Industrial Hamilton's Contribution to the Naval War

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Au cours de la Seconde Guerre mondiale, les centres urbains et industriels du Canada central comme Hamilton, ont entrepris la production de matériaux pour répondre aux besoins de la marine militaire et de la marine marchande. Certaines compagnies de Hamilton ayant acquis des contrats lies a la marine nécessiterent donC l'implantation d'installations specialisés ainsi qu'une augmentation du personnel ouvrier. Du cote industriel, cette mise en oeuvre impliqua l'utilisation de plaques de tole pour la construction des navires, la fabrication et l'installation des machines et des composantes electriques a bord des navires, la fourniture d'équipement aux dragueurs de mines, la fabrication de barges en acier ainsi que la fabrication de divers articles pour la marine. C 'est ainsi qu 'Hamilton a pu faire sa part pour la guerre en mer.

The materiel needs and technical complexities of modern navies tax the industrial capacity of states, particularly in times of wartime emergency. Alfred Thayer Mahan, the noted American historian and naval strategist writing over a hundred years ago, identified the wider relation between effective development of sea power and national resources in terms of people and economic potential.[1] In normal times of peacetime activity, navies are capital intensive and customarily have long procurement cycles. However, when war or other crisis comes, navies and the industries that support them face remarkable demands for expansion and growth in a compressed time span, to meet immediate maritime threats. In Canada's case during the Second World War, Canadian industry moved into novel lines of marine and munitions manufacture and produced key equipment for the Royal Canadian Navy, the British Royal Navy, and merchant marines within months and years.[2] The prevailing image of a miraculous record of wartime production, carefully nurtured during and after the war, has come under critical scrutiny

[1] "Notes on Elements of Naval Strategy," Manuscript Division, Library of Congress, Washington D.C. (hereafter LC), Alfred Thayer Mahan papers, Reel 5 Container 7.

[2] Paper prepared by Dr. J.L. Granatstein for the Canadian Council of Chief Executives, "Arming the Nation: Canada's Industrial War Effort 1939-1945," Ottawa, 27 May 2005, 10-11.

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by naval historians.[3] David Zimmerman and Michael Hennessy have analysed the limitations of Canadian industrial capacity at the time and the concomitant effect on wartime naval performance and policy.[4] The type of instant, emergency fleets built by Canada, combined with meeting the needs of another ally, raised numerous challenges and problems for government procurement officials, private enterprise, and naval authorities.[5] Putting warships to sea in a timely manner required an enormous industrial effort extending from the coast back into the hinterland which involved cities and industries in central Canada far removed from the main fighting theatres. While the home front during the war has attracted academic interest from a national perspective, the exact nature and effect of specialized wartime industrial activity on private companies and workers in local communities remains unrecognized.[6] In particular, the city of Hamilton, located on the west end of Lake Ontario astride transportation links between the American border and Ontario's largest city and provincial capital Toronto, assumed a part in Canada's war at sea through its manufacturing and industrial endeavours.

The Second World War represents a mere episode in Hamilton's economic and social development as a major industrial centre of steel and related manufacturing during the twentieth century. The city's image has long been associated with heavy industry and the large steel mills that provided employment and prosperity for its residents.[7] Like the American cities of Buffalo and Rochester across the international border in neighbouring New York State, Hamilton benefited from concentration in certain primary and secondary industries during a burgeoning industrial age. The city's progress became intertwined with manufacturing and promotion of a favourable business climate. At the turn of the century, Hamilton's city officials and professional elite fostered the transition from a craft-based productive past into newer industrial processes and methods of organization.[8] Called the "Birmingham of Canada" in comparison to another British urban industrial centre, Hamilton leveraged geographical, municipal, and human capital advantages in

[3] J. De N. Kennedy, *History of the Department of Munitions and Supply* Vol. 1 (Ottawa, 1950), Foreword by C D . Howe.

[4] David Zimmerman, *The Great Naval Battle of Ottawa* (Toronto, 1989). Michael Hennessy, "The Rise and Fall of a Canadian Maritime Policy, 1919-1965: A Study of Industry, Navalism and the State" (unpublished PhD thesis, University of New Brunswick, 1995). Though Gilbert Tucker's older and the new official R C N histories touch upon shipbuilding and production, no comparable official or semi-official study exists to Robert Connery, *The Navy and the Industrial Mobilization in World War II* (Princeton, 1951), for the US Navy.

[5] C P . *Slacey, Arms, Men and Governments: The War Policies of Canada 1939-1945* (Ottawa, 1970), 487-489.

[6] Jeffrey A. Keshen, *Saints, Sinners, and Soldiers: Canada's Second World War* (Vancouver, 2004). Michael D. Stevenson, *Canada's Greatest Wartime Muddle: National Selective Service and the Mobilization of Human Resources during World War II* (Montreal and Kingston, 2001).

[7] John C. Weaver, *Hamilton: An Illustrated History* (Toronto, 1982). M.J. Dear, J.J. Drake, and L.G. Reeds, (eds.), *Steel City: Hamilton and Region* (Toronto, 1987). Bill Freeman, *Hamilton: A People's History* (Toronto, 2001).

[8] Robert Boyd Kristofferson, "Craft Capitalism: Crafts workers, Industrialization and Class Formation in Hamilton, Ontario 1840-1872" (unpublished PhD thesis, York University, 2003). Diana J. Middleton and David F. Walker, "Manufacturers and Industrial Development Policy in Hamilton, 1890-1910," *Urban History Review* 8(1980), 20-46.

attracting commercial enterprises. The city enjoyed ready access to raw materials and major transportation networks by rail, water, and road, municipal business taxes were kept low, energy prices for electricity were comparatively cheap, and influxes of skilled and semi-skilled immigrants from southern and eastern Europe proved amenable to the discipline of the shop floor and the factory.[9] A significant portion of Hamilton's residents came to be employed directly or indirectly in large and small manufacturing concerns in the steel and metal trades, leading to the growth of distinct working class districts in the downtown core and toward the waterfront. Labour historians Bryan Palmer and Craig Heron argue that the industrial culture in Hamilton steel plants and factories generated collective awareness among workers and class conflict with management.[10] The extraordinary conditions of war and general economic swings furnished an important catalyst to industrial relations. During the First World War, Hamilton workers producing shell casings for the Imperial Munitions Board went on strike for higher wages in defiance of threats from employers and the government." War orders were quickly terminated with the end of hostilities. The turbulence of the immediate post-war years and the general downturn of the Great Depression inevitably affected general industrial activity and manufacturing employment in Hamilton.[12]

Hamilton lagged behind larger Canadian urban centres such as Montreal and Toronto in creating a truly diversified industrial and commercial base. These cities competed with each other to convince businesses to establish or relocate factories and manufacturing concerns within their locales. Promotional literature touted Hamilton as a place with an established industrial record without equal in Canada and superior standard of living in a beautiful environment.[13] Those selling Hamilton on its strengths frequently overlooked the downside of concentrated industrialization. The production of steel increasingly assumed a larger part in the city's economic livelihood, though Hamilton retained latent industrial capacity for manufacturing and a disciplined labour force

' Ian A. Drummond, *Progress without Planning: The Economic History of Ontario from Confederation to the Second World War* (Toronto, 1987), 175-176.

[10] Craig Heron and Bryan Palmer, "Through the Prism of the Strike: Industrial Conflict in Southern Ontario, 1901-14," *Canadian Historical Review* 58 (1977), 423-458. Bryan D. Palmer, *A Culture Conflict: Skilled Workers and Industrial Capitalism in Hamilton, Ontario 1860-1914* (Montreal and Kingston, 1979). Craig Heron, "The Crisis of the Craftsman: Hamilton's Metal Workers in the Early Twentieth Century," *Labour* 6 (Autumn 1980), 7-48. Craig Heron, "Hamilton Steelworkers and the Rise of Mass Production," *Canadian Historical Association Papers* (1982), 103-131. Craig Heron, *Working in Steel: The Early Years in Canada, 1883-1935* (Toronto, 1988).

" Meyer Siemiatychi, "Munitions and Labour Militancy: The 1916 Hamilton Machinists' Strike," *Labour* 3 (1978), 145-149.

[12] W. Peter Archibald, "Distress, Dissent, and Alienation: Hamilton Workers in the Great Depression," *Urban History Review* 21 (1992), 6-10.

[13] *Hamilton: The City beautiful and industrial hub of Canada: the ideal Canadian city in which to reside and do business* (Hamilton, 1925), Special Collections Hamilton Public Library, Hamilton (hereafter HPL), RG 17 Industrial Commissioner Series A. *Hamilton Canada: Canada's Finest Land Locked Harbour Hamilton, City of opportunity* (Hamilton, 1932), HPL, RG 17 Series A. *Hamilton: Its Commerce and Industries* (Hamilton, 1933). See also, Dominic T. Alessio, "Capitalist Realist Art: Industrial Images of Hamilton, Ontario, 1884-1910," *Journal of Urban History* 18 (1992), 442-469.

accustomed to factory work. The dumping of untreated residential sewage and toxic industrial sludge into Hamilton harbour, according to Ken Cruikshank and Nancy Bouchier, created a looming environmental disaster with potential health consequences for the workers living near the industries that employed them, while Hamilton residents of any means lived away from the waterfront higher up the escarpment.[14] Hamilton gained the reputation of having a dirty waterfront with dirty industries, accentuated by the wartime demands for production and industrial expansion soon to be thrust upon it. With the advent of the Second World War, the federal government placed war orders with selected Hamilton companies, and workers found employment in unprecedented numbers.[15] As the war emergency brought money, activity, and a sense of national purpose, the steel city responded to the challenge based upon its existing strengths as a major area of industry in Canada.

The purpose of this article is neither to assess the overall impact of the wartime production experience on Hamilton in its many facets nor to delve into the backgrounds or details of individual companies. An informative web-site based on research done by Rob Kristofferson in locally available sources already exists as part of the Made in Hamilton Heritage Project that supports walking tours past former and present industrial sites.[16] Principal companies and their various iterations over time are outlined there. The City of Hamilton's Culture section, which maintains a network of museums, has concentrated extensively on heritage, industrial, and local developments during the last two centuries. The Hamilton Museum of Steam and Technology, for instance, caters to a distinct audience. Public interpretation of the 20th century industrial past has also attracted special projects by the Hamilton Public Library and other privately-funded groups. The Workers Arts and Heritage Centre, located in a historic customs house on Stuart Street, has presentation galleries and a small archival collection explaining the history and culture of workers, with particular emphasis on Ontario and local Hamilton. Likewise, the William Ready Division of Archives and Research Collections at McMaster University is nationally recognized for its holdings in Canadian labour and business history. Waterfront revitalization and opening of a new Parks Canada Maritime Discovery Centre, both made possible through considerable federal government funds and the backing of local members of parliament, have also reconnected Hamilton residents with the harbour and its related industrial pursuits. Historian John Weaver and

[14] Ken Cruikshank and Nancy B. Bouchier, "Blighted Areas and Obnoxious Industries: Constructing Environmental Inequality on an Industrial Waterfront, Hamilton, Ontario, 1890-1960," *Environmental History* 9 (2004), 475. Remediation of "one of the worst polluted bodies of water on the Great Lakes" started two decades ago and has since been carried on by the Hamilton Port Authority, Environment Canada, and the Ontario Ministry of Environment according to the Hamilton Harbour Remedial Action Plan. Peter Gorrie, "Cleaning Up Hamilton Harbour," *Canadian Geographic* 107, 3, (June/July 1983), 35-36.

[15] Robert Henry Storey, "Workers, Unions and Steel: The Shaping of the Hamilton Working Class, 1935-1948" (unpublished Ph.D thesis, University of Toronto, 1982), 423-426.

[16] *Industrial Hamilton: A Trail to the Future* (Hamilton, 2000) < http://collections.ic.gc.ca/industrial/ >. Rob Kristofferson, "The Past is at Our Feet: The Worker's City Project in Hamilton, Ontario," *Labour* 41 (1998), 181-197.

historical geographer Michael Doucet, in one monograph, go so far to claim Hamilton represents a "typical" North American city.[17] City pride and boosterism underpin considerations of Hamilton's history by those living there, if for no other reason to be distinguished from nearby Toronto whose prowess in organized sports, economic and cultural advancements, and general habitability remain hotly contested. Certainly, the long-standing rivalry is curious to those from outside since people living in Toronto hardly think about Hamilton and would never concede that the working class city at the head of the lake is in any way better. In time, local historians will undoubtedly give Hamilton's Second World War home front and wartime industrial developments similar attention as other historical periods, special collections archivist Margaret Houghton having made an admirable first start.[18]

Instead, this article adopts a narrow approach focussed on maritime-related manufacturing in Hamilton to illustrate how a middle of the road Canadian industrial city far from the sea and still in its glory days of heavy industry could make a significant contribution to the naval war on the production side. It draws upon a wide range of primary materials from archives in various countries to put local matters related to naval production into international and national contexts. Why did Hamilton companies receive naval-related contracts and what was the scope of this industrial activity? What was the quality and timeliness of the product achieved by Hamilton companies and workers? Should industrial Hamilton's achievements in maritime production warrant special distinction, if Toronto emerged as the important wartime shipbuilding spot on Lake Ontario and its companies held more prime contracts in naval manufacturing?

Successful prosecution of the war at sea rested upon essential manufacturing and factory work done in urban areas with developed industries like Hamilton to produce the armaments and munitions necessary to equip and operate the navies of Canada and its closest allies. By virtue of location and productive potential, Hamilton received a disproportionate share of naval orders of a secondary nature through naval and government procurement authorities. Existing facilities were expanded and new buildings added exclusively for naval work through allowances for special depreciation against taxes payable and direct financial outlays from the federal government. Private companies departed from regular lines of manufacture into war work on behalf of the government, while the employed work force grew and acquired skills to undertake demanding industrial tasks on a quantity basis. The fact that Hamilton was never a shipbuilding centre and no complete warship was ever built there does not diminish the meaningful contribution made by companies and workers in furnishing materials such as steel plate, selected components and electrical apparatus, and ordnance items for construction and installation in ships. If the productive demands for waging naval war reached back into Canada's wartime economy and industries at the local level, the limitations of existing industrial capacity and selected policy choices were equally

[17] John Weaver *and* Michael Doucet, *Housing the North American City* (Montreal *and* Kingston, 1991).
[18] Margaret Houghton, *Hamilton at War on the Home Front* (Burlington, 2005).

important. In terms of complexity, some jobs proved almost beyond the talents and expertise residing in Hamilton's companies, whereas strict adherence to British designs complicated production to North American standards. In turn, reconversion from war work to previous civilian manufacturing challenged the companies involved. These qualifications put into proper perspective industrial Hamilton's wartime record in meeting the needs of the fighting navies and merchant marine.

Hamilton's size and industrial focus were important determinants in available supply of labour on war work for naval purposes. At the outbreak of the war in September 1939, the city's population was approximately 175,000 with a high concentration of skilled and semi-skilled workers in the steel and metal trades manufacturing sectors. As the *Hamilton Spectator* reported, the steel industry showed the first signs of ramping up before the award of actual munitions contracts: "Although it was stated armament orders have not yet been placed, it is known that Hamilton, steel capital of Canada, stands prepared to place her industrial resources at the service of the country."[19] These industrial resources included diversified industries with strengths in certain key areas and large payrolls of experienced workers with various skill levels. At the time, the Canadian government was committed neither to sending substantial land forces overseas nor expanding the small Royal Canadian Navy in any significant fashion because the "phoney war" encouraged the view that hostilities with Nazi Germany would be short. The first naval orders related to construction and machinery for coastal minesweepers and corvettes in Canada were tendered in late 1939 for the British Admiralty. Notwithstanding, William Morrison, Hamilton's mayor, forecast substantial industrial expansion and employment for the city if the war proved longer in duration.[20] By 1941, Dominion industry statistics recorded 45,421 workers employed directly in 491 manufacturing establishments within Hamilton proper, a one third increase from 1939 and more than double the number in 1933.[21] The rise was largely due to war work as civilian production dropped off or became severely restricted for want of materials. War conditions generally reinforced existing industrial concentrations within Canada. Hamilton was ranked fifth overall in terms of wartime industrial employment behind Montreal, Toronto, Vancouver, and Winnipeg.[22] This placing can be interpreted two ways: Hamilton was behind the established principal cities in Canada and in front of the rest.

Opportunities for employment in war-related industries increased, whilst large numbers of fighting age males from Hamilton's factories joined the armed forces. Skilled workers accustomed to working with machines and under industrial discipline were

" "Rise in Steel Activity Contrary to Usual Trend," *Hamilton Spectator* (28 September 1939).

[20] "Believes Great Expansion Period Awaits Hamilton," *Hamilton Spectator* (3 November 1939), HPL, Scrapbook "Hamilton - Economic Conditions," Vol. 1.

[21] Dominion Bureau of Statistics, General Manufacturing Branch, *The Manufacturing Industries of Canada, 1941* (Ottawa, 1943), 81.

[22] Research Study, Stewart Bates to W.A. Mackintosh "Location and Effects of Wartime Industrial Expansion in Canada 1939-1944," 18 December 1945, Queen's University Archives, Kingston (hereafter QUA), William Archibald Mackintosh fonds, Collection 1043 Box 2 Folder 39.

particularly attractive as hostilities-only ratings, chiefs, and officers in the Royal Canadian Navy, a technical-oriented service. In their stead, new workers entered the workplace or moved up from lower trade and job classifications. Figure 1 shows that the

Date	Number	Percentage of War Workers Nationally
30 September 1939	31,796	5.4%
1 June 1942	54,446	5.8%
1 July 1943	53,537	5.2%
1 July 1944	55,827	5.3%

Figure 1. Industrial War Employment in Hamilton (Source: "Location and Effects of Wartime Industrial Expansion in Canada 1939-1944")

number of Hamilton residents engaged in war work rose and peaked at over 50,000 and and consistently represented a little over 5 per cent of the total employed in armament manufacturing nationally. In other words, Hamilton kept pace with growth of the war economy over these years in terms of numbers working and held its own in relation to other Canadian cities. One in four persons living in Hamilton was engaged in war work in one way or another. Over time, a certain blending occurred between industries considered directly involved on war work and those servicing the wider Canadian economy, though manufacturing was somewhat of a special case in relation to the armed forces because munitions and war equipment came predominantly from Canadian sources.[23] Hamilton industry and related employment expanded progressively to meet wartime needs.

For the most part, the federal government set wage rates and labour conditions in Hamilton for companies engaged on war work. Labour was nominally a provincial jurisdiction, but the federal government before and during the war assumed ever greater responsibilities. The Dominion Department of Labour applied among other legislation the Fair Wages and Hours of Labour Act as well as the Industrial Disputes Investigation Act to all government war contracts.[24] Though labour conditions still varied from locality to locality, increasingly uniformity was achieved within districts and across industries. Industrial pay in Hamilton was comparable to or slightly lower than Toronto depending upon skill level, seniority, and classification. In the metal trades, a good mechanics wage in 1940 was above $1.00 per hour going down to forty cents for piecework, adjusted with premiums for cost of living. The standard working week was forty-eight hours with one

[23] Paul Hubert Casselman, *Methods Employed in Estimating Total Manpower in War Work in Canada,* Technical Series Publication No. 2 (Eastview, ON, 1946), HPL. Department of Munitions and Supply, *Canada Supplies the Tools of War* (Ottawa, August 1941).

[24] Memorandum, "Labour Conditions Applicable to Contracts Let by the Department of Munitions and Supply," 23 April 1940, Library and Archives of Canada, Ottawa (hereafter LAC), RG 27 Reel T-10,087 Vol. 77 File 401:48 pt. 1.

day off in seven, though companies were allowed to deviate from this norm for the sake of pressing war production. Levels of industrial activity in Hamilton returned to and superseded pre-Depression norms as plants reached full capacity.[25] Under direction from the Department of Munitions and Supply, some factories went to second and third shifts, thereby working machines around the clock. Federal and provincial labour officials reconciled conflicting views during conferences in 1941 and issued orders-in-council under the War Measures Act to bring agreed measures and minimal standards into effect.[26] Humphrey Mitchell, an elected member of parliament (Welland) from the greater Hamilton area, became minister of labour in prime minister William Lyon Mackenzie-King's war cabinet. Mitchell had previously served in the Royal Navy as a technical rating and had worked in Hamilton as an electrician before entering civic and federal politics.[27] Nonetheless, his association with and sympathy for traditional craft-based organized labour won little support amongst industrial workers. The local Hamilton Labour Council and Canadian Congress of Labour affiliates formally called for Mitchell's resignation as being "wholly incapable of administering a constructive labour policy."[28] Despite high expectations on him, Mitchell made several controversial policy decisions and resisted calls for collective bargaining legislation. Liberal premier Mitchell Hepburn, the stalwart foe of intrusions into Ontario by the Congress of Industrial Organizations (CIO) since 1937, eventually acknowledged industrial unionism and introduced provincially-mandated collective bargaining between employers and organized labour covering the Hamilton area.[29]

Hepburn, who drew connections between the CIO and Communist influences, corresponded directly with employers in the steel industry about relations with workers. In a previous letter, the president of Hamilton's Dominion Foundries and Steel Company wrote the premier: "We are carrying on with increases in wages here and there, wherever the pay envelope is thin, for reasonable production, and on the whole our people and those in close touch say that the C.I.O. is completely licked in our plant, but strikes as

[25] Department of Munitions and Supply Press Release No. 339, 23 May 1941, Archives of Ontario, Toronto (hereafter AO), RG 7-1-0-430 Box 9. "Hamilton Industrial Plants Now Geared Up to War Pitch," *Hamilton Spectator*^ February 1940), HPL, Clipping File "Hamilton - Industry - Before 1945."

[26] Conference of Dominion and Provincial Ministers of Labour "Summary of Tentative Conclusions," 8 May 1941, AO, RG 7-12-0-764 Box 11. Memorandum, H.B. Chase "Government Wartime Labour Policy," 10 October 1941, LAC, RG 27 Reel T-10,087 Vol. 77 File 401:48 pt. 2.

[27] Peter S. Mclnnis, *Harnessing Labour Confrontation: Shaping the Postwar Settlement in Canada, 1943-1950* (Toronto, 2002), 204.

[28] Minutes, Regular Meeting Hamilton Labour Council (CCL), Hamilton and District Labour Council, William Ready Division of Archives and Research Collections McMaster University, Hamilton (hereafter McMaster), Hamilton and District Labour Council fonds, Series 3 Minute Book "6 October 1941-31 May 1945." "Resignation of Mitchell is Demanded," *Globe and Mail* (30 November 1942).

[29] Judge Fudge and Eric Tucker, *Labour Before the Law: The Regulation of Workers' Collective Action in Canada, 1900-1948* (Don Mills, ON, 2001), 206. John T. Saywell, *Just call me Mitch: The life of Mitchell F. Hepburn* (Toronto, 1991), Chapter 13. Taylor Hollander, "Making Reform Happen: The Passage of Canada's Collective-Bargaining Policy, 1943-1944," *Journal of Policy History* 13 (2001), 305.

well as elections are uncertain things."[30] This collusion meant that Hamilton steel companies were virtually unorganized going into the war, in contrast to limited union organizing gains in Nova Scotia and northern Ontario. In fact, the Steel Company of Canada paid the highest steel wages in Canada to counter ClO-backed unions from gaining a foothold in Hamilton. Strong evidence suggests that the businessmen with whom Hepburn confided and socialized had the premier's ear in this regard. When Mitchell's predecessor in Ottawa wrote to one steel owner, Hepburn interceded:

> I have interpreted your letter [to James Dunn] as inviting me to express an opinion on the wisdom of accepting C.I.O. as bargainer between Canadian workmen and management and have discussed the matter at length with my associates and have canvassed the views of important friends and advisors before forming a definite opinion which I now take the liberty of expressing to you. The following reasons against accepting C.I.O. have developed in my conversations - it has not created harmony between American employees and management - it would merge Canadian industrial life with American and subject the industrial destinies of twelve million people to the control of one hundred and thirty million and it would run contrary to the expressed policy of the Government of our Province.[31]

Hepburn viewed the American CIO as a foreign influence out of step with the Canadian industrial and social scene in Hamilton and other Ontario locales. Responsibility between the federal and provincial governments for industrial labour relations during the war was shared not surrendered. For Hamilton, the influence of government regulation became omnipresent as industry drew deeper and deeper into war production.

Inside the war plants, existing industrial arrangements between management and labour co-existed with changes to the production process and introduction of new workers for the duration of the war. Several unions with affiliations to the Canadian Congress of Labour (CCL) and the American Federation of Labor (AFL) were active in Hamilton's metal trades and held negotiated agreements with some principal manufacturers.[32] Wartime was an opportunity for further organizing based on larger memberships as well as securing union recognition and bargaining rights in those plants

[30] Letter, Charles W. Sherman to Mitchell Hepburn, 21 August 1937, AO, RG 3-10-0-603.1 Box 267. Jeremy Weber, "The Malaise of Compulsory Conciliation: Strike Prevention in Canada During World War II," *Labour* 15 (Spring 1985), 61.

[31] Letter, Mitchell Hepburn to Norman McLarty, 18 January 1940, AO, RG 3-10-0-987 Box 303. The CRTs confrontation with the "Little Steel" companies in the United States no doubt reinforced Hepburn and his business friends in reaching these conclusions. Nelson Lichtenstein, *Labor's War at Home: The CIO in World War II* (Cambridge, 1982), 21-22. James Carl Kollros, "Creating a Steel Workers Union in the Calumet Region, 1933 to 1945" (unpublished Ph.D thesis, University of Illinois at Chicago, 1998), Chapters 7 and 10.

[32] Laurel Sefton MacDowell, "The Formation of the Canadian Industrial Relations System during World War II," *Labour* 3 (1978), 177-178.

and industries not already unionized. In a resolution to Mackenzie King and Hepburn four days after the attack on Pearl Harbor, the Hamilton Labour Council stressed "that while our support of the war was unqualified the Government could increase the effectiveness of our ability to produce the weapons of war if Labour was granted by Law the rights of collective bargaining."[33] Besides pressing these larger issues, organized labour maintained relations with employers and kept the government aware of local matters affecting labour and production. Paramount was avoidance of potential impediments to production such as walk-outs or strikes. Charles Millard, director of the Steel Workers Organizing Committee (later the United Steelworkers of America) and CCL regional organizer for the Toronto district, was actively involved in a strike at the National Steel Car Corporation in Hamilton over re-instatement of a dismissed union leader.[34] While the CCL unions and ClO-affiliated steelworkers reserved the right to strike at any time, the AFL craft unions and brotherhoods in the Hamilton area followed directions from Washington, Ottawa, and Montreal to abstain from strike activities. At the request of US president Franklin Roosevelt, the AFL had voluntarily adopted a no strike pledge for the war's duration, pronounced by AFL president William Green and enforced by John Frey amongst unions and locals through the AFL's metal trades department.[35] AFL international unions were predominant in Great Lakes shipyards on both sides of the US-Canada border, though industrial unions from the CIO and the CCL made major inroads into the steel and manufacturing sectors. In Hamilton, steelworkers launched organizing drives in competition with established AFL machinists, boilermakers, and electrical workers and sought certification through Ontario's new labour court.[36] At some companies, labour-management committees were created on the initiative of workers and management facilitated by government labour coordinators. Companies solicited and encouraged suggestions from employees on how to improve the work environment and increase production. Posters hung prominently on Hamilton factory floors and lunch rooms connected individuals to the war effort, celebrated achievement of production targets, and reinforced the constant need for safety in the

[33] Minutes, Regular Meeting Hamilton Labour Council (CCL), 11 December 1941, McMaster, Hamilton and District Labour Council fonds, Series 3 Minute Book "6 October 1941-31 May 1945."

[34] Minutes, Regular Meeting National Labour Council of Toronto, 28 April 1941, LAC, Reel M-2294. R.J. Magor, "National Steel Car Corporation, Limited: A Statement to Shareholders from the President Reciting the Developments that Culminated in the Dominion Government Appointing a Controller of Its Hamilton Plant," 13 May 1941, AO, RG 3-10-0-1083 Box 311. Millard had earlier been arrested under Section 39 of the Defence of Canada Regulations for alleged inflammatory statements made at a trade union meeting in Timmins, Ontario. The charges were eventually dropped, and he subsequently resigned as a trade union representative on the National Labour Council, a predecessor body to the National War Labour Board. Reg Whitaker, "Official Repression of Communism During World War II," *Labour* 17 (1986), 153.

[35] "Proceedings of the Conference of International Officers of the American Federation of Labor," 16 December 1941, Wisconsin Historical Society, Madison, American Federation of Labor President William Green papers, U.S. Mss 117A Series 1 IB Box 10 Folder "World War II Policy 1941." For the relative effectiveness of the no-strike pledge, see James B. Atleson, *Labor and the Wartime State: Labor Relations and Law During World War II* (Urbana and Chicago, 1998), Chapter 7.

[36] Letter, F.A. Brewin to Jacob Finkelman, 21 April 1943, AO, RG 7-46-0-2 Box 1. Laurel S. MacDowell, "The 1943 Steel Strike Against Wartime Wage Controls," *Labour* 10 (Autumn 1982), 67-68.

A third or more workers employed in Hamilton manufacturing and precision machining related to wartime naval contracts were female. Labour unions and company management adjusted existing industrial arrangements to meet the influx of these new workers. (Hamilton Public Library)

workplace; as well, company-distributed newsletters and similar publications were loaded with propaganda and self-congratulation to inspire positive motivation.[37] Hamilton's relation to the war at sea attracted an occasional topic or headline in the context of actual production. In addition, war plants opened health and sanitation facilities, rest rooms, and even daycare centres.

Though the skilled industrial workforce remained overwhelmingly male, a third or more workers in some war plants were females recruited since the start of the war. Whereas women worked the same shifts as men, pay was often less and the provincial government required employers to have permits for overtime in the case of females.[38] In keeping with the "Rosie the Riveter" stereotype imported from the United States, women predominantly entered newer trades such as welding or precision machining. Less union opposition common to established trades existed, and the physical demands were not as

[37] Robert Storey, "Unionization Versus Corporate Welfare: The 'DOFASCO Way,'" *Labour* 12 (1983), 20-21.
[38] Letter, N.O. Hipel to Norman McLarty, 25 June 1940, AO, RG 7-12-0-708 Box 10.

strenuous. Whether male or female, training and on the job practice leading to experience were imperative for the unskilled and semi-skilled workers brought into wartime factories and places of production. It was often easier to train new workers in the intricate work associated with manufacturing for marine purposes rather than to retrain older ones. Tasks were broken down onto a mass production basis, and workers learned requisite skills without the long apprenticeships associated with existing unions. Union locals, however, were quick to make sure new workers joined as dues-paying members with restricted privileges and some companies insisted that they do so. The transposing of newer innovations onto an established industrial organization made possible the great changes to manufacturing in Hamilton necessary to meet naval requirements.

Supply of steel, Hamilton's specialty, was critical for expanded wartime shipbuilding and marine-related manufacturing. Canada had never been self-sufficient in steel production, having been reliant upon imports from Europe and the United States prior to the war.[39] Despite tariffs that discriminated, limited capacity at plants inside Canada existed at several main steel industrial centres: Sydney and Trenton, Nova Scotia as well as Sault Ste Marie and Hamilton, Ontario. The latter drew iron ore and other raw materials from fields along Lake Superior and shipped through the Great Lakes canal system for processing into steel by heat treatment. Duncan McDowall has described how Sir James Dunn exploited the war situation within the government-regulated steel industry to further his interests in Algoma Steel Corporation.[40] While it is difficult to draw direct parallels with business conditions in Hamilton, established steel companies certainly confronted similar challenges and were compelled through a government-appointed steel controller to work collectively toward common production goals. Likewise, trade unions in the steel industry agreed to "co-operate with the Dominion government in the prosecution of the war and in the maintenance of fair and reasonable standards of wages and working conditions and in avoidance of industrial strife."[41] To meet wartime demands, the federal government encouraged expansion of facilities operated by existing private companies. The largest ones in Hamilton, the Steel Company of Canada followed by Dominion Foundries and Steel Company, added blast furnaces, electric and open hearth furnaces, as well as rolling and blooming mills.[42] Additional capital infrastructure and training of new workers necessarily took time to come into full operation. Given the small number of Canadian companies able to roll plate suitable for shipbuilding in September 1939, industry officials recommended that orders be placed in

[39] Kennedy, Vol. 2, 209.

[40] Duncan McDowall, *Steel at the Sault: Francis H. Clergue, Sir James Dunn, and the Algoma Steel Corporation 1901-1956* (Toronto, 1984), Chapter 8.

[41] "Resolution adopted at Conference in Ottawa on 4-5 November 1939 by representatives of Organized Labour of Steel Company of Canada, Hamilton; Dominion Steel & Coal Corporation, Sydney and Trenton, NS; Algoma Steel Corporation, Sault Ste Marie, Ontario", AO, RG 7-1-0-374 Box 8.

[42] Department of Munitions and Supply, *The Industrial Front* (Ottawa, 1 January 1944), 290-292. "Huge Addition Being Made to Dofasco Plant," *Hamilton Spectator* (18 May 1940), HPL, Scrapbook "Dominion Foundries and Steel Limited," Vol. 1 Pt. 1.

the United States to meet Canadian and British requirements for steel.[43] Application of the US Neutrality Act restricted exports with potential war uses because Canada's southern neighbour still remained apart from the world conflict against the Axis powers, but Canadian companies and manufacturing firms retained the privilege of purchasing directly on a North American basis for the time being. This special access to American supply was crucially important to Canada's war effort in the first part of the war.

The decision to build merchant ships in Canada and institution of a mandatory priorities system covering production and allocation of steel in the United States had far-reaching effects on availability of steel for Canadian shipbuilding. In April 1941, Harvey MacMillan, president of the crown company Wartime Merchant Shipping Limited, counted steel imported from the United States toward maximum Canadian labour content in merchant ship construction.[44] Increased production at Hamilton and elsewhere meant that the proportion of steel from American sources coming into Canada decreased by nearly a third. Ross McMaster, the Steel Company of Canada's president, announced a $4.7 million steel mill capable of rolling 100 inch wide steel plates with a capacity of 180,000 tons annually, specifically for the national shipbuilding programme.[45] Unlike other steel companies that demanded direct government investment in plant, the Steel Company of Canada used its own capital to build this rolling mill, on the understanding that the cost received accelerated depreciation over a shorter period of time. As production reached stipulated schedules from late 1941 onward, domestically-made Hamilton steel increasingly went into Canadian-built warships and merchant vessels. The twinning of steel foundries with big rolling mills represented a significant step forward for the Canadian steel industry and brought Hamilton in line with North American-wide practice. Addressing a meeting of the Association of Iron and Steel Engineers, the first to be held in Canada and Hamilton, mayor Morrison boasted that 55 per cent of Canada's entire steel output came out of Hamilton and he made special reference to the rolling of steel plate used in corvette and tank construction.[46] Shipbuilding created demand for large quantities of steel, for which the two principal Hamilton companies expanded production capacity as well as specialized facilities and equipment.

Ship construction was a heavy consumer of steel of the right type and quantity produced in Hamilton. By November 1941, shipbuilding received two thirds of the 18,000 tons of steel scheduled in Canada monthly under allocation by the steel controller.[47] Actual production frequently lagged behind forecasted deliveries, the difference met by ever so scarce imports from the United States. Throughout the war, steel was consistently in short supply on a North American basis. In the United States, this scarcity created fierce competition between the Navy Department, the War

[43] Letter, A. Cross to R.C. Vaughan, 16 September 1939, LAC, RG 24 Series D-1-a Vol. 5607 File 29-24-1.
[44] Memorandum, "H.R. MacMillan," 5 April 1941, AO, Floyd S. Chalmers fonds, F 4153-3-0-10 Box 6.
[45] "Growing Production Record Meets National Emergency," *Hamilton Spectator* (18 March 1941), HPL, Scrapbook "The Steel Company of Canada," Vol. 1.
[46] "City Turns Out More than Half Steel Output of Entire Dominion," *Globe and Mail* (12 May 1942).
[47] Letter, D.A. Clarke to W.G. Mills, 18 November 1941, LAC, RG 24 Series D-1-a Vol. 5602 File 29-1-31 pt. 4.

Department, and United States Maritime Commission, whilst in Canada, availability of steel presented the main impediment to MacMillan's plans to expand shipyard facilities to match United Kingdom output of merchant ships, about 1,250,000 tons annually.[48] Canadian shipbuilding proceeded forward with allotments redirected from the British Merchant Shipping Mission in New York, special arrangements under the 1941 Hyde Park Agreement signed between the Canadian prime minister and the American president, and whatever could be squeezed out of steel production from industrial capacity in Canada.

In contrast to the aircraft and automotive industries, the biggest demand in shipbuilding was for steel plate of commercial grade and thickness. Hamilton rolling mills more than doubled the amount of steel for such purposes. Warships such as corvettes and minesweepers required less than a thousand tons of steel each, whereas every standard 10,000 tons deadweight merchant ship consumed approximately 2,400 tons of steel. Besides the new steel plate mill dedicated to shipbuilding that went into full production, the Steel Company of Canada was a principal supplier of steel wire and pipe destined for installation in ships.[49] Dominion Foundries and Steel also installed new facilities for production of higher carbon armour plate, strengthened for use in gun shields and protected areas on ships. The company's president claimed that Canadian manufacturing technique and metallurgy rivaled the British, who "are now coming to Hamilton to find how they should be done."[50] Though Canadian general and specialized steel production remained small compared to levels in the United States, Hamilton provided a reliable source of supply under direct Canadian control. Demand for steel, particularly steel plate in volume, closely tracked Canada's aspirations in the field of shipbuilding.

As the exigency of Canada's campaign against German U-boats in the North Atlantic lessened, steel firms in Hamilton indirectly experienced the effect. Wartime emergency shipbuilding in Canada peaked during the Summer of 1943 in terms of overall employment and number of hulls under construction in the shipyards. Consequently, Wartime Merchant Shipping, later renamed Wartime Shipbuilding Limited and given authority over all naval as well as merchant shipbuilding, extended times between scheduled launchings.[51] The effect was to reduce shipbuilding production levels and lessen demand for Hamilton steel. Shipyards were directed to draw from existing

[48] Frederic C. Lane, *Ships for Victory: A History of Shipbuilding under the U.S. Maritime Commission in World War II* (Baltimore, 1951), Chapter 10. Joel R. Davidson, *The Unsinkable Fleet: The Politics of U.S. Navy Expansion in World War* //(Annapolis: Naval Institute Press, 1996), 78-80. Keith E. Eiler, *Mobilizing America: RobertP. Patterson and the War Effort 1940-1945* (Ithaca, 1997), 181-187.

[49] William Kilbourn, *The Elements Combined: A history of The Steel Company of Canada* (Toronto and Vancouver, 1960), 162.

[50] Memorandum, "Frank A. Sherman, Dominion Foundries and Steel," 5 June 1941, AO, Chalmers fonds, F 4153-3-0-11 Box 6. "British Armour Mission to U.S.A.: Preliminary Report on Cast and Rolled Armour," 31 July 1942, The National Archives, Kew (hereafter TNA), A D M 1/11735.

[51] Hamilton business executives from the steel companies were seconded to Wartime Merchant Shipping. Letter, D.B. McCloy to H.R. MacMillan, 22 June 1943, University of British Columbia Library Special Collections, Vancouver, Harvey Reginald MacMillan papers, Box 24 File 18.

inventories, while orders for steel plate and forms were cancelled. Hamilton steel companies now possessed capacity redundant to war purposes and available for other uses and reconversion. The steel controller gradually relaxed or lifted restrictions on allocation of steel for civilian consumption and the construction trades. Steel production, unlike other munitions manufacture, was more amenable to making a relatively easy transition back into normal business. The government applied renegotiation to war contracts involving considerable cost accounting. Extraordinary plant such as blast furnaces and rolling mills built with private capital received special depreciation against the Excess Profits Tax, while other companies exercised options to purchase on favourable terms government-financed facilities declared surplus.[52] The war left Hamilton steel producers with modern plant amenable to civilian production, considerable managerial and technical experience, and abundant skilled labour. During a visit to Hamilton, minister of munitions and supply Clarence Howe met with a delegation at city hall about the possibility of establishing a permanent shipyard devoted to building steel ships.[53] The future of steel, however, was not in shipbuilding, which returned to minimal levels in Canada after the wartime emergency, but in a diversified market of consumer products.

Besides the steel plate forming the hull and superstructure, modern steel warships and cargo vessels comprised a wide array of machinery and apparatus necessary for propulsion, steering and navigation, power, environmental control, ventilation, and crew living. Components included main and auxiliary engines, propellers, pumps, valves, piping as well as electrical wiring, control panels, and generators. Even the simplest ship design represented a complicated technical and engineering challenge, sequenced to meet set delivery schedules under wartime conditions. Components and machinery had to be completed, tested, and forwarded in a logical and timely manner, often by companies and manufacturers without prior experience in the exacting specifications demanded of naval construction. Unlike the United States or the United Kingdom where the largest capital ships were built by established firms with long years of expertise, warships constructed in Canada were smaller in size than the average destroyer, to simplified designs and commercial standards for ease and speed in production.[54] Likewise, Canadian-built merchant ships fell into standard 4,700 tons deadweight and 10,000 tons deadweight categories based on British designs using steam-reciprocating engines capable of relatively slow speeds. The US Maritime Commission, meanwhile, moved away from the comparable *Liberty* ship into an emphasis on tankers and fast freighters, far more sophisticated in terms of propulsion and machinery. Though Canadian shipyards initially ordered marine engines and components directly from builders, central purchasing was

[52] Craig Heron and Robert Storey, "Work and Struggle in the Canadian Steel Industry, 1900-1950," in Douglas McCalla, ed. *The Development of Canadian Capitalism: Essays in Business History* (Toronto, 1990), 224.

[53] "Minister Agrees to Aid if Plant Established Here," *Hamilton Spectator* (29 September 1944).

[54] Memorandum, W.C. Horton to Executive Assistant Director General of Shipbuilding, "Orders for Machinery etc. to be obtained in U.K.," 27 August 1941, LAC, RG 24 Series D-1-a Vol. 5602 File 29-1-31 pt. 4. Hamilton firms also contributed components to Tribal class destroyers, the most sophisticated warship attempted in Canada during the war. "Hamilton Shares in Making Parts for Tribal Ships," *Hamilton Spectator* (16 April 1943).

increasingly applied through the Department of Munitions and Supply's director general of shipbuilding and Wartime Merchant Shipping.[55] Contracts covering items, either whole or in part, were placed with firms thought best able to deliver sufficient quality products in an expeditious manner, and then shipments were made to the shipyards according to a progress schedule. A private firm was often designated as lead for a group of smaller manufacturers and sub-contractors working on a particular component, piece of machinery, or electrical apparatus. Those companies with engineering, purchasing, and accounting departments sufficient in size to handle the rigorous inspection and audit procedures associated with Dominion government war contracts were limited in number. Hamilton, however, was home to several large manufacturing firms with established facilities and industrial work forces which had engaged in peacetime pursuits similar, with some modification, to naval-related production.

Most important to the manufacture of marine engines and other components elsewhere was the forging capacity resident in Hamilton-based companies. Before the war, virtually all marine engines and machinery were imported from the United Kingdom or the United States because indigenous industry lacked a market to develop the requisite technical expertise and make a profit. In fact, during the war, Wartime Merchant Shipping still continued to rely on engines and key components from American sources, despite strident efforts to increase Canadian production. Montreal-based Dominion Engineering Company possessed exclusive Canadian manufacturing rights to the Sulzer diesel engine and Vivian Engine Works in Vancouver and Canadian Fairbanks-Morse produced smaller diesels, but the decision was made to pursue steam-reciprocating engines suited to the British-type ships building in Canada.[56] The heating of water into steam vapour at pressure to drive the engines required large boilers and condensers cast from poured molten metal. Canadian Westinghouse Company, the Hamilton subsidiary of Pittsburgh's Westinghouse known for manufacturing of air brakes on railroad rolling stock, refrigeration units, and consumer appliances, established a marine department, which drew upon American mass production and assembly methods in the furnishing of components for steam turbines and marine reduction gears.[57] In operation since 1896, Canadian Westinghouse was a longstanding Hamilton fixture and major employer in the city. George Westinghouse, the pioneering American inventor and founder, possessed practical experience in marine engineering during the US Civil War and introduced improved steam turbines and reduction gears for the merchant marine prior to the First World War.[58] The American company and its Canadian subsidiary returned to these roots for the sake of war production. Cylinders weighing as much as 10 tons, for incorporation into merchant ship engines, were cast in Canadian Westinghouse's foundries and forging

[55] Memor*an*dum, Acting Deputy Minister to Minister, 5 June 1941, LAC, RG 24 Series D-1-a Vol. 5602 File 29-1-31 pt. 2.

[56] "Production of Naval Machinery, 1935-1945," TNA, CAB 102/540.

[57] *Westinghouse Wartime Engineering* (Pittsburgh, J*an*uary 1943), 23, HPL. The Americ*an* parent comp*an*y also engaged in subst*an*tial war work on the industrial side. David O. Woodbury, *Battlefronts of Industry: Westinghouse in World War II* (New York, 1948).

[58] "George Westinghouse," Canadian Westinghouse Company fonds, McMaster, Series 3 Box 16 File 4.

shops and then shipped to marine engine builders in Toronto and Montreal for finishing.[59] Due to shortages and substitutions in key metals, wastage rates in the production process were exceedingly high by commercial standards. A standing order at the John Inglis Company in Toronto for 20 ton and 70 ton Worthington-Simpson pumps destined for installation in frigates was delayed because Canadian Westinghouse, Otis-Fensom Elevator Company, and Tallman Brass Company in Hamilton experienced too many rejected castings.[60] The inability of companies to deliver forged parts and components had a trickle down effect on the completion of marine engines and the ships they went into. However, marine work became a sideline for Canadian Westinghouse once Hamilton Munitions Limited, a crown company operating from an adjacent plant, went into gun production. On the electrical side, Hamilton was somewhat better positioned to meet the requirements for electrical fittings and apparatus going into ships from Canadian Westinghouse production.

Canada boasted an advanced electrical manufacturing industry following North American standards and integration centered round the Toronto and Hamilton areas. Over time, this industry was adapted and organized quite comprehensively to meet war purposes in Canada, from the generation of electrical power to the production of armaments and related electrical apparatus in dedicated war plants.[61] Canadian General Electric Company and Canadian Westinghouse, branch plants of American industry leaders, were at the forefront of Canadian electrical manufacturing. Company engineers belonged to American professional associations and kept abreast of the latest developments and production techniques in the field.[62] These connections represented an indispensable means to exchange information about industry-wide practice. The principle problem was the different specifications and voltage called for in British ship and electrical plans, often requiring considerable reworking and redesign on the part of the companies involved. The British Admiralty Technical Mission, which provided overseers and inspection of electrical fittings, accepted some adoption of North American standards, but ships destined for British end-use usually followed Admiralty patterns.[63] To do otherwise created problems with servicing and maintenance when ships became operational with British fleets or operating out of British-controlled ports and bases. Since the Royal Canadian Navy preferred Canadian standards to North American voltage, it was not uncommon for electrical manufacturers like Canadian Westinghouse to be producing the same items for the same class of ship to two entirely different specifications. The range of products made at Canadian Westinghouse included

[59] "Down to the Sea in Ships go Westinghouse marine engine castings..., " *Westinghouse Employees' Magazine* Vol. 1 No. 8, (October 1943), 4-5.

[60] Letter, P.J. Baldwin to George C. Batem*an,* 22 October 1943, City of Toronto Archives, Toronto, John Inglis Company fonds, Fonds 1297 Series A5 Box 16 (196599) File "Department of Munitions *an*d Supply 1943."

[61] "Electrical Firms Devote Pl*an*ts to Major War Tasks," *Hamilton Spectator* (28 December 1943).

[62] Annual Joint Meeting, Hamilton Branch Americ*an* Institute of Electrical Engineers, 10 April 1942, QUA, Collection 3621.1 Series I Box 2 File 17.

[63] Letter, Engineer Rear Admiral H. A. Sherid*an* to Engineer Captain G.L. Stephens, 22 November 1941, LAC, RG 24 Series D-1-a Vol. 5602 File 29-1-31 pt.5.

generators, electric-powered motors, floodlights, and other specialized electrical apparatus. When British-designed motors and blowers failed in Canadian warships under operational conditions, technical engineers in Hamilton designed and tested new models for ventilation purposes.[64] From a material and technical perspective, the amount of Canadian content thereby increased, and less dependence on foreign sources of supply was possible. The war years proved extremely lucrative for Canadian Westinghouse, which recorded $23.1 million in profit after expenses during the tenure of president John Read between 1940 and 1949.[65] Naval work accounted for a fraction of this business, though among Hamilton companies engaged in electrical manufacturing, Canadian Westinghouse could bid with confidence on immediate and future work related to shipbuilding and the Royal Canadian Navy based on its war production record.

Despite the lack of a full-fledged shipyard in Hamilton during the war, some outfitting of minesweepers and fabrication work took place within city limits on behalf of the British. Shipyards on the Ontario side of the Great Lakes were designated mostly for construction of warships due to size limitations and marginal facilities. The Wolvin group, the only established pre-war shipbuilding conglomerate, was run out of Montreal and maintained the illusion of competition to maximize government dry dock subsidies through shipyards situated at Kingston, Collingwood, Midland, and Port Arthur. Hamilton possessed no existing shipbuilding concerns, though vacant lands adjoining the harbour area were suitable for such purposes. The Hamilton Harbour Commission, a quasi public-private body, maintained several harbour-side warehouses for transshipment of freight and goods. Canadian Steamship Lines possessed a large warehouse, and the steel companies built slips and docks for the unloading of coal and raw materials by barges and lake ships. Hamilton's controller A.H. Frame, a long-time advocate of shipbuilding for Hamilton, tirelessly lobbied the Dominion government and local members of parliament: "I have been working in the hope of having shipyards built at Hamilton, as an additional industry, but since the war, and particularly within the last few months, I feel the location of such an industry here could help considerably in the successful prosecution of the war."[66] Hamilton possessed the advantage of nearby supporting industries for the supply of steel plate, propulsion machinery, and related components, but the harbour was iced up part of the year and an available labour market reaching its ceiling with a looming housing shortage worked against adding the burden of one more industry. For their part, civic and public officials largely looked upon shipbuilding as a means of continued employment once armaments production tapered off and reconstruction began.

But, in the end, no private interests stepped forward to undertake the risks

[64] "How Fighting Ships Breathe," *Westinghouse Employees' Magazine* Vol. 3 No. 7 (September 1945), 7.

[65] "Financial History of Canadian Westinghouse," 1960, McMaster, Canadian Westinghouse Company fonds, Series 3 Box 16 File 4.

[66] "Will Urge Shipbuilding Program for Hamilton," *Hamilton Spectator* (12 April 1941). A later newspaper editorial applauded Frame for his efforts and felt that shipbuilding "is an industrial achievement which Hamilton is well able to perform." "Hamilton Can Build Them," *Hamilton Spectator* (6 February 1942).

associated with shipbuilding. In contrast, a wartime emergency yard, laid out on modern lines to facilitate mass production, was started in Toronto by a businessman of Italian descent engaged in road construction under the name Dufferin Shipbuilding, later changed to the Toronto Shipbuilding Company.[67] Located on lands leased from the Toronto Harbour Commission at the foot of Spadina, this shipyard received contracts first for Bangor minesweepers and then the improved Algerine minesweeper, an ocean-going fleet minesweeper of wartime design. A shipyard of similar size and function could undoubtedly have been built in Hamilton if private start-up capital had been forthcoming. It was only lagging production and doubts about the Toronto company's management that later led to government ownership in August 1943, when the shipyard was put under the agency of Redfern Construction Company headed by Clarence Redfern, one of MacMillan's former vice presidents at Wartime Merchant Shipping.[68] In contrast, officials in Hamilton wanted primary government involvement from the outset. The experience with Toronto Shipbuilding Company undoubtedly made procurement authorities extremely wary about opening other government-run shipyards in places like Hamilton.

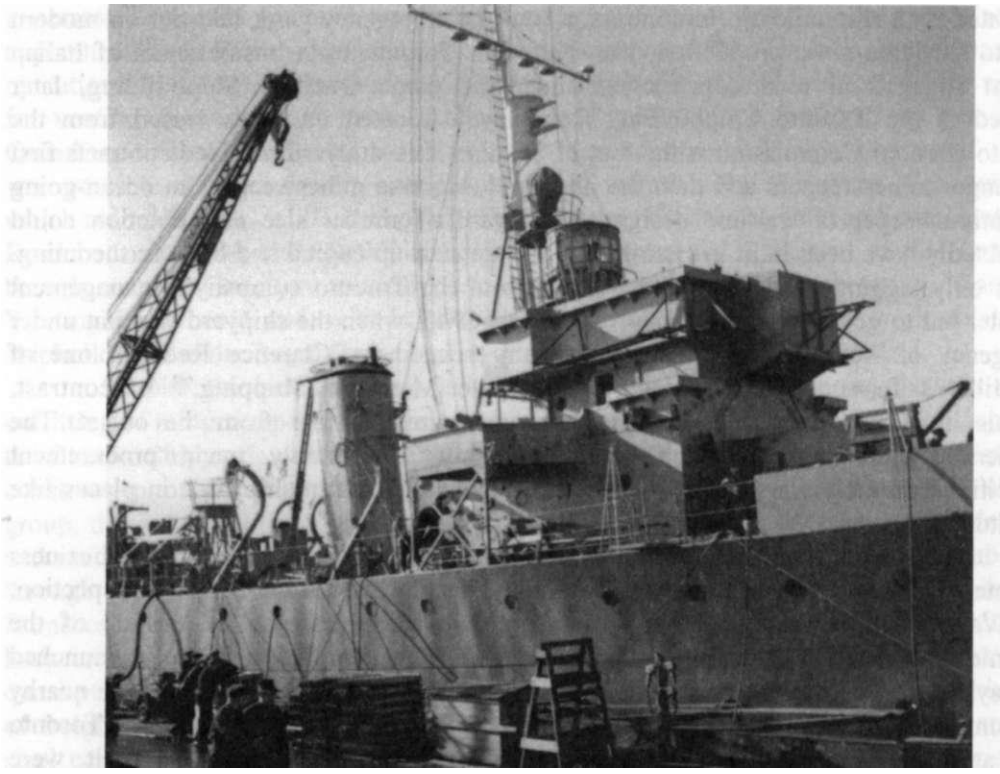
Nonetheless, conditions in Toronto opened up the opportunity for some business to come Hamilton's way. The British Admiralty Technical Mission oversaw inspection, and Wartime Shipbuilding Limited provided general supervision on behalf of the Dominion government under the existing contract. The completion of hulls, launched sideways into Toronto harbour, outpaced available outfitting facilities on a nearby government dock, while severe shortages of electricians and trades people in the Toronto area caused delays. The British, for whom the minesweepers were being built, were anxious to get as many ships completed before the close of navigation by ice conditions on Lake Ontario and the St. Lawrence River.[69] In order to speed up delivery and acceptance in 1943, the company was directed to open satellite yards at St. John, New Brunswick and Hamilton for outfitting Algerines to take pressure off Toronto.

Hardly the permanent shipbuilding foreseen by Frame, the Hamilton outfitting yard represented mostly a short-term expedient operated on a sub-contract basis. After the conclusion of negotiations between the Hamilton Harbour Commission and the Department of Munitions and Supply, on 25 June 1943, a seventeen acre site with an existing warehouse and slip at Wellington Street was designated for development for

[67] "History of Toronto Shipbuilding Company Limited," LAC, RG 28 Vol. 20 File 61.

[68] Agreement between Department of Munitions and Supply and Redfern Construction Company, 12 August 1943, LAC, RG 24 Series D-1-c Acc. 1983-84/167 Vol. 3788 File 8200-R375. Memorandum, Ian Stevenson to Watson Sellar, 10 March 1944, LAC, RG 58 Vol. 245 File 10.

[69] Minutes, Meeting "Production of Escort Vessels and Fleet Minesweepers in U.K. and Canada," 30 March 1943, TNA, ADM 1/13030. After completion, the minesweepers conducted armament trials at Toronto, wireless and radar trials at Montreal, anti-submarine warfare and gunnery trials at Quebec City, and working-up at Halifax. Memorandum, Deputy Secretary Naval Board "Arrangements for Trials and Commissioning of R.N. and R.C.N. New Construction Building in the Great Lakes and River St. Lawrence 1943," 19 March 1943, LAC, RG 24 Series D-13 Vol. 11,970 File NMS 261-1-2.



An Algerine fleet minesweeper undergoes outfitting. Some hulls were diverted from the building yard in Toronto for finishing and electrical work at facilities leased from the Hamilton Harbour Commission using Hamilton workers. (Library and Archives of Canada)

work on escorts and minesweepers.[70] Availability of skilled labour and suitable facilities amenable to alterations in a short period of time were key factors. The Department of Munitions and Supply's naval shipbuilding branch approved capital of expenditures of $174,400 to install new buildings, tools, and equipment on land leased from the Hamilton

[70] "Ship Project Will Require More Storage," *Globe and Mail* (25 June 1943). "Warships Being Equipped for Service Against Axis at New Harbour Project," *Hamilton Spectator* (31 August 1943).

Harbour Commission.[71] This amount was admittedly modest compared to money spent on the shipyard in Toronto. Carter-Halls-Aldinger Limited, a Hamilton company acting as a sub-contractor to Toronto Shipbuilding Company, undertook work associated with outfitting the minesweepers for cost plus a fixed fee. No provision was made for building slips: bare hulls were towed from Toronto into Hamilton harbour where installation of machinery and electrical apparatus occurred at the harbour commission dock over several months. Labour was locally recruited on the basis of a forty-eight hour week, at hourly pay rates of $1.20 for foremen, $1.00 for superintendents, 90 cents for journeymen, and 60 cents for labourers and no provision for double time.[72] Canadian Comstock Company, another Hamilton-based business which also operated the outfitting yard in New Brunswick, received a sub-contract to handle all electrical work and steam-fitting on the Algerines; an existing labour agreement with the electrical union local was extended to cover old and new workers in the outfitting yard. Work progressed satisfactory, although deficiencies in key materials and components led to periodic lag times for riggers, fitters, and welders. Due to concerns over financing, the British cancelled six out of the twenty-five Algerines programmed for construction in Canada.[73] This move signalled a coming conclusion to Hamilton's modest entry into the field of shipbuilding. Facilities at Toronto were freed up, and the urgency for getting minesweepers to sea passed. As a result, the Hamilton outfitting yard laid off three hundred and seventy-five workers and ceased operations in late November 1944.[74] The buildings and equipment on the leased land reverted to the Hamilton Harbour Commission for use as warehouses again. The hopes of Frame and others to establish permanent shipbuilding facilities in Hamilton as a complement to the steel industry went unrealized.

Similarly, a last order related to fabrication of steel barges destined for the Indian and Pacific Oceans went to Hamilton Bridge Company, another local private enterprise. The Canadian Mutual Aid Board in Ottawa considered and withheld a request from the British Ministry of War Transport for Phoenix nesting barges to be built in Canada at a total contract value of $3 million.[75] Nonetheless, the British persisted because shipyards

[71] Letter, G.K. Sheils to Toronto Shipbuilding Company "Fitting out of Naval Escort Vessels," 30 July 1943, LAC, RG 28 Vol. 521 File 51-T-1. The final amount was $176,700. Department of Munitions and Supply, "Report on the Government-financed Expansion of Industrial Capacity in Canada as at December 31, 1943," Directorate of History and Heritage National Defence Headquarters, Ottawa (hereafter DHH), File 83/477.

[72] Minutes, Executive Meeting, 17 September 1943, McMaster, International Brotherhood of Electrical Workers Local 105 fonds, Box 3 Book 14.

[73] Message, British Admiralty Technical Mission to Admiralty, 24 2210 October 1944, TNA, ADM 1/16742. "Naval Construction in Canada for British Admiralty Monthly Progress Report *30*^ November 1944," LAC, RG 24 Series D-1-c Acc. 1983-84/167 Vol. 3789 File 8200-11 Pt. 2.

[74] Memorandum, A.E. McMaster to C D. Howe "Lay-offs in War Industry, 20 November 1944, LAC, RG 28 Series A Vol. 210 File 196-2-31-2. These lay-offs, perhaps small in number, followed upon earlier discharges from munitions and armaments manufacturing concerns in Hamilton, warranting the establishment of a lay-off committee by the Hamilton Labour Council. Minutes, Regular Meeting Hamilton District Labour Council (CCL), 9 March 1944, McMaster, Hamilton and District Labour Council fonds, Series 3 Minute Book "6 October 1941-31 May 1945."

[75] Minutes, 32nd Meeting Canadian Mutual Aid Board, 11 December 1944, LAC, RG 19 Vol. 418 File 101-106-3.

in the United Kingdom were heavily engaged in higher priority naval construction and the Americans refused to accord strategic priority to Admiral Lord Louis Mountbatten's South East Asia war theatre over pressing demands in the Pacific for supply from the United States. Canada's generous extension of mutual aid dollars encouraged the British to place such orders in Canada, and most were eventually accepted.[76] This type of self-propelled barge was intended for ports, advance bases, and other points without developed facilities. Phoenix barges, otherwise known as Halberds, originated with War Office designs for breakwaters such as ones used at Arromanches, Normandy for the famed Mulberry Harbour and adapted by the Admiralty for employment with block ships, concrete caissons, jetties, and piers which formed artificial habours.[77] Mountbatten, with his background in combined operations and flair for the unconventional, was especially keen on the idea. This sequence of events outside Canada explains how Hamilton came to be chosen to build such specialized equipment as nesting barges for the Allied war effort.

The Phoenix nesting barge, though relatively cheap at $8,000 apiece, by its size and volume required large quantities of light grade steel plate and proper fabrication facilities. Hamilton Bridge, an established company with a stable workforce and considerable pre-war experience in bridgework and structural steel construction, received half of a $2.5 million order for three hundred steel nesting barges on British behalf.[78] Hamilton Bridge Company, named Hamilton Bridge Works Company prior to 1928, had operated from a large works at Caroline and Stuart Streets since the turn of the century. The company started out producing railway equipment and related infrastructure.[79] During the First World War, the company was involved in making steel components for the Imperial Munitions Board's steel shipbuilding program, for which expansion of plant and facilities had taken place. In the intervening years, Hamilton Bridge catered mostly to national and regional southern Ontario markets for large steel bridges and steel work associated with construction of office buildings and skyscrapers, with a head office in Hamilton and a second office in Toronto. In 1929, the company received a $1 million contract in regard to construction of the Bank of Commerce building in Toronto, one of the finest in the Dominion at the time.[80] During the first years of the Second World War, Hamilton Bridge switched over production facilities to construct armoured vehicle hulls. Workers went on strike for a wage increase in 1941 and local organizers of the United Steelworkers of America were later active in the company's wartime plants. Given this

[76] Staff Minute, J.W. Kenzies, 29 October 1943, TNA, A D M 116/4955. "British Contract is Being Sought By Ottawa Officials," *Hamilton Spectator* (6 January 1944).

[77] Staff Minute, A.C.N.S. (W), 17 November 1944, TNA, A D M 116/5116.

[78] Memorandum, D.B. Carswell to C D . Howe, 2 February 1945, L A C, Clarence Decatur Howe papers, MG 27 II B20 Vol. 2 File S-4(6). Advertisement, "Sectional Steel Nesting Barges," HPL, Clipping File "Hamilton - Industries - Hamilton Bridge Company."

[79] *The Hamilton Bridge Works Company Limited: engineers, designers, and contractors for railway bridges, railway turntables electric railway bridges, electric railway powerhouses and running sheds* (Hamilton, 1909) CIHM No. 99501.

[80] "Hamilton Company Gets Big Contract," HPL, Clipping File "Hamilton -Industries-Hamilton Bridge Company."

situation and Clarence Howe's aversion toward activist industrial workers, Hamilton Bridge was extremely fortunate to be chosen by the Department of Munitions and Supply for the nesting barges job. Under the contract, the steel barges were scheduled for delivery by September 1945. The British Ministry of War Transport made a further request for an additional 150 Phoenix nesting barges to be completed in late 1945, but Howe doubted whether enough steel plate was available in Canada.[81] At the time, Canadian shipyards were full with logistics support ships and transport ferries (Landing Ship Tank Mark 3) building for a British fleet heading to the Pacific, which possessed a higher priority on steel supplies than the nesting barge fabricated in sections.

The Japanese unconditional surrender in mid-August 1945, earlier than expected, interrupted British naval planning and halted Canadian production. Remaining steel nesting barges building in Hamilton were cancelled as part of general reductions in the British Admiralty's programme in Canada.[82] Under the contract terms, Hamilton Bridge was entitled to submit claims against cancellation and scrapping to the Department of Munitions and Supply and the crown War Assets Corporation. On 21 November 1945, the British Admiralty accepted eighty-seven Phoenix nesting barges at a book value of $779,979.41 toward financial settlement with the Canadian government.[83] The steel and materials for these barges, declared surplus at the company's Hamilton plant, were melted down and incorporated into civilian trade products for post-war office building construction. After several corporate acquisitions and reorganizations, Hamilton Bridge Company eventually became the third largest steel fabricator in Canada. The wartime naval contracts remain an important footnote to the corporate history of this once successful Hamilton company.

Among the most complicated and novel manufacturing challenges faced by companies in Hamilton was production of specific items of naval ordnance for installation on ships. Canadian companies lacked any experience in this field because naval guns or similar specialized equipment had never before been built in Canada and British firms met the limited requirements of the small Royal Canadian Navy. The situation remained the same until the threatened invasion of the United Kingdom in the summer of 1940 when the British Admiralty sent a technical mission to Ottawa to explore opportunities for educational orders with selected Canadian manufacturers in case British sources of supply were cut off.[84] The mission, headed by Vice Admiral Alfred Evans, immediately consulted officials in the Department of Munitions and Supply. As with Harvey MacMillan, Clarence Howe collected around him many leading Canadian business executives, celebrated in the financial press as dollar-a-year men and put into

[81] Memorandum, G.R. Heasman to C D . Howe "Steel Nesting Barges," 24 May 1945, L A C , Howe papers, MG 27 III B20 Vol. 2 File S-4(6).

[82] Department of Munitions and Supply Press Release No. 586A, 31 August 1945, QUA, William Clifford Clark fonds, Collection 2207 Box 15 File " U K Financing Arrangements Post V - J Day Discussions September 1945."

[83] Memorandum, P.F. Weiss " C M . A . B . Surplus Stores," 23 April 1947, L A C , RG 19 Vol. 408 File 101 -106-2.

[84] "History of the British Admiralty Technical Mission in Canada," D H H , File 82/29. "British Navy Places Faith in Industries of Dominion," *Hamilton Spectator* (10 October 1940).

key positions of oversight and coordination.[85] The most helpful to the navies were Frank Ross, a Vancouver businessman who was director general of the naval armament and equipment branch, and Harry Carmichael, director general of the gun production branch formerly vice president and general manager of General Motors of Canada in Oshawa. Earlier surveys by the Department of National Defence and the short-lived Defence Purchasing Board of available manufacturing capacity across Canada provided a good basis for finding suitable manufacturers with facilities and potential expertise to embark on naval ordnance production.[86] Such items required precise accuracy in machining and extremely close tolerances, not normally found in standard commercial work. Moreover, the demanding and comparatively small naval orders directly competed with production orders on behalf of the army and the growing aircraft industry which had already secured most of the best plants and factories.[87] To entice companies into naval-related work, Ross offered generous capital assistance for expansion or creation of necessary facilities as well as promises of follow-on orders for continuity of work. In turn, the British Admiralty Technical Mission furnished considerable advice, assistance, and contacts back with established armament firms in the United Kingdom such as Vickers Armstrong. It was somewhat self-serving on the part of the British because once the educational phase passed, the Admiralty wanted full production from Canada of selected naval ordnance, in order to release United Kingdom manufacturing sources for other purposes and to lessen dependence on variable supply from the United States. That the Canadians seemed willing to produce British-pattern equipment, in contrast to the Americans who pushed standardization on US designs, was significant. Consequently, orders were placed with Hamilton companies for fire-control instruments, torpedo components, gun mounts, and gun barrels intended for naval use.

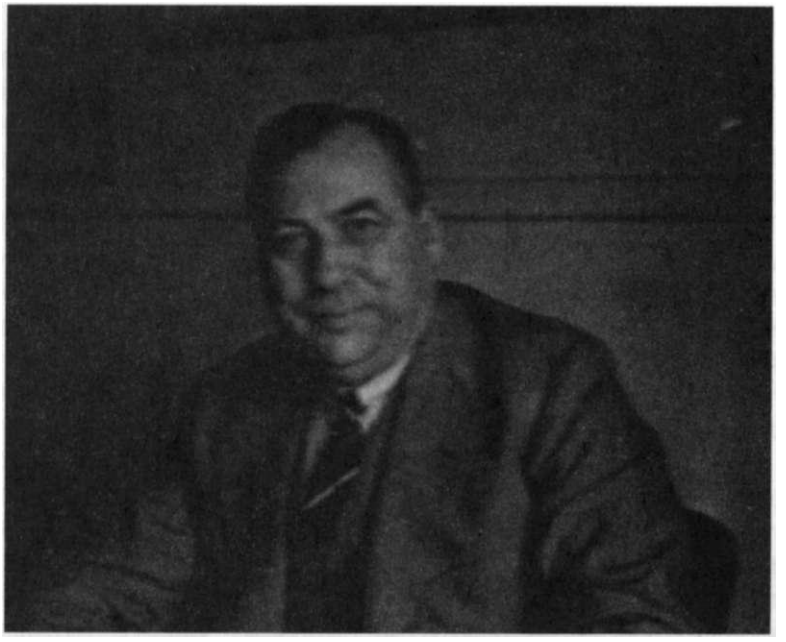
Ross and Evans selected Canadian Westinghouse for several special projects during the war. The first was a fuse keeping clock, a complex fire control apparatus comprised of roughly 5,000 separate parts machined to close tolerances and following the same principle as an aircraft predictor. A contract placed on 6 November 1940 gave Canadian Westinghouse $60,000 in capital assistance to start delivery at the rate of two per month beginning in March 1942, though technical problems and other higher priority jobs delayed the first production model by several months.[88] Despite the best efforts of John Read and his technical engineers, turnover in skilled machinists and the inability of most to master the technique demanded in such intricate work impeded progress. The basic difficulty, however, went deeper since Canadian Westinghouse tried to apply mass

[85] Program, "Anniversary Dinner of the Department of Munitions and Supply, Tuesday April 10th, 1945, QUA, Morely C. Tillotson fonds, Collection 2343.4 Box 1 File "Album-Department of Munitions and Supply 1943-1946." Robert Bothwell *and* William Kilbourn, *CD. Howe: A Biography* (Toronto, 1979), 131.

[86] A.G. Campbell, "Department of Munitions *and* Supply Gun Production Branch: History from Inception to December 1943," LAC, RG 28 Vol. 13 File 42.

[87] "Historical Record of the Evolution *and* Development of the Naval Armament *and* Equipment Br*an*ch of the Department of Munitions *and* Supply," LAC, RG 28 Vol. 29 File 4. Kennedy, Vol. 1, 229.

[88] A.E. Brewerton, "Progress of Fuse Keeping Clocks at Canadian Westinghouse," LAC, RG 24 Series D-1-c Acc. 1983-84/167 Vol. 2189 File 54200-1.



Frank Ross, director general of the Department of Munitions and Supply's naval armament and supply branch, placed contracts with Hamilton manufacturing firms for selected naval ordnance items and extended generous financial assistance for expansion of factories. (Queen's University Archives)

production techniques to an item normally made and assembled in a craft fashion. By September 1944, the production rate was three per month in two different versions, the Mark II and Mark III.[89] Such results after so much investment and effort were clearly disappointing. Even though the quantity produced increased marginally, quality remained a persistent problem. According to the British Admiralty, Canadian-built fuse keeping clocks "were not strictly up to the standard of those made in the U.K., but after each instrument had been overhauled by British firms, it was passed into service, and all proved satisfactory in use."[90] By comparison, Canadian Westinghouse-produced fuse keeping clocks were crude and required extra work at the point of destination.

The mixed record with the fuse keeping clock resulted, in part, from Canadian Westinghouse accepting a second technically challenging order, engines for the British-type 21" torpedo. Grinders, lathe operators, fitters, drill press operators, and assemblers were redirected onto torpedo work because the company was under enormous pressure to

[89] "Progress Report - Fire Control, corrected to 1st December 1944," LAC, RG 24 Series D-1-c Acc. 1983-84/167 Vol. 2119 File 5370-1 pt. 1.

[90] "Dominions: Gun Mounting and Fire Control Production, 1939-46," TNA, CAB 102/526.

deliver on time and in quantity.[91] Production of British-type torpedoes in the United States was far behind schedule and the approach to Canadian Westinghouse was somewhat of a desperate measure. Earlier forecasts of timely delivery of complete torpedoes at the rate of ten per week from E.W. Bliss and Company in New York City proved overly optimistic.[92] In fact, the whole American enterprise turned into a fiasco, and the British never seemed able to get the American company to live up to its promised deliveries. The US Navy, which had its own early technical problems with torpedoes, wanted the Admiralty simply to adopt US-types.[93] Instead, the British response was to pursue alternate supply in Canada. As a sub-contractor, Canadian Westinghouse eventually delivered 2000 engines and 900 unfinished engine drop forgings, but E.W. Bliss was as much as eighteen months behind assembly into complete torpedoes.[94] The 21" torpedo Mark VIII remained standard for most British warships of destroyer size or larger with such capability, though British expectations of getting significant production from North America went unrealized. Canadian Westinghouse, however, considered its torpedo engine a great technical success story and proudly claimed as much in the company newsletter distributed to workers.[95] In contrast, the less glamorous and troubled fuse keeping clock hardly received any mention.

Manufacture of gun mounts, a less sophisticated venture, was within the existing talents of another Hamilton company, Sawyer-Massey Limited. Though presenting unique technical challenges, gun mounts more closely resembled standard commercial fabrication and assembly. Sawyer-Massey was a local company of long standing tracing its business roots back to 1836; a factory on Wellington Street focussed its lines on threshers and steam tractors for agricultural usage as well as road-building equipment marketed under the brand name "Imperial."[96] During the First World War, Sawyer-Massey Limited became engaged almost wholly in war work related to artillery shell and other specialized manufacturing for the Imperial Munitions Board. The company was formally sold in 1927, but still operated under the name Sawyer-Massey to capitalize on existing domestic and export markets for its established products. After the Second

[91] "Wage Rates and Classifications," 19 September 1943, McMaster, Canadian Westinghouse Company fonds, Series 11 Box 26.

[92] Diary, 20 October 1941, National Maritime Museum, Greenwich, Vice Admiral James Wilfred Dorling papers, JOD/185/1. Letter, L.H. Cornell to E.F. Johnson "Inspection by Mr. E.S. Chapman and Mr. L.H. Cornell," 25 March 1942, National Archive and Records Administration, College Park (hereafter NARA), RG 74 Entry 1030 Records Relating to the Official History of the Bureau 1939-1953 Box 37 File "Torpedo Production for British Consumption."

[93] Memorandum, Chief Bureau of Ordnance to Secretary of Navy "Final Report of present Chief of Bureau of Ordnance," 9 December 1943, LC, Admiral William Henry Purnell Blandy papers, Box 1 File "Correspondence Official 1939-50." Robert Gannon, *Hellions of the Deep: The Development of American Torpedoes in World War* //(University Park, Pennsylvania, 1996).

[94] Memorandum, Deputy Secretary (Staff) Naval Service "Manufacture of Torpedoes in Canada," 7 May 1942, LAC, RG 24 Series D-1-c Acc. 1983-84/167 Vol. 2278 File C5720-100.

[95] "Power for the 'Tin Fish'," *Westinghouse Employees' Magazine* Vol. 3 No. 1, (March 1945), 3, 8.

[96] "Sawyer-Massey Limited 1836-1936," *Manufacturing and Engineering (September* 1936), HPL, Clipping File "Hamilton - Industries - Sawyer Massey Company."

World War began and Hamilton industries were again drawn into war work, Sawyer-Massey put aside normal production of road-making equipment and agricultural threshers in favour of naval armaments, the impetus coming from Frank Ross. Sawyer-Massey received a shared contract with the Canadian Pacific Railway Ogden shop for one thousand 12-pounder Mark IX mounts valued at $4,725,000, split evenly between Hamilton and Calgary, to be delivered within a year. The British Admiralty needed a gun to be put on defensively armed merchant ships and the reliable, simple 12-pounder posed few major manufacturing problems. Production technique for the mount was actually based upon the 2-pounder Mark VII, a lighter anti-aircraft gun known as the Pom Pom under construction in Kingston, and possessed many interchangeable parts. The first Sawyer-Massey mount was completed in late August 1941 and after inspection by Vice Admiral Evans was sent to the Canadian National Exhibition in Toronto for display.[97] Training of new workers and modest improvements to equipment and buildings allowed the company to get onto a regular delivery schedule, though the Ogden shop consistently delivered more gun mounts in the same time frame leading to an additional order for 250 being placed in Calgary instead of Hamilton.

In spite of output falling short of expectations on the first gun mount order, munitions procurement authorities still saw value in Sawyer-Massey for additional work. The main impediments at the Hamilton location were operating space and shop lay-out, both recognized as deficient for large-scale jobs. Ross extended $120,000 in capital assistance to Sawyer-Massey to make assembly arrangements more efficient and pushed the British Admiralty Technical Mission to place follow-on orders in Hamilton, either a continuation of the 12-pounder mount or a mount for a heavier gun.[98] Lack of business after the initial contract raised the prospect of losing the company to other pursuits after a reasonable calibre of skill and experience in naval ordnance work had been achieved. Thus, based on the 12-pounder internship, Sawyer-Massey moved up to producing 4" single Mark XIII mounts, 546 of which were delivered from the Hamilton war plant at a value of $8,695,000. The manually-sighted 4" single was the main gun on frigates and corvettes, both Canadian and British. Engineers at Sawyer-Massey made numerous modifications to the mount to speed up production and save on critical materials.[99] While not among the best firms engaged on naval ordnance manufacture in Canada, Sawyer-Massey was reliable and consistently delivered in much the same way as the low-technology mounts being produced. The company received upwards of $670,000 in capital assistance for facilities and equipment declared surplus by the Department of

[97] "Vice Admiral Evans Praises Feat of Hamilton Industry," *Hamilton Spectator* (20 August 1941), HPL, Clipping File "Hamilton - Industries - Sawyer Massey Company." Letter, A.O. Thormahlen to W.D. Dickie, 25 August 1941, Naval Museum of Alberta, Calgary, Harry Connolly collection.

[98] Letter, Frank Ross to Captain G.M. Hibbard "Minutes of Meeting held in the office of the Director General, Naval Armament and Equipment, on Friday, April 24th, 1942 at 3 o'clock to discuss the policy of armament production in Canada," 2 May 1942, LAC, RG 24 Series D-1-c Acc. 1983-84/167 Vol. 2189 File 5420-1 pt. 1.

[99] "Mk. XXIII Mount Modified for Further Improvement in Performance," *Canadian Machinery and Manufacturing News* Vol. 54 (December 1943), 163-166, University of Guelph Library Archival and Special Collections, Guelph, Massey-Harris (Massey Ferguson) Company Limited fonds, Folder MH 67.

Munitions and Supply. Sawyer-Massey returned to civilian manufacturing shortly before the end of the war and subsequently merged to become a subsidiary of Hamilton Bridge Company. Credits from excess profits taxes and renegotiation of wartime contracts in subsequent years were transferred to the latter company. In addition to the manufacture of mounts, Hamilton also became a key producer of barrels for a specific type of standard gun central to the war at sea.

Otis-Fensom Elevator Company, located in Hamilton, became the leading plant in Canada for production of 40-mm Bofors gun barrels. The Bofors was a Swedish-designed medium anti-aircraft gun, adopted by the British, American, and Canadian armed services during the war as the mainstay of close range protection against enemy aircraft. Arrangements for production in the United States and Canada were well underway before a formal agreement for manufacturing rights in North America was signed with A.B. Bofors of Sweden in June 1941.[100] In the United States, the York Lock and Safe Company of Pennsylvania and subsequently Chrysler Corporation in Detroit entered into mass production of Bofors gun barrels and mounts, delivering an astounding 22,300 complete outfits of various configurations for British and American naval use. Meanwhile, in Hamilton, on the basis of army contracts, Otis-Fensom constructed a seven and half acre crown-financed ordnance plant dedicated to manufacture mostly of Bofors gun barrels beside its existing factory on Victoria Avenue and Feme Street. Although Chrysler's Detroit factory was larger and achieved higher rates of Bofors production, the Hamilton ordnance plant was billed as the largest of its kind in the British Empire.[101] Otis-Fensom, the Canadian subsidiary of Otis Elevator Company of New York, came into existence out of a 1905 merger with a strong competitor elevator company run by George Fensom in Toronto. Corporate affairs were run out of Toronto until 1927 when Fensom retired and the erstwhile works manager W.D. Black took over as president; manufacturing facilities in Hamilton expanded to meet steady demand for elevators and escalators as well as temporary diversion into artillery shell production during the First World War.[102] Otis-Fensom, now headquartered in Hamilton, experienced considerable slowdown in the Canadian domestic elevator market during the Depression years (in March 1933, no elevator sales were recorded throughout Canada) which required strict financial stringency, deferred capitalization of plant, and deep reductions in the company's work force. Thus, the opportunity for war work outside of

[100] "History of the 40 mm Bofors Gun," NARA, RG 74 Entry 1030 Records relating to Official History of the Bureau 1939-1953 Box 29 File "40 mm AAG (Bofors)." Buford Rowland and William B. Boyd, *U.S. Navy Bureau of Ordnance in World War II* (Washington, DC, 1953), 224. In spite of the licensing agreement, the company in Sweden remained largely ignorant of wartime developments and technical changes made to the Bofors design in North America and the United Kingdom. "Report on Visit of Admiralty Officers to A.B. Bofors Factories in Sweden," March 1946, LAC, RG 24 Series D-1-c Acc. 1983-84/167 Vol. 2192 File 15428-4.

[101] *On the Industrial Front with the Ordnance Division* (Hamilton, 1941), HPL. *War Production* (New York, 1947), 78-84, Otis-United Technologies Company Archives, Farmington, Connecticut.

[102] "A Brief History of Otis Elevator Company (U.S.A.) and Otis Elevator Company Limited (Canada)," 1951, 10.

A propaganda poster used to boost productivity and connect workers to the war effort at the Otis-Fensom Elevator Company's naval ordnance plant. This Hamilton war plant was the largest producer of barrels for the Bofors 40 mm anti-aircraft gun in the British Empire and second in North America. (Hamilton Public Library)

normal peacetime industrial pursuits was eagerly embraced to restore the company's coffers.

Under Black's stewardship, Otis-Fensom essentially gave over most of its managerial and technical expertise to war contracts on behalf of the Dominion government. W.J.W. Reid, the works manager who later succeeded Black as company president in June 1947, became wartime head of Otis-Fensom's ordnance division. The first Canadian-manufactured gun was delivered on 21 August 1941 with much fanfare, a mere fourteen months after breaking ground for the new ordnance plant.[103] As the recipient of almost $14 million in capital assistance from the Department of Munitions and Supply, Otis-Fensom worked up regular deliveries from Bofors production, in part through extensive use of semi-skilled labour on broken-down tasks. Under the fixed price contract, the company accepted a profit of 5 per cent or $8.35 per barrel.[104] Army-type and naval-type Bofors guns were for all practical purposes the same, though the electrically-powered twin configured naval mounts manufactured by National Railways Munitions Limited in Montreal were substantially different. After barrels were matched up with mounts, trials were conducted at a proofing range on Hamilton beach, after which inspections and packing took place at Otis-Fensom facilities for shipment eastward to Montreal.[105] For naval use, the ordnance plant completed 500 Mark I guns for Mark III mounts, 1000 spare Mark I barrel assemblies, 500 Mark XI spare barrels, 100 Mark XI spare barrel assemblies, as well as refurbishing many army guns for the navy. The company and president Black prided themselves on looking after the interests of nearly 5,000 wartime employees, but attempts to introduce a closed shop by one industrial union in 1943 were vigorously opposed by upper management.[106] By this date, expansion gave way to contraction, a situation detrimental to labour's ability to bargain from strength. Lessened demand for the Bofors guns as the nature of operations shifted resulted in few follow-on contracts, reduced production schedules, and letting go of workers. On the question of lay-offs from the Otis-Fensom ordnance plant and other area factories engaged in war work, the Hamilton Labour Council declared that the "Government has made no provisions for the active participation of the labour movement in assisting the realization of proper reconversion, adjustment of lay-offs and protection of our living standards."[107] Workers at Otis-Fensom Elevators' ordnance plant were left to deal as best they could with the abrupt termination orders.

Returning to the staple business of elevator manufacturing, Otis-Fensom's board

[103] "Hard-Hitting Bofors Rolls from Great Assembly Line; Believed Canadian Record," *Hamilton Spectator* (21 August 1941), HPL, Clipping File "Hamilton Industries - Otis-Fensom Elevator."

[104] Letter, W.C. Clarke to B.G. Mclntyre, 20 July 1942, LAC, RG 19 Vol. 3984 File N-2-5-2.

[105] Memorandum, Captain F.C. Flynn to Director of Naval Ordnance Admiralty "Firing Trials of 40 mm Bofors (Army type Mark III modified for Naval service)," 20 March 1943, LAC, RG 24 Series D-1-c Acc. 1983-84/167 Vol. 2189 File 5420-240. Houghton, 133-134.

[106] *A Statement issued for the Information of Hamilton Works Employees by the Management* (Hamilton, 1943), HPL.

[107] Minutes, Regular Meeting Hamilton Labour Council (CCL), 31 May 1945, McMaster, Hamilton and District Labour Council fonds, Series 3 Minute Book "6 October 1941-31 May 1945."

of directors assessed productive capacity required for the post-war market and elected not to purchase the ordnance plant building from the Dominion government. A short time later, the Studebaker Corporation transferred its operations from Windsor to Hamilton and acquired the abandoned plant as an assembly facility for its bold entry into the Canadian automobile market, the first automaker to set up business in Hamilton.[108] Otis-Fensom Elevator Company stands out as a good example of how a Hamilton-based commercial enterprise switched over wholeheartedly to war production necessary for prosecution of the war at sea and consequently made a small mark on the world stage.

Hamilton, through its industries and productive efforts, was one of several cities far from the sea in central Canada that made a measurable contribution to the material side of the naval war. Its geographical position on Lake Ontario along major transportation routes and proximity to the nation's industrial heartland leveraged strengths in the steel, manufacturing, and electrical sectors. These key industries were essential to meeting the technical requirements of modern navies and merchant marines. For the most part, government procurement authorities placed war contracts with existing private companies capable of expanding facilities and increasing workforces in order to meet wartime production. Several notable Hamilton firms, both Canadian-owned and branch plants of American companies, put aside normal peacetime business in favour of direct war-related activities. Steel plate from Hamilton blast furnaces and rolling mills as well as important components such as forged boilers and manufactured generators went into ships; outfitting of minesweepers and fabrication of barges took place on lands along Hamilton harbour; and, Hamilton factories produced selected pieces of naval ordnance including fire control instruments, torpedo components, gun mounts, and anti-aircraft gun barrels. This type of work was often new to the companies involved and entailed quantity production in a remarkably short period of time under war conditions. Products from Hamilton industry were destined for Canadian and British end-use against the common enemy at sea. Behind the struggle against the dreaded U-boat and the passing of plodding convoys under escort through the waters of the North Atlantic were the quiet efforts of workers, companies, and procurement officials in Hamilton and elsewhere to furnish the tools of war. International, continental, and national contexts influenced local developments in Hamilton as the city became integrated into the larger national war economy that contributed to execution of broad allied strategy.

Despite Hamilton's notional wartime production record in the naval field, Canada still remained an immature maritime nation with limited naval aspirations according to Mahan's criterion. A country vast in resources and blessed by geography possessed few reasons to pursue meaningful sea power and the supporting industrial base it required, except when major war demanded. Rather, Canada was a coastal state with maritime interests. The remarkable wartime expansion of naval forces into a sizeable navy of emergency type warships and temporary merchant marine relied mostly on residual economic potential within the nation at selected urban areas of industrial activity.

[108] "Bright Hamilton Future as Industries Expand," *Hamilton Spectator* (nd), HPL, Clipping File "Hamilton Industry 1946-1956."

Hamilton received naval-related industrial work because suitable productive facilities and labour sources already existed there. Existing private civilian enterprises were harnessed to temporary wartime needs. The limitations to what could be achieved were apparent. Quality of finished materials to naval specifications was sometimes problematical, as demonstrated by the complicated Admiralty fuse keeping clock produced at Canadian Westinghouse and Sawyer-Massey's under-performance in producing gun mounts. Moreover, Canadian adherence to British designs, patterns, and measurements as the basis for production contradicted prevailing North American manufacturing practices in Hamilton plants, especially when American ones were perhaps more suitable. This was most evident in the selection of engine types and manufacturing of electrical fittings. While industrial Hamilton possessed indigenous capacity to make just about any moderately technical item, the selection of British types and equipment resulted in inferior technology with little application beyond immediate wartime needs. Industries in Hamilton and elsewhere in Canada were burdened with tooling up and creating manufacturing capacity, for which no future could be foreseen in the field of specialized naval equipment. Though the war was lucrative in terms of profits and employment for a short period of time, Hamilton manufacturers in the precision machining and electrical fields confronted an abrupt transition back to civilian lines of production once hostilities ended. The steel companies, on the other hand, used new facilities and wartime plant to position themselves in post-war markets requiring increased demand for commercial steel. Thus, the naval wartime contracts accelerated the pre-eminence of steel in Hamilton's overall economic well-being to the detriment of a diversified manufacturing mix. Most importantly, Hamilton still languished in the shadow of Toronto, whose efforts in the fields of war production, shipbuilding, and naval-related manufacturing outperformed the steel city at the end of Lake Ontario. The scale of this achievement in Ontario's largest city and industrial heart deserves further treatment in a separate article.