DEPARTMENT OF REGIONAL ECONOMIC EXPANSION
STUDY OF OPPORTUNITIES IN METAL SHIPPING CONTAINERS

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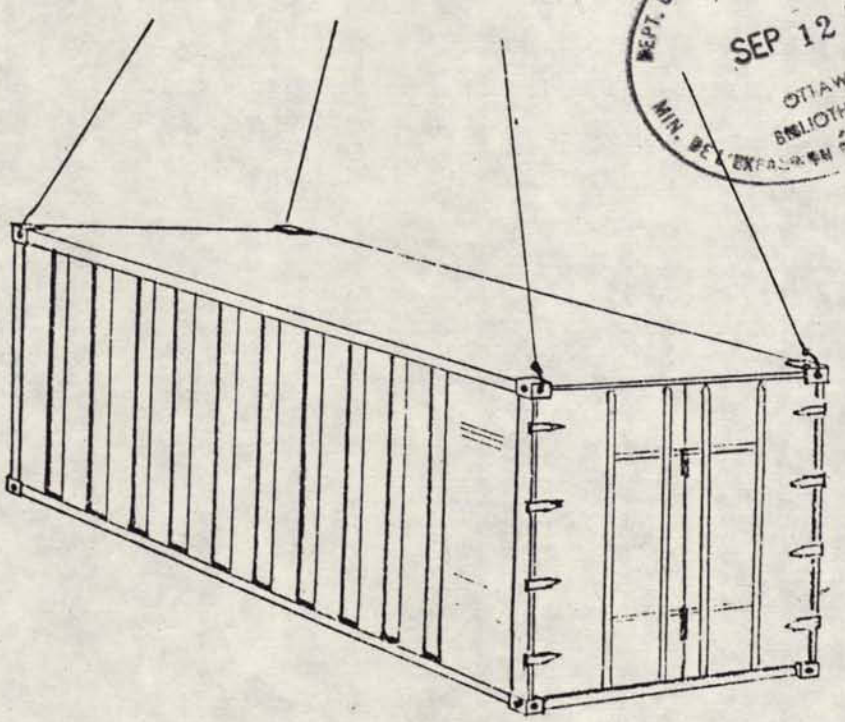
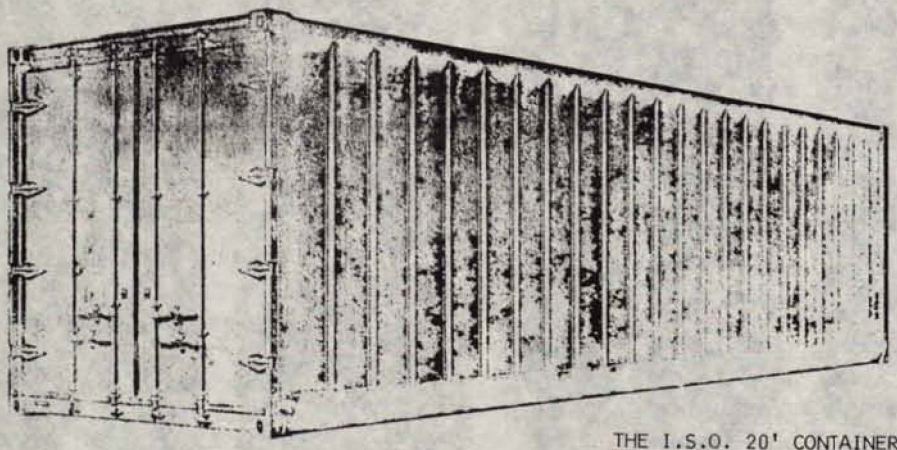
NOVEMBER 1972

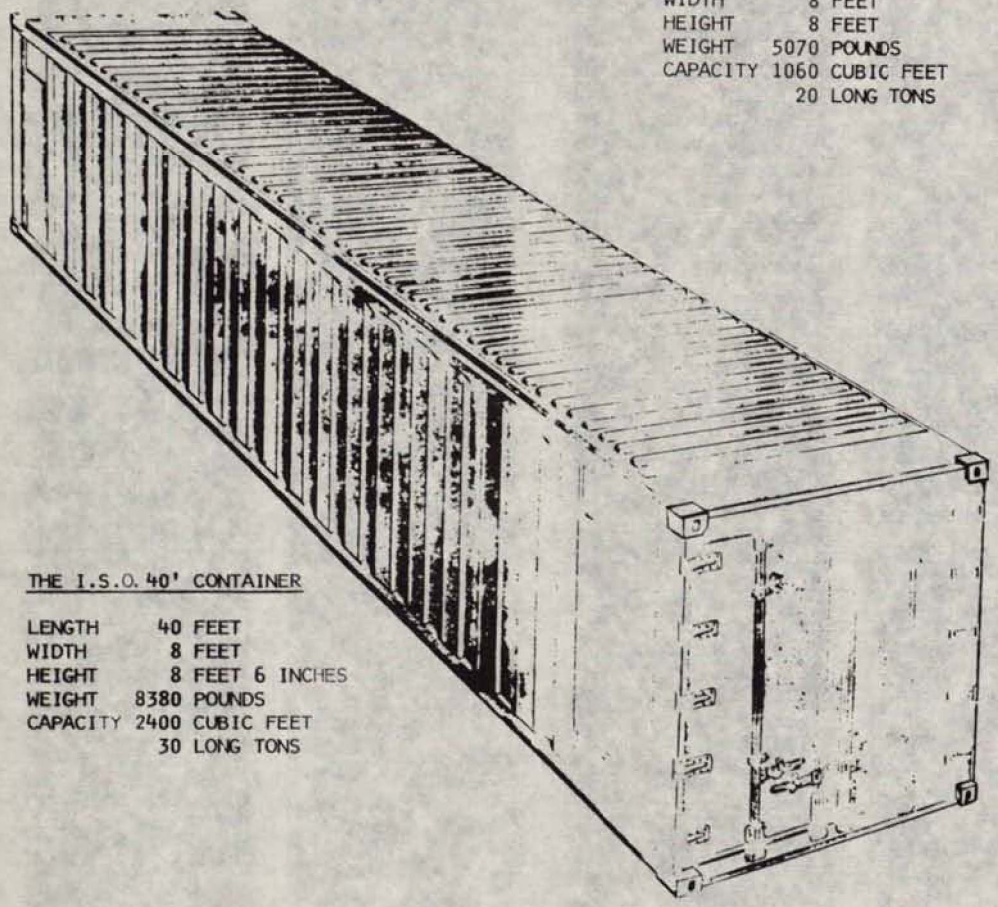


TYPICAL ISO CONTAINERS



THE I.S.O. 20' CONTAINER

LENGTH	20 FEET
WIDTH	8 FEET
HEIGHT	8 FEET
WEIGHT	5070 POUNDS
CAPACITY	1060 CUBIC FEET
	20 LONG TONS



THE I.S.O. 40' CONTAINER

LENGTH	40 FEET
WIDTH	8 FEET
HEIGHT	8 FEET 6 INCHES
WEIGHT	8380 POUNDS
CAPACITY	2400 CUBIC FEET
	30 LONG TONS

SHIPPING CONTAINERS

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SHIPPING CONTAINERS

SUMMARY

An opportunity appears to exist for a Canadian firm to volume manufacture intermodal shipping containers to meet international specifications and standards.

The international shipping container business is a growth industry (25% to 30% annually). In 1972, some 13,000 new containers worth from $35,000,000 to $40,000,000 are expected to enter service.

The market is characterized by a relatively small number of large scale users operating around the world. The location of manufacturing of the containers relating to these customers is comparatively unimportant as they take delivery at any point in the international shipping routes as they are able to inject new containers into their systems at almost any point.

These containers are precision products which must meet rigid international specifications. The market is highly competitive and price conscious and to compete effectively a new manufacturer will likely have to look to manufacture about 2,500 units annually.

A number of substantial Canadian manufacturers with domestic shipping containers experience have been unsuccessful in penetrating the market - primarily because of price competition from Europe and Japan.

The containers are large (up to 40' x 8' x 8') and a Canadian manufacturer entering this field must have metal fabrication background, be experienced in working to close tolerances and have a

knowledge of the shipping-transportation industry. It is equally essential that a Canadian manufacturer have access to materials at competitive international prices and be tooled to operate a highly automated assembly line facility.

Domestic container requirements for internal usage do not have to conform to international specifications and sales in the order of $300,000 to $800,000 annually do not warrant the entry of a new manufacturer into this field.

BACKGROUND

The container market is divided into two separate categories. The first consists of containers used for intermodal transportation and which can be carried on any one of a number of international ships as well as by rail and over-the-road carriers. The second category comprises all the domestic containers used by air cargo, railway and other regional systems. These latter containers are not normally interchangeable with the international type containers and usually circulate within a "closed" or "captive" system.

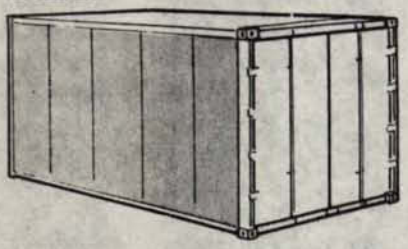
Intermodal Containers

The intermodal containers, largely conform to specifications established by the Paris international conference on containerization in 1964, together with annual revisions. The International Standards Organization (or I.S.O.) specifications call for a limited number of basic sizes for containers which will fit interchangeably into the holds of ships, which can be hoisted rapidly by crane type handling equipment, and which can be stacked several units high. The basic sizes are as follows:

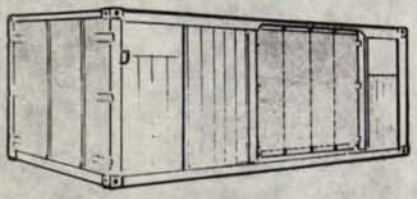
Width	Height	Length
8'	8'	20'
8'	8'	40'
8'	8'-6"	20'
8'	8'-6"	40'
8'	4'	20'
8'	4'	40'

CONTAINER TYPES

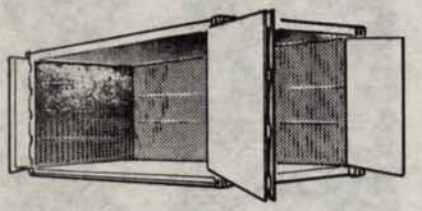
61. End door



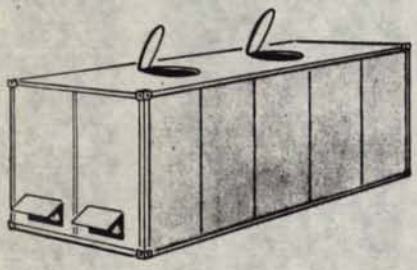
62. Side door



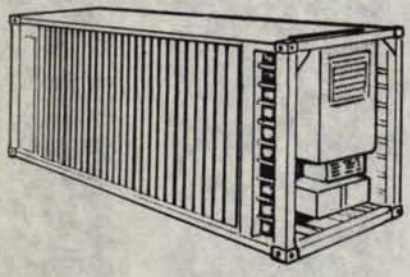
63. Open side



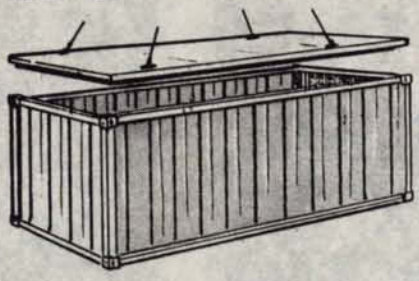
64. Bulk adapted



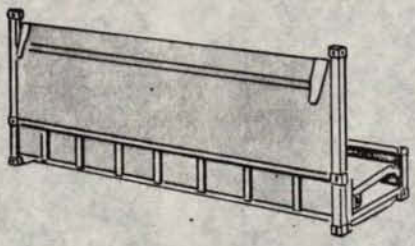
65. Insulated



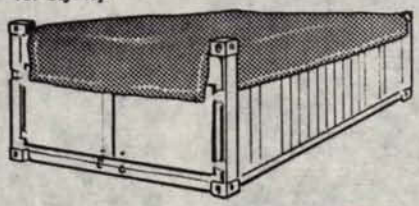
66. Hard top



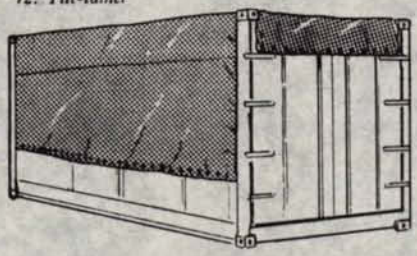
67. Folding



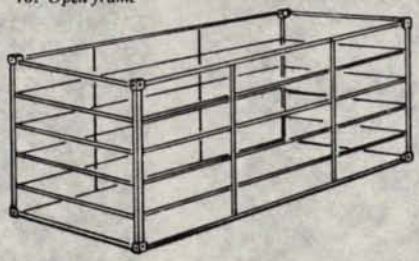
71. Soft top



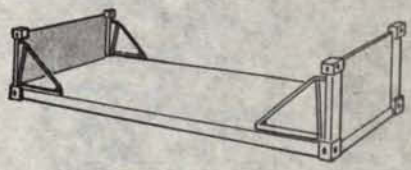
72. Tilt-tainer



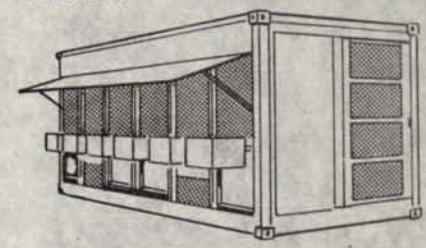
73. Open frame



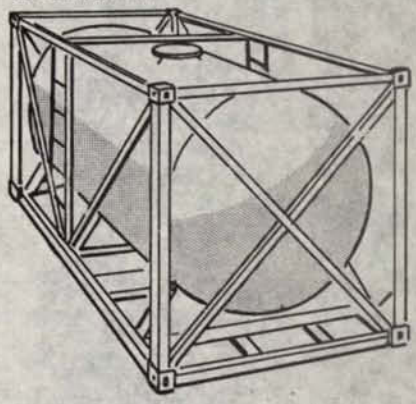
74. Flat-tainer



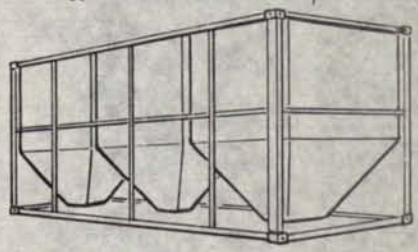
70. Livestock



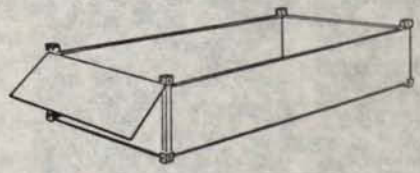
81. Tank container



83. Hopper-tainer



84. Dumper-tainer



There are other size ranges covered by the I.S.O. specifications which include lengths of 10 feet, 30 feet, and/or heights of 4'-3". Other heights are in use for special purposes, and large fleets of containers 24' and 35' long are also in use internationally but these are not endorsed by I.S.O.

A number of different types of containers exist within the size specifications. The classifications total as many as forty; the more common are:

Closed Container	- Fully enclosed containers with openings in one or both ends and/or in the sides, or with openings in the roof.
Ventilated Containers	- Similar to the above, but with forced, or non-forced ventilation.
Insulated Containers	- Similar to above two types, but with insulated walls, doors, roof and floor, and which may be heated or cooled. These are commonly known as "Reefers".
Open Top Containers	- These may have flexible coverings or tarpaulins to cover goods.
Tank Containers Other Bulk Containers	- To carry liquids or gasses.

The most popular types of containers used in world trade, appear to be in the 20' x 8' x 8' closed category with the door in one end. Less popular, but significant, are the 40' x 8' x 8'-6" end door, 40' x 8' x 8' end door, and 20' x 8' x 8' insulated types. Also, a large American shipping company, Sea-land, uses a significant quantity of non-I.S.O. containers in its international fleet, 35' long.

Materials used in the manufacture of containers consist of all steel, and steel frame with aluminum as plywood and GRP (glass reinforced polyester) panels. The all-steel containers are most common, although they tend to rust easily, and are heavy if weight is a factor. Lighter in weight (3,900 lbs. vs. 4,600 lbs. for all steel 20' standard container) are the aluminum and plywood - GRP containers, and while they cost roughly 40% to 50% more than the steel container, they have roughly 5% to 7% more useable volume, and annual maintenance is said to be significantly lower.

Statistics concerning I.S.O. containers are normally tabulated in terms of 20' equivalents, i.e. in accounting for a 40' container, two 20' equivalents are reported.

Domestic Containers

Domestic containers are largely non-I.S.O. standard, hence they cannot be used on an International basis, and as a result they remain within the system for which they were designed. For instance, C.N.R. has a fleet of some 1,500 containers for use in their rail and truck system. Because their units do not have to be stacked, their structural strength requirements are less than the equivalent I.S.O. container. The sizes, however, do conform to the I.S.O. standards so C.N.R. can also carry I.S.O. Boxes on their equipment.

Another example of non-standard containers is the White Pass and Yukon system. About 600, specially designed containers are used to carry dry cargo up the Pacific coast from Vancouver across land by narrow gage railway and truck to the Yukon, and then to return

with mineral ore concentrate. Because of the narrow gage railway, the width of the containers was restricted. The length of the containers are 23-25 feet, making them completely non-standard so far as I.S.O. shipments are concerned.

Other non-standard systems exist, noteably the containers used for handling air cargo. Standardization of containers in this industry is being investigated by the International Air Transport Association, but progress is slow for a number of reasons:

1. Due to various aircraft designs, no small set of standard containers will fit efficiently into the cargo space of the majority of carriers. Because space is a premium, no concensus on standards can be reached.
2. Standard type containers are heavy, and as weight is a premium, the carriers prefer to stack cargo on lightweight pallets and load directly.
3. Air carriers are geared to speed and service by the nature of the industry. Hence containerization will not contribute significantly to speed of service as it has done in the shipping industry.
4. The air transport industry can regulate the volume of business by using selective commodity rates, and changing these to control demand. Containerization would lead to loss of this selective rate mechanism as a single freight rate would apply to all containerized freight, regardless of the commodity. Hence the airlines have not been promoting the use of containers.

Turn-around time of aircraft has not, in the past, depended on freight loading times. Rather, refuelling and servicing the aircraft has dictated the length of this cycle. With the advent of the jumbo jet, it is expected that more emphasis will be placed on containerization as efficient loading and unloading practices will contribute significantly to the utilization of these expensive carriers.

Materials used in domestic container fleets tend to be of the aluminum or G.R.P. category as weight is more important, especially in the aircraft industry.

While specifications for air cargo containers have not been agreed upon, the International Air Transport Association (I.A.T.A.) does maintain a register of containers, used by the airlines.

MARKET POTENTIAL

I.S.O. Containers

It is estimated the world container fleet is currently approximately 675,000 twenty foot equivalents, although no central register of containers has been established. The figure of 675,000 units has been derived from the numbers of ships, and their capacities, together with a factor to account for units not in service, being loaded, in storage, etc. Considering ships planned for construction, projections of the world fleet is as follows:

ESTIMATED WORLD CONTAINERS, BY END OF YEAR

	In Service Containership (and Other) Capacity (20' Equivalent)	Estimated Containers in Service (20' Equivalent)
1969	104,238	310,000
1973	274,711	830,000
1975	372,209	1,120,000

This corresponds to an increase of roughly 23% annually in the world container market, without taking into account the replacement factor. Replacements, however, should be small during the next several years, as the world container fleet is relatively new.

As a growth of 23%, the world market is ~~150,000~~ 15,000 new units (20' equivalents) annually, which corresponds to an annual market of $35,000,000 to $40,000,000.

While the capacity of ships of Canadian Registration could be shown, the figure is not meaningful as the market is a truly international one. Those in the market are the major shipping lines, as well as certain freight consolidations and forwarders. These companys tend to shop internationally and obtain quotations for their requirements from around the world.

Types and Sizes

While no statistics are available for types of I.S.O. containers manufactured, it is understood that by far the largest type is the 20' x 8' x 8' enclosed end door type. In a recent sample of some 18 manufacturers surveyed, the following percentages of container by size and type were reported:

1.	20' x 8' x 8' end door van	67%
2.	40' x 8' x 8'-6" end door van	8½%
3.	40' x 8' x 8' end door van	6%
4.	20' x 8' x 8' insulated van	5½%
	All others	13%

In discussions with manufacturers, and users, the popularity of the 40' length was reported to be increasing, however, its use is restricted (in the Canadian market) as the density of the material shipped by Canadian Manufacturers (primary industry goods) causes the 40' units to exceed weight limits imposed by road restrictions.

Location

The world market is divided into several areas. The chief area is the Atlantic trade between the North American Continent and European countries. Of growing importance is the Pacific fleet and the growing trade between North America and Eastern countries, especially Japan. Other trade countries encouraging container traffic are Australia, and within the next few years, African countries should have the necessary handling equipment to accept container traffic.

Manufacturing facilities in Canada will be located close to ports serving either the Atlantic or Pacific areas. In the East, this could range from anywhere on the Great Lakes system to the Eastern Seaboard. In the West, the most likely area will be close to Vancouver.

Domestic Containers

The market potential for domestic containers is restricted to filling special orders for carriers in Canada. As mentioned earlier, the only users are C.N.R. with a fleet of about 1,500 non-I.S.O. standard containers, the airlines, which currently have a fleet of:

Air Canada: 125 "igloo" type unit
CP Air: 50 units

And an estimated increase to perhaps 300 units by 1975.

Another shipper using specialized containers are White Pass and Yukon who have 600, 23' units. It is possible that other shippers to the Arctic will develop specialized container systems to conform with the conditions in the north, however, fleets of over 200-300 units would be unusual.

SUPPLY AND MARKETING CHARACTERISTICS

The supply of I.S.O. containers to the world market is being met largely by European and Japanese manufacturers. It is customary that the shipping lines or freight handlers will order in bulk quantities directly from manufacturers, and so there is virtually no distribution organization.

Pricing is handled through a quotation system on orders, and while standards define the sizes and capacities of the various types of containers, each end user wants various options and accessories, from special handling attachments to colour and identification markings. Consequently, every container is made to order at a contract price.

Basic prices for twenty foot, standard 8' x 8', I.S.O. containers with end opening and no special hardware runs about $1,050 to $1,250 each when ordered in quantities of roughly 30 and upwards, and a standard 40' x 8' x 8' container costs roughly $2,000 to $2,100. With the addition of extras, special doors, hardware for bulk handling, etc., the price for a 20' container can escalate quickly to $2,000 to $3,000. Refrigerated units with insulation, etc. can cost as much as $20,000.

Competition within the industry is largely on price, although the ability to deliver on time is also important. Reputation plays an important part in obtaining new or repeat business.

Because the customers for containers are used to operating in world markets, and because a container is put into service where it is bought, manufacturers in any country have access to the world market without incurring transportation costs to the purchasers country.

As a result, major manufacturers have located in areas where shipping activities are concentrated, and where low cost operation can be achieved.

Competition is also based on delivery and while 4 to 6 months appears to be normal, some manufacturers are obtaining business by promising 6 to 8 week delivery times. While containers are normally built to order, it may be possible to preassemble some standard sizes, and only finish the unit once an order is received. This practice would require higher inventory investment, but it could permit economies of scale when orders are low.

Because statistics are not available from this relatively young industry, it is difficult to pinpoint the major manufacturers of containers. Lists manufacturers world wide are readily available; one such list includes some 62 names, although the activity each represents is questionable.

Key amongst these manufacturers are:

- Fruehauf, France, who manufacture truck bodies, truck components and have facilities to make containers which is a similar type of product.

- York Trailer Co. Ltd. in England, again have had experience in related manufacturing. In this case, York has set up a fully automated plant with assembly lines for producing standard steel containers. In addition, a unique process is used to treat and coat the steel used in production so that a recognized superiority exists in the rust-proof characteristics in their containers.

Canadian manufacturers who have indicated they will produce international containers are limited to the following:

Steadman Industries, Toronto
Canadian Trailmobile, Brantford
Hawker Siddeley Canada, Limited
Canadian Car Division, Thunder Bay

These companies have not produced any significant container volume in the past several years. They are active in other, related businesses and have quoted on international orders, but have not been successful, with one exception.

Steadman Industries, who produce Railtainer (R), a proprietary side transfer system of equipment for loading containers, have produced roughly 1,200 units over the past several years for their associate company Interpol who have a world fleet of 29,000 units.

Canadian Trailmobile produce truck bodies and have produced some domestic containers.

Hawker Siddeley produce rail car equipment.

Domestic Containers

Those domestic containers which have been built were largely manufactured by the above mentioned companies on a contract basis. No one manufacturer appears to be predominant, as each order is unique in design, materials used etc.

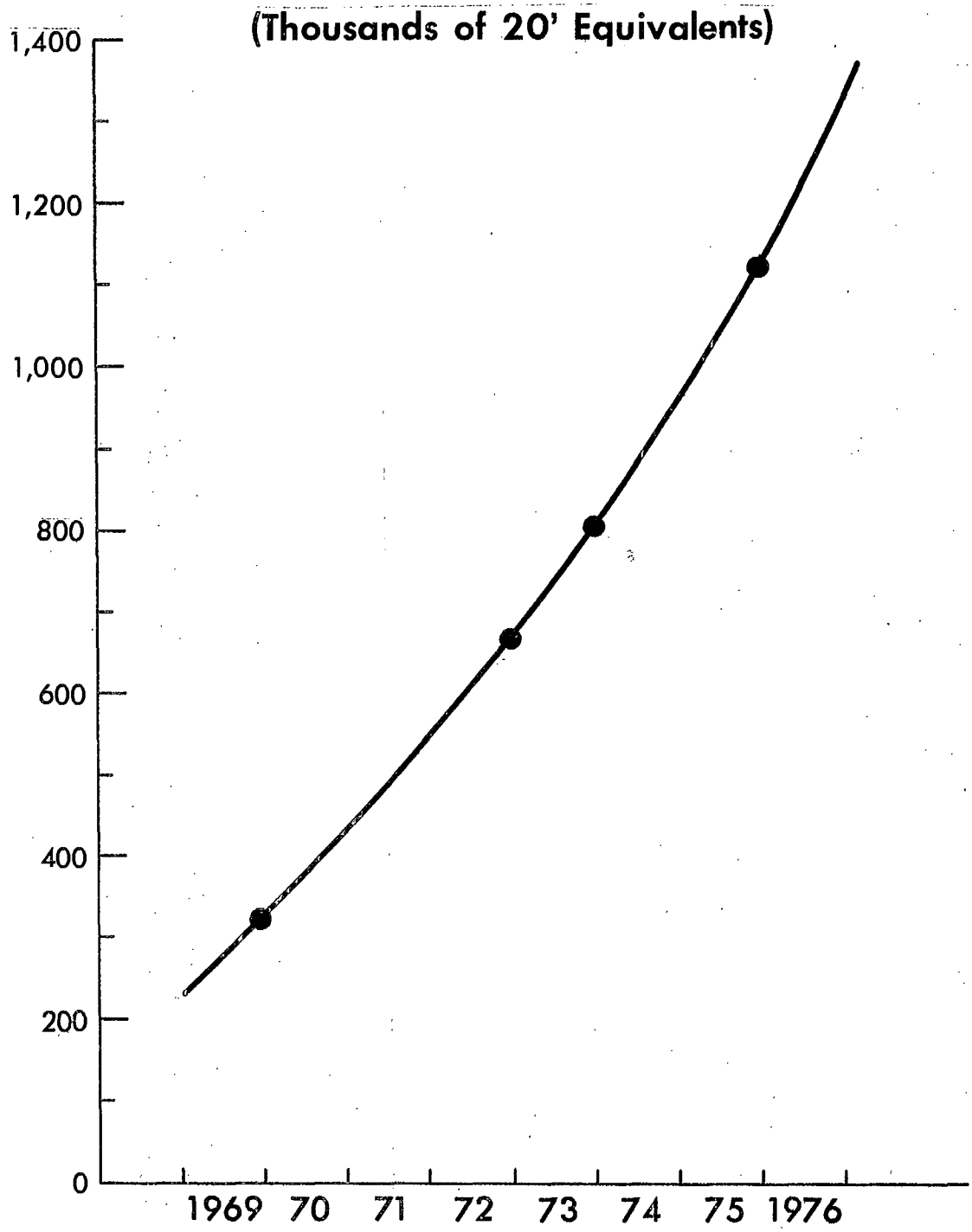
INDUSTRY CHARACTERISTICS

The industry is characterized by its newness. Six years ago, the I.S.O. standards which allowed the construction of container-ships to transport standard boxes also released the potential market for containers. Many small companies started making containers, but a large number of these have been forced out of business because:

a) Exacting standards make construction of containers more difficult than the normal vehicle construction. Most small manufacturers added containers as a sideline to their truck body manufacturing.

b) Mass production techniques required to achieve close tolerances at low cost require high volume production, and this can only be achieved if there are a few, large producers.

ESTIMATED WORLD CONTAINERS



The growth of the industry which has resulted, however, is phenomonal. The estimated world fleet has grown from some 320,000 units in 1969 to 675,000 in 1972 and is expected to continue on the over 1.1 million by the end of 1975, as shown on the graph opposite.

This growth is the result of more and more applications being found for containerized freight. Several years ago, it was thought containerized freight was limited to manufactured products, as the chief advantages were protection of the contents from damage and pilferage. If these were the only advantages, a limit of 5-6% of all ship freight would be the maximum market for container use. It has been found, however, that containers not only protect the contents, but permit such rapid loading and unloading of ships that bulk freight is also being containerized. This also improves the utilization of containers, eliminating the need for dead-heading.

With the increase in uses for containers and the increasing fleets of ships and systems being designed to handle only containerized freight, the growth in containers experienced in the past should continue well into the foreseeable future.

Domestic Containers

As opposed to I.S.O. containers, production of containers for domestic uses has been restricted to those few applications mentioned. It does not appear that a significant market for these containers exists.

PRODUCTION

Production of containers follows two basic methods, firstly, the low volume production methods follow the traditional build-up techniques wherein a container is assembled from components as it sits on a shop floor. Secondly, when high volume production is warranted, i.e. at production rates of 50 per week or more, an assembly line method is used.

In the first, low volume technique, general tools are used, and no high-investment machinery is required. However, production is limited by the amount of space available, and there is an extremely high risk of failure to meet specifications, particularily when dimensional standards include tolerences of ¼" on 40' lengths, or ± ½%. Consequently, with this type of production, high skilled labour is required, and a high cost unit results.

If a higher volumes can be expected, special tooling including jigs and fixtures for assembling the units can be justified and assembly line techniques employing a lower level of skill can be utilized. This increases the fixed investment, however, it results in lower overall unit costs.

RESEARCH AND DEVELOPMENT

Research and development in the industry seems primarily to be directed towards finding new methods for making containers fill new needs. For instance, methods have been developed to convert a standard end loading container into a bulk unit by installing a plastic liner on special hooks. Inflatable tanks or bags have also been developed to transport liquids inside standard or special container frameworks.

As with any new industry, new methods of manufacture develop as volumes increase, the direction being towards automation, improved materials, and, where possible, changes to the basic design to improve performance. Door latching mechanisms are an example of the type of equipment which has been improved. Finishes for steel containers are also being developed, and rust-proofing techniques that last 3-5 years are now being used.

COSTS

As mentioned, the price of a basic 20' container is roughly $1,050-$1,250. Of this, it is estimated raw materials - steel and castings, together with hardware is 40% or $400. Labour depends largely on the process, but in the above case, where automation has reduced the cost of labour significantly, it should run to $200 or $250. The remaining 35% or $350-$400 is available for fixed overheads, plant and equipment, etc.

PLANT LOCATION

It is not necessary to have a plant close to a container port, although it is preferable to be reasonably close, so the finished containers can easily be trucked or transported by rail. Usually the container can be put directly into service by the customer, although if a foreign container is ordered, the manufacturer may utilize the capacity available in the container in shipping it overseas to the customer.

Primary materials used are steel, castings, hardware, and in some cases, aluminum, or plastic panels. Proximity to sources of supply of these materials is desireable, although not necessary.

Skilled labour, on the other hand, is absolutely necessary. When production is low, skilled mechanical tradesmen are required during all phases of manufacture. If assembly line production is possible, manufacturing skill requirements are lowered, but other mechanical skills are needed to ensure the various jigs, fixtures and other equipment is operating satisfactorily and that changes in types of containers are incorporated into the production system without problems.

PROJECT OPPORTUNITIES

Key opportunities appear to be in the extremely large growth expected in the industry, and while there are currently a number of manufacturers unable to obtain orders, this is a result of their not being able to meet price competition from European suppliers.

The product is basically of a stable design, and while there are a number of variations, they appear to be well defined. There are no great technological demands and a manufacturer with strengths in production line assembly should be able to consider the potential in this growing area.

ECONOMIC DETERMINANTS

The end use of the product determines the size of the market, and on a gross scale, volume of shipping determines the size of the container market. It has been shown, however, that only a small portion of total shipments are containerized, however this portion is growing rapidly. More appropriate, then, are container shipments in determining the volume of new containers required. Related to this is the production of ships capable of carrying containers.

INTERNATIONAL SHIPMENTS OF CONTAINERS FROM CANADIAN PARTS

NUMBERS OF CONTAINERS, HANDLED 6 MONTHS JANUARY 1 - JUNE 30, 1972

I.S.O. - ALL TYPES

	Maritime Provinces				Net tons of container	
	Unloaded	Loaded	Total	%	Cargo	%
20'	11,257	14,209	25,466	71	353,814	74
40'	3,956	5,156	9,112	25	109,001	23
Others	628	920	1,548	4	13,141	3
	15,841	20,285	36,126	100	475,956	100

	Quebec Province				Net tons of container	
	Unloaded	Loaded	Total	%	Cargo	%
20'	24,817	24,599	49,416	86	653,834	85
40'	2,862	2,859	5,721	10	76,247	10
Others	550	1,681	2,231	4	38,685	5
	28,229	29,139	57,368	100	768,766	100

	British Columbia				Net tons of container	
	Unloaded	Loaded	Total	%	Cargo	%
20'	6,285	5,713	11,998	49	138,275	46
40'	1,558	1,130	2,688	11	33,316	11
Others	4,817	5,062	9,879	40	130,016	43
	12,660	11,905	24,565	100	301,607	100

Total all parts 118,058 containers, 6 months, 1972

Source: Statistics Canada
54.003

Container shipments in Canada have not been reported by Statistics Canada until just recently, however in their Water Transport Service Bulletin, container freight figures have been released for the first time.

The Table opposite summarizes this bulletin, showing regional shipments of containers by size. It is apparent that 40' containers constitute roughly 10-25% of the unit shipments. It is also significant that a large portion of the containers used on the West Coast are not of the standard 20' or 40' size.

The growth of container shipments is not apparent in this table. To illustrate the growth in container shipments, the following statistics for the Quebec City Port were reported:

1969	5,716 units
1970	N/A
1971	70,000
1972	133,000 (est. to end of the year)

This growth, representing an average of 186% annually demonstrates the results of the containerization movements.

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