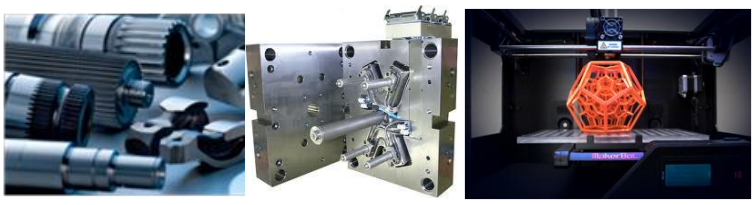

United States Market Opportunities for Production Technology Providers

Desk Study

Prepared for
PRODUTECH – Associação para as Tecnologias de Produção Sustentável

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CHAPTER 1: INTRODUCTION

The PRODUTECH – Association for Sustainable Production Technologies is an organization that represents the Portuguese manufacturing technologies sector, which includes companies that develop and market products and services that enable the national and international manufacturing industry to meet the challenges and requirements of sustainability and competitiveness. These companies rely on their ability to be innovative, flexible, and competitive. Similar to most companies in Portugal they also look to international markets for growth.

PRODUTECH and its members realize the United States of America (US) market is a substantial manufacturing market that cannot be ignored. Considering the technological abilities of the Portuguese manufacturing technologies sector, there should be significant opportunity for this sector to compete at an international level in general and within the US market specifically. Therefore, through an open bidding process, PRODUTECH has commissioned SPI USA Inc. to conduct a study on the opportunities for production technology providers within the US market.

The following study provides an analysis of the US manufacturing and production technology sectors, identifying the leading manufacturing sectors from a value of shipments and number of company sites perspective, and the production technologies in the highest demand, measured by their import levels and their relevance to the main manufacturing sectors.

The study starts by providing an insight into the current US reality from an industry, trade and capital expenditure standpoint (Chapter 2), before analyzing the manufacturing sector in greater detail (Chapter 3) to determine which industrial sectors play the most important roles in the country's economic fabric.

Chapter 4 includes an analysis of production technology import levels, as these are of particular significance for this study. Typically, high import levels represent potential opportunities for foreign suppliers and, possibly, a large domestic market demand from specific manufacturing sectors.

Finally, in Chapter 5, the study considers the top manufacturing sectors identified in Chapter 3 and elaborates on specific production technologies that serve those sectors, irrespective of their import levels. The domestic sector for each of these production technologies is analyzed, presenting indications on its market size, market trends, leading domestic competitors and geographical concentrations of potential domestic competitors.

In Chapter 6, further information is provided on the key market entry influences such as trade agreements, tariffs and restrictions. The study closes with conclusions and observations that highlight some of the key findings that may be most relevant to Portuguese production technology providers interested in entering the US market.

CHAPTER 2: MARKET OVERVIEW

The US is the largest economy in the world with a gross domestic product (GDP) of more than $15.94 trillion and per capita GDP of $49,800.[1] With an estimated population of 320 million over a geographical area that is the third largest, behind Russia and Canada respectively, the US's service sector is the largest in the world and its manufacturing sector is second only to China.

In general terms, the US economy is well-developed and experiencing a "reshoring" trend that is benefiting the manufacturing industry due, in part, to an efficient supply chain management and rising labor costs in China. The economy remains strong through its diversity and its leadership position in the manufacturing and services sectors. It is a forerunner in industries such as automotive, aerospace, telecommunications, chemicals, electronics and IT. In addition, the traditional industries have been strengthened by the implementation of modern technology.

A survey was conducted in February of 2012, which indicated about 37% of executives in companies that have sales of more than $1 billion are planning or considering the return of their production to the US from China.[2] Several companies have brought back some of their manufacturing to the US, such as General Electric, Nissan and the Ford Motor Company. Experts contribute this trend to a competitive and less risky investment climate, stability in wage inflation, enhanced productivity, and most important the availability of skilled labor compared to economies in Southeast Asia.

In addition, the economy will continue to recover from the economic downturn in 2008 through increased self-sufficiency in energy and a recovering housing sector. The recent oil and gas boom in the US is expected to lead to energy independence through the application of two technologies, horizontal drilling and hydraulic fracturing. These technologies provide added capability to extract natural gas from shale deposits and tight oil from low-permeability shale, sandstone and carbonate formations. According to the US Energy Information Administration, the gap between energy production and consumption will decrease in the next three decades from 19% in 2011 to 9% in 2040.[3]

The housing sector recovery is slow but showing positive signs. The number of newly started private housing units increased to a seasonally adjusted annual level close to

[1] The World Fact Book, United States Central Intelligence Agency, 2012
[2] Boston Consulting Group, 2012
[3] Annual Economic Outlook, US Energy Information Administration – EIA, May 2013

one million by the end of 2012; while the demand-supply scenario is also strong with new home inventories, near a 50-year low at the end of 2012. Further positive signs are being seen in the house prices, which have started to recover. These positive signs with a declining foreclosure market point towards a recovery in the US housing market in the near future.

2.1 Technology & Innovation

Technology and innovation are key influences on the US economy. The US has a long history of adapting and applying technology towards a higher quality of life for Americans. The country has several strengths with regard to technology development and implementation as well as some challenges.

Since World War II the US has maintained a leadership position with regard to technology and innovation within the global economy. This is shown in part through the US's consistent funding of R&D at a national level. In 2011, the US spent roughly 2.65% of its GDP on R&D.[4] According to the OECD, the US was responsible for 42% of the total R&D expenditure within the OECD countries in 2009.[5] In addition to strong funding of R&D, the US has an effective innovation system in place.

The US's well-established intellectual property rights (IPR) protection and enforcement system granted more than 250,000 patents in 2012, of which roughly 48% originated from the US. The IPR enforcement system encourages innovations from other countries to come to the US as well, which is a significant benefit for the US economy. In addition to the US patents, the US also accounts for about 28% of worldwide triadic patents that are taken simultaneously at the European Patent Office, the Japan Patent Office, and the US Patent and Trademark Office (USPTO).

The US's ability to facilitate the commercialization of technology is a strong aspect of the innovation system. According to the National Science Board's Science and Engineering Indicators 2012[6], of the five high-technology manufacturing industries, the US ranked first overall in aerospace, tied with the EU in pharmaceuticals, ranked behind Japan and Asia-8[7] in communication equipment manufacturing, and ranked behind the EU in scientific instruments. Nevertheless, in overall value added of high-technology manufacturing industries from 1998-2010, the US ranked first well above the EU and China (2nd and 3rd respectively).

[4] National Center for Science and Engineering Statistics, NSF, 13-313
[5] OECD Factbook 2013: Economic, Environmental and Social Statistics; Expenditure on R&D
[6] http://www.nsf.gov/statistics/seind12/pdf/overview.pdf
[7] Asia-8: India, Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand

The large number of multinational corporations based in the US contributes to the US's technology and innovation capabilities. Out of the Fortune 500 global companies listed in 2013, 132 are based in the US. The top ten technological companies in the world by annual revenue consist of six companies from the US. These companies, as well as affiliates of other global companies, contribute significantly to the technology exports of the country. As important, they have contributed to bringing new technology and skills to the US, further strengthening the technology sector and innovation system.

The ongoing funding of R&D with a strong innovation system in place virtually guarantees further growth through technology results. The development of technologies has allowed the US to remain at the forefront of emerging sectors such as biotechnology and nanotechnology. The US biotechnology sector has experienced strong growth in recent years even as the world's biggest and most mature sector. This trend is expected to continue. Similarly, the US is a leader in nanotechnology with an estimated 35% of the global market share.

From a technology and innovation perspective, in addition to the normal competition from the EU, the US has been facing significant competition from Asia. China intends to increase its spending on R&D to 2.5% of GDP by 2020 and South Korea 5% by 2022.[8] If current trends continue, China will equal if not surpass the US in scientific publications before 2020. Nevertheless, the trend shows the US will continue to remain highly respected within the scientific community as shown by its citation pattern. The trend indicates the US scientific community will continue to be the most cited community, providing the greatest impact, despite the growing number of publications by competing countries.

2.2 Industry

As shown by Figure 1, the US industry sector represented 19.2% of the US GDP in 2012. The service sector was the largest contributor to GDP, 79.7%, with the agriculture sector representing the remaining 1.1%.[9] The industrial output increased from $2.85 trillion in 2007 to $3.06 trillion in 2012. The US was the largest manufacturing country until it was surpassed by China in 2010.

[8] "Knowledge, networks and nations – Global scientific collaboration in the 21st century", The Royal Society, 2011

[9] The World Fact Book, United States Central Intelligence Agency, 2012

In order to ensure the US industrial output remains high, the US government has advanced policies aimed at negotiating lower tariffs and removing other barriers to US imports, while protecting US companies from unfair foreign competition.

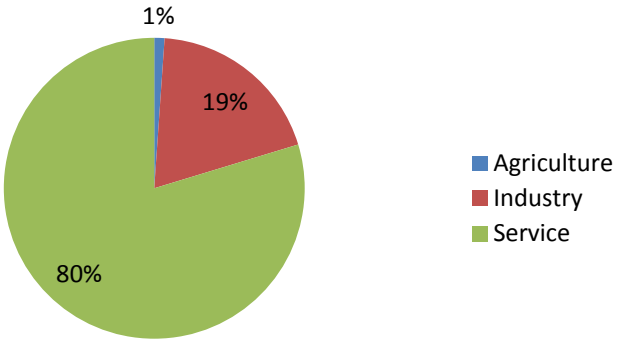

Figure 1 – GDP by Sector, 2012

The Industrial Production Index (IP) is a well-accepted measure of the US industry's capacity and utilization as well as its overall performance. The IP is comprised of the manufacturing, mining and utilities sectors. As shown by Figure 2, there was a significant decline from 2007 to 2009 due to the widely acknowledged recession.

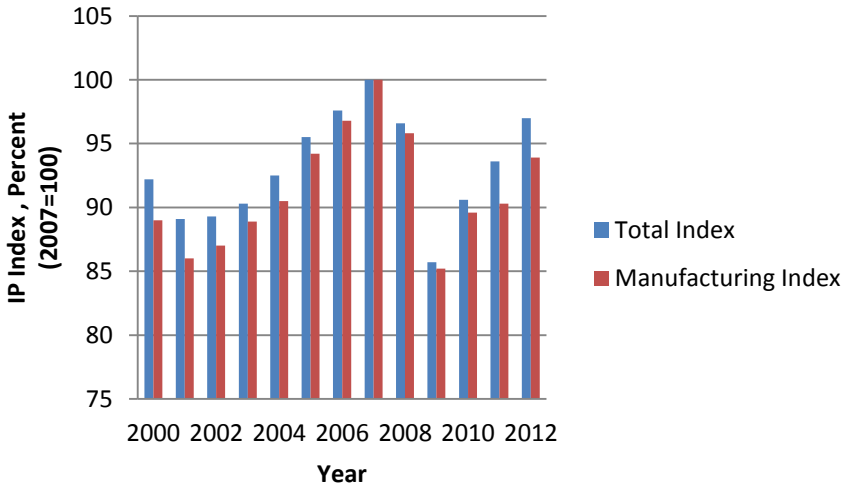

Figure 2 – Industrial Production Index, 2000-12: Overall Production and Manufacturing[10]

This decline reached 17% before beginning to rebound during the second half of 2009. In 2010, the industry rebounded about 6% and it is estimated to have rebounded 3% both in 2011 and in 2012. Roughly about 14% of the decline had been recovered by the end of 2012. All signs indicate the US industry is trending positive

[10] US Board of Governors of the Federal Reserve System, Industrial Production and Capacity Utilization

with growth in capacity and production with a current estimated 76% to 78% capacity utilization rate.

2.3 Trade

Similar to the US industry trends, the US merchandise exports have shown a steady increase since 2009 to $1.55 trillion in 2012. This represents a 28.7% growth in real US goods exports since 2009. Manufactured goods accounted for 87% of US merchandise exports. From a dollar value perspective, transportation equipment accounted for 16.1% of the merchandise exports for 2012 followed by: computer and electronic products - 13.2%, chemicals – 12.8%, machinery – 10.7%, and petroleum and coal products – 7.2%. All other merchandise accounted for the rest of the market exports – 40.1%.[11]

The US exports reach more than 230 destinations worldwide, with Canada and Mexico accounting for almost one-third of the total. The leading export markets for 2012 were Canada ($293 billion), Mexico ($216 billion,) China ($110 billion), Japan ($70 billion) and the United Kingdom ($55 billion). Due to free trade agreements, Mexico showed the highest growth from a value perspective compared to 2011. It is also interesting to note US goods exports to markets in South and Central America represent the most rapid growth since 2009 with both up by more than 70%, although these markets are a much smaller share of the overall exports. Despite the steady increase in exports, the US still maintains a trade deficit that reached $730 billion in 2012.

The US maintains a trade surplus in services and a significant trade deficit with regard to goods, which accounts for the overall trade deficit. Manufactured goods accounted for 79% of merchandise imports for 2012. From a dollar value perspective, computers and electronic products accounted for 15.6% of the merchandise imports for 2012 followed by: oil and gas – 14.3%, transportation equipment – 14.0%, chemicals – 8.7%, and machinery 6.5%. All other merchandise accounted for the rest of the market imports – 40.9%.[11]

Since the US import market is the primary interest of Produtech's membership, a closer review of the market is considered. In order to take a closer review of the market, one needs to review the relevant industry sector categories as defined by the North America Industry Classification System (NAICS). The NAICS is a well-

[11] Office of Trade and Industry Information, International Trade Administration, US Department of Commerce, www.trade.gov

accepted classification system within the US. It is the standard used by the US government statistical agencies in classifying companies for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.[12]

To provide a view of the US import market and its trends, the most relevant NAICS categories in relation to production technologies were selected. The NAICS categories that are most relevant to the production technology US market are the machinery categories (non electrical and electrical) and the computer & electronic products categories. The other categories under the manufacturing heading mostly relate directly to the manufacturing of specific consumables such as beverages, dairy products and paper products, or to the manufacturing of household items, motor vehicles and aerospace products. The remaining non manufacturing related categories are focused on non manufacturing related items such as crop production, natural resource extraction, construction, and professional services.

In review of the machinery except electrical category (NAICS 333), there are a few interesting conclusions. The total import market for 2012 was over $165 billion with the agriculture & construction machinery submarket accounting for 31.6% of the total import market followed by: other general purpose machinery – 25.7%, engines – turbines & power transmission equipment – 17.8%, industrial machinery – 9.4%, and metal working machinery – 4.9% (Figure 3).

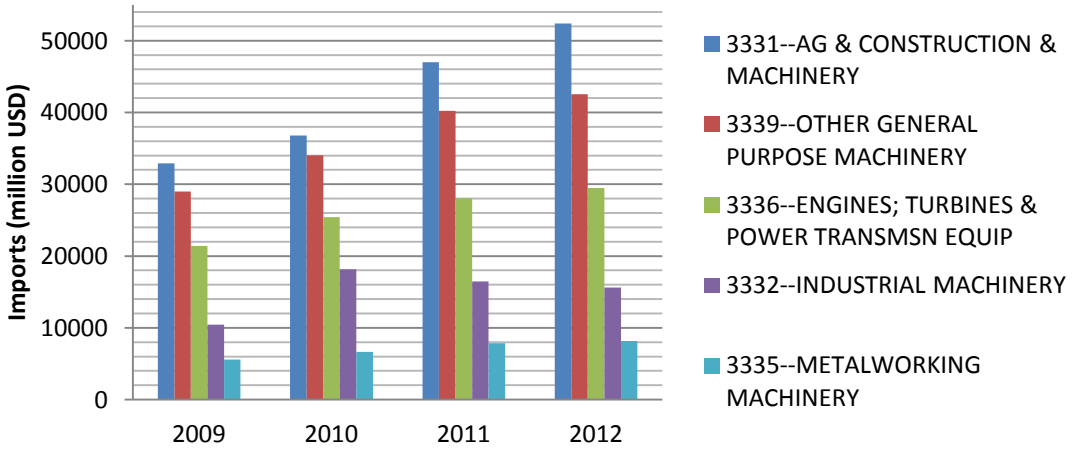

Figure 3 – Machinery (except electrical) imports [13]

The computer & electronic products category (NAICS 334) experienced significant market growth from 2009 to 2012 as well. The total import market for 2012 was over

[12] North America Industry Classification System, http://www.census.gov/eos/www/naics/

$355 billion.[13] Computer equipment accounted for about 28.3% of the market followed by: communications equipment – 26.3%, semiconductors & other electronic components – 20.6%, and navigational/ measuring/ medical/ control instrument – 13.4%. All the above mentioned subcategories experienced substantial market growth from 2009 to 2012 (Figure 4).

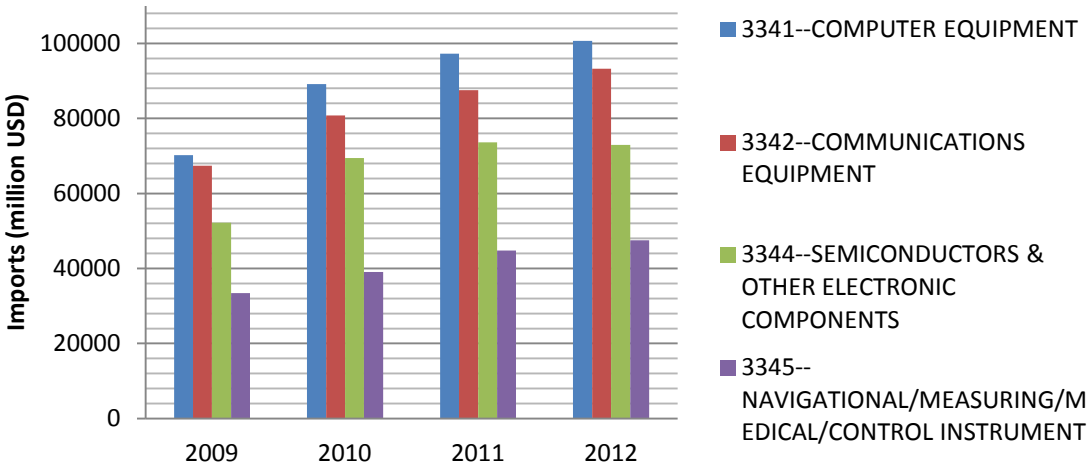

Figure 4 – Computer & electronic products imports [13]

With regard to the electrical equipment category (NAICS 335), the most relevant subcategory is the electrical equipment & components which accounts for 44.1% of the total $46 billion electrical equipment market. This subcategory experienced consistent market growth from 2009 to 2012 (Figure 5).

Therefore, all categories that are most relevant to the production technology US market represent a sizable market (over $550 billion) and show consistent growth over the last four years.

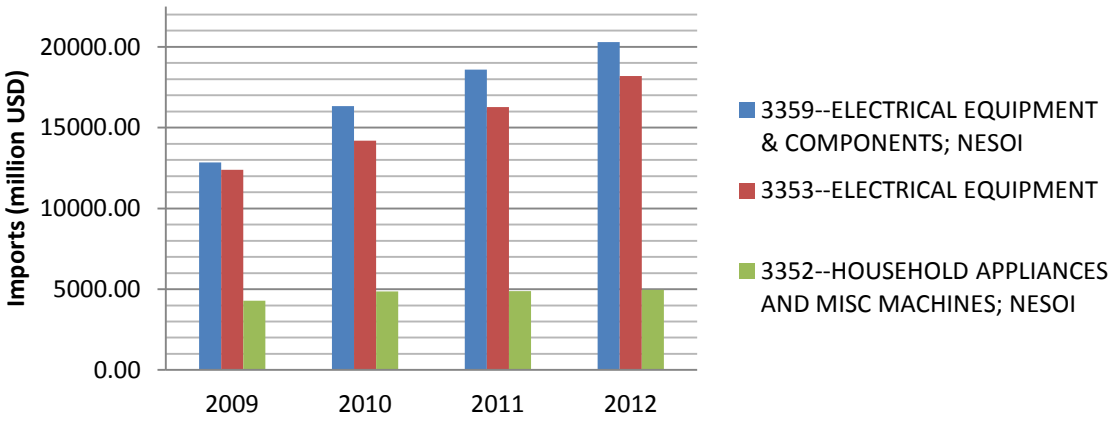

Figure 5 – Electrical equipment imports [13]

[13] Foreign Trade Division, US Census Bureau, US Department of Commerce, www.trade.gov

2.4 Capital Expenditures

The US government conducts an annual survey of companies within various industries in order to gain insight to the industries' trends with regard to economic factors such as employment, investment, outsourcing, offshoring, etc. One of the factors the government tracks is the capital expenditures for companies with employees by industry sector. The equipment share of capital expenditures for companies with employees is a relevant indicator of the trend and potential size of the production technology market of the US.

In reviewing the US Census Bureau's findings for the manufacturing sector from 2002 to 2011, one finds a dynamic equipment market with a steep decline from 2008 to 2009, as one would expect, with steady growth from 2009 to 2011 (Figure 6). The equipment share of the capital expenditures is on average almost 80% of the total expenditures compared to the structures share of the expenditures. In total, the manufacturing sector capital expenditures for 2011 are estimated to be about $193 billion of which about $157 billion are equipment related expenditures directly associated to production technologies.

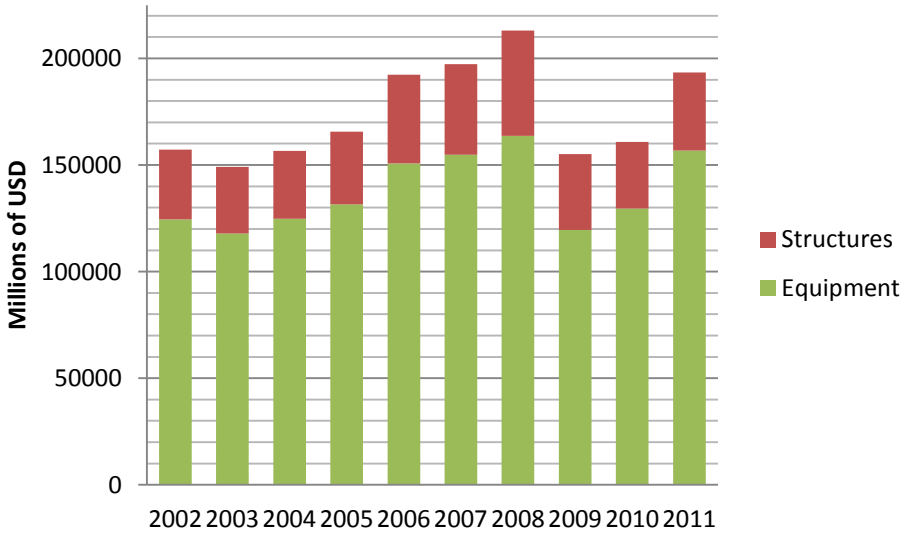

Figure 6 – Manufacturing Sector Structures and Equipment Share of Capital expenditures for Companies with Employees. [13]

CHAPTER 3: LEADING US MANUFACTURING SECTORS

The following chapter identifies the leading manufacturing sectors, in order to determine potential US market opportunities for product technology providers. The production technology related manufacturing subsectors that support the leading manufacturing sectors are identified as well. The production technology related manufacturing subsectors are discussed at length in Chapter 5.

3.1 Manufacturing Sectors

In accordance with the US government's definition, the US manufacturing sectors are comprised of establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The US government also considers the assembling of component parts of manufactured products to be within the manufacturing sectors; except when the activity is classified within the construction sector.[14]

Taking the above definition into consideration, the main manufacturing sectors as identified by the NAICS are the following:

Table 1 – Main Manufacturing Sectors and NAICS Codes

NAICS Code	Manufacturing Sector
311	Food manufacturing
312	Beverage and tobacco product manufacturing
313	Textile mills
314	Textile product mills
315	Apparel manufacturing
316	Leather and allied product manufacturing
321	Wood product manufacturing
322	Paper manufacturing
323	Printing and related support activities
324	Petroleum and coal products manufacturing
325	Chemical manufacturing
326	Plastics and rubber products manufacturing
327	Nonmetallic mineral product manufacturing
331	Primary metal manufacturing

[14] Guide to Data Sources from the US Census Bureau, US Census Bureau

NAICS Code	Manufacturing Sector
332	Fabricated metal product manufacturing
333	Machinery manufacturing
334	Computer and electrical product manufacturing
335	Electrical equipment, appliance, and components
336	Transportation equipment manufacturing
337	Furniture and related product manufacturing
339	Miscellaneous manufacturing

One can identify the leading manufacturing sectors, in part, through analyzing the manufacturing sectors' annual sales by value of shipments. This will give an indication of the size of each manufacturing sector from a value of shipments perspective. The size of the market from a value of shipments perspective is not the only measurement that needs to be considered. One also needs to take into account the potential number of customers from a production technology provider perspective. If a specific manufacturing sector is significant based on value of shipments but has a small number of potential production technology customers, the sector may not be as interesting to production technology providers as a less significant sector based on value of shipments that has a greater number of potential customers.

Therefore, in order to identify the leading manufacturing sectors from a production technology provider's perspective, the manufacturing sectors are analyzed based on their annual value of shipments and the potential customer base.

3.2 Annual Value of Shipments

According to the 2011 Annual Survey of Manufacturers conducted by the US Census Bureau, the leading eight manufacturing sectors by value of shipments are presented in Table 2. These values are estimates for businesses with paid employees. The petroleum and coal products manufacturing, chemical manufacturing and food manufacturing are the leading manufacturing sectors; while from a percent increase from 2010 perspective, the petroleum and coal products manufacturing, primary metal manufacturing, and machinery manufacturing standout from the group with 15% to 33% growth.

Table 2 – Leading Manufacturing Sectors by Value of Shipments ($ million)

NAICS Code	Manufacturing Sector	2011 Total Value of Shipments	Percent Change from 2010
324	Petroleum and coal products manufacturing	836,813	33.4
325	Chemical manufacturing	776,817	11.3
311	Food manufacturing	710,366	9.4
336	Transportation equipment manufacturing	690,437	8.4
333	Machinery manufacturing	365,735	15.1
334	Computer and electrical product manufacturing	337,861	2.0
332	Fabricated metal product manufacturing	326,797	11.2
331	Primary metal manufacturing	280,153	20.3

3.3 Potential Production Technology Customer Base

In order to estimate the potential customer base of the eight leading manufacturing sectors by value of shipments, a proprietary database of more than 20 million businesses and 222 million consumers was utilized.[15] The database identifies individual company sites. A company may have many manufacturing sites and support facilities. This is important considering each individual company site can be a production technology customer. The companies associated to each manufacturing sector were identified based on their "primary" and "secondary" NAICS code. Companies that identify the particular manufacturing sector as their "primary" line of business are quantified as "primary". Similarly, companies that are related to the particular manufacturing sector, but the sector is not their "primary" line of business, are quantified as "secondary".

Table 3 presents the results of the data mining exercise. If one considers the "primary" line of business as being more relevant, the leading manufacturing sectors from a potential customer base are the fabricated metal product manufacturing sector and food manufacturing sector, followed by the machinery manufacturing sector. These three sectors have more than three times the company sites compared to the remaining manufacturing sectors.

One finds a similar result when analyzing the number of companies that list a manufacturing sector as a "secondary" line of business. The leading three sectors

[15] ReferenceUSA, www.referenceusa.com

are the fabricated metal product manufacturing sector, machinery manufacturing sector and the food manufacturing sector. These three sectors each almost double the number of company sites of any other manufacturing sector.

Table 3 – Potential Customer Base per Leading Manufacturing Sector (number of company sites)

NAICS Code	Manufacturing Sector	Primary NAICS	Secondary NAICS
332	Fabricated metal product manufacturing	73,597	99,835
311	Food manufacturing	50,818	69,334
333	Machinery manufacturing	39,494	75,582
334	Computer and electrical product manufacturing	20,317	32,346
325	Chemical manufacturing	14,552	24,433
336	Transportation equipment manufacturing	12,368	22,232
331	Primary metal manufacturing	7,140	12,793
324	Petroleum and coal products manufacturing	4,918	7,934

3.4 Leading Three Manufacturing Sectors

Taking into account the annual value of shipments and the potential production technology customer base, it is clear there are three leading manufacturing sectors that are well above the remaining sectors:

- **Fabricated metal product manufacturing** (NAICS 332) – Industries in this sector transform metal into intermediate or end products, other than machinery, computers and electronics, and metal furniture, or treat metals and metal formed products fabricated elsewhere. Important fabricated metal processes are forging, stamping, bending, forming, and machining, used to shape individual pieces of metal; and other processes, such as welding and assembling, used to join separate parts together. Establishments in this subsector may use one of these processes or a combination of these processes.
- **Food manufacturing** (NAICS 311) – Industries in this sector transform livestock and agricultural products into products for intermediate or final consumption. The industry groups are distinguished by the raw materials (generally of animal or vegetable origin) processed into food products.

- **Machinery manufacturing** (NAICS 333) – Industries in this sector create end products that apply mechanical force, for example, the application of gears and levers, to perform work. Some important processes for the manufacture of machinery are forging, stamping, bending, forming, and machining that are used to shape individual pieces of metal. Processes such as welding and assembling are used to join separate parts together. Although these processes are similar to those used in metal fabricating establishments, machinery manufacturing is different because it typically employs multiple metal forming processes in manufacturing the various parts of the machine. Moreover, complex assembly operations are an inherent part of the production process.

CHAPTER 4: US MANUFACTURING MARKET SEGMENTS FROM AN IMPORT PERSPECTIVE

The following Chapter analyzes production technology subsectors from an import perspective taking into account total value of imports and import trends. The most important production technology subsectors, based on these criteria, and the most relevant manufacturing market segments they support are identified. Furthermore, specific production technology subsectors that are particularly important in Portugal are also included in the analysis, even if they do not represent major US imports.

Market information on each of the relevant manufacturing market segments is presented in order to provide a market overview and potential approach that would be most effective for a foreign based production technology company.

4.1 Production Technology Import Market

In accordance with the North America Industry Classification System, the majority and largest production technology related industry subsectors are within the Machinery Manufacturing category (NAICS 333). Taking this into account, the individual subsectors within this category were analyzed from an import perspective, which included more than 40 subsectors. The value of imports were reviewed from 2008 to 2012, a total of five years.

The import data showed a significant decrease in imports from 2008 to 2009 due to the recession. The magnitude of the rebound from 2009 to 2010 varied depending on the production technology subsector. Therefore, the average of the import values from 2010 to 2012 was used to identify the leading subsectors based on imports. The 2010 to 2012 data shows more consistent trending and, therefore, reflects a more steady market. Through this approach the influence of the recession was minimized in selecting the most important production technology subsectors from an import market value perspective.

The six most important production technology subsectors from an import market value perspective are (listed in order of import market size):

- Construction Machinery Manufacturing (NAICS 333120)
- Farm Machinery and Equipment Manufacturing (NAICS 333111)
- Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing (NAICS 333415)

- Semiconductor Machinery Manufacturing (NAICS 333242)
- Machine Tool Manufacturing (NAICS 333517)
- Optical Instrument and Lens Manufacturing (NAICS 333314)

The import data and trending is presented in Annex 1. All six production technology subsectors represent strong positive trends over the last three years, 2010 to 2012. The Machine Tool Manufacturing subsector, followed by the Construction Machinery Manufacturing subsector, represents the strongest positive trends of the six subsectors. Nevertheless, one should take into account the recession may have delayed the rebound of these subsectors, which influences the trend analysis.

In addition to the six production technology subsectors indicated above, the study includes two additional subsectors that have been deemed particularly important to Portugal's production technology output:

- Stone Working Machinery Manufacturing (NAICS 333249)
- Food Product Machinery Manufacturing (NAICS 333241)

Given the Portuguese production technology industry's specialization in these two subsectors, it is possible that opportunities may exist in the US market for Portuguese producers even if import levels are below those of the other six subsectors.

4.2 Relevant Manufacturing Market Segments

The six most important production technology subsectors, from an import market value perspective identified by the previous section, and the two subsectors that have been considered significant for Portuguese production technology suppliers support several US manufacturing market segments, as one would expect. The most relevant manufacturing market segments are presented in Table 4.

Table 4 – Most Relevant Manufacturing Market Segments per Production Technology Subsector

NAICS Code	Manufacturing Market Segment
Production Technology – Construction Machinery Manufacturing	
236	Construction of Buildings
237	Heavy and Civil Engineering Construction
238	Specialty Trade Contractors
Production Technology – Farm Machinery and Equipment Manufacturing	
111	Crop Production

NAICS Code	Manufacturing Market Segment
112	Animal Production and Aquaculture
113	Forestry and Logging
115	Support Activities for Agriculture and Forestry
Production Technology – Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing
3115	Dairy Product Manufacturing
3116	Animal Slaughtering and Processing
3117	Seafood Product Preparation and Packaging
Production Technology - Semiconductor Machinery Manufacturing	
334413	Semiconductor and Related Device Manufacturing
Production Technology – Machine Tool Manufacturing	
332	Fabricated Metal Product Manufacturing
333	Machinery Manufacturing
Production Technology – Optical Instrument and Lens Manufacturing	
332	Fabricated Metal Product Manufacturing
333	Machinery Manufacturing
3343	Audio and Video Equipment Manufacturing
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
3346	Manufacturing and Reproducing Magnetic and Optical Media
Production Technology – Stone working machinery manufacturing	
327991	Cut Stone and Stone Product Manufacturing
Production Technology – Food Product Machinery Manufacturing	
311	Food Manufacturing
312	Beverage and Tobacco Product Manufacturing

The above listed manufacturing market segments are analyzed within the following Section.

4.3 Profiles of Manufacturing Market Segments

As indicated by the previous section, each of the eight most important production technology subsectors, from an import market value and Portuguese significance perspective, supports one or more market segments. These market segments as a

whole represent the respective US market. A market profile is presented within this section for each of the eight production technology subsectors.

The market profiles consist of a market overview that includes:

- Defined Market – the market segments that makeup the market.
- Total Establishments – the total number of establishments (potential clients) within the US Market. It is important to note a company may have several sites and, therefore, each site is considered an establishment or potential client.
- Establishments by State – the five States with the highest concentration of establishments are presented with the percent of establishments compared to the total US Market.
- Enterprises by Employment Size – the distribution of enterprises by number of employees is provided, which gives an indication to the average size of the enterprises within the market.
- Enterprises by Employment Size per State – the distribution of enterprises by number of employees is provided for each of the five States with the highest concentration of establishments.
- Total Value of Business Done – the revenue generated by the market is provided to give a sense of the total market size from a Gross Domestic Product perspective.
- Corporate Annual Sales Volume – the distribution of annual sales are provided to give further insight to the size of the establishments within the five States with the highest concentration of establishments.
- Relevant Market Channels – The most common market channels utilized by production technology providers within the respective market are presented and discussed. The market channels are defined as:
    - Manufacturer Direct – sales conducted by the technology provider directly to the client. For the case of foreign based providers this would be from outside the country.
    - Manufacturer's Local Representative – sales conducted by a local representative that does not handle competing lines and normally does not take possession of the technology.
    - Distributor – sales conducted by a local company that may handle competing lines.

- Turnkey Solutions Providers – sales are directed at a technical firm that markets a solution, which includes the production technology.

4.3.1 Construction Machinery Relevant US Manufacturing Market

Defined Market

The US Manufacturing Market most relevant to construction machinery manufacturers that export to the US is comprised of the following market segments:

Table 5 – US market segments most relevant to construction machinery manufacturers that export to the US

NAICS Code	Market Segment
236	Construction of Buildings
237	Heavy and Civil Engineering Construction
238	Specialty Trade Contractors

Considering the three market segments presented in Table 5, five US states standout in terms of number of establishments: California, New York, Florida, Texas and Illinois, with a combined 33% market share, Figure 7.

In terms of employment size, companies in the Construction of Buildings, Heavy and Civil Engineering Construction and Specialty Trade Contractors segments are mainly MSMEs with less than 4 employees.

Total Establishments[16]: 682,684

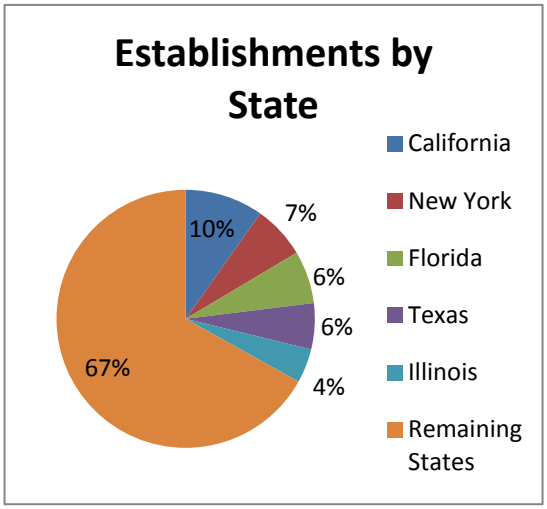

Figure 7 - NAICS 236, 237, 238 establishments by state

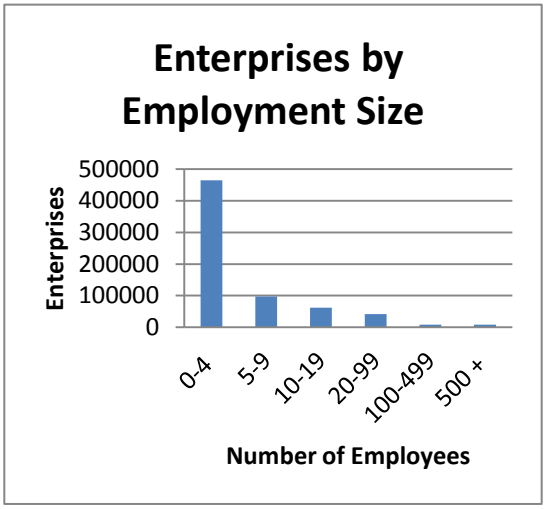

Figure 8 - NAICS 236, 237, 238 enterprises by employment size

[16] 2010 Census

Leading Geographical Markets Based on Number of Establishments[16]

Table 6 – Number of establishments vs. number of employees per leading geographical markets

Number of Employees	Number of Establishments				
	California	New York	Florida	Texas	Illinois
Total	66999	45293	45041	39321	29175
0-4	43243	32688	32716	22608	21500
5-9	10354	5890	5354	6685	3700
10-19	6773	3618	3516	4519	2081
20-99	4945	2446	2420	3747	1384
100-499	974	375	483	912	268
500 +	710	276	552	850	242

Total Value of Business Done ($ Million)*[17]*: 1,731,840

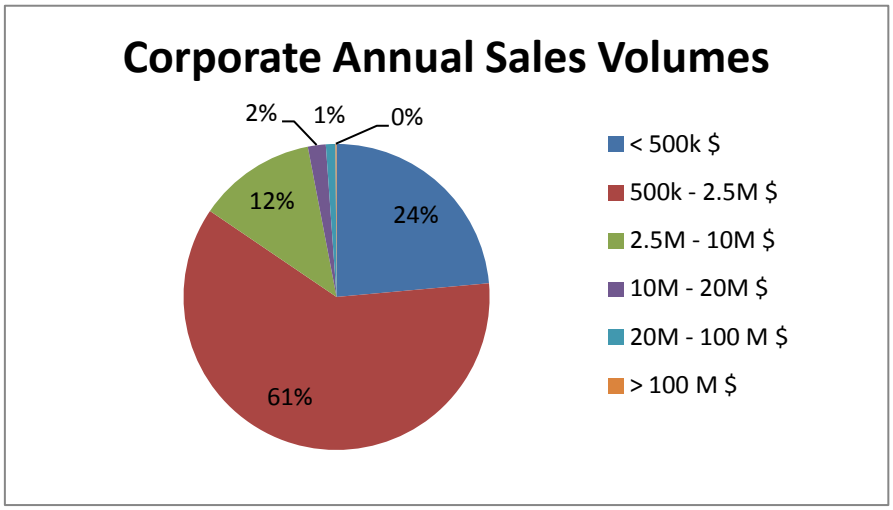

Figure 9 – Distribution of corporate annual sales volumes in the leading geographical markets (NAICS 236, 237, 238)

Based on a proprietary market database[18], the five leading geographical markets identified previously are comprised primarily of enterprises with annual sales volumes between $500k and $2.5M. Enterprises with annual sales volumes of $10M or less represent about 97% of the market.

Relevant Market Channels

- Distributors

[17] 2007 Census
[18] ReferenceUSA, www.referenceusa.com

Distributors are, by far, the most important marketing channel used by construction equipment manufacturers in the US. The construction equipment market dynamics is quite well known and regularly monitored by business associations and other relevant stakeholders, thus knowledge on the matter is substantial and robust. In particular, the Associated Equipment Distributors publish on a regular basis the Construction Equipment Market Study, a survey-based report which describes the main marketing channels and distribution strategies for construction equipment. The 2008 report[19], the most recent publicly available issue, presents important information in this regard.

More than two-thirds of all the equipment manufacturers sell is sold through independent distributors. This is consistent with how equipment buyers acquire their goods – very high percentages indicated they purchased new equipment from independent distributors (90% in 2003, 93% in 2006 and 95% in 2008).

Equipment users also indicated they purchase new equipment from auctions (26% in 2008) and rental companies (18% in 2008). Purchasing new equipment on the Internet is also gaining in popularity, albeit slowly. In 2008, 8% of equipment-user respondents said they purchase new equipment on the Internet, a large gain compared with only 2% in 2003.

Lastly, the study confirmed that selling through rental companies and direct to equipment buyers have become popular channels-to-market for manufacturers of attachments, lifting, paving, and light/general products. Manufacturers are emphasizing those channels to increase market coverage, to gain market share and to develop new markets.

It is also extremely relevant to point out that for manufacturers, it is essential to establish long lasting relations with distributors. Distributors believe selling equipment is still very much a relationship business – they indicated past experience with a distributor is the most important factor considered by their customers, whereas brand is deemed quite unimportant. Furthermore, equipment users seem to agree. They rank brand as one of their least important considerations when determining where to buy – just as distributors did. Thus, manufacturers should invest strongly in building good business relations with distributors, as this seems to be the fastest and most effective way to reach equipment users.

[19] AED 2008 Construction Equipment Market Study

4.3.2 Farm Machinery and Equipment Relevant US Manufacturing Market

Defined Market

The US Manufacturing Market most relevant to farm machinery and equipment manufacturers that export to the US is comprised of the following market segments:

Table 7 – US market segments most relevant to farm machinery and equipment manufacturers that export to the US

NAICS Code	Market Segment
111	Crop Production
112	Animal Production and Aquaculture
113	Forestry and Logging
115	Support Activities for Agriculture and Forestry

Taking into account the four market segments presented in Table 7, five US states standout in terms of number of establishments: California, Oregon, Washington, Georgia and Texas, with a 30% market share, Figure 10. The first three, California in particular, are expected results, as they cover the entire US West Coast, a territory with outstanding conditions for agricultural production and where agribusiness is exploited with high profitability.

In terms of employment size, companies in the Crop Production, Animal Production and Aquaculture, Forestry and Logging and Support Activities segments are mainly MSMEs with less than 4 employees.

Total Establishments[16]: 19,288

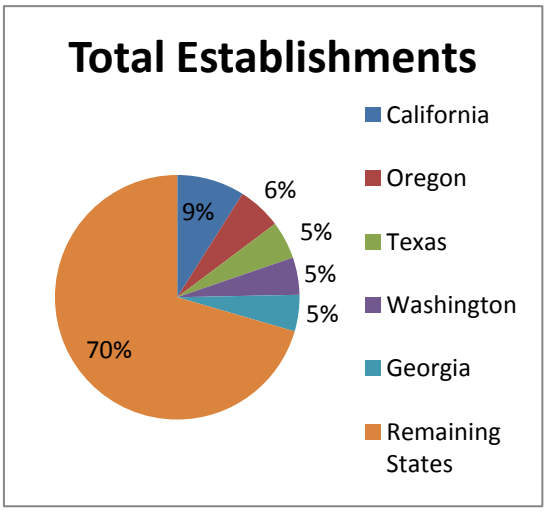

Figure 10 - NAICS 111, 112, 113,115 establishments by state

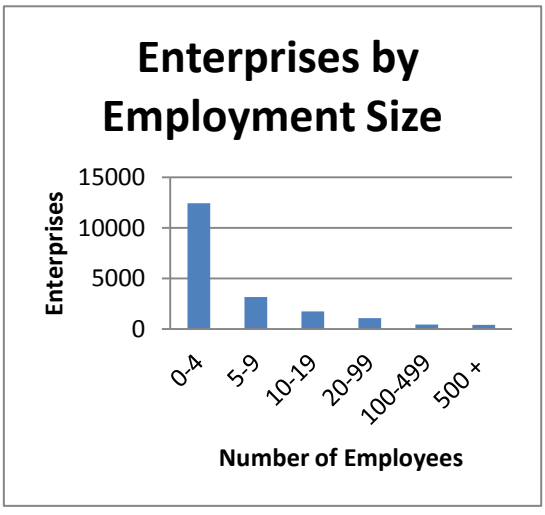

Figure 11 - NAICS 111, 112, 113,115 enterprises by employment size

Leading Geographical Markets Based on Number of Establishments[16]

Table 8 – Number of establishments vs. number of employees per leading geographical markets

Number of Employees	Number of Establishments				
	California	Oregon	Texas	Washington	Georgia
Total	1728	1117	963	952	930
0-4	1084	678	593	628	472
5-9	231	129	175	112	208
10-19	152	141	80	92	130
20-99	160	123	42	67	82
100-499	71	28	58	29	16
500 +	30	18	15	24	22

Total Value of Business Done ($ Million)*[20]*: Greater than 958,900

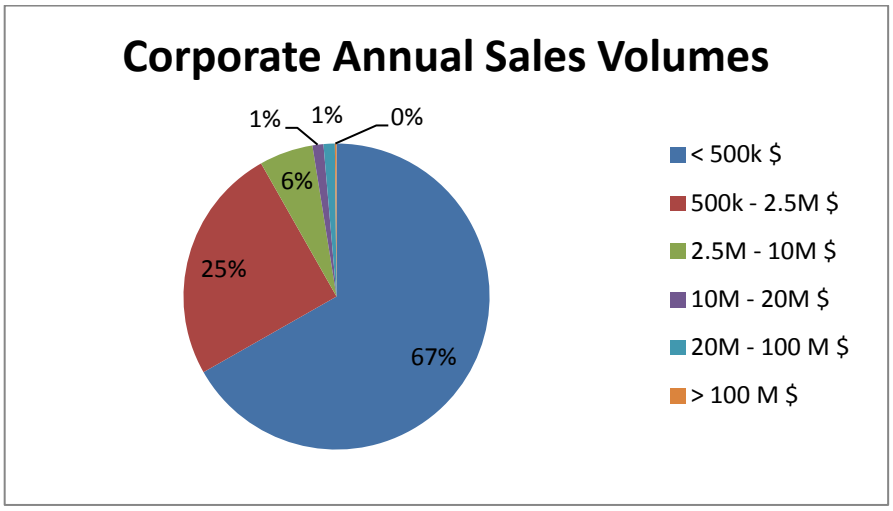

Figure 12 – Distribution of corporate annual sales volumes in the leading geographical markets (NAICS 111, 112, 113,115)

Based on a proprietary market database[21], the five leading geographical markets identified previously are comprised primarily of enterprises with annual sales volumes less than $500k. Enterprises with annual sales volumes of $10M or less represent about 98% of the market.

Relevant Market Channels

- Distributors

[20] US Census Bureau, Statistical Abstract of the US 2012 – based on estimates for NAICS 111 & 112
[21] ReferenceUSA, www.referenceusa.com

- Manufacturer's Local Representative

The US market for farm equipment and machinery is extremely concentrated and is clearly dominated by three well know players – Deere & Company, CNH Global and AGCO Corp.

Likewise, these three companies control 43% of the global market for farm machinery, whereas the remaining members of the top 20 firms in the world control another 37%, meaning that 80% of the sector is controlled by just 20 companies.

The three market leaders channel their products to users through distributors, being that many of these are exclusive (local representatives), given the market power of the manufacturers. Deere, for example, has more than 2500 distribution branches all over North America.

It is quite possible the high import levels of farm equipment and machinery result from overseas production by the Big Three being expedited into the US.

4.3.3 Air-conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Relevant US Manufacturing Market

Defined Market

The US Manufacturing Market most relevant to air-conditioning and warm air heating equipment and commercial and industrial refrigeration equipment manufacturers that export to the US is comprised of the following market segments:

Table 9 – US market segments most relevant to air-conditioning and warm air heating equipment, and commercial and industrial refrigeration equipment manufacturers that export to the US

NAICS Code	Market Segment
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing
3115	Dairy Product Manufacturing
3116	Animal Slaughtering and Processing
3117	Seafood Product Preparation and Packaging

Considering the four market segments presented in Table 9, California, Texas, Wisconsin, Ohio and New Your standout in terms of number of establishments, with a combined proportion of 30%, Figure 13.

In terms of employment size, companies in the above mentioned market segments tend to be either very small (less than 4 employees) or very large (+500 employees) as shown in Figure 14.

Total Establishments[16]: 7,497

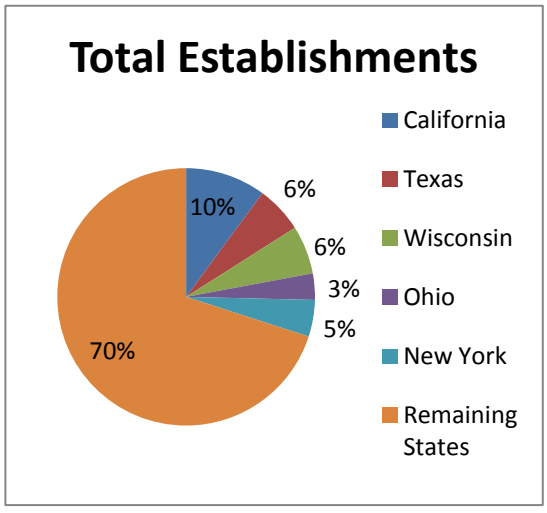

Figure 13 - NAICS 3114, 3115, 3116, 3117 establishments by state

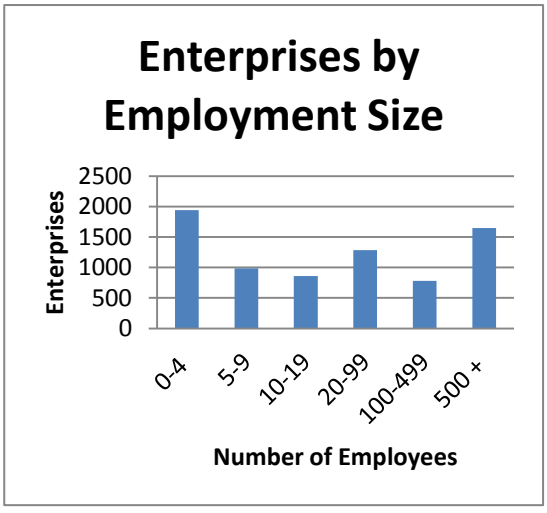

Figure 14 - NAICS 3114, 3115, 3116, 3117 enterprises by employment size

Leading Geographical Markets Based on Number of Establishments[16]

Table 10 – Number of establishments vs. number of employees per leading geographical markets

Number of Employees	Number of Establishments				
	California	Texas	Wisconsin	Ohio	New York
Total	757	442	456	248	345
0-4	161	129	63	48	109
5-9	69	64	43	43	37
10-19	93	43	60	36	43
20-99	168	71	87	49	88
100-499	101	51	61	28	29
500 +	165	84	142	44	39

Total Value of Business Done ($ Million)*[17]*: 323,425

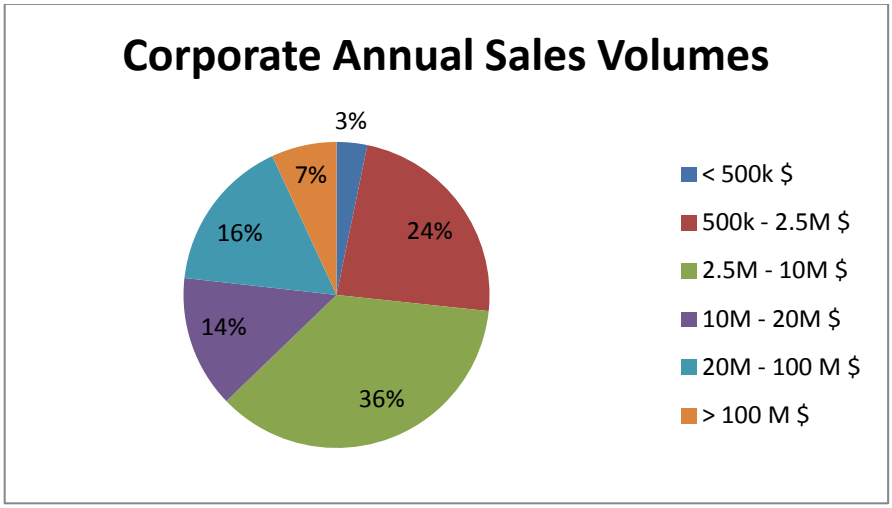

Figure 15 – Distribution of corporate annual sales volumes in the leading geographical markets (NAICS 3114, 3115, 3116, 3117)

Based on a proprietary market database[22], the five leading geographical markets identified previously are comprised primarily of enterprises with annual sales volumes between $500k and $10M. Enterprises with annual sales volumes of $10M or less represent about 63% of the market.

Relevant Market Channels

- Distributors
- Turnkey Solutions Providers
- Manufacturer Direct

[22] ReferenceUSA, www.referenceusa.com

With regard to Air-conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment, several market channels are normally available to link production technology manufacturers and final users, namely distributors, turnkey solution providers and direct sales.

In this sector, substantiated information can be found through the US Department of Energy (DOE), in its document "Energy Conservation Program: Energy Conservation Standards for Commercial Refrigeration Equipment"[23]. The information relates mostly to commercial and industrial refrigeration equipment, although one can assume conclusions can be extended to air conditioning and warm air heating.

The DOE determined commercial refrigeration equipment is purchased by the users through three major distribution channels:

- Manufacturer – Customer (National Account Channel), representing direct sales;
- Manufacturer – Wholesaler – Customer (Wholesaler Channel), representing distributor sales;
- Manufacturer – Wholesaler – Contractor – Customer (Contractor Channel), representing turnkey solution providers.

Further, the DOE also provides the relative importance of each distribution channel:

Equipment type	Direct sales	Distributors	Turnkey providers
Remote condensing	70%	15%	15%
Self-contained	30%	60%	10%

[23] Energy Conservation Program: Energy Conservation Standards for Commercial Refrigeration Equipment

4.3.4 Semiconductor Machinery Relevant US Manufacturing Market

Defined Market

The US Manufacturing Market most relevant to semiconductor machinery manufacturers that export to the US is comprised of one market segment:

Table 11 – US market segment most relevant to semiconductor machinery manufacturers that export to the US

NAICS Code	Market Segment
334413	Semiconductor and Related Device Manufacturing

As would be expected, California holds a dominant position in terms of number of establishments in the semiconductor and related device manufacturing industry. The state's highly technology intensive economy is the reason for that. As indicated in Figure 16, 36% of the sector establishments are in California. Texas, Massachusetts, New York and New Jersey are also home to a considerable number of sites.

In terms of employment size, MSME continue to play a major role in the sector's fabric, but there are also a significant number of companies with more employees, especially large companies, with more than 500 employees (Figure 17).

Total Establishments[16]: 972

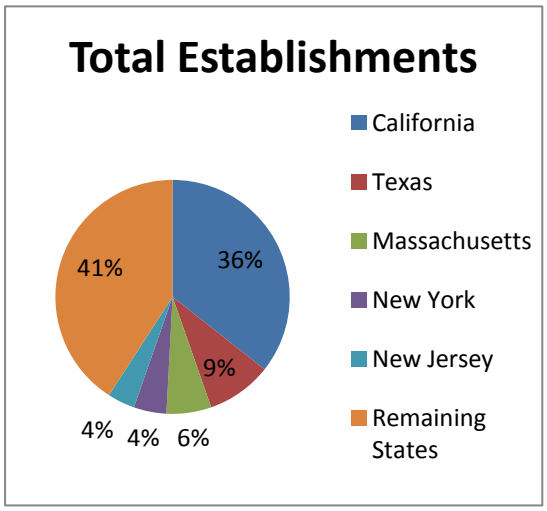

Figure 16 - NAICS 334413 establishments by state

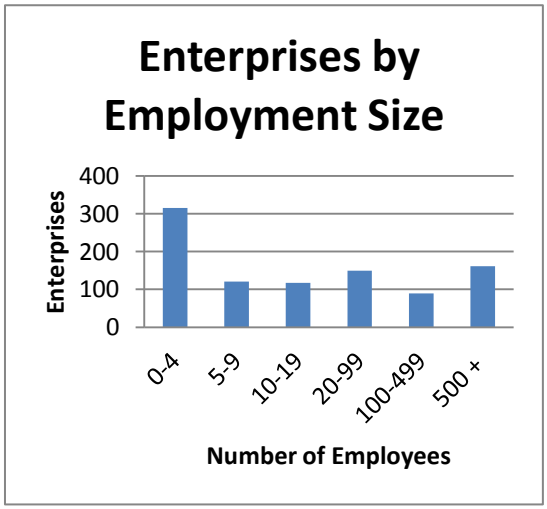

Figure 17 - NAICS 334413 enterprises by employment size

Leading Geographical Markets Based on Number of Establishments[16]

Table 12 – Number of establishments vs. number of employees per leading geographical markets

Number of Employees	Number of Establishments				
	California	Texas	Massachusetts	New York	New Jersey
Total	339	86	59	43	36
0-4	121	29	16	15	5
5-9	48	8	10	5	5
10-19	44	9	5	6	7
20-99	55	15	7	9	9
100-499	28	9	5	3	5
500 +	43	16	16	5	5

Total Value of Business Done ($ Million)*[17]*: 72,401

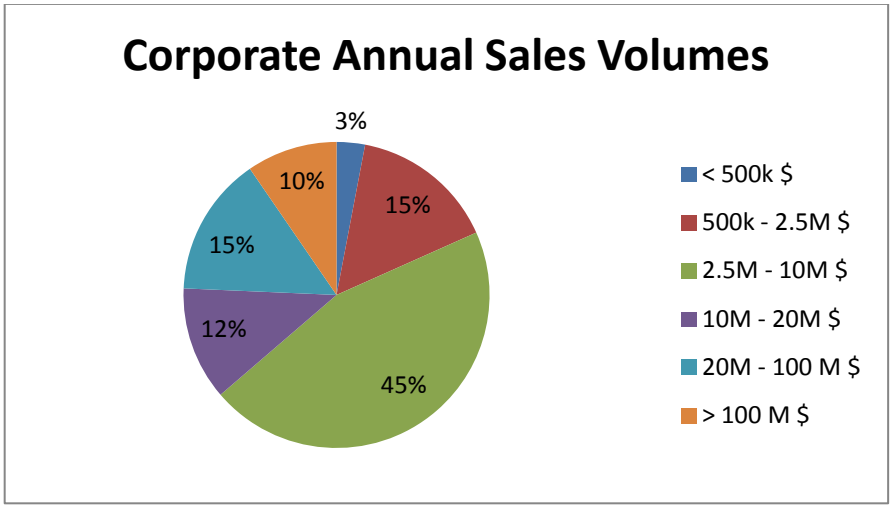

Figure 18 – Distribution of corporate annual sales volumes in the leading geographical markets (NAICS 3344)

Based on a proprietary market database[24], the five leading geographical markets identified previously are comprised primarily of enterprises with annual sales volumes between $2.5M and $10M. Enterprises with annual sales volumes of $10M or less represent about 63% of the market.

Relevant Market Channels

- Manufacturer Direct

[24] ReferenceUSA, www.referenceusa.com

The amount of information available on the semiconductor machinery marketing channels is considerably limited, making it difficult to determine which channels are more frequently used, based on any market studies or publicly available data.

Still, the complexity and degree of customization that are characteristic of semiconductor machinery might lead one to conclude, with some confidence, that most sales originate from direct interaction between equipment buyers (semiconductor manufacturers) and semiconductor machinery producers. Thus, direct sales represent the most important marketing channel in the industry.

Some relevant sources point in that direction, namely research conducted on the semiconductor machinery supply chain. One such work, published by the Wharton School of business, considered by many to be the best business school in the US, does indeed describe the process of acquisition of semiconductor machinery as a direct interaction between producers and end-users. The paper further describes how that process normally takes place in the US, starting with the semiconductor manufacturer (buyer) creating a forecasted order (soft order), which is shared with the equipment manufacturer (supplier) via an on-line collaboration system. That order might later be confirmed or not, which can create significant hurdles for the supplier. It is interesting to add that 20% of all soft orders are cancelled, 71% result in changes in the desired delivery dates, and 5% lead to changes in equipment specification.[25]

[25] Measuring Imputed Costs in the Semiconductor Equipment Supply Chain, Wharton School of the University of Pennsylvania

4.3.5 Machine Tool Relevant US Manufacturing Market

Defined Market

The US Manufacturing Market most relevant to machine tool manufacturers that export to the US is comprised of the following market segments:

Table 13 – US market segments most relevant to machine tool manufacturers that export to the US

NAICS Code	Market Segment
332	Fabricated Metal Product Manufacturing
333	Machinery Manufacturing

Total Establishments[16]: 80,201

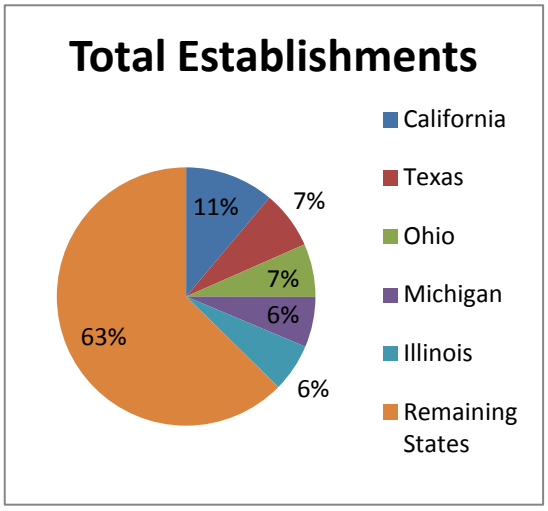

Figure 19 - NAICS 332 & 333 establishments by state

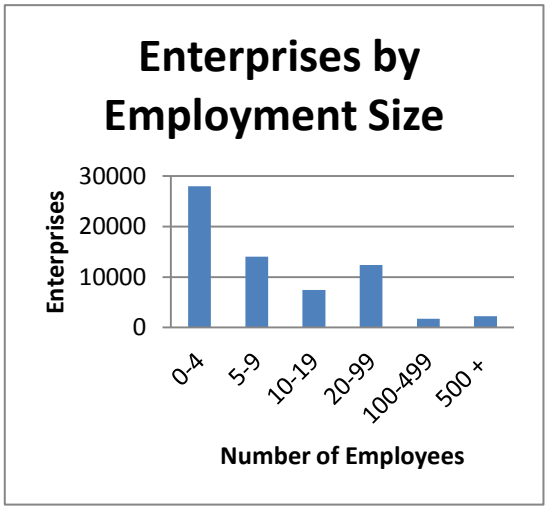

Figure 20 - NAICS 332 & 333 enterprises by employment size

California leads the country in terms of number of establishments in the machine tool manufacturing sector, as shown in Figure 19. Texas, Ohio, Michigan and Illinois also hold important positions in the nation, as would be expected of states whose economies greatly hinge on heavy industries such as oil, automotive and aeronautics. These five states account for 37% of the total US establishments.

In terms of employment size, MSME play, once again, a major role in the sector with most of the companies having fewer than 5 employees (Figure 20).

Leading Geographical Markets Based on Number of Establishments[16]

Table 14 – Number of establishments vs. number of employees per leading geographical markets

Number of Employees	Number of Establishments				
	California	Texas	Ohio	Michigan	Illinois
Total	8940	5815	5328	5048	4826
0-4	3419	1921	1668	1649	1540
5-9	1652	980	950	903	836
10-19	1505	886	904	895	823
20-99	1606	1142	1098	1061	1018
100-499	375	397	372	320	316
500 +	383	489	336	220	293

Total Value of Business Done ($ Million)*[17]*: 695,666

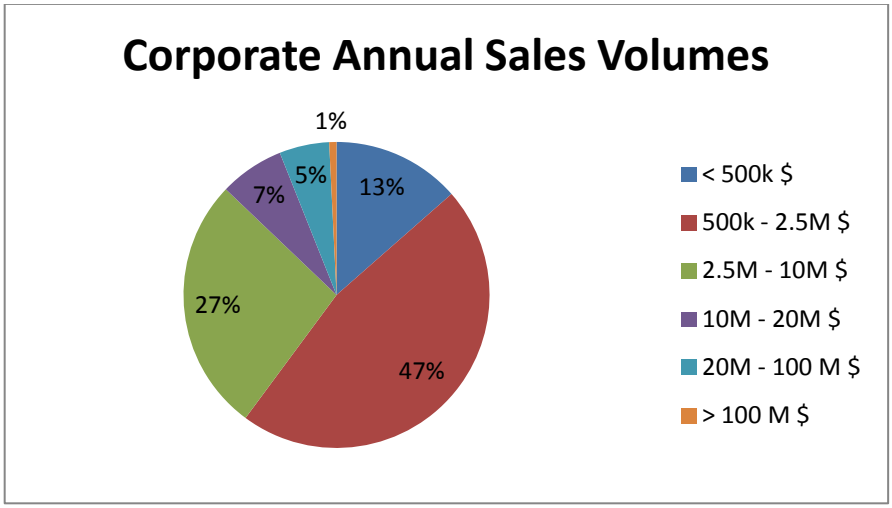

Figure 21 – Distribution of corporate annual sales volumes in the leading geographical markets (NAICS 332 & 333)

Based on a proprietary market database[26], the five leading geographical markets identified previously are comprised primarily of enterprises with annual sales volumes between $500k and $2.5M. Enterprises with annual sales volumes of $10M or less represent about 87% of the market.

Relevant Market Channels

- Manufacturer Direct
- Manufacturer's Local Representative
- Distributor
- Turnkey Solution Providers

[26] ReferenceUSA, www.referenceusa.com

Machine tool manufacturing is an industrial sector that lends itself to being served by all the relevant marketing channels considered, although with different relative importance.

Freely available information on distribution channels is relatively difficult to find, although the topic generates considerable interest among market researchers and industrial stakeholders. The most recent information found to support conclusions on machine tool marketing channels dates back to 1983, although it is quite detailed and answers perfectly to the requirements of this study. A report by the US International Trade Commission[27] states that imported machine tools were sold through several distribution channels, the most important of which were "indenting agents" (sales representatives), accounting for about 55% of imported machine tool sales; distributors, accounting for 25%; end users, purchasing directly from foreign manufacturers, accounting for about 15%; and the remaining 5% comprised of sales to contractors. Engineers and contractors are occasional suppliers of machine tools, in that they are responsible for specifications and recommendations in the acquisition for new plants of user industries.

Today, the relative importance of each channel has most likely changed. It is expectable, for example, that direct sales have increased in proportion, as needs for greater customization in industry require greater customization of equipment and a closer interaction between users and producers. This increase might happen at the expense of sales representatives. The advent of the internet must have contributed to a greater direct interaction between buyers and sellers.

In conclusion, the four considered marketing channels most likely apply to the US machine tool distribution and it will be up to the manufacturer (and market conditions) to decide on which to choose.

[27] Competitive Assessment of the US Metalworking Machine Tool Industry, US International Trade Commission

4.3.6 Optical Instrument and Lens Relevant US Manufacturing Market

Defined Market

The US Manufacturing Market most relevant to optical instrument and lens manufacturers that export to the US is comprised of the following market segments:

Table 15 – US market segments most relevant to optical instrument and lens manufacturers that export to the US

NAICS Code	Market Segment
332	Fabricated Metal Product Manufacturing
333	Machinery Manufacturing
3343	Audio and Video Equipment Manufacturing
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
3346	Manufacturing and Reproducing Magnetic and Optical Media

Taking into account the market segments presented in Table 5, California, Texas, Ohio, Michigan and Illinois standout in terms of number of establishments, with a combined 37% of the total, Figure 22.

Companies in the five sectors tend to have less than 4 employees, although a considerable number of them are larger, employing between 20 and 99 people.

Total Establishments[16]: 82,155

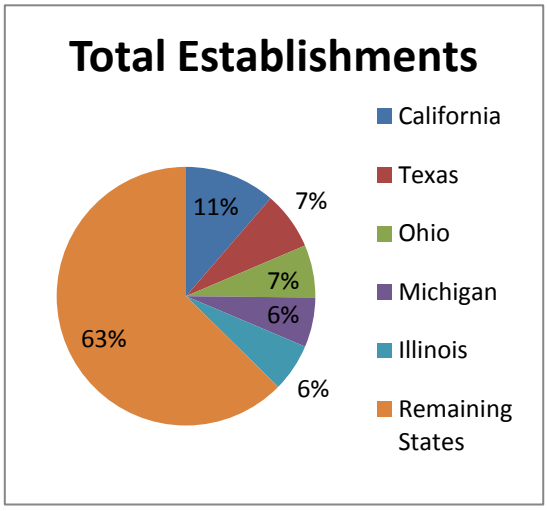

Figure 22 - NAICS 332, 333, 3343, 334513, 3346 establishments by state

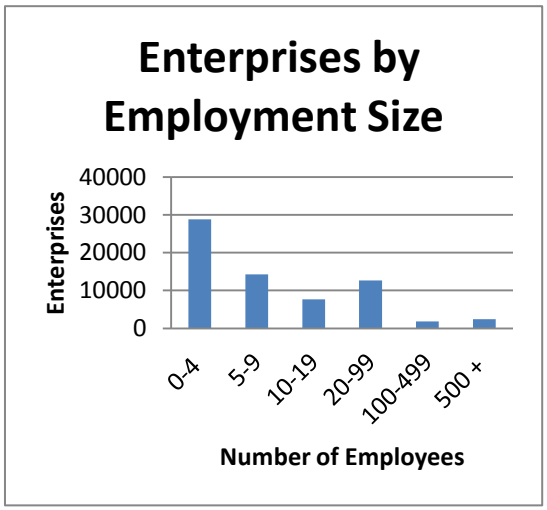

Figure 23 - NAICS 332, 333, 3343, 334513, 3346 enterprises by employment size

Leading Geographical Markets Based on Number of Establishments[16]

Table 16 – Number of establishments vs. number of employees per leading geographical markets

Number of Employees	Number of Establishments				
	California	Texas	Ohio	Michigan	Illinois
Total	9318	5958	5402	5098	4915
0-4	3576	1978	1696	1679	1581
5-9	1723	1003	960	908	848
10-19	1551	905	912	902	835
20-99	1672	1157	1112	1065	1031
100-499	392	407	380	321	317
500 +	404	508	342	223	303

Total Value of Business Done ($ Million)*[17]*: 718,729

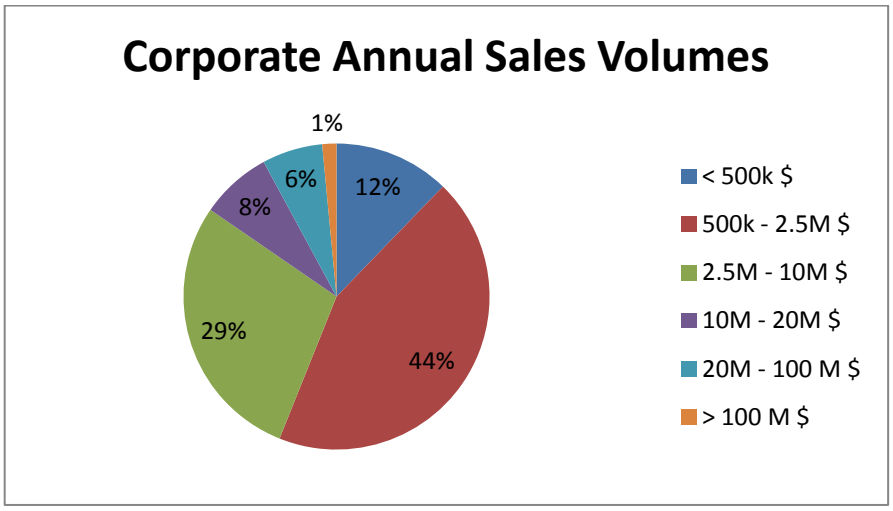

Figure 24 – Distribution of corporate annual sales volumes in the leading geographical markets (NAICS 332, 333, 3343, 334513, 3346)

Based on a proprietary market database[28], the five leading geographical markets identified previously are comprised primarily of enterprises with annual sales volumes between $<500k and $2.5M. Enterprises with annual sales volumes of $10M or less represent about 85% of the market.

Relevant Market Channels

- Distributors
- Manufacturer's Local Representative
- Manufacturer Direct

[28] ReferenceUSA, www.referenceusa.com

The optical instrument and lens production technology subsector includes a range of technologies such as gauges, machinist's precision tools, camera lenses, and instrument lenses. In all cases, the turnkey solution providers are not a prevailing market channel.

In most cases one finds distributors are the prevailing market channel. Since in most cases no technical support is required, the distributor market channel is more common and an effective market penetration channel. There is also manufacturer direct and manufacturer's local representative market channels present with regard to optical instrument and lens production technologies.

4.3.7 Stone Working Machinery Relevant US Manufacturing Market

Defined Market

The US Manufacturing Market most relevant to stone working machinery manufacturers that export to the US is comprised of the following market segment:

Table 17 – US market segment most relevant to stone working machinery manufacturers that export to the US

NAICS Code	Market Segment
327991	Cut Stone and Stone Product Manufacturing

According to Figure 25, Georgia, Texas, Pennsylvania, California and New York are the states that possess the highest numbers of establishments under the 327991 NAICS code, the single code describing companies considered as relevant potential buyers of stone working machinery.

Companies under said NAICS code tend to have less than 4 employees, as shown in Figure 26.

Total Establishments[16]: 1912

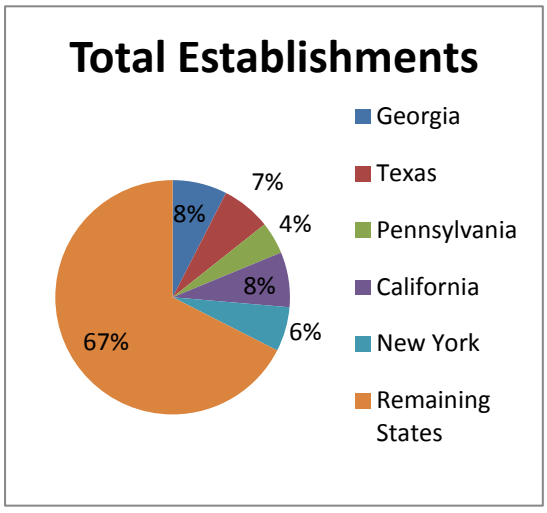

Figure 25 - NAICS 327991 establishments by state

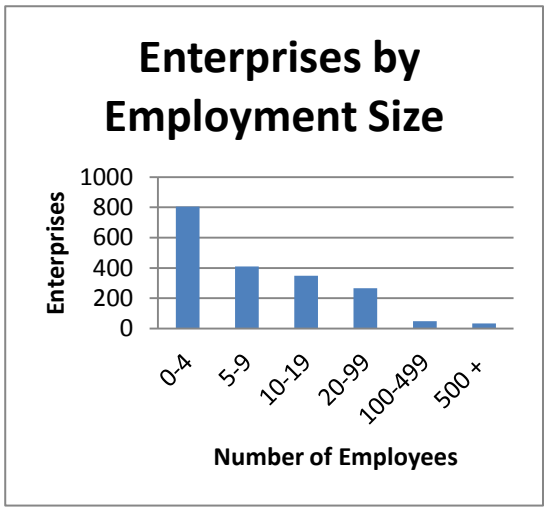

Figure 26 - NAICS 327991 enterprises by employment size

Leading Geographical Markets Based on Number of Establishments[16]

Table 18 – Number of establishments vs. number of employees per leading geographical markets

Number of Employees	Number of Establishments				
	Georgia	Texas	Pennsylvania	California	New York
Total	144	130	85	145	117
0-4	61	49	36	61	47
5-9	30	36	22	41	27
10-19	30	22	16	20	18
20-99	20	17	10	14	22
100-499	2	5	1	7	3
500 +	1	1	0	2	0

Total Value of Business Done ($ Million)*[17]*: 4,119

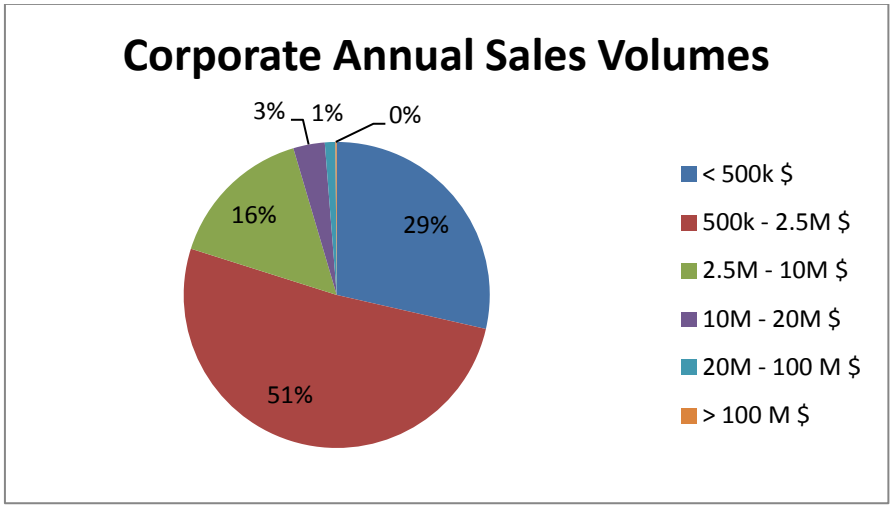

Figure 27 – Distribution of corporate annual sales volumes in the leading geographical markets (NAICS 327991)

Based on a proprietary market database[29], the five leading geographical markets identified previously are comprised primarily of enterprises with annual sales volumes between $<500k and $2.5M. Enterprises with annual sales volumes of $10M or less represent about 96% of the market.

Relevant Market Channels

- Manufacturer Direct
- Manufacturer's Local Representative
- Distributor
- Turnkey Solution Providers

[29] ReferenceUSA, www.referenceusa.com

Substantiated information for the distribution channels of stone working machinery could not be found for the purpose of this study. However, it is reasonable to assume that marketing channels for stone working machinery will be quite similar to those that apply to machine tools in general. In fact, stone working tasks involve many of the same operations as metal working, such as cutting, drilling, lathing, polishing, etc.

Considering the most prevalent marketing channels for machine tools, it is likely that, in comparison, stone working relies even further on direct sales and direct interaction between users and manufacturers, as stone processing is evolving towards greater levels of customization. Shorter series and different types of client demands cause stone processors to move away from standard production and navigate towards tailored products.

4.3.8 Food Product Machinery Relevant US Manufacturing Market

Defined Market

The US Manufacturing Market most relevant to food product machinery manufacturers that export to the US is comprised of the following market segments:

Table 19 – US market segments most relevant to food product machinery manufacturers that export to the US

NAICS Code	Market Segment
311	Food Manufacturing
312	Beverage and Tobacco Product Manufacturing

Potential client companies for the food machinery industry are represented by NAICS headings 311 and 312. The five leading states regarding concentration of establishments are California, New York, Texas, Illinois and Pennsylvania. These five states represent 38% of the total US establishments in the two sectors (Figure 28).

A significant portion of companies in these sectors are MSMEs with fewer than 4 employees, as shown in Figure 29.

Total Establishments[16]: 29,419

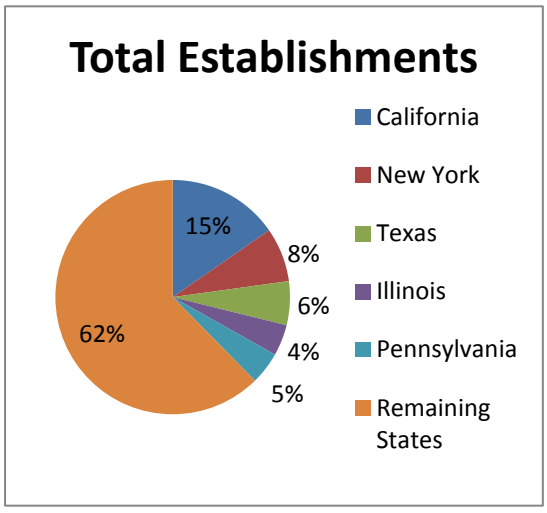

Figure 28 - NAICS 311 & 312 establishments by state

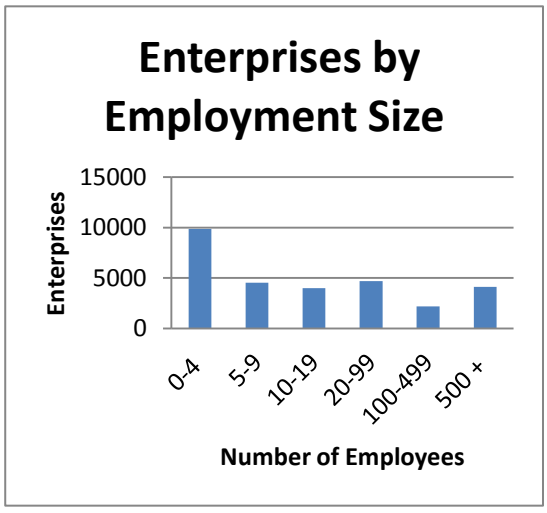

Figure 29 - NAICS 311& 312 enterprises by employment size

Leading Geographical Markets Based on Number of Establishments[16]

Table 20 – Number of establishments vs. number of employees per leading geographical markets

Number of Employees	Number of Establishments				
	California	New York	Texas	Illinois	Pennsylvania
Total	4517	2194	1779	1262	1314
0-4	1527	939	653	352	386
5-9	641	404	256	181	198
10-19	634	302	224	211	200
20-99	901	342	269	191	248
100-499	365	104	125	122	98
500 +	449	103	252	205	184

Total Value of Business Done ($ Million)[17]: 717,857

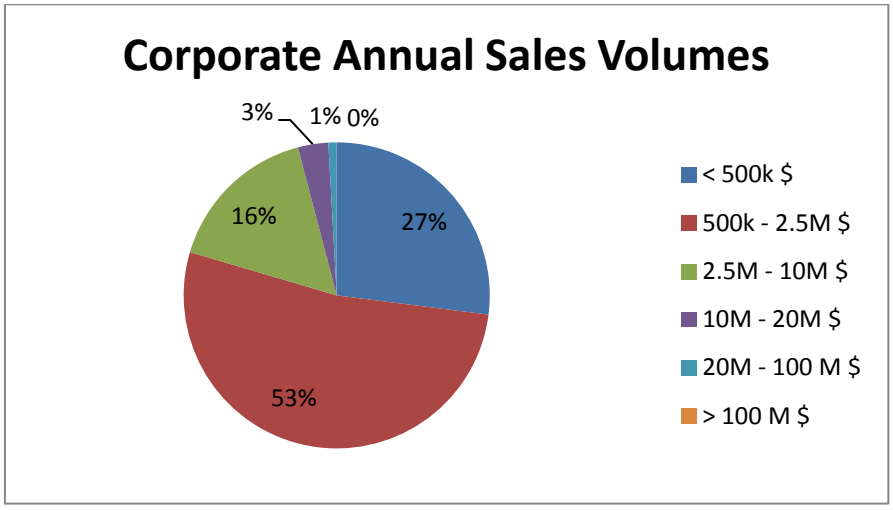

Figure 30 – Distribution of corporate annual sales volumes in the leading geographical markets (NAICS 311& 312)

Based on a proprietary market database[30], the five leading geographical markets identified previously are comprised primarily of enterprises with annual sales volumes between $<500k and $2.5M. Enterprises with annual sales volumes of $10M or less represent about 96% of the market.

Relevant Market Channels

- Distributors
- Manufacturer Direct
- Turnkey Solution Providers

The food products machinery industry and the processed food industry enjoy a very close relationship, with companies in the latter sector dominating market dynamics.

[30] ReferenceUSA, www.referenceusa.com

Some of these food processing companies, however, usually develop many of their own specialized applications in-house, thus being considered proprietary and eligible for patenting. This brings less business to food processing machinery manufacturers.

The industrial production of food processing machinery in North America is characterized by: (a) a large, but declining, part of manufacturing continuing to take place in small and medium sized independent firms; (b) production usually based on orders received; (c) restricted markets for many types of machines; (d) heterogeneous equipment production; (e) relatively small production series; (f) concentration similar to that in food industries.

These market conditions imply that direct sales between the equipment manufacturer and the equipment user is one of the industry's privileged marketing channels. This is further reinforced by the fact that smaller, specialized equipment manufacturers produce nearly 80% of all food processing equipment in the United States. These companies operate in the context described above – based on orders received, heterogeneous equipment and small production series – which applies to a market in which direct sales prevail.[31]

Still, the 12 largest companies in the industry supply the remaining 20% of the food processing industry's orders. These companies most likely produce more standardized types of equipment, allowing them to reach economies of scale and to access the market through networks of distributors. It is also probable that more vertically integrated manufacturers can supply the food processing industry via turnkey projects, although these tend to be full-fledged engineering companies.

[31] Highbeam Business, Food Products Machinery

CHAPTER 5: PRODUCTION TECHNOLOGY MARKET SEGMENTS FROM A DOMESTIC MARKET PERSPECTIVE

5.1 Highly Relevant Production Technology Subsectors

The three leading manufacturing sectors determined by Section 3.4 (NAICS 332 – fabricated metal product manufacturing sector, NAICS 311 – food manufacturing sector and NAICS 333 – machinery manufacturing sector) were reviewed with the specific objective of identifying highly relevant production technology subsectors. The subsectors presented within this section are defined by the NAICS in order to maintain consistency. They are production technology subsectors that directly support the three leading manufacturing sectors.

Several production technology subsectors are relevant to the leading manufacturing sectors. Table 21 presents what one may consider the most relevant production technology subsectors, with an indication to the leading manufacturing sector(s) they primarily support. These subsectors were selected based on the range of production technologies they represent and their direct relationship to the leading manufacturing sectors.

It is important to note, the list of production technology related subsectors is not encompassing and strictly identifies the most relevant subsectors with regard to the three leading manufacturing sectors.

Table 21 – Highly Relevant Production Technology Subsectors

NAICS Code[32]	Production Technology Subsector	Manufacturing Sector		
		NAICS 332	NAICS 311	NAICS 333
333294	Food Product Machinery Manufacturing		■	
333511	Industrial Mold Manufacturing	■		
333512	Machine Tool (Metal Cutting Types) Manufacturing	■		■
333514	Special Die and Tool, Die Set Jig, and Fixture Manufacturing	■		■
333515	Cutting Tool and Machine Tool Accessory Manufacturing	■		■
333518	Metal Work Machinery Manufacturing	■		■
333911	Pump and Pumping Equipment		■	

[32] 2007 NAICS Codes

NAICS Code[32]	Production Technology Subsector	Manufacturing Sector		
		NAICS 332	NAICS 311	NAICS 333
	Manufacturing			
333993	Packaging Machinery Manufacturing			
333994	Industrial Process Furnace and Oven Manufacturing			
33399N	Fluid Power Equipment Manufacturing			
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables			
335314	Relay and Industrial Control Manufacturing			

As indicated by the above table, there are production technology subsectors that primarily support a single leading manufacturing sector, such as packaging machinery manufacturing which supports the food manufacturing sector (NAICS 311). There are two production technology subsectors that support all three leading manufacturing sectors: instruments and related products manufacturing, and relay and industry control manufacturing. Due to the similarities in manufacturing processes and environments between the fabricated metal product manufacturing (NAICS 332) and machinery manufacturing (NAICS 333), all production technology subsectors that apply to one of the two manufacturing sectors apply to the other.

It is important to note, the above production technology subsectors do not directly account for computer-aided design (CAD), computer-aided engineering (CAE), and computer-aided manufacturing (CAM) systems integration design. The integration design of these systems is considered a service industry and is classified by the NAICS under the computer system design services industry (NAICS 541512). Unfortunately, under this classification it is not possible to analyze the CAD, CAE and CAM component of the industry separately. Additionally, the industry is quite large since it accounts for, to a certain degree, related computer hardware and the design of integrated systems that integrate communication technologies. Therefore, this industry is not included in the market analysis, although the hardware related to CAM integration is addressed by the machine tool (metal cutting type) subsector and the relay and industrial control subsector.

Further details on each of the production technology subsectors is presented within this Chapter.

5.2 Production Technology US Market Segments

An analysis of the production technology subsectors that support the three leading manufacturing sectors provides relevant insight to the correlating production technology US market segment. The following Section presents market segment relevant information with regard to each of the production technology subsectors.

The Section reviews the total value of shipments as an indicator of the US market segment size. The market segment size is calculated by adding import values and subtracting export values from the total value of the shipments performed by US domestic suppliers. When possible, equipment product category specific market information is presented that provides further insight to the market segment.

Indications of geographical concentrations of production technology providers are discussed in order to give a sense as to the most active states with regard to the specific US market segment. A sample selection of companies in the market segment is also included as an initial reference point with regard to established market competition.

5.2.1 Food Product Machinery Market Segment

The US food product machinery industry is comprised of companies primarily engaged in manufacturing food and beverage manufacturing-type machinery and equipment, such as dairy product plant machinery and equipment, meat and poultry processing and preparation machinery, and other commercial food products machinery.

The food product machinery US market segment in 2007 accounted for a total market value of $4,299 million (based on domestic food product machinery value of shipments estimated at $4,244 million[33] plus total import value of $1,090 million[34] less total export value of $1,035 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[35] Considering the total value of domestic shipments is only slightly inferior to the total market value for the food product machinery subsector, one could conservatively assume the

[33] Economic Census, 2007
[34] US International Trade Statistics, US Census, 2007 http://censtats.census.gov/cgi-bin/naic3_6/naicCty.pl
[35] Economic Census, 2011

domestic value of shipments stated below for each product category is also representative of the US market segment for that same product category.

- Dairy and milk products plant machinery and equipment, except bottling and packaging – $610 million
- Commercial food products machinery, except packaging machinery and food cooking and warming equipment – $1,299 million
- Industrial machinery and equipment for manufacturing or processing foods, beverages, and animal and fowl feed – $1,736 million
- Food products machinery – not specified by kind – $500 million

The above market shipments provide a reliable indication of the value of the market segment at the machinery product category level.

The following is a brief list of some of the domestic food product machinery manufacturers:

- Atlas Pacific Inc. - www.atlaspacific.com
- Bettcher Industries Inc. - www.bettcher.com
- Berg Chilling Systems Inc. - www.berg-group.com
- FANUC Robotics America Inc. - www.fanucrobotics.com
- Heat and Control Inc. – www.heatandcontrol.com
- John Bean Technologies Corporation - www.jbtfoodtech.com
- Krones Inc. - www.krones.com
- Mettler Toledo Inc. - www.packrite.com
- Microfluidics International Corporation - www.microfluidicscorp.com
- Paul Mueller Company - www.muel.com
- Provisur Technologies - www.provisur.com
- Quadro Engineering - www.quadro.com

The highest concentrations of companies in this market segment are based in California, Georgia, Illinois, Ohio and Wisconsin. Each of these states has between 24 and 65 established companies that account for between $278 million and $481 million in value of shipments.[36] The second tier of states is comprised of Kansas, Minnesota, New York, Pennsylvania, Oregon and Texas, which have between 16 and 24 established companies.

[36] US Census, 2007

5.2.2 Industrial Mold Market Segment

The industrial mold industry is comprised of companies primarily engaged in manufacturing industrial molds for casting metals or forming other materials such as plastics, glass, or rubber.

The domestic manufacturing of molds is stable, 1.9% increase from 2002 to 2007, showing no significant positive or negative trend; therefore, any increases in demand are being fulfilled by foreign suppliers.[37]

The industrial mold US market segment in 2008 accounted for a total market value of $5,809 million (based on industrial mold value of shipments estimated at $5,221 million[38] plus total import value of $1,505 million[34] less total export value of $917 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[39] The domestic value of shipments is slightly below the total market value; nevertheless one could still conservatively assume the domestic value of shipments stated below is to some extent representative of the US market segment product category.

- Industrial molds made of metal, for die-casting of metal or metal carbides – $655 million
- Industry molds made of metal and other materials, except industrial injection or compression molds made of metal for plastic – $1,207 million
- Industrial injection-type molds made of metal for plastics – $3,010 million
- Industrial molds and mold boxes, not specified by kind – $624 million

Considering these figures do not account for imports at the machinery product category level, the above market shipments provide low estimate of the value of the US market segment per category. In the overall industrial mold subsector, the total market value is moderately higher than the value of domestic shipments, therefore, it is possible that the US market segments for each of the above mentioned categories are slightly higher than the domestic value of shipments.

[37] US Census Bureau, Industry Snapshots
[38] Economic Census, 2008
[39] Economic Census, 2002

As of 2005, the leading 75 US based companies generated an estimated total of $3,784 million in sales with a total workforce of about 15,000 employees.[40] The following is a brief list of some of the larger domestic mold manufacturers:

- Boardman Molded Products Inc. - www.boardmanmoldedproducts.com
- Connecticut Tool Co. – www.conntool.com
- Flambeau Inc. – www.flambeau.com
- Hasco America Inc. – www.hasco.com
- Hi-Tech Mold and Engineering – www.hitechmold.com
- Industrial Molds Inc. – www.industrialmolds.com
- Industrial Molding Corp. – www.indmolding.com
- Jomar Corp. – http://jomarcorp.corp.com
- Lefrancois Mold & Tool Inc. – http://lmtinc.biz
- Minico Industries – www.minicoindustries.com
- Ross Mould Inc – www.rossmould.com
- Toledo Molding and Die Inc. – www.tmdinc.com

The highest concentrations of domestic companies in this US market segment are based in California, Illinois, Indiana, Michigan, Ohio, Pennsylvania, and Wisconsin. Each of these states has between 110 and 264 established companies that account for between $161 million and $1,092 million in value of shipments.[41] The second tier of states is comprised of Florida, Minnesota, New York, New Jersey and Texas, which have between 39 and 109 established companies.

5.2.3 Machine Tool (Metal Cutting Types) Market Segment

The machine tool (metal cutting types) industry is comprised of companies primarily engaged in manufacturing metal cutting machine tools (except hand tools).

The domestic manufacturing of machine tools (metal cutting types) has a strong positive trend since 2002, 64.7% increase from 2002 to 2007.[37]

The machine tool (metal cutting types) US market segment in 2007 accounted for a total market value of $7,327 million (based on machine tool domestic value of shipments estimated at $5,621 million[42] plus total import value of $4,141 million[34] less

[40] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005
[41] US Census, 2007
[42] Economic Census, 2007

total export value of $2,435 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[43] Considering the domestic value of shipments is considerably less than the total market value, one could conservatively assume the domestic value of shipments stated below underrepresents the US market segment per product category.

- Metal gear cutting machines – $204 million
- Metal grinding, polishing, buffing, honing and lapping machines – $390 million
- Metal lathes numerically and non numerically controlled – $280 million
- Metal milling machines – $101 million
- Metal machining centers (multifunction numerically controlled machines – $1,045 million
- Metal station type machines – $153 million
- Metal boring machines and drilling machines (excluding machining centers) – $241 million
- Machine tools, metal cutting types, not specified by kind – $484 million

The above domestic market shipments provide a low estimate of the value of the US market segment, considering the values do not account for imports at the machinery product category level.

As of 2005, the leading 75 US based companies generated an estimated total of $26,421 million in sales with a total workforce of about 72,000.[44] The following is a brief list of some of the larger machine tool manufacturers:

- Acu-Grind Tool Works Inc. - www.acugrind.com
- Ahaus Tool & Engineering - www.ahaus.com
- Fives Machining Systems Inc. – www.fivesmsi.com
- Garr Tool Company - www.garrtool.com
- Hannibal Carbide Tool Company - www.hannibalcarbide.com
- Ingersoll Machine Tools Inc. - www.camozzimachinetools.com
- Kennametal Inc. - www.kennametal.com
- LSB Industries Inc. - www.lsbindustries.com/summit
- Tivoly Inc. - www.tivoly.com
- Zenith Cutter – www.zenithcutter.com

[43] Economic Census, 2011
[44] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005

The highest concentrations of domestic companies in this US market segment are based in California, Illinois, Michigan and Ohio. Each of these states has between 23 and 61 established companies that account for between $263 million and $1,187 million in value of shipments.[45] The second tier of states is comprised of Minnesota, New York, Pennsylvania, Texas and Wisconsin, which have between 13 and 23 established companies.

5.2.4 Special Die & Tool, Die Set Jig, and Fixture Market Segment

The special die & tool, die set jig, and fixture industry is comprised of companies known as tool and die shops, primarily engaged in manufacturing special tools and fixtures, such as cutting dies and jigs.

The domestic manufacturing of special dies and tools, die set jigs, and fixtures has experienced a positive trend from 2002 to 2007, 12.2% increase.[37]

The US market segment in 2007 accounted for a total market value of $8,338 million (based on domestic value of shipments estimated at $7,834 million[46] plus total import value of $950 million[34] less total export value of $446 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[47] Considering the domestic value of shipments is only slightly less than the total market value, one could conservatively assume the domestic value of shipments stated below is representative of the US market segment product category.

- Jigs and fixtures – $1,175 million
- Standard catalog components and parts for jigs and fixtures, including drill bushings – $125 million
- Metalworking forming and drawing dies – $738 million
- Metalworking stamping, forging, extrusion, and wiredrawing, and straightening dies – $1,020 million
- Punches for dies – $168 million
- Industrial models and prototypes – $466 million
- Other specially designed tooling – $781 million

[45] US Census, 2007
[46] Economic Census, 2007
[47] Economic Census, 2002

- Special dies, tools, jigs, and fixtures, not specified by kind – $1,637 million

As of 2005, the leading 75 US based companies generated an estimated total of $9,415 million in sales with a total workforce of about 39,100 employees.[48] The following is a brief list of some of the larger domestic special die and tool, die set jig, and fixture manufacturers:

- A. Finkl and Sons Co. - www.finkl.com
- Alro Steel - www.alro.com
- Anchor Danly - www.anchordanly.com
- Autodie LLC – www.autodie-llc.com
- Dayton Progress Corporation - www.daytonprogress.com
- Doerfer Companies - www.doerfer.com
- General Carbide - www.generalcarbide.com
- Kaspar Die & Tool Inc. - www.kaspardieandtool.com
- Kennametal IPG - www.kennametal.com
- TEAM Industries - www.team-ind.com
- Toledo Molding & Die Inc. - www.tmdinc.com/

The highest concentrations of domestic companies in this US market segment are based in California, Illinois, Indiana, Michigan, Ohio, Pennsylvania, and Wisconsin. Each of these states has between 102 and 608 established companies that account for between $165 million and $2,614 million in value of shipments.[49] The second tier of states is comprised of Connecticut, Massachusetts, Minnesota, Missouri, New York, New Jersey, Tennessee and Texas, which have between 50 and 102 established companies.

5.2.5 Cutting Tool & Machine Tool Accessory Market Segment

The cutting tool & machine tool accessory industry is comprised of companies primarily engaged in manufacturing accessories and attachments for metal cutting and metal forming machine tools.

The domestic manufacturing of cutting tool and machine tool accessories has experienced a positive trend from 2002 to 2007, 5.7% increase.[37]

[48] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005
[49] US Census, 2007

The US market segment in 2007 accounted for a total market value of $5,912 million (based on domestic value of shipments estimated at $5,389 million[50] plus total import value of $1,858 million[34] less total export value of $1,335 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[51] Considering the domestic value of shipments is almost equal to the total market value, one could conservatively assume the domestic value of shipments stated below is representative of the US market segment product category.

- Small cutting tools for machine tools & metalworking machinery – $3,039 million
- Other attachments and accessories – $902 million
- Cutting tool & machine tool accessories, not specified by kind – $686 million

As of 2005, the leading 75 US based companies generated an estimated total of $34,772 million in sales with a total workforce of about 88,700.[52] The following is a brief list of some of the larger domestic cutting tool and machine tool accessory manufacturers:

- Fives Machining Systems Inc. - www.fivesmsi.com/
- Flow International Corporation - www.flowwaterjet.com
- General Carbide Corp. - www.generalcarbide.com
- Hardinge Inc. - www.hardinge.com
- Kennametal IPG - www.kennametal.com
- Lincoln Electric Holdings, Inc. - www.lincolnelectric.com
- Milacron Inc. - www.milacron.com
- Schmitt Industries, Inc. - www.schmitt-ind.com/
- Star Cutter Company - www.starcutter.com
- Victor Technologies - www.victortechnologies.com/

The highest concentrations of domestic companies in this US market segment are based in California, Connecticut, Illinois, Michigan, Ohio and Pennsylvania. Each of these states has between 70 and 329 established companies that account for between $158 million and $880 million in value of shipments.[53] The second tier of states is comprised of Indiana, Massachusetts, Minnesota, New York, New Jersey,

[50] Economic Census, 2007
[51] Economic Census, 2011
[52] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005
[53] US Census, 2007

North Carolina, Texas and Wisconsin, which have between 32 and 70 established companies.

5.2.6 Metal Work Machinery Market Segment

The metal work machinery industry is comprised of companies primarily engaged in manufacturing metal working machinery (except industrial molds; metal cutting machine tools; metal forming machine tools; special dies and tools, die sets, jigs, and fixtures; cutting tools and machine tool accessories; and rolling mill machinery and equipment).

The domestic manufacturing of metal work machinery has experienced a significant negative trend from 2002 to 2007, 20.7% decrease.[37]

The domestic industry's value of shipments in 2007 is estimated at $2,286 million.[54] Unfortunately, accurate import and export data on this market segment are not available; therefore, the total value of the metal work machinery market segment could not be estimated. The market segment includes the following product categories and estimated domestic value of shipments.[55]

- Assembly machines – $1,324 million
- Other metalworking machinery (except handheld and ultrasonic) – $523 million
- Metalworking machinery, not specified by kind – $206 million

As previously indicated, the above domestic market shipments provide a conservative estimate of the value of the US market segment, considering the values do not account for imports at the machinery product category level.

As of 2005, the leading 75 US based companies generated an estimated total of $20,455 million in sales with a total workforce of about 76,600 employees.[56] The following is a brief list of some of the larger domestic metal work machinery manufacturers:

- Daito USA Inc. – www.daitousa.com
- Davis-Standard, LLC - www.davis-standard.com
- Doerfer Companies - www.doerfer.com

[54] Economic Census, 2007
[55] Economic Census, 2011
[56] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005

- Fives Machining Systems Inc. - www.fivesmsi.com
- Haas Automation Inc. – www.haascnc.com
- Hurco - www.hurco.com
- International Tool Machines – www.itmfl.com
- JET Tools North America - www.jettools.com
- Kennametal - www.kennametal.com
- MJC Engineering and Technology Inc. – www.mjcengineering.com
- National Machinery LLC - www.nationalmachinery.com
- Victor Technologies - www.victortechnologies.com/

The highest concentrations of domestic companies in this US market segment are based in Illinois, Michigan and Ohio. Each of these states has between 23 and 59 established companies that account for between $241 million and $600 million in value of shipments, about 49% of value of shipments in this industry.[57] The second tier of states is comprised of California, Connecticut, Indiana and Wisconsin, which have between 14 and 23 established companies.

5.2.7 Pump & Pumping Equipment Market Segment

The pump & pumping equipment industry is comprised of companies primarily engaged in manufacturing general purpose pumps and pumping equipment (except fluid power pumps and motors), such as reciprocating pumps, turbine pumps, centrifugal pumps, rotary pumps, domestic water system pumps, oil well and oil field pumps and sump pumps.

The domestic manufacturing of pumps and pumping equipment has experienced a significant positive trend from 2002 to 2007, 72.8% increase.[37]

The US market segment in 2007 accounted for a total market value of $12,349 million (based on domestic value of shipments estimated at $12,177 million[58] plus total import value of $3,147 million[34] less total export value of $2,975 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[59] Considering the domestic value of shipments is almost identical to the total market value, one could conservatively assume the domestic value of shipments stated below is representative of the US market segment product category.

[57] US Census, 2007
[58] Economic Census, 2007
[59] Economic Census, 2011

- Industrial pumps, except hydraulic fluid power pumps, automotive circulating pumps, and measuring and dispensing pumps – $10,127 million
- Parts and attachments for pumps and pumping equipment, except hydraulic, fluid power, and air and gas compressors – $1,994 million
- Pumps and pumping equipment, not specified by kind – $889 million

As of 2005, the leading 75 US based companies generated an estimated total of $83,334 million in sales with a total workforce of about 120,000.[60] The following is a brief list of some of the larger domestic pump & pumping equipment manufacturers:

- Beckett Pumps - www.beckettpumps.com
- ClydeUnion Pumps - www.spx.com/en/clydeunion-pumps/
- Depco Pump Company Inc. - www.depcopump.com/
- Dover Corp's Pump Solutions Group - www.psgdover.com/en/
- Flowserve Corp. - www.flowserve.com
- Flowtronex PSI Inc. - http://unitedstates.xylemappliedwater.com/brands/flowtronex
- Grunfos USA - http://us.grundfos.com/
- Haight Pumps - www.haightpump.com/
- KSB, Inc. - www.ksb.com/ksb-us
- Sulzer Pumps Inc. - www.sulzer.com/
- Roper Pump Company - www.roperpumps.com
- Weatherford International Ltd. - www.weatherford.com/
- Weir Floway Pumps Inc. - www.weirminerals.com

The highest concentrations of domestic companies in this US market segment are based in California, Kansas, Ohio and Texas. Each of these states has between 26 and 71 established companies. California, Oklahoma, New York and Texas account for between $789 million and $1,423 million in value of shipments. The top 50 companies accounted for 83% of value of shipments in this industry in 2007.[61] The second tier of states is comprised of Florida, Illinois, Michigan, Pennsylvania, New York and Wisconsin, which have between 19 and 26 established companies.

[60] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005
[61] US Census, 2007

5.2.8 Packaging Machinery Market Segment

The packaging machinery industry is comprised of companies primarily engaged in manufacturing packaging machinery, such as wrapping, bottling, canning, and labeling machinery.

The domestic manufacturing of packaging machinery has experienced a positive trend from 2002 to 2007, 10.5% increase.[37]

The US market segment in 2007 accounted for a total market value of $6,058 million (based on domestic value of shipments estimated at $4,671 million[62] plus total import value of $2,257 million[34] less total export value of $870 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[63] Considering the domestic value of shipments is considerably less than the total market value, one could conservatively assume the domestic value of shipments stated below are under representative of the US market segment product category.

- Cartoning, multipacking, and leaflet-coupon placing machinery – $263 million
- Thermoforming, blister, and skin machinery – $22 million
- Bagging machines – $256 million
- Machinery for bottling, canning, cleaning, drying bottles and containers, and adhesive devices for packing, packaging, and bottling – $500 million
- Liquids, dry, and viscous products filling machinery – $229 million
- Glass and plastics container and can capping, sealing, and lidding machinery – $77 million
- Labeling machinery – $197 million
- Coding, dating, imprinting, jet printing, marking, and stamping machinery – $264 million
- Corrugated and solid fiber case and tray forming, loading, and sealing machinery – $202 million
- Accumulating, collating, feeding, and unscrambling machinery; and testing, inspecting, detecting, checkweighing, and other quality control devices – $168 million

[62] Economic Census, 2007
[63] Economic Census, 2002

- Paper, film, and foil wrapping machines – $248 million
- Other packing, packaging, and bottling machinery or systems and combination of equipment – $337 million
- Packing, packaging, and bottling machinery, not specified by kind – $149 million

As previously indicated, the above product category domestic market shipments provide an estimate of the minimum value of the US market segment, considering the values do not account for imports at the machinery product category level.

As of 2005, the leading 75 US based companies generated an estimated total of $69,283 million in sales with a total workforce of about 107,800.[64] The following is a brief list of some of the larger domestic packaging machinery manufacturers:

- A Packaging Systems – www.apacks.com
- ARPAC LLC - www.arpac.com
- Bosch Dobboy Inc. - www.boschpackaging.com/doboy/eng/index.asp
- CVC Technologies Inc. - www.cvcusa.com
- Fres-co System USA Inc. – www.fresco.com
- Harland Machine Systems - www.harlandamerica.com/
- Hartness International Inc. - http://hartness.com/
- Haver Filling Systems Inc. – www.haverusa.com
- Hayssen Packaging Equipment - www.hayssensandiacre.com/
- Matrix Packaging Machinery LLC – www.matrixpm.com
- PFM North America - www.pfmnorthamerica.com
- Pneumatic Scale Corp. - www.psangelus.com
- Scandia Packaging Machinery Company - www.scandiapack.com
- Serac Inc. – http://seracusa.serac-group.com

The highest concentrations of domestic companies in this US market segment are based in Colorado, Florida Indiana, Massachusetts, Missouri and Texas. Each of these states has between 129,592 and 575,594 established companies. The second tier of states is comprised of Alabama, Arkansas, California, New York, North Carolina and Oregon, which have between 84,081 and 129,592 established companies. The top 50 companies account for about 65% of value of shipments in

[64] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005

this industry.[65] These companies are primarily located in Georgia, Illinois, Minnesota, Ohio and Wisconsin.

5.2.9 Industrial Process Furnace & Oven Market Segment

The industrial process furnace & oven industry is comprised of companies primarily engaged in manufacturing industrial process ovens, induction and dielectric heating equipment, kilns (except cement, chemical, wood), and laboratory furnaces and ovens.

Data for this market segment does not exist prior to 2007; therefore a trend analysis could not be completed.

The US market segment in 2007 accounted for a total market value of $1,900 million (based on domestic value of shipments estimated at $2,384 million[66] plus total import value of $618 million[34] less total export value of $1,102 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[67] Considering the domestic value of shipments is considerably higher than the total market value, one could estimate the product category domestic market value as a ratio of the domestic value of shipments to the total market value.

- Fuel-fired industrial process furnaces, ovens, and kilns – $378 million total domestic value of shipments, $302 million domestic market value
- Parts and attachments for industrial fuel-fired furnaces, ovens, and kilns – $109 million, $87 million
- High-frequency induction and dielectric heating equipment – $168 million, $134 million
- Electric resistance-heated furnaces, ovens, and kilns – $114 million, $91 million
- Electric (except high-frequency and dielectric and resistance-heated) metal processing and heat treating furnaces – $32 million, $26 million
- Other electric industrial furnaces, ovens, and kilns – $105 million, $84 million

[65] US Census, 2007
[66] Economic Census, 2007
[67] Economic Census, 2002

- Parts and attachments for electric industrial furnaces, ovens, and kilns, and high-frequency induction and dielectric heating equipment – $92 million, $74 million
- Other electrical heating equipment for industrial use – $267 million, $214 million
- Parts and attachments for electric industrial tubular heaters and other electrical heating equipment for industrial use – $86 million, $69 million
- Industrial furnaces and ovens, not specified by kind – $162 million, $130 million

As of 2005, the leading 75 US based companies generated an estimated total of $25,558 million in sales with a total workforce of about 32,700.[68] The following is a brief list of some of the larger domestic industrial process furnace and oven manufacturers:

- Abbott Furnace Company - www.abbottfurnace.com
- Can-Eng Furnaces International – www.industrialfurnace.com
- CM Furnaces INC. - www.cmfurnaces.com/
- Epcon Industrial Systems LP - www.epconlp.com
- Inductotherm Corp. - www.inductotherm.com
- Ipsen International Inc. - www.ipsenusa.com/
- Jackson Oven Supply Inc. – www.jacksonoven.com
- Lochaber Cornwall Inc. – http://lochabercornwall.com
- Surface Combustion, Inc. - www.surfacecombustion.com
- Wellman Thermal Systems Corp. - www.wellmanfurnaces.com/

The highest concentrations of domestic companies in this US market segment are based in Michigan, Ohio and Pennsylvania. Each of these states has between 29 and 36 established companies. The second tier of states is comprised of California, Illinois, New Jersey and Wisconsin, which have between 15 and 29 established companies. New Jersey, Ohio and Pennsylvania account for between $202 million and $303 million in value of shipments.[69]

[68] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005
[69] US Census, 2007

5.2.10 Fluid Power Equipment Market Segment[70]

The fluid power equipment industry is comprised of companies primarily engaged in manufacturing fluid power (i.e. hydraulic and pneumatic) cylinders, actuators, pumps and motors.

The domestic manufacturing of fluid power equipment has experienced a significant positive trend from 2002 to 2007, 60.0% increase.[37]

The US market segment in 2007 accounted for a total market value of $9,933 million (based on domestic value of shipments estimated at $9,075 million[71] plus total import value of $2,781 million[34] less total export value of $1,923 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[72] Considering the domestic value of shipments is slightly lower than the total market value, one could conservatively assume the domestic value of shipments stated below are representative of the US market segment product category.

- Non-aerospace type hydraulic fluid power cylinders and actuators, linear and rotary – $1,798 million
- Non-aerospace type pneumatic fluid power cylinders and actuators, linear and rotary – $810 million
- Parts for non-aerospace hydraulic and pneumatic fluid power cylinders, actuators, including accumulators, cushions, etc. – $1,025 million
- Aerospace type fluid power cylinders and actuators, hydraulic and pneumatic – $1,520 million
- Fluid power cylinders and actuators, not specified by kind – $249 million
- Non-aerospace type reciprocating fluid power pumps – $1,208 million
- Non-aerospace type rotary and other fluid power pumps – $726 million
- Non-aerospace type fluid power motors – $566 million
- Aerospace type fluid power pumps and motors – $381 million
- Parts for fluid power pumps, motors, and hydrostatic transmissions – $442 million

[70] Presented data unless otherwise stated includes: NAICS 333995 Fluid Power Cylinder & Actuator Manufacturing, and NAICS 333996 Fluid Power Pump & Motor Manufacturing
[71] Economic Census, 2007
[72] Economic Census, 2011

- Fluid power pump and motors, not specified by kind – $246 million

As of 2005, the leading 75 US based companies generated an estimated total of $89,007 million in sales with a total workforce of about 169,700.[73] The following is a brief list of some of the larger domestic fluid power equipment manufacturers:

- Applied Industrial Technologies - www.applied.com
- Bosch Rexroth Corp. - www.boschrexroth-us.com
- Cameron International Corp. - www.c-a-m.com
- Cross Fluid Power - http://crossfluidpower.com
- Dakota Fluid Power – www.dakotafluidpower.com
- Eaton - www.eaton.com
- Fluid Power Sales, Inc. - www.fluidpowersales.com
- ITT Industries Inc. - www.itt.com
- Parker Hannifin Corp. - www.parker.com
- SPX Corporation - www.spx.com

From a fluid power cylinder and actuator manufacturing perspective, the highest concentrations of domestic companies in this US market segment are based in California, Illinois and Ohio. Each of these states has between 20 and 35 established companies. These states and New York account for between $332 million and $1,100 million in value of shipments. The top 50 companies account for about 87% of value of shipments in this industry.[74] The second tier of states is comprised of Michigan, New York, Oregon, Texas and Wisconsin, which have between 12 and 20 established companies.

From a fluid power pump and motor manufacturing perspective, the highest concentrations of domestic companies in this US market segment are based in California and Texas. Each of these states has between 11 and 17 established companies. Illinois and South Carolina account for between $266 million and $570 million in value of shipments. The top 4 companies account for about 69% of value of shipments in this industry.[75] The second tier of states is comprised of Illinois, Michigan, Minnesota, Ohio and Wisconsin, which have between 6 and 11 established companies.

[73] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005
[74] US Census, 2007
[75] US Census, 2007

5.2.11 Instruments & Related Products Market Segment

The instruments & related products manufacturing industry is comprised of companies primarily engaged in manufacturing instruments and related devices for measuring, displaying, indicating, recording, transmitting, and controlling industrial process variables.

The domestic manufacturing of instruments and related products has experienced a positive trend from 2002 to 2007, 29% increase.[37]

The US market segment in 2007 accounted for a total market value of $9,133 million (based on domestic value of shipments estimated at $9,064 million[76] plus total import value of $6,381 million[34] less total export value of $6,312 million[34]).

As of 2005, the leading 75 US based companies generated an estimated total of $135,454 million in sales with a total workforce of about 200,100.[77] The following is a brief list of some of the larger domestic instruments and related products manufacturers:

- Ametek - www.ametek.com
- BEI Sensors **-** www.beisensors.com
- Emerson Electric Co. - www2.emersonprocess.com/
- GE Measurement & Control - www.ge-mcs.com/
- Invensys Systems Inc. - www.invensys.com
- Mettler-Toledo International Inc. - http://us.mt.com/us
- MKS Instruments - www.mksinst.com/
- National Instruments - www.ni.com/
- PerkinElmer Inc. - www.perkinelmer.com/
- Rockwell Automation - www.rockwellautomation.com/
- Siemens Industrial Automation Inc. - www.automation.siemens.com
- Thermo Fisher Scientific Inc. - www.thermofisher.com

The highest concentrations of domestic companies in this US market segment are based in California, Massachusetts, Ohio, Pennsylvania and Texas. Each of these states has between 37 and 127 established companies. These states and Colorado account for between $545 million and $959 million in value of shipments. The top 50 companies account for about 73% of value of shipments in this industry.[78] The

[76] Economic Census, 2007
[77] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005
[78] US Census, 2007

second tier of states is comprised of Colorado, Connecticut, Florida, Illinois, Michigan, New Jersey, New York and Wisconsin, which have between 21 and 37 established companies.

5.2.12 Relay & Industrial Control Market Segment

The relay & industrial control industry is comprised of companies primarily engaged in manufacturing relays, motor starters and controllers, and other industrial controls and control accessories.

The domestic manufacturing of relays and industrial controls has experienced a positive trend from 2002 to 2007, 13.5% increase.[37]

The US market segment in 2007 accounted for a total market value of $12,365 million (based on domestic value of shipments estimated at $11,189 million[79] plus total import value of $6,483 million[34] less total export value of $5,307 million[34]). The market segment includes the below product categories and estimated domestic value of shipments.[80] Considering the domestic value of shipments is relatively less than the total market value, one could conservatively assume the domestic value of shipments stated below are to some extent under representative of the US market segment product category.

- Relays for electronic circuitry, industrial control, overload, and switchgear type – $1,216 million
- Specific-purpose industrial controls – $3,064 million
- General-purpose industrial controls - $3,606 million
- Parts for industrial controls and motor-control accessories - $684 million
- Relays and industrial controls, not specified by kind – $722 million

As of 2005, the leading 75 US based companies generated an estimated total of $255,072 million in sales with a total workforce of about 507,800.[81] The following is a brief list of some of the larger domestic relay and industrial control manufacturers:

- Bosch Rexroth Corp. - www.boschrexroth-us.com
- Eaton - www.eaton.com

[79] Economic Census, 2007
[80] Economic Census, 2011
[81] Ward's Business Directory of U.S. Private and Public Companies, Vol 1 & 2, 2005

- Emerson Electric Co. – www.emerson.com
- Honeywell International Inc. – www.honeywellprocess.com
- Johnson Controls Inc. - www.johnsoncontrols.com
- Moog Inc. – www.moog.com
- Rockwell Automation Inc. - www.rockwellautomation.com
- Schneider Electric Co. - www2.schneider-electric.com
- Siemens Industrial Automation Inc. - www.automation.siemens.com
- Texas Instruments Inc. – www.ti.com

The highest concentrations of domestic companies in this US market segment are based in California, Illinois, Michigan, New York, Pennsylvania, Ohio, Texas and Wisconsin. Each of these states has between 39 and 117 established companies. The leading six states account for between $617 million and $1,798 million in value of shipments.[82] The second tier of states is comprised of Connecticut, Florida, Indiana, Massachusetts, Minnesota, New Jersey and Oregon, which have between 26 and 39 established companies.

[82] US Census, 2007

CHAPTER 6: KEY MARKET ENTRY FACTORS

The following Chapter provides information on key market entry factors relevant to US imported production technologies. The US trade regulations are discussed and a series of germane harmonized tariff schedules presented to provide an indication of the import duty and fees required for market access.

6.1 Trade Agreements

The US is a country with a history of being pro-trade with minimal non-tariff influences and low tariffs. Nevertheless, some exceptions apply primarily with regard to agriculture related products. From a consumer buying perspective, there have been consumer campaigns to “buy American” or to boycott goods from specific countries. These campaigns have grown out of slowdowns in the economy, which was the case in 2007 and 2010. In general, the campaigns have been ineffective with regard to the consumer goods markets and nonexistent with regard to production technology markets.

This protectionist mood has dissipated recently as shown by the US Congress’ approval of several new bilateral free trade agreements (FTA’s) during 2012. In February 2013, the Obama administration announced it was moving forward with negotiating an ambitious trade-liberalization agreement with the European Union.

Such a comprehensive transatlantic trade and investment partnership agreement could have a strong negative impact on the rest of the world’s economies, although quite a positive impact on the US and EU, including Portugal. The agreement could significantly decrease not only tariffs but also non-tariff trade barriers, which would increase gross domestic product per capita and the creation of new jobs. From a production technology perspective, the agreement could remove or substantially lower US tariff rates and allow the highly competitive technologies from Portugal full access to the world’s second largest manufacturing market.

The Obama administration also started negotiations on an Asia-Pacific trade agreement, the Trans-Pacific Partnership (TPP). The negotiations originally include the US, Australia, Brunei, Chile, New Zealand, Peru, Singapore, and Vietnam. Between June 2012 and April 2013, Canada, Japan, Malaysia and Mexico joined the negotiations. The countries have made substantial progress but according to the US Trade Representative, disagreements still remained on several issues such as

customs, telecommunications, technical barriers to trade, sanitary and phytosanitary issues.

At the moment, there are several FTA's that make the US market highly competitive for foreign based suppliers. The most important FTA is the North American Free Trade Agreement (NAFTA) between Canada, Mexico, and the US, which created the world's largest free trade area in 1994. All tariffs and quantitative restrictions between the member countries were lifted by January 2008. The value of all US goods imports from NAFTA countries rose 3.9% from 2011 to 2012, although this FTA primarily impacts the imports of consumer goods with minimal influence on the production technology market segments.

In addition to NAFTA, there are bilateral FTA's established with the following countries: Israel, since 1985; Jordan, 2001; Singapore and Chile, 2004; Australia, 2005; Bahrain and Morocco, 2006; Oman and Peru, 2009; and South Korea, Colombia and Panama, 2012. The FTA with South Korea is the most significant FTA in a decade. The US International Trade Commission has estimated that reductions to tariffs and quotas on goods will add $10 billion to $12 billion to the US gross domestic product annually. Under the agreement almost 80% of US exports of consumer and industrial products will become duty free by the 15th of March 2017, and most remaining tariffs will be eliminated by 2022.

Other notable trade agreements that impact imports to the US include: the Andean Trade Preference Act (ATPA) that was enacted in 1991 with Bolivia, Colombia, Ecuador and Peru; the Caribbean Basin Initiative that was enacted in 1983 with 16 beneficiary countries in the Caribbean; and the African Growth Opportunity Act (AGOA) that was enacted in 2000 with sub-Saharan Africa with 39 beneficiary countries.

Countries not under the above trade agreements may be under the most-favored-nation (MFN) dutiable rates; while importers from countries without MFN status are dutiable at the highest statutory rates.

6.2 Tariff Considerations

As mentioned previously, the overall tariff burden in the US is not high with a mean rate on all goods at about 2.8% with a decreasing trend.[83] Most US tariffs are levied

[83] World Bank mean tariff rates, http://data.worldbank.org/indicator/TM.TAX.MRCH.SM.AR.ZS

as a percent of value with a few still being applied at a specific amount per unit. The rates vary mainly by country of origin and type of product, although there are other factors that have less influence. The US tariff schedule is based on the Harmonized Tariff Schedule, which was established by the World Customs Organization.[84]

Since production technologies include a wide range of equipment, tooling and software, one would expect a substantial list of Harmonized Tariff Codes would be relevant in determining the rate of duty. To add further complexity to the process, production technology providers should consider the rate of duty for individual components of the equipment/system as well as the equipment/system as a whole they wish to import to the US market. In some cases, it may be more cost effective to import the components under lower rates of duty and assemble in the US. For example, a wastewater filtration system could be imported as a skid system or as components (separate tanks, pumps, control system, filter system, etc.). The production technology provider should consider both options when calculating the rate of duty.

The Harmonized Tariff Schedule of the United States is organized by general sections and chapters. The majority of production technologies would most-likely be categorized under:

- Section XVI: Machinery and Mechanical Appliances: Electrical Equipment; Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
  - Chapter 84: Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof[85]
  - Chapter 85: Electrical machinery and equipment and parts thereof; sound recorders and producers, television image and sound recorders and reproducers, and parts and accessories of such articles[86]

Table 22 provides an example of one relevant production technology Harmonized Tariff Code, as presented within the Harmonized Tariff Schedule. The heading is provided with a description of the article. In this particular case, a rate of duty is provided: 3.5% for most-favored-nations (general column), and rate of duty under

[84] Harmonized Tariff Schedule : http://data.worldbank.org/indicator/TM.TAX.MRCH.SM.AR.ZS
[85] Harmonized Tariff Schedule, Chapter 84: http://hts.usitc.gov/Table%2084.xml
[86] Harmonized Tariff Schedule, Chapter 85: http://hts.usitc.gov/Table%2085.xml

one or more special tariff treatment programs (special column).[87] The rate of duty designated by column (2) applies to products imported directly or indirectly from less favored nations – Cuba and North Korea.

Table 22 – Direct Example from the Harmonized Tariff Schedule of the United States (2013)

Heading/ Sub	Stat Suffix	Article Description	Unit of Quantity	Rates of Duty		
				(1) General	(1) Special	(2)
8456		Machine tools for working any material by removal of material, by laser or other light or photon beam, ultrasonic, electro-discharge, electro-chemical, electron-beam, ionic-beam or plasma arc processes; water-jet cutting machines:				
8456.10		Operated by laser or other light or photon beam processes:				
8456.10.10		For working metal……		3.5%	Free (A,AU,BH,CA, CL, CO, E, IOL, JJ, MA, MX, OM, , A PE, SG) 2.1% (KR)	30%

As one would expect, Portugal is categorized as a most-favored-nation.[88] Therefore, in accordance with the above example, there would be a 3.5% rate of duty applied to machine tools classified by the Harmonized Tariff Heading 8456.10.10. Table 23 provides an extended sample listing of classifications that are relevant to the import of production technologies.

Table 23 – Sample List of Harmonized Tariff Classifications of Production Technologies (country of origin – Portugal)

Heading/ Subheading	Article Description	Rates of Duty
8456	Machine tools for working any material by removal of material, by laser or other light or photon beam, ultrasonic, electro-discharge, electro-chemical, electron-beam, ionic-beam or plasma arc processes; water-jet cutting machines:	

[87] Harmonized Tariff Schedule of the United States, General Notes, Products Eligible for Special Tariff Treatment, p. 6

[88] http://dataweb.usitc.gov/scripts/trade_program/trade_program_group.asp?country_group=NTR

Heading/ Subheading	Article Description	Rates of Duty
8456.10	Operated by laser or other light or photon beam processes:	
8456.10.10	For working metal……	3.5%
8456.20	Operated by electro-discharge processes	
8456.20.10	For working metal……	3.5%
8456.90	Other:	
8456.90.21	Water-jet cutting machines……	2.5%
8458	Lathes (including turning centers) for removing metal:	
	Horizontal lathes:	
8458.11.00	Numerically controlled……	4.4%
8466	Parts and accessories suitable for use solely or principally with the machines of headings 8456 to 8465, including work or tool holders, self-opening dieheads, dividing heads and other special attachments for machine tools; tool holders for any type of to	
8466.10.01	Tool holders and self-opening dieheads:	3.9%
	Other	
8466.93	For machines of headings 8456 to 8461	
8466.93.11	For water-jet cutting machines……..	Free

It is important to note, the normal fees for all imported goods still apply. These fees include the following:

- Merchandise processing fee in the range of 0.25%
- Harbor maintenance fee in the range of 0.21%

In all import cases that involve unique production technology items, it is recommended a Customs House Broker be used to move the item through customs efficiently.

6.3 Import Restrictions

The US requires a license or permit for some major types of imports such as alcoholic beverages, cars, certain drugs, fish and wildlife products, fruits and vegetables, meat and dairy products, nuts, plants, poultry, petroleum products and trademarked articles. In some cases, licenses are also required at a state level, which adds additional complexity to the importing process.

The main target of US restrictions in recent years has been China. This is due to the ongoing high trade deficit the US has with China. The Obama administration blames the trade deficit on a range of unfair practices that include dumping and export subsidies. The disputes have included green technologies. In most cases, the US has countered with stiff anti-dumping duties. For example, in 2012 the US placed duties averaging 30% on imports of Chinese solar-heating panels. There are no restrictions placed on European Union member states with respect to technologies.

Imports to the US can also be restricted based on quota limits. There are two types of quotas: tariff-rate and absolute. Tariff-rate quotas provide for the entry of a specified quantity of the quota product at a reduced rate of duty during a given period. There is no limitation on the amount of the product that may be entered during the quota period, but quantities entered in excess of the quota for the period are subject to higher duty rates. Absolute quotas are quantitative, no more than the amount specified may be permitted entry during a quota period. Some absolute quotas are global in nature, while others are allocated to specific foreign countries. There are ways importers can manage product that is imported in excess of an absolute quota that include holding the product until the next quota period.

There are no relevant quota limits on production technologies with Portugal as the country of origin.

CHAPTER 7: CONCLUSIONS AND OBSERVATIONS

The analysis of the US market from a production technology perspective has identified several relevant conclusions and observations. As indicated by the market overview, the US manufacturing sector remains a considerable potential market for production technology providers when one considers the overall size of the market and the interest of leadership within large industries to bring manufacturing back to the US from abroad due to the less risky investment climate and stability in wages. In addition to the "reshoring" trend, there are positive signs the economy is rebounding from the recent recession.

The positive trend since 2009 with regard to production technology imports is another clear sign the US global manufacturing sector is stable and growing. This is supported by the machinery, computer & electronic product, and electrical equipment & components imports. Quite possibly the most relevant indicator is the global manufacturing sector's rising trend in equipment capital expenditures. Taking the above indicators into account as well as the US's leading high-technology manufacturing industry, from a global US manufacturing sector standpoint, the sector and the production technology market it represents is stable and growing.

In terms of production technology import levels, various meaningful results were obtained. The production technology items which the US imports the most are:

- Construction Machinery
- Farm Machinery and Equipment
- Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment
- Semiconductor Machinery
- Machine Tools
- Optical Instruments and Lenses

Unsurprisingly, most clients for these sectors are located in States with the largest manufacturing and technology bases. California is the most important production technology customer in the country, but Texas, Ohio, Michigan and Illinois are also important buying markets.

Most clients are small companies with less than four employees, although some production technology providers, such as those in air-conditioning and refrigeration equipment and semiconductor machinery, supply a considerable number of large companies (with more than 500 employees).

Regarding marketing channels, almost all production technology equipment is supplied via distributors. In specific sectors where the market is very concentrated, such as the farm machinery, the main players have their own networks of exclusive representatives, whereas in others, such as semiconductor machinery, complexity and customization needs by the manufacturing industry trigger strong levels of direct sales. Production support equipment, such as air-conditioning and industrial refrigeration equipment, is frequently sold via contractors as integrating parts of turnkey projects.

In reviewing the annual value of shipments and potential production technology customer base on an individual manufacturing sector basis, it was determined the following three manufacturing sectors are the most promising from a production technology market perspective:

- Fabricated metal product manufacturing (NAICS 332)
- Food manufacturing (NAICS 311)
- Machinery manufacturing (NAICS 333)

There are at least 12 production technology related manufacturing subsectors that directly support the three manufacturing sectors, which were found to represent large potential production technology US market segments. Their combined total US market value is estimated at $83,423 million with an imports to the US estimated at $31,211 million.[89]

Of the 12 production technology market segments, the relay & industrial control market segment and the pump & pumping equipment market segments represent the largest production technology market segments followed by the fluid power equipment market segment and instruments & related products market segment.

From a production technology market segment growth perspective, the pump & pumping equipment market segment, machine tool market segment, and fluid power equipment market segment showed significant growth from 2002 to 2007. The only market segment that declined from 2002 to 2007 is the metal work machinery market segment, although this market segment showed a slight positive trend with regard to imported machinery from 2009 to 2012.

A review of the manufacturing and sales locations of production technology providers (competitors in the market) within the 12 production technology market segments

[89] Total of 11 market segments. The total market segment value and import value for metal work machinery is not available.

indicated a higher concentration of providers in what have been historically strong manufacturing states: California, Illinois, Indiana, Michigan, New York, Ohio, Pennsylvania, Texas and Wisconsin. The number of company sites and value of shipments per state is highly dependent on the market segment.

With regard to US market access for Portuguese production technology providers, no preferable conditions apply. Portugal has not signed any free trade agreements with the US, either by itself or in the framework of the European Union, so no favorable treatment is given to Portuguese imports.

The US has signed a number of free trade agreements with some of its international trading partners, but many of those agreements are in a spirit of development assistance and improvement of diplomatic relations, rather than being instruments to effectively boost trade and contribute to mutual economic growth. This applies to African and Caribbean countries as well as some Middle-Eastern and Latin American countries.

On the other hand, when those agreements are signed with partners that possess significant manufacturing and technological capabilities and/or economic weight, they do place those trading partners in favorable positions to access the US market. In this category, the NAFTA and the free trade agreements with Australia, South Korea and Singapore are important examples of instruments providing favorable market access conditions that do not apply to Portugal.

Detrimental as this situation may be, the fact remains that, by itself, it should not prevent Portuguese production technology providers from actually entering the US market. The US has always been an advocate and practitioner of predominantly unrestricted trade, and import duties on Portuguese production technologies do not normally go above 4%. Import duties consist mostly of ad valorem tariffs rather than specific tariffs.

No quotas or similar quantitative restrictions apply to Portuguese production technology imports; so in essence access by Portuguese providers to the US market might not be facilitated, but it is also not impaired in any way. The internal market demand, the quality of products, price competitiveness and the capacity of the suppliers are much more important factors.

ANNEX 1 – PRODUCTION TECHNOLOGY SUBSECTOR IMPORT MARKET ANALYSIS RESULTS

NAICS CODE	Production Technology Subsector	Imports (Thousand USD)					% change 2010 to 2012 (3 yrs)	2010-12 Average
		2008	2009	2010	2011	2012		
333120	Construction Machinery Manufacturing	13,774,009	7,074,611	9,194,532	14,412,169	18,242,750	98%	13,949,817
333111	Farm Machinery and Equipment Manufacturing	8,806,947	6,545,306	7,404,424	8,781,954	9,621,423	30%	8,602,600
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	6,760,387	5,698,124	6,694,810	7,828,493	8,677,199	30%	7,733,501
333242	Semiconductor Machinery Manufacturing	3,903,312	3,152,885	5,623,032	8,436,694	7,171,799	28%	7,077,175
333517	Machine Tool Manufacturing	6,603,190	3,408,678	3,774,113	6,193,884	7,870,433	109%	5,946,143
333314	Optical Instrument and Lens Manufacturing	4,820,089	3,680,030	4,567,121	5,235,475	5,648,471	24%	5,150,356