PERSPECTIVE

Machinery Manufacturing: At the Centre of the Economy

For many of us, the machinery manufacturing industry remains a mystery, yet it lies at the heart of the economy, its products incorporated into all kinds of manufacturing. It's essential not only for factory assembly lines, but also the aviation, forestry, mining, agriculture, energy transmission (electric, wind, solar), food distribution production, retailing and pharmaceutical industries... in short, everywhere you look. Recent years have been especially good for the industry, shown by the increase in the number of jobs and GDP. That said, the machinery manufacturing industry is facing two major disruptions in the short term, each one divided into a "before" and an "after." The first shock is the COVID-19 pandemic, which forced many factories to press pause, then stop, limit or pivot production. The second shock is the digital revolution, specifically, the introduction of artificial intelligence (AI) into manufacturing, which will revolutionize how things and machines are designed and produced. It was impossible to escape the first shock; it will be difficult to hold out against the second.

A Look Inside the Industry

Quebec's machinery manufacturing industry exports more than 90% of its output to international markets, which links it to the ups and downs of the global economy. It also relies on the willingness and ability of businesses to invest in machinery and equipment. Machinery manufacturers have little control over these factors.

Quebec's machinery manufacturers produce a whole range of machines and equipment, including: conveyors, vacuum packaging machines, grinders, woodworking machines, plastic injection moulding machines, shredders, CNC machines, pulp mixers (pulp and paper), planers, surface planers, stills, farm tractor loaders with grabbers, greenhouse irrigation systems, hay bale shredders, crushers, fellers, brush-cutters, log loaders, protective booths for machinery, concrete mixers, snowblowers, hydraulic cylinders, mechanical shovel buckets, resurfacers, metal stamping dies and wastewater treatment plant equipment. The range of products is practically limitless.

It may be easy to think that the variety of customers and economic sectors served would shield the industry against any hard knocks, but this simply isn't the case. The industry has to deal with unforeseen events on the international stage and a fluctuating Canadian dollar, since production is almost entirely aimed at foreign markets.

In terms of numbers, the industry employed 36,301 salaried workers in 2019; this figure doesn't include business owners. An analysis of salaried employment can be divided into seven groups (table 1). Commercial and service industry machinery production (e.g., carpet sweepers, cameras, vending machines, cash registers) employs the highest number of salaried workers (7,608), followed by other machinery (e.g., pumps, compressors, material handling equipment (7,191) and industrial machinery (6,563) (e.g., for sawmills, the rubber and plastics industry, and the paper industry). The other major group in terms of salaried workers comprises ventilation, heating, air-conditioning and commercial refrigeration equipment (6,081).

TABLE 1

Quebec: Salaried employment in machinery manufacturing in 2019

	NUMBER
Total machines*	36,301
Agricultural, construction and mining machinery	4,861
Industrial machinery	6,563
Commercial and service industry machinery	7,608
Heating, ventilation, air-conditioning and commercial refrigeration equipment	6,081
Metalworking machinery	2,012
Engine, turbine and power transmission equipment	1,986
Other general-purpose machinery	7,191

* The total may differ due to rounding.
Sources: Statistics Canada and Desjardins, Economic Studies

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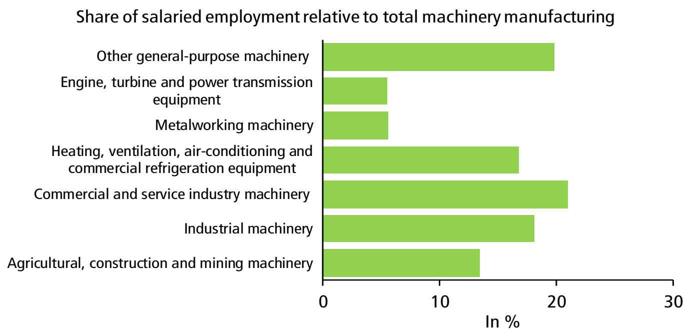
Graph 1 shows the size of each major category relative to the total number of salaried jobs. It's clear that no one group dominates and that two subsectors–engine, turbine and power transmission equipment and metalworking machinery manufacturing–employ far fewer salaried workers (5.5% each).

GRAPH 1
Quebec: Four subsectors dominated salaried employment in 2019



Sources: Statistics Canada and Desjardins, Economic Studies

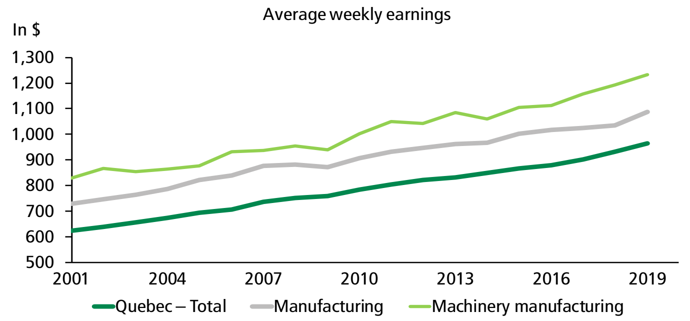
According to Service Canada, between 2015 and 2017, jobs were more highly concentrated in the Montreal area (21.7%) and in Montérégie (16.6%), but the industry exists more or less throughout Quebec. Estimates indicate that 8.8% of the workers lived in Centre-du-Québec, 8.3% in Chaudière-Appalaches, 7.7% in Laurentides, 6.4% in Quebec City, 5.5% in Laval and the remainder (roughly 25%) scattered throughout Quebec.

Bucking the Manufacturing Trend

It's worth noting that the industry managed to increase the number of salaried workers even though Quebec's economy has been experiencing a labour scarcity for several years. Until very recently, the sector's employment outlook was good, but then the COVID-19 pandemic hit. That's how it was able to recruit, albeit with some difficulty, welders and welding equipment operators, mechanical engineers, painters, electrical mechanics, machine fitters, programmers and shippers, to name but a few. Average weekly earnings higher than the average for salaried workers in Quebec and the manufacturing sector as a whole may be one reason behind this hiring success story (graph 2).

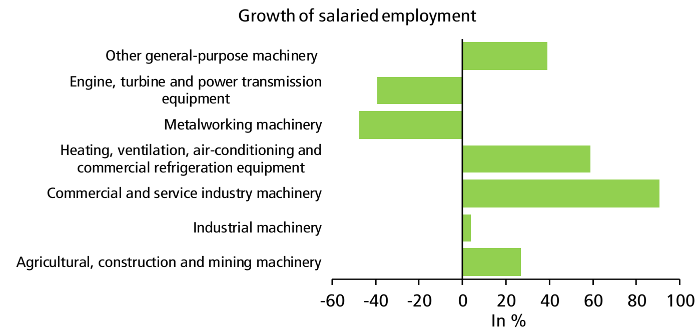
The machinery manufacturing industry stands out from the rest of the manufacturing industry in Quebec in several ways. Salaried employment rose 20.0% between 2001 and 2019, whereas it was negative in manufacturing overall for the same period (-19.2%). The commercial and service industry machinery group gained the most (+90.4%) (graph 3). The services sector has expanded throughout most of the world in recent years, so it's not surprising that the demand for machinery, and the workers needed to produce it, did too. The number of salaried workers in heating, ventilation, air-conditioning and commercial refrigeration equipment manufacturing grew 58.8%, while that of other general-purpose machinery rose 39.1% and agricultural,

GRAPH 2
Quebec: Earnings are clearly higher in this sector than in all of Quebec and manufacturing



Sources: Statistics Canada and Desjardins, Economic Studies

GRAPH 3
Quebec: Growth of salaried employment varied somewhat in machinery manufacturing between 2001 and 2019



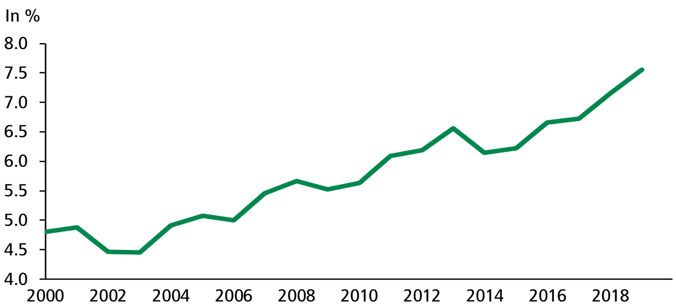
Sources: Statistics Canada and Desjardins, Economic Studies

construction and mining machinery increased 26.9%. Two sectors saw the number of salaried workers fall: metalworking machinery manufacturing (-47.4%) and engine, turbine and power transmission equipment manufacturing (-39.2%).
Real GDP followed a trend opposite to that of manufacturing as a whole. Since the early 2000s, machinery manufacturing GDP has jumped 49.9%, while that of all manufacturing fell 6.7%. As a result, machinery manufacturing increased over time as a share of total manufacturing in Quebec, up from 4.8% in 2000 to 7.6% in 2019, its high for this period (graph 4 on page 3).

If we look at machinery manufacturing's share of the total economy, we see that its relative size went from 0.97% in 2000 to 1.02% in 2019. The sector's real GDP hit $3.8B in 2019, just above that of non-residential construction ($3.7B) and below that of chemical manufacturing ($3.9B). These two sectors have a higher profile, but the size of their GDP is very similar.

Needless to say, the outlook for the machinery manufacturing industry has been favourable for many years. The global economic situation, while not frantic, has been positive. It has supported the demand for local products, with most sales recorded outside Quebec. In Canada, accommodating fiscal

GRAPH 4
Quebec: Machinery manufacturing's share of real GDP is gradually increasing relative to total manufacturing



Sources: Institut de la statistique du Québec and Desjardins, Economic Studies

measures at both the federal and provincial levels, such as accelerated depreciation for machinery and equipment, have also helped the industry.

Well-Established

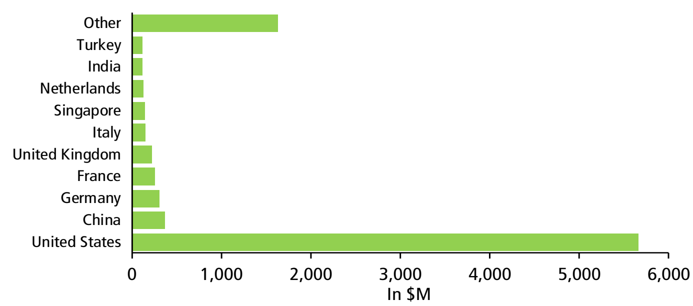
As in all sectors that make up the Quebec economy, small businesses dominate the machinery manufacturing industry. According to Statistics Canada's *Business Register* data, 990 establishments made up the industry (a business can have more than one establishment) (table 2) at the end of 2019. Just over one-quarter (251) employed fewer than 5 employees; 575 establishments had fewer than 20 employees (58.1%); and less than 10% (9.1%) had 100 employees or more. Lastly, 325 establishments, or practically one-third (32.8%), employed between 20 and 99 workers.

Two subsectors dominate. In first place, "other machinery" manufacturing, i.e., machines not included in the other categories, had the highest number of establishments (238), or practically one-quarter of the industry, followed by industrial machinery in second place (217) and the four other sectors, which vary in size between 111 and 144 establishments. One group stands out for its low number (37), namely engine, turbine and power transmission equipment manufacturing, which has two establishments and 500 or more employees.

International Markets

As mentioned earlier, international markets are the primary customers of Quebec factories. Of these, the United States ranks number one, as it accounts for almost two-thirds (62.3%) of the machinery manufacturing industry's international exports. China is in second place (4.0%), followed by Germany (3.4%), France (2.9%) and the United Kingdom (2.4%) (graph 5). Therefore, the United States is of considerable importance, although this has fluctuated in the last 15 years, but never below 50%.

GRAPH 5
Quebec: The United States clearly dominated international machinery exports in 2019



Sources: Institut de la statistique du Québec and Desjardins, Economic Studies

In 2019, machinery manufacturing exports accounted for 8.5% of all goods shipped from Quebec to the United States, the highest percentage recorded in 15 years (graph 6 on page 4). The industry's importance in terms of total exports to the United States has been growing non-stop since 2014. More than 500 Quebec companies in this sector exported in 2019, the second highest contingent of exporting companies in the Quebec manufacturing sector according to the Ministère de l'Économie et de l'Innovation.

TABLE 2
Quebec: Number of establishments by subsector in December 2019

		NUMBER OF EMPLOYEES							
	Total	**1 to 4**	**5 to 9**	**10 to 19**	**20 to 49**	**50 to 99**	**100 to 199**	**200 to 499**	**500 and up**
Total machines*	990	251	176	148	225	100	62	25	3
Agricultural, construction and mining machinery	144	37	16	18	40	18	13	2	n/a
Industrial machinery	217	50	30	40	49	25	18	5	n/a
Commercial and service industry machinery	111	37	22	15	17	7	8	4	1
Heating, ventilation, air-conditioning and commercial refrigeration equipment	118	18	25	11	28	19	9	8	n/a
Metalworking machinery	125	39	31	20	26	7	2	n/a	n/a
Engine, turbine and power transmission equipment	37	13	9	4	4	4	n/a	1	2
Other general-purpose machinery	238	57	43	40	61	20	12	5	n/a

n/a: Not available for a specific baseline period
Sources: Statistics Canada and Desjardins, Economic Studies

GRAPH 6
Quebec: Share of machinery manufacturing exports to the United States is growing

Sources: Statistics Canada and Desjardins, Economic Studies

Therefore, the strength of the Quebec industry relies mostly on that of its U.S. customers, the trade agreements in effect, the mood (belligerent or not) of the trade representatives, the strength (or weakness) of the U.S. economy, the willingness of business owners to invest, and the value of the loonie. These are factors over which manufacturers have little influence. Moreover, the prosperity and performance of Quebec's industries depends on the quality of the workforce (training, ability to adapt, retention and recruitment) and on up-to-date manufacturing processes.

Cruising Speed Slowed by the Pandemic

The lockdown measures imposed by the Government of Quebec to slow the spread of COVID-19 caused activities to slow down starting on March 24. According to Service Canada's review of the websites of Quebec's 50 biggest employers in the industry, "[…] more than half are maintaining operations that are essential to producing inputs that the priority sectors, such as food, agriculture, health and defence, need while implementing measures to reduce the spread of the virus."

Interestingly, despite the slowdown in economic activity, the need for workers remains high. Service Canada noted that there were layoffs, but the reallocation of activities in support of the fight against the pandemic led to workers being rehired. Like the rest of the economy, the current situation isn't ideal and it's crippling some operations. A significant number of exporters have teams who travel the world to install and service the machinery. And they don't include the sales representatives criss-crossing the planet to make sales.

Without a doubt, COVID-19 has managed to slow down an industry that had the wind at its back. Still, with the gradual lifting of the lockdown, operations are starting to pick up. There are signs of a rebound in manufacturing in the United States, but our southern neighbour still can't control the spread of COVID-19. That's why it's too early to talk about the industry's exports quickly picking up speed. By the same token, the increase in new cases in Europe and Asia and the return of stricter lockdown measures in some countries makes it impossible to say that this slowdown is a thing of the past. Furthermore, the restrictions on exports are disrupting the supply chains to ship goods, which is slowing down the rate of activities. It will still take months for operations to get back to pre-pandemic levels.

As to what may happen in 2021 and 2022, it remains to be seen whether businesses will have the financial backing to invest in machinery here and elsewhere in the world. And then there's the matter of our trading partners' intentions: Will the growing desire to buy local translate into protectionism, pure and simple?

The Industry in the Midst of a Digital Revolution

The machinery manufacturing industry is well-acquainted with automation, an innovation that has rapidly expanded in just a few years. During this digital revolution, the machinery manufacturing industry is in a unique situation: It has assumed the roles of both seller (and vehicle of new technologies) and buyer. The gradual introduction of AI will change the way things are produced and revolutionize the things that businesses will be able to market.

Currently, machinery is designed to mass-produce the same item in what is referred to as standardized manufacturing. However, customization is increasing in all areas of life, whether it's a matter of healthcare or offering goods and services to individuals. The introduction of AI in designing machinery and producing things will drive this shift and turn not only manufacturing in general, but also the machinery manufacturing sector in particular completely upside down. Expectations are that investments in machinery and equipment will be needed sooner rather than later. And there are other imperatives are driving equipment buying, including the labour shortage.

"Before" and "After"

The machinery manufacturing industry is faced with two major disruptions in the short term, each one divided into a "before" and an "after." The first shock is the COVID-19 pandemic, which forced many factories to press pause, then stop, limit or pivot production. The return to pre-pandemic levels will be long and depend on the strength of the global economy, the strength of customers, the value of the Canadian dollar, the availability of workers... in short, a number of unrelated factors beyond entrepreneurs' control. Nonetheless, the situation should improve in 2021 and 2022, as we gain more control over the health crisis around the world. There will be less of a scarcity, even shortage, of workers in the short term, but it will continue to be an issue. A demographic phenomenon of this size can't be fixed in one or two years.

The second shock is the digital revolution, specifically, the introduction of AI into manufacturing, which will revolutionize how things and machines are designed and produced. It was impossible to escape the first shock; it will be difficult to hold out against the second. Here, too, there will be a "before" and an "after" that will depend more on the willingness of entrepreneurs than in the case of the pandemic. The impact will be huge: All that remains to be seen is when businesses will jump on board.

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