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CONSUMPTION OF SCRAP IRON AND STEEL IN CANADA, 1924-1940

Scrap is one of the important primary materials of the iron and steel industry. In the manufacture of steel and of iron castings it replaces pig iron ton for ton while in rolling and stamping mills substantial tonnages are re-rolled and re-shaped into a variety of commercial products. More than 1.3 million tons of scrap iron and steel were used in Canadian industry in 1940, this tremendous tonnage assuming special significance in war-time from the standpoint of conservation as well as from the fact that it would require about 3 1/2 million tons of iron ore, most of which must be imported, to supply this amount of new metal.

Scrap is anything of iron and steel that is the waste or by-product of manufacturing or that has been discarded on account of failure, obsolescence or other factors that have rendered it unfit for further use in its present form. It is rails that have been discarded, automobiles that have been scrapped, freight cars and locomotives that have been withdrawn from service, machines that have outlived their usefulness, turnings from machinery operations, waste from stampings, and so on.

Much of the scrap originates within the consuming works and is commonly called "home" scrap. This consists of crop ends of billets, bars, rails, etc., trimmings from plates and sheets, defective ingots and castings, machine-shop turnings and borings and a variety of other forms arising from the manufacturing operations. This material which never reaches the open market accounts for about 35 to 40 per cent of all scrap charged to furnaces.

Other scrap originates across the country, in a variety of fabrication plants, in the yards of transportation companies, in shipyards, at mines, in auto wrecking establishments, etc., or is collected by peddlers who go from door to door in the cities and in country districts. Nearly every town or city has its junk yards piled high with old autos, stoves, boilers and a multitude of motley items all of which must be carefully sorted before being returned to industry. The sorting and grading is a highly specialized business and only a few yards in Canada are equipped with facilities for this purpose. This material is eventually bought by the consumers and is commonly designated as "purchased" scrap which accounts for about 60 to 65 per cent of all scrap charged to furnaces.

Some scrap material, of course, can be re-formed and used again without other than mechanical operations. Washers, for example, may be stamped from waste sheet or plate or old rails may be slit and re-rolled into bars for concrete reinforcement and other purposes. But most of the scrap must be re-melted usually with the addition of new pig iron and as such it replaces new iron and is just as good.

About 72 per cent of the scrap iron and steel which is recovered in Canada finds its way into steel-making furnaces. In 1940 the amount so used was 1,323,501 net tons of which 541,582 tons were home scrap and 781,919 tons were purchased.

While steel can be made in an open-hearth furnace from a charge consisting of either 100 per cent pig iron or 100 per cent scrap or a combination of both, by far the most widely used practice is to use both pig iron and scrap iron in the charge. A frequently used ratio is 55 per cent scrap and 45 per cent pig iron. In 1940, Canada's steel furnaces used 1,323,501 tons of scrap and 1,083,421 tons of pig iron. The production of steel ingots and steel castings in 1940 totalled 2,254,680 net tons which amounted to approximately 85 per cent of the rated capacity of the furnaces available for use during the year. With the new furnaces which were added during 1940, the steel capacity at the year-end was close to 2 3/4 million net tons annually.

Iron foundries use about 20 per cent of all scrap recovered for use in Canada. Here the scrap is charged into cupolas or malleable furnaces along with cold pig iron, loses its identity in the melt and emerges as new iron to be cast into various forms. There are about 350 iron foundries distributed across Canada and these furnish local markets for material gathered by the scrap dealers across the country. In 1940 a total of 375,000 net tons of scrap were used in iron foundries.

In iron blast furnaces some scrap is charged with iron ore, coke and limestone but it usually forms a very small part of the charge. Sometimes when it is desired to step up the production of pig iron, the furnace operator increases the scrap content in the charge, as the scrap is nearly pure metal whereas the ore averages only about 51 per cent iron content. In 1940, Canada's four blast furnace operators used 28,691 net tons of scrap iron and steel.

In the manufacture of ferro-alloys scrap is the most important source of iron. In 1940 a total of 45,920 net tons of old iron and steel were used in ferro-alloy furnaces, and 9,427 tons were used in artificial abrasives furnaces where ferrosilicon was recovered as a by-product.

In rolling mills substantial tonnages of old rails and axles are re-rolled or forged into a variety of shapes, such as, fence posts, bars for concrete reinforcement, light angles for bedsteads, etc. In 1940 the consumption by rolling mills amounted to 46,050 net tons of which 4,319 tons were home scrap from the producers' own works and 41,731 tons were purchased from outside sources.

Imports of scrap iron and steel totalled 415,981 net tons in 1940 compared with 177,564 tons in 1939, while exports amounted to only 3,261 tons compared with 93,837 tons in the preceding year.

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Table 1 - SCRAP IRON AND STEEL USED IN CANADA, 1924 - 1940

Year	In iron blast furnaces	In steel furnaces	In ferro- alloy furnaces	In rolling mills	In iron foundries	In artificial abrasives furnaces	TOTAL
(Tons of 2,000 pounds)							
1924 ...	32,732	398,705	11,000	28,634	242,004	4,458	717,583
1925 ...	35,782	452,343	13,000	32,527	238,264	4,600	776,516
1926 ...	56,783	451,262	16,262	58,461	245,004	4,603	832,415
1927 ...	48,294	522,681	12,000	39,003	264,866	4,579	891,423
1928 ...	62,259	706,515	11,516	77,771	310,892	5,505	1,174,458
1929 ...	69,390	824,628	29,174	104,815	251,327	9,896	1,289,230
1930 ...	40,218	641,818	15,018	60,552	278,023	6,887	1,042,516
1931 ...	18,225	449,624	5,331	55,512	226,090	3,733	758,515
1932 ...	4,642	301,506	5,126	25,990	145,516	1,242	484,022
1933 ...	12,184	345,326	17,936	22,032	115,322	4,499	517,249
1934 ...	13,956	538,360	15,208	27,757	163,002	5,941	764,224
1935 ...	34,400	718,768	29,738	37,770	202,091	5,679	1,028,446
1936 ...	22,832	777,268	42,336	40,135	226,396	5,987	1,114,954
1937 ...	18,443	1,003,791	34,405	51,222	306,872	10,025	1,424,758
1938 ...	21,418	747,340	22,328	37,023	247,936	5,651	1,081,696
1939 ...	21,204	927,018	30,736	36,385	268,534	5,993	1,299,870
1940 ...	28,691	1,323,501	45,920	46,050	375,000	9,427	1,828,589
Per cent of total in 1940.	1.6	72.4	2.5	2.5	20.5	0.5	100.0

Table 2 - SCRAP IRON AND STEEL USED IN STEEL FURNACES IN CANADA, 1924 - 1940

Year	Companies' own make	Purchased	Cost at works of purchased scrap
(Tons of 2,000 pounds)			\$
1924	168,861	229,844	3,881,156
1925	186,160	266,183	3,727,042
1926	193,493	257,769	3,462,775
1927	229,753	292,928	3,612,683
1928	298,804	407,711	4,793,502
1929	315,243	509,385	5,891,000
1930	268,696	373,122	4,365,184
1931	178,774	270,850	2,950,255
1932	109,976	191,530	1,591,137
1933	106,322	239,004	1,418,420
1934	216,574	321,786	3,029,549
1935	325,317	393,341	3,694,029
1936	297,193	480,075	5,007,161
1937	366,919	636,872	8,371,995
1938	284,562	462,778	5,782,857
1939	372,413	554,605	7,227,009
1940	541,582	781,919	12,421,527

Table 3 - SCRAP IRON AND STEEL AND PIG IRON USED IN STEEL FURNACES IN CANADA,
1924 - 1940

Year	Scrap	Pig iron	Per cent scrap
		(Tons of 2,000 pounds)	
1924	398,705	420,924	48.6
1925	452,243	483,766	48.3
1926	451,262	513,699	46.8
1927	522,681	577,443	47.5
1928	906,515	782,647	53.7
1929	824,628	853,303	49.1
1930	641,818	583,029	52.4
1931	449,624	367,430	55.0
1932	301,506	119,785	71.5
1933	345,326	175,797	66.3
1934	538,360	394,627	57.7
1935	718,658	499,824	59.0
1936	777,268	584,912	57.1
1937	1,003,791	747,747	57.3
1938	747,340	634,920	54.1
1939	927,018	733,096	55.8
1940	1,323,501	1,083,421	55.0

Table 4 - SCRAP IRON AND STEEL USED IN IRON FOUNDRIES IN CANADA, 1924 - 1940

Year	Tons of 2,000 pounds	Cost at works
		\$
1924	242,004	3,933,109
1925	238,264	3,875,690
1926	245,044	4,194,369
1927	264,866	4,294,229
1928	310,892	4,895,108
1929	251,327	4,949,686
1930	278,023	4,140,522
1931	226,090	2,637,474
1932	145,516	1,569,002
1933	115,322	1,088,919
1934	163,002	1,722,742
1935	202,091	2,137,224
1936	226,396	2,523,272
1937	306,872	4,319,211
1938	247,936	3,440,200
1939	268,534	3,680,584
1940	375,000	(a)

(a) Not yet available.

Table 5 - SCRAP IRON AND STEEL AND PIG IRON USED IN IRON FOUNDRIES, 1924 - 1940

Year	Pig iron	Scrap (Tons of 2,000 pounds)	Per cent scrap
1924	238,330	242,004	50.4
1925	270,021	238,264	46.9
1926	298,968	245,044	45.0
1927	280,206	264,866	48.6
1928	309,635	310,892	50.1
1929	383,958	251,327	39.6
1930	264,208	278,023	51.3
1931	173,181	226,090	56.6
1932	85,918	145,516	62.9
1933	68,677	115,322	62.7
1934	106,266	163,022	60.5
1935	135,650	202,091	60.0
1936	149,019	226,396	60.3
1937	196,208	306,872	60.0
1938	140,856	247,936	64.8
1939	150,332	268,534	63.5
1940	185,000	375,000	65.8

Table 6 - SCRAP IRON AND STEEL USED IN IRON BLAST FURNACES IN CANADA, 1924 - 1940

	Quantity (net charge) (Tons of 2,000 pounds)	Cost at works \$
1924	32,732	376,680
1925	35,782	390,675
1926	56,783	619,488
1927	48,294	490,163
1928	62,259	577,504
1929	69,390	664,202
1930	40,218	354,158
1931	18,225	147,180
1932	4,642	27,397
1933	12,184	92,421
1934	13,956	108,966
1935	34,400	300,131
1936	22,832	177,923
1937	18,443	159,825
1938	21,418	175,648
1939	21,204	192,362
1940	28,691	333,768

Table 7 - SCRAP IRON AND STEEL USED IN ROLLING MILLS IN CANADA, 1924 - 1940

Year	Companies' own make	Purchased	Cost at works of purchased materials
	(Tons of 2,000 pounds)		\$
1924	15,154	11,603	442,907
1925	32,527	472,596
1926	5,777	52,684	820,384
1927	9,335	29,668	385,640
1928	9,947	67,824	1,046,142
1929	35,849	68,966	1,044,318
1930	7,171	53,381	813,824
1931	6,764	48,748	768,822
1932	4,533	21,457	236,108
1933	4,300	17,732	195,613
1934	3,875	23,882	253,403
1935	3,591	34,179	401,514
1936	5,899	34,236	434,752
1937	3,842	47,380	848,807
1938	3,088	33,935	585,992
1939	3,979	42,406	815,291
1940	4,319	41,731	816,944

Table 8 - SCRAP IRON AND STEEL USED IN THE MANUFACTURE OF FERRO-ALLOYS IN CANADA, 1924 - 1940

	Tons of 2,000 pounds	Cost at works
1924	11,000	123,000
1925	13,000	139,000
1926	16,262	200,678
1927	12,000	140,000
1928	11,516	130,000
1929	29,174	313,272
1930	15,018	168,684
1931	5,331	46,624
1932	5,126	27,784
1933	17,936	124,423
1934	15,208	118,580
1935	29,738	213,102
1936	42,356	375,858
1937	34,405	425,835
1938	22,328	231,285
1939	30,736	269,462
1940	45,920	554,102

Table 9 - SCRAP IRON USED IN THE MANUFACTURE OF ARTIFICIAL ABRASIVES IN CANADA,
1924 - 1940

Year	Tons of 2,000 pounds	Cost at works \$
1924	4,458	57,121
1925	4,600	58,000
1926	4,603	53,052
1927	4,579	47,914
1928	5,505	46,937
1929	9,896	112,366
1930	6,887	76,903
1931	3,733	28,910
1932	1,242	7,385
1933	4,449	32,559
1934	5,941	51,084
1935	5,679	41,000
1936	5,987	49,089
1937	10,025	107,827
1938	5,651	51,155
1939	5,993	47,996
1940	9,427	108,351

Table 10 - IMPORTS INTO CANADA OF SCRAP IRON AND STEEL, 1926 - 1940

Year	Tons of 2,000 pounds	\$
1926	85,945	953,045
1927	102,126	1,234,124
1928	152,972	1,675,435
1929	121,294	1,367,179
1930	119,074	1,222,940
1931	76,083	662,010
1932	60,717	385,073
1933	46,364	307,086
1934	58,948	411,360
1935	104,820	618,801
1936	65,636	498,800
1937	174,907	2,063,838
1938	99,380	849,263
1939	177,584	2,053,687
1940	415,981	5,786,265



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Table 11 - EXPORTS FROM CANADA OF SCRAP IRON AND STEEL, 1924 - 1940

Year	Tons of 2,000 pounds	\$
1926	64,844	646,644
1927	77,876	782,407
1928	86,687	954,363
1929	138,372	1,583,830
1930	43,446	416,579
1931	26,844	172,144
1932	20,068	104,933
1933	143,577	880,821
1934	92,518	691,454
1935	115,038	1,024,681
1936	224,160	2,289,814
1937	143,977	1,954,698
1938	85,122	1,008,992
1939	93,837	1,020,642
1940	3,261	47,336