# Comparing Entry-Level Engineering Jobs in Ontario:

## What Disciplines are in High Demand?

ONTARIO SOCIETY OF PROFESSIONAL ENGINEERS

## Contents

## 1. Purpose

The purpose of this report is to demonstrate what type of engineering offers the best chance for a new graduate being hired in an entry level position and outlines career paths in different engineering disciplines. It is intended for engineering students, new graduates, and young people in high school (and their parents) considering pursing engineering in university and as a career. The report informs about what to expect when choosing a career and/or engineering discipline to pursue. As such, the intent of the report is to be applied, practical, and engaging to this target audience.

## 2. Introduction

OSPE is often asked what type of engineering has the most openings or the highest demand for new engineering graduates in entry level positions. Of course, many factors influence demand for jobs. It depends on economic issues, location, resources, and COVID-19 recovery efforts.

The annual Mercer/OSPE engineering compensation survey results provides a snapshot of demand for entry level positions in Ontario companies that participated in the 2019 survey. The survey was conducted well before the pandemic, and conditions may change during post-pandemic economic recovery. Nonetheless, data provide insight into what types of engineering jobs exist at engineering companies, and how many individuals are working in various position levels, including entry level. Furthermore, comparisons with the number of professionals in more senior level positions indicate how pathways over an entire career may look within different engineering disciplines.

In June 2019, 210 Ontario engineering companies responded to the Mercer/OSPE survey. Information was provided about 17,127 engineering professionals working in Ontario. Mercer categorizes career levels into six stages, from entry level to the highest level (typically those with more than 15 years experience), set forth as such:

P1: Entry Professional (1-2 Years Experience)
P2: Experienced Professional (2-4 Years Experience)
P3: Senior Professional (4-8 Years Experience)
P4: Specialist Professional (8-12 Years Experience)
P5: Expert Professional (12+ Years Experience)
P6: Pre-Eminent Professional (15+ Years Experience)

Proportions of job levels in specific types of engineering covered in the 2019 Mercer survey can be compared to the overall proportions in all types of engineering. This means that the types of engineering most closely matching the overall proportions can be viewed as a ‘norm’ with the most stable and predictable labour market conditions.

Comparison charts of different engineering disciplines are presented below. Data represent 9,431 individuals (Professional Engineers or engineering graduates). Only the types of engineering that had at least 200 engineers in Ontario companies are compared, excluding ‘general’ and ‘multiple specializations’ that include engineers that cannot be easily classified.

So, therefore, not all 17,127 are covered. Comments and findings from these charts are qualitative and based on interpretations about the general engineering labour market. OSPE has verified the observations with an engineering Human Resources professional with over 25 years experience and findings are deemed valid and a reflection of reality. Of course, this reality is pre-pandemic and, while it is not expected to change much, various factors could influence the reality in post-pandemic recovery.

Types of engineering are also linked to specific skills sets as identified by Mercer and are insightful for students and new graduates to show what employers are looking for when hiring. The types of engineering represented, and number of Ontario individuals from the 210 companies (in brackets) who reported working in that type include:

- Civil/Construction/Structural Engineering (2,654)
- Product Design Engineering (1,344)
- Project Engineering (1,163)
- Mechanical Engineering (967)
- Electrical Engineering (927)
- Manufacturing Production Process Engineering (705)
- Environmental Engineering (669)
- Quality Assurance Engineering (425)
- Hardware/Software Product Usability Engineering (High Tech) (321)
- Chemical Engineering (256)

When specific skills and skill sets typical of each engineering disciplines described are mentioned in the report, it is useful to consider what they could be classified as according to the Conference Board of Canada Employability Skills . These general headings are mentioned under several discipline descriptions. Specifically, these are:

***Fundamental Skills -*** These are the skills needed as a basis for further development and better prepares one to progress in the world of work when one can:

- Communicate
- Manage information• Use numbers
- Think and solve problems

***Personal Management Skills -*** These are the personal skills, attitudes, and behaviours that drive one's potential for growth. One will be able to offer oneself greater possibilities for achievement when one can:

- Demonstrate positive attitudes and behaviours
- Be responsible
- Be adaptable
- Learn continuously
- Work safely

[1]Conference Board of Canada. (n.d.). Employability skills.

Teamwork Skills - These are skills and attributes needed to contribute productively. One will be better prepared to add value to the outcomes of a task, project, or team when one can:

- Work with others
- Participate in projects and tasks

The intent of listing the above skills is to provide engineering students and new graduates with guidance for what to expect when seeking employment and embarking on their career journey.

# 3. Types of Engineering and Skills Required

## 3.1 Civil/Construction/Structural Engineering

According to Mercer, Civil/Construction/Structural Engineering "manages or performs engineering projects such as roads, airports, railroads, bridges, pipelines, tunnels, and water and sewage systems." Most all new graduates would likely understand that definition. What may not be well understood are the specific skills this type of engineering requires. The following are specific descriptions of skills needed in different types of civil/construction/structural jobs. While skills are learned during all levels of all types of engineering and entry level positions do not require expert knowledge, an understanding of what to expect and strive for when starting a career is important and shows an employer the job seeker has s a realistic understanding of what to expect.

The following list from Mercer describes specific skills related to Civil/Construction/Structural Engineering. The duties listed will provide guidance towards what a hiring committee could ask a candidate. A familiarity of what may be asked in an interview will allow a candidate to think of examples and how to demonstrate that knowledge ahead of time. The more familiar they are of a task, the better chance the interviewer will be confident they are capable of working in the company.  Skills needed in this discipline include:

- Analyzing the design effectiveness and structural reliability of major projects
- Analyzing the purpose and scale of the construction
- Responsibility for the proof, evaluation and optimization of the structure, foundation, and other civil engineering professional technical scheme to ensure that the various usage of the construction is convenient and practical
- Preparing proposals and cost estimates and evaluating all project progress and recommending changes, if needed, in final procedures
- Responsibility for the collection, analysis, and interpretation of spatial data for positioning, navigation, and mapping (specific only to geomatics engineering)

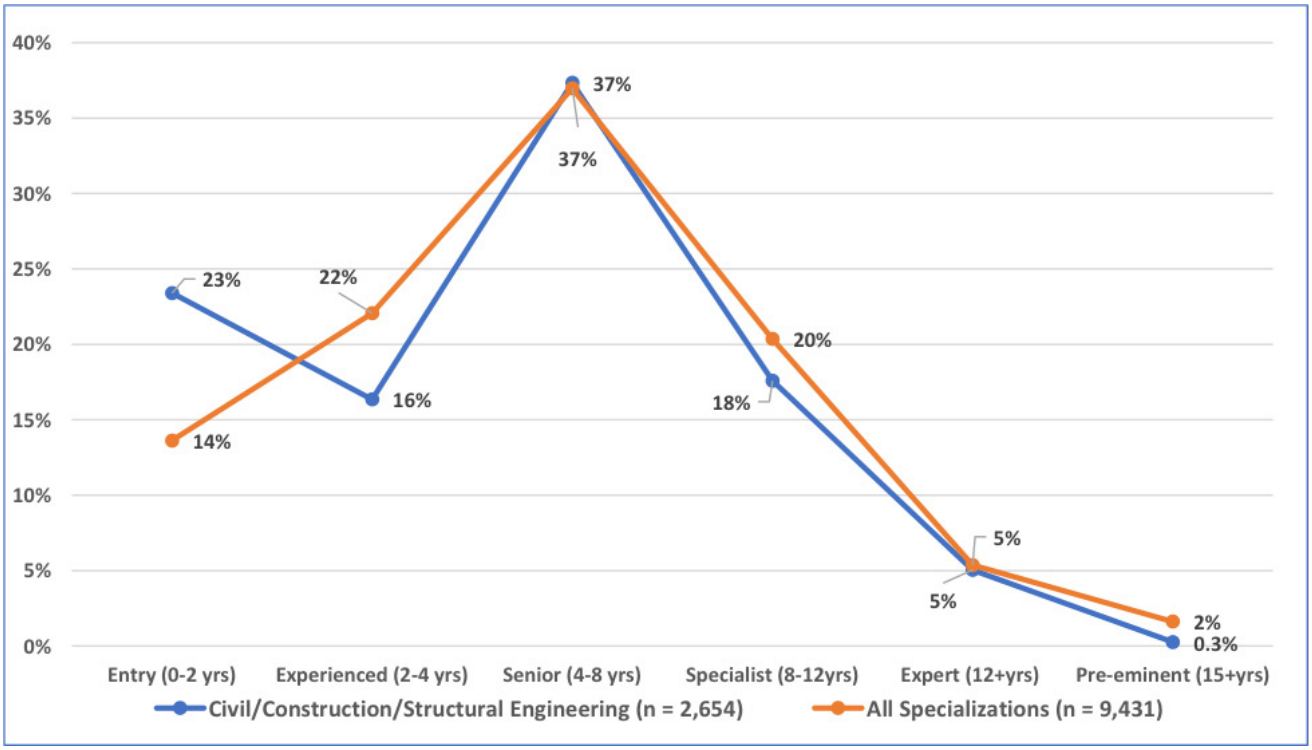
This type of engineering employs by far the most individuals in companies responding to the Mercer survey. As shown in Figure 1, 23% of people working in this category are in entry level positions, which represents 621 out of 2,654 individuals. For new graduates, seeking work in civil/construction/structural engineering may be a logical choice and a jumping off point to gain experience to move on to the same or different types of engineering.

After obtaining at least two years of experience, it is common for professionals in this discipline to springboard onto specializations such as highways/bridge design, tunnel engineering,

After obtaining at least two years of experience, it is common for professionals in this discipline to springboard onto specializations such as highways/bridge design, tunnel engineering, rail/track design, or pavement engineering (road and airport). All these roles come from the same root of civil engineering. Their jobs title may not use the term civil, but their skills are founded on the discipline.

As shown in Figure 1, the civil/construction/structural engineering sector is a promising pathway for new graduates to start their careers.

Figure 1: Comparison of Proportions between Civil/Construction/Structural Engineering and All Types of Engineering




The decrease in positions between Entry and Experienced (2 – 4 years) may mean that after two years, individuals in this type of engineering have enough experience to move into other engineering roles to gain even more experience, such as those mentioned above. This is particularly evidenced as Experienced professionals at 16% (434 positions) are lower than all types of engineering, at 22%. Senior positions (4 – 8 years) represent the same proportion as all types of engineering at 37% (991 professionals) and Specialist positions (8 – 12 years), at 18% (467 workers) are fewer than All Types of Engineering.

This can be interpreted at least three ways:
(1) It is typical in this type of engineering and All Types of Engineering for newer workers with up to four years experience to move into Senior positions after working in both civil/construction/structural and other engineering fields; and
(2) Professionals are staying in Senior positions for the bulk of their careers and not moving onto Specialist positions. They may be satisfied with the work they do as Senior level engineers. Indeed, very few engineers move into Expert (134 individuals) and Pre-eminent (7 professionals) careers.
(3) After obtaining eight years experience, it is very common and there is a high demand to move up to positions in management and/or specialist positions not classified as civil/construction/structural. Hence, not that many people are in specialist positions labeled as civil/construction/structural.

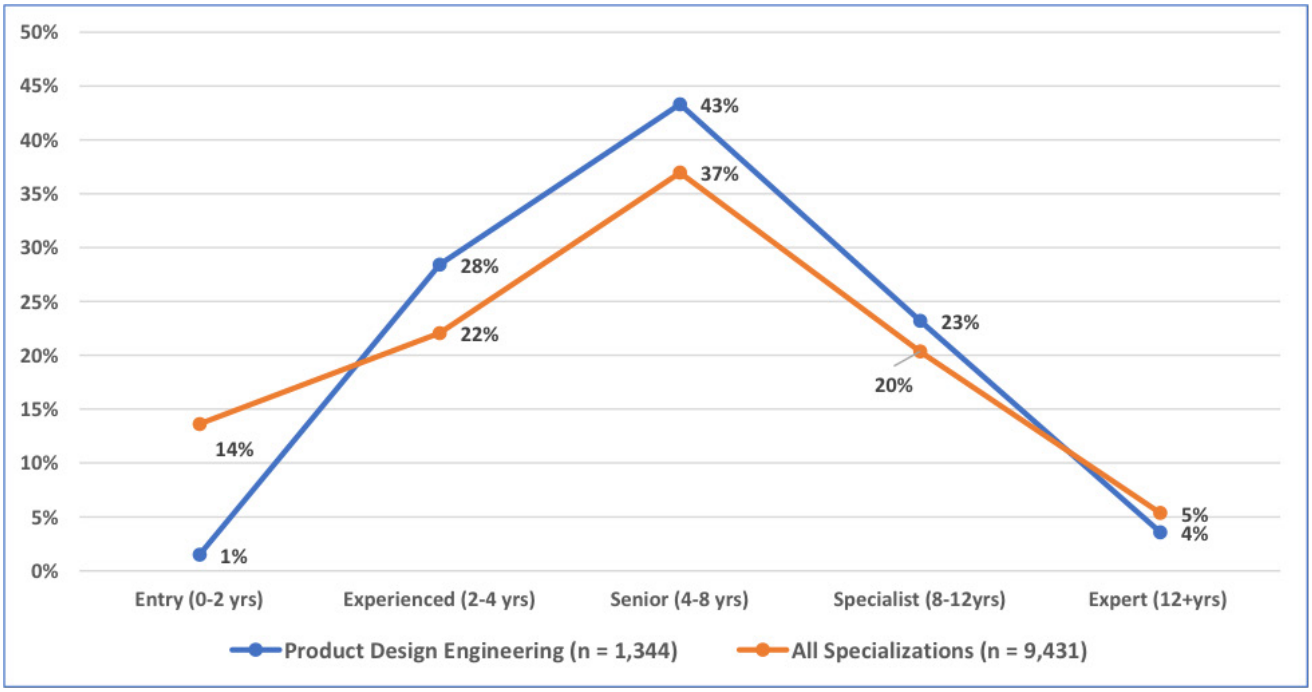
## 3.2 Product Design Engineering

Using Mercer's definition, Product Design Engineering "focuses on designing and developing new or existing products, components, or assemblies". Key skills needed in product design engineering include:

- Applying engineering principles to develop mechanical, electronic, or chemical products that meet customer technical/functional specifications as well as manufacturing cost/efficiency requirements
- Conducting mathematical modelling to determine if proposed designs are technically feasible
- Supporting and participating in the design, test, modification, fabrication, and assembly of prototypes

This type of engineering represents the second highest number of engineers in the Mercer database (Figure 2).

Figure 2: Comparison of Proportions between Product Design Engineering and All Types of Engineering




Only 1% of product design positions are entry level (20 out of 1,344 workers). However, once engineering professionals have two years job experience, numbers in this type of engineering exceed proportions of all types of engineering. There were 28% (382 individuals) at the Experienced level and 43% (over 5% more than all types of engineering) at Senior positions (582 professionals).

What this indicates is that individuals who aspire to become product designers but do not have any engineering employment experience should apply to other types of engineering jobs first as they are unlikely to be hired at entry level. However, after just two years experience in another discipline, the chances are favourable for being hired in the product design industry. Indeed, an HR expert confirmed that any product that can be designed to be sold to consumers is considered a product, even software.

This means the designer must understand the product and the consumer who typically buys the product. These cannot be learned in university – they are only learned through experience. Hence, new graduates are rarely, if ever, hired to design products. Furthermore, many International Engineering Graduates (IEGs) have this experience and are hired over new graduates (and at entry level wages). Applying for a Product Design engineering position is not something that a new graduate without engineering experience should consider. As the HR expert says, “this industry does not want new grads – period”.

If Entry Level positions are not open to new graduates, there certainly is opportunity for new graduates to gain experience in other industries and then move to product design careers. At Specialist (312 workers) and Expert (48 professionals) levels (there were no observations at the Pre-eminent level), proportions are very close to all types of engineering. This indicates these professionals follow a typical career path as most other types of engineering. It also demonstrates that many product design engineers are moving to higher levels in their careers and not remaining in their Senior level positions.

## 3.3 Project Engineering

Project Engineering “focuses on designing, communicating, and implementing an operational plan for completing an engineering-based project”. Some of the skills needed in this field include:

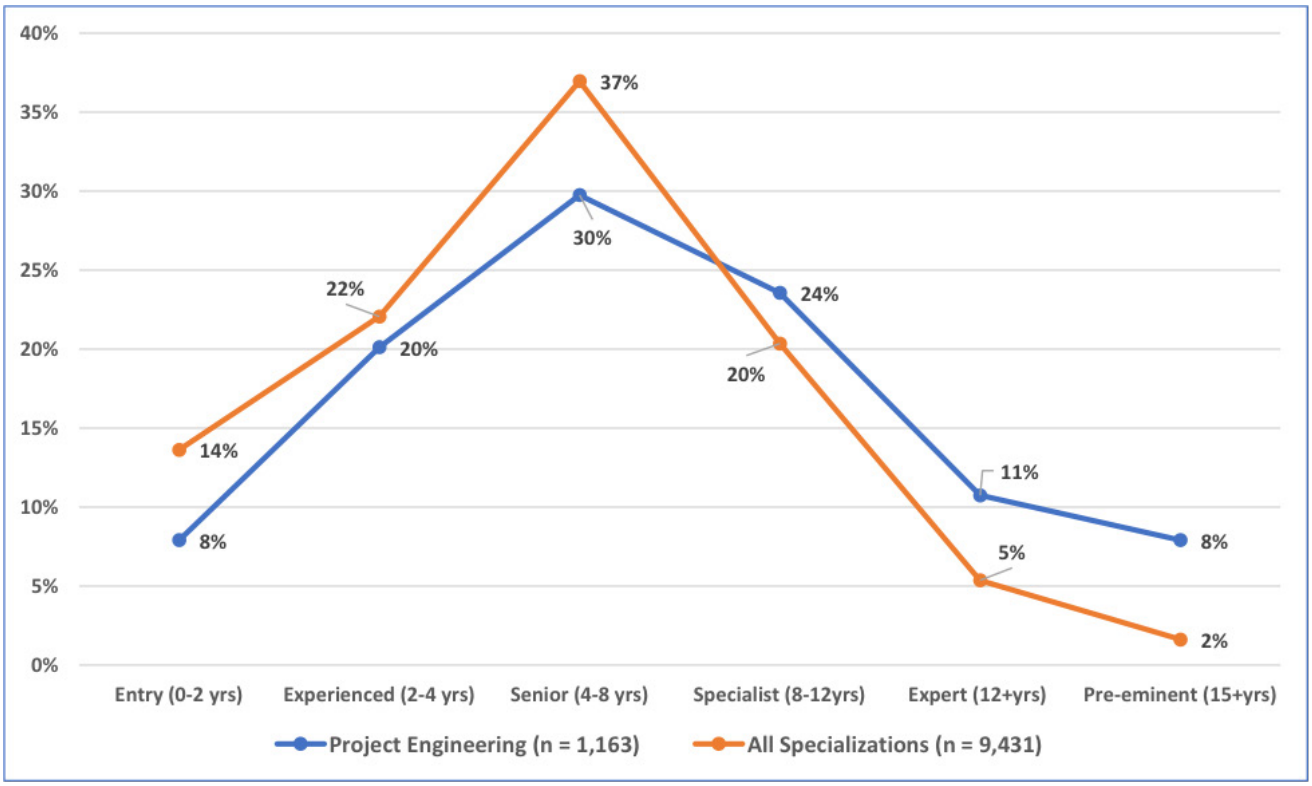
- Preparing designs, project controls and specifications, schedules, cost estimates, production, transportation, installation, testing and/or commissioning of new infrastructure, facilities, equipment, etc.
- Monitoring progress and performance against the project plan; taking action to resolve operational problems and minimize delays
- Preparing engineering standards, designs, and work specifications; developing project schedules, budgets, and forecasts; and selecting materials, equipment, project staff, and external contractors
- Works with third parties to ensure plans are realistic and achievable
  (Project Planning Engineering)

While entry level positions make up a greater proportion than Product Design Engineering, Project Engineering may not be the best option for a new graduate to start their career. As shown in Figure 3, only 8% (92 out of 1163 workers) are in entry level positions. This makes sense as project management requires well-rounded, non-technical skills such as budgeting, scheduling, and teamwork with professionals from a wide range of disciplines – skills primarily acquired by on-the-job experience.

At the Experienced Professional level, those who have 2 – 4 years experience, proportions are very near All Types of Engineering, at 20% (234 individuals). This is a clear indication companies are looking to hire engineering graduates in Project Engineering who have gained two or more years work experience – likely in other fields. This again speaks to new graduates to apply and start out in fields such as civil or construction to gain that experience to move on to more senior levels.

Although significantly less than All Types of Engineering, Senior Professionals who have 4 – 8 years experience, represent most positions in Project Engineering at 30% (346 workers). It seems many of them move on to higher levels as Specialist Professions make up a higher proportion of the workforce than those in All Types of Engineering, at 24% (274 positions).

Figure 3: Comparison of Proportions between Project Engineering and All Types of Engineering




Proportions of Project Engineers at the most senior levels are noticeably greater than all engineering types. Clearly, the most experienced Project Engineers have opportunities to become Expert Professionals with 12+ years experience, at 11% (125 individuals), and Pre-eminent Professionals with 15+ years experience, at 8% (92 positions). Indeed, 43% of Project Engineering are Specialist Professionals and above – well more than the 30% of Senior Professionals – meaning most people working in Project Engineering move up to more senior levels in their careers.

## 3.4 Mechanical Engineering

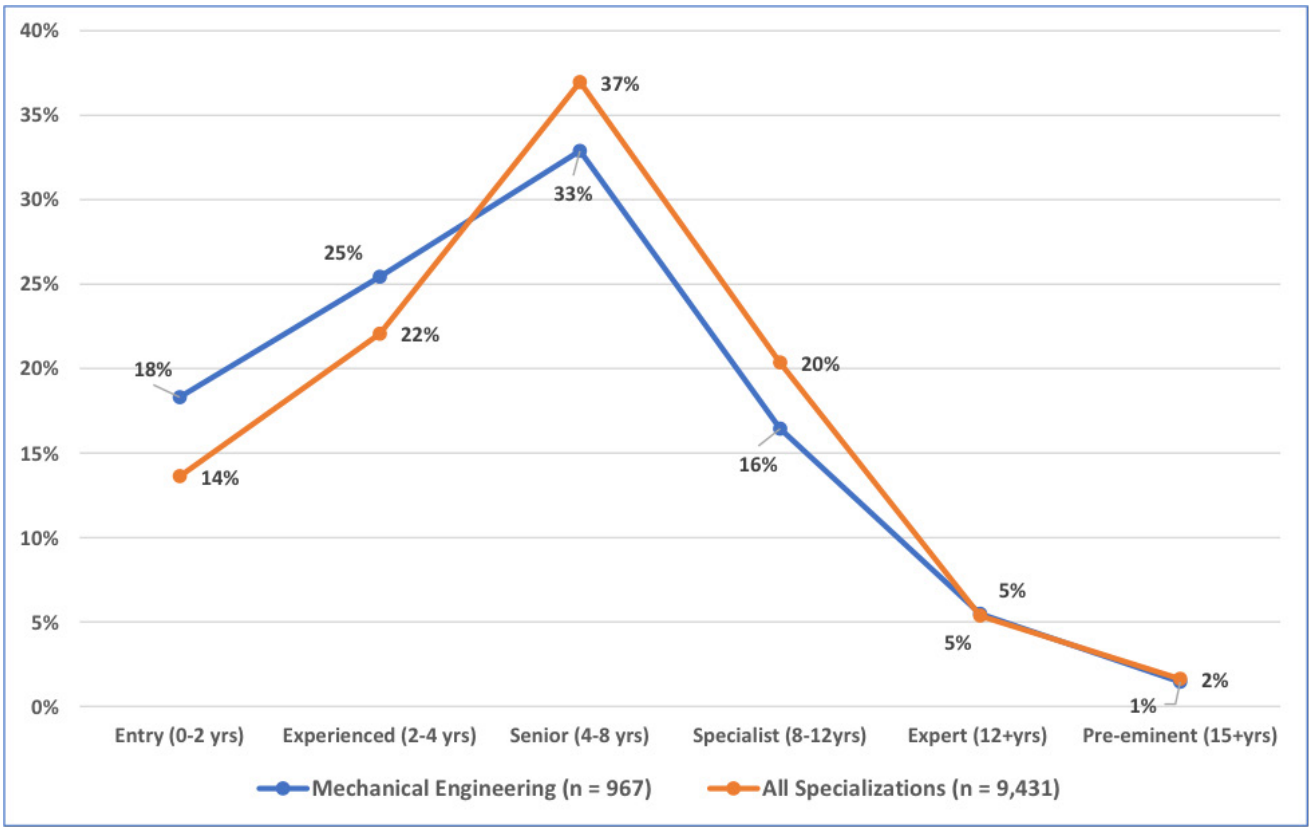
Mechanical Engineering "researches, plans, designs and develops mechanical products and systems", such as instruments, controls, robots, engines, machines and mechanical, thermal hydraulic or heat transfer systems for production, transmission, measurement, and use of energy. This includes,

- Planning, design, development, and testing of mechanical and/or electromechanical systems, instruments, controls, engines, and/or machines

Skill sets as identified by Mercer for Mechanical Engineering are the most technically focused than any other type of engineering examined in this report. Nonetheless, any job that involves planning, designing, and testing would necessitate at least some teamwork skills as developing these mechanical instruments typically would not be a one-person job. But, for new graduates who prefer more technical occupations, survey results in Figure 4 suggest Mechanical Engineering may fit the bill.

Entry and Experienced Professional positions are 4% and 3% greater, respectively, than All Types of Engineering. The 18% (177 out of 967 professionals) and 25% (246 workers) of positions in these levels, respectively, represent solid opportunities for recent graduates to start their careers.

Figure 4: Comparison of Proportions between Mechanical Engineering and All Types of Engineering




Senior Professionals, as in most types of engineering, represent the greatest proportions of Mechanical Engineering workers at 33% (318 individuals), and 4% lower than All Types of Engineering. As well, at 16% (159 positions), there are 4% fewer Mechanical Engineering professionals becoming Specialists. This is even lower than Entry Level Professionals. Expert and Pre-eminent Professionals mirror those from All Types of Engineering. Coupled with the lower proportions of Specialist Professionals, these numbers indicate Mechanical Engineering Professionals prefer to work as Senior Professionals, roles which likely involve more technical tasks than non-technical duties. Another possibility is many Mechanical Engineering professionals move on to other types of engineering after attaining four to eight years experience.  Indeed, as verified by the HR expert, mechanical engineers do not need as much project management skills as civil engineers and therefore can hone their skills in a heavy industrial space. These people can become highly specialized without ever going into management and, as this provides great value to companies, the more specialized, the greater the compensation these highly technical professionals get paid.

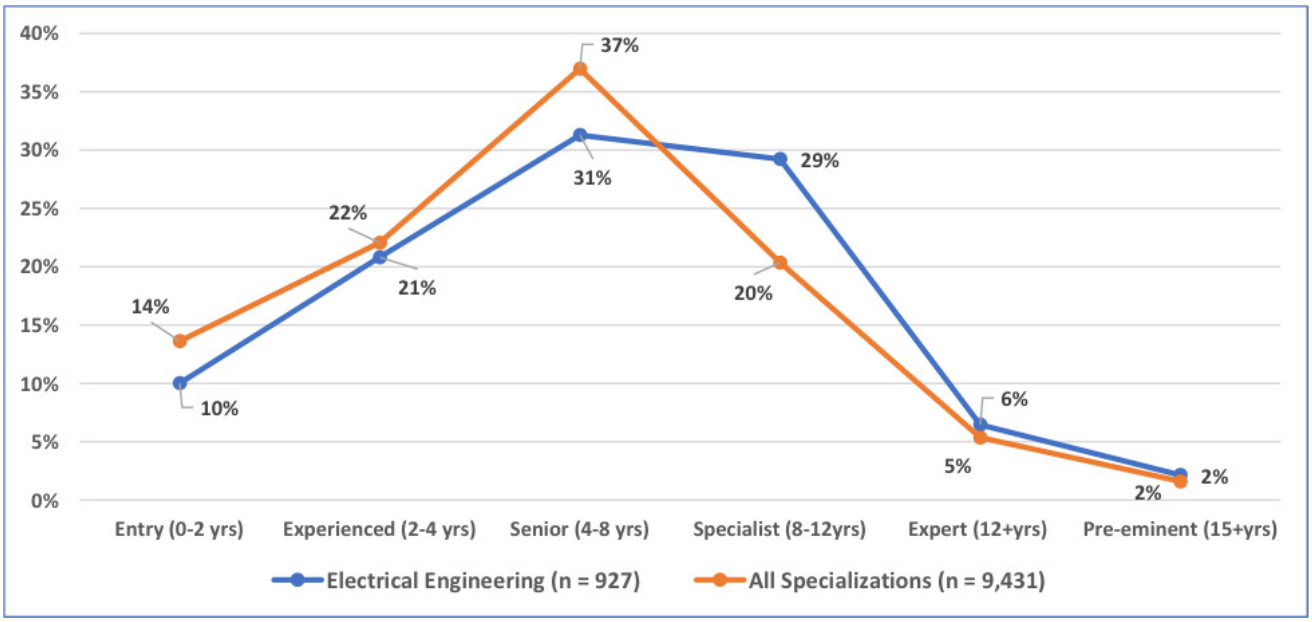
## 3.5 Electrical Engineering

Electrical Engineering "researches, develops, designs, and tests electrical components, equipment, systems, and networks". This includes designing,

- Electrical equipment, facilities, components, products, and systems for commercial, industrial, and domestic purposes.

This is another field that relies heavily on technical skills and may be appealing to individuals who thrive in a more technical environment. Nonetheless, like Mechanical Engineering, strong teamworking skills are necessary for working in multidisciplinary environments. However, as shown in Figure 5, and unlike Mechanical Engineering, it appears that entry level positions are not as common.

Figure 5: Comparison of Proportions between Electrical Engineering and All Types of Engineering




Only 10% (93 out of 927 workers) are in entry level positions, which is 4% lower than All Types of Engineering. However, after two years, at 21% (193 positions), Experienced Electrical Engineering professionals are at almost the same proportions as All Types of Engineering. This suggests new graduates may want to apply for other, yet related, types of engineering to gain the two years experience that employers are looking for. Once in this career path, there are many high demand positions beyond only electrical. Electrical engineering systems are a growing area needing workers. These are especially important in rail systems. With increasing reliance on electrical power for transportation, opportunities, many of which aren't showcased in mainstream job search engines, will increasingly become available.

Unlike other types of positions, it appears that many Electrical Engineering professionals do indeed move up from Senior levels to Specialist levels. Senior Professionals are significantly lower in proportion, at 31% (290 workers), than All Types of Engineering. As well, at 29% (271 individuals) the proportion of Specialist Professionals exceeds that of All Types of Engineering by almost 10%. Higher levels demonstrate almost exact same proportions as All Types of Professionals, with 6% (60 positions) as Experts and 2% (20 individuals) as Pre-eminent Professionals. This suggests most Electrical Engineering professionals remain (likely by choice) as Senior and Specialist Professionals.

## 3.6 Manufacturing Production Process Engineering

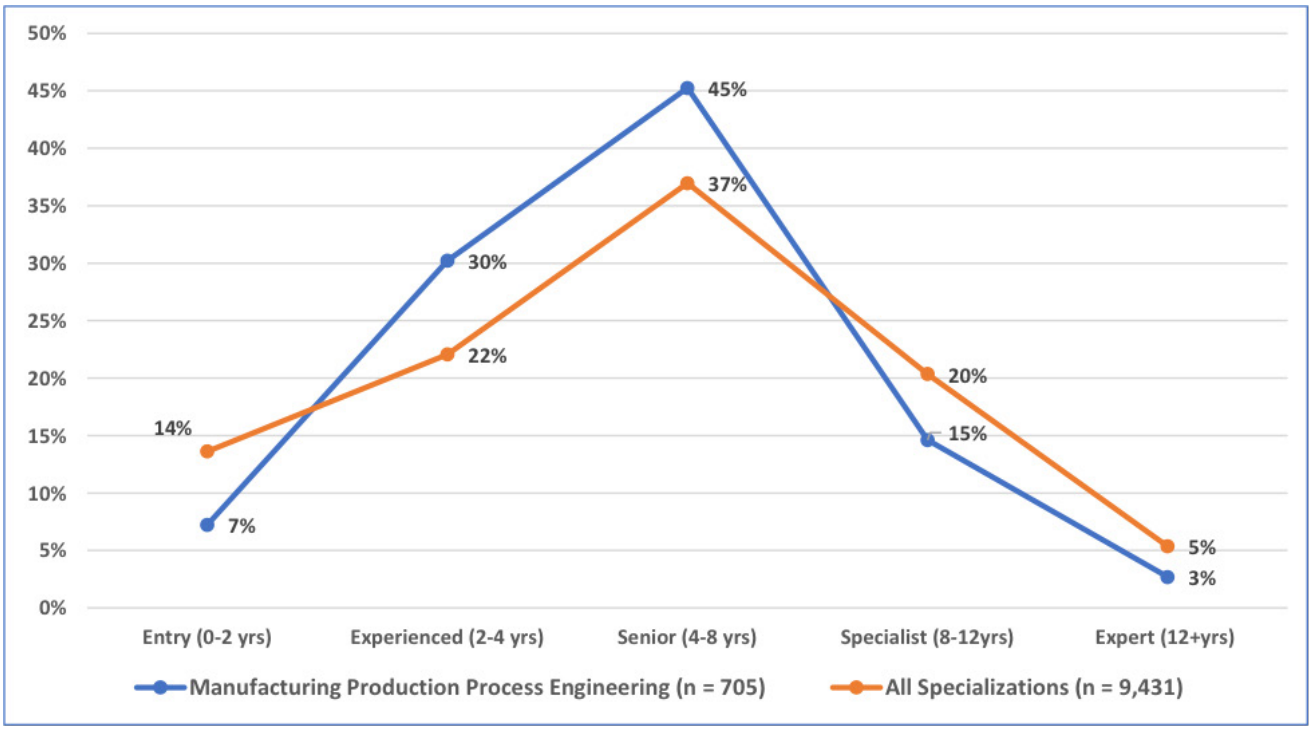
Manufacturing Production Process Engineering "focuses on designing, developing, and implementing new or revised production processes for the efficient/economical mass production of goods". These duties include,

- Designing arrangement of manufacturing equipment to ensure most efficient and productive layout
- Designing the sequence of production operations, specifying procedures for the fabrication of applicable tools and equipment, and adapting machinery in response to factory conditions
- Conducting tests throughout all stages of production to determine control over applicable variables and troubleshooting/solving production problems
- Providing guidance to product design engineering on technical specifications that will best utilize equipment and manufacturing techniques
- Ensuring that production processes and procedures are in compliance with regulations

Teamwork skills would seem to be particularly important when working in Manufacturing Production Process Engineering as many of their duties seem to be conducted on the factory floor where a wide range of workers would be performing their jobs. This would entail understanding what each worker does and how it affects production. A willingness to learn would be needed to understand regulations, which likely were not taught in university. This discipline requires sound understanding of systems, which typically are learned on the job. Careers in Manufacturing Production Process engineering are not usually started in entry level positions.

As shown in Figure 6, it is unlikely new graduates would start their careers in this type of engineering. Only 7% (51 out of 705 workers) are Entry Level Professionals, which is half the percentage of entry level positions in All Types of Engineering. Once professionals gain two years experience, it appears many positions open for Manufacturing Production Process Engineering Professionals. Experienced Professionals compose 30% (213 positions) and a significant 45% (319 workers) of Senior Professionals in this type of engineering. These proportions are fully 8% higher than comparable positions in All Types of Engineering. Inversely, proportions of professionals in this type of engineering are lower than All Types of Engineering in Specialized and above levels, indicating, most Manufacturing Production Process Engineering professionals either stay at a Senior level or pursue positions in other types of engineering, including management.

Figure 6: Comparison of Proportions between Manufacturing Production Process Engineering and All Types of Engineering



## 3.7 Environmental Engineering

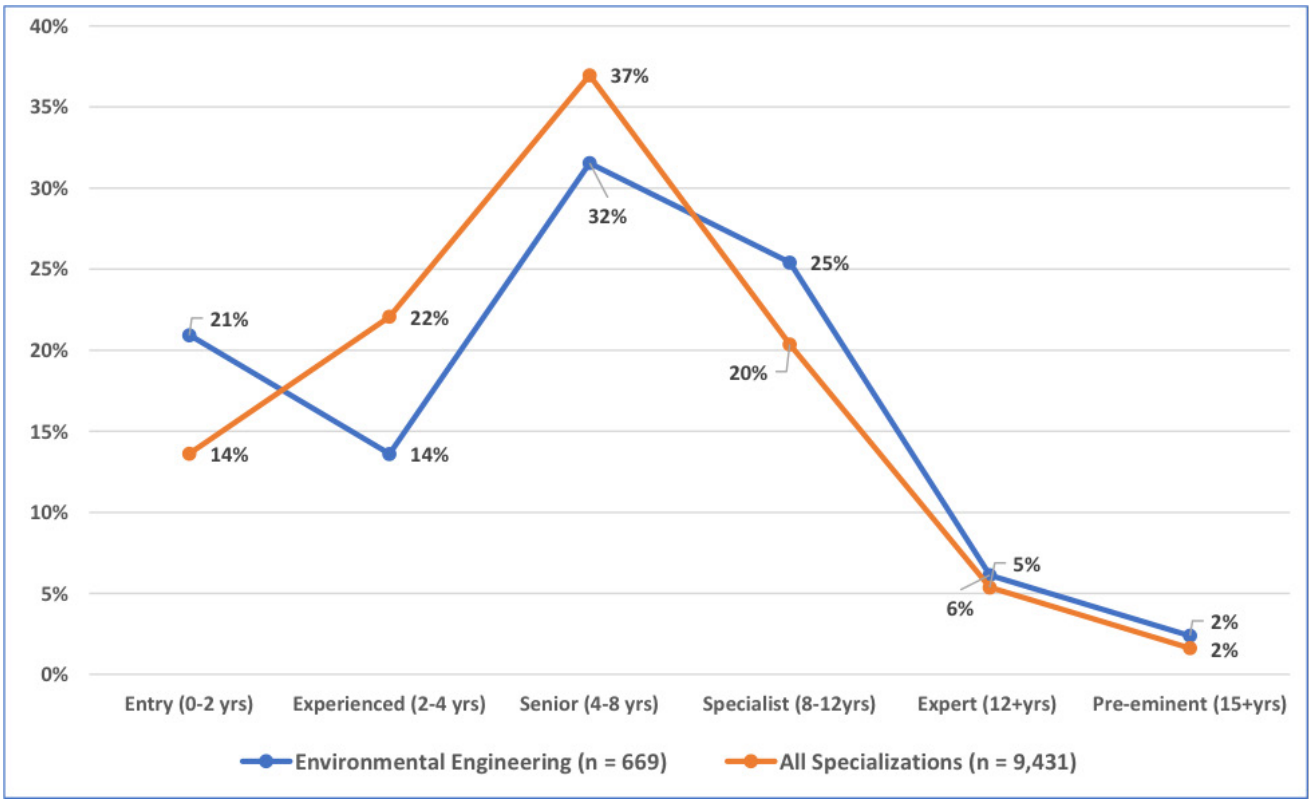
Environmental Engineering "focuses on designing engineering solutions to mitigate environmental hazards in the workplace and broader community". This includes,

- Designing and administering environmental safety and pollution prevention programs in accordance with organization, regulatory, and labour union requirements/agreements
- Conducting environmental engineering studies and preparing environmental impact reports for new construction projects, plant processes, and permits
- Reviewing and analyzing environmental documentation issued by regulatory agencies
- Evaluating proposed regulations to determine financial, industrial, public, and environmental impact
- Working with external regulators to resolve compliance issues

The skills and skill sets needed to work in Environmental Engineering seem more complex and multi-disciplinary than some other types of engineering. Heavy emphasis is placed on preparing and writing reports as well as fostering a firm understanding of regulatory and compliance issues. Teamwork is needed to understand and learn from not only regulatory agencies but also institutions such as labour unions. The wide range of elements needing reviewing and analyzing (e.g., construction projects, financial, industrial, and public impacts) mean Personal Management skills such as continuous learning and adaptability are essential.

Given the complexities of duties required of environmental engineering professionals, it is somewhat surprising, then, that after Civil Engineering, Environmental Engineering shows the highest proportion, at 21% (140 out of 669 workers), of Entry Level Professionals of all the types of engineering analyzed for this report (Figure 7). This indicates new graduates may find more opportunities to begin their careers in environmental sector companies and industries. There is a dichotomy, however, in that it is unlikely new graduates would enter the workforce with such a complexity of skills needed to work in this field. As well, it appears many professionals leave this type of engineering after two years, presumably to gain experience in other fields, with only 14% (91 positions) at the Experienced Professional level. Regardless, this sector may be a good place for new graduates to find work and after two years, move on into other types of engineering careers.

Figure 7: Comparison of Proportions between Environmental Engineering and All Types of Engineering




With Senior Professionals, at 32% (211 individuals) being fewer than All Types of Engineering, and Specialists, at 25% (170 workers) greater than All Types of Engineering, indications are that Environmental Engineering professionals tend to move up to Specialist levels or leave this type of engineering for other fields. This type of engineering displays similar proportions as All Types of Engineering at the most experienced levels.

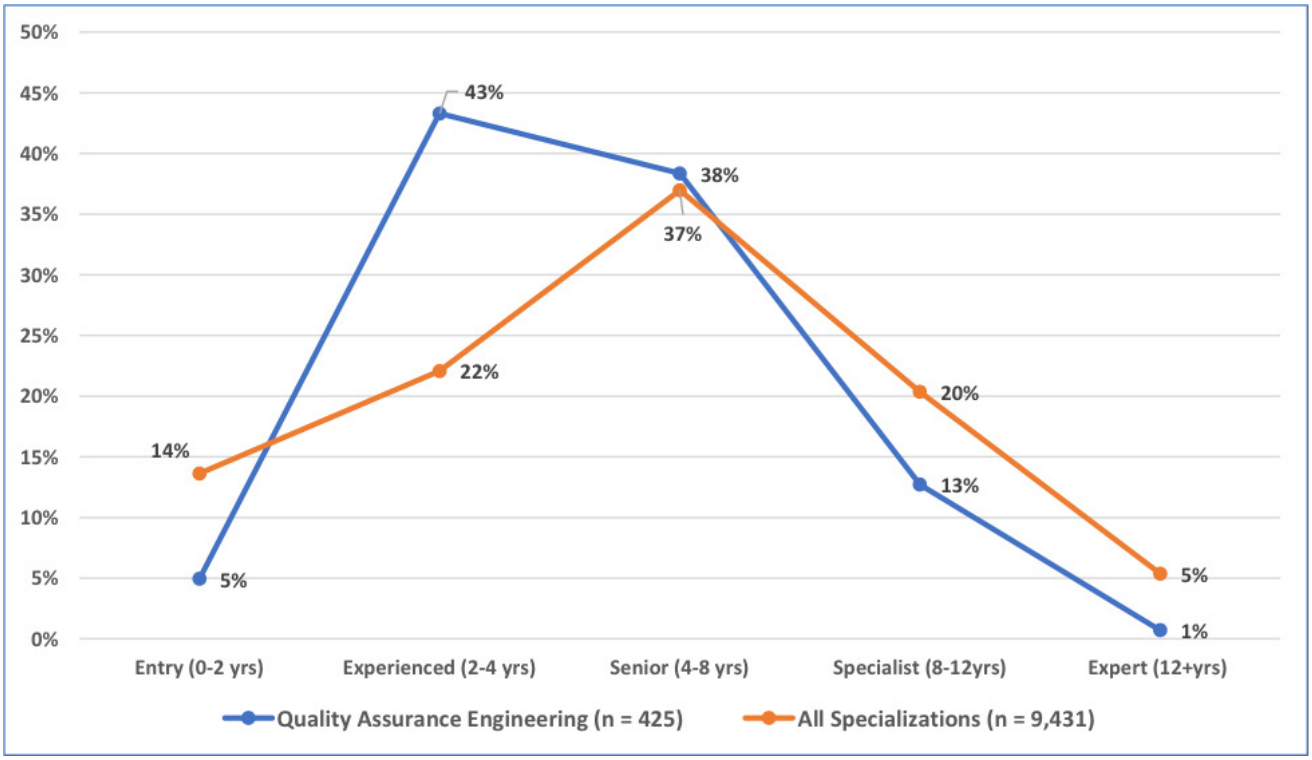
## 3.8 Quality Assurance Engineering

Quality Assurance Engineering "focuses on developing, modifying, applying, and maintaining quality evaluation and control systems/protocols". This includes,

- Devising and implementing methods and procedures for inspecting, testing, and evaluating the precision and accuracy of products and production equipment
- Designing and analyzing inspection and testing processes, mechanisms, and equipment
- Conducting quality assurance tests and performing statistical analysis to assess the level of control and manage product quality risks
- Undertaking root cause analysis of incidents requiring corrective action
- Ensures that corrective measures and deviation meet acceptable reliability standards and that documentation is compliant with requirements

While fundamental for a Quality Assurance professional, many of the skills required for this career would be developed from being on-the-job. Indeed, as shown in Figure 8, at 5% (21 out of 425), very few positions are entry level.

Figure 8: Comparison of proportions between Quality Assurance Engineering and All Types of Engineering




It is much more difficult to explain why the majority of Quality Assurance Engineering professionals are at the Experienced level, at 43% (184 positions), which only requires 2 – 4 years experience. As these jobs would be lower paying than Senior Professionals and if the skills needed can be learned on-the-job, companies may hire less experienced engineering graduates as a cost saving measure. This may be a fair assumption as almost as many Quality Assurance Engineering professionals are at the Senior level, at 38% (163 workers), with very few at the Specialist and above levels. It would be logical for Senior Professionals to supervise multiple Experienced Professionals, so economies of scale could come into place, with more Experienced Professionals receiving less pay. The HR expert confirms that indeed these observations are often the case. Many workers start out in civil engineering, learning how, for example, to perform audits. After two years, they could move into quality assurance as auditors. It is only after a few more years that they learn to then provide compliance recommendations and thus move into more senior roles.

## 3.9 Hardware/Software Product Usability Engineering

Hardware/Software Product Usability Engineering is "responsible for usability testing and design of high-tech products (hardware or software) in support of end users' needs." Included are,

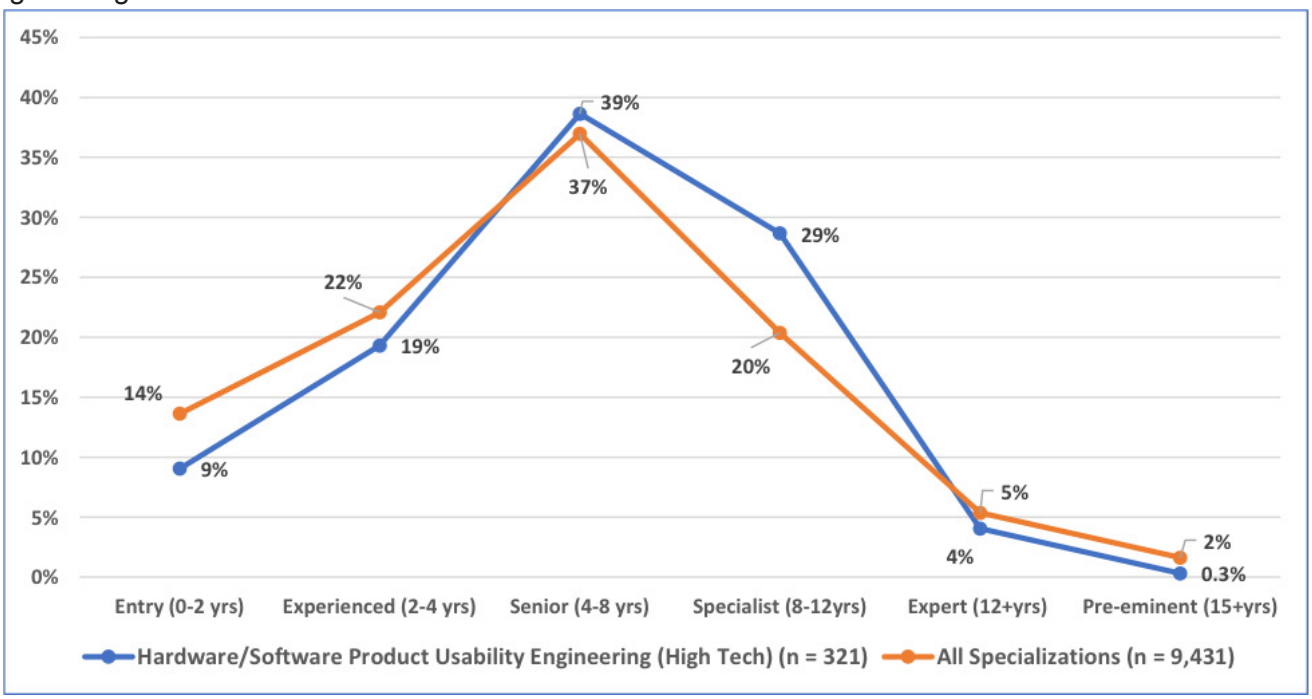
- Providing usability support to product development teams by performing heuristic evaluation, cognitive walkthroughs, and task analysis
- Compiling, analyzing, and documenting test results
- Proposing conceptual designs and modifications to existing products for enhancements/features
- Establishing usability standards and best practices during product development to ensure optimal user experience

Clearly a strong computing education and background are required for these positions. Because user needs are critical, teamwork is involved at almost every stage to collaborate with colleagues, as well as users. With high-tech jobs significantly increasing in the coming years, the demand should expand accordingly.

As demonstrated in Figure 9, it is somewhat surprising that proportions of Hardware/Software Product Usability Engineering Entry and Experienced Level Professionals are lower than All Types of Engineering. Only 9% (29 out of 321 positions) are at the entry level and 19% (62 individuals) with two to four years experience. Senior Professionals, however, exceed proportions of All Types of Engineering at 39% (124 workers). One reason may be that because user needs are so important, as well as collaboration with colleagues, these positions require many years of teamwork and practical experience, and likely this experience can be gained by hardware/software work in any type of engineering. Indeed, understanding end user experience is very important, as well as collaboration with all design team members. Skills in marketing in addition to engineering are needed, and these normally are only fine tuned by on-the-job experience.

With almost 10% higher than All Types of Engineering, at 29% (92 positions), many move into Specialist Professional positions. This indicates Hardware/Software Product Usability Engineering professionals are staying in this field throughout their careers, although not moving higher to Expert of Pre-eminent levels.

Figure 9: Comparison of Proportions between Hardware/Software Product Usability Engineering and All Types of Engineering



## 3.10 Chemical Engineering

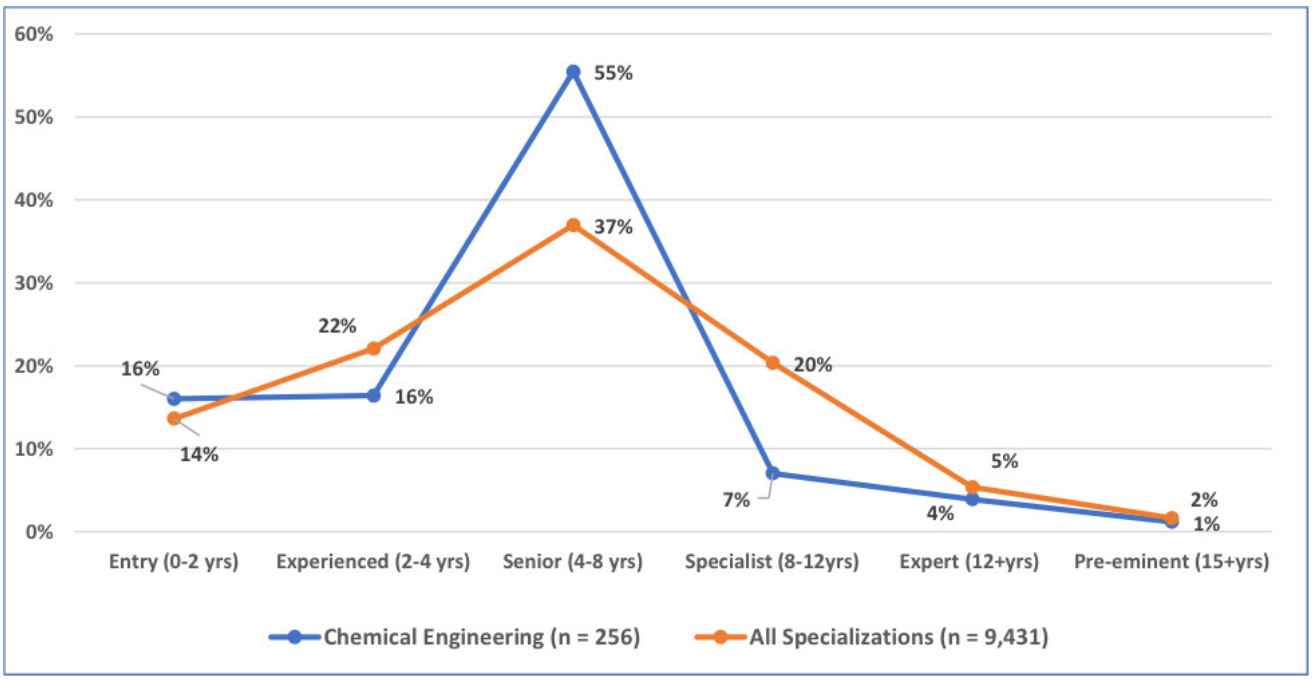
Chemical Engineering "researches, designs, develops, and implements chemical reactions used in processes that convert raw materials or chemicals into more useful or valuable forms". Specific areas include:

- The design of chemical plant equipment and processes for the manufacture of chemical products such as gasoline, synthetic rubber, plastics, detergents, cement, paper, and pulp
- Determines most effective arrangement of operations such as mixing, crushing, heat transfer, distillation, oxidation, hydrogenation, and polymerization

Chemical engineering falls within the types of engineering that requires more technical skills than a strong mix of technical and non-technical ability. As such, new graduates may have many of the skill sets employers are looking for when hiring Entry Level Professionals.

Figure 10 supports this speculation, with proportions of entry level positions, at 16% (41 out of 256 positions) higher than All Types of Engineering. Chemical engineering professionals appear to stay in the same field as they progress in their careers, with the same proportion, again at 16% (42 workers), being Experienced professionals with 2 – 4 four years experience.

Figure 10: Comparison of proportions between Chemical Engineering and All Types of Engineering




By far, most chemical engineering professionals remain as Senior Professionals, with 55% (142 positions) at this level. With only 7% (18 individuals), 4% (10 positions), and 1% (3 individuals) as Specialist, Expert, and Pre-eminent Professionals, respectively, indications are that most chemical engineering workers stay at the Senior Professional level for the duration of their careers, unless they leave this type of engineering altogether.

For engineering graduates seeking technical-oriented careers and desiring or willing to remain at a senior level position, chemical engineering may be an appealing career to pursue.

## 4. Summary

The observations presented in this report looks at what types of engineering employs the highest proportions of professionals at an entry level position and what types of engineering tend to attract engineering professionals who desire or are willing to remain at a Senior Professional Level throughout their careers. These observations may help engineering students and new graduates determine which engineering discipline most suits their career plans.

Table 1 shows from highest percentage of Entry Level Professionals (0-2 years experience) to fewest. Those with the highest proportions may provide a better opportunity for engineering graduates to start their careers. Especially with Civil/Construction/Structural, to start a career in these sectors can provide the experience necessary to move on into other types of engineering.

Table 1: Proportions of Entry Level Positions (0-2 Years Experience) in Specific Types of Engineering

| Type of Engineering | Percentage Entry Level | Number of Positions |
|---|---|---|
| Civil/Construction/Structural | 23% | 621/2654 |
| Environmental | 21% | 140/669 |
| Mechanical | 18% | 177/967 |
| Chemical | 16% | 41/256 |
| Electrical | 10% | 93/927 |
| Hardware/Software Product Usability | 9% | 29/321 |
| Project | 8% | 92/1163 |
| Manufacturing Production Process | 7% | 51/705 |
| Quality Assurance | 5% | 21/425 |
| Product Design | 1% | 20/1344 |

Table 2 outlines the percentage of Senior Level Professionals (4 – 8 years experience). The higher the percentage the more likely professionals in these positions tend to stay at this level throughout their careers. These types of engineering may appeal to engineering graduates who prefer to work in more technical environments and are satisfied to remain there for their careers. Conversely, those who aspire to the highest professional levels or desire to go into management positions, may want to explore careers in the types of engineering with the fewest proportions of Senior Level Professionals.

Table 2: Proportions of Senior Level Positions (4-8 Years Experience) in Specific Types of Engineering

| Type of Engineering | Percentage Entry Level | Number of Positions |
|---|---|---|
| Chemical | 55% | 142/256 |
| Manufacturing Production Process | 45% | 319/705 |
| Product Design | 43% | 582/1344 |
| Hardware/Software Product Usability | 39% | 124/321 |
| Quality Assurance | 38% | 163/425 |
| Mechanical | 33% | 318/967 |
| Environmental | 32% | 211/669 |
| Civil/Construction/Structural | 31% | 991/2654 |
| Electrical | 31% | 290/927 |
| Project | 30% | 346/1163 |

While many factors are at play when deciding which discipline and career to pursue in engineering, this report at least provides useful observations about the most common engineering positions amongst Ontario companies. There is a dearth of practical information about which types of engineering are the most open to hiring entry level engineering graduates. With this analysis, OSPE hopes that it will provide insight for young peoples and their parents in deciding which engineering program to choose when applying and starting university. It also outlines skill sets needed in these disciplines to show what new graduates should prepare for when pursuing engineering as a career.

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