THE STEEL MILL PRODUCT DIRECTORY

NEW YORK CENTRAL SYSTEM

MARKETING DEPARTMENT

MARKET RESEARCH DIVISION

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THE STEEL MILL PRODUCTS DIRECTORY

INTRODUCTION

Purpose. This directory is meant to serve as a handy reference for those seeking general and non-technical information about the products of the steel industry. It should prove useful to anyone on the System who deals with the transportation problems of the steel industry. In addition, this directory will provide background information for consideration of future market studies dealing with transportation of steel mill products.

The sections of this directory, which indicate the location and capacity of facilities producing various steel mill products, may prove of interest to the sales force in determining potential movements. Likewise, the sections dealing with the markets consuming various products may help to trace potential movements.

Scope. This directory points out certain ways in which the products of steel mills may be classified. First, it classifies steel according to finished and semi-finished products; next, is classification by grade (such as carbon steel, stainless steel, etc.) A brief explanation of each of these various grades is also given. Finally, there is a detailed description of each steel mill product according to the American Iron and Steel Institute product classification.

Every effort has been made to keep the information in this directory as pertinent as possible, and to avoid needless and cumbersome detail. The following types of information are given in the product sections: 1) The name of the product, a brief description of how the product is made, and its general physical characteristics. 2) The official American Iron and Steel Institute definition of the product. 3) Any other information about the product which might be deemed significant, i.e.; product use, etc.

A table is included which indicates for every steel mill product or group of products: (1) the total U. S. capacity to produce the product, (2) the location of producing firms, (3) the capacity at every location, and (4) the percent of total U. S. capacity at each point. Finally, at the conclusion of each product section is a table indicating the general market classifications which that product serves.

Method. The information contained in this directory has been gathered from various sources. Most important of these is the ANNUAL STATISTICAL REPORT of the AMERICAN IRON AND STEEL INSTITUTE, and a volume entitiled THE MAKING, SHAPING, AND TREATING OF STEEL, published by the United States Steel Corporation. Where other sources of information are significant, they will be noted in an appropriate place in the report.

The information used in the directory is as current as possible. Material of this type, however, will necessarily get out of date. For this reason, this directory is printed on loose-leaf paper so that it may be up-dated by replacement of the affected pages. In most cases, however, the changes in the data from one year to another are not significant enough to merit complete annual revision of the material. Revisions will be issued periodically as necessary to reflect significant changes.

In the section entitled "Steel Mill Products Defined", the following products are dealt with in order: 1) The so-called semi-finished products, including ingots, blooms, skelp, wire rods, etc. 2) The structural steel items including piling and plates. 3) The family of railroad items: rails, track parts, wheels and axles. 4) The bar items. 5) The family of tubular products. (Actually, tool steel is interspersed between bar and tubular products in the AISI reports. For purposes of this directory, however, tool steel has been included with the grade definitions since it is actually a grade of steel rather than a product.) 6) Wire Products. 7) Tin mill products. 8) Sheet and strip products.

There is no apparent logic for this order of listing which has been used by the American Iron and Steel Institute, except that it is considered to be "convenient." Since it is used by the AISI, however, it has been adapted almost wholely for use in this directory so that anyone using it will easily be able to make comparisons with AISI data.

CLASSIFICATION OF STEEL PRODUCTS

To use the word STEEL by itself is somewhat meaningless in most contexts because of the fact that steel takes so many different forms. For convenience sake, it is necessary to classify steel products in some way so that the various terms will be meaningful and concise. Two ways of classifying steel products will be described below. They are (1) Finished and Semi-finished Steel, and (2) Grade Definitions.

Finished and Semi-finished Steel

Steel products may be classified in several ways. One of the more general methods of classification is the concept of finished and semi-finished products. The breakdown of steel into these two groups carries with it a marketing connotation - the final destination for the steel goods. Finished steel is that which has reached the end of its production process as far as actual changes in the type or form of steel is concerned. While this generally means that the product will pass from the steel industry to a manufacturing plant in another industry, this is not always the case. (Other industries have the facilities to process further* semi-finished steel and they, therefore, purchase steel in a semi-finished state.) However, finished steel products are ready for processing into end products and will not receive further processing as steel per se. For example, steel sheet is a finished steel product. Its next stop may be an automobile factory where it will become a component part of an automobile.

Semi-finished steel, as the name implies, is steel which requires further finishing. Such finishing may produce great changes in the form of the product such as from a heavy slab into a thin sheet. Alternatively, the change may be less radical, as by changing a hot rolled sheet into a cold finished sheet. At any rate, the semi-finished steel will undergo further processing as steel which will change it as a form of steel. Such further processing which converts semi-finished into finished steel is commonly done, in the case of an integrated steel firm, in the same plant which has turned out the semi-finished product. When a semi-integrated firm has made the steel, the semi-finished product may be shipped to another steel firm for the final finishing job. In some cases, the semi-finished product will be sent to a firm outside the steel industry for processing into its final state; generally, however, such final processing takes place within the steel industry itself.

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* Further Processing includes any operations performed beyond the hot rolling or hot processing stage; i.e. cold reduction, drawing, etc.

A few sources use the terms finished and semi-finished with respect to steel industry operations. Thus, a product is finished if no other operations are to be performed on it by another member of the steel industry. Using this definition, a billet or bloom is considered a finished product if it is to be exported or sent to some firm outside what is commonly considered to be the steel industry.

This definition is somewhat confusing and, for purposes of this directory, therefore, a steel product will be considered finished or semi-finished depending on its stage in the production cycle, not upon whether the final stages of processing are done by the steel industry or by some other industry.

Grade Definitions

Another general method of classification of steel is according to grade definitions. Such grade definitions are of general interest only for the purposes of this directory except that there is some variation in the amounts and types of raw materials required in the production of the different grades of steel. Therefore, this method of classification will be touched upon rather briefly.

The first, and by far the most important in terms of quantity of the grades is carbon steel. In 1960, the American Iron and Steel Institute reports that 91.5% of all steel produced was carbon steel. Table 1 indicates what markets use this type of steel. The Institute defines carbon steel as "...steel with no minimum content specified or required for aluminum, boron, chronium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, or zirconium, or any other element added to obtain a desired alloying effect..."

The second most important general grade is alloy steel, which in 1960 accounted for 7.5% of all steel production. See Table 2 for a breakdown of markets served by this grade of steel. This classification is sub-divided into two groups: (1) alloy steels, and (2) high strength - low alloy steel.

Alloy steels are those which must contain a specified amount of one or more of the various alloying elements mentioned above. These limits are set by the Iron and Steel Institute, but will not be described here since this voluminous technical information is not relevant for transportation or distribution analysis. It is interesting to note, however, that alloy steels have special properties and therefore serve certain uses which could not be served by ordinary carbon steel. It also should be noted that, due to the increasing demands made on materials by the development of new equipment and processes (jet engines and rockets, for example) alloy steels are assuming an ever-increasing importance.

TABLE 1

WHERE CARBON STEEL IS USED; by Markets*

Market	1960 (%)
Converters and Processors	4.24
Forgings	.84
Warehouses and Distributors	17.74
Construction	19.71
Automotive	19.92
Transportation (not auto)	.86
Drilling, Mining, Quarrying	.83
Agriculture	1.48
Machinery	7.56
Domestic	5.49
Containers	9.68
All other	6.65
	100.00

* American Iron and Steel Institute Annual Statistical Report for 1960.

TABLE 2

WHERE ALLOY STEEL IS USED; by Markets*

Market	1960 (%)
Converters and Processors	1.76
Forgings	6.41
Warehouses and Distributors	11.61
Construction	4.19
Automotive	30.69
Transportation (not auto)	7.12
Drilling, Mining, Quarrying	3.20
Agriculture	.52
Machinery	22.55
Domestic	.74
Containers	.54
All other	10.67
	100.00

* American Iron and Steel Institute Annual Statistical Report for 1960.

High strength - low alloy steel is defined by the Iron and Steel Institute as comprising "...a specific group of steels with chemical compositions especially developed to impart higher mechanical property values and greater resistance to atmospheric corrosion than are obtainable from conventional carbon structural steels containing copper. High strength-low alloy steel is generally produced to mechanical property requirements rather than to chemical composition limits.

High strength-low alloy steel is generally intended for application where savings in weight can be effected by reason of its greater strength and atmospheric corrosion resistance and where better durability is desired."

A third classification of steel grades includes stainless and heat-resisting steels. In 1960, stainless steel acounted for 1% of total steel production. Stainless is defined as any steel containing specified percentages of chromium and other alloys. It is, in effect, a special type of alloy steel. This classification also includes valve or bearing steels, high temperature alloys, or electrical grades. It excludes tool steel grades. Note Table 3 which indicates the markets served by stainless steel.

TABLE 3
WHERE STAINLESS AND HEAT RESISTING STEELS ARE USED; BY MARKETS *

Market	1960 %	'57-'59 Av. %
Converters & Processors	7.65	8.90
Forgings	1.19	1.90
Warehouses & Distributors	39.50	37.64
Construction	4.25	3.87
Automotive	13.51	15.56
Transportation (not auto)	.66	3.77
Drilling, Mining, Quarrying	.11	.16
Agriculture	.04	.07
Machinery	7.81	9.85
Domestic Equipment	8.49	8.94
Containers	.19	.28
All other	16.60	9.06

Heat-resisting steel includes all steels containing slightly smaller amounts of chromium than stainless steels.

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* Iron Ore Analyses 1961 - The M. A. Hanna Company

High speed and tool steel excluding hollow drill steel, is another grade of steel.

Tool steel, according to AISI definition, "...is produced in the form of hot and cold finished bars, special shapes, forgings, wire, drill rod, plate, sheets, strip, tool bits, and precision or sand castings.

Tool steels are either carbon or alloy steels, capable of being hardened and tempered. They are usually melted in electric furnaces and produced under tool steel practice to meet special requirements. They may be utilized for application in certain tools used by hand, or in mechanical fixtures for cutting, shaping, forming and blanking of materials at either ordinary or elevated temperatures; they are also used for precision gages (sic).

"Tool steels can be grouped into eight main types:

High speed tool steels	Shock resisting tool steels
Hot work tool steels	Mold tool steels
Chromium die tool steels	Special purpose alloy tool steels
Oil hardening tool steels	Water hardening tool steels"

Production of items in this classification is not of significant volume at the present time, accounting for only around 1/10th of 1% of total steel production.

It should be pointed out at the conclusion of this section on steel types by grade, that the above grade definitions should not be confused with the steel product types to be described in following sections. Almost any given steel product can be made of steel of any grade; e.g. cold rolled steel sheets could be made of carbon steel, stainless steel, heat resisting steel, etc. By the same token, either finished or semi-finished steel products can be, and are, made of steel of all grades.

STEEL MILL PRODUCTS DEFINED

Ingots and Steel for Castings are examples of steel in its primary form. They are made in a steel furnace (two or more steel furnaces may be used in the duplex or triplex process) which has been charged with hot metal or pig iron and/or scrap. The end product is steel as it leaves the furnace. Whether it becomes an ingot or a steel casting depends on what transpires as the steel is poured from the furnace.

In the case of an ingot, the molten steel from the furnace is poured into an ingot mold which may vary in size and shape. The steel is allowed to cool to the point of solidity, at which time the ingot mold is removed. If the ingot is destined for a rolling operation, it will be sent to a primary mill where it generally will become either a bloom, billet, or slab. Ingots may also be used for forging, or they can be remelted elsewhere for casting into other steel products.

Steel for castings is also originally hot metal from the steel furnace. It, too, is cast into a mold; however, a casting mold differs from an ingot mold in that it is shaped more specifically like the finished product. Steel castings are machined into finished steel products.

A listing showing where ingots and steel for casting are produced is not included at this point since it would include every firm in the industry with steel-making furnaces. The Steel Firm Directory, which is currently being prepared and will be distributed shortly as a companion to this Product Directory, shows a listing of the firms that produce steel. The Firm Directory describes the 20 largest steel firms in detail.

Blooms, slabs, billets, and sheet bars: These semi-finished steel products are defined by the American Iron and Steel Institution as follows: "These are the products of blooming, slabbing, billet or sheet bar mills which are shipped from the steel mill, without further work other than cutting to length or surface conditioning. Products are used for rerolling, forging, or other processing into further finished products. Size is generally designated in inches or fractions thereof."

Almost all ingots are rolled into either blooms, slabs, or billets. Sheet bars are not in common usage today. They were formerly used in the old hand hot mills or "jobbing mills" which have all but been replaced since the 1930's by the continuous hot strip mill. For this reason, sheet bars will not be discussed in further detail.

There is no clear-cut differentiation between a billet, bloom, or slab. All three are formed by the same general process. An ingot which has been pre-heated to the desired temperature enters the rollers of what is commonly referred to as a blooming or a primary mill. Here, the ingot is reduced in cross section and increased in length proportionally. The immediate result of this operation will be either a bloom, billet, or slab depending on its general characteristics, future uses, and other factors including type of mill, etc. In some continuous mills, the ingot enters and some finished product leaves at the other end. More often than not, however, the finished billet, bloom, or slab is transferred to another mill for further processing. The destinations of these products and their importance in each market, are indicated in Table 4.

Just as the ingot itself may vary considerably in size, so does the size of a bloom, billet, or slab vary. With regard to size, however, there are certain general characteristics which serve to distinguish the three shapes. Blooms and billets are similar in shape, but the billet is generally smaller. Both have all corners rounded and have a length which is several times greater than their maximum cross section. The cross section of the bloom can be either square or slightly oblong while the billet cross section is almost always square.

The slab always has an oblong cross section and mostly 2 to 6 inches thick. It may be from 24 to 60 inches wide.

The mill usually bears the name of the product it produces, in the case of the above three. Sometimes the mill may be called a "primary mill" in any of the three cases. Also, tradition may cause exceptions in the mill name.

TABLE 4

SHIPMENTS OF INGOTS, BLOOMS, BILLETS,
SLABS, SHEET BARS & SEAMLESS TUBE ROUNDS

Market Classification	Tons Shipped	% of Total Shipments of These Items	% of These Items of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	358,626	19.4	11.5
Forgings(other than auto)	561,108	30.4	58.6
Bolts, nuts, rivets & Screws	12,565	.7	1.2
Warehouses & distributors	32,082	1.7	.2
Construction & maintenance	138,161	7.5	1.6
Contractor's products	4,654	.3	.1
Automotive	459,861	24.9	3.2
Rail transportation	21,626	1.2	.9
Shipbuilding & marine equip	4,449	.2	.7
Aircraft	16,790	.9	23.5
Oil & gas drilling	21,815	1.2	4.0
Mining, quarrying & lumbering	822	.04	.3
Agricultural	20,680	1.1	1.6
Machinery, ind. equip & tools	137,468	7.4	3.3
Electrical machinery & equip	8,858	.5	.4
Appl., utensils & cutlery	29	.002	.002
Other dom. & com. equipment	287	.02	.02
Containers	1,200	.06	.02
Ordnance & other military	36,851	2.0	28.9
Export	1,905	.1	.1
Non-classified shipments	8,370	.5	.5
TOTAL	1,848,207	100.0*	2.7
To steel industry for conversion or resale	1,255,041	67.9	30.6

* Column does not total 100% because of rounding.

There are many exceptions to the above definitions depending on what special uses may be required for a particular piece. Examples of some of these exceptions are : Any piece to be rolled into a plate is almost always called a slab regardless of its size or dimension proportions. Any piece which is produced on what is considered to be a billet mill is called a billet regardless of shape and size, except for the "round billet" intended for seamless tube piercing, (expecially in shrt lengths) which is usually known as a tube round. Blooms in short lengths are sometimes called blanks or blocks. Finally, special shape blooms for structural sections are frequently called blanks, regardless of length.

There are many exceptions to the form of billets, blooms and slabs and to the names of the mills producing these products, that the distinctions may be almost meaningless. There are a couple of main points with reference to these terms which have relevance for purposes of this study, however.

Billets, blooms, and slabs are semi-finished steel products which constitute a stage in production between the ingot and a whole variety of finished steel products. Occasionally, the ingot will be rolled in one continuous operation through intermediate stages directly into finished products. This, for all practical purposes eliminates the billet, bloom or slab stage. Such an operation is not often economical, however, so that billets, blooms, and slabs play a very important intermediate part in the steel production process.

It is important to note further that these three semi-finished products may be carbon steel, stainless, etc. depending on what the finished steel product is to be.

A list indicating all of the locations where billets, blooms and/or slabs are produced will not be shown because of the very large number of firms which would be involved. Note that a list (Table 5) is included which shows the production of these semi-finished products "for forging or export." This classification is an American Iron and Steel Institute classification, and the products thus classified are <u>not</u> earmarked for further processing <u>at the mill where they are made</u>. As a rule of thumb, it may be assumed that almost every mill (there are few exceptions) which has both steel-making facilities and any type of further processing facilities will turn out billets, blooms and/or slabs at some stage of the production process.

TABLE 5

PRODUCTION OF
BLOOMS & BILLETS FOR FORGING OR EXPORT

Location	Firm	Capacity	% US Total
Dunkirk, N. Y.	Allegheny-Ludlum	4,700	.6
Watervliet, N. Y.	" "	3,900	.5
Bethlehem, Pa.	Bethlehem	186,000	25.6
Steelton, Pa.	"	42,000	5.7
Lackawanna, N. Y.	"	120,000	16.4
Johnstown, Pa.	"	24,000	3.3
Pueblo, Colo.	C F & I	1,000	.1
Harrisburg, Pa.	Harsco	125,000	17.1
E. Chicago, Ind.	Inland	12,000	1.6
S. Chicago, Ill.	Intl Harvester	72,000	9.8
Owensboro	Jessop	84,000	11.5
Ft. Wayne, Ind.	Joslyn Stainless	6,000	.8
Fontana, Calif.	Kaiser	9,700	1.3
Portland, Ore.	Oregon Steel	15,000	2.1
Lowellville, Ohio	Sharon	26,000	3.6
TOTAL U. S.		731,300	100.0

Tube Rounds: As mentioned before, tube rounds are, in effect, a specialized type of billet which is intended for piercing or boring in the manufacture of seamless tubing or piping. They are generally manufactured on a billet mill, and are considered hot rolled, semi-finished steel products.

In some cases, the tube round is manufactured on a bar mill in which case it is commonly referred to as a bar round.

The American Iron and Steel Institute product classification lists the tube round as a separate product class in spite of its close relationship to the billet. This may be some indication of the degree of importance of this product. The production facilities are indicated in Table 6. Shipment statistics are included in Table 4, page 12.

TABLE 6
Production of
Blanks, Tube Rounds or
Pierced Billets for Seamless Tubes

Location	Firm	Capacity	% US Total
Ambridge, Pa.	Armco	500,000	8.6
Beaver Falls, Pa.	Babcock & Wilcox	204,000	3.5
Lackawanna, N. Y.	Bethlehem	12,000	.2
Pueblo, Colo.	C F & I	300,000	5.1
Warren, Ohio	Copperweld	50,000	.9
E. Chicago, Ind.	Inland	10,000	.2
Aliquippa, Pa.	J & L	563,400	9.7
Allenport, Pa.	Pgh. Steel	306,000	5.2
S. Chicago, Ill.	Republic	326,000	5.6
Canton, Ohio	Timken	302,000	5.2
Duquesne, Pa.	USS (Cen Ops)	62,940	1.1
Gary, Ind.	" " "	115,920	2.0
S. Chicago, Ill.	" " "	18,120	.3
Lorain, Ohio	USS (Natl Tube)	1,216,920	20.9
McKeesport, Pa.	" " "	811,580	13.9
Ellwood, Pa.	" " "	203,300	3.5
Youngstown, Ohio	Y S & T	660,000	11.3
E. Chicago, Ind.	"	174,000	3.0
TOTAL U. S.		5,836,180	100.0*

* Column does not add to 100% because of rounding.

Skelp is a flat, semi-finished steel product in cut lengths or coils which has been hot rolled from either heated slabs or directly from ingots. It resembles hot rolled strip with square or slightly beveled edges. It is used for one purpose only, to make pipe or tubing by the furnace weld process. Such pipe is known as butt-weld or jumpweld pipe. Skelp is sized so that its width corresponds to the circumference of the pipe to be produced, and its gage equals the thickness of the pipe's walls. Skelp production facilities and markets are summarized in Tables 7 and 8.

TABLE 7

PRODUCTION OF SKELP

Location	Firm	Capacity	% US Total
Sparrows Point, Md.	Bethlehem	730,000	12.0
Ambridge, Pa.	Byers	3,000	.05
Aliquippa, Pa	J & L	127,200	2.1
Fontana, Calif.	Kaiser	537,500	8.9
Alton, Ill.	Lacledo	77,000	1.3
Lone Star, Texas	Lone Star (Includes H.R. Strip)	655,000	10.8
Youngstown, Ohio	Republic	1,000,000	16.5
Warren & Niles, Ohio	"	24,000	.4
Cleveland, Ohio	"	12,000	.2
Gadsden & Birmingham, Alabama	"	220,000	3.6
Elyria, Ohio	"	37,000	.6
Youngstown, Ohio	USS (Cen Ops)	377,580	6.2
Lorain, Ohio	USS (Natl Tube)	344,750	5.7
Fairless Hills, Pa.	" " "	449,890	7.4
Benwood, W. Va.	Wheeling	492,000	8.1
Campbell, Ohio	Y S & T	588,000	9.7
E. Chicago, Ind	"	396,000	6.5
TOTAL U. S.		6,070,920	100.0*

* Column does not add to 100% because of rounding.

TABLE 8

SHIPMENTS OF SKELP BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	26,658	64.9	.9
Contractor's products	382	.9	.01
Export	14,169	34.2	1.0
TOTAL	41,209	100.0	.06
To steel industry for conversion or resale	360,551	874.9	8.8

Wire Rods may be in cut lengths or coiled, plain or coated. They generally have a circular cross section which is a fraction of an inch in diameter. They may be similar to, but always smaller than, hot rolled bars.

All steel wire rod is hot rolled on a rod or bar mill from billets. While it is a finished product of the rolling mill, it is raw material for the wire mill where it is drawn into wire. Production and destination data are shown in Tables 9 and 10.

TABLE 9

PRODUCTION OF WIRE RODS

Location	Firm	Capacity	% US Total
Dunkirk, N. Y.	Allegheny Lud.	20,800	.3
Monessen, Pa.	Am Chain & Cable	68,500	.9
Baltimore, Md.	Armco	24,000	.3
Kansas City, Mo.	"	259,000	3.5
Houston, Texas	"	62,500	.9
Atlanta, Ga.	Atlantic Steel	76,000	1.0
Sparrows Point, Md.	Bethlehem	420,000	5.7
Johnstown, Pa.	"	350,000	4.8
Los Angeles, Calif.	"	82,000	1.1
Reading, Pa.	Carpenter Steel	17,100	.2
Pueblo, Colo.	C F & I	275,000	3.7
Tonawanda, N. Y.	"	234,000	3.2
Roebling, N. J.	"	169,700	2.3
Kokomo, Ind.	Continental Steel	300,000	4.1
Glassport, Pa.	Copperweld Steel	55,000	.7
Syracuse, N. Y.	Crucible	13,000	.2
Portsmouth, Ohio	Detroit Steel	200,000	2.7
Newark, N. J.	Driver Co.	5,000	.1
Pittsburgh, Pa.	Firth-Sterling	2,000	.03
Aliquippa, Pa	J & L	362,000	4.9
Ft. Wayne, Ind.	Joslyn Stainless	4,000	.05
Peoria, Ill.	Keystone Steel & Wire	480,000	6.5
Alton, Ill	Laclede	150,000	2.0
Sterling, Ill.	NW Steel & Wire	315,000	4.3
Monessen, Pa.	Pittsburgh Steel	230,000	3.1
Chicago, Ill.	Republic	201,000	2.7
Gadsden-Birmingham,Ala	"	118,000	1.6
N. Tonawanda, N. Y.	Seaway Steel	36,000	.5
Worcester, Mass.	USS (A S & W)	215,620	2.9
Donora, Pa	" "	508,940	6.9
Cleveland, Ohio	" "	638,500	8.7
Joliet, Ill.	" "	866,320	11.8
Duluth, Minn.	" "	111,240	1.5
Pittsburg, Calif.	USS (Col Geneva)	148,460	2.0
Fairfield, Ala.	USS (T C & I)	131,100	1.8
Bridgeville, Pa.	Univ-Cyclops	11,700	.2
Phillipsdale, R. I.	Washburn Wire	41,000	.6
Cortland, N. Y.	Wickwire Bros.	30,000	.4
Campbell, Ohio	Y S & T	108,000	1.5
TOTAL U. S.		7,340,480	100.0*

* Column does not add to 100% because of rounding.

TABLE 10

SHIPMENTS OF WIRE RODS BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	248,526	25.4	7.9
Forgings (other than auto)	146	.01	.02
Bolts, nuts, rivets & screws	289,889	29.6	27.1
Warehouses & distributors	110,825	11.3	.8
Construction & maintenance	29,239	3.0	.3
Contractor's products	36,317	3.7	1.0
Automotive	61,839	6.3	.4
Rail Transportation	21	.002	.001
Shipbuilding & marine equip	3	.0003	.0004
Aircraft	106	.01	.1
Oil & gas drilling	843	.09	.2
Mining, quarrying & lumbering	37	.004	.02
Agricultural	9,963	1.0	.8
Machinery, ind. equip & tools	145,727	14.9	3.5
Electrical machinery & equip	19,105	1.9	.9
Appl., utensils & cutlery	762	.08	.04
Other dom. & com. equipment	21,155	2.2	1.2
Containers	1,131	.1	.02
Ordnance & other military	74	.008	.06
Export	3,833	.4	.3
Non-classified shipments	725	.07	.04
TOTAL	980,266	100.0*	1.4
To steel industry for conversion or resale	303,015	30.9	7.4

* Column does not add to 100% because of rounding.

Structural shapes (heavy) includes all standard structural shapes or special sections with at least one dimension three inches or over. (Sections with all dimensions under three inches are called bars.) Note that "shape" is used interchangeably with "section" in describing forms of rolled material. An exception to this is that geometric shapes are called rounds, squares, hexagons, etc.

Sections are normally divided into two classes: structural and other. Structural shapes include:

Angles	Light Beams
Bulb Angles	Ship Channels
Car Channels	Special Sections
Center Sills	Stanchions
Channels	Standard Beams
Columns	Special Car Building Sections
H Beams	Tees
I Beams	Wide Flange Beams
Joists	Zees

Processes which are common to the manufacture of all the above shapes are (1) heating of a bloom, (2) rolling to proper contour and dimensions, and (3) cutting and straightening.

The term standard sections refers to beams, channels, etc. usually produced on conventional structural mills. Wide flange sections refers to beam and column sections having wider and heavier flanges than those of standard sections. These are generally rolled on wide-flange or universal type mills. Occasionally they are rolled on standard or conventional structural mills. Structural shapes are used in the fabrication of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes (see Table 12). Their production is indicated in Table 11.

TABLE 11

PRODUCTION OF STRUCTURAL SHAPES (HEAVY)

Location	Firm	Capacity	% US Total
Kansas City, Mo.	Armco	52,000	.6
Houston, Texas	"	81,300	1.0
Atlanta, Ga.	Atlantic Steel	28,000	.3
Bethlehem, Pa.	Bethlehem	2,226,000	27.1
Lackawanna, N. Y.	"	762,000	9.3
Johnstown, Pa.	"	18,000	.2
S. San Francisco, Cal.	"	73,000	.9
Los Angeles, Calif.	"	45,000	.5
Seattle, Wash.	"	40,000	.5
Pueblo, Colo.	Colo. F & I	60,000	.7
E. Chicago, Ind.	Inland	718,000	8.7
S. Chicago, Ill.	Intl Harvester	45,000	.5
Aliquippa, Pa.	J & L	233,600	2.8
Fontana, Calif.	Kaiser	117,000	1.4
Weirton, W. Va.	National	200,000	2.4
Sterling, Ill.	NW Steel & Wire (Includes plates)	264,000	3.2
Portland, Ore.	Oregon Steel Mills	16,500	.2
Union City, Calif.	Pacific States Steel	32,000	.4
Phoenixville, Pa.	Phoenix Steel	259,000	3.2
Birmingham, Ala.	H K Porter	7,000	.1
Geneva, Utah	USS (Col-Geneva)	108,480	1.3
Torrance, Calif.	" "	47,060	.6
Bessemer, Ala.	USS (T C & I)	19,200	.2
Fairfield, Ala.	" "	196,700	2.4
Clairton, Pa.	USS (Cen Ops)	397,860	4.8
Braddock, Pa.	" "	12,000	.1
Gary, Ind.	" "	188,220	2.3
Homestead, Pa.	" "	834,960	10.2
S. Chicago, Ill.	" "	1,125,060	13.7
Campbell, Ohio	Y S & T	6,000	.1
E. Chicago, Ind.	"	6,000	.1
TOTAL U. S.		8,218,940	100.0*

* Column does not add to 100% because of rounding.

TABLE 12

SHIPMENTS OF HEAVY STRUCTURAL
SHAPES BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting or processing	406	.01	.01
Warehouses & distributors	839,450	20.5	6.4
Construction & maintenance	2,080,141	50.8	24.4
Contractor's products	19,984	.5	.6
Automotive	52,892	1.3	.4
Rail Transportation	312,195	7.6	13.2
Shipbuilding & marine equip	96,777	2.4	15.1
Aircraft	2,246	.05	3.1
Oil & gas drilling	24,864	.6	4.6
Mining, quarrying & lumbering	29,023	.7	12.4
Agriculture	51,316	1.3	4.1
Machinery, ind. equip & tools	233,170	5.7	5.6
Electrical machinery & equip	19,949	.5	1.0
Appl., utensils & cutlery	670	.02	.04
Other dom. & com. equipment	3,065	.07	.2
Containers	173	.004	.003
Ordnance & other military	3,571	.09	2.8
Export	174,087	4.3	12.4
Non-classified shipments	146,556	3.6	7.2
TOTAL	4,090,535	100.0	5.9
To steel industry for conversion or resale	3,221	.08	.08

Sheet Piles, often known as steel piling, are rolled from blooms on a structural mill. This product should not be confused with wide flange beams which are similar in size and shape.

The American Iron and Steel Institute definition of this product is as follows: "Sheet piles are rolled sections with interlocking joints (continuous throughout the entire length of the piece) on each edge to permit being driven edge to edge to form continuous walls for retaining earth or water. Sheet piling sections include straight web, deep-arch, arch-web and Z-sections in graduated weights to meet various requirements of strength and service. H-Bearing Piles are wide flange structural shapes used as piling."

According to this definition, pipe which is used as piling is excluded from this product group. Sheet pile production and use is indicated in Tables 13 and 14.

TABLE 13

PRODUCTION OF STEEL SHEET PILING (ROLLED)

Location	Firm	Capacity	% US Total
Bethlehem, Pa.	Bethlehem	180,000	41.4
Lackawanna, N. Y.	"	120,000	27.6
E. Chicago, Ind.	Inland	3,500	.8
Homestead, Pa.	USS (Cen Ops)	93,000	21.4
S. Chicago, Ill.	" "	38,100	8.8
TOTAL U. S.		434,600	100.0

TABLE 14

SHIPMENTS OF SHEET PILES BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
Warehouses & distributors	43,371	12.7	.3
Construction & maintenance	269,561	79.1	3.2
Rail Transportation	429	.1	.02
Shipbuilding & marine equip	1,730	.5	.3
Mining, quarrying & lumbering	432	.1	.2
Ordnance & other military	16	.005	.01
Export	25,130	7.4	1.8
TOTAL	340,669	100.0	5.9

Plates are produced by hot rolling either heated slabs or ingots in a direct conversion process. They are classified by size limitations to distinguish them from sheet and strip. It is important to note that some flat, hot rolled, semi-finished steel products such as slabs, sheet, bars and skelp, are not classed as plates even though their weight and dimensions might be similar.

There are numerous types of plates, the names of which are often derived from the mills producing them, usually sheared, universal, continuous strip and, occasionally, bar mills.

Sheared plate is rolled between straight horizontal rolls and later trimmed on all edges. Universal plates (UM plates) are rolled simultaneously between both plain horizontal and vertical rolls and trimmed on the ends only.

Rolled floor plates are produced with a final pass through patterned rolls so that a raised figure is produced on the plate at regular intervals. Floor plates may also be plain plates with a grit impregnated surface.

Circles are circular plates which are sheared or torch cut from rectangular plate sections. Sketch plates are produced like circles and are of various shapes and sizes. Plate production and use is shown in Tables 15 and 16.

TABLE 15

PRODUCTION OF PLATES (SHEARED & UNIVERSAL)

Location	Firm	Capacity	% US Total
Riverdale Sta-Chgo,Ill	Acme	24,000	.2
Newport, Ky.	Acme-Newport	81,000	.7
Ivy Rock, Pa.	Allan Wood	189,000	1.7
Ashland, Ky.	Armco	240,000	2.2
Houston, Texas	"	636,900	5.8
Steelton, Pa.	Bethlehem	6,000	.1
Sparrows Point, Md.	"	1,074,000	9.8
Lackawanna, N. Y.	"	72,000	.7
Johnstown, Pa.	"	438,000	4.0
Seattle, Wash.	"	18,000	.2
Newcastle, Ind.	Borg-Warner	10,000	.1
Ambridge, Pa.	Am Byers	17,000	.2
" "	" (wrt. iron)	83,000	-
Pueblo, Colo.	Colo. F & I	7,000	.1
Claymont, Del.	" "	300,000	2.7
Midland, Pa.	Crucible	26,600	.2
Baltimore, Md	Eastern Stainless Steel Corp. (In HR sheets)		
Granite City, Ill.	Granite City	185,000	1.7
E. Chicago, Ind.	Inland	726,000	6.6
S. Chicago, Ill.	Intl Harvester	57,000	.5
Washington, Pa.	Jessop	15,000	.1
Aliquippa, Pa.	J & L	7,200	.1
Pittsburgh, Pa.	"	157,200	1.4
Cleveland, Ohio	"	66,000	.6
Fontana, Calif.	Kaiser	527,300	4.8
Longview, Texas	LeTourneau	85,500	.8
Lone Star, Texas	Lone Star	50,000	.5
Coatesville, Pa.	Lukens	790,000	7.2
Sterling, Ill.	NW Steel & Wire (with structural shapes)		
Harrisburg, Pa.	Phoenix Steel	288,000	2.6
Warren & Niles, Ohio	Republic	14,000	.1
Cleveland, Ohio	"	100,000	.9
Gadsden-Birmingham,Ala	"	24,000	.2
Farrell, Pa.	Sharon	120,000	1.1
Lowellville, Ohio	"	36,000	.3
Lockport, N. Y.	Simonds Saw & Steel	400	.004
Geneva, Utah	USS (Col Geneva)	657,220	6.0
Bessemer, Ala.	USS (T C & I)	8,200	.07
Fairfield, Ala.	" "	462,600	4.2
Clairton, Pa.	USS (Cen Ops)	13,560	.1
Gary, Ind.	" "	562,440	5.1
Homestead, Pa.	" "	1,756,080	16.0
Dravosburg, Pa.	" "	6,060	.06
S. Chicago, Ill.	" "	972,240	8.8
Youngstown, Ohio	" "	45,240	.4
Bridgeville, Pa.	Univ-Cyclops (In HR sheets)		
Steubenville, Ohio	Wheeling Steel	25,000	.2
Campbell, Ohio	Y S & T	30,000	.3
E. Chicago, Ind.	"	60,000	.5
TOTAL U. S.		10,986,740	100.0*

* Column does not add to 100% because of rounding.

TABLE 16

SHIPMENTS OF PLATES BY
MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	119,939	2.1	3.8
Forgings (other than auto)	11,594	.2	1.2
Bolts, nuts, rivets & screws	13,588	.2	1.3
Warehouses & distributors	880,384	15.1	6.7
Construction & maintenance	1,431,578	24.6	16.8
Contractor's products	168,917	2.9	4.7
Automotive	341.755	5.9	2.4
Rail Transportation	543,177	9.3	23.0
Shipbuilding & marine equip	464,781	8.0	72.4
Aircraft	5,399	.1	7.6
Oil & gas drilling	23,154	.4	4.3
Mining, quarrying & lumbering	54,461	.9	23.2
Agriculture	116,111	2.0	9.2
Machinery, ind. equip & tools	1,094,598	18.8	26.3
Electrical machinery & equip	140,561	2.4	6.9
Appl., utensils & cutlery	11,848	.2	.6
Other dom. & com. equipment	20,258	.3	1.1
Containers	22,238	.4	.4
Ordnance & other military	29,439	.5	23.1
Export	74,826	1.3	5.3
Non-classified shipments	250,550	4.3	12.3
TOTAL	5,819,156	100.0	8.5
To steel industry for conversion or resale	512,486	8.8	12.5

Rails are classified into two categories as follows:

1 - Standard tee rails over 60 pounds per yard. This is the standard rail used in main line railroad service. It is rolled from either a bloom or directly from an ingot. The term "tee" is used to designate the general shape of this steel section which consists of three major areas; the head, web, and base. "Tee" also distinguishes these rails from girder rails which are included in the second category.

2 - Rails - all other. This classification includes tee rails 60 pounds per yard and under, and also all other rails regardless of their weight.

Light tee rails may be manufactured by re-rolling heavy rails or by directly rolling them from billets. These rails may be produced in the bar mill, light structural mill, or a special light rail mill. They might be found in a coal or ore mine, or perhaps on an industrial track.

The following four types of rails are included in the "all other" group. First, is the crane track rail whose function is described by its name. It is rolled in the same manner as the standard tee rail. The second and third types are the girder guard rail and the girder grooved rail, both of which are used in street railway construction. Finally, there is the electric contact rail which is often the source of power for an electric railway operation. Production and usage is shown in Tables 17 and 18.

TABLE 17-A

RAILS

Geographic Distribution of Production by 1960 annual NT rated capacity

I. Rails (over 60 pounds per yard)

Location	Firm	Capacity	% US Total
Steelton, Pa.	Bethlehem	216,000	15.5
Lackawanna, N. Y.	"	96,000	6.9
Pueblo, Colo.	C F & I	350,000	25.1
Gary, Ind.	USS (Cen Ops)	510,000	36.5
Ensley, Ala.	USS (T C & I)	223,600	16.0
TOTAL U. S.		1,395,600	100.0

TABLE 17-B

II. Rails (60 pounds or less per yard)

Location	Firm	Capacity	% US Total
Johnstown, Pa.	Bethlehem	6,000	5.5
Pueblo, Colo.	C F & I	8,000	7.3
Huntington, W. Va.	H K Porter	10,000	9.1
Williamsport, Pa.	Sweet's Steel	57,000	51.8
Ensley, Ala.	USS (T C & I)	3,200	2.9
Braddock, Pa. (Thompson Works)	USS (Cen Ops)	19,080	17.4
Gary, Ind.	" "	6,660	6.1
TOTAL U. S.		109,940	100.0

TABLE 18-A

SHIPMENTS OF STANDARD TEE RAILS
BY MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	733	.12	.02
Warehouses & distributors	7,334	1.2	.06
Construction & maintenance	30,111	5.1	.4
Rail Transportation	495,738	84.0	21.0
Shipbuilding & marine equip	39	.007	.006
Mining,quarrying & lumbering	6,752	1.1	2.9
Machinery, ind. equip & tools	850	.1	.02
Export	48,482	8.2	3.4
TOTAL	590,039	100.0	.9

TABLE 18-B

SHIPMENTS OF RAILS, OTHER BY
MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
Warehouses & distributors	10,505	25.0	.08
Construction & maintenance	12,236	29.1	.1
Rail Transportation	6,170	14.7	.3
Shipbuilding & marine equip	338	.8	.05
Mining, quarrying & lumbering	6,733	16.0	2.9
Machinery, ind. equip & tools	3,644	8.7	.09
Ordnance & other military	6	.01	.005
Export	2,182	5.2	.2
Non-classified shipments	244	.6	.01
TOTAL	42,058	100.0	.06
To steel industry for conversion or resale	34	.08	.0008

Joint Bars are defined as follows by the AISI: "Joint bars (sometimes referred to as splice bars, angle bars, or fish plates) are members used in fastening together the ends of abutting rails in the formation of continuous track. Two bars comprise one joint."

This product may be rolled from either billets or blooms. Following such rolling, the section of joint bar is cut into convenient long lengths and sent to the joint bar shop for processing into finished joint bars. The finishing may be done in three ways; (1) by cold working, (2) by hot working, and (3) by hot working and then immersing in oil for cooling. This last mentioned method produces the highest quality product and most joint bars used in main line rail service are produced in this manner. Production and destination statistics appear in Tables 19 and 20. Table 19-A indicates productive facilities for intermediate products in the family of track accessories.

TABLE 19

PRODUCTION OF TRACK ACCESSORIES,
(SPLICE CARS AND OTHER RAIL JOINTS)

Location	Firm	Capacity	% US Total
Steelton, Pa.	Bethlehem	18,000	5.3
Lackawanna, N. Y.	"	8,400	2.5
Pueblo, Colo.	C F & I	50,000	14.7
Joliet, Ill	USS (A S & W)	150,000	44.0
Fairfield, Ala.	USS (T C & I)	62,900	18.5
Braddock, Pa.	USS (Cen Ops)	51,500	15.1
TOTAL U.S.		340,800	100.0*

* Column does not add to 100% because of rounding.

TABLE 19-A

LONG JOINT OR SPLICE BARS & TIE PLATE BARS

Geographic Distribution of Production by 1960 annual NT rated capacity

Location	Firm	Capacity	% US Total
Steelton, Pa.	Bethlehem	90,000	16.9
Lackawanna, N. Y.	"	32,000	6.0
Seattle, Wash.	"	9,000	1.7
Pueblo, Colo.	Colo. F & I	120,000	22.5
Troy, N. Y.	Poor & Co.	12,000	2.3
Williamsport, Pa.	Sweet's Steel	(Included in HR bars)	
Richmond, Va.	Tredegar Co.	20,000	3.8
Torrance, Calif.	USS (Col-Geneva)	14,300	2.7
Fairfield, Ala.	USS (T C & I)	80,000	15.0
Braddock, Pa.	USS (Cen Ops)	12,780	2.4
Gary, Ind.	" "	142,500	26.8
TOTAL U. S.		532,580	100.0*

* Column does not add to 100% because of rounding.

TABLE 20

SHIPMENTS OF JOINT BARS BY
MARKET CLASSIFICATION-1959

Market Classfication	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	208	.7	.01
Warehouses & distributors	1,038	3.3	.008
Construction & maintenance	1,864	5.9	.02
Rail Transportation	25,280	80.6	1.1
Mining, quarrying & lumbering	569	1.8	.2
Machinery, ind. equip & tools	81	.3	.002
Export	2,154	6.9	.2
Non-classified shipments	180	.6	.009
TOTAL	31,374	100.0	.05
To steel industry for conversion or resale	3,398	10.8	.08

Tie Plates are fabricated from hot rolled steel sections punched and sheared either hot or cold. The tie plate serves the following functions: (1) distributes the rail load over the tie, (2) gives the rail the desired cant, (3) tends to hold the rails to the gage, and (4) protects the tie.

The AISI definition of this product is as follows: "Tie plates (also known as riser and slide plates) are members used in track construction between the base of the rail and wooden ties. They have a rail seat and one or two shoulders, and are generally punched with holes for spikes. Two tie plates are used on each tie - one under each rail." Production and distribution statistics are shown in Tables 21 and 22.

TABLE 21

PRODUCTION OF TRACK ACCESSORIES (TIE PLATES)

Location	Firm	Capacity	% US Total
Steelton, Pa.	Bethlehem	66,000	11.2
Lackawanna, N. Y.	"	21,600	3.7
Seattle, Wash.	"	9,000	1.5
Pueblo, Colo.	Colo. F & I	150,000	25.4
Torrance, Calif.	USS (Col-Geneva)	45,070	7.6
Fairfield, Ala.	USS (T C & I)	150,200	25.4
Braddock, Pa.	USS (Cen Ops)	17,000	2.9
Gary, Ind.	" "	131,500	22.3
TOTAL U. S.		590,370	100.0

TABLE 22

SHIPMENTS OF TIE PLATES BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	16	.01	.001
Warehouses & distributors	339	.2	.003
Construction & maintenance	2,916	2.0	.03
Rail Transportation	126,274	88.1	5.4
Mining,quarrying&lumbering	887	.6	.4
Machinery, ind.equip&tools	22	.02	.001
Export	12,803	8.9	.9
Non-classified shipments	5	.003	.0002
TOTAL	143,262	100.0	.2
To steel industry for conversion or resale	189	.1	.004

Track Spikes are defined by the AISI as follows: "Track spikes are of two types, cut spikes and screw spikes. Cut track spikes consist of a body or shank approximately square with a head forged at the top end and a wedge-shaped point cut at the bottom end. They are used to hold rails and tie plates in place on wooden ties.

Screw-track spikes consist of a square tapered head, a round collar or shoulder and a body or shank threaded to a rather coarse pitch. They are used principally for securing the tie plates to the ties." Tables 23 and 24 indicate production facilities and shipments of this item respectively.

TABLE 23

PRODUCTION OF TRACK ACCESSORIES (TRACK SPIKES)

Location	Firm	Capacity	% US Total
Jersey City, N. J.	Ames & Co.	18,000	7.2
Kansas City, Mo.	Armco	24,000	9.6
Lebanon, Pa.	Bethlehem	24,000	9.6
Seattle, Wash.	"	4,000	1.6
Pueblo, Colo.	Colo. F & I	20,000	8.0
E. Chicago, Ind.	Inland	24,000	9.6
Pittsburgh, Pa.	J & L	36,000	14.4
Youngstown, Ohio	Republic	20,000	8.0
S. Chicago, Ill.	"	15,000	6.0
Richmond, Va.	Tredegar Co.	6,000	2.4
Fairfield, Ala.	USS (T C & I)	30,000	12.0
Campbell, Ohio	Y S & T	14,400	5.8
E. Chicago, Ind.	"	14,400	5.8
TOTAL U. S.		249,800	100.0

TABLE 24

SHIPMENTS OF TRACK SPIKES
BY MARKET CLASSIFICATION -1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	161	.3	.005
Warehouses & distributors	5,359	10.2	.04
Construction & maintenance	1,356	2.6	.02
Rail Transportation	44,277	84.5	1.9
Mining, quarrying&lumbering	367	.7	.2
Machinery, ind. equip & tools	55	.1	.001
Ordnance & other military	1	.002	.0008
Export	813	1.6	.06
TOTAL	52,389	100.0	.08
To steel industry for conversion or resale	2	.004	.00005

Wheels (rolled and forged) are classified according to the method of manufacture. They may be fabricated from several pieces by riveting or welding, or else made in one piece and called "solid iron or steel wheels." Very large or very small wheels are usually fabricated. Solid steel wheels are either cast in liquid form, or wrought from solid blocks.

Wrought steel wheel is the name applied to wheels formed from a suitable metal block by forging alone, or by forging and rolling. The original steel block is formed by one of three processes. (1) By casting metal for each wheel as an individual ingot, (2) by cutting the blanks directly from ingots, or (3) by either hot shearing or cold cutting the blanks from a round bloom.

The "wheel blank" used in the production of the wrought wheel is prepared from the steel block by press forging in the general form of a wheel. The final shaping of the wheel is then completed by rolling the blank in the wheel mill which may be one of two types designated from the position in which the blank is held during the rolling; (1) a vertical mill, or (2) a horizontal mill.

Another method of classification of wheels is according to their intended service. The classifications to follow apply to the various types of wrought steel wheels:

1 - Industrial car wheels; mine cars, RR hand cars, mill buggies.
2 - Industrial locomotive wheels, for use in mines and plants.
3 - Crane track wheels, single or double flange.
4 - Railroad freight car wheels
5 - High duty wheels

The AISI defined wheels as, "circular sections produced by a combination of press forging and rolling operations. Type of wheels include one wear or multiple wear for freight car service and multiple wear for all types of locomotives, passenger car, electric railway, industrial, and mine car service.

Cast steel wheels, mentioned earlier, are excluded from the Institute's classification of wheels. It includes basically rolled and forged wheels. For production locations and markets serviced, see Tables 25 and 26-A.

Axles according to the AISI definiton are "commonly hammer forgings of round section made from rolled blooms. They are of many designs, some having tapered bodies and others having parallel sides between the wheel seats. Plain or roller bearings are used on all types of axles."

See production and shipment statistics for this item in Tables 25, 26-B.

TABLE 25

PRODUCTION OF WHEELS AND AXLES (ROLLED)

Geographic Distribution of Production by 1960 annual NT rated capacity

Location	Firm	Capacity	% US Total
Butler, Pa. (wheels)	Armco	46,800	9.7
Burnham, Pa. (wheels)	Baldwin, Lima, Hamilton	66,000	13.7
Johnstown, Pa.	Bethlehem	152,000	31.5
Oakmont, Pa.	Edgewater Steel	62,000	12.8
Gary, Ind.	USS (Cen Ops)	87,000	18.0
Homestead, Pa.	" "	69,240	14.3
TOTAL U. S.		483,040	100.0

TABLE 26-A

SHIPMENTS OF WHEELS BY
MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipment of This Item	% of This Item of Total Steel Shipped To Each Market
Warehouses & distributors	6	.003	.0005
Construction & maintenance	3,902	1.7	.05
Rail Transportation	219,230	94.2	9.3
Shipbuilding & marine equip	38	.02	.01
Oil & gas drilling	46	.02	.009
Mining, quarrying&lumbering	1,022	.4	.4
Machinery, ind. equip & tools	6,900	3.0	.2
Electrical machinery & equip	56	.02	.003
Export	1,549	.7	.1
TOTAL	232,749	100.0	.3

TABLE 26-B

SHIPMENTS OF AXLES BY
MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
Construction & maintenance	1,391	1.4	.02
Rail Transportation	92,747	95.6	3.9
Mining, quarrying&lumbering	916	.9	.4
Machinery, ind. equip & tools	520	.5	.01
Export	1,528	1.6	.1
TOTAL	97,102	100.0	.1

Hot Rolled Bars by AISI definition are, "rounds, squares, hexagons, etc., and small standard bar size shapes (angles, channels, tees, etc.) with all dimensions under 3 inches..."

Bars are rolled in the bar mill from slabs and are then, in most cases, transported to another mill for finishing into various narrow flat rolled products. Production and distribution statistics for hot rolled bar products are indicated in Tables 27 and 28-A.

Reinforcing Bars by AISI definition, "...includes all concrete reinforcing bars (whether plain or deformed) rolled from new billet steel, rail steel or axle steel including straight lengths and coils.

Concrete reinforcing bars are hot rolled bar products consisting of plain rounds, or special deformed sections used to resist tension, compression, temperature and/or shear stresses for the reinforcing of concrete. They range in size from $\frac{1}{4}$ inch rounds up to and including $2\frac{1}{4}$ inch rounds."

Concrete reinforcing bars are shipped from the mill in straight sections which may either be cut right in the mill to the desired length, or else shipped in long lengths which will be re-cut for fabrication at a later time.

Like other merchant bar products, reinforcing bars are generally shipped in groups which are bound together by varying means. Each group is known as a bundle or a lift. Production and shipment statistics are shown in Tables 27 and 28-B.

TABLE 27

PRODUCTION OF HOT ROLLED BARS

U.S. Totals

1,273,680	LS-Light Shapes
2,919,630	C-Concrete Reinforcement
14,155,820	O-All Other

Location	Firm	Prod.	Capacity	% US Total
Chicago, Ill.	Acme	O	30,000	.2
Watervliet, N.Y.	Allegheny-Lud.	LS	1,280	.1
Dunkirk, N.Y.	" "	O	19,800	.1
Watervliet, N.Y.	" "	O	55,000	.4
Cincinnati, O.	Am. Compressed Stl.	C	12,000	.4
Jersey City, N.J.	Ames & Co.	O	30,000	.2
Baltimore, Md.	Armco	LS	31,200	2.4
Kansas City, Mo.	"	LS	103,000	8.1
Houston, Tex.	"	LS	25,700	2.0
Kansas City, Mo.	"	C	103,000	3.5
Sand Spring, Okla.	"	C	119,000	4.1
Houston, Tex.	"	C	28,900	1.0
Kansas City, Mo.	"	O	170,000	1.2
Houston, Tex.	"	O	90,500	.6
Atlanta, Ga.	Atlantic Steel	LS	40,000	3.1
"	"	C	60,000	2.1
"	"	O	50,000	.4
Bethlehem, Pa.	Beth.	LS	114,000	9.0
"	"	O	174,000	1.2
Steelton, Pa.	"	O	48,000	.3
Lebanon, Pa.	"	C	24,000	.8
"	"	O	172,000	1.2
Sparrows Pt., Md.	"	C	240,000	8.2
Lackawanna, N.Y.	"	LS	18,000	1.4
"	"	C	120,000	4.1
"	"	O	654,000	4.6
Johnstown, Pa.	"	C	60,000	2.1
"	"	O	606,000	4.3
San Francisco, Calif.	"	LS	30,000	2.4
"	"	C	56,000	1.9
"	"	O	66,000	.5
Los Angeles, Calif.	"	LS	15,000	1.2
"	"	C	112,000	3.8
"	"	O	102,000	.7
Seattle, Wash.	"	LS	10,000	.8
"	"	C	60,000	2.1
"	"	O	62,000	.4
Chicago Heights, Ill.	Borg Warner	LS	24,000	1.9
"	"	C	30,000	1.0
"	"	O	49,000	.3
Franklin, Pa.	"	LS	46,000	3.6
"	"	C	12,000	.4

TABLE 27 (cont'd.)

Location	Firm	Prod.	Capacity	% US Total
Braeburn, Pa.	Braeburn Stl.	O	3,200	.02
Tonawanda, N.Y.	Buffalo Stl.	C	25,000	.9
"	"	O	55,000	.4
Ambridge, Pa.	Byers Co.	O	5,000	.04
Reading, Pa.	Carpenter Stl.	O	37,730	.3
Bridgeport, Conn.	"	O	34,640	.2
Lemont, Ill.	Ceco Stl.	C	98,000	3.4
"	"	O	42,000	.3
Pueblo, Colo.	CF&I	LS	20,000	1.6
"	"	O	60,000	.4
"	"	C	70,000	2.4
Chicago Heights, Ill.	Columbia Tool Stl.	O	1,800	.01
Kokomo, Ind.	Continental	C	8,000	.3
Warren, O.	Copperweld	O	353,350	2.5
"	"	C	1,000	.03
Midland, Pa.	Crucible	O	717,300	5.1
Pittsburgh, Pa.	"	O	74,900	.5
Syracuse, N.Y.	"	O	41,200	.3
Pittsburgh, Pa.	Firth Sterling	O	5,000	.04
Tampa, Fla.	Fla. Steel	LS	5,000	.4
"	"	C	40,000	1.4
Dearborn, Mich.	Ford	O	84,000	.6
Honolulu, H.I.	Hawaiian Stl.	O	45,000	.3
E. Chicago, Ind.	Inland	LS	80,000	6.3
"	"	C	70,000	2.4
"	"	O	438,000	3.1
Chicago Heights, Ill.	"	LS	65,000	5.1
"	"	C	5,000	.2
"	"	O	20,000	.1
S. Chicago, Ill.	Int. Harvester	LS	33,000	2.6
"	"	O	563,000	4.0
Avis, Pa.	Jersey Shore Stl.	C+O	40,000	1.4
Washington, Pa.	Jessop	O	6,700	.05
Owensboro, Ky.	"	O	24,000	.2
Alquippa, Pa.	J&L	LS	50,800	4.0
"	"	O	62,800	.4
Pittsburgh, Pa.	"	LS	14,400	1.1
"	"	O	499,900	3.5
"	"	C	48,000	1.6
Warren, Mich.	"	O	137,200	.9
Ft. Wayne, Ind.	Joslyn Stnls. Stl.	O	18,000	.1
Emeryville, Calif.	Judson	O	14,000	.1
"	"	C	40,000	1.4
Fontana, Calif.	Kaiser	O	55,800	.4
"	"	C	50,000	1.7
Knoxville, Tenn.	Knoxville Iron	LS	13,900	1.1
"	"	O	51,500	.4
"	"	C	23,100	.8
Alton, Ill.	Laclede	LS	6,500	.5
"	"	C	9,000	.3
"	"	O	20,000	.1

Location	Firm	Prod	Capacity	%US Total
Madison, Ill.	Laclede	LS	25,000	2.0
"	"	C	120,500	4.1
"	"	O	13,000	.1
Latrobe, Pa.	Latrobe Stl.	O	6,500	.05
McKeis Rocks, Pa.	Lockhart I&S	O	60,000	.4
Milton, Pa.	Merritt-Chapman	C	90,000	3.1
Jackson, Miss.	Miss. Steel	LS	15,000	1.2
"	"	C	30,000	1.0
St. Louis, Mo.	Mo. Rolling Mill	LS	24,000	1.9
"	"	C	15,000	.5
Ecourse, Mich.	National	LS	240,000	18.8
Medford, Mass.	Northern Stl.	C	15,000	.5
Seattle, Wash.	NW Stl. Rolling Mls	O	13,500	.1
"	"	C	31,500	1.1
Sterling, Ill.	NW Stl. & Wire	C&O	288,000	2.0
Okla. City, Okla.	Okla. Steel	C&LS	15,000	.5
Portland, Ore.	Oregon Stl. Mills	LS	5,500	.4
"	"	C	75,000	2.6
"	"	O	13,000	.1
Union City, Calif.	Pacific States Stl.	LS	16,000	1.3
"	"	C	70,000	2.4
"	"	O	26,000	.2
Joliet, Ill.	Phoenix Mfg. Co.	O	158,000	1.1
"	"	C	38,000	1.3
Marion, O.	Pollak Stl.	LS	25,000	2.0
"	"	C	60,000	2.1
"	"	O	20,000	.1
Birmingham, Ala.	H.K. Porter	LS	67,400	5.3
"	"	C	40,000	1.4
"	"	O	18,000	.1
Huntington, W.Va.	"	LS	72,000	5.7
"	"	C	20,000	.7
"	"	O	10,000	.1
Youngstown	Republic	O+C + Tube Rounds	272,000	1.9
Warren & Niles	"	" " "	38,000	.3
Massillon & Canton, O.	"	" " "	1,094,000	7.7
Cleveland, O.	"	" " "	450,000	3.2
Buffalo & Troy, N.Y.	"	" " "	691,000	4.9
S. Chicago, Ill.	"	" " "	688,000	4.9
Gadsden & Birmingham, Ala.	"	" " "	132,000	.9
Cleveland, O.(Balt.&Nut.Div)	"	" " "	130,000	.9
Roanoke, Va.	Roanoke Elect.Steel	O	20,000	.1
N. Tonawanda, N.Y.	Seaway Stl.	O	30,000	.2
Kenosha, Wis.	Simmons Co.	O&LS	24,000	.2
San Francisco, Calif.	"	O&LS	9,000	.1
"	"	C	3,000	.1
Lockport, N.Y.	Simonds Saw & Stl.	O	6,000	.04
Birmingham, Ala.	Southern Ele. Stl.	C	30,000	1.0
"	"	O	15,000	.1
"	"	LS	15,000	1.2
Los Angeles, Calif.	Southwest Stl. Rlg.	C&LS	120,000	4.1

TABLE 27 (cont'd.)

Location	Firm	Prod.	Capacity	% US Total
Seguin, Tex.	Structural Metals Inc	O	18,000	.1
Williamsport, Pa.	Sweets Stl.	O+C + Tie plates	47,000	.3
Fort Worth	Texas Steel	O	15,000	.1
"	"	C	70,000	2.4
Canton, O.	Timken Roller Bearing	O	146,000	1.0
Gambrinus, O.	"	O	7,500	.05
Richmond, Va.	Tredegar Co.	O	15,000	.1
"	"	C	3,500	.1
Duluth, Minn.	USS (AS&W)	O	38,810	.3
Geneva, Utah	" (Col.Gen.)	O	1,990	.01
Pittsburg , Calif.	"	O	25,490	.2
"	"	C&LS	47,300	1.6
Torrance, Calif.	"	O	46,220	.3
"	"	C&LS	52,270	1.8
Bessemer, Ala.	USS (TCH)	O	73,100	.5
Fairfield, Ala.	" "	O	89,700	.6
"	" "	C	130,900	4.5
Clairton, Pa.	USS (Cen Ops.)	O	117,900	.8
Duquesne, Pa.	" "	O	494,760	3.5
"	"	C	71,280	2.4
Fairless Hills, Pa.	" "	O	190,620	1.3
"	" "	C	94,020	3.2
Gary, Ind.	" "	O	1,286,880	9.1
"	" "	C	101,160	3.5
S. Chicago, Ill.	" "	O	167,820	1.2
Youngstown, O.	" "	O	676,380	4.8
"	" "	C	34,200	1.2
Budgeville, Pa.	Univ-Cyclops	O	11,500	.08
Titusville, Pa.	"	O	8,900	.06
Lalrobe, Pa.	Vanadum Alloys	O	34,000	.2
Monaca, Pa.	"	O	29,930	.2
Commerce, Calif.	Wesco Steel Rolling	C	12,000	.4
"	"	LS	4,000	.3
"	"	O	4,000	.03
Campbell, O.	YS&T	LS	12,000	.9
"	"	O	150,000	1.1
"	"	C	3,000	.1
E. Chicago, Ind.	"	LS	6,000	.5
"	"	O	318,000	2.2
"	"	C	3,000	.1
TOTAL U. S.			18,349,130	300.0*

* Except for rounding, this column adds to 300% because it indicates 100% of U. S. capacity for each of the 3 product groups; light shapes, concrete reinforcement, and all other hot rolled bars.

TABLE 28A

SHIPMENTS OF HOT ROLLED BARS BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	239,691	3.5	7.7
Forgings (other than auto)	381,365	5.5	39.9
Bolts, nuts, rivets & screws	374,709	5.4	25.0
Warehouses & distributors	1,134,400	16.4	8.7
Construction & maintenance	565,007	8.1	6.6
Contractor's products	154,456	2.2	4.3
Automotive	2,025,598	29.2	14.3
Rail Transportation	233,123	3.4	9.9
Shipbuilding & marine equip	30,713	.4	4.8
Aircraft	15,265	.2	21.4
Oil & gas drilling	123,087	1.8	22.8
Mining, quarrying & lumbering	95,482	1.4	40.6
Agriculture	367,285	5.3	29.0
Machinery, ind. equip & tools	745,369	10.7	17.9
Electrical mach & equip	109,096	1.6	5.3
Appliances, utensils & cutlery	14,263	.2	.8
Other dom. & com. equipment	56,820	.8	3.1
Containers	3,756	.05	.06
Ordnance & other military	16,423	.2	12.9
Export	62,704	.9	4.5
Non-classified shipments	187,679	2.7	9.2
TOTAL	6,936,291	100.0*	10.0
To steel industry for conversion or resale	66,306	9.6	16.3

* Column does not add to 100% because of rounding.

TABLE 28B

SHIPMENTS OF CONCRETE REINFORCING BARS BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	3,823	.2	.1
Warehouses & dist.	619,943	28.5	4.8
Cons't. & Maintenance	1,011,031	46.5	11.9
Contractor's prod.	41,865	1.9	1.2
Rail Trans.	723	.03	.03
Shipbuilding & marine equip.	113	.005	.02
Oil & gas drilling	327	.02	.06
Mining, quarrying & lumbering	1,381	.06	.6
Agriculture	227	.01	.02
Appliances, utensils & cutlery	224	.01	.01
Other dom. & com. equipment	125	.006	.01
Export	13,389	.6	1.0
Non-classified shipments	480,291	22.1	23.7
TOTAL	2,173,462	100.0*	3.1
To steel industry for conversion or resale	3,465	.2	.1

* Column does not add to 100% because of rounding.

Cold Finished Bars. This classification includes all cold drawn or cold rolled flats, rounds, or special sections including straight lengths and coils. It also includes centerless ground, plain ground and polished or turned bars.

According to AISI definition, cold finished bars are, "...rounds, squares, hexagons, octagons, flats, and other hot rolled bar sections which have been singly or in combination, cold drawn, cold rolled, turned, ground, or polished and straightened to improve mechanical and physical properties and for surface finish and dimensional accuracy. In general, this term applies to all cold reduced carbon, alloy and special steels over 9/16 inches in diameter if round or square, or if flat, 12 inches and narrower and .250 inches or thicker. Cold reduced flat material, .2499 inches or thinner, is classified as strip if over $\frac{1}{2}$ inch wide, or wire if $\frac{1}{2}$ inch and under."

Cold rolled or cold finished bars are classified as finished products and are one of four general categories of cold rolled, finished steel products; the remaining three being strip, sheet, and black plate. See Tables 29, 30-A and 30-B for production and shipments statistics.

TABLE 29

PRODUCTION OF COLD FINISHED BARS

Location	Firm	Capacity	% US Total
Dunkirk, N.Y.	Allegheny Lud.	15,300	.4
Watervliet, N.Y.	"	11,200	.3
Baltimore, Md.	Armco	21,600	.5
Branford, Conn.	Atlantic Wire	1,200	.03
Bethlehem, Pa.	Beth.	39,000	.9
Lackawanna, N.Y.	"	36,000	.9
Harvey, Ill.	Bliss & Laughlin	235,000	5.6
Buffalo, N.Y.	"	165,000	4.0
Detroit, Mich.	"	55,000	1.3
Mansfield, O.	"	40,000	1.0
Los Angeles, Calif.	"	48,000	1.1
Seattle, Wash.	"	4,000	.1
Reading, Pa.	Carpenter Steel	27,000	.6
Bridgeport, Conn.	"	26,200	.6
Carnegie, Pa.	Columbia Stl.& Shafting	135,000	3.2
Readville, Mass.	Compressed Stl.Shafting	20,000	.5
Warren, O.	Copperweld	55,100	1.3
Midland, Pa.	Crucible	113,400	2.7
Pittsburgh, Pa.	"	7,800	.2
Syracuse, N.Y.	"	46,000	1.1
Harrison, N.J.	"	2,200	.05
Cumberland, Md.	Cumberland Stl.	50,000	1.2
Cleveland, O.	Cuyahoga	25,000	.6
Massillon, O.	Eaton Mfg.	27,000	.6
Pittsburgh, Pa.	Firth Sterling	2,800	.07
Youngstown, O.	Fitzsimons Stl.	50,000	1.2
Green Bay, Wis.	Ft. Howard Stl. & Wire	21,600	.5
Morton Grove, Ill.	H.M. Harper	7,800	.2
S. Chicago, Ill.	Int. Harvester	58,240	1.4
Pittsburgh, Pa.	J & L	300,000	7.2
Warren, Mich.	"	120,300	2.9
Hammond, Ind.	"	50,000	1.2
Willimantic, Conn.	"	30,000	.7
Ft. Wayne, Ind.	Joslyn Mfg.	25,000	.6
Spring City, Pa.	Keystone Drawn	40,000	1.0
Hammond, Ind.	LaSalle Steel	310,000	7.4
Latrobe, Pa.	Latrobe Steel	1,500	.04
Beaver Falls, Pa.	Moltrup Steel	72,000	1.7
Franklin Park, Ill.	Welsen Steel	150,000	3.6
Los Angeles, Calif.	Pacific Tube Co.	40,000	1.0
Plymouth, Mich.	Pilgrim Drawn	150,000	3.6
Detroit, Mich.	Plymouth Steel	50,000	1.2
W. Aliquippa, Pa.	H.K. Porter	3,000	.07
Camden, N.J.	Precision Drawn Stl.	77,000	1.8
Massillon, O.	Republic	183,000	4.4
Beaver Falls, Pa.	"	108,000	2.6
Gary, Ind.	"	140,000	3.4
Hartford, Conn.	"	55,000	1.3

TABLE 29 (cont'd)

Location	Firm	Capacity	% US Total
Los Angeles, Calif.	Republic	24,000	.6
Monaca, Pa.	Superior Drawn Stl.	36,000	.9
Gambrinus, O.	Timken Roller Bearing	125,000	3.0
Cleveland, O.	USS (Am.Steel & Wire)	84,510	2.0
Duquesne, Pa.	USS (Central Operators)	7,500	.2
Chicago, Ill.	" "	3,400	.1
Bridgeville, Pa.	Universal-Cyclops Stl.	7,350	.2
Latrobe, Pa.	Vanadium-Alloys Stl.	3,000	.1
Monaca, Pa.	" "	7,400	.2
Elyria, O.	Western Auto. Mach.Screw	52,500	1.3
Ambridge, Pa.	Wyckoff Stl. Co.	243,500	5.8
Chicago, Ill.	"	146,400	3.5
Newark, N.J.	"	63,300	1.5
Putnam, Conn.	"	30,500	.7
Youngstown, O.	Y S & T Co.	90,000	2.2
TOTAL U. S.		4,175,600	100.0*

* Column does not add to 100% because of rounding

TABLE 30-A

SHIPMENTS OF COLD FINISHED BARS BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	2,480	.2	.08
Forgings (other than auto.)	1,613	.1	.2
Bolts, nuts, rivets, & screws	40,224	2.9	3.8
Warehouses & dist.	419,228	29.8	3.2
Cons't. & maintenance	4,846	.3	.06
Contractor's Prod.	19,525	1.4	.5
Automotive	322,433	22.9	2.3
Rail Transportation	4,942	.4	.2
Shipbuilding & marine equip.	3,307	.2	.5
Aircraft	8,903	.6	12.5
Oil & gas drilling	10,161	.7	1.9
Mining, quarrying & lumbering	4,029	.3	1.7
Agriculture	73,288	5.2	5.8
Mach., ind. equip. & tools	336,877	23.9	8.1
Electrical machinery & equip	35,598	2.5	1.7
Appl., utensils & cutlery	32,394	2.3	1.8
Other dom. & com. equip	33,401	2.4	1.8
Containers	1,915	.1	.03
Ordnance & other military	6,354	.5	5.0
Export	4,341	.3	.3
Non-classified shipments	42,952	3.0	2.1
TOTAL	1,408,811	100.0	2.0
To steel industry for conversion or resale	746	.05	.02

TABLE 30-B

SHIPMENTS OF TOOL STEEL BARS * BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	401	.4	.01
Forgings (other than auto.)	1,060	1.1	.1
Bolts, nuts, rivets & screws	12	.01	.001
Warehouses & dist.	14,662	15.3	.1
Cons't. & maintenance	416	.4	.005
Contractor's products	29	.03	.001
Automotive	901	.9	.006
Rail Transportation	3	.003	.0001
Shipbuilding & marine equip.	1	.001	.0002
Aircraft	88	.09	.1
Oil & gas drilling	455	.5	.08
Mining, quarrying & lumbering	787	.8	.3
Machinery, ind. equip & tools	18,738	19.5	.5
Electrical machinery & equip	38	.04	.002
Appl., utensils & cutlery	243	.3	.01
Other dom. & com. equip	145	.2	.01
Ordnance & other military	80	.08	.06
Export	247	.3	.02
Non-classified shipments	57,763	60.1	2.8
TOTAL	96,069	100.0	.1
To steel industry for conversion or resale	4,807	5.0	.1

*This product is actually a specialized type of cold finished bar. The term Tool Steel is actually a grade of steel and is described in the "Grade Definitions" section of this study. Since most tool steel is rolled into bars, the AISI shows shipments of this product separately.

Tubular Steel Products. In addition to being a very important segment of all steel products, the tubular group is also made up of numerous specific products. This collection of products may be classified (1) according to usage, or (2) according to method of manufacture.

The AISI prefers to classify tubular products according to usage. This method is the best for our purposes as well, so it will be dealt with first and in greater detail than the classification by manufacturing method.

The Iron and Steel Institute defines tubular products in general as all pipe and tubing regardless of method of manufacture, coatings, end finish or couplings. It draws a distinction between pipe which is generally produced to fractional sizes, and tubing which is usually produced to decimal measurements. The Institute then sub-divides tubular products into five classifications; (1) standard pipe, (2) oil country goods, (3) line pipe, (4) mechanical tubing, and (5) pressure tubing. The following are the AISI definitions of these five tubular products:

'Standard pipe (from 1/8 to 12 inches usual size range) is ordinarily used for low pressure conveyance of air, steam, gas, water, oil or other fluids and for miscellaneous purposes other than generally designated for Oil Country Goods and Line Pipe, Mechanical or Pressure Tubing. It is usually produced to ASTM (American Society for Testing Materials) specifications.

The classification standard pipe includes the following items:

Ammonia pipe
Bedstead tubing
Conduit pipe (for rigid conduit)
Conduit tubing (for electrical metallic tubing)
Driven well pipe
Drive pipe
Dry kiln pipe
Dry pipe for locomotives
English gas and steam pipe
Furniture pipe
Ice machine pipe
Mechanical service pipe
Nipple pipe
Pipe for piling
Pipe for plating and enameling
Pump pipe
Signal pipe
Standard pipe couplings and coupling stock
Structural pipe
Turbine pump pipe
Water main pipe
Water well casing
Water well reamed and drifted pipe

2-Oil country goods includes:

Drill pipe	Oil country tubing
Oil country casing	Oil country tubular goods
	Couplings and coupling stock

"Oil country goods is pipe used in wells in oil and gas industries, consisting of casing, tubing and drill pipe. Casing is the structural retainer for the walls of oil or gas wells, It covers sizes $4\frac{1}{2}$ to 20 inches actual O.D. inclusive. Tubing is used within casing of oil wells to convey oil to ground level and ordinarily includes sizes 1.050 to 4.500 inches O.D. inclusive. Drill pipe is used to transmit power to a rotary drilling tool below ground level and covers sizes 2-3/8 to 6-5/8 inches actual O.D. inclusive. Oil country goods are produced to A.P.I. (American Petroleum Institute) specifications.

3-Line pipe includes:

Line pipe	Line pipe couplings and
Water main pipe	coupling stock

"Line pipe is used for transmission of gas, oil, or water. It covers sizes 1/8 to 36 inches O.D. inclusive. It is produced to A.P.I. (American Petroleum Institute) or A.W.W.A. (American Water Works Association) specifications."

4-"Mechanical tubing is welded or seamless tubing used for a variety of mechanical purposes. It is produced in a large number of shapes and sizes and of varied chemical composition in size 3/16 to 10-3/4 inches O.D. inclusive. It is produced to exact O.D. and decimal wall thickness in sizes $\frac{1}{2}$ to 6 inches O.D. inclusive. It is not normally produced to meet any specification other than that required to meet the end use. It is produced to exact O.D. and decimal wall thickness."

Mechanical tubing includes these items:

Aircraft tubing	Furniture tubing
Air frame tubing	Mechanical tubing
Automotive tubing	Precision pump tubes
Bearing tubes	Structural tubing

Excluded from this classification are furniture pipe or structural pipe.

5-"Pressure tubing is used to convey fluids at elevated temperatures or pressures, or both, and is suitable to be subjected to heat applications. It is produced to exact O.D. and decimal wall thickness in sizes $\frac{1}{2}$ to 6 inches O.D. inclusive, usually to standard specifications such as A.S.T.M. (American Society for Testing Materials). It includes boiler and superheater tubes, heat exchanger and condenser tubes."

Pressure tubing includes the following items:

Air heater tubes	Oil-still tubes
Boiler tubes	Pressure piping
Header tubes	Pressure tubing couplings and coupler stock
Heat exchanger and condenser tubes	Superheater tubes

This will conclude the description of tubular products according to final use. Most of the above descriptive material has been extracted from The American Iron and Steel Institute's "Instructions for Reporting Shipment Statistics." It is useful to understand what is included in the various classifications of tubular products and what the uses of these products are because this particular method of describing tubular products that will be used to determine where and how these items are distributed.

As mentioned before, another method of classifying tubular products is according to method of manufacture. This method is useful for discerning the manufacturing methods used and thus for purposes of tracing the flows of the semi-finished steel products used in the production. In addition, this method of classification is used to determine the capacities of mills that produce these products. For these reasons, a brief description of tubular products defined by manufacturing process will follow. The six types of pipe to be considered here will be (1) buttweld, (2) lapweld, (3) seamless, (4) electricweld, (5) spiralweld, and (6) gasweld.

The first of the classifications of tubular products by method of manufacture is buttweld (also known as jumpweed) pipe. Tubular products made by this process are drawn from the semi-finished product, skelp, which has been discussed earlier. (See the section dealing with skelp.) It will be recalled that skelp is a special form of hot rolled strip with square or slightly beveled edges, the width of which corresponds to the circumference of the pipe, and the gage to the thickness of the pipe's walls.

Basically, the manufacturing of buttweld pipe consists of drawing pre-heated skelp through a butt-welding furnace where a bell folds the skelp into a circular section, and the seam is then welded closed. The pipe is finished by rolling to obtain proper size, straightening, etc. This process is used to produce pipe 1/8 to 4 inches in diameter.

Another type of tubular product according to method of manufacture is lapweld pipe. This process is generally used to manufacture pipe $1\frac{1}{4}$ to 30 inches in diameter.

Lapweld pipe is processed in the same general manner as buttweld pipe, that is, it is drawn from skelp. The difference in the two methods is that in the manufacture by lapweld process, the skelp is pre-formed, bent to pipe shape, right in the skelp mill. This pre-formed skelp is then sent to the lapweld pipe mill where it is reheated and the overlaping edges are welded closed.

The third classification of pipe by method of manufacture is seamless pipe. This process is second in importance in terms of the capacity which is dedicated to it. The only pipemaking process which is greater in national capacity than seamless is the electric-weld process.

The seamless process for manufacture of tubular products may be carried out in one of two ways. First, there is what is known as the piercing process; secondly, there is the cupping process. When the piercing process is employed, a solid round bar or billet usually known as a tube round, is heated and pierced. Following this procedure, the pierced round is wrought (that is, formed by a mechanical process rather than by a casting process) to the prescribed diameter and wall thickness. This process is generally used to produce pipe and tubes which when hot finished, have a diameter of from $1\frac{1}{2}$ to 26 inches. The piercing process is also used to produce cold drawn pipe and tubing. In this case, the dimensions will include diameter sizes up to 10-3/4 inches.

In the cupping process, a solid round plate is pressed through cup shaped dies. The resulting pipe may be from 3 to 20 inches in diameter.

The seamless method of producing tubular products has greatly grown in the years since about 1925. Presently, pipes and tubing of many kinds and for a variety of uses are produced in this manner. Also, tubular goods made from alloy and other special steels are manufactured by the seamless process.

The most important method of producing pipe, in terms of tonnage capacity dedication, effective January 1, 1960, is the electricweld process. This process is most often used to produce pipes which are larger than may practically be manufactured in another way. The reason for this will become obvious when the process has been described.

In simple terms, the electricweld process of pipe manufacture is merely the bending and welding of steel plates in the shape of pipes. The size of pipes made in this way is almost unlimited because if the pipe circumference exceeds the width of a plate, then two or more plates may be welded together. Following welding, the pipes are expanded to the proper diameter and the ends are finished so they will be straight. The plate which is used as a raw material for this type of pipe is any rolled-steel plate which is able to be welded.

Pipes made by this process are commonly used for water lines, gas mains, tanks, etc.

Spiralwelding is a process for producing pipe which consists of welding a sheet or plate in a continuous spiral for the entire length of the pipe section. The result is a section which resembles, at least in type of construction, a section of "BX" cable.

There is an advantage to the producer in using this type of production. Namely, that a large diameter pipe may be produced from a very narrow piece of steel by merely increasing the length of the spiral; whereas the production of pipe of similar diameter by other means would require a very wide piece of sheet or "skelp" which many mills are not set up to roll.

Spiralweld pipe has the advantage of being able to withstand extremes of hot and cold without much expansion or contraction. This quality is made possible because the continuous weld which runs around the pipe tends to absorb the expanding and contracting forces in the steel.

Spiralwelding is used by relatively few companies with Armco being the leader in the field.

Gaswelding is a special process which is practiced by a few companies, and which produces a specialized product consumed mainly by the automobile industry for brake fluid and gasoline tubing.

The gasweld process is used to produce tubing rather than pipe, the difference being that tubing is of a very small diameter.

Generally, gasweld tubing is produced in diameters of from 3/16 to 5/8 of an inch. The process consists of starting with strip steel which has a width about twice the circumference of the tubing to be made. This strip is then bent under pressure so that the tubing thus formed has walls consisting of a double layer of steel. The two layers are fused together by heat as the tubing is drawn. It is then welded shut in a gas furnace. This process is slightly similar to the buttweld process mentioned earlier, except that the skelp in the buttweld process is over-lapped only enough for welding purposes, while the strip in the gasweld process is wrapped twice so that the walls of the tube have double thickness.

Tables showing production facilities for pipe are as follows:

Table 31-A Buttweld
" " B Lapweld
" " C Seamless
" " D Electricweld
" " E Spiralweld
" " F Gasweld

Tables showing shipments are as follows:

Table 32-A Standard pipe and tubing
" " B Oil Country goods
" " C Line pipe
" " D Mechanical tubing
" " E Pressure tubing

TABLE 31-A

PRODUCTION OF PIPE & TUBING (BUTTWELD)

Location	Firm	Capacity	% US Total
Etina, Pa.	Armco	250,000	6.6
Sparrows Pt., Md.	Beth.	360,000	9.4
Pittsburgh, Pa.	A.M. Byers	47,000	1.2
Butler, Pa.	Fretz-Moon Tube	70,000	1.8
Aliquippa, Pa.	J & L	420,000	11.0
Fontana, Calif.	Kaiser	120,000	3.1
Alton, Ill.	Laclide	100,000	2.6
Pittsburgh, Pa.	Pgh. Tube	42,000	1.1
Youngstown, O.	Republic	410,000	10.8
Sharon, Pa.	Sawhill Tubular	120,000	3.1
Adrian, Mich.	Service Stl. Div.	1,000	.03
Sharon, Pa.	Sharon Tube Co.	48,000	1.3
San Francisco, Calif.	Simmons Co.	3,100	.1
Lorain, O.	USS (NAT. TUBE)	405,000	10.6
Fairless Hills, Pa.	" "	407,000	10.7
Wheatland, Pa.	Wheatland Tube	120,000	3.1
Benwood, W.Va.	Wheeling Steel	360,000	9.4
Campbell, O.	Y S & T	180,000	4.7
E.Chicago, Ind.	"	348,000	9.1
TOTAL U. S.		3,811,100	100.0*

TABLE 31-B

PRODUCTION OF PIPE & TUBING (LAPWELD)

Location	Firm	Capacity	% US Total
Pittsburgh, Pa.	A.M. Byers	90,000	100.0
TOTAL U. S.		90,000	100.0

* Column does not add to 100% because of rounding.

TABLE 31-C

PRODUCTION OF PIPE & TUBING (SEAMLESS)

Location	Firm	Capacity	% US Total
Watervliet, N. Y.	Allegheny Ludlum	3,600	.1
Ambridge, Pa.	Armco	400,000	7.7
Beaver Falls, Pa.	Babcock & Wilcox	192,000	3.7
Milwaukee, Wisc.	" "	84,000	1.6
Pueblo, Colo.	Colo. F & I	240,000	4.6
Carnegie, Pa.	ColumbiaSteel&Shafting	7,700	.1
Scottdale, Pa.	" " "	300	.01
Shelby, Ohio	Copperweld	48,000	.9
Philadelphia, Pa.	Ivins Steel Tube	2,000	.04
Aliquippa, Pa.	J & L	480,000	9.2
Anniston, Ala.	Kilby Steel	50,000	1.0
S. Lyon, Mich.	Mich. Seamless Tube	32,000	.6
Rosenberg, Texas	" " "	24,000	.5
Phoenixville, Pa.	Phoenix Steel	75,000	1.4
Allenport, Pa.	Pittsburgh Steel	250,000	4.8
S. Chicago, Ill.	Republic	276,000	5.3
Adrian, Mich.	Service Steel Div.	2,500	.04
Norristown, Pa.	Superior Tube	2,200	.04
Canton, Ohio	Timken Roller Bearing	75,000	1.4
Gambrinus, Ohio	" "	132,000	2.5
Wooster, Ohio	" " "	50,000	1.0
Wallington, N. J.	Am. Metal Prod. Co.	30,000	.6
Lorain, Ohio	USS (Natl Tube)	929,800	17.9
McKeesport, Pa.	" "	613,400	11.8
Ellwood, Pa.	" "	254,790	4.9
Gary, Ind.	" "	218,830	4.2
Campbell, Ohio	Y S & T	480,000	9.2
E. Chicago, Ind.	"	240,000	4.6
TOTAL U. S.		5,193,120	100.0*

* Column does not add to 100% because of rounding.

TABLE 31-D

PRODUCTION OF PIPE & TUBING (ELECTRIC WELD)

Location	Firm	Capacity	% US Total
Toledo, Ohio	AP Parts Corp.	30,000	.4
Campbell, Ky.	Acme Steel	95,000	1.3
Detroit, Mich.	American Metal Prod.	32,000	.5
Piqua, Ohio	Armco	27,000	.4
Etna, Pa.	"	7,200	.1
Rochester, Mich.	Avon Tube Division	8,400	.1
Alliance, Ohio	Babcock & Wilcox	60,000	.8
Maspeth, N. Y.	Berger Machine Prod.	20,000	.3
Sparrows Point, Md.	Bethlehem	264,000	3.7
Hometown, Pa.	Bundy Tubing	12,000	.2
Baton Rouge, La.	Cal-Metal Pipe Corp.	200,000	2.8
Los Angeles, Calif.	Calif. Steel & Tube	6,000	.1
Clinton, Iowa	Central Steel Tube Co.	30,000	.4
Claymont, Del.	Colo. F & I	150,000	2.1
Shelby, Ohio	Copperweld	8,400	.1
E. Troy, Wisc.	Crucible	4,000	.1
Greenville, Pa.	Damascus Tube	750	.01
Azusa, Calif.	Electroweld Steel	7,200	.1
Sturgis, Mich.	Formed Tubes, Inc.	12,000	.2
Los Angeles, Calif.	Harris Tube, Inc.	20,000	.3
Sinking Springs, Pa.	Hofmann Industries, Inc.	15,000	.2
Madison Hgts., Mich.	James Steel & Tube	14,000	.2
N. Miami, Fla.	" " "	4,000	.1
Aliquippa, Pa.	J & L	216,000	3.1
Oil City, Pa.	"	50,000	.7
Napa, Calif.	Kaiser	540,000	7.6
Fontana, Calif.	"	292,000	4.1
Galveston, Texas	Kane Boiler Works	24,000	.3
Mattoon, Ill.	Kuehene Mfg. Co.	8,000	.1
Alton, Ill.	Laclede	24,000	.3
Lone Star, Texas	Lone Star	520,000	7.4
Niles, Ohio	Mahoning Valley Steel	24,000	.3
Evanston, Ill.	Mark & Co.	32,000	.5
Dallas, Texas	Master Tank & Welding	100,000	1.4
Piqua, Ohio	Miami Ind., Inc.	35,000	.5
Monroe, Mich.	Monroe Auto Equipment	12,000	.2
Hartwell, Ga.	" " "	9,000	.1
Ludington, Mich.	Motyka Metal Prod.	4,000	.1
Chicago, Ill.	Nikoh Tube	100,000	1.4
Youngstown, Ohio	Republic	440,000	6.2
Gadsden-Birmingham, Ala	"	216,000	3.1
Cleveland, Ohio	"	88,000	1.2
Detroit, Mich.	"	43,000	.6
Brooklyn, N. Y.	"	60,000	.8
Elyria, Ohio	"	42,000	.6
Rome, N. Y.	Rome Mfg.	18,000	.3
Sharon, Pa.	Sawhill Tubular	60,000	.8
Adrian, Mich.	Service Steel Div.	500	.01
Detroit, Mich.	Shwayder Bros.	10,000	.1

TABLE 31-D (Cont.)

Location	Firm	Capacity	% US Total
Milwaukee, Wisc.	Smith Corp.	564,000	8.0
Houston, Texas	Smith Corp. of Texas	480,000	6.8
N. Birmingham, Ala.	Southeastern Metals,Inc	20,000	.3
Sheffield, Ala.	Southern Fabricating	25,000	.4
Azusa, Calif.	Southern Pipe Div.	85,000	1.2
Detroit, Mich.	Standard Tube	99,000	1.4
Shelby, Ohio	" "	15,000	.2
Los Angeles, Calif.	State Industries	5,500	.1
Norristown, Pa.	Superior Tube	450	.01
Cicero, Ill.	Taylor Forge & Pipe	12,000	.2
Houston, Texas	Tex-Tube, Inc.	60,000	.8
Toledo, Ohio	Toledo Steel Tube	25,000	.4
Owatonna, Minn.	Tubeco, Inc.	3,000	.04
Torrance, Calif.	Tubecraft	18,000	.3
Union, N. J.	Union Steel	4,000	.1
Orange, Texas	USS (AmBridge)	350,000	5.0
Provo, Utah	USS (Consol West.)	533,100	7.5
McKeesport, Pa.	USS (Natl Tube)	257,000	3.6
Gary, Ind.	" "	34,640	.5
Cleveland, Ohio	United Tube Corp. ofOhio	15,000	.2
Warren, Ohio	VanHuffel Tube Corp.	84,000	1.2
Orwell, Ohio	Welded Tubes, Inc.	4,800	.1
Wheatland, Pa.	Wheatland Tube Co.	10,000	.1
Delain, N. J.	" " "	18,000	.3
Ft. Smith, Ark.	Williams Mfg. Co.	2,000	.02
Campbell, Ohio	Y S & T	12,000	.2
Youngstown, Ohio	"	336,000	4.8
TOTAL U. S.		7,066,940	100.0

TABLE 31-E

PRODUCTION OF PIPE & TUBING (SPIRALWELD)

Location	Firm	Capacity	% US Total
Campbell, Ky.	Acme	15,000	4.9
Middletown, O.	Armco	144,000	46.9
Chicago, Ill.	Naylor Pipe Co.	28,000	9.1
Gary, Ind.	Taylor Forge & Pipe	48,000	15.6
Carnegie, Pa.	"	36,000	11.7
Fontana, Calif.	"	36,000	11.7
TOTAL U. S.		307,000	100.0*

TABLE 31-F

PRODUCTION OF PIPE & TUBING (GASWELD)

Location	Firm	Capacity	% US Total
Wallingford, Conn.	Allegheny Lud.	2,300	6.6
Detroit, Mich.	Bundry Tubing	27,500	79.0
Alton, Ill.	Laclede	5,000	14.4
TOTAL U. S.		34,800	100.0

* Column does not add to 100% because of rounding.

TABLE 32-A

SHIPMENTS OF STANDARD PIPE & TUBING
BY MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	33,560	1.5	1.1
Warehouses & distributors	1,589,572	71.5	12.1
Construction & maintenance	112,404	5.1	1.3
Contractor's products	132,495	6.0	3.7
Automotive	3,334	.2	.02
Rail Transportation	4,679	.2	.2
Shipbuilding & marine equip	5,823	.3	.9
Aircraft	33	.001	.05
Oil & gas drilling	6,894	.3	1.3
Mining,quarrying&lumbering	2,063	.1	.9
Agriculture	30,530	1.4	2.4
Machinery,ind. equip & tools	23,924	1.1	.6
Electrical machinery & equip	221,365	10.0	10.8
Appl., utensils & cutlery	6,944	.3	.4
Other dom. & com. equipment	6,282	.3	.3
Containers	2,772	.1	.04
Ordnance & other military	187	.01	.1
Export	18,138	.8	1.3
Non-classified shipments	18,525	.8	.9
TOTAL	2,210,524	100.0	3.2
To steel industry for conversion or resale	31,264	1.4	.8

TABLE 32-B

SHIPMENTS OF OIL COUNTRY GOODS
BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	3,491	.2	.1
Warehouses & distributors	1,780,091	86.1	13.6
Construction & maintenance	15,356	.7	.2
Oil & gas drilling	200,495	9.7	37.1
Export	67,228	3.3	4.8
TOTAL	2,066,661	100.0	3.0
To steel industry for conversion or resale	107,047	5.2	2.6

TABLE 32-C

SHIPMENTS OF LINE PIPE BY
MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	1,765	.06	.06
Warehouses & distributors	601,238	21.5	4.6
Construction & maintenance	1,958,993	70.0	23.0
Contractor's products	11,639	.4	.3
Automotive	457	.02	.003
Rail Transportation	419	.01	.02
Shipbuilding & marine equip	8,620	.3	1.3
Aircraft	93	.003	.1
Oil & gas drilling	81,241	2.9	15.0
Mining, quarrying&lumbering	2,839	.1	1.2
Agriculture	419	.01	.03
Machinery, ind. equip & tools	14,059	.5	.3
Electrical machinery & equip	1,919	.07	.1
Appl., utnesils & cutlery	38	.001	.002
Other dom. & com. equipment	750	.03	.04
Ordnance & other military	232	.01	.2
Export	73,732	2.6	5.2
Non-classified shipments	44,084	1.6	2.2
TOTAL	2,802,537	100.0	4.0
To steel industry for conversion or resale	19,076	.9	.5

TABLE 32-D

SHIPMENTS OF MECHANICAL TUBING
BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	11,360	1.2	.4
Bolts, nuts, rivets, screws	1	.0001	.0001
Warehouses & distributors	121,590	12.5	.9
Construction & maintenance	5,772	.6	.07
Contractor's products	35,811	3.7	1.0
Automotive	170,163	17.5	1.2
Rail Transportation	990	.1	.04
Shipbuilding & marine equip	451	.05	.07
Aircraft	2,465	.3	3.5
Oil & gas drilling	20,658	2.1	3.8
Mining, quarrying&lumbering	2,756	.3	1.2
Agriculture	29,858	3.1	2.4
Machinery, ind. equip & tools	227,743	23.5	5.5
Electrical machinery & equip	9,319	1.0	.5
Appl., utensils & cutlery	12,205	1.3	.7
Other dom. & com. equipment	19,406	2.0	1.1
Containers	1,706	.2	.03
Ordnance & other military	3,724	.4	2.9
Export	7,016	.7	.5
Non-classified shipments	287,350	30.0	14.2
TOTAL	970,344	100.0	1.4
To steel industry for conversion or resale	36,474	3.8	.9

TABLE 32-E

SHIPMENTS OF PRESSURE TUBING
BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	1,087	.4	.03
Bolts, nuts, rivets & screws	91	.03	.008
Warehouses & distributors	69,016	26.5	.5
Construction & maintenance	6,103	2.3	.07
Contractor's products	2,814	1.1	.08
Automotive	13,233	5.1	.09
Rail Transportation	136	.1	.01
Shipbuilding & marine equip	361	.1	.06
Aircraft	127	.05	.2
Oil & gas drilling	1,657	.6	.3
Mining, quarrying&lumbering	9	.003	.004
Agriculture	761	.3	.06
Machinery, ind. equip&tools	44,522	17.1	1.1
Electrical machinery & equip	222	.1	.01
Appl., utensils & cutlery	3,182	1.2	.2
Other dom. & com. equip	34	.01	.002
Containers	12	.004	.0002
Ordnance & other military	274	.1	.2
Export	1,330	.5	.09
Non-classified shipments	115,645	44.4	5.7
TOTAL	260,616	100.0	.4
To steel industry for conversion or resale	1,670	.6	.04

Wire and wire products (general). The family of wire and wire products is manufactured from wire rods which have been hot rolled, in most cases, from billets. The rods are commonly coiled and used in coiled form in the wire-producing mill. Usually, wire rods are round in cross section and have a diameter exceeding 7/32 of an inch. This size rod is used to produce wire in sizes less than 7/32 inch in diameter. If the wire to be produced is to have a diameter more than 7/32 inch, the semi-finished rod will naturally be of a larger size.

The procedure by which most wire products are manufactured is known as drawing. This is, in effect, a form of cold working which consists of pulling the rod, or reduces wire size, through a tapered hole in a die. The actual treatment varies according to the end product which is being manufactured, and then according to a variance in plant procedure. It is not important to explain the details of the various methods for purposes of this directory. It is important, however, to have an understanding of what the various wire products are. The following definitions of the wire products are those of the American Iron and Steel Institute:

Drawn Wire. This classification includes, "All coarse round, fine round and shaped merchant wire and manufacturers' wire, whether plain, galvanized or coated. Drawn wire generally includes the broad range of products produced by cold drawing hot rolled wire rods through a die or series of dies to improve surface finish, dimensional accuracy, and varying mechanical and physical properties. Drawn wire generally covers those found and shaped cold drawn products .999 inches in diameter and smaller, and all flat cold reduced steel $\frac{1}{2}$ inches wide and narrower and .2499 inches or thinner."

"Wire nails and staples includes a wide range of plain or coated products fabricated from wire into nails and staples of various designs and uses.

"Wire, barbed and twisted is a wire product, consisting of a wire or strand of twisted wires, armed with barbed or sharp points.

"Wire, woven wire fence is a wire product used for fencing and is composed of horizontal or lateral wires which are secured in position with vertical or diagonal stay wires.

"Twisted barbless wire is a wire product, consisting of two strands of twisted wire without barbs or sharp points.

"Wire bale ties are wire products consisting of cut lengths of wire with a loop on one end, used to bind large closely pressed packages of material for shipping or storage.

"Wire, baling wire is a special grade of annealed wire usually 14½ gage, furnished in rewound coils to fit the specifications for the various types of automatic hay baling machines."

The preceding seven wire classifications are those which are generally used by the American Iron and Steel Institute. These seven broad classifications are perhaps too general since wire products are extremely numerous and are used for a great variety of purposes. For example, galvanized wire is the basis for another line of wire products which serves special purposes and is not mentioned per se in the above classification.

For purposes of reporting manufacturing capacity, the Iron and Steel Institute has defined wire products using a slightly different breakdown than that previously mention. A seven product classification is still used but the seven products are as follows: (1) plain wire, (2) galvanized wire, (3) nails and staples, (4) barbed wire, (5) woven fence, (6) reinforcing fabric and netting, and (7) bale ties. It will be noted that this classification is similar to the one mentioned earlier, but there is some variance. For example, the first classification combines plain and galvanized wire into one group called drawn wire. The listing above breaks down the drawn wire group into two parts, (1) plain, and (2) galvanized wire. These two breakdowns are self-explanatory, plain wire being that which is uncoated, and galvanized wire being that which is coated with some light coating for purposes of either protection or decoration. Over 1/3 of all wire drawn is given some coating.

Of the remaining categories in this particular method of breakdown, it will be noted that (3) nails and staples, (4) barbed wire, (5) woven fence, and (7) bale ties are exactly the same as those mentioned by the same names in the previous grouping. Number 6, reinforcing fabric and netting, is a new category, however. This material is an electric welded wire-fabric which is used mainly to reinforce concrete which goes into such things as roads, dams, pipe, posts, and slabs. The fabric consists of longitudinal and transverse wires which are fixed in position and welded at the contact points. This material is sold in standard rolls which are 60 inches wide by 150 inches long. When the wire used is too heavy to be rolled, it is supplied in flat cut lengths.

Because of the vast number of forms that wire may take, the diverse uses to which it may be put, and the variety of methods by which it may be produced, the preceding methods of classification are not by any means the only ways in which wire and wire products can be classified; however, all types of wire are somewhere included in one of the categories mentioned above. The groupings mentioned are perhaps the most useful for our purposes, but in addition, wire may also be classified according to shape, compositions of steel, method of drawing, etc.

The following series of Tables indicates production statistics for wire and wire products by product:

Table 33-A Plain wire
" " B Galvanized wire
" " C Nails and staples
" " D Barbed wire
" " E Woven fence
" " F Reinforcing fabric and netting
" " G Bale ties

Shipment statistics are found in the Tables shown below:

Table 34-A Drawn wire
" " B Wire nails and staples
" " C Barbed and twisted wire
" " D Woven wire fence
" " E Bale ties and baling wire

TABLE 33-A

PRODUCTION OF WIRE & WIRE PRODUCTS (PLAIN WIRE)

Location	Firm	Capacity	% US Total
Monessen, Pa.	Am. Chain & Cable	92,000	1.3
Cleveland, Ohio	Angell Nail & Chaplet	22,000	.3
Baltimore, Md.	Armco	14,400	.2
Kansas City, Mo.	"	175,000	2.4
Houston, Texas	"	100,000	1.4
Kansas City, Mo.	"	66,000	.9
Atlanta, Ga.	Atlantic Steel	87,600	1.2
Branford, Conn.	Atlantic Wire Co.	24,000	.3
Fairhaven, Mass.	Atlas Tack Corp.	5,000	.1
Sparrows Point, Md.	Bethlehem	300,000	4.1
Johnstown, Pa.	"	236,000	3.3
Williamsport, Pa.	"	30,000	.4
Los Angeles, Calif.	"	60,000	.8
Uniontown, Pa.	Cavert Wire Co, Inc.	3,600	.05
New Brunswick, N. J.	Carpenter Steel	840	.01
Cedarburg, Wis.	CedarburgWireNail&Screw	1,200	.02
Chicago, Ill.	Chicago Steel & Wire	15,000	.2
Pueblo, Colo.	Colo. F & I	216,000	3.0
Tonawanda, N. Y.	"	245,180	3.4
S. San Francisco, Cal.	"	67,000	.9
Palmer, Mass.	"	80,400	1.1
Roebling, N. J.	"	169,700	2.3
Kokomo, Ind.	Continental Steel	265,000	3.7
Glassport, Pa.	Copperweld	53,640	.7
Cleveland, Ohio	Cuyahoga Steel & Wire	20,000	.3
Los Angeles, Calif.	Davis Wire & Cable	15,000	.2
Portsmouth, Ohio	Detroit Steel	135,000	1.9
Shelton, Conn.	Driscoll Wire	7,800	.1
Newark, N. J.	Driver Co.	2,000	.03
S. San Francisco, Cal.	Edwards Co.	13,500	.2
Blue Island, Ill.	Enterprise Wire Co.	28,000	.4
Georgetown, Conn.	Gilbert&Bennett Mfg.	23,200	.3
Ble Island, Ill.	" " "	7,000	.1
Morton Grove, Ill.	Harper Co.	2,600	.03
Newark, N. J.	Igoe Bros, Inc.	14,700	.2
Jacksonville, Fla.	Ivy Steel & Wire	15,000	.2
Aliquippa, Pa.	J & L	315,000	4.3
Warren, Mich.	"	3,000	.04
Ft. Wayne, Ind.	Joslyn Mfg.	6,000	.08
Peoria, Ill.	Keystone Steel & Wire	350,000	4.8
Crawfordsville, Ind.	" " "	80,000	1.1
Jacksonville, Fla.	" " "	20,000	.3
Alton, Ill.	Laclede	142,000	2.0
Kenosha, Wis.	Macwhyte Co.	19,500	.1
Buffalo, N. Y.	Madison Wire Co.	6,000	.08
Cockeysville, Md.	Md.Fine&SpecWireCo.	2,500	.03

(Continued)

TABLE 33-A (Cont.)

Location	Firm	Capacity	% US Total
Akron, Ohio	National-Standard Co.	10,000	.1
Los Angeles, Calif.	" " "	1,000	.01
Niles, Mich.	" " "	28,000	.4
Dixon, Ill.	" " "	7,000	.1
Worcester, Mass.	" " "	15,000	.2
Millbury, Mass.	New Eng.HighCarbonWire	14,400	.2
Sterling, Ill.	Northwestern Steel&Wire	358,600	4.9
Monessen, Pa.	Pittsburgh Steel	324,000	4.5
Worcester, Mass.	" "	18,000	.2
Akron, Ohio	" "	11,700	.2
Los Angeles, Calif.	" "	5,280	.07
Prospect Park, Pa.	H K Porter	3,500	.05
Holyoke, Mass.	"	4,000	.06
Riverside, N. J.	"	3,600	.05
Worcester, Mass.	Reed & Prince Mfg.	10,500	.1
Baltimore, Md.	Reid-Avery Co.	16,000	.2
S. Chicago, Ill.	Republic	168,000	2.3
Gadsden-Birmingham,Ala	"	110,000	1.5
Cleveland, Ohio	"	56,000	.8
Berkeley, Calif.	Rods, Inc.	6,000	.1
Tonawanda, N. Y.	Seaway Steel	24,000	.3
Fostoria, Ohio	Seneca Wire & Mfg.	19,000	.3
Sherman, Texas	Sherman Steel & Wire	2,900	.04
Rahns, Pa.	Techalloy Co.	5,000	.1
Union, Ill.	" "	1,500	.02
Worcester, Mass.	Thompson Wire	12,000	.2
New Brighton, Pa.	Townsend Co.	27,000	.4
Worcester, Mass.	USS (A S & W)	150,240	2.1
Donora, Pa.	" "	344,330	4.7
Cleveland, Ohio	" "	401,290	5.5
Joliet, Ill.	" "	360,600	5.0
Duluth, Minn.	" "	156,530	2.1
Waukegan, Ill.	" "	424,970	5.9
Trenton, N. J.	" "	60,390	.8
New Haven, Conn.	" "	34,460	.5
Pittsburg, Calif.	USS (Col-Geneva)	143,670	2.0
Fairfield, Ala.	USS (T C & I)	171,800	2.4
Bridgeville, Pa.	Univ-Cyclops	6,000	.1
Phillipsdale, R. I.	Washburn Wire	4,700	.1
New York, N. Y.	" "	16,000	.2
Elyria, Ohio	WesternAutoMachineScrew	12,000	.2
Cortland, N. Y.	Wickwire Bros.	12,000	.2
Chicago, Ill.	Wilson Steel & Wire	35,000	.5
Chicago, Ill.	Wire Sales Co.	25,000	.4
Worcester, Mass.	Wright Steel & Wire	15,000	.2
Campbell, Ohio	Y S & T	72,000	1.0
TOTAL U. S.		7,256,320	100.0*

* Column does not add to 100% because of rounding.

TABLE 33-B

PRODUCTION OF WIRE & WIRE PRODUCTS (GALVANIZED WIRE)

Location	Firm	Capacity	% US Total
Monessen, Pa.	Am. Chain & Cable	18,000	1.1
Kansas City, Mo.	Armco	35,000	2.2
Houston, Texas	"	24,000	1.5
Kansas City, Mo.	"	6,000	.4
Atlanta, Ga.	Atlantic Steel	31,000	1.9
Branford, Conn.	Atlantic Wire	1,800	.1
Sparrows Point, Md.	Bethlehem	90,000	5.6
Johnstown, Pa.	"	60,000	3.7
Los Angeles, Calif.	"	12,000	.7
Chicago, Ill.	Chicago Steel & Wire	12,000	.7
Pueblo, Colo.	Colo. F & I	60,000	3.7
Tonawanda, N. Y.	"	11,700	.7
S. San Francisco, Cal.	"	14,500	.9
Palmer, Mass.	"	3,640	.2
Roebling, N. J.	"	25,000	.5
Kokomo, Ind.	Continental Steel	60,000	3.7
Los Angeles, Calif.	Davis Wire & Cable	2,700	.2
Portsmouth, Ohio	Detroit Steel	25,000	1.5
S. San Francisco, Cal.	Edwards Co.	3,600	.2
Blue Island, Ill.	Enterprise Wire	2,000	.1
Georgetown, Conn.	Gilbert & Bennett	7,500	.5
Blue Island, Ill.	" "	6,000	.4
Aliquippa, Pa.	J & L	68,000	4.2
Peoria, Ill.	Keystone Steel & Wire	142,200	8.8
Crawfordsville, Ind.	" " "	40,000	2.5
Jacksonville, Fla.	" " "	12,000	.7
Alton, Ill.	Laclede	10,000	.6
Kenosha, Wis.	Macwhyte Co.	600	.04
Cockeysville, Md.	Md.Fine&SpecWireCo.	1,000	.1
Akron, Ohio	National-Standard	5,000	.3
Niles, Mich.	" "	2,500	.2
Worcester, Mass.	" "	800	.05
Sterling, Ill.	Northwestern Steel&Wire	95,400	5.9
Monessen, Pa.	Pittsburgh Steel	100,000	6.2
Worcester, Mass.	" "	1,800	.1
S. Chicago, Ill.	Republic	22,000	1.4
Gadsden-Birmingham,Ala.	"	69,000	4.3
Fostoria, Ohio	Seneca Wire & Mfg.	1,000	.1
Sherman, Texas	Sherman Steel & Wire	1,500	.09
Worcester, Mass.	USS (A S & W)	26,150	1.6
Donora, Pa.	" "	84,600	5.2
Cleveland, Ohio	" "	15,980	1.0
Joliet, Ill.	" "	112,960	7.0
Duluth, Minn.	" "	66,400	4.1

(Continued)

TABLE 33-B (Cont.)

Location	Firm	Capacity	% US Total
Waukegan, Ill	USS (A S & W)	56,150	3.5
Trenton, N. J.	" "	23,100	1.4
New Haven, Conn.	" "	7,510	.5
Pittsburg, Calif.	USS (Col-Geneva)	38,500	2.4
Farifield, Ala.	USS (T C & I)	72,300	4.5
Cortland, N. Y.	Wickwire Bros.	3,000	.2
Chicago, Ill.	Wilson Steel & Wire	10,000	.6
Chicago, Ill.	Wire Sales Co.	1,000	.1
Worcester, Mass.	Wright Steel & Wire	6,000	.4
Campbell, Ohio	Y S & T	6,000	.4
TOTAL U. S.		1,613,890	100.0*

* Column does not add to 100% because of rounding.

TABLE 33-C

PRODUCTION OF WIRE & WIRE PRODUCTS (NAILS & STAPLES)

Location	Firm	Capacity	% US Total
Cleveland, Ohio	Angell Nail & Chaplet	18,000	1.6
Kansas City, Mo.	Armco	32,000	2.8
Houston, Texas	"	29,200	2.5
Atlanta, Ga.	Atlantic Steel	43,000	3.7
Fairhaven, Mass.	Atlas Tack Corp.	4,900	.4
Sparrows Point, Md.	Bethlehem	48,000	4.2
Johnstown, Pa.	"	20,000	1.7
Cedarburg, Wis.	Cedarburg Wire	1,200	.1
Pueblo, Colo.	Colo. F & I	56,200	4.9
Kokomo, Ind.	Continental Steel	51,500	4.5
Glassport, Pa.	Copperweld Steel	190	.02
Newark, N. J.	Igoe Bros.	1,000	.1
Aliquippa, Pa.	J & L	66,000	5.7
Peoria, Ill.	Keystone Steel & Wire	60,000	5.2
Crawfordsville, Ind.	" " "	16,000	1.4
Jacksonville, Fla.	" " "	3,000	.3
Sterling, Ill.	Northwestern Steel&Wire	72,000	6.2
S. Chicago, Ill.	Republic	42,000	3.6
Gadsden-Birmingham,Ala	"	72,000	6.2
Worcester, Mass.	USS (A S & W)	18,780	1.6
Donora, Pa.	" "	104,210	9.0
Joliet, Ill.	" "	101,600	8.8
Duluth, Minn.	" "	88,800	7.7
Pittsburg, Calif.	USS (Col-Geneva)	81,980	7.1
Fairfield, Ala.	USS (T C & I)	90,100	7.8
Wheeling, W. Va.	Wheeling Steel	12,000	1.0
Cortland, N. Y.	Wickwire Bros.	5,300	.5
Chicago, Ill.	Wilson Steel & Wire	15,000	1.3
Chicago, Ill.	Wire Sales Co.	2,000	.2
TOTAL U. S.		1,155,960	100.0

TABLE 33-D

PRODUCTION OF WIRE & WIRE PRODUCTS (BARBED WIRE)

Location	Firm	Capacity	% US Total
Monessen, Pa.	Am. Chain & Cable	600	.2
Kansas City, Mo.	Armco	14,500	3.7
Houston, Texas	"	14,400	3.7
Atlanta, Ga.	Atlantic Steel	13,000	3.3
Sparrows Point, Md.	Bethlehem	2,400	.6
Pueblo, Colo.	Colo. F & I	24,000	6.2
Kokomo, Ind.	Continental	31,000	8.0
Aliquippa, Pa.	J & L	15,000	3.9
Peoria, Ill.	Keystone Steel & Wire	35,000	9.0
Crawfordsville, Ind.	" " "	8,000	2.1
Jacksonville, Fla.	" " "	1,000	.3
Sterling, Ill.	Northwestern Steel&Wire	27,000	6.9
S. Chicago, Ill.	Republic	18,000	4.6
Gadsden-Birmingham,Ala.	"	14,000	3.6
Donora, Pa.	USS (A S & W)	52,580	13.5
Joliet, Ill.	" "	33,800	8.7
Duluth, Minn.	" "	50,700	13.0
Pittsburg, Calif.	USS (Col-Geneva)	7,510	1.9
Fairfield, Ala.	USS (T C & I)	26,300	6.8
TOTAL U. S.		388,790	100.0

TABLE 33-E

PRODUCTION OF WIRE & WIRE PRODUCTS (WOVEN FENCE)

Location	Firm	Capacity	% US Total
Kansas City, Mo.	Armco	24,000	2.9
Houston, Texas	"	12,000	1.4
Atlanta, Ga.	Atlantic Steel	11,250	1.3
Pueblo, Colo.	Colo, F & I	36,500	4.4
Tonawanda, N. Y.	" "	13,520	1.6
Oakland, Calif.	" "	4,800	.6
Kokomo, Ind.	Continental	70,000	8.4
Aliquippa, Pa.	J & L	14,000	1.7
Peoria, Ill.	Keystone Steel&Wire	233,000	27.9
Crawfordsville, Ind.	" " "	30,000	3.6
Jacksonville, Fla.	" " "	4,000	.5
Sterling, Ill.	Northwestern Steel&Wire	121,700	14.6
S. Chicago, Ill.	Republic	27,000	3.2
Gadsden-Birmingham,Ala.	"	14,000	1.7
Donora, Pa.	USS (A S & W)	19,800	2.4
Joliet, Ill.	" "	94,180	11.3
Duluth, Minn.	" "	32,960	4.0
Pittsburg, Calif.	USS (Col-Geneva)	9,010	1.1
Fairfield, Ala.	USS (T C & I)	63,850	7.6
TOTAL U. S.		835,570	100.0

TABLE 33-F

PRODUCTION OF WIRE & WIRE PRODUCTS
(REINFORCING FABRIC & NETTING)

Location	Firm	Capacity	% US Total
Kansas City, Mo.	Armco	48,000	4.3
Houston, Texas	"	25,000	2.2
Branford, Mass.	Atlantic Wire	7,000	.6
Pueblo, Colo.	Colo. F & I	63,000	5.6
Tonawanda, N. Y.	" "	97,760	8.8
Oakland, Calif.	" "	1,170	.1
Kokomo, Ind.	Continental	45,000	4.0
Glassport, Pa.	Copperweld	5,860	.5
Los Angeles, Calif.	Davis Wire & Cable	3,000	.3
Portsmouth, Ohio	Detroit Steel	75,000	6.7
S San Francisco, Cal.	Edwards Co.	2,970	.3
Georgetown, Conn.	Gilbert & Bennett	22,000	2.0
Blue Island, Ill.	" "	4,500	.4
Jacksonville, Fla.	Ivy Steel & Wire	15,000	1.3
Peoria, Ill.	Keystone Steel&Wire	29,100	2.6
Alton, Ill.	Laclede	50,000	4.5
Sterling, Ill.	Northwestern Steel&Wire	211,400	18.9
Monessen, Pa.	Pittsburgh Steel	100,000	9.0
S. Chicago, Ill.	Republic	3,000	.3
Gadsden-Birmingham,Ala.	"	32,000	2.9
Donora, Pa.	USS (A S & W)	97,560	8.7
Cleveland, Ohio	" "	42,000	3.8
Joliet, Ill.	" "	101,040	9.1
Duluth, Minn.	" "	24,800	2.2
Cortland, N. Y.	Wickwire Bros.	5,000	.4
Chicago, Ill.	Wire Sales Co.	1,600	.1
Worcester, Mass.	Wright Steel & Wire	3,000	.3
TOTAL U. S.		1,115,760	100.0*

* Column does not add to 100% because of rounding.

TABLE 33-G

PRODUCTION OF WIRE & WIRE PRODUCTS (BALE TIES)

Location	Firm	Capacity	% US Total
Kansas City, Mo.	Armco	2,000	1.6
Houston, Texas	"	1,800	1.5
Atlanta, Ga.	Atlantic Steel	6,000	4.9
Sparrows Point, Md.	Bethlehem	12,000	9.8
Uniontown, Pa.	Cavert Wire Co.	2,500	2.0
Pueblo, Colo.	Colo. F & I	1,700	1.4
S San Francisco, Cal.	" "	960	.8
Kokomo, Ind.	Continental Steel	10,000	8.1
S San Francisco, Cal.	Edwards Co.	3,830	3.1
Crawfordsville, Ind.	Keystone Steel & Wire	3,000	2.4
Jacksonville, Fla.	" " "	800	.7
Sterling, Ill.	Northwestern Steel&Wire	64,800	52.7
Gadsden-Birmingham,Ala.	Republic	4,000	3.3
Donora, Pa.	USS (A S & W)	3,290	2.7
Duluth, Minn.	" "	2,500	2.0
Pittsburg, Calif.	USS (Col-Geneva)	1,970	1.6
Fairfield, Ala.	USS (T C & I)	1,900	1.5
TOTAL U. S.		123,050	100.0

TABLE 34-A

SHIPMENTS OF DRAWN WIRE BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	969,376	35.6	30.9
Forgings (other than auto)	1	.0004	.0001
Bolts, nuts, rivets & screws	255,198	9.4	23.8
Warehouses & distributors	253,514	9.3	1.9
Construction & maintenance	63,292	2.3	.7
Contractor's products	74,137	2.7	2.1
Automotive	216,232	7.9	1.5
Rail Transportation	2,814	.1	.1
Shipbuilding & marine equip	1,670	.06	.3
Aircraft	1,766	.06	2.5
Oil & gas drilling	127	.005	.02
Mining,quarrying&lumbering	1,735	.06	.7
Agriculture	11,827	.4	.9
Machinery, ind. equip & tools	188,343	6.9	4.5
Electrical machinery & equip	39,035	1.4	1.9
Appl., utensils & cutlery	56,336	2.1	3.1
Other dom. & com. equipment	338,385	12.4	18.5
Containers	66,476	2.4	1.1
Ordnance & other military	2,182	.08	1.7
Export	15,946	.6	1.1
Non-classified shipments	167,206	6.1	8.2
TOTAL	2,725,598	100.0*	3.9
To steel industry for conversion or resale	28,885	1.1	.7

* Column does not add to 100% because of rounding.

TABLE 34-B

SHIPMENTS OF WIRE NAILS & STAPLES
BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	2,256	.6	.07
Warehouses & distributors	357,566	91.3	2.7
Construction & maintenance	6,543	1.7	.08
Contractor's Products	975	.2	.03
Automotive	260	.07	.002
Rail Transportation	2,408	.6	.01
Shipbuilding & marine equip	31	.008	.005
Aircraft	7	.002	.01
Oil & gas drilling	13	.003	.002
Mining, quarrying & lumbering	68	.02	.03
Agriculture	169	.04	.01
Machinery, ind. equip & tools	3,959	1.0	.1
Electrical machinery & equip	288	.07	.01
Appl., utensils, cutlery	101	.03	.01
Other dom. & com. equipment	495	.1	.03
Containers	6,140	1.6	.1
Ordnance & other military	46	.01	.04
Export	773	.2	.05
Non-classified shipments	9,596	2.4	.5
TOTAL	391,694	100.0*	.6
To steel industry for conversion or resale	610	.2	.01

* Column does not add to 100% because of rounding.

TABLE 34-C

SHIPMENTS OF BARBED & TWISTED WIRE
BY MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting or processing	454	.9	.01
Warehouses & distributors	46,771	96.0	.4
Construction & maintenance	477	1.0	.006
Rail Transportation	676	1.4	.03
Mining, quarrying&lumbering	8	.02	.003
Agriculture	44	.3	.003
Containers	8	.02	.0001
Ordnance & other military	29	.06	.02
Export	278	.6	.02
TOTAL	48,745	100.0*	.07
To steel industry for conversion or resale	96	.2	.002

* Column does not add to 100% because of rounding.

TABLE 34-D

SHIPMENTS OF WOVEN WIRE FENCE
BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	169	.1	.005
Warehouses & distributors	138,232	97.7	1.1
Construction & maintenance	1,700	1.2	.02
Contractor's products	2	.001	.0001
Rail Transportation	1,167	.8	.05
Mining, quarrying&lumbering	5	.004	.002
Agriculture	30	.02	.002
Ordnance & other military	25	.02	.02
Export	184	.1	.01
TOTAL	141,514	100.0*	.2
To steel industry for conversion or resale	297	.2	.007

* Column does not add to 100% because of rounding.

TABLE 34-E

SHIPMENTS OF BALE TIES AND BALING WIRE BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	10	.02	.0003
Warehouses & distributors	53,054	95.5	.4
Construction & maintenance	73	.1	.0009
Containers	2,292	4.1	.04
Ordnance & other military	1	.002	.0008
Export	13	.02	.0009
Non-classified shipments	99	.2	.005
TOTAL	55,542	100.0*	.08

* Column does not add to 100% because of rounding.

Tin Mill Products. The products of the tin mill include black plate, hot dipped tin and terne plate, and electrolytic tin plate. Actually, the basic product is black plate, which in effect is cold rolled sheet. Most black plate is made into tin plate, some into terne plate, and some is sold as is for the production of such items as containers, trays, and toys. Black plate is generally flat-rolled, mild (low carbon) steel, in relatively thin gages.

The AISI defines raw black plate as follows: "Cold reduced flat rolled product, specified in cut sizes or coils, in base weights 128 pounds and lighter, processed to make it suitable for intended purposes and not coated with any metal. Chemically treated black plate is black plate that is given a chemical treatment to improve the adhesion of organic enamels, paints or lacquers and to retard under-film corrosion." Included in this definition are the following types or grades of black plate: Blued, can making quality, chemically treated, and hollow ware enameling stock.

Black plate which is not "chemically treated steel" (CTS), as mentioned above, will rust easily in shipment or in a warehouse. For this reason, most black plate is coated in some manner. About 4/5 of all black plate tonnage is coated with commercially pure tin and thus is known as "tinplate."

Tinplate is classified in one of two major categories according to method of production, (1) Hot Dipped, and (2) Electrolytic. The AISI gives the following definitions:

"Hot Dipped Tin Plate is black plate additionally processed by pickling and coated on both sides with commercially pure tin by the hot dip process. It is termed coke tin plate, charcoal tin plate or silver tin, depending on the coating weight."

"Electrolytic tin plate is cold reduced tin mill black plate specified in cut sizes or coils coated with tin by electrodeposition. The classes of electrolytic tin plate which are now available, with their nominal coating weights, are as follows:"

Number	Nominal Coating Weight Pounds Per Base Box
25	.25
50	.50
75	.75
100	1.00
100/25	(Differentially Coated)

The distinction between hot dipped and electrolytic tin plate is not particularly important since it is mainly one of production process and has little or no bearing on the final finished product, except that plating by electrodeposition produces better tin uniformity. Viewed from the production standpoint, electroplating makes possible a better control of the tin coating and results in a large saving of tin. In addition, electrolytic tinplate is available in both melted and Matte (unmelted) finish. The melted finish has a bright finish surface as does hot dipped tinplate. The Matte finish has a dull surface.

Regarding the various grades of hot dipped tinplate mentioned above in the definition, the thickness of the tin varies from "coke" which has the thinnest covering of tin, to "charcoal" which has the heaviest coat of tin.

Mention should be given to the term "Base Box" which is used in the definitions. Tin plate is sold on a weight per unit area basis rather than a gage thickness basis. The "Base Box" is the unit of area used for this purpose. It is equal to the area of 112 sheets which are 14 by 20 inches. This, in turn, is equal to 31,360 square inches or 217.78 square feet. The gage or thickness of tin plate is expressed in terms of the "Base Weight", or pounds per "Base Box." Base box ratio tables have been devised so that the estimated weight in pounds per base box may be easily derived for material of any size.

Tinplate, of both major types, is one of the most important of steel products and generally accounts for about 5 to 7% of all steel production each year. This product is closely related to the food preservation industry since one of its most important uses is in food cans. Other main uses include paint cans, bottle caps, kitchen utensils, and toys.

Among tinplate's outstanding characteristics are these: (1) pleasing appearance, (2) relative inexpensiveness, and (3) non-toxicity. In addition, light weight must now be included as one of tinplate's characteristics in view of the recent development of "Thin Tin." Thin Tin is merely steel tinplate which is rolled much thinner than any previous tinplate. Its development was hastened by a very strong competitive threat from aluminum in the food canning industry. This new product is almost as light as aluminum but still retains its strength and other favorable characteristics mentioned above.

A final product to be dealt with in this section on tin mill products is terne plate which is defined by the AISI as follows: "Terne Plate is black plate additionally processed by pickling, and hot-dip coated on both sides with a lead-tin alloy known as terne metal. It may be in the form of short ternes, roofing ternes or tin, fire door ternes and heavy coated ternes and manufacturing ternes, depending on size and coating weight."

Terne plate may also be referred to as long terne sheets or "short ternes." The tonnage of this product is not nearly as great as is tin plate production, however, it is an important item nevertheless finding uses in such things as fuel tanks, roofing, fire extinguishers, burial caskets, etc. Also, automobile water distributor tubes, radiator parts, mufflers, oil pans and air cleaners are made from terne plate. The raw steel from which terne plate is made may be either hot or cold rolled depending upon uses and/or types of fabrication to follow at the customer's plant.

Of interest is the fact that "terne" means dull which is descriptive of the type of finish which terne plate has.

See the following Tables for production statistics:

Table 35-A Coils for cold reduced black and tin plate
" " B Tin and terne plate
" " C Long terne sheets

Tables in the 36 series indicate distribution statistics:

Table 36-A Black plate
" " B Tin and terne plate, hot dipped
" " C Tin plate - electrolytic

TABLE 35-A

PRODUCTION OF COILS FOR COLD-REDUCED BLACK PLATE & TINPLATE

Location	Firm	Capacity	% US Total
Sparrows Point, Md.	Bethlehem	1,675,000	15.5
Granite City, Ill.	Granite City	84,000	.8
E. Chicago, Ind.	Inland	321,000	3.0
Aliquippa, Pa.	J & L	649,900	6.0
Fontana, Calif	Kaiser	483,700	4.5
Weirton, W. Va.	National (Includes HR Sheet)	2,640,000	24.4
Youngstown, Ohio	Republic	136,000	1.3
Warren, Ohio	"	82,000	.8
Fairless Hills, Pa.	USS (Cen Ops)	253,380	2.3
Gary, Ind.	USS (Cen Ops)	670,800	6.2
Gary, Ind. (Sheet & Tin)	" "	222,240	2.1
Dravosburg, Pa.	" "	611,640	5.6
Geneva, Utah	USS (Col-Geneva)	502,200	4.6
Fairfield, Ala.	USS (T C & I)	650,500	6.0
Steubenville, Ohio	Wheeling	1,233,000	11.4
E. Chicago, Ind.	Y S & T	612,000	5.7
TOTAL U. S.		10,827,360	100.0

TABLE 35-B

PRODUCTION OF TIN & TERNE PLATE

Location	Firm	Capacity	% US Total
Sparrows Point, Md.	Bethlehem	1,260,000	15.3
Granite City, Ind	Granite City	227,000	2.8
E. Chicago, Ind.	Inland	277,000	3.3
Aliquippa, Pa.	J & L	524,000	6.4
Fontana, Calif.	Kaiser	441,000	5.4
Weirton, W. Va.	National	1,090,000	13.3
Steubenville, Ohio	"	355,000	4.3
Warren, Ohio	Republic	180,000	2.2
Pittsburg, Calif.	USS (Col-Geneva)	622,560	7.6
Fairfield, Ala.	USS (T C & I)	565,300	6.9
Fairless Hills, Pa.	USS (Cen Ops)	250,750	3.1
Gary, Ind.	" "	893,300	10.9
Dravosburg, Pa.	" "	701,080	8.5
Yorkville, Ohio	Wheeling Steel	306,200	3.7
E. Chicago, Ind.	Y S & T	516,000	6.3
TOTAL U. S.		8,209,190	100.0

TABLE 35-C

PRODUCTION OF SHEETS (LONG TERNE)

Location	Firm	Capacity	% US Total
Middletown, Ohio	Armco	52,800	25.6
Weirton, W. Va.	National	20,000	9.7
Warren, Ohio	Republic	24,000	11.6
Gary, Ind.	USS (Cen Ops)	56,300	27.3
Mansfield, Ohio	Univ.-Cyclops	15,000	7.3
Follansbee, W. Va.	Wheeling	38,000	18.4
TOTAL U. S.		206,100	100.0*

* Column does not add to 100% because of rounding.

TABLE 36-A

SHIPMENTS OF BLACK PLATE BY
MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	7,918	1.4	.3
Warehouses & distributors	72,968	13.0	.6
Construction & maintenance	2,621	.5	.03
Contractor's products	24,091	4.3	.7
Automotive	10,146	1.8	.07
Rail Transportation	323	.06	.01
Mining, quarrying&lumbering	47	.008	.02
Agriculture	377	.07	.03
Machinery, ind. equip&tools	12,075	2.1	.3
Electrical machinery & equip	1,572	.3	.08
Appl., utensils & cutlery	38,131	6.8	2.1
Other dom. & com. equipment	70,060	12.5	3.8
Containers	293,340	52.2	4.6
Export	28,478	5.1	2.0
TOTAL	562,147	100.0	.8
To steel industry for conversion or resale	2,754	49.0	.07

TABLE 36-B

SHIPMENTS OF TIN & TERNE PLATE-HOT DIPPED
BY MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of These Items	% of These Items of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	68	.02	.002
Warehouses & distributors	13,182	3.2	.1
Construction & maintenance	235	.06	.003
Contractor's products	1,076	.3	.03
Automotive	4,405	1.1	.03
Rail Transportation	14	.003	.001
Shipbuilding & marine equip	15	.004	.002
Agriculture	18	.004	.001
Machinery, ind. equip & tools	3,612	.9	.09
Electrical machinery & equip	2,220	.5	.1
Appl., utensils & cutlery	6,688	1.6	.4
Other dom. & com. equipment	5,395	1.3	.3
Containers	306,929	74.5	4.9
Ordnance & other military	595	.1	.5
Export	67,671	16.4	4.8
TOTAL	412,123	100.0*	.6

* Column does not add to 100% because of rounding.

TABLE 36-C

SHIPMENTS OF TIN PLATE - ELECTROLYTIC
BY MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for conversion and processing	606	.01	.02
Warehouses & distributors	92,006	1.9	.7
Construction & maintenance	1,472	.03	.02
Contractor's products	4,269	.09	.1
Automotive	24,031	.5	.2
Rail Transportation	424	.009	.02
Shipbuilding & marine equip	24	.0005	.004
Aircraft	61	.001	.09
Agriculture	820	.02	.06
Machinery, ind. equip & tools	14,760	.3	.4
Electrical machinery & equip	5,974	.1	.3
Appl., utensils & cutlery	18,597	.4	1.0
Other dom. & com. equipment	18,013	.4	1.0
Containers	4,405,309	90.7	69.7
Ordnance & other military	101	.02	.08
Export	272,044	5.6	19.3
TOTAL	4,858,511	100.0	.7
To steel industry for conversion or resale	405	.01	.01

Sheet and strip products in general are defined by the AISI as follows: "...include all prime and secondary flat rolled products for the grade indicated within the size ranges specified below (in the more specific definitions), regardless of additional processing such as pickling, annealing, oiling, painting, and chemical treatment. Circles, whether blanked or circle sheared, sketches, and formed products are included."

In actuality, there are numerous additional sheet and strip products which are not included in the scope of the above definition. All of these products have been mentioned under previous classifications, and together with the products defined above, make up one segment of the very large family of so-called flat rolled products. Two distinguishing features of flat rolled steel are these: (1) Flat rolled products are produced on rolls with smooth faces, versus cut or grooved rolls which are used in rolling shapes. (2) The ratio of width to thickness is generally high for flat rolled products.

In general, flat rolled products may be classified as either hot-rolled or cold-rolled. The flat, hot-rolled finished products may be further broken down into four groups: (1) bars, (2) plate, (3) hot-rolled strip, and (4) hot-rolled sheets. The above classifications are based mainly on thickness and width. The chief cold-rolled products, all classified as "finished", may be divided into four groups also: (1) bars, (2) strip, (3) sheets, and (4) black plate.

It will be noted at this point that many of the above-mentioned groups have already been discussed such as bars, plates, and black plate. Thus, it might be concluded that the products to be included in this section and in the above AISI definition are the remaining products of the flat rolled family, including both the hot and cold-rolled variety.

It should be noted that about $\frac{1}{2}$ of all steel products are flat rolled and further that the sheet and strip products included in this section make up a very significant portion of the total flat rolled family. In fact, sheet and strip products, including tinplate which has been included in a previous classification, account for 3/4 of total flat rolled tonnage.

As mentioned earlier, all cold-rolled products are classified as finished and they, therefore, receive no further processing in the steel mill except for cutting to length. Hot-rolled products, on the other hand, may be either finished or semi-finished. Since all cold-rolled products must first be hot-rolled, there is a special category of hot-rolled products which is produced especially for further cold-rolling and is therefore a semi-finished product. This product of the hot strip mill is known as "hot-rolled breakdowns for cold reduction." This product becomes the input for the cold reduction process and, therefore, is generally used in coil form.

There are seven product classifications which the AISI includes as sheet and strip products. These seven categories are defined by the AISI in the following manner:

"Sheets - hot rolled are all hot rolled products other than galvanized, coated, and electrical grades within the following size limits:

Thickness	Width
.0449 to .2299 inches incl.	over 12 to 48 inches incl.
.0449 to .1799 inches incl.	over 48 inches

Exception: Alloy and Stainless Flat Rolled products are classified as sheets when 24 inches and over in width. Stainless with a #1 or lesser finish is considered Hot Rolled."

This classification includes:

Circles (blanked or sheared)	Enameling Sheets
Formed Roofing and Siding (black or painted)	Pickled Sheets
Nail and Tack Plate	Annealed and Pickled Sheets
	Sketches

"Sheets - cold rolled are all cold reduced products other than galvanized, coated and electrical grades within the following limits:

Thickness	Width
.0142 to .0821 inches incl. (Note 1)	2 to 12 inches incl.
.0142 inches and thicker (Note 2)	over 12 to under 24 inches
.0142 inches and thicker	24 inches and over

Note 1: Cold Rolled Sheet coils and cut lengths, slit from wider coils with No. 3 edge only, carbon .20% maximum, in either Dull or Luster finish.

Note 2: When no special temper, edge or finish (other than Dull or Luster) is specified, or when single strand rolling widths under 24 inches are not specified or required.

Exception: Alloy and Stainless Flat Rolled products are classified as sheets when 24 inches and over in width."

Specific products included in the Cold Rolled Sheet category are:

Sheets-enameling	Porcelain Enameling Sheets
Circles (blanked or sheared)	Formed Roofing and Siding (unpainted or painted)
Sketches	
Tack Plate	

"Galvanized Sheets are all hot and cold rolled sheets and black plate galvanized (zinc coated) by hot dip or electrolytic methods including those formed into recognized forms as stated below:"

Flat	Gal. sheets - hot dip conventional
Formed roofing and siding (incl. accessories)	Gal. sheets - hot dip continuous
	Gal. sheets - electrolytic
Corrugated	Culvert sheets, flat or formed
Chemically treated	

"Sheets - All Other Coated are all metallic coated sheets, other than galvanized and tinplate, within the size and width limits of hot and cold rolled sheets and black plate, regardless of the method of coating."

"Electrical Sheets and Strip are specially manufactured steel sheets and strip containing silicon from 15% up to 6% and processed to develop definite magnetic characteristics for use by the electrical industry, whether hot or cold rolled."

"Hot Rolled Strip includes all hot rolled products excluding electrical grades within the following limits and including bar mill bands and hoop steel.

Exception: Alloy and Stainless Flat Rolled Product is classified as strip when under 24 inches in width.

Thickness	Width
.0449 to .2030 inches	To 12 inches
.2031 to .2299 inches	Over 6 to 12 inches

"Cold Rolled Strip is all cold reduced product within the following limits and conforming to the noted characteristics as to edge, temper, finish, etc.

Exception: Alloy and Stainless Flat Rolled Product is classified as strip when under 24 inches in width.

up to .0141 in. incl. (Note 1)	up to 12 inches incl.
up to .0141 in. incl.	over 12 to under 24 in. incl.
.0142 to .2499 in. incl. (Note 1 & 2)	under 2 inches
.0142 to .2499 in. incl. (Note 2)	2 to 12 inches incl.
.0142 to .2499 in. (Note 2)	over 12 to under 24 in. incl.
.2500 in. and thicker (Note 2)	over 12 to under 24 in. incl.

Note 1: When the width is greater than the thickness with a maximum width of $\frac{1}{2}$ inch and a cross sectional area not exceeding .05 sq. in., and the material has rolled or prepared edges, it is classified as flat wire.

Note 2: When a particular temper as defined in American Society for Testing Materials (A.S.T.M.) Specification A109 or a special edge or special finish is specified or when single strand rolling is specified in widths under 24 inches.

See Tables in the 37 series for capacity and location statistics for sheet and strip products as follows:

Table 37-A Hot rolled sheet
" " B Cold rolled sheet
" " C Galvanized
" " D Hot rolled strip
" " E Cold rolled strip
" " F Galvanized strip

Shipments appear in the following 38 series Tables:

Table 38-A Hot rolled sheet
" " B Cold rolled sheet
" " C Galvanized sheet
" " D All other coated sheet
" " E Electrical sheet and strip
" " F Hot rolled strip
" " G Cold rolled strip

TABLE 37-A

PRODUCTION OF HOT ROLLED SHEETS

Location	Firm	Capacity	% US Total
Chicago, Ill.	Acme	150,000	.4
Newport, Ky.	"	360,000	.9
Ivy Rock, Pa.	Alan Wood	(In HR Strip)	
Brackenridge, Pa.	Allegheny Ludlum	563,000	1.4
Ashland, Ky.	Armco	709,000	1.8
Butler, Pa.	"	293,900	.7
Middletown, Ohio	"	1,800,000	4.6
Zanesville, Ohio	"	102,000	.3
Sparrows Point, Md.	Bethlehem	2,925,000	7.4
Lackawanna, N. Y.	"	2,635,000	6.7
Newcastle, Ind.	Borg-Warner	25,000	.1
Chicago, Ill.	" "	80,000	.2
Ambridge, Pa.	Am Byers	15,000	.04
" "	"	45,000 wrt. iron sheet & strip	
Kokomo, Ind.	Continental	57,000	.1
Midland, Pa.	Crucible	144,000	.4
Pittsburgh, Pa.	"	15,100	.04
Portsmouth, Ohio	Detroit	600,000	1.5
Baltimore, Md.	Eastern Stainless (Including plates)	36,000	.1
Dearborn, Mich.	Ford	1,414,000	3.6
Granite City, Ill.	Granite City	906,000	2.3
E. Chicago, Ind.	Inland	2,562,000	6.5
S. Chicago, Ill.	Intl. Harvester	7,000	.02
Washington, Pa.	Jessop	7,700	.02
Aliquippa, Pa.	J & L	577,400	1.5
Pittsburgh, Pa.	"	1,208,900	3.1
Cleveland, Ohio	"	1,509,500	3.8
Fontana, Calif.	Kaiser	429,000	1.1
Trenton, Mich.	McLouth (Inc. Strip)	1,734,000	4.4
Niles, Ohio	Mahoning Valley	52,000	.1
Weirton, W. Va.	National (In coils for black & tin plate)		
Ecorse, Mich.	"	2,795,000	7.1
Allenport, Pa.	Pittsburgh Steel	753,000	1.9
Warren & Niles, Ohio	Republic	955,000	2.4
Massillon & Canton, O.	"	175,000	.4
Cleveland, Ohio	"	2,378,000	6.0
Gadsden-Birmingham, Ala.	"	449,000	1.1
Farrell, Pa.	Sharon	412,000	1.0
Lockport, N. Y.	Simonds	5,000	.01
Fairless Hills, Pa.	USS (Cen Ops)	1,133,580	2.9
Gary, Ind. (Gary Works)	" "	68,280	.2
" "(Sheet & Tin)	" "	2,538,240	6.4

(Continued)

TABLE 37-A (Cont.)

Location	Firm	Capacity	% US Total
Homestead, Pa.	USS (Cen Ops)	7,980	.02
Dravosburg&Vandergrift, Pa. (Irvin)	" "	1,933,980	4.9
Youngstown, Ohio	" "	614,760	1.6
Bridgeville, Pa.	Univ.-Cyclops (Includes Strip)	13,100	.03
Mansfield, Ohio	" " (Inc. Strip & Plate)	480,000	1.2
Monaca, Pa.	Vanadium-Alloys	2,400	.01
Steubenville, Ohio	Wheeling	250,000	.6
Campbell, Ohio	Y S & T	1,098,000	2.8
E. Chicago, Ind.	"	1,152,000	2.9
Geneva, Utah	USS (Col-Geneva)	650,050	1.6
Fairfield, Ala.	USS (T C & I)	730,700	1.8
TOTAL U. S.		39,512,570	100.0*

* Column does not add to 100% because of rounding.

TABLE 37-B

PRODUCTION OF COLD-ROLLED SHEETS

Location	Firm	Capacity	% US Total
Campbell, Ky.	Acme	100,000	.5
Ivy Rock, Pa.	Alan Wood	240,000	1.1
Brackenridge, Pa.	Allegheny Ludlum	293,600	1.3
W. Leechburg, Pa.	" "	1,200	.01
Ashland, Ky.	Armco	338,000	1.5
Butler, Pa.	"	258,600	1.2
Middletown, Ohio	"	1,402,000	6.4
Sparrows Point, Md.	Bethlehem	1,008,000	4.6
Lackawanna, N. Y.	"	1,896,000	8.6
Midland, Pa.	Crucible	19,800	.1
Pittsburgh, Pa.	"	20,000	.1
Portsmouth, Ohio	Detroit Steel	420,000	1.9
Baltimore, Md.	Eastern Stainless	50,000	.2
Dearborn, Mich.	Ford Motor	885,000	4.0
Granite City, Ill.	Granite City	312,000	1.4
E. Chicago, Ind.	Inland	1,605,000	7.3
Aliquippa, Pa.	J & L	22,000	.1
Pittsburgh, Pa.	"	600,000	2.7
Cleveland, Ohio	"	820,200	3.7
Louisville, Ohio	"	26,400	.1
	Kaiser (Included in CR Strip)		
Detroit, Mich.	McLouth	28,800	.1
Gibraltar, Mich.	"	614,880	2.8
Weirton, W. Va.	National	750,000	3.4
Ecorse, Mich.	"	2,220,000	10.1
Allenport, Pa.	Pittsburgh	410,000	1.9
Warren, Ohio	Republic	576,000	2.6
Massillion-Canton, O	"	60,000	.3
Cleveland, Ohio	"	1,600,000	7.3
Gadsden-Birmingham,Ala	"	340,000	1.5
Pittsburg, Calif.	USS (Col-Geneva)	365,860	1.7
Fairfield, Ala.	USS (T C & I)	389,700	1.8
Fairless Hills, Pa.	USS (Cen Ops)	524,900	2.4
Gary, Ind.	" "	1,061,100	4.8
Dravosburg, Pa.	" "	510,530	2.3
Vandergrift, Pa.	" "	106,100	.5
	Univ.-Cyclops (Included in CR Strip)		
Washington, Pa.	Washington Steel	40,000	.2
Steubenville, Ohio	Wheeling Steel	600,000	2.7
Follansbee, W. Va.	" "	100,000	.5
Campbell, Ohio	Y S & T	672,000	3.1
E. Chicago, Ind.	"	720,000	3.3
TOTAL U. S.		22,007,670	100.0*

* Column does not add to 100% because of rounding.

TABLE 37-C

PRODUCTION OF SHEETS (GALVANIZED)

Location	Firm	Capacity	% US Total
Ashland, Ky.	Armco	342,500	8.2
Butler, Pa.	"	78,000	1.9
Middletown, Ohio	"	228,000	5.5
Sparrows Point, Md.	Bethlehem	336,000	8.1
Kokomo, Ind.	Continental Steel	100,000	2.4
Granite City, Ill.	Granite City	225,400	5.4
E. Chicago, Ind.	Inland	358,000	8.6
Pittsburgh, Pa.	J & L	138,000	3.3
Weirton, W. Va.	National	535,000	12.9
Warren, Ohio	Republic	200,000	4.8
Massillon-Canton, O	"	120,000	2.9
Cleveland, Ohio	"	120,000	2.9
Gadsden-Birmingham,Ala	"	120,000	2.9
Pittsburg, Calif	USS (Col-Geneva)	150,870	3.6
Fairfield, Ala.	USS (T C & I)	281,700	6.8
Gary, Ind.	USS (Cen Ops)	197,000	4.7
Dravosburg, Pa.	" "	179,400	4.3
Dover, Ohio	Universal Cyclops	120,000	2.9
Martins Ferry, Ohio	Wheeling Steel	324,000	7.8
TOTAL U. S.		4,153,870	100.0*

* Column does not add to 100% because of rounding.

TABLE 37-D

PRODUCTION OF HOT ROLLED STRIP

Location	Firm	Capacity	% US Total
Chicago, Ill.	Acme	396,000	14.9
Ivy Rock, Pa.	Alan Wood	340,000	12.8
W. Leechburg, Pa.	Allegheny Ludlum	100,000	3.8
	Armco (Included in HR Sheets)		
Atlanta, Ga.	Atlantic Steel	66,000	2.5
	Bethlehem (Included in HR Sheets)		
	Byers (Included in HR Sheets)		
Reading, Pa.	Carpenter Steel	12,570	.5
Pueblo, Colo.	Colo. F & I	2,500	.1
Roebling, N. J.	" "	12,300	.5
Carnegie, Pa.	Copperweld	145,000	5.5
	Crucible (Included in HR Sheets)		
Portsmouth, Ohio	Detroit (Included in HR Sheets)		
Pittsburgh, Pa.	Firth Sterling	3,600	.1
E. Chicago, Ind.	Inland	28,000	1.1
S. Chicago, Ill.	Intl Harvester	22,000	.8
Fontana, Calif.	Kaiser	2,700	.1
Knoxville, Tenn.	Knoxville Iron	1,500	.1
Alton, Ill.	Laclede Steel	62,000	2.3
Lone Star, Texas	Lone Star (Included in Skelp)		
Trenton, Mich.	McLouth (Included in HR Sheets)		
Ecorse, Mich.	National (Included in HR Sheets)		
Birmingham, Ala.	Porter	1,600	.1
Warren & Niles, Ohio	Republic	375,000	14.1
Farrell, Pa.	Sharon	514,000	19.4
Lockport, N. Y.	Simonds Saw & Steel	800	.03
Gary, Ind.	USS (Cen Ops)	135,120	5.1
Youngstown, Ohio	" "	234,360	8.8
Cleveland, Ohio	USS (A S & W)	84,500	3.2
Duluth, Minn.	" "	1,600	.1
Torrance, Calif.	USS (Col-Geneva)	6,960	.3
Bessemer, Ala.	USS (T C & I)	5,800	.2
Fairfield, Ala.	" "	58,200	2.2
Bridgeville, Pa.			
Mansfield, Ohio	Universal Cyclops (Included in HR Sheets)		
Phillipsdale, R. I.	Washburn Wire	32,000	1.2
E. Chicago, Ind.	Y S & T	12,000	.5
TOTAL U. S.		2,65,110	100.0

TABLE 37-E

PRODUCTION OF STRIP (COLD ROLLED)

Location	Firm	Capacity	% US Total
Chicago, Ill.	Acme	256,700	7.1
	Alan Wood (Included in CR Sheets)		
W. Leechburg, Pa.	Allegheny Ludlum	193,440	5.3
Wallingford, Conn.	" "	35,000	1.0
New Kensington, Pa.	American Shim Steel	36,000	1.0
Detroit, Mich.	Barry Universal Corp.	24,000	.7
Newcastle, Pa.	Blair Strip Steel	52,000	1.4
Los Angeles, Calif.	Calstrip Steel	36,000	1.0
Reading, Pa.	Carpenter Steel	10,000	.3
New Brunswick, N. J.	" "	90	.002
Roebling, N. J.	Colo. F & I	34,500	1.0
Carnegie, Pa.	Copperweld	80,000	2.2
Midland, Pa.	Crucible	76,200	2.1
Harrison, N. J.	"	16,000	.4
Detroit, Mich.	Detroit Steel	100,000	2.8
New Haven, Conn.	" "	75,000	2.1
Newark, N. J.	Driver Co.	1,100	.03
McKeesport, Pa.	Firth Sterling	500	.01
Dover, Ohio	Greer Steel	48,000	1.3
Anderson, Ind.	" "	36,000	1.0
Ferndale, Mich.	" "	3,000	.1
Erie, Pa.	Griffin Mfg.	27,000	.7
Union, N. J.	Hind Steel	5,000	.1
Sinking Springs, Pa.	Hofmann Industries	24,000	.7
	Inland (Included in CR Sheets)		
Youngstown, Ohio	J & L	50,000	1.4
Louisville, Ohio	"	3,600	.1
Indianapolis, Ind.	"	33,000	.9
Los Angeles, Calif.	"	8,000	.2
Fontana, Calif.	Kaiser	36,000	1.0
Detroit, Mich.	McLouth	59,900	1.7
Gibraltar, Mich.	"	57,120	1.6
NewCastle, Pa.	Mill Strip Prod. Co.	150,000	4.1
Evanston, Ill.	" " " "	38,000	1.0
Clifton, N. J.	National-Standard	12,000	.3
Weirton, W. Va.	National	60,000	1.7
Pawtucket, R. I.	Newman-Crosly Steel	29,000	.8
Warren, Ohio	Pittsburgh Steel	120,000	3.3
Prospect Park, Pa.	H K Porter	2,900	.1
Warren, Ohio	Republic	440,000	12.1
Canton, Ohio	"	63,000	1.7

(Continued)

TABLE 37-E (Cont.)

Location	Firm	Capacity	% US Total
New Bedford, Mass.	Rodney Metals	20,000	.6
Rome, N. Y.	Rome Strip Steel	40,000	1.1
Farrell, Pa.	Sharon Steel	120 000	3.3
Dearborn, Mich.	" "	78,000	2.2
Lockport, N. Y.	Simonds Saw & Steel	1,500	.04
New Britain, Conn.	Stanley Works	105,000	2.9
Rahns, Pa.	Techalloy Co.	3,000	.1
Boston, Mass.	Thompson Wire	20,000	.6
Chicago, Ill.	" "	70,000	1.9
Sparrows Point, Md.	" "	60,000	1.7
Wallingford, Conn.	Ulbrich Stainless	8,000	.2
Worcester	USS (A S & W)	14,090	.4
Cleveland, Ohio	" "	222,120	6.1
Bridgeville, Pa.	Universal Cyclops	15,000	.4
Coshocton, Ohio	" "	21,500	.6
Mansfield, Chio	" "	300,000	8.3
Bristol, Conn.	Wallace Barnes Co.	25,000	.7
New York, N. Y.	Washburn Wire	22,000	.6
	Washington Steel	(Included in CR Sheets)	
Follansbee, W. Va.	Wheeling Steel	150,000	4.1
TOTAL U. S.		3,627,260	100.0*

* Column does not add to 100% because of rounding.

TABLE 37-F

PRODUCTION OF STRIP (GALVANIZED)

Location	Firm	Capacity	% US Total
Chicago, Ill.	Acme	106,840	43.8
Atlanta, Ga.	Atlantic Steel	13,000	5.3
Trenton, N. J.	Colo. F & I	9,500	3.9
Dover, Ohio	Greer Steel	12,000	4.9
Youngstown, Ohio	J & L	10,000	4.1
Warren, Ohio	Pittsburgh	12,000	4.9
Farrell, Pa.	Sharon	48,000	19.6
Warren, Ohio	"	10,000	4.1
Cleveland, Ohio	USS (A S & W)	22,530	9.2
New York, N. Y.	Washburn Wire	500	.2
TOTAL U. S.		244,370	100.0

TABLE 38-A

SHIPMENTS OF SHEETS-HOT ROLLED
BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	607,327	7.7	19.4
Bolts, nuts, rivets & screws	47,536	.6	4.4
Warehouses & distributors	1,095,097	14.0	8.4
Construction & maintenance	411,082	5.2	4.8
Contractor's products	696,499	8.9	19.5
Automotive	3,279,200	41.8	23.1
Rail Transportation	158,071	2.0	6.7
Shipbuilding & marine equip	9,005	.1	1.4
Aircraft	4,210	.05	5.9
Oil & gas drilling	19,902	.3	3.7
Mining, quarrying&lumbering	12,141	.2	5.2
Agricultural	207,443	2.6	16.4
Machinery, ind. equip & tools	399,890	5.1	9.6
Electrical machinery & equip	194,759	2.5	9.5
Appl., utensils & cutlery	120,336	1.5	6.6
Other dom. & com. Equipment	121,873	1.6	6.6
Containers	374,619	4.8	5.9
Ordnance & other military	14,503	.2	11.4
Export	67,850	.9	4.8
Non-classified shipments	3,176	.04	.2
TOTAL	7,844,519	100.0	11.3
To steel industry for conversion or resale	380,369	4.8	9.3

TABLE 38-B

SHIPMENTS OF SHEETS-COLD ROLLED
BY MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	335,097	2.6	10.7
Bolts, nuts, rivets & screws	7,123	.06	.7
Warehouses & distributors	1,560,300	12.2	12.0
Construction & maintenance	114,468	.9	1.3
Contractor's products	918,911	7.2	25.7
Automotive	6,134,849	48.1	43.2
Rail Transportation	11,311	.09	.5
Shipbuilding & marine equip	3,179	.02	.5
Aircraft	4,676	.04	6.6
Oil & gas drilling	2,430	.02	.4
Mining, quarrying&lumbering	2,387	.02	1.0
Agriculture	75,552	.6	6.0
Machinery, ind. equip & tools	256,374	2.0	6.2
Electrical machinery & equip	489,380	3.8	23.9
Appl., utensils & cutlery	1,223,686	9.6	66.9
Other dom. & com. equipment	872,437	6.8	47.6
Containers	518,018	4.1	8.2
Ordnance & other military	8,383	.07	6.6
Export	212,511	1.7	15.1
TOTAL	12,751,072	100.0*	18.4
To steel industry for conversion or resale	73,151	.6	1.8

* Column does not add to 100% because of rounding.

TABLE 38-C

SHIPMENTS OF SHEETS-GALVANIZED
BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	14,641	.5	.5
Bolts, nuts, rivets & screws	625	.02	.06
Warehouses & distributors	841,472	30.3	6.4
Construction & maintenance	158,006	5.7	1.9
Contractor's products	1,006,554	36.3	28.2
Automotive	158,280	5.7	1.1
Rail Transportation	27,928	1.0	1.2
Shipbuilding & marine equip	5,955	.2	.9
Aircraft	1,039	.04	1.5
Oil & gas drilling	803	.03	.1
Mining, quarrying&lumbering	590	.02	.3
Agriculture	186,641	6.7	14.8
Machinery, ind. equip & tools	31,588	1.1	.8
Electrical machinery & equip	47,148	1.7	2.3
Appl., utensils & cutlery	120,142	4.3	6.6
Other dom. & com. equipment	75,362	2.7	4.1
Containers	47,274	1.7	.7
Ordnance & other military	460	.02	.4
Export	48,327	1.7	3.4
TOTAL	2,772,835	100.0*	.4
To steel industry for conversion or resale	5,337	.2	.1

* Column does not add to 100% because of rounding.

TABLE 38-D

SHIPMENTS OF SHEETS-ALL OTHER COATED
BY MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	1,535	.5	.05
Warehouses & distributors	19,282	6.9	.1
Construction & maintenance	6,496	2.3	.08
Contractor's products	16,504	5.9	.5
Automotive	163,456	58.3	1.1
Rail Transportation	162	.06	.01
Shipbuilding & marine equip	2,757	1.0	.4
Aircraft	92	.03	.1
Mining, quarrying&lumbering	75	.03	.03
Agriculture	2,356	.8	.2
Machinery, ind. equip & tools	9,514	3.4	.2
Electrical machinery & equip	12,998	4.6	.6
Appl., utensils & cutlery	21,604	7.7	1.2
Other dom. & com. equipment	6,330	2.3	.3
Containers	1,685	.6	.03
Ordnance & other military	49	.02	.04
Export	15,441	5.5	1.1
TOTAL	280,336	100.0*	.4
To steel industry for conversion or resale	120	.04	.003

* Column does not add to 100% because of rounding.

TABLE 38-E

SHIPMENTS OF ELECTRICAL SHEET & STRIP
BY MARKET CLASSIFICATION - 1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	43	.007	.001
Warehouses & distributors	5,164	.8	.04
Contractor's products	808	.1	.02
Automotive	7,128	1.1	.05
Rail Transportation	5,820	.9	.2
Shipbuilding & marine equip	469	.07	.07
Aircraft	181	.03	.3
Oil & gas drilling	53	.008	.01
Mining, quarrying&Lumbering	63	.01	.03
Agriculture	24	.004	.002
Machinery, ind. equip&tools	6,510	1.0	.2
Electrical machinery & equip	544,177	86.1	26.5
Appl., utensils & cutlery	10,973	1.7	.6
Other dom. & com. equipment	4,927	.8	.3
Containers	16	.003	.0003
Ordnance & other military	17	.003	.01
Export	45,578	7.2	3.2
Non-classified shipments	359	.06	.02
TOTAL	632,310	100.0*	.9

* Column does not add to 100% because of rounding.

TABLE 38-F

SHIPMENTS OF STRIP-HOT ROLLED
BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	98,671	7.8	3.1
Bolts, nuts, rivets & screws	5,978	.5	.6
Warehouses & distributors	133,088	10.5	1.0
Construction & maintenance	57,751	4.5	.7
Contractor's products	75,654	5.9	2.1
Automotive	392,689	30.9	2.8
Rail Transportation	12,651	1.0	.5
Shipbuilding & marine equip	942	.07	.1
Aircraft	4,251	.3	6.0
Oil & gas drilling	1,512	.1	.3
Mining, quarrying&lumbering	5,762	.5	2.5
Agriculture	74,846	5.9	5.9
Machinery, ind. equip & tools	126,614	9.9	3.0
Electrical machinery & equip	57,238	4.5	2.8
Appl., utensils & cutlery	20,739	1.6	1.1
Other dom. & com. equipment	38,182	3.0	2.1
Containers	148,846	11.7	2.4
Ordnance & other military	1,277	.1	1.0
Export	14,693	1.2	1.0
Non-classified shipments	1,307	.1	.2
TOTAL	1,272,691	100.0	1.8
To steel industry for conversion or resale	276,930	21.8	6.8

TABLE 38-G

SHIPMENTS OF STRIP-COLD ROLLED
BY MARKET CLASSIFICATION-1959

Market Classification	Tons Shipped	% of Total Shipments of This Item	% of This Item of Total Steel Shipped To Each Market
To non-steel industry for converting and processing	42,305	3.0	1.4
Forgings (other than auto)	6	.0004	.0006
Bolts, nuts, rivets & screws	23,603	1.7	2.2
Warehouses & distributors	95,625	6.9	.7
Construction & maintenance	7,578	.5	.09
Contractor's products	124,828	9.0	3.5
Automotive	370,733	26.6	2.6
Rail Transportation	892	.06	.04
Shipbuilding & marine equip	296	.02	.05
Aircraft	3,545	.3	5.0
Oil & gas drilling	1	.00007	.0002
Mining, quarrying&lumbering	697	.05	.3
Agriculture	4,403	.3	.3
Machinery, ind. equip & tools	70,822	5.1	1.7
Electrical machinery & equip	90,702	6.5	4.4
Appl., utensils & cutlery	109,067	7.8	6.0
Other dom. & com. equipment	119,579	8.6	6.5
Containers	112,374	8.1	1.8
Ordnance & other military	2,534	.2	2.0
Export	7,104	.5	.5
Non-classified shipments	206,406	14.8	10.2
TOTAL	1,393,100	100.0	.2
To steel industry for conversion or resale	18,712	1.3	.5

All other hot rolled products: One final classification of steel mill products which deserves brief mention is the "all other" classification as defined by the American Iron and Steel Institute. This group, for the most part, includes fairly standard types of products with some variation or special type of treatment so that they do not quite fit into other product groups. An example of such a product might be rough turned bars, or perhaps turned and polished bars. Locomotive tires is another product which is classified in the all other group. These, of course, are a variation of the "wheels" classification.

Table 39 indicates where the "all other" products are produced. Where the company has supplied details regarding exactly what these products are, such information will be listed on the table. Shipment statistics for the products shown in Table 39 are not available.

TABLE 39

PRODUCTION OF ALL OTHER HOT ROLLED PRODUCTS

Location	Firm	Capacity	% US Total
Latrobe, Pa. (Locomotive and car wheels)	Alco Products	26,000	8.7
Houston, Texas	Armco	45,600	15.2
Burnham, Pa. (Rolled tires and rings)	Baldwin-Lima-Hamilton	50,000	16.7
Chicago Hgts., Ill.	Borg-Warner	18,000	6.0
Franklin, Pa.	" "	12,000	4.0
Pueblo, Colo.	Colo. F & I	75,000	25.0
Oakmont, Pa. (Rolled tires and rings)	Edgewater Steel	36,000	12.0
Pittsburgh, Pa.	Firth-Sterling	6,000	2.0
Warren, Mich.	J & L	25,600	8.5
Birmingham, Ala.	H K Porter	2,000	.7
Titusville, Pa.	Universal Cyclops	3,900	1.3
TOTAL U. S.		300,100	100.0

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