

THE SURFACE FINISHING INDUSTRY IN CANADA ECONOMIC IMPACT STUDY





2020

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ORR & BOSS

Orr & Boss Consulting Incorporated 10 Shawfield Crescent Toronto, ON M3A 1S1

Prepared for

Canadian Association for Surface Finishing PO Box 41085 Rockwood Mall Mississauga, ON L4W 5C9

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I EXECUTIVE SUMMARY

The Surface Finishing industry includes a wide array of products that are used to electroplate metal, ABS, polypropylene and nylon resins and in the case of powder coating, wood and other substrates. Electroplating, anodizing, coating, galvanizing, and heat treating metal and plastic substrates fall into this segment. Specialty finishes produced by the surface finishing industry become key components of many products used in everyday life around the world. Surface finishers supply the automotive, oil & gas, agricultural, aerospace, defense, building & construction, medical, electronics and many other sectors. As such, it is a key industrial market in Canada and helps Canada maintain its manufacturing competitiveness.

Not only does the surface finishing industry play a pivotal role in the Canadian economy by contributing a significant amount of economic activity and supporting other manufacturing industries within Canada, like automotive, aerospace and almost everything else, it extends the lifetime and durability of finished parts, and by doing so, improves the sustainability and environmental performance of Canadian industry. Moreover, the surface finished parts do not wear out or corrode as easily, and thus contribute to improved safety performance and life. This is especially true in the automotive and aerospace industries. Finally, the supply chain for surface finished products is global and the Canadian surface finishing industry results in significant exports. Many parts that are surface finished in Canada are exported to the United States, and globally.

The industry is a key facilitator of economic activity in Canada. Parts to be surface finished are either produced within Canada or imported into Canada, surface finished, and then either consumed within Canada or exported. The exporting of products from the Canadian surface finishers is important and creates and maintains jobs within Canada as well as generating economic activity and tax revenue for the government.

While the surface finishing industry touches a wide variety of products and industries within Canada, it is often overlooked as a driving economic force with an annual impact of \$3.5 billion. Just about every manufacturing industry in Canada is touched by the surface finishing industry. Surface finishing adds value to every product made with enhancements related to aesthetics, performance, durability, and lifespan. This report focuses on the economic impacts of the surface finishing industry and reveals the multi-dimensional nature of the sector in Canada.

The surface finishing industry generates significant employment in excess of 17,198 jobs, which tend to be higher paying jobs than those in other industries. The surface finished products touch many end-use markets such as construction, automotive, oil & gas, mining, metal products, aerospace, agricultural machinery, transportation equipment, and general industrial manufacturing. In many of these end-use applications, surface finishing is critical to the success of that industry.

The surface finishing industry is one of the most heavily regulated in Canada. The use of chemicals and need for sustainable business practices is critical to the success of the industry. As such, the surface finishing industry continues to invest in new technologies by developing new product formulations that are more environmentally friendly. A strong surface finishing industry is considered important to maintaining and improving Canada's overall economic performance, and that strength is reflected in the contribution to Canada's Gross Domestic Product (GDP) estimated at \$1.31 billion annually.

While the surface finishing industry touches a wide variety of products and industries within Canada, it is often overlooked as a driving economic force with an annual impact of \$3.5 billion.



Economic impacts are defined as changes to an economy as a result of a specific undertaking or activity. With those activities come benefits impacting the size and structure of an economy. This happens as goods and services are produced and purchased resulting in direct inflows of capital for construction of new facilities or delivery of new and better services. Economic output relates to the gross revenue of goods or services produced by an economic sector, while Gross Domestic Product measures the value of goods and services produced. The 'output' of goods noted in this report is defined as goods produced or imported and sold in the Canadian market. It also captures economic activity generated by exports.

A summary of the economic impact that the surface finishing industry has on Canada shows:

- · Annual Direct and Indirect Output of \$3.5 billion
- · Surface Finishers Revenue of \$2.5 billion
- · Total Direct and Indirect Estimated Employment of 17,198
- · Total Direct and Indirect Wages and Salaries of \$705 million
- · Wages and Salaries that are 26% higher than the Canadian average
- · Annual Induced Employment of 29,924
- · Total Induced Wages and Salaries of \$996 million
- · Annual Federal and Provincial Tax Revenue of \$448 million
- · Annual GDP Impact of \$1.31 billion
- \cdot Ontario, Alberta, and Quebec are the main beneficiaries of the economic activity generated by the industry (nearly 90% of the economic activity is in those three provinces).

Tables 1.1 and 1.2 summarize the data noted above.

TABLE 1.1 SUMMARY OF ECONOMIC IMPACT OF SURFACE FINISHING

	DIRECT	INDIRECT	тот	AL ECONOMIC IMPACT
OUPUT (MILLIONS OF \$)	\$ 2,586	\$ 930	\$	3,516
WAGES & SALARIES (MILLIONS OF \$)	\$ 638	\$ 69	\$	707
EMPLOYMENT (NUMBER OF JOBS)	15,121	2,077		17,198

TABLE 1.2 SUMMARY OF GDP AND TAXES PAID BY PROVINCE (MILLIONS OF \$)

	тс	OTAL GDP	TOTAL TAXES COLLECTED		
ONTARIO	\$	743	\$	241	
ALBERTA	\$	248	\$	65	
QUEBEC	\$	165	\$	80	
BRITISH COLUMBIA	\$	80	\$	30	
MANITOBA	\$	21	\$	11	
SASKATCHEWAN	\$	33	\$	11	
ATLANTIC CANADA	\$	25	\$	10	
TOTAL	\$	1,315	\$	448	



The surface finishing industry generates significant employment in Canada; an estimated 17, 198 jobs are created as a result of the industry in Canada and those jobs tend to be higher paying than those in other industries. In addition to the above economic activity, a related segment is the paint and coatings industry where metal and plastic parts are coated. In 2017, the Canadian Paint & Coatings Association (CPCA) engaged with Orr & Boss on a study of the economic impact that the paint and coatings sectors have in Canada. The surface finishing and paint and coatings segments are similar since they serve similar markets, and both involve coatings or surface finishing of a metal or plastic part. If we include the economic impact of all industrial applied coatings (in other words, excluded site-applied coatings like architectural, auto refinish, protective, and marine coatings), the economic impact is:

- · \$3.03 billion of output
- · \$702 million of wages & salaries
- · 21,241 jobs created
- \$1.148 billion of GDP
- · \$427 million of tax revenues

It should be noted that the above values for industrial applied surface finishing and powder coated paint includes all industrially applied coatings including automotive OEM coatings, coil, general industrial, metal packaging, powder, and transportation coatings (rail, aerospace, and others).

TABLE 1.3 ECONOMIC IMPACT OF INDUSTRIAL APPLIED PAINT & COATINGS

	DIRECT	INDIRECT	τοτΑ	AL ECONOMIC IMPACT
OUTPUT (MILLIONS OF \$)	\$ 1,109	\$ 1,921	\$	3,030
WAGES & SALARIES (MILLIONS OF \$)	\$ 222	\$ 480	\$	702
EMPLOYMENT (NUMBER OF JOBS)	5,276	15,965		21,241

TABLE 1.4 SUMMARY OF GDP AND TAXES PAID BY PROVINCE (MILLIONS OF \$) OF INDUSTRIAL COATINGS

	то	TAL GDP	TOTAL TAXES COLLECTED		
ONTARIO	\$	671	\$	251	
ALBERTA	\$	105	\$	39	
QUEBEC	\$	164	\$	61	
BRITISH COLUMBIA	\$	110	\$	41	
MANITOBA	\$	35	\$	13	
SASKATCHEWAN	\$	22	\$	8	
ATLANTIC CANADA	\$	37	\$	14	
TOTAL	\$	1,144	\$	427	

If we add in the contributions of the Surface Finishing and Industrial Paint & Coatings Market, the total result is:

- · Output of \$6.5 billion
- · Wages of \$1.4 billion
- · Employment of 38,438



Total economic impact of the surface finishing industry includes an annual contribution to GDP of \$1.3 billion. · Total GDP Impact of \$2.5 billion

· Total Taxes Collected of \$877 million

These data are summarized in Tables 1.5 and 1.6.

TABLE 1.5 ECONOMIC IMPACT OF SURFACE FINISHING & INDUSTRIAL APPLIED PAINT & COATINGS SEGMENTS

	DIRECT	INDIRECT	TOTA I	L ECONOMIC MPACT
OUTPUT (MILLIONS OF \$)	\$ 3,695	\$ 2,851	\$	6,546
WAGES & SALARIES (MILLIONS OF \$)	\$ 859	\$ 549	\$	1,408
EMPLOYMENT (NUMBER OF JOBS)	20,397	18,041		38,438

TABLE 1.6 SUMMARY OF GDP AND TAXES PAID BY PROVINCE (MILLIONS OF \$) OF SURFACE FINISHING AND INDUSTRIAL COATINGS

	тс	OTAL GDP	TOTAL TAXES COLLECTED	
ONTARIO	\$	1,413	\$	492
ALBERTA	\$	353	\$	105
QUEBEC	\$	329	\$	142
BRITISH COLUMBIA	\$	191	\$	71
MANITOBA	\$	56	\$	24
SASKATCHEWAN	\$	54	\$	19
ATLANTIC CANADA	\$	62	\$	24
TOTAL	\$	2,458	\$	877

Consumers cars last longer, airplanes are safer, consumer electronics perform better, the oil, gas, and *mining industries* are more efficient, and the Canadian economy is more efficient and productive- all as a result of the surface finishing industry.

The Canadian surface finishing industry has proven to be strong and resilient. A highly regulated sector, the surface finishing industry has shown tremendous responsibility in cooperating with all levels of government to ensure products are safe to human health and the environment. It does this while still performing to the standards expected by customers and improving the economy's overall sustainability record by increasing the durability and lifetime of the surface finished part. As a direct result of these value-added activities, consumers' cars last longer, airplanes are safer, consumer electronics perform better, the oil, gas, and mining industries are more efficient, and the Canadian economy is more efficient and productive — all as a result of the surface finishing industry.

In addition to cooperating with all levels of the Canadian government, the surface finishing industry complies with regulations around the world due to the global nature of the product. Good examples of these are the EU REACH regulation and the RoHS Directive. Since many surface finished parts are used in the EU, many Canadian surface finishers must also ensure that their products comply with the REACH regulation and/or the RoHS Directives.

CASF has worked closely with all levels of government in Canada to help develop appropriate regulations for the industry and promote compliance with existing regulations, thereby ensuring a strong, sustainable and environmentally compliant manufacturing industry in Canada.



II INTRODUCTION

The Canadian Association for Surface Finishing (CASF) engaged Orr & Boss to determine the economic output of the surface finishing and powder coating industry. The objective was to obtain a greater understanding of the present economic contributions generated by the industry including contributions to GDP and employment. The key types of impacts considered were:

Direct Impacts | total employment, output, and GDP generated by the surface finishers directly.

Indirect Impacts | the other economic impacts that are generated by the industry as a result of the purchase of goods and services to produce surface finishing products.

Induced Impacts | personal expenditures by people who have been paid wages and salaries in support of business operations, for facility construction, facility operations, production of indirect goods and services, etc.

DATA SOURCES

Data presented in this report was collected from several sources. The major ones are as follows:

- · Interviews with CASF member companies
- · Government data sources such as Statistics Canada and Industry Canada
- · CPCA data (collected from member companies)
- · Orr & Boss data (collected from Orr & Boss work in the chemical industry markets over several decades)

Some of the data was put together using government data that was provided via NAICS codes. The relevant NAICS codes used are summarized below:

- · 332811: Heat Treating
- · 332812: Coating, Engraving (except jewelry and silverware), and Allied Services to Manufacturer
- · 332813: Electroplating, Plating, Polishing, Anodizing, and Colouring

ORR & BOSS CONSULTING INCORPORATED

Orr & Boss Consulting Incorporated, headquartered in Toronto, is a leading management consulting firm to the specialty chemicals industry with focus on the paint & coatings and adhesives & sealants markets. Founded in 1947, Orr & Boss Consulting is an experienced, highly respected international management, marketing, and strategic planning consulting firm. For more than three decades, Orr & Boss has specialized in the coatings industry, and has worked for many of the leading specialty chemical manufacturers. We have also worked for many of the smaller regional formulators and suppliers.



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BACKGROUND ON THE SURFACE FINISHING MARKET

Surface finishing companies are generally located in clusters close to where their main customers are located. This means that those surface finishers focusing on the oil & gas market tend to be in Alberta while those focusing on the automotive industry tend to be in Ontario. The Quebec market is a diverse surface finishing arena focussing on fasteners, aerospace, wear-resistant coatings and general metal finishing.

There are two types of surface finishers: Job Shops provide surface finishing services to other manufacturers or end users, while some large manufacturing operations choose to incorporate their specifically-required surface finishing needs as a part of the whole operation. These are generally referred to as "Captive shops." The job shop surface finishers generally supply multiple end-use industries. It is estimated that 50% of the surface finishers fall into the job shop category and the other 50% are captive.



ABOUT CASF

The Canadian Association for Surface Finishing (CASF) is the principal surface finishing industry association in Canada established to provide support services to it's corporate members, electroplaters, surface finishers, suppliers and professional service providers and individual members as well as be well-represented within all levels of government in Canada.

CASF's goal is to provide a single unified voice for the surface finishing industry in Canada — no other association exists to do so. CASF is a volunteer-based organization that relies on the participation and experience of finishers, suppliers, and decision-makers within the finishing industry to help its members and their industry succeed.

In addition to their primary objectives, CASF also exists to:

- \cdot increase representation of surface finishing members across Canada
- · engage in industry promotion
- · improve the public image of the industry



The CASF is the principal surface finishing industry association in Canada established to keep suppliers, finishers, professional service providers, and individuals connected, educated, and well represented at all levels of government.

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Orr & Boss Consulting Incorporated was engaged by CASF to estimate the direct and indirect economic impacts of the Canadian surface finishing industry. For the purposes of this study, the Canadian surface finishing industry consists of companies engaged in the development, manufacture, and distribution of surface finished products. The surface finishing industry includes a wide array of products that are used to finish metal and plastic substrates. Electroplating, anodizing, powder coating, galvanizing, and heat treating metal and plastic substrates fall into this segment.

Surface Finishing of products provides three primary functions — decoration, wear-resistance and protection including from the environment - all of which are important to industry. Without the surface finishing industry, the product life-cycles are shortened and, in some cases, safety performance would be reduced. Many products made for general consumption would not even be marketable due to performance degradation over time.



The surface finishing industry in Canada consists of raw material and proprietary product suppliers, raw material distributors, the surface finishing shops themselves, as well as other manufacturers that captively surface finish their parts before further processing steps. The approach of this study was to estimate the economic activity in terms of output and the salary and wages generated by employment for all surface finishing companies operating in Canada.

Surface finished products and processes are used in many different end-use segments, and on metal or plastic substrates. In fact, almost all manufactured products use some level of surface finishing. Thus, the key drivers of the surface finishing industry are generally the drivers of the overall Canadian manufacturing economy which include automotive production, oil & gas activity, construction activity, farming and agriculture, forestry, and overall industrial production.



III TYPES OF SURFACE FINISHES

There are a wide variety of surface finishes and surface finishing processes. Each has its own unique advantages and disadvantages but all result in improved asset protection (increasing the service life of the part by strengthening it and improving its corrosion protection) as well as improving the appearance of the part. A summary of the most common types of surface finishes is given below:

Anodizing | Anodizing is the process whereby the metal surface is converted to an anodic oxide surface. The anodizing process improves the decorative, durability, and corrosion resistant features of the surface. Several metals can be anodized, including aluminum, magnesium, and titanium, but by far the most common is aluminum.

In the anodizing process, metal oxide is not applied to the surface like paint or plating, but is created by applied DC amperage to build the metal oxide which is fully integrated with the underlying metal substrate so it cannot chip or peel. An anodized surface is usually treated with secondary processes like colouring and sealing.

Anodizing is used in many applications. Some common ones include building exteriors (such as storefronts, curtain walls, and metal roofing systems), appliances, furniture, automotive parts, boats, and others.

Antiquing | Antiquing refers to the process whereby the object's surface features are altered to make it appear to be an older object. This can be accomplished by a number of methods including surface finishing techniques. It normally consists of glaze or a thin layer coating over a base finish, usually copper or brass but also sometimes tin and other metals. An oxide coating is applied and then usually buffed to create the desired antique finish. In the surface finishing industry, the object would normally be metallic.



Electroplating | Electroplating is a process that uses a DC electric current to build a thin metallic coating onto a properly prepared substrate, either metal or plastic. Electroplating is used to improve the functional surface properties of an object like abrasion and wear resistance, and corrosion protection and also can be used to change the appearance of the substrate. The choice of coating is almost always decided by a specification which lays out in great detail such parameters as coating thickness, hardness, stress level, gloss, ductility, and much more. Many metals can be electroplated but the common ones are bright, satin or dark nickel or multiple nickel layers and chromium used in automotive or motorcycle bright trim, plumbing fixtures, kitchen appliances and more. Zinc and zinc alloys are used extensively on fasteners and automotive under-hood components for corrosion protection. Copper, tin and gold on printed circuit boards, hard chromium on automobile shock absorbers and hydraulic shafts used in construction and oil & gas drilling. Everywhere you look you will find electroplated parts.





There are a wide variety of surface finishing processes but each result in improved asset protection, increased service life, better appearance, and in some cases improved safety performance of the final part. Like other surface finished parts, there are many examples of objects that are electroplated, including bathroom and kitchen fixtures, automotive wheel rims, door handles, motorcycle handlebars, and many others.

Electropolishing | Electropolishing is a process that uses an electric current to level out micro cracks and crevices in a metal part. It is used to polish or smooth out those parts.

Electropolishing has many applications in the metal finishing industry. Some of these include washing machine drums and surgical devices.

Etching | Etching is the process of using strong acid to cut into a metal surface to create a design. In the modern manufacturing process, chemicals can be used with a template to create the design needed.

Etching is typically used in any process where decorative features or patterns are needed; it is, as well, an important process in printed circuit board manufacturing, and ABS plastic must be etched as a first step in electroplating.

E-Coating | E-coating is the process whereby a metal part is immersed in a solution, containing a paint emulsion. An electric voltage is applied to the part causing the paint emulsion to condense onto the part. This process results in nearly 100% coverage of the part with the paint or film layer. The e-coat process has resulted in a significant increase in the lifetime of metal parts.

The e-coat process is most frequently used in the automotive industry but also is used in other industrial applications where 100% coverage of the metal part is needed to prevent or minimize corrosion.

Hot-dip Galvanizing | Hot-dip galvanization is the process of coating metal with principally zinc, or other metals by immersing the metallic part to be galvanized into a bath of molten metal. The finished part can be left as-is, for example galvanized nails, or painted, for example highway light standards. The metal coatings will then form a metal oxide. The layer forms a strong surface which prevents corrosion of the underlying metal substrate. Hot-dip galvanizing by its nature of application leaves a thick coating of metal on the surface and is therefore widely used where corrosion protection of steel or iron is needed.

Hot-dip galvanized objects are used in many applications. One of its important applications is in making steel frames and components for steel frame building.

Printed Circuit Boards | Printed circuit boards normally have copper finishes on their surface. If the copper is left unprotected, it will oxidize and deteriorate. Surface finishing is required to eliminate or decrease the possibility of the surface oxidizing. The surface finish forms a protective interface between the component and the PCB. The finish has two essential functions, to protect the exposed copper circuitry and to provide a solderable surface when assembling (soldering) the components to the printed circuit board. There are several forms of surface finishing that can be undertaken. These include hot air solder levelling (HASL), immersion tin, organic solderability preservative (OSP), silver, gold and electroless nickel immersion. All have their advantages and disadvantages. The specific performance properties desired as well as the cost drive the decision.

Polishing | Polishing is a finishing process for smoothing a workpiece's surface using an abrasive. Polishing is usually used to improve the appearance of the item or to remove surface contaminants. It can also be used to remove oxidation from the metal surface. By creating a smooth, clean surface, the polishing process enables a more optically pleasing final finish on the work being electroplated or painted.

Automotive, Oil & Gas, aerospace, and other manufacturing industries all rely on the surface finishing industry to produce high quality parts that have extended service lives.



Polishing is used in many applications, including automotive, architectural, process pipework, handrails, and others.

Powder-Coating | Powder coatings are available in different chemistries and systems to provide protective and decorative finishes for various end uses, especially for metal objects, MDF, glass, and plastics. They do not contain solvent, have little impact on the environment — emit a negligible amount of volatile organic compounds (VOCs) — produce thicker coatings without risk of sagging, and provide excellent paint finishes.

Powder-coated products are used in many applications, including architectural, automotive, construction, appliance, and many other industrial applications.

Physical Vapor Deposition | Physical vapor deposition (PVD) is a finishing process conducted in a vacuum chamber utilizing metals, and an energized high temperature gas called a plasma. It results in a hard, long-lasting surface that's resistant to attack by many household chemicals and mostly immune to metallic corrosion.

Examples of where the PVD process is used include semiconductor devices such as thin film solar panels, aluminized PET film for food packaging, and metalworking tools.

Electroless Finishing (Nickel and Copper) | The electroless finishing process, principally nickel but copper is also popular, is an autocatalytic process whereby an even layer of nickel or copper alloy is deposited on the surface of a metal or plastic substrate. The process involves dipping the substrate in a bath of electroless plating solution to produce the reaction that deposits the alloy without electric power. Electroless deposition ensures a completely uniform thickness of deposit film over 100% of the substrate surface thereby encapsulating as no regular electroplating process can. Electroless nickel processes are used as a base layer in plating-on-plastics, as a build process in PCBs, and at higher included phosphorus content, as a wear-resistant and highly corrosion resistant coating.

Electroless finishing has many of the same end-use applications as electroplating, in automotive, building and construction, aerospace, and many others. Since it doesn't use an electric current, electroless plating works with both conductive and properly-prepared non-conductive objects.

The above surface finishing processes are the major ones used in the industry. As the list above indicates, surface finishing is a diverse industry and touches many industrial applications within Canada. Many of the everyday products that we use in our daily lives have been improved by the surface finishing industry.





Many of the everyday products that we use in our daily lives have been improved by the surface finishing industry.

IV OVERVIEW OF THE SURFACE INDUSTRY

The surface finishing market in Canada is estimated to be \$2.6 billion. Before proceeding to discuss the details of the surface finishing market, we would like to describe the value chain.

SURFACE FINISHING INDUSTRY VALUE CHAIN

The surface finishing industry is divided into Job Finishers, which provide surface finishing to other OEM manufacturing firms, and Captive Finishers, which are surface finishing operations within firms that manufacture products. The captive finishers manufacture a part themselves, surface finish it themselves, and then, in some cases, use that surface finished part in another step of their manufacturing process or sell the surface finished part to their customer, be it an automotive, aerospace, or another manufacturer. Job finishers take a part from an OEM manufacturer, surface finish the part and then return it to the OEM manufacturer either for further processing or sale to the end user. It is estimated that about 50% of the surface finishing establishments are job finishers with the other 50% being captive finishers.

Proprietary raw material suppliers design and manufacture specialty chemicals for the surface finishing industry.

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Some of the other key players are summarized below.

Proprietary Raw Material Suppliers | There are two types of companies that supply raw materials to the surface finishers; proprietary raw material suppliers and commodity raw material suppliers. The proprietary raw material suppliers design and manufacture specialty chemicals for the surface finishing industry. To accomplish this, the proprietary raw material suppliers buy raw materials; in some cases they produce custom blends of those raw materials and in other cases, chemically react those raw materials to form new raw materials. In either case, these companies are supplying custom formulations that are used in the surface finishing industry. Examples of proprietary chemicals used in the surface finishing industry. Examples of proprietary chemicals used in the surface finishing industry include the special additives to, for example, impart brightness, levelling, corrosion resistance, unique grain structures and more to nickel/chromium finishes - all critical to deliver and meet the demanding and required OEM specifications. There are thousands of these specialty formulations used throughout the surface finishing industry would be unable to function.

Commodity Raw Material Suppliers | Commodity raw material suppliers are similar to the proprietary raw material suppliers in that they supply raw materials to the surface finishers; but they generally do not produce custom blends or products for the surface finishing industry. In many cases, these companies produce raw materials outside of Canada but have sales and administrative offices within Canada as well as warehouses. In other cases, the raw material suppliers manufacture the raw materials in Canada. Examples include processed and purified metals such as zinc, copper and nickel that are commonly used as anodes in the electroplating process as well as chemicals like sulfuric acid, sodium hydroxide, lime, solvents, and others.

Raw Material Distributors | In some cases, raw materials are sold to surface finishers not by the raw material manufacturers but by distributors who purchase raw materials from raw material manufacturers or international distributors. They then warehouse them, formulate certain batch mixtures in some cases, and sell directly to Canadian surface finishers. For the purposes of this study, the distributors are included in the raw material supplier data.



Plant Equipment | Like raw material suppliers, plant and lab equipment suppliers sell surface finishing shops in the 21st century and, by evolution and legislation, have evolved into sophisticated operations using state-of-the-art equipment. This equipment can encompass massive computer controlled lines where every part is integrated, calibrated and functions synergistically such that all production parameters are finely controlled and recorded resulting in total certainty of outcome. This extends to the on-site laboratory controls, the environmental and air quality monitoring and control systems, quality control itself and in fact total control of the entire system. Surface finishing shops operate this way as they comply with the social and legislative demands of the 21st century and this has been a good example of how CASF has worked with all levels of the Canadian government in helping to formulate some of these controls and be a liaison in this process.

Professional Service Providers | The surface finishing industry retains and uses a variety of professional service providers. These include banking, legal, management, and accounting services that other industries would be using as well. But also, given the nature of the chemicals involved, the industry uses environmental consulting services, who will assess and advise on, for example, air quality standards and compliance, both inside the plant and in controlling outside emissions; also effluent control and compliance systems. Electroplating facilities are among the most environmentally controlled in the country and the industry process suppliers and professional service providers along with the plants themselves ensure that compliance.



The diagram below pictorially describes the surface finishing Value Chain.

The surface finishing market is estimated to be \$2.6 billion. Ontario is the province where just over half of the economic activity takes place. The surface finishing industry also has a significant presence in Alberta and Quebec. These three provinces account for 86% of the market.



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The output of the

surface finishing

estimated to be

\$2.6 billion and

surface finishing

employers located

there are 806

in Canada.

industry is

TABLE 4.1 DIRECT SURFACE FINISHING OUTPUT, # OF EMPLOYERS, AND EMPLOYMENT BY PROVINCE

	OUTPUT (1000s OF \$)		# OF SURFACE FINISHER EMPLOYERS	EMPLOYEES (FTEs)
ONTARIO	\$	1,371,489	368	7,855
QUEBEC	\$	441,742	159	3,041
ALBERTA	\$	404,236	120	2,258
BRITISH COLUMBIA	\$	216,378	92	1,145
MANITOBA	\$	49,222	22	331
SASKATCHEWAN	\$	49,403	19	303
ATLANTIC	\$	53,283	26	189
TOTAL	\$	2,585,753	806	15,122

FIGURE 4.1 SURFACE FINISHING INDUSTRY BY PROVINCE



Sources | Industry Canada, Statistics Canada, Orr & Boss Estimates

The output data provided in Table 4.1 and Figure 4.1 were estimated from various sources including Industry Canada and Statistics Canada which reported on the surface finishing industry by province as well as Orr & Boss estimates which were mostly generated through interviews with CASF member companies as well as several other data sources. The employment data was estimated through data provided by Industry Canada as well as data that Orr & Boss collected through its interviewing process. The data show that there are 806 employers in Canada that participate in the surface finishing market. These 806 employers have a total output of \$2.6 billion and a total employment of 15,122.

In addition to the direct output of the industry, there are indirect outputs. Indirect outputs are the other economic outputs that are generated by the industry as a result of the purchase of goods and services to produce surface finishing products. These would include purchases of raw materials, professional service companies, and capital equipment sup-



The total direct

estimated to be \$2.6 billion.

output of the surface finishing

industry is

pliers. Industry Canada provided data which indicated that purchases of raw materials and process supplies (those goods used in the manufacture but not going into the actual product) are 28% of the revenue of a typical surface finishing company. The raw material used would include proprietary chemicals like the additives that will result in a zinc alloy deposit on under hood vehicle components and fasteners outlasting the vehicle itself; like the additives that produce the "Chromium" coating on a vehicle running board or bright trim grille outlast the paint on the vehicle; like the additives that produce the shiny film seen on a hydraulic shaft be so hard it triples the life of that shaft. It would also include commodity chemicals like sulphuric acid, sodium hydroxide, lime, solvent and processed and purified metals such as copper and nickel. This results in a total size of raw material supplier output being \$724 million. Raw material supplier employment generated is estimated to be 1,137. This value was estimated by assuming 55% of the raw material supplies were domestically sourced whereas the other 45% were imported (these import and export statistics are similar to those of the Canadian chemical industry statistics as a whole, so we assumed that they would be similar in the surface finishing industry). For the domestically produced, we used a value of \$350K of revenue per FTE. The imported products will still be generating employment in Canada since those goods would be passing through a distributor who employs people. We used a value of \$1 million per FTE for the distributor. These values were gathered from the interviewing process. Table 4.2 summarizes the output and employment data for the raw material and process material suppliers.

	(1	OUTPUT 000s OF \$)	EMPLOYEES (FTEs)
ONTARIO	\$	496,363	780
QUEBEC	\$	98,639	155
ALBERTA	\$	45,933	72
BRITISH COLUMBIA	\$	45,209	71
MANITOBA	\$	14,105	22
SASKATCHEWAN	\$	8,680	14
ATLANTIC	\$	14,467	23
TOTAL	\$	723,396	1,137

TABLE 4.2 OUTPUT AND EMPLOYMENT OF RAW MATERIALS & PROCESS MATERIALS SUPPLIERS

The total chemical raw material and packaging items sold into the Canadian surface finishing market is estimated to be \$723 million and creates 1,137 jobs in Canada.

In addition to the raw material and manufacturer suppliers, the industry would be buying goods and services from other suppliers: capital equipment suppliers who would be supplying all the equipment needed for the manufacturer of products; professional services like environmental consultants, legal services, and other professional services. Also, freight costs to providers would be included for both inbound and outbound freight. The output and employment for these suppliers is summarized in Tables 4.3 and 4.4.



TABLE 4.3 OUTPUT AND EMPLOYMENT OF OTHER SURFACE FINISHING SUPPLIERS

	(1	OUTPUT 000s OF \$)	EMPLOYEES (FTEs)
CAPITAL EQUIPMENT	\$	79,305	399
PROFESSIONAL SERVICES	\$	16,489	82
FREIGHT	\$	111,187	458
TOTAL	\$	206,981	939

TABLE 4.4 OUTPUT AND EMPLOYMENT OF OTHER SURFACE FINISHING SUPPLIERS BY PROVINCE

OUTPUT EMPLOYEES (1000s OF \$) (FTEs) **ONTARIO** \$ 109,784 488 QUEBEC \$ 35,360 189 ALBERTA \$ 32,358 140 **BRITISH COLUMBIA** \$ 17,320 71 \$ 3,940 21 **MANITOBA** \$ **SASKATCHEWAN** 3,955 19 \$ 4,265 12 ATLANTIC \$ TOTAL 206,982 939

The output of these other suppliers used within the surface finishing industry was estimated using U.S. Census Bureau data and scaling it to the size of the Canadian surface finishing market.

Average wages and salaries paid in the surface finishing industry are estimated to be 26% higher than the average Canadian wage and salary. The people in this industry tend to be more skilled than in other industries and thus command a higher wage and salary. This results in more induced benefits for the economy.

FIGURE 4.2 AVERAGE WAGE & SALARY OF THE SURFACE FINISHING INDUSTRY VERSUS THE CANADIAN AVERAGE



Sources | Statistics Canada, Industry Canada, and Orr & Boss Estimates



Average wages paid by surface finishing companies are 26% higher than the average wage in Canada. Table 4.5 provides the data on total estimated direct and indirect wages and salaries earned as a result of the surface finishing industry. In total, it is estimated that \$705 million in wages and salaries are earned as a result of the surface finishing industry.

	DIRECT	INDIRECT	TOTAL
ONTARIO	\$ 331	\$ 47	\$ 378
QUEBEC	\$ 128	\$ 9	\$ 137
ALBERTA	\$ 95	\$ 4	\$ 99
BRITISH COLUMBIA	\$ 48	\$ 4	\$ 52
MANITOBA	\$ 14	\$ 1	\$ 15
SASKATCHEWAN	\$ 13	\$ 1	\$ 14
ATLANTIC CANADA	\$ 9	\$ 1	\$ 10
TOTAL	\$ 638	\$ 67	\$ 705

TABLE 4.5 TOTAL WAGES AND SALARIES (MILLIONS OF \$)



Totals wages paid by the surface finishing industry and suppliers to it are estimated to be \$705 million.

Table 4.6 summarizes the data presented in this chapter. The total economic output generated by the surface finishing industry is \$3.5 billion. There are an estimated 17,198 people employed in the industry in Canada. Total wages and salaries paid are estimated to be \$705 million.

TABLE 4.6 DIRECT AND INDIRECT OUTPUT, EMPLOYMENT, AND WAGES

	O (MILL	UTPUT IONS OF \$)	EMPLOYMENT (NUMBER OF EMPLOYEES)	WAGES (MILLIONS OF \$)		
ONTARIO	\$	1,978	9,123	\$	378	
QUEBEC	\$	576	3,384	\$	137	
ALBERTA	\$	483	2,470	\$	99	
BRITISH COLUMBIA	\$	279	1,287	\$	52	
MANITOBA	\$	67	374	\$	15	
SASKATCHEWAN	\$	62	335	\$	14	
ATLANTIC CANADA	\$	72	223	\$	10	
TOTAL	\$	3,517	17,196	\$	705	



VIMPACT ON GDP, TAXES, AND INDUCED BENEFITS

This section of the report summarizes the impact that the direct and indirect benefits provided in Section III have on GDP and taxes, as well as calculating the induced benefits.

It is estimated that the surface finishing industry increases GDP by \$1.3 billion. The Direct Surface Finishing GDP was provided by Industry Canada. Orr & Boss calculated the Supplier GDP contribution to GDP by scaling the GDP impact by the Output tables (Table 4.1, 4.2, and 4.4).

	S FINIS	URFACE SHING GDP	SUPPLIER GDP		TOTAL	
ONTARIO	\$	504	\$	239	\$	743
QUEBEC	\$	117	\$	47	\$	164
ALBERTA	\$	226	\$	22	\$	248
BRITISH COLUMBIA	\$	59	\$	22	\$	81
MANITOBA	\$	14	\$	7	\$	21
SASKATCHEWAN	\$	28	\$	4	\$	32
ATLANTIC CANADA	\$	18	\$	7	\$	25
TOTAL	\$	966	\$	348	\$	1,314

TABLE 5.1 GDP DIRECT AND INDIRECT GDP IMPACT BY PROVINCE (MILLIONS OF \$)



GDP is the total dollar output of all finished goods and services produced in a given year.

TAXES

There are two types of taxes generated by the industry. The first are the taxes paid by employees through the wages and salaries that they earn. These taxes include federal and provincial income tax as well as the CPP and El contributions that both the employee and the employer contribute. The second are the taxes that companies involved in the industry pay through corporate income taxes as well as the sales tax (both provincial and federal) that are generated through the sale of surface finishing and ancillary products.

Table 5.2 provides the estimate for the taxes paid by the employees that work in the industry. Total wages paid were multiplied out by the federal and provincial income tax rates. We also multiplied out the wages by 13.8% to determine both the company and employee contribution to the CPP and El programs. As Table 5.2 indicates, the total taxes paid by individuals employed (both direct and indirect) are estimated to be \$218 million.



	ESTIMATED FEDERAL INCOME TAXES		CPP & El		E P IN(ESTIMATED ROVINCIAL COME TAXES	TOTAL TAXES PAID	
ONTARIO	\$	33.1	\$	52.0	\$	16.8	\$	101.9
QUEBEC	\$	12.0	\$	18.9	\$	12.2	\$	43.1
ALBERTA	\$	8.7	\$	13.7	\$	19.8	\$	42.2
BRITISH COLUMBIA	\$	4.6	\$	7.2	\$	2.3	\$	14.1
MANITOBA	\$	1.3	\$	2.1	\$	3.2	\$	6.6
SASKATCHEWAN	\$	1.2	\$	1.9	\$	2.8	\$	5.9
ATLANTIC CANADA	\$	0.9	\$	1.5	\$	2.0	\$	4.4
TOTAL	\$	61.8	\$	97.3	\$	59.1	\$	218.2

TABLE 5.2 TAXES PAID BY INDIVIDUALS EMPLOYED IN THE SURFACE FINISHING INDUSTRY (MILLIONS OF \$)

Companies participating in the surface finishing industry pay an estimated \$218 million per year in taxes. Table 5.3 provides the estimate for the corporate taxes paid. Again, this is both the corporate income taxes that are paid to the federal and provincial governments as well as the sales taxes that are paid. Corporate taxes were estimated by multiplying the total output by province by an average profit before tax rate for the industry of 8.1% (Industry Canada data).

TABLE 5.3 TAXES PAID BY COMPANIES (MILLIONS OF \$)

	F CO	EDERAL RPORATE TAXES	FEDERAL GST COLLECTED		PROVINCIAL CORPORATE TAXES		PROVINCIAL SALES TAX COLLECTED		TOTAL TAXES	
ONTARIO	\$	24.1	\$	37.1	\$	18.5	\$	59.4	\$	139.2
QUEBEC	\$	7.0	\$	8.2	\$	5.5	\$	16.4	\$	37.2
ALBERTA	\$	5.9	\$	12.4	\$	4.7	\$	0	\$	23.0
BRITISH COLUMBIA	\$	3.4	\$	4.0	\$	2.5	\$	5.6	\$	15.5
MANITOBA	\$	0.8	\$	1.1	\$	0.7	\$	1.7	\$	4.2
SASKATCHEWAN	\$	0.8	\$	1.6	\$	0.6	\$	2.0	\$	4.9
ATLANTIC CANADA	\$	0.9	\$	1.2	\$	0.9	\$	2.5	\$	5.5
TOTAL	\$	42.9	\$	65.6	\$	33.4	\$	87.6	\$	229.5

To calculate these values, we multiplied the profit before tax by the federal corporate tax rate of 15% and the provincial tax rates. The GST and PST's were estimated by using the federal GST rate of 5% and the various PST rates. These were multiplied by the value-add or GDP generated in each province. In total, there is an estimated \$229.5 million of corporate taxes paid.



Table 5.4 combines the data in Tables 5.2 and 5.3. In total, the industry contributes \$447 million in taxes to the federal and provincial governments.

	тот	AL FEDERAL TAXES	TOTAL PROVINCIAL TAXES		TOTAL TAX	
ONTARIO	\$	146	\$	95	\$	241
QUEBEC	\$	46	\$	34	\$	80
ALBERTA	\$	41	\$	25	\$	66
BRITISH COLUMBIA	\$	19	\$	10	\$	29
MANITOBA	\$	5	\$	6	\$	11
SASKATCHEWAN	\$	5	\$	5	\$	10
ATLANTIC CANADA	\$	4	\$	5	\$	9
TOTAL	\$	266	\$	180	\$	446

TABLE 5.4 TAXES PAID BY INDIVIDUALS AND COMPANIES (MILLIONS OF \$)

INDUCED BENEFITS

The direct and indirect economic activity created by the industry results in induced economic benefits. These benefits are the result of wages and salaries paid to the employees in the industry who then spend their money on other goods and services which further create economic activity. The induced economic activity creates jobs and wages. Table 5.5 provides the induced number of jobs and the wages and salaries earned at those jobs. The number of jobs was calculated by using a multiplier for every direct and indirect job created. The multiplier varies by type of job. In this study, we used the multiplier 1.74 for manufacturing jobs (the direct jobs created in the industry as well as those created by the raw materials suppliers). These multiplier values come from published academic studies that estimate the induced economic impact of various job classes on the economy. Also, we used the national average wage earned of \$33,300 (this is the average wage from Statistics Canada).

7 Total taxes paid, both corporate and individual, are estimated to be \$446 million per year.

TABLE 5.5 TOTAL INDUCED EMPLOYMENT AND WAGES & SALARIES

	INDUCED EMPLOYMENT	WAGES AND SALARIES (MILLIONS OF \$)		
ONTARIO	15,874	\$	529	
QUEBEC	5,889	\$	196	
ALBERTA	4,299	\$	143	
BRITISH COLUMBIA	2,240	\$	75	
MANITOBA	650	\$	22	
SASKATCHEWAN	584	\$	19	
ATLANTIC CANADA	388	\$	13	
TOTAL	29,924	\$	997	



VI CONCLUSION

The total output of the Canadian surface finishing industry is estimated to be \$3.5 billion. The industry creates an estimated 47,121 jobs in Canada. The industry's contribution to GDP is \$1.3 billion. Ontario, Quebec, and Alberta are the leading provinces and account for 87% of the employment, 86% of the output, and 88% of the GDP. The total taxes generated are estimated to be \$447 million.

	TOTAL DIRECT, INDIRECT, & INDUCED EMPLOYMENT	TOTAL OUTPUT (MILLIONS OF \$S)		(MI	GDP LLIONS OF \$S)	TOTAL FEDERAL AND PROVINCIAL TAXES PAID (MILLIONS OF \$S)	
ONTARIO	24,998	\$	1,978	\$	743	\$	241
QUEBEC	9,273	\$	576	\$	165	\$	80
ALBERTA	6,769	\$	483	\$	248	\$	65
BRITISH COLUMBIA	3,527	\$	279	\$	80	\$	30
MANITOBA	1,024	\$	67	\$	21	\$	11
SASKATCHEWAN	919	\$	62	\$	33	\$	11
ATLANTIC CANADA	611	\$	72	\$	25	\$	10
TOTAL	47,121	\$	3,517	\$	1,315	\$	448

TABLE 6.1 TOTAL EMPLOYMENT AND ECONOMIC OUTPUT

The surface finishing industry's impact relates directly to the fact that it touches all aspects of the Canadian economy. Virtually all manufacturing sectors are *touched by the* surface finishing industry; most notably auto*motive, oil & gas,* agricultural, and aerospace.

Not only does the Surface Finishing Industry create many jobs within Canada, it also creates relatively good paying jobs. The average salary and wage within the industry is 26% higher than the Canadian average. In addition to these numbers, the surface finishing industry's impact relates directly to touching all aspects of the Canadian economy. Virtually all manufacturing sectors are touched by the surface finishing industry; most notably automotive, oil & gas, agricultural, and aerospace.

The Canadian surface finishing industry has a strong record of sustainability. Not only does the industry have an outstanding record in dealing with waste, air quality and other products, but surface finishing significantly extends the life of the parts.

The industry continues to work with the federal and the provincial government departments and agencies on improving chemicals management in Canada. This has led to advances in the protection of human health and the environment with new regulations and other risk control measures for industry. All this is done while ensuring customers have access to a wide range of highly performing and functional surface finishes.

Governments and stakeholders view the Canadian Association for Surface Finishing as an organization that seeks to proactively address environmental issues before they become problems for both industry and government. The association is considered an integral part of the government's regulatory development process. CASF is also viewed as an important ally in promoting compliance and other hazard communication initiatives once regulations or other risk management measures have been introduced. This aligns with the longstanding approach of the Canadian surface finishing industry to aggressively pursue innovations in product formulations in an environmentally conscious manner without compromising product performance.

