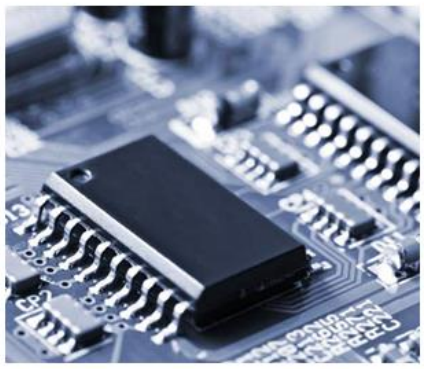

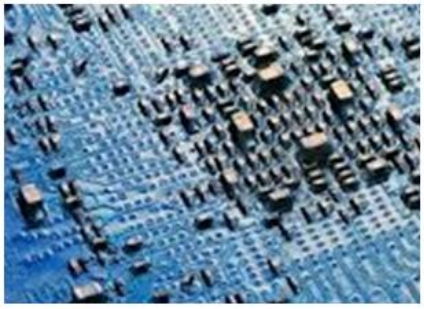

The U.S. Semiconductor Industry is one of the Most Competitive Manufacturing Industries in the United States

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The U.S. semiconductor industry ranks among the most competitive manufacturing industries in the United States. Using a methodology based on the United Nations' (U.N.) Competitive Industrial Performance (CIP) index to rank the competitiveness of American industries, SIA calculates that **the U.S. semiconductor industry ranks as the second most competitive U.S. industry out of 288[2] U.S. industries** designated manufacturers by the U.S. Census Bureau.

Key Takeaways

1. The U.S. semiconductor industry ranks second out of 288 U.S. manufacturing industries for competitiveness. That means the U.S. semiconductor industry produces some of America's most advanced products, is one of the largest contributors to U.S. gross domestic product (GDP), and has one of the highest potentials for growth of all U.S. manufacturers.
2. The U.S. semiconductor industry ranks consistently high in all four indicators of the CIP index, ranging from the top 0.3 to the top 15 percentile. The industry ranks first among 288 manufacturing industries in value added, which is one measure of how innovative an industry is.
3. These results confirm the vital role of the U.S. semiconductor industry in the U.S. economy, for the significant revenue and innovation it generates as well as for its huge potential to grow in foreign markets.

Introduction

The U.S. semiconductor industry has been a driving force of U.S. economic growth practically from its inception. Over the past 25 years, the U.S. semiconductor industry has produced more economic growth and innovation than any other major U.S. manufacturer, adding value to the nation's GDP in a time where many manufacturing industries are shrinking. But while there are abundant examples of the U.S. semiconductor industry's growth, it can be difficult to compare such a wide variety of factors between different industries.

This paper attempts to quantify and compare to other U.S. Industries the growth, innovation, and impact of the U.S. semiconductor industry. SIA's analysis is based on a methodology in the U.N.'s 2012/2013 Report, "The Industrial Competitiveness of Nations."[3] It combines high performance indicators such as value added, number employed, and number of exports in order to rank U.S. industries by their industrial competitiveness. By generating an explicit standard for industry competitiveness, the U.S. semiconductor industry's proficiency and worth become all the more apparent.

Of the over 288 industries compared for this analysis, the U.S. semiconductor industry ranks second out of all manufacturing industries in the United States. That means the U.S. semiconductor industry produces some of America's most advanced products, is one of the largest contributors to U.S. GDP, and, most importantly, has one of the highest potentials for international growth of all of America's manufacturers. Between these factors, and the vast number of other industries that rely on semiconductors (and are not even taken into account in this index), it is easy to see how the U.S. semiconductor industry is vital to the U.S. economy.

Table 1. Top 10 Most Competitive U.S. Manufacturing Industries

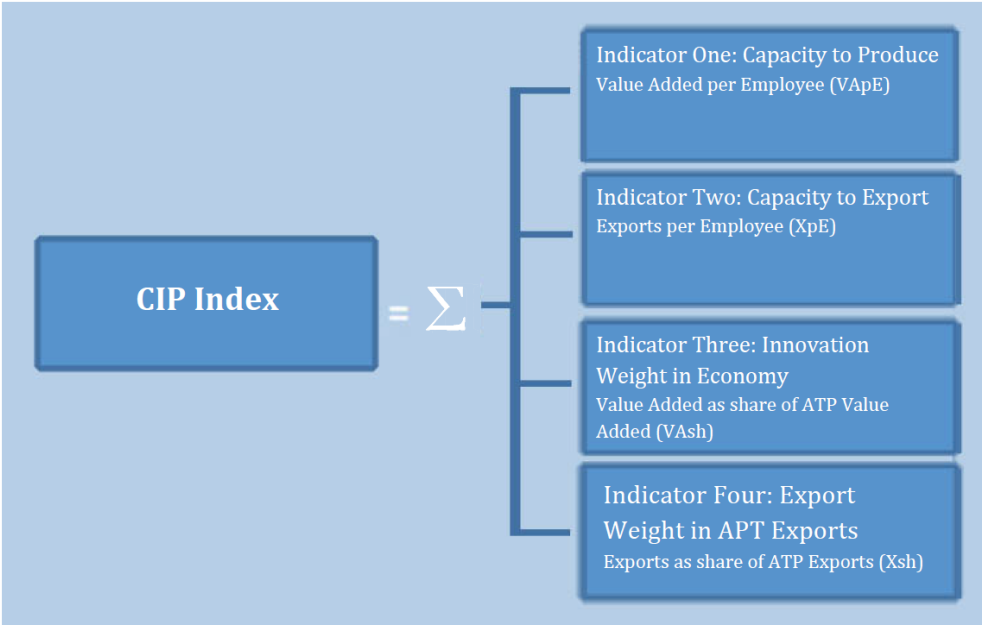
Industry[4]	Ranking
Other basic organic chemical manufacturing[5]	1
Semiconductor and related device manufacturing	2
Petroleum refineries	3
Other computer peripheral equipment manufacturing	4
Biological product (except diagnostic) manufacturing	5
Tobacco manufacturing	6
Telephone apparatus manufacturing	7
Aircraft manufacturing	8
Pulp mills	9
Other basic inorganic chemical manufacturing	10

What is Industrial Competitiveness?

According to the U.N., competitiveness is defined as "the capacity of countries to increase their presence in international and domestic markets while developing industrial sectors and activities with higher value added and technological content." While translating competitiveness among countries to industrial competitiveness within one country presents challenges, SIA has attempted to translate the U.N.'s country-to-country comparison methodology to fit the context of an industry-to-industry comparison methodology. The industrial competitiveness methodology therefore takes factors already available and adapts them into an industry-to-industry context.

SIA's CIP index is comprised of four different indicators that cover a wide spectrum of performance metrics, which is slightly different from the U.N.'s index. The reason for the changes is that the U.N. measures the differences between the overall competitiveness of a country's entire industrial sector, while we had to contend with both scaling back (as we are only interested in comparing American industries), and a difference in data availability. The methodology established and used by the U.N. over the past 30 years is still seen in this report; the indicators still cover dimensions listed in the U.N. report, each indicator is still given equal weight, and both geometric aggregation and linear aggregation[6] are used to calculate the index. By pulling different factors into a single composite index and using an established methodology, looking at the CIP index allows us to determine generally what the most competitive industries are, not only now, but for years to come.

Figure 1. Competitive Industrial Performance Index



The Indicators in Detail

Table 2 below summarizes the results for the U.S. semiconductor industry for the overall competitiveness ranking as well as its ranking for the four indicators.

Table 2. Summary of Competitiveness Indicator Results for the U.S. Semiconductor Industry

NAICS Code	Name	Overall Ranking	Indicator 1: Capacity to Produce	Indicator 2: Capacity to Export	Indicator 3: Innovation Weight	Indicator 4: Export Product Complexity
334413	Semiconductor and related device manufacturing	Rank **2/288**	Rank **39/288**	Rank **36/288**	Rank **1/288**	Rank **2/288**
		Top **0.69**th percentile	Top **13**th percentile	Top **12**th percentile	Top **0.34**th percentile	Top **0.69**th percentile

The first indicator, the capacity to produce, is measured in Value Added[7] per Employee[8] (VApE). Looking at value added[9] shows the relative value of the industry's output, while expressing the value per employee adjusts for the size of the industry.

Out of the 288 industries, the U.S. semiconductor industry ranks 39th, or in the top 13th percentile of all American manufacturing industries in this indicator. Each person employed by the U.S. semiconductor industry adds more value to their products than 87 percent of other U.S. manufacturing industries.

The second indicator is the capacity to export, which shows an industry's ability to produce goods competitively, while also excluding any biases that might occur due to incentives or subsidies in the internal market. This is measured by Exports[10] per Employee (XpE), where measuring by employee once again adjusts for differences in different industry sizes. The semiconductor industry is a major contributor to American exports, exporting over $42 billion worth of products each year[11], more per employee than the next 248 industries.

While indicator one and two provide a sense of how high an industry's capacity to export and produce is, they do not differentiate between industries based on technological capabilities. Indicator three and four help to bridge this gap. Indicator three looks at the share of Value Added from Advanced

Box 1. Indicator Three: Exceptional Innovation

Semiconductors rank remarkably high in value added as a share of ATP industries. This should come as no surprise; the need for innovation at high speeds is a driving force of the industry, as semiconductors lead the way for advancement in all electronic product sectors.

Technology Product (ATP) Industries, or high-tech industries, Value Added (ATPVAsh). This provides a sense of how technologically advanced the industrial structure has become, which in turn is an indicator of high opportunities for innovation and learning.

Out of all 288 manufacturing industries in the United States, the U.S. semiconductor industry ranks first in value added. This means that the semiconductor industry adds more value to their products than any other industry and is America's most innovative manufacturing industry by this measure.

Indicator four looks at an industry's Exports as a share of ATP manufactured Exports (Xsh).This indicator accounts for the complexity and technological content of the industry's exports. Here too, the semiconductor industry ranks extremely high, coming in at number two out of the 288 manufacturers.

Table 2. What are Advanced Technology Products?

The U.S. Census Bureau's Foreign Trade division maintains a list of Advanced Technology Products (ATP), or products "whose technology is from a recognized high technology field." The Census Bureau notes that "such products represent leading edge technology." Using this distinction and translating product specialized HS code into industry specialized NAICS codes, indicator three and indicator four cover an industry's technological level.

Rank of Semiconductor Industry among ATP Industries:

NAICS Code	Name	Overall Ranking	Indicator 1: Capacity to Produce	Indicator 2: Capacity to Export	Indicator 3: Innovation Weight	Indicator 4: Export Product Complexity
334413	Semiconductor and related device manufacturing	Rank **2/53**	Rank **6/53**	Rank **16/53**	Rank **1/53**	Rank **2/53**
		Top **3.7**th percentile	Top **11**th percentile	Top **30**th percentile	Top **1.8**th percentile	Top **3.7**th percentile

Semiconductors: An Industry or Growth

This paper compares U.S. industries' competitiveness and how the U.S. semiconductor industry ranks among other U.S. manufacturing industries. In all four competitiveness indicators included, the U.S. semiconductor industry ranks consistently high.[12]

This index is not simply designed to show how well the U.S. semiconductor industry ranks, but it also underscores the great potential for the industry. As mentioned earlier, the U.S. semiconductor industry affects many other high

technology industries; after all, computers, cell phones, tablets, and other devices used in less obvious fields, such as medical and scientific equipment, all rely on semiconductors. Therefore, while the U.S. semiconductor industry is highly important on all of the indicators we have used, its true economic impact is almost certainly being under-valued. Even more, the U.S. semiconductor industry needs to reach even higher levels of high-production to keep the United States globally competitive.

ENDNOTES

[1] Global Policy Intern (Summer 2015), Semiconductor Industry Association (SIA). Opinions expressed in this paper are the author's own and do not necessarily reflect those of the organization with which the author is associated.
[2] There are actually 417 different industries given unique 6-digit identification codes under the 2012 NAICS code. However, the U.S. Census Bureau has consolidated many of these industries into 5-digit level categories, due to confidentiality rules. It should be noted that several "industries" are actually an aggregation of several 6-digit industries.
[3] UNIDO (2013), the Industrial Competitiveness of Nations, Competitive Industrial Performance Report 2012/2013, Vienna: UNIDO.
[4] To see the complete list, see Appendix 2.
[5] As mentioned in endnote 1, while the majority of industries listed are broken down to the narrow 6-digit level, some of the 6-digit industry categories have been combined at their 5-digit level. "Other basic organic chemical manufacturing" is an example of such an industry category, as three 6-digit industry categories have been combined. It should be noted that, when broken apart, only one of the 6-digit industry categories is considered an Advanced Technology Product industry category (See Appendix 2 for more detail).
[6] Due to mathematical differences, a linear aggregation is used to rank all 288 industries, while a geometric aggregation is used to rank all high technology product industries. For more details, please see Appendix 1.
[7] U.S. Department of Commerce (USDOC), Bureau of Economic Analysis (BEA).
[8] Bureau of Labor Statistics (BLS), 2011 Employment Data.
[9] Value Added is the difference between an industry's outputs and the prices of the items purchased to make those outputs. For more information, refer to the SIA white paper, *The U.S. Semiconductor Industry: A Key Contributor to U.S. Economic Growth,* by Matti Parpala at:
http://www.semiconductors.org/clientuploads/Industry%20Statistics/SIA%20White%20Paper%20on%20Value%20Added%20and%20Economic%20Impact.pdf.
[10] U.S. International Trade Commission, 2011 U.S. export data.
[11] U.S. International Trade Commission, as of 2013. Industry defined by NAICS code 334413.
[12] We are also working to keep our information as accurate and as up-to-date as possible. For example, we are looking to make the ranking more equitable by expanding those industries that have been condensed to their 5-digit NAICS levels into 6-digit levels. We are confident that, no matter how the numbers are divided and reexamined, the U.S. semiconductor industry will continue to rank very high.

Appendix 1: Data Collection and Methodology

1. Data Sources

   The methodology used in this report is based on the methodology used in the U.N.'s *The Industrial Competitiveness of Nations,* released in 2013. Data was collected from the U.S. Department of Commerce, Bureau of Economic Analysis, Bureau of Labor Statistics 2011 Employment Data, and the U.S. Internal Trade Commission.

2. ATP/non-ATP

   The designation of ATP and non-ATP industries was assigned to 390 product categories by HS code, by the Foreign Trade Division of the U.S. Census Bureau. We then translated those codes into their corresponding NAICS codes. The following 53 industries were identified as producing advanced technology products, as identified by NAICS code.

NAICs Code	Industry
32519M	Other basic organic chemical manufacturing
334413	Semiconductor and related device manufacturing
325414	Biological product (except diagnostic) manufacturing
325188	Other basic inorganic chemical manufacturing
334119	Other computer peripheral equipment manufacturing
325411	Medicinal and botanical manufacturing
339112	Surgical and medical instrument manufacturing
333242	Semiconductor machinery manufacturing
334510	Electromedical and electrotherapeutic apparatus manufacturing
334210	Telephone apparatus manufacturing
339113	Surgical appliance and supplies manufacturing
334516	Analytical laboratory instrument manufacturing
33399P	All other miscellaneous general purpose machinery manufacturing
334220	Radio and television broadcasting and wireless communications equipment manufacturing
33592M	Communication and energy wire and cable manufacturing
335999	All other miscellaneous electrical equipment and component manufacturing
336413	Other aircraft parts and auxiliary equipment manufacturing
33392M	Material handling equipment manufacturing
334112	Computer storage device manufacturing
334511	Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing
334515	Instrument manufacturing for measuring and testing electricity and electrical signals
334519	Other measuring and controlling device manufacturing
334517	Irradiation apparatus manufacturing

333314	Optical instrument and lens manufacturing
334310	Audio and video equipment manufacturing
334513	Instruments and related products manufacturing for measuring, displaying, and controlling industrial process variables
335314	Relay and industrial control manufacturing
335313	Switchgear and switchboard apparatus manufacturing
33632M	Motor vehicle electrical and electronic equipment manufacturing
333517	Machine tool manufacturing
334111	Electronic computer manufacturing
336412	Aircraft engine and engine parts manufacturing
336411	Aircraft manufacturing
332992	Small arms ammunition manufacturing
33399N	Fluid power equipment manufacturing
336992	Military armored vehicle, tank, and tank component manufacturing
327215	Glass product manufacturing made of purchased glass
332216	Hand tool and saw blade manufacturing
332410	Power boiler and heat exchanger manufacturing
325910	Printing ink manufacturing
332994	Small arms and ordnance manufacturing
333316	Photographic and photocopying equipment manufacturing
334418	Printed circuit assembly (electronic assembly) manufacturing
334412	Bare printed circuit board manufacturing
333511	Industrial mold manufacturing
334411	Electron tube manufacturing
334613	Magnetic and optical recording media manufacturing
336419	Other guided missile and space vehicle parts and auxiliary equipment manufacturing
334512	Automatic environmental control manufacturing for residential, commercial, and appliance use
333210	Sawmill and woodworking machinery manufacturing
336415	Guided missile and space vehicle propulsion unit and propulsion unit parts manufacturing
334612	Prerecorded compact disc (except software), tape, and record reproducing
336414	Guided missile and space vehicle manufacturing

Several of these codes use “M” as a place holder for their final digit. This designation means that those industries are an amalgamation of all of the 6-digit industries under the 5-digit category.

3. Missing Data

Certain industries had values that were either missing from or imperfectly correlated to the separation between ATP and non-ATP categories. As outlined in the U.N. report, missing values have been replaced with the last available

observation prior to the missing observation. In the case of this report, the missing values are the 2011 employment data; for those values, the 2010 data has been used.

4. Normalization

The data must be normalized prior to any data aggregation, as the indicators have different measurement units. To place all indicators on a common basis, the data are normalized using the Min-Max rescaling technique:

$$I_{ij} = \frac{X_{ij} - Min_j(X_{ij})}{Max_j(X_{ij}) - Min_j(X_{ij})}$$

Where I_{ij} is the index value i for industry j, X_{ij} is the indicator value i for industry j, and min (resp. max) are the minimum (resp. maximum) operators returning the smallest (resp. largest) value in the sample. As a result, the top industry in the sample is assigned the value 1, while the worst performer is given the value 0.

5. Weighting scheme

Each indicator received a certain weight. These weights are based on equal weighting important dimensions in the construction of the CIP index:

	VApE	XpE	VAsh	Xsh
Linear Aggregate	1/4	1/4	1/4	1/4
Geometric Aggregate	1/4	1/4	1/4	1/4

6. Aggregation method

We used two different methods of aggregation, linear and geometric. Linear aggregation has been used by the U.N. in the past, but is not what they used in the most recent draft of *The Industrial Competitiveness of Nations*; a geometic aggregation was used instead. We could not use the geometric aggregation in our index, however, because industries that do not produce ATP products were assigned a 0 to the indicators that only revolved around ATP products, i.e. indicators 3 and 4. A geometric aggregation cannot calculate a 0 as a sub-indicator, which is why we provide two different ranks; the linear aggregate ranking, which includes non-ATP products as well as ATP products, and the geometric aggregation, which only includes ATP products.

Linear Aggregation: Using the linear aggregation method, the CIP index is constructed as a weighted average of the q sub-indicators:

$$CIP_{jt} = \sum_{i=1}^{q} w_i I_{ijt},$$

with w_1 being the weight of indicators i (i=1,…,q), and the requirement that all weights should be positive summing to 1.

Geometric Aggregation: Using the geometric aggregation method, the CIP index is constructed as a weighted geometric average of the q sub-indicators:

$$CIP_j = \prod_{i=1}^{q} I_{ij}^{w_i}$$

with w_i being the weight of indicator i, and the requirement that all weights should be positive and add up to 1. This is the aggregation method used in aggregation 2, which only compared ATP industries.

Appendix 2: Detailed Results

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
32519M	Other basic organic chemical manufacturing	Y	1	1	7	3	3	1
334413	Semiconductor and related device manufacturing	Y	2	2	39	36	1	2
324110	Petroleum refineries	N	3	NA	2	1	54	54
334119	Other computer peripheral equipment manufacturing	Y	4	5	157	7	28	3
325414	Biological product (except diagnostic) manufacturing	Y	5	3	9	17	8	12
312230	Tobacco manufacturing	N	6	NA	1	182	191	191
334210	Telephone apparatus manufacturing	Y	7	10	163	8	31	5
336411	Aircraft manufacturing	Y	8	33	77	239	2	37
322110	Pulp mills	N	9	NA	29	2	55	55
325188	Other basic inorganic chemical manufacturing	Y	10	4	20	18	11	8
325312	Phosphatic fertilizer manufacturing	N	11	NA	12	5	57	57
311224	Soybean and other oilseed processing	N	12	NA	4	6	58	58
339112	Surgical and medical instrument manufacturing	Y	13	7	82	78	6	7
33399P	All other miscellaneous general purpose machinery manufacturing	Y	14	13	202	35	15	4
325411	Medicinal and botanical manufacturing	Y	15	6	30	14	17	14
339113	Surgical appliance and supplies manufacturing	Y	16	11	62	105	5	13
333242	Semiconductor machinery manufacturing	Y	17	8	27	15	19	18
33991M	Jewelry and silverware manufacturing	N	18	NA	172	4	56	56
334511	Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing	Y	19	20	67	197	4	29
325110	Petrochemical manufacturing	N	20	NA	3	119	138	138
334510	Electromedical and electrotherapeutic apparatus manufacturing	Y	21	9	59	53	9	11
334310	Audio and video equipment manufacturing	Y	22	25	260	11	46	10

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
334220	Radio and television broadcasting and wireless communications equipment manufacturing	Y	23	14	87	55	13	9
325211	Plastics material and resin manufacturing	N	24	NA	24	10	60	60
334516	Analytical laboratory instrument manufacturing	Y	25	12	54	31	16	15
336413	Other aircraft parts and auxiliary equipment manufacturing	Y	26	17	80	156	7	26
33592M	Communication and energy wire and cable manufacturing	Y	27	15	56	26	20	21
334111	Electronic computer manufacturing	Y	28	31	286	49	37	6
336120	Heavy duty truck manufacturing	N	29	NA	119	9	59	59
312140	Distilleries	N	30	NA	8	43	79	79
33392M	Material handling equipment manufacturing	Y	31	18	91	123	12	24
334517	Irradiation apparatus manufacturing	Y	32	23	73	23	39	30
334112	Computer storage device manufacturing	Y	33	19	109	29	32	23
325212	Synthetic rubber manufacturing	N	34	NA	88	12	61	61
335999	All other miscellaneous electrical equipment and component manufacturing	Y	35	16	111	40	29	19
336111	Automobile manufacturing	N	36	NA	81	13	62	62
334515	Instrument manufacturing for measuring and testing electricity and electrical signals	Y	37	21	182	48	26	16
325181	Alkalies and chlorine manufacturing	N	38	NA	16	32	72	72
333314	Optical instrument and lens manufacturing	Y	39	24	187	28	42	22
311514	Dry, condensed, and evaporated dairy product manufacturing	N	40	NA	17	34	73	73
334519	Other measuring and controlling device manufacturing	Y	41	22	97	54	21	27
336412	Aircraft engine and engine parts manufacturing	Y	42	32	93	204	10	35
311930	Flavoring syrup and concentrate manufacturing	N	43	NA	6	142	157	157
311221	Wet corn milling	N	44	NA	18	38	75	75
325311	Nitrogenous fertilizer manufacturing	N	45	NA	10	108	128	128

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
334513	Instruments and related products manufacturing for measuring, displaying, and controlling industrial process variables	Y	46	26	233	77	22	17
336112	Light truck and utility vehicle manufacturing	N	47	NA	5	265	265	265
333120	Construction machinery manufacturing	N	48	NA	52	21	66	66
312120	Breweries	N	49	NA	11	118	137	137
335314	Relay and industrial control manufacturing	Y	50	27	201	70	27	20
32561M	Soap and cleaning compound manufacturing	N	51	NA	13	71	101	101
311225	Fats and oils refining and blending	N	52	NA	14	69	100	100
325320	Pesticide and other agricultural chemical manufacturing	N	53	NA	33	37	74	74
33149M	Nonferrous metal (except copper and aluminum) rolling, drawing, extruding, and alloying	N	54	NA	45	27	70	70
333611	Turbine and turbine generator set unit manufacturing	N	55	NA	120	16	63	63
325412	Pharmaceutical preparation manufacturing	N	56	NA	19	66	97	97
332992	Small arms ammunition manufacturing	Y	57	34	145	33	45	33
325620	Toilet preparation manufacturing	N	58	NA	21	63	94	94
32513M	Synthetic dye and pigment manufacturing	N	59	NA	50	30	71	71
333618	Other engine equipment manufacturing	N	60	NA	75	25	69	69
33111M	Iron and steel mills and ferroalloy manufacturing	N	61	NA	34	46	82	82
325182	Carbon black manufacturing	N	62	NA	35	45	81	81
333220	Plastics and rubber industry machinery manufacturing	N	63	NA	199	19	64	64
33632M	Motor vehicle electrical and electronic equipment manufacturing	Y	64	29	222	100	25	25
316110	Leather and hide tanning and finishing	N	65	NA	244	20	65	65
335313	Switchgear and switchboard apparatus manufacturing	Y	66	28	101	106	24	32

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
313230	Nonwoven fabric mills	N	67	NA	31	59	90	90
336992	Military armored vehicle, tank, and tank component manufacturing	Y	68	36	44	93	38	41
333517	Machine tool manufacturing	Y	69	30	228	80	34	28
33993M	Doll, toy, and game manufacturing	N	70	NA	219	22	67	67
336414	Guided missile and space vehicle manufacturing	Y	71	53	86	264	14	53
336991	Motorcycle, bicycle, and parts manufacturing	N	72	NA	47	52	86	86
333912	Air and gas compressor manufacturing	N	73	NA	74	41	77	77
333911	Pump and pumping equipment manufacturing	N	74	NA	51	50	84	84
33399N	Fluid power equipment manufacturing	Y	75	35	184	107	30	31
324191	Petroleum lubricating oil and grease manufacturing	N	76	NA	15	266	266	266
311111	Dog and cat food manufacturing	N	77	NA	26	143	158	158
311920	Coffee and tea manufacturing	N	78	NA	32	109	129	129
31121M	Flour milling and malt manufacturing	N	79	NA	42	74	104	104
32212M	Paper and newsprint mills	N	80	NA	41	87	113	113
334518	Watch, clock, and parts manufacturing	N	81	NA	282	24	68	68
311230	Breakfast cereal manufacturing	N	82	NA	23	173	182	182
327910	Abrasive product manufacturing	N	83	NA	37	90	115	115
334417	Electronic connector manufacturing	N	84	NA	131	42	78	78
335991	Carbon and graphite product manufacturing	N	85	NA	78	51	85	85
336390	Other motor vehicle parts manufacturing	N	86	NA	178	39	76	76
333913	Measuring and dispensing pump manufacturing	N	87	NA	60	68	99	99
327215	Glass product manufacturing made of purchased glass	Y	88	37	164	159	23	36
322130	Paperboard mills	N	89	NA	22	240	243	243
333111	Farm machinery and equipment manufacturing	N	90	NA	98	47	83	83
324122	Asphalt shingle and coating materials manufacturing	N	91	NA	28	184	193	193
324122	Asphalt shingle and coating materials manufacturing	N	91	NA	28	184	193	193

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
331313	Alumina refining, primary aluminum production	N	92	NA	146	44	80	80
334418	Printed circuit assembly (electronic assembly) manufacturing	Y	93	43	149	227	18	44
32599M	All Other Chemical Product and Preparation Manufacturing	N	94	NA	64	72	102	102
325413	In-vitro diagnostic substance manufacturing	N	95	NA	25	267	267	267
335911	Storage battery manufacturing	N	96	NA	76	62	93	93
332216	Hand tool and saw blade manufacturing	Y	97	38	191	132	33	34
336510	Railroad rolling stock manufacturing	N	98	NA	66	82	109	109
33291N	Valve and fitting (except plumbing) manufacturing	N	99	NA	95	61	92	92
332410	Power boiler and heat exchanger manufacturing	Y	100	39	144	140	35	39
321213	Engineered wood product manufacturing	N	101	NA	40	149	163	163
325910	Printing ink manufacturing	Y	102	40	104	110	44	43
333613	Mechanical power transmission equipment manufacturing	N	103	NA	113	58	89	89
332215	Cutlery, kitchen utensil, pot, and pan manufacturing	N	104	NA	43	145	160	160
325520	Adhesive manufacturing	N	105	NA	63	98	122	122
31191M	Snack food manufacturing	N	106	NA	36	213	218	218
335312	Motor and generator manufacturing	N	107	NA	166	57	88	88
325510	Paint and coating manufacturing	N	108	NA	57	133	149	149
333991	Power-driven hand tool manufacturing	N	109	NA	142	64	95	95
33313M	Mining and oil and gas field machinery manufacturing	N	110	NA	167	60	91	91
333612	Speed changer, industrial high-speed drive, and gear manufacturing	N	111	NA	140	65	96	96
333316	Photographic and photocopying equipment manufacturing	Y	112	42	229	83	49	40
332994	Small arms and ordnance manufacturing	Y	113	41	106	168	41	45
326113	Unlaminated plastics film and sheet (except packaging) manufacturing	N	114	NA	115	81	108	108

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
327992	Ground or treated mineral and earth manufacturing	N	115	NA	49	172	181	181
33142M	Copper rolling, drawing, extruding, and alloying	N	116	NA	143	75	105	105
327211	Flat glass manufacturing	N	117	NA	129	79	107	107
33131N	Other aluminum rolling, drawing and extruding	N	118	NA	133	76	106	106
336340	Motor vehicle brake system manufacturing	N	119	NA	117	88	114	114
336415	Guided missile and space vehicle propulsion unit and propulsion unit parts manufacturing	Y	120	51	65	256	40	52
324199	All other petroleum and coal products manufacturing	N	121	NA	38	268	268	268
333994	Industrial process furnace and oven manufacturing	N	122	NA	135	84	110	110
336350	Motor vehicle transmission and power train parts manufacturing	N	123	NA	100	97	121	121
313320	Fabric coating mills	N	124	NA	192	67	98	98
33631M	Motor vehicle gasoline engine and engine parts manufacturing	N	125	NA	173	73	103	103
311340	Nonchocolate confectionery manufacturing	N	126	NA	53	193	202	202
327410	Lime manufacturing	N	127	NA	46	234	238	238
31131M	Sugar Manufacturing	N	128	NA	58	186	195	195
335912	Primary battery manufacturing	N	129	NA	85	127	145	145
31324M	Knit fabric mills	N	130	NA	255	56	87	87
325920	Explosives manufacturing	N	131	NA	116	101	124	124
339114	Dental equipment and supplies manufacturing	N	132	NA	99	115	134	134
327212	Other pressed and blown glass and glassware manufacturing	N	133	NA	138	94	118	118
32621M	Tire manufacturing	N	134	NA	151	92	117	117
326112	Plastics packaging film and sheet (including laminated) manufacturing	N	135	NA	48	269	269	269
332510	Hardware manufacturing	N	136	NA	147	96	120	120
33521M	Small electrical appliance manufacturing	N	137	NA	206	85	111	111

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
334613	Magnetic and optical recording media manufacturing	Y	138	47	240	89	52	47
334514	Totalizing fluid meter and counting device manufacturing	N	139	NA	68	189	198	198
333511	Industrial mold manufacturing	Y	140	45	227	205	36	42
324121	Asphalt paving mixture and block manufacturing	N	141	NA	55	238	242	242
334411	Electron tube manufacturing	Y	142	46	162	131	51	48
31699M	Other leather and allied product manufacturing	N	143	NA	230	86	112	112
311119	Other animal food manufacturing	N	144	NA	79	164	175	175
334412	Bare printed circuit board manufacturing	Y	145	44	274	161	43	38
31194M	Seasoning and dressing manufacturing	N	146	NA	71	200	208	208
325120	Industrial gas manufacturing	N	147	NA	72	199	207	207
332722	Bolt, nut, screw, rivet, and washer manufacturing	N	148	NA	174	112	131	131
332991	Ball and roller bearing manufacturing	N	149	NA	165	117	136	136
334290	Other communications equipment manufacturing	N	150	NA	153	122	141	141
31142M	Fruit and vegetable canning, pickling, and drying	N	151	NA	92	163	174	174
312130	Wineries	N	152	NA	84	183	192	192
327993	Mineral wool manufacturing	N	153	NA	112	147	161	161
322291	Sanitary paper product manufacturing	N	154	NA	107	152	166	166
33593M	Wiring device manufacturing	N	155	NA	150	125	143	143
326220	Rubber and plastics hoses and belting manufacturing	N	156	NA	198	104	127	127
339999	All other miscellaneous manufacturing	N	157	NA	103	157	170	170
339991	Gasket, packing, and sealing device manufacturing	N	158	NA	181	113	132	132
325314	Fertilizer (mixing only) manufacturing	N	159	NA	61	270	270	270
33329N	Other machinery manufacturing	N	160	NA	126	137	153	153

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
333415	Air-conditioning and warm air heating equipment and commercial and industrial refrigeration equipment manufacturing	N	161	NA	139	134	150	150
337127	Institutional furniture manufacturing	N	162	NA	207	103	126	126
32522M	Artificial and synthetic fibers and filaments manufacturing	N	163	NA	242	91	116	116
31151N	Fluid milk and butter manufacturing	N	164	NA	69	236	240	240
333993	Packaging machinery manufacturing	N	165	NA	123	148	162	162
31199M	All other food manufacturing	N	166	NA	141	141	156	156
32222M	Paper bag and coated and treated paper manufacturing	N	167	NA	171	128	146	146
31135M	Chocolate and Confectionery Manufacturing	N	168	NA	105	170	179	179
333515	Cutting tool and machine tool accessory manufacturing	N	169	NA	156	135	151	151
335221	Household cooking appliance manufacturing	N	170	NA	155	138	154	154
339115	Ophthalmic goods manufacturing	N	171	NA	176	129	147	147
33994M	Office supplies (except paper) manufacturing	N	172	NA	128	150	164	164
334419	Other electronic component manufacturing	N	173	NA	245	102	125	125
33299N	Other fabricated metal products manufacturing	N	174	NA	250	99	123	123
332721	Precision turned product manufacturing	N	175	NA	70	271	271	271
311513	Cheese manufacturing	N	176	NA	94	210	215	215
335110	Electric lamp bulb and parts manufacturing	N	177	NA	235	111	130	130
327999	All other miscellaneous nonmetallic mineral product manufacturing	N	178	NA	132	158	171	171
31182M	Cookie, cracker, and pasta manufacturing	N	179	NA	83	229	233	233
327213	Glass container manufacturing	N	180	NA	96	214	219	219
339992	Musical instrument manufacturing	N	181	NA	213	120	139	139
339994	Broom, brush, and mop manufacturing	N	182	NA	121	175	184	184
327310	Cement manufacturing	N	183	NA	89	221	226	226
339920	Sporting and athletic goods manufacturing	N	184	NA	159	151	165	165

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
31161N	Animal (except poultry) slaughtering and processing	N	185	NA	180	144	159	159
31322M	Narrow fabric mills and schiffli machine embroidery	N	186	NA	270	95	119	119
332913	Plumbing fixture fitting and trim manufacturing	N	187	NA	118	195	204	204
33243M	Metal can, box, and other metal container (light gauge) manufacturing	N	188	NA	114	206	212	212
33512M	Lighting fixture manufacturing	N	189	NA	161	160	172	172
32619M	Other plastics product manufacturing	N	190	NA	158	162	173	173
336419	Other guided missile and space vehicle parts and auxiliary equipment manufacturing	Y	191	48	223	167	50	49
32629M	Other rubber product manufacturing	N	192	NA	168	169	178	178
321219	Reconstituted wood product manufacturing	N	193	NA	152	181	190	190
336214	Travel trailer and camper manufacturing	N	194	NA	254	121	140	140
31311M	Fiber, yarn, and thread mills	N	195	NA	266	114	133	133
336999	All other transportation equipment manufacturing	N	196	NA	90	272	272	272
327110	Pottery, ceramics, and plumbing fixture mfg	N	197	NA	252	124	142	142
339993	Fastener, button, needle, and pin manufacturing	N	198	NA	232	139	155	155
336330	Motor vehicle steering and suspension component (except spring) manufacturing	N	199	NA	197	155	169	169
336612	Boat building	N	200	NA	239	136	152	152
331314	Secondary smelting and alloying of aluminum	N	201	NA	102	243	246	246
31211M	Soft drink and ice manufacturing	N	202	NA	110	232	236	236
336370	Motor vehicle metal stamping	N	203	NA	122	216	221	221
31599M	Apparel accessories and other apparel manufacturing	N	204	NA	275	116	135	135
326122	Plastics pipe and pipe fitting manufacturing	N	205	NA	194	165	176	176
322299	All other converted paper product manufacturing	N	206	NA	188	171	180	180

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
337212	Custom architectural woodwork and millwork manufacturing	N	207	NA	108	273	273	273
31621M	Footwear manufacturing	N	208	NA	267	126	144	144
333318	Other Commercial and Service Industry Machinery Manufacturing	N	209	NA	185	179	188	188
314994	Rope, twine, tire cord and tire fabric mills	N	210	NA	216	154	168	168
33721N	Office furniture manufacturing	N	211	NA	124	231	235	235
333414	Heating equipment (except warm air furnaces) manufacturing	N	212	NA	186	187	196	196
334512	Automatic environmental control manufacturing for residential, commercial, and appliance use	Y	213	49	257	208	47	46
333413	Ventilation equipment manufacturing	N	214	NA	237	153	167	167
326160	Plastics bottle manufacturing	N	215	NA	160	209	214	214
337910	Mattress manufacturing	N	216	NA	125	242	245	245
335311	Power, distribution, and specialty transformer manufacturing	N	217	NA	203	176	185	185
332420	Metal tank (heavy gauge) manufacturing	N	218	NA	205	174	183	183
333210	Sawmill and woodworking machinery manufacturing	Y	219	50	273	146	53	50
31141M	Frozen food manufacturing	N	220	NA	170	211	216	216
33211M	Forging and Stamping	N	221	NA	127	241	244	244
327120	Clay building material and refractories mfg	N	222	NA	204	185	194	194
327420	Gypsum product manufacturing	N	223	NA	190	201	209	209
32223M	Stationery product manufacturing	N	224	NA	231	166	177	177
313210	Broadwoven fabric mills	N	225	NA	278	130	148	148
32221M	Paperboard container manufacturing	N	226	NA	154	224	229	229
334416	Capacitor, resistor, and inductor mfg	N	227	NA	208	177	186	186
336611	Ship building and repairing	N	228	NA	130	247	250	250
321999	All other miscellaneous wood product manufacturing	N	229	NA	189	207	213	213

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
311520	Ice cream and frozen dessert manufacturing	N	230	NA	137	250	253	253
33299p	Arms Ammunition Manufacturing and Fabricated Pipe and Pipe Fitting Manufacturing	N	231	NA	175	219	224	224
33261M	Spring and wire product manufacturing	N	232	NA	211	188	197	197
333112	Lawn and garden tractor and home lawn and garden equipment manufacturing	N	233	NA	134	274	274	274
33151M	Ferrous metal foundries	N	234	NA	179	222	227	227
331210	Iron and steel pipe and tube manufacturing from purchased steel	N	235	NA	136	275	275	275
314110	Carpet and rug mills	N	236	NA	224	190	199	199
334612	Prerecorded compact disc (except software), tape, and record reproducing	Y	237	52	214	253	48	51
336360	Motor vehicle seating and interior trim manufacturing	N	238	NA	226	192	201	201
33122M	Rolling and drawing of purchased steel	N	239	NA	193	220	225	225
326140	Polystyrene foam product manufacturing	N	240	NA	148	276	276	276
333519	Rolling Mill and Other Metalworking Machinery Manufacturing	N	241	NA	200	218	223	223
32111M	Sawmills and wood preservation	N	242	NA	247	180	189	189
32733M	Concrete pipe, brick, and block manufacturing	N	243	NA	169	257	258	258
336212	Truck trailer manufacturing	N	244	NA	253	178	187	187
33712N	Other household nonupholstered furniture	N	245	NA	196	233	237	237
326121	Unsupported plastics profile shape manufacturing	N	246	NA	212	217	222	222
33152M	Nonferrous metal foundries	N	247	NA	177	277	277	277
326111	Plastics bag manufacturing	N	248	NA	183	278	278	278
32311M	Printing	N	249	NA	221	223	228	228
31511M	Hosiery and sock mills	N	250	NA	264	191	200	200
31171M	Seafood product preparation and packaging	N	251	NA	215	228	232	232
31412M	Curtain and linen mills	N	252	NA	258	196	205	205

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
33281M	Coating, engraving, heat treating, and allied activities	N	253	NA	195	279	279	279
33231M	Plate work and fabricated structural product manufacturing	N	254	NA	225	226	231	231
311615	Poultry processing	N	255	NA	251	212	217	217
314999	All other miscellaneous textile product mills	N	256	NA	262	202	210	210
31181M	Bread and bakery product manufacturing	N	257	NA	218	245	248	248
326150	Urethane and other foam product (except polystyrene) manufacturing	N	258	NA	209	280	280	280
327320	Ready-mix concrete manufacturing	N	259	NA	210	263	264	264
33232M	Ornamental and architectural metal work manufacturing	N	260	NA	234	254	256	256
337215	Showcase, partition, shelving, and locker manufacturing	N	261	NA	272	203	211	211
339995	Burial casket manufacturing	N	262	NA	217	281	281	281
327390	Other concrete product manufacturing	N	263	NA	236	251	254	254
311830	Tortilla manufacturing	N	264	NA	220	282	282	282
339950	Sign manufacturing	N	265	NA	238	258	259	259
336213	Motor home manufacturing	N	266	NA	280	194	203	203
31331M	Textile and fabric finishing mills	N	267	NA	243	255	257	257
32191M	Millwork	N	268	NA	249	244	247	247
32312M	Support activities for printing	N	269	NA	241	260	261	261
337121	Upholstered household furniture manufacturing	N	270	NA	263	230	234	234
333514	Special die and tool, die set, jig, and fixture manufacturing	N	271	NA	256	235	239	239
332710	Machine shops	N	272	NA	246	283	283	283
326130	Laminated plastics plate, sheet, and shape manufacturing	N	273	NA	248	284	284	284

NAICS Code	Name	High Technology Industry	Aggregate 1 Rank	Aggregate 2 Rank	Normalized Indicator 1 Rank	Normalized Indicator 2 Rank	Normalized Indicator 3 Rank	Normalized Indicator 4 Rank
336211	Motor vehicle body manufacturing	N	274	NA	259	246	249	249
321992	Prefabricated wood building manufacturing	N	275	NA	276	225	230	230
3152M	Cut and Sew Apparel Manufacturing	N	276	NA	284	198	206	206
327991	Cut stone and stone product manufacturing	N	277	NA	261	252	255	255
337920	Blind and shade manufacturing	N	278	NA	271	249	252	252
31491M	Textile bag and canvas mills	N	279	NA	277	237	241	241
321991	Manufactured home (mobile home) manufacturing	N	280	NA	268	259	260	260
339116	Dental laboratories	N	281	NA	265	285	285	285
337110	Wood kitchen cabinet and counter top manufacturing	N	282	NA	269	261	262	262
32121N	Veneer and plywood manufacturing	N	283	NA	285	215	220	220
321920	Wood container and pallet manufacturing	N	284	NA	279	248	251	251
337122	Nonupholstered wood household furniture manufacturing	N	285	NA	281	262	263	263
31519M	Other apparel knitting mills	N	286	NA	283	286	286	286
334611	Software reproducing	N	287	NA	287	287	287	287
334113	Computer terminal manufacturing	N	288	NA	288	288	288	288