment has occurred in several regions and the type of employment created includes high value manufacturing roles, support services and R&D. R&D is growing in importance in the Irish Medical Device sector; Medtronic, Cook Medical, Stryker and DePuy Synthes all announced investments in new R&D and Innovation Centres in the last 2 years.

Recent Major Investments in Ireland

<table>
<thead>
<tr>
<th>Date</th>
<th>Jobs</th>
<th>Company</th>
<th>Location</th>
<th>Type of Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 2015</td>
<td>TBC</td>
<td>Medtronic</td>
<td>Galway</td>
<td>Invests €13m in new manufacturing facility</td>
</tr>
<tr>
<td>June 2015</td>
<td>50</td>
<td>Abbvie</td>
<td>Sligo</td>
<td>€40m investment to expand manufacturing capacity</td>
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<tr>
<td>June 2015</td>
<td>50</td>
<td>Moss Vision</td>
<td>Roscommon</td>
<td>Establishing a facility to produce intraocular lenses</td>
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<tr>
<td>April 2015</td>
<td>125</td>
<td>Bausch &amp; Lomb</td>
<td>Waterford</td>
<td>€75m to increase manufacturing capacity</td>
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<tr>
<td>Jan 2015</td>
<td>250</td>
<td>Zimmer</td>
<td>Galway</td>
<td>€51m manufacturing plant for orthopaedic implants</td>
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<tr>
<td>Oct 2014</td>
<td>100</td>
<td>Teleflex</td>
<td>Athlone</td>
<td>Expanding its shared services and R&amp;D facility</td>
</tr>
<tr>
<td>Sept 2014</td>
<td>TBC</td>
<td>Stryker</td>
<td>Cork</td>
<td>Building a new Surgical Innovation Centre</td>
</tr>
<tr>
<td>June 2014</td>
<td>TBC</td>
<td>Hollister</td>
<td>Ballina</td>
<td>Invests €80m in plant, employs over 600 people</td>
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<tr>
<td>April 2014</td>
<td>270</td>
<td>Ethicon Biosurgery</td>
<td>Limerick</td>
<td>Invests €80m in plant</td>
</tr>
<tr>
<td>Mar 2014</td>
<td>125</td>
<td>Vistamed</td>
<td>Carrick</td>
<td>Invests €7 million in plant</td>
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Medical device companies are dispersed throughout Ireland. The presence of these companies throughout the country means that there is a steady supply of talent in every region, allowing medical device companies to easily set up a facility anywhere they choose.

A renewed focus on regional investment from IDA Ireland should see further gains in employment for regional locations, particularly in this sector. The presence of these multinationals around the country has generated an ecosystem of support companies in tool making, plastics, and automation. Infrastructure developments put in place to support these multinationals benefits the broader economy greatly as well.

West

Galway is the most important medtech cluster in the country. It accounts for approximately 31% of all medical device employment. Galway has significant expertise in vascular technologies, which are dominated by Boston Scientific and Medtronic. Boston Scientific is the largest medical device employer in Ireland with a staff of more than 4,500 across 3 sites located in Clonmel, Cork, and Galway. Its range of products include drug eluting stents, structural heart products, pacemakers, and Implantable Cardiac Defibrillators (ICD). Boston Scientific employs around 3,000 people in Galway. Medtronic has roughly 2,000 staff working at its Galway facility, including over 100 employees working in R&D. Other notable companies in Galway include Merit Medical, Creganna, Crospon, and Zimmer who opened a facility in Oranmore along with their well-established facility in Shannon.

The medical device industry in Galway is continually expanding, with local company Aerogen, the winner of the 2013 Medical Technology Company of the Year award, creating a further 20 R&D posts at its Galway headquarters, after securing a licencing agreement for its nebuliser technology with electronics company Phillips. Creganna is an Irish company that employs over 800 people globally. It is headquartered in Galway and provides outsourced solutions for medical device companies. It can provide design, manufacturing, clinical and regulatory support. Creganna specialises in minimally invasive delivery and access devices such as catheters. Mayo has several large multinational medtech companies with manufacturing operations, including Baxter and Hollister. They produce renal dialysis equipment, and ostomy/continence care products respectively. Hollister has invested €80 million in its Ballina plant, which currently employs over 600 people. National University of Ireland, Galway and the Galway Mayo Institute of Technology have important links with medical device companies operating in the region, providing research collaboration and skilled graduates ready to specialise in the medical device industry.

North West

The North West is home to several large medtech companies. Abbott has a number of facilities in the region including Abbott Diabetes in Donegal, Abbott Diagnostics and Abbott Nutrition in Sligo, and Abbott Medical Optics in Mayo. The region supports both large multinationals and indigenous companies, with Irish owned Arrotek and Inblex Plastics based in Sligo. Multinationals B. Braun, Hospira, Amcor Flexible, and AbbVie are all located in Sligo as well. Donegal also contributes to the North West medtech cluster with Abbott Diabetes, Phillips-Medisize and Moll Industries all located in the county. Vention in Boyle is another significant medtech manufacturing site in the North West. Harmac Medical in Castlerea employs 290 people.

The sector continues to grow with a number of investments and job announcements in the last 24 months. Abbvie recently announced a €40 million investment in its Sligo plant, which makes medical delivery devices. It will create 50 jobs in the region. Vistamed, which makes precision extrusions and catheters, doubled the size of its Carrick-on-Shannon plant, expanding its headcount to 250. The industry has also given rise to a diverse range of support companies to serve the sector. These include specialist tooling companies such as Avenue Mould, automation companies such as ATS Automation, and metrology and manufacturing consultancy companies such as Verus.
Midwest

Limerick is also an important location for medical device companies. Cook Medical has an 800 person manufacturing facility in Limerick that makes products for use in gastroenterology, urology, obstetrics, and gynaecology. Stryker Orthopaedics, Teleflex Medical, and Johnson & Johnson Vision Care are also important employers in the county. Ethicon Biosurgery, part of J&J, has recently invested €80 million in its Limerick plant, which will see it create 270 jobs. Vistakon, part of the J&J group that employs almost 2,000 people in Ireland, made a landmark €100 million investment at the start of 2013 that will see the creation of 100 additional jobs at its Limerick site where it manufactures the Acuvue range of disposable contact lenses. In June 2015 Vistakon announced another €100 million investment to further its manufacturing capabilities. The University of Limerick has a strong engineering department that offers a specialised Biomedical Engineering Degree in addition to its other engineering programmes.

South

Cork has significant expertise in orthopaedic technologies. Stryker, which manufactures orthopaedic implants, minimally invasive surgical equipment and neurovascular products, is the biggest medical device employer in Cork. Stryker are building a new 44,000 sq. ft. surgical innovation centre in Cork that will conduct research on the surgical issues of bone cutting and soft tissue dissection. Stryker employs 1,200 people across its 3 Irish sites, two of which are located in Cork. DePuy Synthes produces orthopaedic knees and hips from its Cork plant, employing over 600 people. This site also includes a global supply chain operation and an R&D Innovation Centre. Boston Scientific employs approximately 1,100 people in Cork and produces over 5,600 devices, primarily for their Cardiology, Rhythm and Vascular Group, Endoscopy, and Urology & Women's Health Divisions.

South East

Waterford hosts contact lens manufacturer Bausch & Lomb and precision engineering company Schivo. Bausch & Lomb is investing €75 million to increase its manufacturing capacity. Nypro Healthcare announced plans to establish a state-of-the-art facility in Waterford, which will create more than 200 jobs manufacturing complex respiratory and injection devices. Clearstream in Ennis, which was bought by CR Bard, has added 160 roles since 2011 and, after a significant capital investment in its facility, will have the capacity to add 200 more roles in the coming years. Boston Scientific employs over 700 people in Clonmel and manufactures all of their pacemakers and implantable defibrillators for the global market. The Clonmel facility is also involved in R&D for its next generation of Cardiology Rhythm Management devices. Abbott Vascular is also located in Clonmel and manufactures a host of vascular devices for the international market.

Midlands

Medical device activity in the midlands is centred in Athlone with KCI, Covidien, AMS Medical and Teleflex all located there. Other notable companies in the region include Abbott Diagnostics and B. Braun in Longford. These companies, with the exception of Teleflex, are all involved in the manufacturing of various medtech products, from diagnostic kits and advanced wound care products to an assortment of medical tubing. Teleflex has a shared services centre and its European HQ in Athlone and runs key back office operations from this site. It currently employs 160 people in Athlone and is set to add a further 100 jobs over the next three years. Renew Health established its manufacturing business in Athlone in June 2014 and now employs 30 staff. Integra Life Sciences are continually investing in their site in Tullamore. They have expanded to over 100 staff and are refurbishing their facilities to increase automation. Moss Vision are a new start up in Roscommon that manufacture contact lenses. The midlands region is also home to several polymer companies who provide polymer solutions and outsource manufacturing to the medical device industry, for example – Kelpac, Tool & Plastics, Mergon, and Steripack.
Engineers

We have seen a strong demand nationally for a range of engineering professionals; process engineers, lean six sigma engineers, quality engineers, validation engineers, manufacturing engineers, NPD engineers, automation engineers, process design engineers, and polymer engineers are all sought after. Salaries in this sector have been relatively stable over the last 12 months, with a small number of pay increases in certain niche areas. Demand for engineers will remain strong over the next few years. This steady demand for engineering skills will lead to certain pressure points in supply as the industry continues to grow, but the output of new engineers, the dispersed nature of the existing engineering talent, and the experience the Institutes of Technology have in servicing the demands of medical device multinationals, will ensure there is no critical shortage of engineering skills in the industry.

Alongside these engineering skills there is an increased demand for biotechnology and pharmaceutical related skills. Personnel with qualifications in the biological sciences, chemistry and pharmacology are becoming more important as well. The convergence of different technologies with medical device products means that there is a demand for expertise in the areas of nanotechnology, software, ICT, maths, statistics, informatics and bioprocessing, and material science. There has been an increase in the pace of automation as the industry in Ireland shifts towards the production of more high value products. This requires greater training for employees in the industry, and places more pressure on 3rd level institutes to produce the necessary volume of graduates. Overall, this will drive up the quality of employment in the industry and increase Ireland’s competitiveness internationally.

Graduates

Sustained efforts at encouraging STEM careers and the provision of conversion courses should ensure there are sufficient numbers of graduates. CAO Level 8 first preference applications for STEM courses, which include science, engineering, computing and construction, have increased by 18% over the 5 years since 2010. Individually there has been a 23.9% rise in engineering applications, a 47.6% rise in computing applications, a 17.2% rise in science applications, and a drop of 36.1% in construction applications. This increase in STEM applications has been ongoing since 2007 but there are still minor shortages in certain disciplines. CAO application trends suggest that this will abate over the next few years. The government are devising a new apprenticeship programme in consultation with industry to provide more skilled professionals at technician level. This will further bolster the supply of qualified personnel for the medical device industry.

ICT skills are playing an increasing role in the medical device industry, particularly in the area of connected health. Government efforts to increase the ICT graduate output have been very successful, but the rapidly expanding incorporation of ICT into other industries means that a greater increase in graduate output is required in order to keep pace with this rise in demand. The government sponsored Springboard programme offered 21 ICT conversion courses in 2014, and is providing a further 42 courses in the 2015/16 academic year, which should help address the demand for ICT professionals. Springboard also provided 14 medtech courses in 2014/15.

In addition to the demand for the major technical skills, highly qualified staff are also needed in support functions such as regulatory affairs, HR, finance, ICT, and sales. Irish third level institutes will be able to match demand for these skillsets going forward.
Senior & Executive Talent

The rapid expansion of the medical device industry since the mid ‘90s has created a strong pool of senior and executive talent. There are numerous Irish expats in these positions in medical device companies globally. This has benefitted the Irish medical device industry significantly. They have helped to promote Ireland around the world and made Ireland a more attractive destination for FDI. Many have also returned to Ireland in the last decade, either to set up a new medical device company, or to take over the operation of an existing facility. Collins McNicholas has seen numerous examples of this, having conducted several international recruitment searches to identify senior and executive talent on behalf of medical device companies operating in Ireland. These experienced Irish expats will often have worked across several divisions within a company giving them a broad, as well as a deep, knowledge of the operation of medical device companies. They know the business well but they also have a strong network within the parent group which can help attract investment to Ireland. This makes them sought after talent for senior roles. They are often eager to return to Ireland, waiting for the right role before moving home.

International assignments are often viewed as a way of fast tracking your career and talented senior level executives in the medtech industry in Ireland will often look for international opportunities to enhance their prospects in the future. They are viewed by Irish executives as attractive opportunities to further progress their careers.
The medical device sector is highly diverse, producing everything from bandages to MRI machines. Medical device companies in Ireland perform a wide variety of activities, such as R&D, clinical and preclinical trials, manufacturing, marketing and sales, and shared services. Ireland has particular expertise in diagnostics, orthopaedics, vascular technology, combination devices and connected health. As a result, there are excellent employment opportunities in this sector for a wide range of skills.

Combination Devices

Combination devices bring together two different medical technologies in a single product. Types of drug device combinations include drug eluting stents, antimicrobial catheters, and infusion pumps. Ireland has several companies operating in this sector. Abbvie in Sligo manufactures a pen-style injector for its biopharmaceutical products. Boston Scientific manufactures drug eluting stents from its Galway facility. Clearstream Technologies is also involved in the production of drug-eluting stents and antimicrobial catheters from its facility in Enniscorthy. The market is estimated to grow by 7.9% per year to 2019 when it will be valued at $115bn, according to Transparency Market Research. Developments in material science and nanotechnology will assist the rapid expansion in combination devices.

Ireland’s knowledge of pharmaceutical and biopharmaceutical production, along with its medical device expertise, gives it a major advantage in developing combination devices. Many of these companies bring together more traditional skillsets like plastic moulding and tool making with newer skillsets involving nanotechnology or biopharmaceutical production. Ireland’s manufacturing history as well as its investment in highly automated and complex manufacturing technologies provides the range of skills required to produce these devices.

Diagnostics

In vitro diagnostics are now the fastest growing subsector in the medical device industry. Real time diagnosis, the development of personalised medicine, reduced costs, and the expansion of healthcare in developing countries is driving this growth. Ireland has extensive experience in this sector with Abbott Diagnostics, Covidien, Alere, Roche, Beckman Coulter, Siemens Healthcare, and many others, engaged in either production or research operations in Ireland.

Connected Health

Connected health, the use of information technology to provide better healthcare, is another significant development in the medical device industry. It incorporates mobile technology, advanced sensors, remote monitoring tools and networked devices to better monitor patients’ health. It allows for a vastly improved system for gathering and sharing medical information. Ireland is superbly positioned to take advantage of this rapidly developing field due to our strong medical device and ICT sectors. BiancaMed, Helix Health, Intel Digital Health Group, Slainte Technologies and Valentia Technologies are just a few of the connected health companies in Ireland. These companies are supported by connected health research centres, such as the Applied Research for Connected Health (ARCH), the Biomedical Diagnostics Institute (BDI) and INSIGHT, which provide opportunities for collaborative research. The government has committed to providing funding support for the connected health sector,
and it has received considerable investment over the last few years.

**Quality Control, Regulatory Affairs & Shared Services, 3rd party manufacturing**

Ireland has an excellent track record for regulatory compliance, and is experienced in dealing with the FDA and other regulatory bodies. The medical device industry is facing ever stricter quality and regulatory oversight, and is therefore in need of greater numbers of personnel to fill these industry requirements. There will be a strong demand for experienced QA and Regulatory Affairs professionals in the next few years as greater emphasis is placed on the safety and effectiveness of increasingly complex medical technologies.

Many medical device companies have shared services operations in Ireland, including Abbott, Alere and Baxter. They tend to cluster around Dublin but can be found in many regional locations. Often these companies will have a manufacturing or research facility in the country as well. Shared services operations provide opportunities for professionals with a wide range of skills. These centres can contain several functions, from accounting and finance, to multilingual customer and technical support centres, tech support, supply chain management, HR services and legal services.

Ireland is ideally suited for this type of activity as it has an excellent supply of talent to fill these roles and has accumulated an abundance of experience in this area over the previous decades. Ireland’s quality and regulatory expertise, in addition to its shared service experience, has brought investment in 3rd party manufacturing activities. Many international 3rd party manufacturing operations are also managed from Ireland.

**RESEARCH**

The medical device industry is the #1 industry for innovation globally, with 8% of sales being invested in R&D and a new patent filed every 50 minutes. The innovation cycle is incredibly fast, taking just 18-24 months. This means that a new product will be superseded by an improved version in less than 2 years. The funding of research will therefore play an important role in the continued development of the medtech industry in Ireland.

Research funding has increased markedly in the last number of years, with several new research centres being established. Key priority areas for R&D include combination devices, personalised orthopaedics, drug eluting balloons, stents, and connected health. Institutes such as the National Centre for Biomedical Engineering Science, the Network of Excellence for Functional Biomaterials, the Centre for Research in Medical Devices (CURAM), and the Regenerative Medicine Institute (REMEDi) have made NUI Galway a European hub for medtech research. Industry collaboration has been a key feature of this new research environment. CURAM’s research concentrates on the development of ‘smart,’ implantable medical devices. It has over 40 industry partners. REMEDI is combining stem cell and gene therapy technologies to assist in tissue repair. It is partnered with Creganna, Enbio, Ovagen, and Medtronic, among others.

Research centres specialising in nanotechnology (CCAN, CRANN); in ICT and data analytics (Tyndall, INSIGHT); and material science (MSSI in Limerick, the National Polymer Centre in Athlone IT, and SEAM in Waterford IT); are applying their expertise to the medtech sector. They are all partnered with major domestic and multinational companies. Substantial resources have been invested in Irish research institutes in recent years and this has greatly benefitted the work of medical devices companies operating in the country.
Overall, the outlook for the medical device industry, both globally and in Ireland, is extremely positive. The industry in Europe is growing at about 4% annually. Despite greater financial pressures, and increased regulatory constraints, there is a fast growing demand for new medical technologies. Ageing developed country populations, the growth of emerging markets, and technological developments, are opening up new opportunities and expanding the size of the market. Ireland is already an important producer of medical devices, and is well positioned to expand on this success. A survey by the Irish Medical Device Association (IMDA), conducted in December 2015, showed how optimistic companies are about the industry’s future. In the 1st Quarter of 2016, 47% of companies expect to hire more staff and 72% expect to increase their sales. The medical device industry in Ireland is investing more of its resources in high value manufacturing and R&D to maintain its leading position in the industry. This transition will require better qualified, and more highly skilled, employees. The increase in STEM graduates will provide the talent needed to support this transition and the creation of new apprenticeships will provide a technical base to drive the industry forward. The outlook for the medical device industry in Ireland is positive. It has the capability to expand and presents excellent career opportunities for qualified professionals.

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