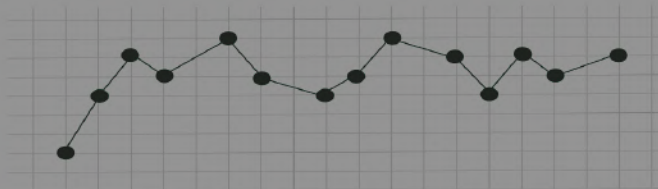
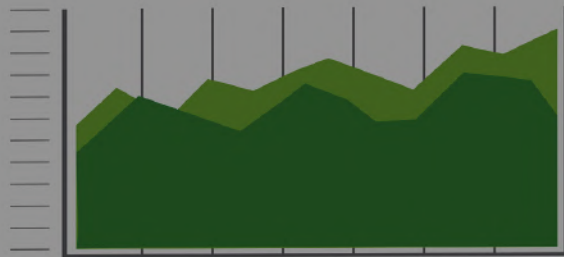
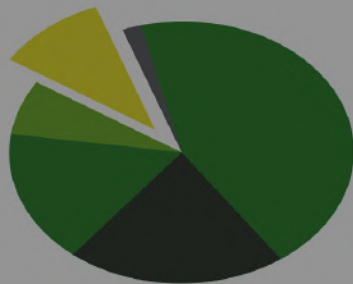




Can Atlantic Canada's Labour Shortage be Solved by Robotics?



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THE CHALLENGE

Atlantic Canada is facing a labour shortage issue that is not altogether unique in North America, but has been exasperated due many smaller, often distinct but accumulating reasons. In fact, in 2018 labour shortage study by the Business Development Bank of Canada stated:

50% of Atlantic Canadian businesses report difficulty in hiring employees during the last year (highest in the country)

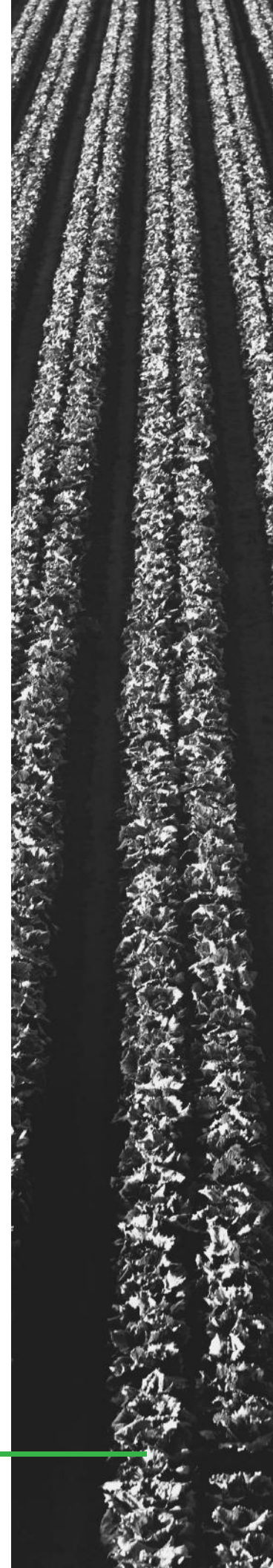
– *An Exploration of Skills and Labour Shortages, ACOA, June 2019*

The statement above naturally poses a question as to why, let us explore this in more detail. To allow for a slightly more detailed and pointed analysis we will focus on Nova Scotia as it displays – with greater contrast – the issues commonly present in Atlantic Canada.

The first point to explore is regarding the fact that **Nova Scotia is less populous and more spread-out than some other provinces in Canada.**

Although Halifax is a relatively densely populated city with 1077 people per square km and is Canadas 13th largest metropolitan area^[1], there are many small rural townships.

In fact, over half of the people living in Nova Scotia do not live in Halifax Regional Municipality (HRM). Furthermore, although Halifax is seeing growth not seen since the 1970's, rural Nova Scotia is suffering.



Pertaining to rural Nova Scotia's work force problem, like many other rural areas in the world; two major things are happening in parallel with one another:

- ▶ The current workforce is **retiring**
- ▶ The **younger population** (future employees) are **leaving their local residence** to do things such as go to school and or find a higher paying or less physical job.

This is supported referencing the ACOA report "An Exploration of Skills and Labour Shortages" where it states,

“Atlantic Canada has a higher unemployment rate for both workers 55 years and older, and workers between the ages of 15 and 25 compared to the national average.”

Q:

What can a company do when they are losing employees and do not have anyone to fill the gap?

A:

They could find people, or as will be explored in this article, **automate the tasks they were doing.**



HOW CAN THIS HELP YOU?

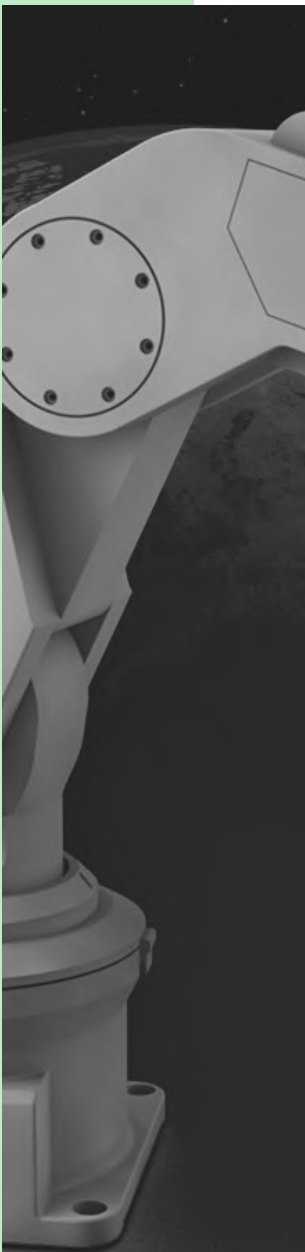
How could a company benefit from automation?

- 1 Firstly, it could **bring a skilled workforce** by creating the need for higher skill jobs (for instance work that is in line with ones field of study).
- 2 Secondly, this can **allow a company to continue production**, often at an increased output, while simultaneously reducing their bottom-line. This can allow them to remain competitive on the worlds stage.
- 3 Finally, automation often not only leads to the above listed benefits, but somewhat counterintuitively, can **lead to an overall increase in total employees**. This was shown when Statistic Canada found that companies who automated, over the course of 20 years, found that these companies increased their total number of full time employees compared to similar companies that did not automate.^[2]

Automation efforts can increase efficiency without making wholesale changes to buildings and infrastructure, allowing businesses to maximise their available space and see gains that otherwise only be available by rebuilding their facility.

This is all great news, but what about another issue present in Atlantic Canada's workforce, the need for a seasonal work force in industries such as seafood and agriculture? Without people who can easily adapt to seasonal work, such as students, it can be difficult to find the necessary labour. Also, people may not want to do a job that can be physically demanding and does not provide consistent income.

Many seasonal jobs share a common thread both in the seafood and agriculture sectors, the need for repetitive and tedious activities for example: picking, placing, sorting, and moving products. Coincidentally, many full-time jobs in industry, especially in rural areas, can share some of the same job requirements. These jobs can also be extended to other repetitive tasks including welding, painting, and any other task which is done repeatedly.





RETURN ON INVESTMENT (ROIs)

Before we dive in and see how automation can help you, let us first quantify some basic Return on Investment (ROI) metrics. This will be useful for future items seen below. The ROIs are very dependent on the specific job being subsidized / replaced, but they can still act as a baseline to be used when contemplating automated solutions.

Usually, an ROI can be less than is shown in the below examples due to other factors that will be unique to your application, such as: capacity gains (making more product), rework savings, scrap savings, and employee/customer retention, to name a few.

Costs should be added to these sections to give you a fuller ROI description. Enginuity can help you with this process if needed. It should also be noted that systems mentioned below are basic in nature and do not include other pieces of machinery and or automation that may be required for your specific application.

AUTOMATION EXAMPLES & ROIs

So how can automation help? Let us break it down by task and see what could be done.

Picking and placing products has been established in industry (especially in the automotive sector) for decades. Often however, they required large and very expensive robotic systems that are tailored to one task. This “task driven” machine is exceptional good at doing one thing repeatedly, but what is often needed is a system that can adapt to changing environments to complete variable tasks. Currently, these types of robots exist, ones that require no safety guarding and large footprint. They are quick to program and can adapt to changing environments – they are called collaborative robots.



Collaborative Robots (Cobot's)

ROI: ~6 months to 1-2 years



With the use of Collaborative Robots, or Cobots, employers can start picking and placing products such as packages or boxes quickly and efficiently. Without the use of machine vision (using a camera to see products), these types of robots can do anything from: palletizing products, welding, painting, and doing things such as loading and unloading of CNC machines.

The lack of machine vision does reduce the complexity of the system but requires the product or work piece to always be in the same location. The need for non-collaborative robots is still present (they are perfect for applications in which you need to lift more, move faster, and do the same task), but Cobots can be deployed more quickly and their tasks changed on the fly.

They can also easily have their physical location moved with little more than wheeling it to a different location. Calculation an ROI on a system like this is complex and depends on many variables such as hours worked and the skill level of the task being automated.

Nonetheless, one can expect to see a return on a small collaborative robotic system in anywhere from 6 months to 1-2 years. By taking advantage of the collaborative robot and its quick task changing ability, you can greatly decrease the time to see a return on your investment.



Machine Vision

ROI: ~1-6 months

So, we have established how Cobots can help with tasks such as picking and placing products without the need for machine vision. These systems are great but let us see how we can extend this system to a more dynamic machine that can do more of what is required by business owners.

Let me first describe what machine vision is; it is essentially adding eyes to a machine which allows you to act on an image that is taken based on either predefined rules or rules determined through Artificial Intelligence (AI).

Machine vision by itself can have a lower entry point as it does not always require the addition of a robot. Simple tasks such as determining a "good" or "bad" product that can be pushed into a reject bin, for instance, can have relatively quick ROIs due to the low material cost and potential immediate gain in quality and or labour reduction. A system such as this could see an ROI in as little as 1-6 months.





Cobots + Machine Vision

ROI: ~6 months to 1-3 years

Let us get back to collaborative robots. To truly allow for autonomy the use of 2D and or 3D machine vision can allow a robot arm to do tasks based on visual input rather than preset points in space.

This can allow for things such as picking and placing randomly placed and variable size objects from containers. This can also allow for a robot to be able to do things such as scan barcodes or QR codes which can then be used to track inventory. This data could then be tied into operational and or supply management software.

Furthermore, having the ability to "see" products can allow for product grading and or quality control. For example, a machine could look at things such as colour or size of a product and act upon it as a human may. This could include putting bad product in the garbage and grading, say, A, B, C of a product. This addition can also allow a robot to quickly sort objects at speeds and with an accuracy a human cannot.

This marriage between technologies increases the breadth of ability this system can provide. Given the intelligence possible, an ROI is quite variable given the multitude tasks that can be done, but one can expect to see an ROI of 6 months to 1-3 years depending on size on the machine.



AGVs and Material Movement

ROI: ~1-3 years

Lastly, let us consider the movement of product throughout a factory floor, or a farmer's field alike. This may be the last thing to be automated when considering the solutions listed thus far, but this allows for full autonomy between the separate automated tasks. This sounds great, but how can we do such a thing?

Let us consider a device called a "Automated Guided Vehicle", or AGV. To best understand the fundamental principles of this machine, one needs to look no further than your local store catalog (provided they sell vacuums). If you do see this, or have ever heard of a Roomba, you can get this gist of what this machine does. When used in industry however many additional sensors are added to ensure the system can work around people all the while performing potentially dangerous tasks. These devices can be used to move pallets, boxes, tools, and anything else that it can pick up, tug, or carry. One application in which AGVs are often used is to replace or supplement a forklift driver. If implementing an AGV to replace a forklift driver, one could expect an ROI of anywhere from 1-3 years.

If deploying many units and if intelligence is added between the AGVs, the time to a return on your investment can decrease. Other elements should be factored into your equation with a system such as this however, such as safety.

Forklifts requiring human drivers are statistically unsafe, and surprisingly there is "90% probability of a forklift being involved in a serious injury or fatality accident over its useful lifetime".^[3] AMRs replacing forklifts may not only allow for a business to keep moving when there is a lack of labour but can also allow for: more efficient product flow, increased production output, and safer material handling.



HEALTH CHECK

	Yes	No
1. Is each system/line maximizing efficiency?	<input type="checkbox"/>	<input type="checkbox"/>
2. Is the total time of line stoppages less than 10% of the total time?	<input type="checkbox"/>	<input type="checkbox"/>
3. Are you handling material as little as possible?	<input type="checkbox"/>	<input type="checkbox"/>
4. Is your employee QA/QC as good as it can be?	<input type="checkbox"/>	<input type="checkbox"/>
5. Have you been able to find good labour?	<input type="checkbox"/>	<input type="checkbox"/>
6. Have you gathered data from your current machines to make informed decisions?	<input type="checkbox"/>	<input type="checkbox"/>

If the answer to any of the questions was no, then there is a possibility you are primed for a process improvement assessment.

A well defined assessment can reveal simple truths and easy fixes with recommendations that can improve:

1. Production output
2. Create a competitive advantage
3. Increase employee efficiency
4. Create a path for new product lines
5. Reduction in waste



MOVING FORWARD

The process requires the work of an experienced company to not only design and program the system but, and arguably more importantly, provide service and support throughout the commissioning and first few months of use and beyond to assist with a smooth transition.

Enginuity can help you every step of the way.

IN SUMMARY

To answer the question posed in the title of this article, if it is not obvious already, **yes - automation can help us solve the labour shortage in Atlantic Canada.**

In fact, it can help in many more ways than listed above. Many articles would be needed to discuss all the ways automation can provide solutions to this problem. The topics chosen in this article were done so to illustrate basic tasks that can be automated and to allow the reader to think (or dream) about how it could work for them.

If you would like to know more about automated and robotic solutions and how they could help your business, please reach out to us at Enginuity and we can walk through your problem and provide you with next steps.

Happy automating.

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