


PROMOTION SECTION  
SECTION DE LA PROMOTION

project report

A REVIEW OF THE MARKET FOR  
CHAIN FOR POWER TRANSMISSION

 **STEVENSON & KELLOGG, LTD.**

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CHAIN FOR POWER TRANSMISSION

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prepared for:

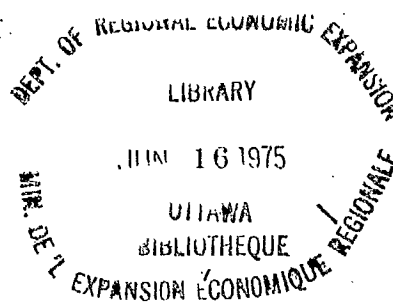
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INTRODUCTION AND SUMMARY

A. INTRODUCTION

This study examines the potential market for Chain for Power Transmission in Canada.

The objective is to evaluate potential manufacturing opportunities. These can then be evaluated in greater detail by prospective entrepreneurs.

B. SUMMARY

The Canadian market for chain for power transmission is about \$18 million. Since 1967 there has been relatively little overall growth in the market, although there have been wide fluctuations from year to year.

There are six basic types of chain, each of which serves different markets and requires different manufacturing techniques. About 27% of all chain is manufactured in Canada and 35% is imported from the U.S. with duties of 15% or 17 1/2%.

The most significant type in terms of volume sizes are for bicycles and conveyors.

Prices have deteriorated due to imported products believed to be of a quality comparable to products of Canadian or U.S. manufacturers.

There is a proliferation of suppliers and brands of roller chain in Canada. The principal is Link Belt.

In general, we can say that constraints outweigh strengths in any consideration of establishing a new facility in Canada.

## II

### CONCLUSIONS

1. There is no segment of the market which will provide an attractive base for an expansion of current production facilities.
2. The major, well established, companies have a strong grip on the market.
3. Brand preference is a significant factor in the purchase decision.
4. A businessman attempting to break into the market would be obliged to specialize in one of two ways:
  - ▶ concentrate on high quality, custome designed, highly engi-  
needed products. This would involve high design capability  
and small production runs.
  - ▶ concentrate on "off the shelf" type of chain. This would in-  
volve longer and less specialized production runs.
5. The size of the Canadian market does not allow for economic  
"volume" production.
6. The diseconomies of the low volume production are not sufficiently  
offset by the import tariffs.

### III

#### COMMODITY DESCRIPTION

There are six basic types of steel chain used for power transmission, with variations within each type due to steel or special shapes for specific applications.

##### A. ROLLER CHAIN

This is by far the most important type of power chain. There are four variations of the basic type:

- ▶ single width;
- ▶ multiple width (1, 2, 3, 4, etc.);
- ▶ hollow pin;
- ▶ double pitch.

These sub-types are based on the basic single row roller chain which is assembled from side bars, rollers, bushings and link pins that may be rivetted or held together with cotter pins.

Sizes are available in pitches (the distance between link pins) from 1/4 through 3 inches.

Most roller chain is manufactured to precise dimensional standards. The predominant standards in Canada are American (ANSI). However, British standards are also available.

Applications cover a wide range of equipment such as:

- ▶ engineering power transmission equipment;
- ▶ conveyors of all types;

- ▶ Bicycles (bicycle chain consists of two special sizes and quality distinct from roller chain for engineering application);
- ▶ Motorcycles (heavier than bicycle chain and made to higher strength and quality standards).

B. OFFSET SIDEBAR CHAIN

Steel offset sidebar chain differs from roller chain in respect to the sidebar fabrication. This type is used mainly as drive chain on construction machinery.

C. DETACHABLE CHAIN

These chains are made up of cast links, malleable iron or steel, designed so that each link can be attached and detached from other links without pins to form a detachable chain. Detachable chains have their greatest application in agricultural machinery and conveyor equipment. We would include in this group the large link and block chains that are cast -- frequently in special alloys -- to withstand adverse conditions of temperature and pull.

D. PINTLE CHAIN

Pintle chains are similar to the detachable type except the links are more precisely fabricated (either cast or welded construction) and are joined together with a pin.

E. INVERTED-TOOTH SILENT CHAIN

These are special chains for engineered product application where high speeds and high loads are encountered. The chains are assembled from plate steel link shaped with inverted gear teeth on one side and a straight edge on the other side. Typical applications are power drives on power cranes, machine tools and automobile camshaft drives.



F. BEAD CHAIN

Bead chains consist of alternate ball and pin links, interlocked loosely together. For industrial purposes, they are limited to applications of slow speed drives and light loads under 75 pounds. Typical product applications are television and radio tuners, computing devices, display drives, venetian blinds.

## IV

### MARKET

#### A. TOTAL CANADIAN MARKET

The total Canadian Market for power transmission and conveyor chain is estimated currently at just under \$18 million per year. (See Appendix A) The market is growing at an average rate of 4% per year. Peak years were reached in 1967 (\$16 million) and 1969 (\$17.6 million). There had been consistent growth from 1961 until 1968. The set backs in 1970 and 1971 appear temporary because current 1972 shows signs of finishing close to the 1969 peak.

Chain represents about 10% of the Canadian market for power transmission equipment whose total growth patterns have been very similar to chain. (See Appendix B)

#### B. CANADIAN PRODUCTION

Canadian production of "sprocket chain and drive chain" was last reported in 1970 at \$4.3 million and is likely to reach \$4.7 million in 1972. This represents about 27% of the total Canadian market for chain.

Canadian production reached a maximum of \$5.6 million in 1967 after a steady growth pattern from 1961. The overall growth in the total market is being achieved through growth in imports, rather than Canadian production.

The percentage of market that is made in Canada is larger in detachable (cast links) and pintle (cast or weldment links) chains compared to chains of the roller and silent type. Furthermore, a rough estimate of how the total chain market is split into the six types has been made on a basis of various product applications. These percentages combine to produce an estimate of Canadian manufacture by chain type, as follows:

	<u>Chain Type</u>	<u>Total Cdn. Market</u>		<u>Made in Canada</u>	
		<u>%</u>	<u>\$ Mill.</u>	<u>%</u>	<u>\$ Mill.</u>
1.	Roller Chain	75	13.2	20	2.6
2.	Offset- sidebar	2	.3	20	.1
3.	Detachable (Cast Link)	10	1.8	80	1.4
4.	Pintle Chain	5	.9	50	.5
5.	Silent Chain	7	1.2	10	.1
6.	Bend Chain	1	.2	50	.1
		<hr/>	<hr/>	<hr/>	<hr/>
		100%	\$17.6	27%	\$4.7

Chains for bicycles and motorcycles are not made in Canada. The bicycle chain market in Canada (part of \$13.2 million above) is estimated roughly at \$1/2 million or only 4% of the total roller chain market. All motorcycles in Canada are imported and the replacement market for chain is a negligible factor.

### C. IMPORTS

Of the total Canadian market for power and conveyor chain, 73% is imported. The trend is generally upward with an 8 year average growth of 10% per year. Sources of imports are currently as follows:

	<u>%</u>	<u>\$ Million</u>
United States	46	6.0
United Kingdom	20	2.6
Japan	20	2.6
West Germany	10	1.3
Others	4	.5
	<hr/>	<hr/>
	100%	\$13.0 Million

D. EXPORTS

Exports of chain from Canada are negligible.

E. CONSUMPTION GROWTH

Figures on consumption by regions are not available. However, chain is primarily associated with the machinery and equipment manufacturing areas in Canada.

Overall growth has averaged almost 10% over the last 8 years.

CANADIAN PRODUCTIONA. MAJOR PRODUCERS

The evidence is not clear concerning which companies are manufacturing chain in Canada. To some extent, this depends on the type of chain. For example, detachable chain made from cast or welded links requires different processes from roller chain. Cast link chain is made by several Canadian foundries but not necessarily as a major component of their production.

Roller chain, on the other hand, is a precise product, frequently involving proprietary design features, and conforming to stringent standards of dimension and strength.

There are two companies manufacturing roller chain in Canada. They are:

- ▶ Link-Belt Division of FMC of Canada Ltd.  
(Toronto, Ontario)
- ▶ Morse Division of Borg-Warner Canada Ltd.  
(Simcoe, Ontario)

Other well known brands include Renold, Rex Chainbelt and Diamond but none of these companies manufacture chain in Canada. Renold is a U.K. company and the original manufacturer of precision roller. Rex Chainbelt is a large U.S. corporation with chain as only one of many lines of manufacture. Diamond Chain is a U.S. company manufacturing roller chains of a high quality.

B. TYPE OF PRODUCTION

Chain for power transmission is marketed either through distributors who stock a wide range of related products in the power trans-

transmission field or sell directly to original equipment manufacturers (O.E.M.'s) - e.g. conveyor manufacturers.

The more common sizes (1/2" to 1" pitch) are produced to maintain inventories for quick service. In the case of larger sizes which tend to be unique assemblies of common interchangeable parts, stocks of parts would be maintained by the manufacturer and the assemblies made to order (e.g. multiple widths, odd lengths, etc.)

Production equipment would include special metal working machines to punch and form links, centerless grinders to make rollers to close tolerances in high volume, and heat treating equipment to finish the parts. Assembly would include automatic equipment to assemble press-fit components and rivet or forge pins.

This type of production would be classed as capital intensive with engineering back-up skills required to ensure quality standards and solve problems of production and product development.

#### C. CONCLUSION

There has been considerable pressure during the past few years to reduce selling prices. Prices are reported to have dropped as much as 35 - 40% in the past 2 years. The pressure has come mainly from off-shore competition where labour rates are lower. Furthermore, off-shore manufacturers are reported to be using the best equipment.

While it may be possible to consider some segment or size range that would support a new Canadian facility, there are two factors which suggest this may not be practical.

- ▶ Any segment of the Canadian market based on specialization is likely to be small in relation to the economic size of a manufacturing facility.
- ▶ Existing production capacity is adequate and could probably be increased at relatively little cost to meet any significant market requirement.

The most significant "growth" market for chain in which Canada is a factor in manufacturing is the bicycle industry. In absolute terms, however the numbers are still small when compared with other producers who have grown to support the bicycle chain industry in countries such as U.K., Europe, Korea, Taiwan and Japan. Bicycle chain is available in Canada at prices in the range of 11 to 15 cents per foot. The quantity required for Canadian manufacture is about 2 to 3 million feet per year. Even if a new facility could capture 80% of the business, total sales would be only \$200,000 per year.

In summary, we conclude it is unlikely the market would support a new facility or an expansion at the present time.

VI

COSTS

A. PRODUCTION

There is no information readily available on costs of manufacture. However, a rough approximation can be developed by examining a probable cost build-up from raw material cost to selling price (on a per pound basis) for a typical roller chain product.

The item illustrated below is single roller chain, sizes 3/4", 1" or 1 1/4" pitch where the price paid by a conveyor manufacturer is about \$1.90 net per foot (or about 1.15 per pound for our purposes below):

	<u>Cost-\$ Per Pound, Finished</u>
Raw Material	.20
Conversion (Labour, Overhead)	.50
Manufacturer's Selling & Distribution Expenses	.10
Manufacturer's Profit	.10
Net to Manufacturer	<u>.90</u>
Distributor's Expenses & Profit	.25
Net to Distribution	<u>\$1.15</u>

B. TARIFFS

The following is a tabulation of current Canadian import duties for roller chain and related industrial products.



IMPORT DUTIES

<u>Item</u>	<u>Preferred Rate - U.K.</u>	<u>Most Favoured Countries (*) (U.S. W. Germ., Italy, etc.)</u>
Roller Chain	15%	17 1/2%
Power Transmission Equipment	2 1/2%	15%
Bicycle Chain } Motorcycle Chain }	FREE	15%

\* Most countries other than the U.K. enjoy the "most favoured" designation.

## VII

### LOCATION

An enterprise contemplating entering or expanding into the transmission chain field would most likely want to be reasonably close to markets to provide quick service to a large number of distributors and customers. The prime markets for roller chain are in the machinery and equipment manufacturing centres of Ontario and Quebec. Detachable chain markets are more dispersed because they relate more to the agriculture and mining industries.

Most of the labour skills required would be semi-skilled to operate special machine tools with some higher skill capabilities to maintain machinery and sustain uniform quality standards.

## VIII

### STRENGTHS AND CONSTRAINTS

#### A. STRENGTHS

There are three factors of strength that would affect establishment of a new or expanded facility:

- ▶ existence of a 17 1/2% duty on imports. (In view of recent trends toward reduction of world tariff structures, this may be removed at any time.
- ▶ Most of the chain for power transmission can be manufactured for inventory and is not usually a special, except relative to final assembly (e.g. length, multiple widths)
- ▶ Obsolescence is normally not a factor. International standards for most types of chain are well established.

#### B. CONSTRAINTS

The main problems of establishing a new facility for chain in Canada are:

- ▶ current proliferation of sources of supply
- ▶ sharp price competition where high volume buying in a particular type or size is concerned (this is indicated by reported deterioration of prices of 35 to 40% for conveyor types of roller chain in the past two years.)
- ▶ relatively static market since 1967 in both chain and the market for all power transmission equipment
- ▶ small total market (\$18 million) split into 6 basic types of chain - each involving different manufacturing processes.

- ▶ high capital cost
- ▶ the advantage of one manufacturer's chain over another is difficult to prove.

APPENDICES

Appendix A

CANADIAN MARKET FOR CHAIN, POWER TRANSMISSION & POWER CONVEYOR  
(\$ x 1, 000)

	<u>Canadian Production</u> (1)	<u>Import into Canada (excludes sprockets)</u>					<u>Total Market</u>
		<u>U.S.</u>	<u>U.K.</u> (2)	<u>Japan</u>	<u>W.Germ.</u>	<u>Other</u>	
1959	1,822						
1960	1,966						
1961	1,661						
1962	2,112						
1963	2,568						
1964	3,123	3,747	1,430	287	263	208	9,058
1965	3,734	4,423	1,694	411	318	96	10,676
1966	3,745	6,187	1,552	798	1,886	177	14,345
1967	5,616	5,866	1,640	975	1,521	378	15,996
1968	3,647	5,757	1,422	819	1,266	498	13,409
1969	5,402	6,359	1,833	1,425	1,911	754	17,684
1970	4,319	6,342	1,722	1,625	980	713	15,701
1971	4,500 *	5,349	2,041	1,735	1,066	500	15,191
1972	4,700 *	6,162	2,664	2,364	1,336	366	17,592
% of total market	27%	35%	15%	13%	8%	2%	100%

\* Estimated

(1) Source: Statistics Canada, Catalogue 42-214, S.I.C. 315, "Sprocket chain and drive chain".

(2) Source: Statistics Canada, Catalogue 65-007, Commodity 466-09.

Appendix B

CANADIAN MARKET FOR POWER TRANSMISSION EQUIPMENT  
 (\$ x 1, 000)

<u>Year</u>	<u>Canadian Production</u>	<u>U.S. Exports to Canada</u>	<u>Imports from Other Countries</u>	<u>Total Market</u>	<u>Chain Market</u>	
					<u>\$</u>	<u>%</u>
1959	27, 530	32, 340	5, 660	65, 430		
1960	29, 257	33, 279	6, 667	69, 221		
1961	28, 112	31, 085	6, 292	65, 489		
1962	34, 021	38, 149	7, 972	80, 142		
1963	38, 551	44, 738	9, 693	92, 982		
1964	43, 408	54, 050	13, 799	111, 257	9, 058	8. 2
1965	49, 996	65, 224	20, 734	135, 954	10, 676	7. 8
1966	48, 345	78, 643	22, 409	149, 397	14, 345	9. 6
1967	50, 424	85, 554	22, 652	158, 630	15, 996	10. 1
1968	56, 147	80, 553	18, 143	154, 843	13, 406	8. 7
1969	61, 020	85, 368	23, 018	169, 406	17, 684	10. 4
1970	60, 661	73, 322	24, 828	158, 811	15, 701	9. 9
1971	63, 000	81, 802	26, 212	171, 014	15, 191	8. 9

N. B. Values are quoted at factory level.

Source: Statistics Canada and MacLean-Hunter Research Bureau.

## Appendix C

CANADIAN PRODUCTION OF POWER TRANSMISSION EQUIPMENT

	<u>1965 - 1969</u> (\$ x 1,000)					
	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
Bearings, ball & roller, and parts	31,374	29,912	28,279	30,905	36,254	34,251
Cut tooth and cast tooth gears	3,436	3,462	3,380	6,197	4,973	6,809
Flexible couplings	527	557	421	1,718	2,213	2,321
Pulleys	944	1,687	2,112	1,417	1,359	1,672
Sprocket chain and drive chain (% of total)	3,734 (7.5%)	3,745 (7.5%)	5,616 (11.1%)	3,647 (6.5%)	5,402 (5.0%)	4,319 (12.2%)
Speed reducer units	3,699	3,286	4,789	4,451	5,234	6,162
V-Belt drives	*	*	285	295	544	597
Other transmission machinery and parts	<u>6,282</u>	<u>5,696</u>	<u>5,542</u>	<u>7,517</u>	<u>5,041</u>	<u>4,530</u>
Total	<u>49,996</u>	<u>48,345</u>	<u>50,424</u>	<u>56,147</u>	<u>61,020</u>	<u>60,661</u>

\* Not reported separately.

Source: Statistics Canada.

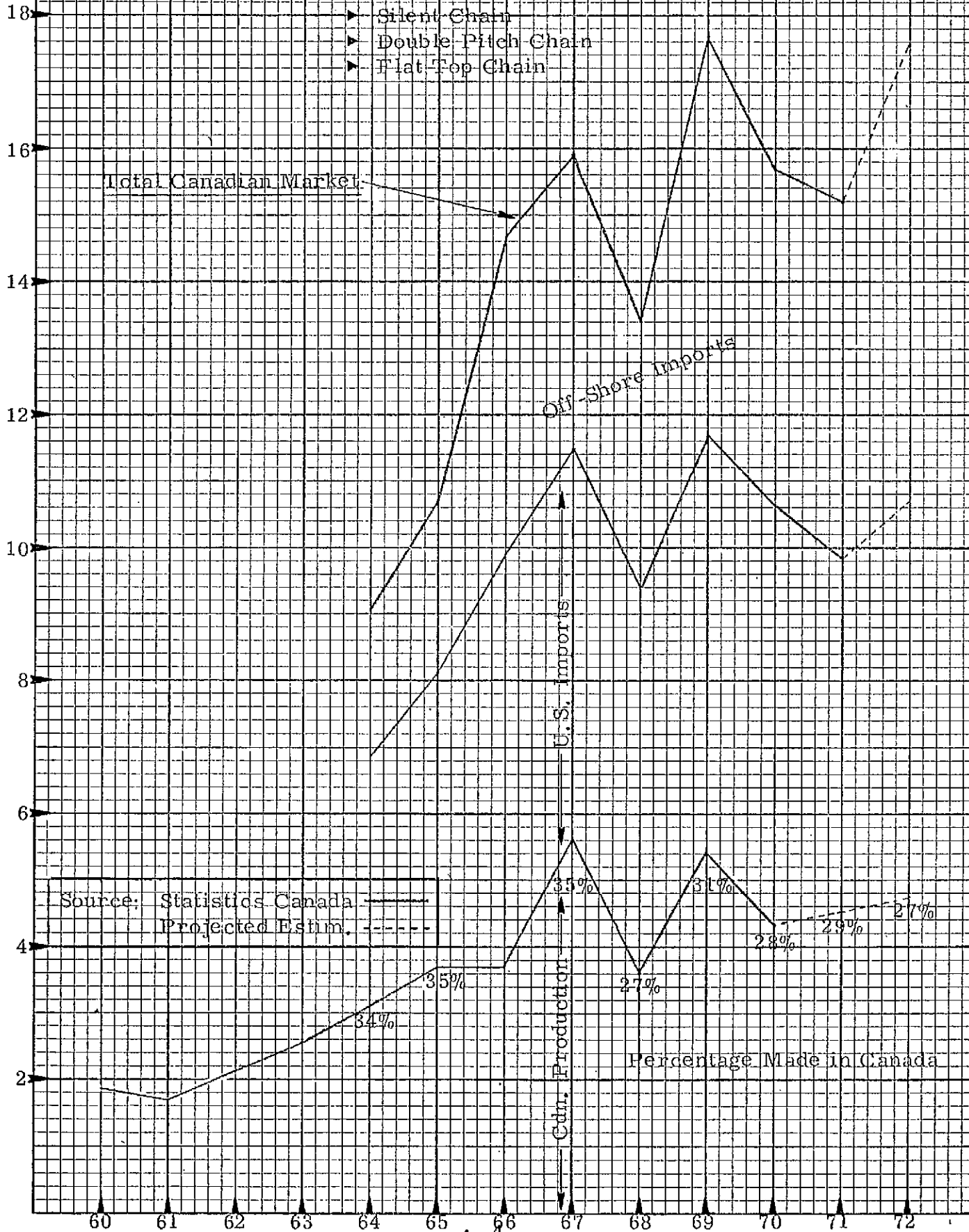


Appendix D

CANADIAN MARKET FOR CHAIN-POWER & CONVEYOR

- Which includes:
- ▶ Roller Chain, Power Transmission
  - ▶ Roller Chain, Conveyor Applications
  - ▶ Offset Sidebar Chain
  - ▶ Silent Chain
  - ▶ Double-Pitch Chain
  - ▶ Flat-Top Chain

Millions of Dollars



Source: Statistics Canada  
 Projected Estimation

Percentage Made in Canada

CANADIAN MARKET FOR POWER TRANSMISSION EQUIPMENT

- Which includes:
- ▶ Chain, Power and Conveyor
  - ▶ Sprockets
  - ▶ Bearings
  - ▶ Clutches
  - ▶ Gears
  - ▶ Shafting and Seals
  - ▶ V.S. Drives

Millions of Dollars

180  
160  
140  
120  
100  
80  
60  
40  
20

Total Canadian Market

Off-Shore Imports

U.S. Imports

Can. Production

Canadian Market For Chain-Power and Conveyor

Source: Statistics Canada  
Projected Estim.

60 61 62 63 64 65 66 67 68 69 70 71 72

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