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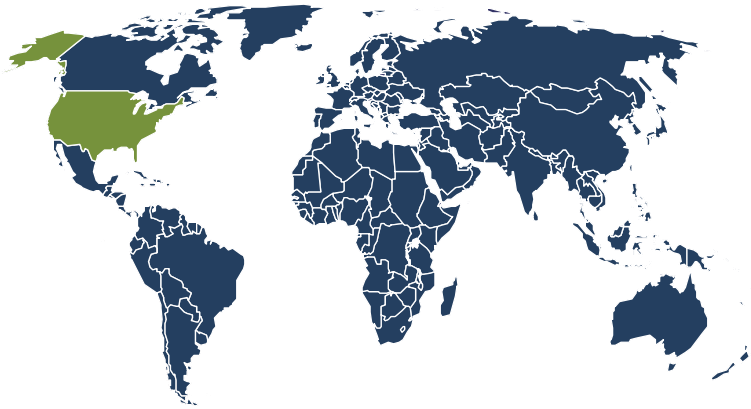
US Collection

Mining Equipment:
United States



November 2015

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ABOUT THIS REPORT

Scope & Method

This report forecasts US mining equipment demand and shipments in US dollars at the manufacturers' level to 2019. Total demand is segmented by product in terms of:

- surface mining machinery
- underground mining machinery
- drills and breakers
- crushing/pulverizing/screening equipment
- mineral processing and other machinery such as robotic seafloor mining machines
- parts and attachments.

Excluded from the scope of this report are certain products that can be used at mining sites and are sometimes considered mining machinery, including general purpose material handling and oilfield equipment. Also excluded is used and rebuilt mining machinery of all types.

Total demand is also segmented by market as follows:

- minerals mining
- metals mining
- coal mining.

To illustrate historical trends, total demand and total shipments are provided in annual series from 2004 to 2014; the various demand segments are reported at five-year intervals for 2009 and 2014.

This report quantifies trends in various measures of growth. Growth (or decline) expressed as an average annual growth rate (AAGR) is the least squares growth rate, which takes into account all available datapoints over a period. Growth calculated as a compound annual growth rate (CAGR) employs, by definition, only the first and last datapoints over a period. The CAGR is used to describe forecast growth, defined as the expected trend beginning in the base year and ending in the forecast year. Readers are encouraged to consider historical volatility when assessing particular annual values along the forecast trend, including in the forecast year.

Key macroeconomic indicators are also provided at five-year intervals with CAGRs for the years corresponding to other reported figures. Other various topics, including profiles of pertinent leading suppliers, are covered in this report. A full outline of report items by page is available in the Table of Contents.

Sources

Mining Equipment: United States (FF75021) is based on *World Mining Equipment*, a comprehensive industry study published by The Freedonia Group in November 2015. Reported findings represent the synthesis and analysis of data from various primary, secondary, macroeconomic, and demographic sources including:

- firms participating in the industry, and their suppliers and customers
- government/public agencies
- national, regional, and international non-governmental organizations
- trade associations and their publications
- the business and trade press
- indicator forecasts by The Freedonia Group
- the findings of other industry studies by The Freedonia Group.

Specific sources and additional resources are listed in the Resources section of this publication for reference and to facilitate further research.

Industry Codes

The topic of this report is related to the following industry codes:

NAICS/SCIAN 2007 North American Industry Classification System		**SIC** Standard Industry Codes	
333120	Construction Machinery Manufacturing	3531	Construction Machinery and Equipment
333131	Mining Machinery and Equipment Manufacturing	3532	Mining Machinery and Equipment, except Oil and Gas Field Machinery and Equipment

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HIGHLIGHTS

- Demand for mining equipment in the US is forecast to total $10.0 billion in 2019, representing annual increases of 4.0% from $8.2 billion in 2014. Ongoing investment in local mining activity will boost sales.

- In 2019, demand in the leading product segment – surface mining machinery – is projected to total $3.8 billion. Suppliers will benefit from increased open pit and strip mine output of aggregates as construction spending rises.

- Sales of underground mining machinery are expected to climb 5.5% per year through 2019, the fastest pace among all discrete product segments. Increases in the mining of metals, which are often extracted using underground methods, will fuel gains.

- Demand for mining equipment utilized in the leading market segment – nonmetallic minerals mining – is forecast to amount to $4.8 billion in 2019. Growth in construction spending will drive gains in aggregates and gypsum production, two materials commonly used in construction applications.

- Sales of equipment used in metals mining are expected to increase 5.1% per year through 2019, the fastest pace of any market segment. Metal prices, particularly for copper, are forecast to recover from recent declines, which will lead to further resource exploration and mining project development.

- US shipments of mining equipment are projected to increase 4.1% per year through 2019 to $11.8 billion. US net exports of mining equipment will continue to grow, as consumers worldwide prefer the higher-value products manufactured locally.

- Among the leading suppliers of mining equipment to the US market in 2014 were Caterpillar, Joy Global, and Komatsu.

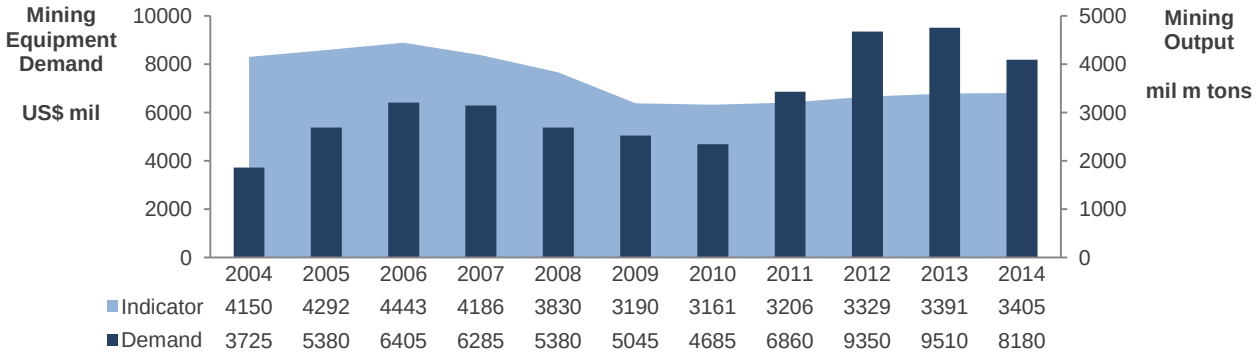
MARKET ENVIRONMENT

Historical Trends

Mining equipment demand in the US totaled $8.2 billion in 2014 and grew at an average annual rate of 6.7% over the 2004-2014 decade. Business conditions in the mining sector have the most direct effect on mining machinery sales, and mining activity is in turn dependent on demand for various mined materials. Of particular interest to both mining firms and equipment producers are commodity prices, which determine whether it is economically feasible to expand existing operations and invest in new machinery. General economic trends also have a major impact on the market for mining equipment because of the diverse and extensive number of applications for mined materials. Among the other factors influencing mining machinery demand are the availability and cost of capital, laws and regulations, new and used equipment prices, and technological innovations in machine design.

During the 2009-2014 period, significant growth in iron ore and copper output volume in the US stimulated associated mining equipment purchases. In fact, sales of mining equipment for use in iron ore mining tripled between 2009 and 2014. However, much of this was due to the weakened iron ore market in 2009 and 2010, as 2014 iron ore output was on par with 2004 output volume. In addition, a rebound in construction spending, which resulted in a subsequent turnaround in aggregates mining output, generated a sizable portion of the additional sales.

Chart 1 | US Mining Equipment Demand Trends, 2004-2014 (US$ mil)



Source: The Freedonia Group, Inc.

Key Economic Indicators

The table below provides forecasts for economic indicators related to US mining equipment demand in value terms.

Table 1 | Key Indicators for US Mining Equipment Demand; 2009, 2014, 2019 (US$ bil)

Item	2009	2014	2019	CAGR 14/09	CAGR 19/14
Resident Population (million persons)	306.8	318.9	332.0	0.8%	0.8%
Gross Domestic Product	14419	17348	21750	3.8%	4.6%
Nonresidential Fixed Investment	1633	2234	2840	6.5%	4.9%
Construction Expenditures	928.3	1012.0	1555.0	1.7%	9.0%
Manufacturers' Shipments	4182	5692	6470	6.4%	2.6%
Machinery	270.7	386.1	463.0	7.4%	3.7%
Electricity Generation (billion kilowatt-hours)	3950	4093	4270	0.7%	0.9%
Mining Output (million metric tons)	3190	3405	3485	1.3%	0.5%
Minerals	2150	2420	2545	2.4%	1.0%
Coal	1010	924	872	-1.8%	-1.2%
Metals	30	61	68	15.3%	2.2%

Source: The Freedonia Group, Inc.

Technology Trends

Technological innovation has played an important role in the mining machinery industry's development throughout its history. In recent years, the introduction of new products has been driven in large part by intense competition among suppliers. Higher-end mining systems have been the principal focus of a great deal of research and development activity, although manufacturers have also worked to develop more capable, better performing lower-end models. Newer equipment is designed to be more productive, more reliable, easier to maintain, more fuel efficient, and safer to operate, and technological advances are making it more feasible to conduct mining operations undersea and, in the not too distant future, outer space.

One major objective of new product development efforts is increased efficiency and lower operating costs. For example, in March 2015, **Caterpillar** introduced its ***313F L GC*** hydraulic excavator, which offers enhanced fuel efficiency over previous models. To provide another example, in November 2015, **Komatsu** introduced a new wheel loader system lip system. This system, which is a fully integrated bucket lip system that provides protection along the edge of the bucket, increases equipment productivity and reduces wear and tear on the machine's components. The wheel lip system also uses the company's ***BLADESAVER*** tooth design, which provides a smooth lip underside that increases production while reducing tire wear.

Improving overall mining efficiency is another concern for mining equipment suppliers. For instance, in April 2014, **Komatsu** and **General Electric Company** (**GE**) established a joint venture, **Komatsu GE Mining Systems**, to develop next-generation mining equipment utilizing **Komatsu**'s vehicle and control technologies and **GE Mining**'s electric and battery power technologies. Furthermore, in April 2015, the joint venture company formed a partnership that sends operational data collected from sensors attached to its mining dump trucks to a US-based **GE** data center for data analysis. The resulting information is intended to improve mining efficiency by providing optimal truck routes and positioning, and speed and braking requirements for specific terrain and site

conditions.

The enactment of more stringent engine emissions regulations has also been a driver of technology development efforts in recent years, as manufacturers have worked to introduce equipment able to meet these standards. For instance, **Atlas Copco** introduced a new engine for its ***MINETRUCK MT42*** in November 2014. This engine meets the exhaust emission requirements of both US Environmental Protection Agency (EPA) Tier 4 and European Union (EU) Stage IV emissions standards.

As an alternative to traditional surface and underground mining operations, technological advances and historically high commodity prices are likely to lead to more undersea mining activity at increasingly greater depths. Longer term, it could eventually become feasible to extract raw materials from asteroids, planetoids, and the moon. An asteroid with a mean diameter of one kilometer, for example, could contain as much iron ore as is currently mined globally each year. Among the companies seeking to mine near-earth asteroids are **Deep Space Industries** and **Planetary Resources**. However, asteroid mining is not expected to be feasible for at least another decade.

Legal & Regulatory Factors

Mining machinery producers are subject to numerous laws, regulations, and standards. These include safety and environmental regulations, as well as various taxes, fees, and statutes relating to mining activity in a given area, which have an indirect effect on mining equipment demand. Actual and proposed changes in regulations and laws can either help boost mining activity and related machinery sales in a given area or lead to the disruption or curtailment of mining operations and negatively impact equipment demand.

The Occupational Safety and Health Administration has issued numerous equipment operation safety regulations. These include standards concerning hazardous exhaust concentrations (ventilation), the use of attachments, machinery inspection, fire protection, and roll-over protective structures.

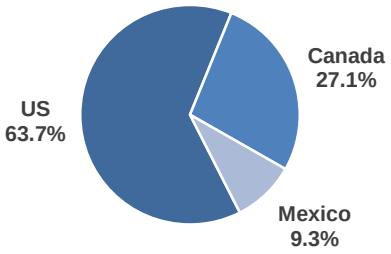
Mining machinery producers are also affected by environmental regulations. The diesel engines that power many types of mining equipment are a significant source of pollutants, including carbon monoxide, hydrocarbons (HCs), nitrogen oxides (NO_x), and particulate matter (PM). As a result, emission standards have been established for off-highway diesel engines. In the US, Tier 4 Final regulations (with lower HC, NO_x, and PM emission limits) will be fully in effect by the end of 2015.

In general, emissions regulations can have a significant effect on the sales patterns for mining equipment. When a new set of standards first comes into effect, the engine technology required to reduce emissions is fairly expensive, increasing the total cost of a new machine. This can cause demand to be higher in the year preceding the introduction of a new tier as customers purchase equipment before the new regulations raise prices.

NAFTA Overview

Demand for mining equipment in the NAFTA region totaled $12.9 billion in 2014. Mining equipment sales in 2014, when measured against mining output, were the highest of any global region, a byproduct of the advanced mining industries in the US and Canada and their respective high labor costs.

Chart 2 | NAFTA Mining Equipment Demand by Country, 2014
($12.9 billion)



Source: The Freedonia Group, Inc.

The US accounted for the largest share of regional mining equipment sales at nearly 64% of the 2014 total due to its large size and extensive mining sector (mining output in the US is the third largest in the world behind China and India). The US is an intensive user of mining equipment when measured against mining output, a byproduct of its advanced economy, large manufacturing and construction sectors, and broad access to capital for mining.

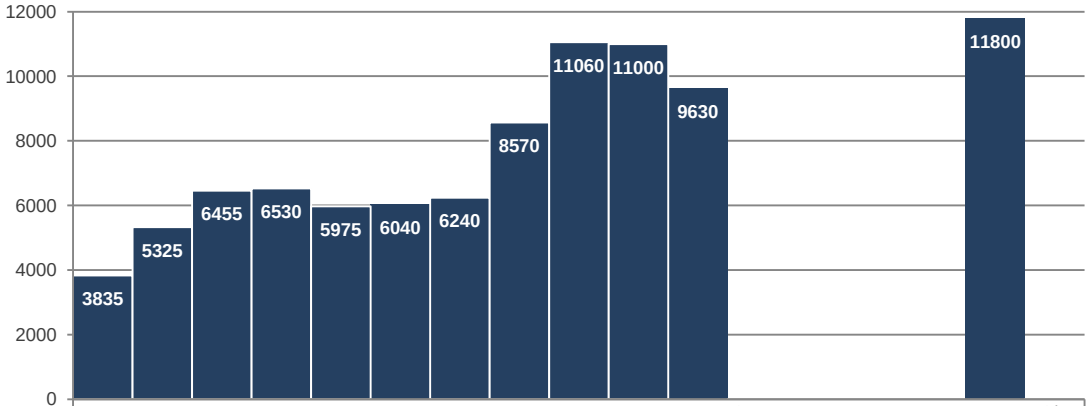
Demand for mining equipment in Canada accounted for 27% of the regional market in 2014. Sales of mining equipment in Canada, relative to gross domestic product and total fixed investment, are higher than those in the US, reflecting the greater importance of mineral extraction activity to the country's economy.

While Mexico possesses significant mineable resources, the capital needed to develop mines and extract these deposits is not as readily available as in Canada or the US, and the country only accounted for 9.3% of regional mining equipment demand in 2014.

Shipments Overview

US shipments of mining equipment totaled $9.6 billion in 2014. The US mining machinery industry is technologically advanced and sophisticated, with domestic manufacturers operating state-of-the-art factories and making significant quantities of all of the major machine types. The technological sophistication of locally manufactured equipment enables it to compete in markets around the world. As a result, US net exports of mining equipment were equivalent to 15% of production in 2014. Advances in local production achieved near double-digit annual gains during the 2009-2014 period, with output bolstered by strong increases in local sales, as well as by advances in some of the country's key export markets, including regional neighbors Canada and Mexico, as well as Brazil, Australia, China, and South Africa.

Chart 3 | US Mining Equipment Shipment Trends; 2004-2014, 2019 (US$ mil)



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	04-14 AAGR	2019	19/14 CAGR
Total Shipments	3835	5325	6455	6530	5975	6040	6240	8570	11060	11000	9630	8.8%	11800	4.1%

Source: The Freedonia Group, Inc.

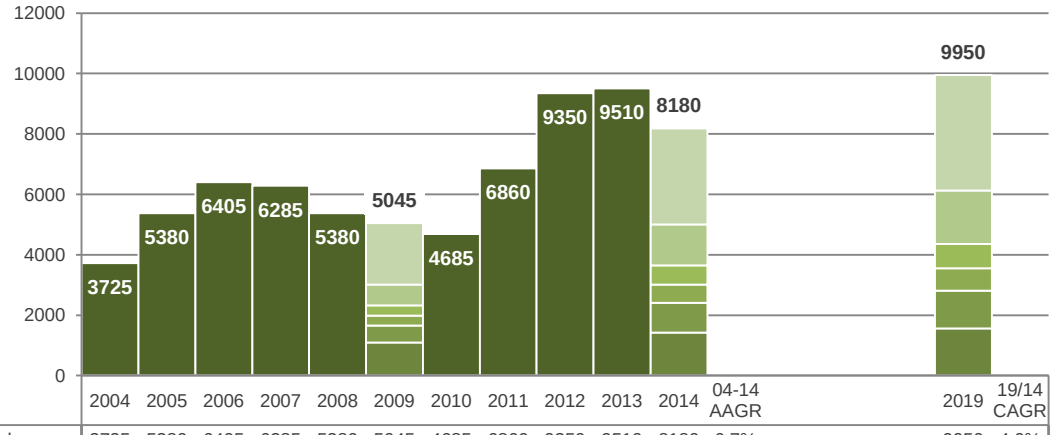
US shipments of mining equipment are projected to increase 4.1% per year through 2019 to $11.8 billion. Local production is expected to slow as the domestic market for mining equipment moderates from robust 2009-2014 sales. However, US net exports of mining equipment will continue to grow, as consumers worldwide prefer the higher-value products manufactured locally, and will reach $1.9 billion in 2019.

SEGMENTATION & FORECASTS

Products

Demand for mining equipment in the US is forecast to total $10.0 billion in 2019, representing annual increases of 4.0% from $8.2 billion in 2014. While sales will slow compared to robust 2009-2014 advances, ongoing investment in local mining activity will boost sales. For instance, **Tintina Resources** is in the process of submitting of a mine operating permit for its Black Butte Copper project in Montana. Furthermore, construction spending will increase through 2019, bolstering sales of equipment used in the mining of construction aggregates. Furthermore, industrial sand and gravel will continue to be mined for the country's sizable hydraulic fracturing sector, aiding equipment purchases.

Chart 4 | US Mining Equipment Demand by Product; 2009, 2014, 2019 (US$ mil)



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	04-14 AAGR	2019	19/14 CAGR
Total Demand	3725	5380	6405	6285	5380	5045	4685	6860	9350	9510	8180	6.7%	9950	4.0%
Surface Mining						2035					3175		3825	3.8%
Underground Mining						680					1355		1770	5.5%
Drills & Breakers						340					635		800	4.7%
Crush/Pulv/Screen						335					605		740	4.1%
Mineral Proc & Other						560					990		1250	4.8%
Parts & Attachments						1095					1420		1565	2.0%

Source: The Freedonia Group, Inc.

Surface Mining Machinery. Demand for surface mining machinery is projected to increase 3.8% per year to $3.8 billion in 2019. Suppliers will benefit from increased open pit and strip mine output of aggregates and other materials as the economy continues to grow and construction spending rises. These methods will remain the most

economical way to extract surface deposits of minerals, guaranteeing some degree of equipment sales in the foreseeable future. Furthermore, most of the largest mining projects are surface mining projects, as these operations do not pose the same engineering challenges as those found in underground mines. As a result, the market for surface mining machinery will be driven to a greater degree by technological advances in product designs, as these advances provide greater efficiency gains when used on a larger scale, making more sophisticated equipment attractive to surface mine operators. For example, in December 2014, **Hitachi** introduced two rigid dump trucks that feature drive control systems designed to reduce tire slippage during acceleration and tire lock-up during braking.

In addition, tightening emissions standards will boost value gains, as these will facilitate the purchase of equipment with higher-value technological features, as well as increased fuel efficiency, factors that typically increase the average price of equipment. For instance, in March 2014, **Doosan Infracore** introduced new loaders and excavators that meet Tier 4 emissions standards. However, more robust gains will be restrained by competition from used and rebuilt machinery. This competition is more important in the surface mining equipment segment than it is in most others due to the versatility of many products included in this category. Items such as dozers, excavators, loaders, and off-highway trucks can be utilized in both mining and construction applications with minimal, if any, need for refitting. Consequently, the stock of used machinery from which secondary market sales can be made is much higher, as is the number of potential customers for used and refurbished equipment.

Surface mining machinery can be segmented into four major product types: mining trucks, excavators and shovels, loaders, and mining dozers or tractors. Included in other surface mining machinery are such products as compactors, draglines, graders, other earthmoving machinery, and specialized conveying equipment.

Underground Mining Machinery. Demand for underground mining equipment is expected to climb 5.5% per year through 2019, the fastest pace among all discrete

product segments, to $1.8 billion. Increases in metals mining output, which is often mined using underground methods, will fuel sales. Furthermore, technological advances will boost sales gains in value terms by raising average product prices and encouraging operators to purchase new equipment in order to increase their efficiency. However, unlike surface mines, underground mines present inherent limits to the size and amount of machinery that can be used, preventing faster sales gains.

Underground mining machinery is specifically designed for use in harsh subterranean settings. Among the products included here are augers; borers; continuous miners; drums; face-haulage vehicles; hydraulic roof supports; loader machines; longwall mining systems; rippers and shearers; roadheaders; roof bolters; and underground dozers, loaders, and trucks. Most of this equipment is used in coal and metal mines, although the extraction of some minerals, such as rock salt, is also done utilizing underground mining machinery.

Drills & Breakers. Demand for mining drills and breakers is expected to increase 4.7% yearly through 2019 to $800 million. Drills and breakers are used in nearly all mining operations, particularly in the exploration stages, which will help spur overall sales gains as commodity prices climb and new mines are developed. Additionally, the expanding use of *in situ* leach (ISL) mining techniques, in which drills are the primary type of equipment used, will support increases in product sales.

Items categorized here include electric, hydraulic, and pneumatic blasthole, coal, core, percussion, and rotary drills; portable drilling rigs; and breakers of various types. Drilling equipment is available in both portable and stationary configurations, with portable units accounting for the larger share of demand. Portable drilling rigs are typically either track-, trailer-, or truck-mounted. Roof bolters or drills, which bore holes in mine roofs to accommodate reinforcing metal bolts, are included in the underground mining machinery product category. Equipment used to drill oil or gas wells is excluded from the scope of this report.

Crushing/Pulverizing/Screening Equipment. Demand for crushing, pulverizing, and screening equipment used in mining applications is forecast to rise 4.1% annually through 2019 to $740 million. Crushing, pulverizing, and screening equipment is utilized in almost all mining operations, and consequently demand will be stimulated by increases in overall mining output. This is especially true in aggregates mining, as aggregates operations often require the crushing of mined stone pieces and the proper screening and sorting of sand, gravel, and crushed stone to get the proper grade. As a result, this type of mining uses crushing, pulverizing, and screening equipment intensively. Furthermore, additional technological advancements will boost average prices and dollar gains through 2019. For example, in June 2015, **Metso Corporation** (**Metso**) introduced ***METSO PREMIER*** and ***METSO COMPACT*** screens. ***METSO PREMIER*** screens are designed to offer application flexibility, while ***METSO COMPACT*** screens are intended for users requiring minimal capital investment. However, the continued dominance of stationary types of crushing, pulverizing, and screening equipment will prevent faster value gains, as these are less expensive than portable models.

Specific products classified here include grinding mills and pulverizers; portable crushing, screening, washing, and combination plants; stationary crushers; stationary vibrating screens; and related products. Stationary equipment is both less expensive and more broadly applicable than portable units.

Mineral Processing & Other Machinery. Demand for mineral processing machinery (including beneficiation equipment) and other mining equipment is projected to advance 4.8% per year through 2019 to $1.3 billion. Similar to crushing, pulverizing, and screening equipment, minerals processing machinery is used in all major types of mining operations, and suppliers will benefit from continued growth in the mining sector. In addition, technological improvements in these products will support increased sales. However, many of these processes can be completed with greater efficiencies of scale at off-site processing facilities. As a result, mine operators will continue to process

mined materials on-site only to the point at that they are economically viable to transport, which will prevent faster sales gains.

Raw ores and other mined materials have to be processed extensively to make them useful. Mineral processing equipment performs the key tasks of preparing mined materials for further downstream processing, such as smelting. Among the specific products categorized here are centrifuges, classifiers, dryers, feeders, flotation and related equipment, spirals, and thickeners.

Also included here are other miscellaneous products such as the robotic seafloor mining machines built by **Soil Machine Dynamics** for **Nautilus Minerals**, and asteroid mining equipment now in the planning stages.

Parts & Attachments. Demand for separately sold parts and attachments used in mining machinery is forecast to increase 2.0% per year through 2019 to $1.6 billion. Many manufacturers offer parts and attachments, as the capital costs and technological requirements of production are far less imposing than those for complete mining machines, resulting in more intense pricing pressures and restraining increases in value terms. In addition, because of the extremely high cost of mining machinery, manufacturers are continuing to improve the durability of their products, which limits the need to purchase repair parts. However, continued growth in the size of the mining equipment stock will boost product sales, as operators will require more components for machinery maintenance and repair. Additionally, pressures to increase mine efficiency will drive sales of attachments that enable a given piece of machinery to either perform a different task or complete the same task more efficiently.

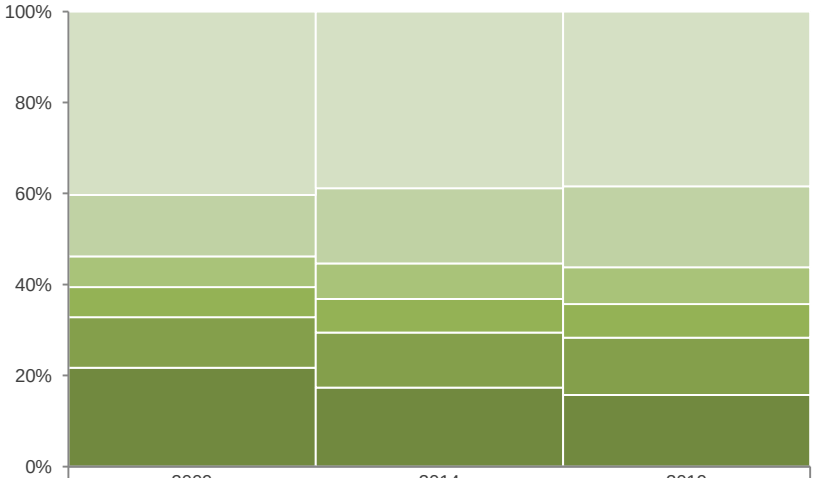
The harsh operating conditions where mining machinery typically operates places considerable stress on the equipment, and periodic replacement of key components is necessary due to normal wear and tear, as well as to occasional part failures. However, sales of parts and attachments as a share of total mining equipment demand have steadily fallen as mining machinery producers have introduced newer, more durable

equipment, and will continue to do so.

A broad range of mining machinery parts and attachments are available for purchase, including belts for conveyor systems, blades, buckets, carbide-tipped picks for longwall shearers, compressors and hydraulic pumps, crusher jaw plates, dragline teeth and adapters, filters for beneficiation machinery, mining drill bits, profile screen cloth for vibration screens, shovels, and replacement parts for locomotion, including wheels and treads.

Nearly every major mining equipment company also produces parts and attachments, as these items tend to have relatively high profit margins compared to new machinery sales. Additionally, many smaller companies also specialize in these types of products, which tend to be less expensive and complex to manufacture.

Chart 5 | US Mining Equipment Demand by Product Share; 2009, 2014, 2019 (%)



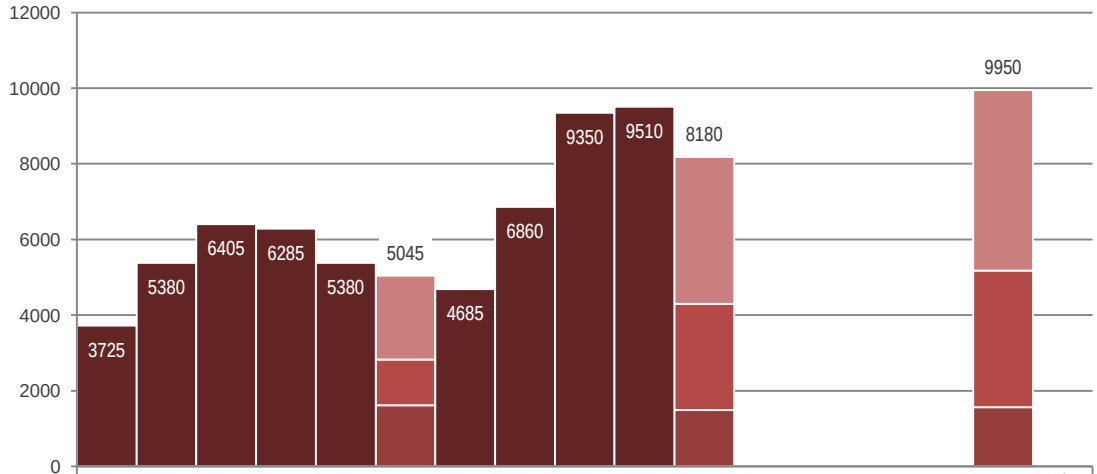
	2009	2014	2019
Surface Mining	40.3	38.8	38.4
Underground Mining	13.5	16.6	17.8
Drills & Breakers	6.7	7.8	8.0
Crush/Pulv/Screen	6.6	7.4	7.4
Mineral Proc & Other	11.1	12.1	12.6
Parts & Attachments	21.7	17.4	15.7

Source: The Freedonia Group, Inc.

Markets

Unlike the metals and minerals markets, demand for mining equipment used in coal applications is expected to achieve only marginal gains through 2019. In part this is due to more stringent environmental regulations that emphasize the use of less polluting alternative fuels. However, as a whole coal producers will limit their equipment purchases as coal output in the US continues to fall.

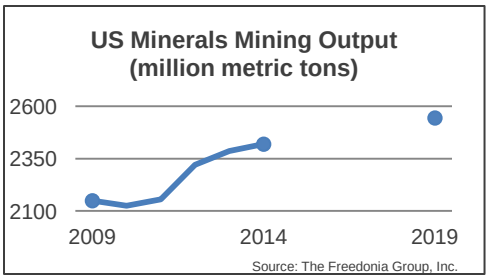
Chart 6 | US Mining Equipment Demand by Market; 2009, 2014, 2019 (US$ mil)



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	04-14 AAGR	2019	19/14 CAGR
Total Demand	3725	5380	6405	6285	5380	5045	4685	6860	9350	9510	8180	6.7%	9950	4.0%
Minerals Mining						2215					3880		4775	4.2%
Metals Mining						1213					2810		3605	5.1%
Coal Mining						1617					1490		1570	1.1%

Source: The Freedonia Group, Inc.

Minerals Mining. Demand for mining equipment utilized in the nonmetallic minerals market is forecast to rise 4.2% annually through 2019 to $4.8 billion. Growth in construction spending will drive gains in aggregates and gypsum production, two materials commonly used in construction applications. However, minerals production faces much greater competition from substitutes and non-mining production methods, such as recycled aggregate materials and nitrogen-based fertilizers made using natural gas feedstock. Additionally, most mineral

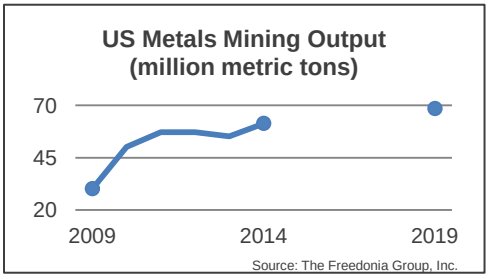


products can be excavated in open pit operations and require little to no processing, limiting mining machinery requirements.

Suppliers of mining equipment for construction aggregate – including crushed stone, gravel, and sand – applications will benefit from strong construction spending advances. Other minerals that are mined include asbestos, barite, clay, dimension stone, feldspar, fluorspar, diamonds and other gemstones, graphite, gypsum, industrial sand, lime, magnesite, mica, oil sands and oil shale, perlite, potassium, salt, silica, talc, and vermiculite. Unlike metals mining, the majority of these minerals are found in separate deposits, and, generally speaking, mining for one material does not yield significant quantities of another useful mineral product. Among the applications for minerals are agriculture, chemical manufacture, and all types of construction. Minerals tend to be both more prevalent and easier to extract than either coal or metals. They are also usually less costly than coal or metals, although there are exceptions, with gem quality diamonds being one example.

Metals Mining. Sales of equipment used in metals mining applications are expected to increase 5.1% per year through 2019, the fastest pace of any market segment, to $3.6 billion. Metal prices, particularly for copper, are forecast to recover from recent declines, which will lead to further resource exploration and mining project development. Sales of bauxite mining equipment will rise as demand for and output of aluminum increases.

While metals mining output is significantly lower than that for minerals and coal in volume terms, these tonnage figures do not reflect the great deal of waste material that is typically generated in mining metals such as copper and gold. To produce one metric ton of copper, for instance, an average of 200 metric tons of ore have to be removed and processed, requiring the use of mining machinery ranging from drills to loaders to crushers and screeners. The amount

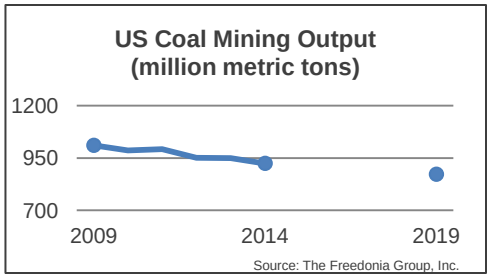


of “overburden” (soil and rock above the desired material) that needs to be removed and later replaced in surface mining operations can also be substantial, often requiring multiple years to clear. This stage further boosts overall equipment demand in metals mining operations.

There is a high degree of interdependence among metals mining markets, as several different ores can be found in the same deposit. A strong gold mining environment can, for example, result in increased output of silver, lead, and zinc, all of which are commonly mined as byproducts of gold production.

Metals tend to be more expensive than other mined materials, and extraction methods are typically both more expensive and more difficult. Metal ores can be segmented into two basic types: industrial and precious. Industrial metals include bauxite (used in the manufacture of aluminum), chromium, cobalt, copper, iron ore, lead, manganese, nickel, tin, titanium, vanadium, and zinc. Precious metal ores include gold, silver, platinum, and other platinum group metals (chiefly palladium, rhodium, and ruthenium).

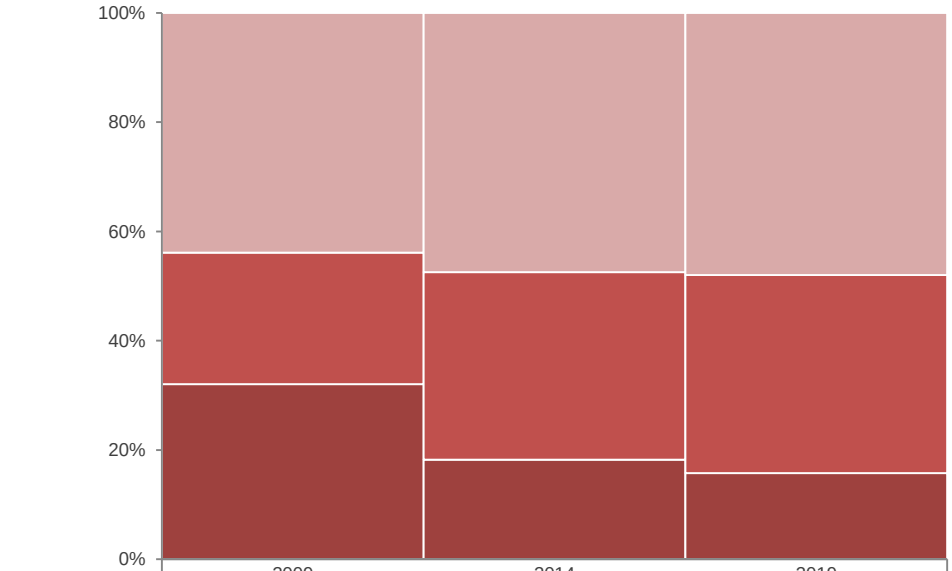
Coal Mining. Demand for mining equipment used in coal mining applications is projected to increase 1.1% per year to $1.6 billion in 2019. An expected decline in coal output volume will temper mining equipment sales in this market. However, coal remains a source of energy, supporting associated mining equipment purchases. Increases in overall economic activity and population levels will result in higher electricity demand, aiding demand for thermal coal. Nevertheless, while electric power generation is expected to grow slightly through 2019, coal will lose share to natural gas and other less polluting fuels, dampening increases in coal production and related mining machinery demand. Expanding use of hydraulic fracturing will lead to increased supplies of natural gas and oil, which places downward pressure on prices and leading to greater utilization of these competitive energy sources.



The environmental problems caused by burning coal and the costs involved in addressing them will constrict both consumption and mine output. For example, in August 2015, the EPA announced the Clean Power Plan and final Carbon Pollution Standards. The Clean Power Plan establishes criteria for power plants to reduce carbon emissions on a state-by-state basis. The aim of the Clean Power Plan is to have emissions in 2030 be 32% below 2005 levels. While the Clean Power Plan will severely restrict overall coal use in the US, the implementation of the plan is uncertain as the Senate passed a resolution in November 2015 that would repeal the Clean Power Plan.

Coal mining can be segmented into two basic types – bituminous and sub-bituminous, and anthracite and other (chiefly lignite). There are more locations on which a bituminous and sub-bituminous mine would be economically attractive, which supports greater equipment demand.

Chart 7 | US Mining Equipment Demand by Market Share; 2009, 2014, 2019 (%)



	2009	2014	2019
Minerals Mining	43.9	47.4	48.0
Metals Mining	24.0	34.4	36.2
Coal Mining	32.1	18.2	15.8

Source: The Freedonia Group, Inc.

INDUSTRY STRUCTURE

Industry Composition & Characteristics

The US market for mining equipment is served by both domestic producers and the imports of foreign suppliers. The US is home to several major mining machinery manufacturers, including **Caterpillar**, which is the world leader. **Astec Industries**, **Joy Global**, **Kennametal**, and **Terex Corporation** (**Terex**) are among the other significant suppliers that are headquartered in the country. Foreign multinationals with plants in the US include **Atlas Copco** (Sweden), **Boart Longyear** (Australia), **CNH Industrial** (United Kingdom), **Doosan Infracore** (South Korea), **FLSmidth** (Denmark), **Komatsu** (Japan), **Liebherr-International** (Switzerland), **Metso** (Finland), **Sandvik** (Sweden), **Sany Heavy Industry** (China), and **Volvo** (Sweden). Among the countries that supply mining equipment to the US market are China and Germany.

While **Metso** maintains seven production sites in the US, in August 2015 the company announced that it would close its York, Pennsylvania plant by March 2016. **Terex** maintains production operations in the US via its **ASV** joint venture. **ASV** was previously a wholly owned subsidiary of **Terex**. However, in December 2014, **Terex** sold a 51% stake to **Manitex International** and reclassified the subsidiary as a joint venture. In addition, **Hitachi** (Japan) produces mining equipment in the US through its joint venture with **Deere & Company**.

Mining equipment manufacturers range from small, privately held companies that specialize in parts and attachments production to large multinational corporations that offer a variety of mining machinery types, as well as equipment used in other markets. The increasing technical complexity of newer models makes it harder for small suppliers to be competitive with manufacturers with greater financial and technological resources, forcing smaller firms to focus on niche products or markets. Mining machinery is expensive, and downtime at a mine site can cost an operator millions of dollars. Because of this, building and maintaining a brand reputation is critical for success.

Company Profile 1 | Caterpillar Inc

Corporate Summary

Caterpillar is one of the world's largest manufacturers of construction and mining equipment, diesel and natural gas engines, industrial gas turbines, and diesel-electric locomotives. The company, together with its subsidiaries, operates in two segments: Machinery, Energy, and Transportation (ME&T); and Financial Products. Caterpillar stood as a leading supplier of mining equipment to the US market in 2014.

Contact Information

100 Northeast Adams Street
Peoria, Illinois 61629
USA
+1-309-675-1000
www.caterpillar.com

2014 Highlights (US$ mil)

Total Revenues	55,184
Gross Margin (percent)	22.4
Total Assets	84,681
Employees (number of persons)	114,233
Major Stock Listing	NYSE:CAT

Segment in Scope

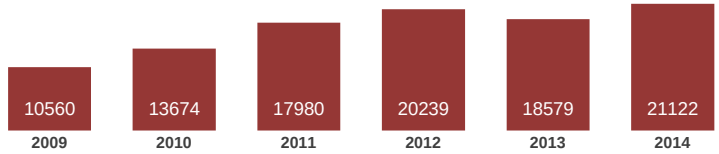
Machinery, Energy & Transportation

Caterpillar is involved in the US mining equipment market through the ME&T segment, which reported 2014 global revenues of $52.1 billion. Via this segment, the company develops, manufactures, and sells a wide range of mining, construction, forestry, and other machinery; diesel and natural gas engines; turbines; power generation systems; and related components, systems, and accessories.

Major Brands

CAT (surface mining equipment)
EL3000 (longwall shearers)
MD5150C (top hammer drill)
TL1055D (telescopic handler)
UNIT RIG (articulated mining trucks)

Caterpillar US Revenues (US$ mil)



Market Position

Divestiture

2014 Dec — Divested Halco Rock Tools, which made ***HALCO*** down-the-hole drilling products for mining and other end uses, to Regent Equity Partners.

Cooperative Agreements

- Produces undercarriage items for hydraulic excavators manufactured by Caterpillar and other original equipment manufacturers (OEMs) via Asia Trak Tianjin, a joint venture between Caterpillar, SNT Corporation, and SCM Singapore Holdings.
- Maintains a production and supply agreement with Oshkosh Corporation's JLG Industries subsidiary, through which JLG Industries manufactures ***CATERPILLAR*** telescopic handlers and distributes them through Caterpillar's worldwide network of dealers.
- Maintains a production and distribution agreement with Wacker Neuson through which Wacker Neuson makes ***CAT*** hydraulic miniature excavators that are then distributed via Caterpillar's global dealer network, except in Japan.

Other Company News

2015 Mar — Introduced the ***313F L GC*** hydraulic excavator, which is engineered to provide enhanced fuel efficiency.

2014 Nov — Debuted the ***GH800B*** longwall plow system, which is designed for mining low coal seams at high rates.

2014 Jan — Introduced the ***843K*** wheel dozer, which features multiple disc brakes and a planetary power-shift transmission.

Sources: company reports, press articles

Company Profile 2 | Joy Global Inc

Corporate Summary

Joy Global is a holding company for subsidiaries involved in the worldwide manufacture and distribution of machinery and related products. The company operates through two segments: Surface Mining Equipment and Underground Mining Machinery. Joy Global ranked as a leading supplier of mining equipment to the US market in 2014.

Contact Information

100 East Wisconsin Avenue, Ste 2780
Milwaukee, Wisconsin 53202
USA
+1-414-319-8500
www.joyglobal.com

FY 2015* Highlights (US$ mil)

Net Sales	3,172
Gross Margin (percent)	26.4
Total Assets	3,712
Employees (number of persons)	13,400
Major Stock Listing	NYSE:JOY

*fiscal year ending October 30, 2015

Segments in Scope

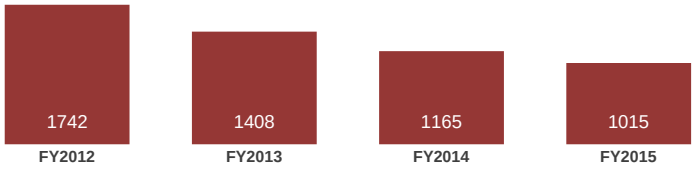
Surface Mining Equipment; Underground Mining Machinery

Joy Global participates in the US mining equipment market through both segments. Via these segments, the company manufactures such items as electric mining shovels, walking draglines, blasthole drills, wheel loaders, excavators, crushing and conveying equipment, roof bolters, feeder breakers, roof supports, and other underground mining equipment.

Major Brands

BLUE LINE (hydraulic breakers)
JMC (shearers)
JOY 12HM37C (continuous miners)
P&H 2650CX (excavators)
P&H 285XPC (blasthole drills)
SILVER CLIP (hydraulic breakers)

Joy Global US Net Sales (US$ mil)



Surface Mining Equipment

- FY 2015 global net sales: $1.5 billion.
- Produces surface mining equipment for mining copper, coal, iron ore, oil sands, gold, and other minerals and ores.

Underground Mining Machinery

- FY 2015 global net sales: $1.8 billion.
- Manufactures roof bolters, feeder breakers, roof supports, and other underground mining equipment under the ***JOY*** tradename.
- The International Mining Machinery subsidiary also makes underground mining products.

Market Position

Acquisitions

2015 Jun	Acquired Montabert, a manufacturer of equipment and related accessories for mining, quarry, construction, and civil works applications from Doosan Infracore.
2014 May	Purchased several mining product lines from Mining Technologies International (MTI), a manufacturer of underground hard rock mining equipment. Included in the transaction were MTI's hard rock drills, loaders, dump trucks, shaft sinking, and raise bore product lines.

Other Company News

2014 Feb	Introduced the ***P&H 285XPC*** blasthole drill model, which provides 53,524 kilograms of bit loading for use in iron ore and copper mining applications.

Sources: company reports, press articles

Company Profile 3 | Komatsu Ltd

Corporate Summary

Komatsu is a diversified provider of industrial products and services. The company operates through two segments: Construction, Mining, and Utility Equipment (CMUE); and Industrial Machinery and Others. Komatsu stood as a leading supplier of mining equipment to the US market in 2014.

Contact Information

3-6, Akasaka 2-chome
Minato-ku, Tokyo 107
Japan
+813-5561-2616
www.komatsu.com

FY 2014* Highlights (US$ mil)

Net Sales	17,988
Gross Margin (percent)	29.2
Total Assets	25,440
Employees (number of persons)	47,417
Major Stock Listing	TSE:6301

*fiscal year ending March 31, 2015

Segment in Scope

Construction, Mining & Utility Equipment

Komatsu participates in the US mining equipment market through the CMUE segment, which reported global sales of $16.0 billion in FY 2014. The segment manufactures a range of equipment for use in mining, construction, utility, and forestry applications. Mining equipment operations include the Komatsu America Corporation and Hensley Industries subsidiaries, and the Komatsu GE Mining Systems joint venture.

Major Brands

D155AXI-8 IMC (bulldozer)
KOMATSU (mining equipment)
KOMTRAX (fleet monitoring)
KOMTRAX PLUS (fleet monitoring)
WA380-8 (wheel loader)

Komatsu CMUE North America Sales (US$ mil)

Subsidiary Overview

- Komatsu America Corporation produces mining and construction equipment, including dump trucks, hydraulic excavators, wheel loaders, crawler dozers, and motor graders.
- Hensley Industries makes attachments, parts, and commercial castings for excavators, wheel loaders, bulldozers, and other mining and construction equipment.

Market Position

Acquisition & Joint Venture

2015 Feb	Acquired an equity stake in ZMP, a firm involved in developing, selling, and supporting autonomous vehicle systems using image recognition, sensing, and control technologies. Through this acquisition, the company expects to use ZMP's proprietary technologies to accelerate the development of next-generation mining and construction equipment, particularly unmanned, remotely controlled mining equipment.
2014 Apr	Began operations of Komatsu GE Mining Systems, a 50/50 joint venture between Komatsu and the GE Mining division of GE. The venture is involved in developing next-generation mining equipment utilizing Komatsu's vehicle and control technologies and GE Mining's electric and battery power technologies, and electric drive systems.

Other Company News

2014 Oct	Introduced the ***PC200I-10 INTELLIGENT MACHINE CONTROL*** (***IMC***) and ***PC210LCI-10 IMC*** hydraulic excavators, which feature technology that automatically controls the boom, arm, and bucket without damaging the target surface.

Sources: company reports, press articles

Additional Companies Cited

Astec Industries Inc (NASDAQ:ASTE)	www.astecindustries.com
Atlas Copco AB (STO:ATCO.A & ATCO.B)	www.atlascopco.com
Boart Longyear Ltd (ASX:BLY)	www.boartlongyear.com
CNH Industrial NV (NYSE:CNHI & MIL:CNHI)	www.cnhindustrial.com
Deep Space Industries Inc	www.deepspaceindustries.com
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Doosan Infracore Co Ltd (KRX:042670)	www.doosaninfracore.com
FLSmidth & Co A/S (CSE:FLS)	www.flsmidth.com
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Terex Corporation (NYSE:TEX)	www.terex.com
Volvo AB (STO:VOLV.A & VOLV.B)	www.volvogroup.com

RESOURCES

The Freedonia Group, Inc

www.freedoniagroup.com

3337 World Mining Equipment, November 2015	see study contents
Related Industry Studies	
3349 World Rare Earths, November 2015	see study contents
3282 World Construction Machinery, June 2015	see study contents
3274 World Copper, April 2015	see study contents
3241 World Power Tools, January 2015	see study contents
3166 World Agricultural Equipment, July 2014	see study contents
Related Focus Reports	
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Construction: United States	see report contents
Construction Aggregates: United States	see report contents
Mining & Quarrying: United States	see report contents
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World Copper	see report contents
World Material Handling Products	see report contents
World Rare Earths	see report contents
Freedonia Custom Research, Inc	see capabilities

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United States Geological Survey	www.usgs.gov
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