DOWNLOAD PDF IRON AND STEEL INDUSTRY =

Chapter 1 : Iron and steel industry in the United States - Wikipedia

The iron and steel industry is one of the most important industries in India. During through , India was the third largest producer of raw steel [1] and the largest producer of sponge iron in the world.

Businesses as large as iron and steel plants and businesses as small as the dry cleaner on the corner have worked with EPA to find ways to operate cleaner, cheaper, and smarter. As a result, we no longer have rivers catching on fire. Our skies are clearer. American environmental technology and expertise are in demand throughout the world. The Clinton Administration recognizes that to continue this progress, we must move beyond the pollutant-by-pollutant approaches of the past to comprehensive, facility-wide approaches for the future. Industry by industry and community by community, we must build a new generation of environmental protection. Within the past two years, the Environmental Protection Agency undertook its Sector Notebook Project to compile, for a number of key industries, information about environmental problems and solutions, case studies and tips about complying with regulations. We called on industry leaders, state regulators, and EPA staff with many years of experience in these industries and with their unique environmental issues. Together with notebooks for 17 other industries, the notebook you hold in your hand is the result. These notebooks will help business managers to better understand their regulatory requirements, learn more about how others in their industry have undertaken regulatory compliance and the innovative methods some have found to prevent pollution in the first instance. These notebooks will give useful information to state regulatory agencies moving toward industry-based programs. Across EPA we will use this manual to better integrate our programs and improve our compliance assistance efforts. I encourage you to use this notebook to evaluate and improve the way that together we achieve our important environmental protection goals. Environmental Protection Agency M St. Environmental Protection Agency EPA to provide information of general interest regarding environmental issues associated with specific industrial sectors. This publication may be purchased from the Superintendent of Documents, U. A listing of available Sector Notebooks and document numbers are included on the following page. All telephone orders should be directed to: Superintendent of Documents U. Government Printing Office P. Box Pittsburgh, PA Complimentary volumes are available to certain groups or subscribers, such as public and academic libraries, Federal, State, local, and foreign governments, and the media. For further information, and for answers to questions pertaining to these documents, please refer to the contact names and numbers provided within this volume. Downloading procedures are described in Appendix A of this document. Cover photograph courtesy of American Iron and Steel Institute. Summary of the Sector Notebook Project! Introduction, Background, and Scope of ijhe Notebook 3 B. Characterization of the Iron and Steel Industry 3 1. Industry Size and Geographic Distribution 3 2. Industrial Processes in the Iron and Steel Industry 13 1. Steelmaking Using the Basic Oxygen rurnace 16 2. Forming and Finishing Operations. Raw Material Inputs and Pollution Outpujts Summary of Selected Chemicals Released Other Data Sources j General Description of Major Statutes. Pending and Proposed Regulatory Requirements: Review of Major Legal Action 86 1. Review of Major Cases 86 2. Sector-related Environmental Programs and Activities 89 B. Industry Research Programs 95 2. Summary of Trade Associations Iron and Steel Producers Iron and Steel Manufacturing Process Overview. Iron and Steel Manufacturing Cokemaking and Ironmaking Iron and Steel Manufacturing Steelmaking Releases for Iron and Steel Facilities! Summary of TRI Data: Releases and Transfers by Industry Iron and Steel Manufacture Summary of the Sector Notebook Project j Environmental policies based upon comprehensive analysis of air, water and land pollution are an inevitable and logical supplement to traditional single- media approaches to environmental protection. The central concepts driving the new policy direction are that pollutant releases to each environmental medium ajir, water and land affect each other, and that environmental strategies ijnust actively identify and address these inter- relationships by designing policies for the "whole" facility. One way to achieve a whole facility focus is to design environmental policies for similar industrial facilities. By doing so, environmental concerns that are common to the manufacturing of similar products can be addressed in a comprehensive manner. Project was initiated by the Office of Compliance within the Office of Enforcement

and Compliance Assurance OECA to provide its staff and managers with summary information for eighteen specific industrial sectors!. As other EPA offices, states, the regulated community, environmental groups, and the public became interested in this project, the scope of the original project was expanded. The ability to design comprehensive, common sense environmental protection measures for specific industries is dependent on knowledge of several inter-related topics. For the purposes of this project, the key elements chosen for inclusion are: For any given industry, each topic listed above could alone be the subject of a lengthy volume. However, in order to produce a manageable document, this project focuses on providing summary information for each topic. This format provides the reader with a synopsis of each issue, and references where more in-depth information is available. Text within each profile was researched from a variety of sources, and was usually condensed from more detailed sources pertaining to specific topics. This approach allows for a wide coverage of activities that can be further explored based upon the citations and references listed at the end of this profile. The Office of Compliance appreciates the efforts of all those that participated in this process and enabled us to develop more complete, accurate and up-to-date summaries. Many of those who reviewed this notebook are listed as contacts in Section IX and may be sources of additional information. The individuals and groups on this list do not necessarily concur with all statements within this notebook. If you have any comments on the existing notebook, or if you would like to provide additional information, please send a hard copy and computer disk to the EPA Office of Compliance, Sector Notebook Project, M St. Follow instructions in Appendix A for accessing these data systems. Adapting Notebooks to Particular Needs The scope of the existing notebooks reflect an approximation of the relative national occurrence of facility types that occur within each sector. In many instances, industries within specific geographic regions or states may have unique characteristics that are not fully captured in these profiles. For this reason, the Office of Compliance encourages state and local environmental agencies and other groups to supplement or re-package the information included in this notebook to include more specific industrial and regulatory information that may be available. Additionally, interested states may want to supplement the "Summary of Applicable Federal Statutes and Regulations" section with state and local requirements. Compliance or technical assistance providers may also want to develop the "Pollution Prevention" section in more detail. Please contact the appropriate specialist listed on the opening page of this notebook if your office is interested in assisting us in the further development of the information or policies addressed within this volume. If you are interested in assisting in the development of new notebooks for sectors not covered in the original eighteen, please contact the Office of Compliance at The type of facilities described within the document are also described in terms of their Standard Industrial Classification SIC codes. Additionally, this section contains a list of the largest companies in terms of sales. Since steel works, blast furnaces, and rolling and finishing mills account for the majority of environmental releases, employees, and value of s hipments, this profile concentrates on the three-digit SIC The environmental releases associated with foundries are similar to the steel casting! Some sections of ly on industries in the four-digit SIC , since virtually all establishments producing primary products iron and steel under SIC , also produce secondary products that fall under some of the other iron and steel SIC codes under SIC Net shipments of steel mill products for all grades including carbon, alloy, and stainless totaled For the same year, the American Iron and Steel Institute estimated companies operated iron and steel facilities; this estimate included any facility with one or more iron or steelmaking operation. A fully integrated facility produces steel from raw materials of coal, iron ore, and scrap. Non- integrated plants do not have all of the equipment to produce steel from coal, iron ore, and scrap on-site, instead they purchase some of their raw materials in a processed form. SIC - Steel works, blast furnaces, coke ovens, rolling and finishing mills - Steel works, blast furnaces, and rolling mills - Electrometailurgical products, except steel - Steel wiredrawing and steel nails and spikes - Cold-rolled steel sheet, strip, and bars - Steel pipe and tubes The remainder of the industries! Two Steel Industries In the past fifteen years, the U. While the integrated steel industry was contracting, a group of companies, called minimills, more than doubled their capacity in the same period and they continue to expand into new markets. Minimills use electric arc furnaces EAFs to melt scrap and other materials to make steel products, instead of using coke, iron ore, and scrap as the integrated producers do. In addition to fundamentally different production technologies, other differences between the integrated steel

mills and minimill are also significant: Additionally, minimills typically produce much less product per facility less than 1 million tons of steel per year. Lower scrap prices in the s and s created opportunities for the minimill segment of the market to grow rapidly. Initially, the EAF technology could only be used in the production of low quality long products, such as concrete reinforcing bar, but over the years minimill products have improved in quality and have overcome technological limitations to diversify their product lines. The EAF producers do face the problems of fluctuating scrap prices which are more volatile than the prices of raw materials used by integrated producers. Geographic Distribution The highest geographic concentration of mills is in the Great Lakes region, where most integrated plants are based Exhibit 1. Approximately 80 percentiof the U. The South is the next largest steel-producing region, although there are only two integrated steel plants Steel production in the western U. Traditional steelmaking regions included the Monongahela River valley near Pittsburgh and along the Mahoning River near Youngstown, Ohio, f The geographic concentration of the industry continues tp change as minimills are built anywhere electricity and scrap are available at a reasonable cost and there is a local market for a single product. In comparing the Census of Manufacture data with the data from , these changes are clear. While the number of establishments under SIC fell by 58 percent from facilities in to in , the absolute number of integrated mills has always been small, and the reduction is largely due to a drop in the number of small establishments.

Chapter 2 : Iron and steel industry in India - Wikipedia

The basic need of Indian economy today is rapid industrialization. As important industries like Railway locomotive, Ship Building, Heavy and Light Machine, Construction, etc. depend on the availability of iron and steel, iron and steel industry accelerates industrialization and is, therefore, called the backbone of all industries.

It is also one of the leading industrialized states of the country. The iron and steel industry of the state plays a very important role in its growth and development. It is one of the key industries required for industrial progress. Various important industries like the construction, power plants, heavy and light machine, automobile, etc. The mineral resources of Karnataka have helped the iron and steel industry to flourish in the state. As of , India was the largest producer of sponge iron and the third largest producer of raw steel in the state. Karnataka, with its rich resources of iron ore, is one of the pillars of the national iron and steel industry. Districts like Bellary, Chitradurga, and Chikmagalur are the nerve-centres of the iron ore deposits in the state. Key factors influencing the growth of the iron and steel industry in Karnataka The history of the iron and steel industry in the state can be traced back to the pre-independence era. It was established under the supervision of Sir M Visvesvaraya. Mysore Iron Works was the first public sector steel plant in the country. Starting with it, the iron and steel industry in Karnataka has come a long way today. There were many ups and downs along the way. But the industry continued to flourish in the state. Today the industry produces more than 15 million tonnes of steel annually. The main reasons behind the growth of the iron and steel industry in Karnataka are: Karnataka has vast resources of iron ore. It is one of the most essential raw materials needed for the iron and steel industry. Four different types of iron ore resources are found in Karnataka. They are hematite, magnetite, titaniferrous magnetite, and limonite and goethite. The iron ore reserves found in Karnataka is of high quality. High grade magnetite and haematite are widely found in the state. Karnataka boosts of importing high grade iron ore to South Korean and Japanese steel majors. Karnataka has 24 mines of iron ore under the private sector. There are 2 mining leases in the public sector. The state is also rich in other mineral deposits needed for the iron and steel industry. These include minerals like manganese, lime stone, silica, etc. They are easily available for commercial exploitation. The rapid industrialization in Karnataka is leading to the construction of buildings, rail tracts, industrial plants, bridges, etc. All these are increasing the demand for iron and steel in the state. The state houses two of the thirteen major steel plants in India. Availability of labour is a prerequisite for any industry. Karnataka has available human resource needed for working in the steel plants. Good communication and other infrastructure facilities are helping the growth of the iron and steel industry in the state. Karnataka has a wide market for iron and steel in the state. The constant implementation of various big and small industrial projects is adding to the demand for iron and steel in the state. Policies and initiatives by the state government The iron and steel industry in Karnataka is a multi-crore industry. It plays a big role in the economy of the state. There are a number of steel plants in Karnataka. They provide employment to a large number of people in the state. The industry also draws a significant amount of investment for the state. The state government has come up with various policies and initiatives to help the industry grow bigger and stronger. These policies and initiatives include the following: The government of Karnataka has plans to set up an industrial park for the iron and steel industry in the state. The government plans to attract huge investment and create around two lakh jobs through the industrial park. There is also plan to establish a township linked to the industrial park. The state government has planned a steel corridor of km length to boost the iron and steel industry in the state. This corridor is proposed to be located around the Hospet-Bellary area in the state. This area is known to be rich in iron ore. The government plans to establish a high-speed train connection, a port, and a nuclear power plant to develop the steel corridor. There are 11 major integrated steel plants that are in different stages of implementation in the state. The state government has plans to come up with a policy decision regarding the allotment of mining leases in the state. The government plans to give priority to value addition while assigning the mining leases. The Karnataka government proposes to provide infrastructure facilities needed for the growth of the iron and steel industry. The state government uses the e-auction method to sell the iron ore mined in the state. This has simplified the whole process of purchasing iron ore in the state.

Challenges faced by the iron and steel industry The iron and steel industry has covered a long journey in the state. But this journey has not been smooth altogether. Some of the main challenges faced by the iron and steel industry in Karnataka are as follows: The shortage of high quality iron ore is causing a problem for the production of iron and steel in the state. This is much lower than the demand of the iron and steel plants in the state. The demand and supply of iron ore has to be balanced for smooth growth of the industry in the state. There are several high profile iron and steel companies in the state. But not a single company has a captive mine linked to its projects. That is why the companies have to depend on merchant miners for the raw materials. Though the state has abundant iron ore resources, illegal mining activities had forced the Supreme Court to put a halt to such activities in This has impacted the growth of the industry. Even the production of a major steel plant like the JSW Steel was impacted by the ban on mining in the state. The iron and steel industry needs coal in large amounts. The rising price of coal is impacting the industry. Setting up of a new iron and steel industry requires huge capital. The lack of such capital makes it difficult to establish many steel plants in the state. Pollution control is another challenge that the industry has to handle in order to make progress in the state. Investment opportunities in the iron and steel industry in Karnataka Karnataka offers attractive investment opportunities in the iron and steel industry sector. Some of the points that highlight Karnataka as a destination for investment in the iron and steel industry are: Reduction in stamp duty and loan agreements Exclusion from entry taxes Subsidy for anchor units and interests Availability of mineral and human resources Allocation of free mineral locations for steel companies Concessions for mega projects in the iron and steel sector Financial incentives to the industry under the Karnataka Industrial Policy Availability of land for setting up of steel projects in the state The future of the iron and steel industry in Karnataka Karnataka has huge reserves of high-grade iron ore. The presence of iron ores and coal mines in the same areas is another added advantage that Karnataka possesses. Easy transportation facilities for raw materials are available within the state. The state has skilled human resources having the technical knowledge needed to work in high profile steel projects. The state government of Karnataka has an investor-friendly industrial policy. With so many advantages, the iron and steel industry is bound to flourish and reach greater heights in the future. Despite the challenges, the road ahead does look bright for the iron and steel industry in Karnataka.

Chapter 3 : Global Iron and Steel Industry

In , the United States was the world's third-largest producer of raw steel (after China and Japan), and the sixth-largest producer of pig calendrierdelascience.com industry produced 29 million metric tons of pig iron and 88 million tons of steel.

Iron and steel, although closely related, are not the same thing. Iron begins as iron ore, which is melted in a blast furnace and blown through with air. Then it is manipulated so as to limit its content of carbon and other impurities. Steel is a particular kind of iron that is approximately one percent carbon, with the carbon content spread throughout the metal evenly. Steel is harder than iron and does not rust as easily. However, for most of history steel was harder to make than iron. That is why ironmaking was by far the bigger industry in America until the late nineteenth century. The first iron works in America, called Hammersmith, began operation in in Saugus, Massachusetts, but lasted only five years. Subsequent ironmaking firms would be small operations that tended to be located close to local ore supplies, water power , and major transportation routes. Some of the most important ironmaking regions of the country in colonial America were in eastern Pennsylvania near the Delaware River, western Pennsylvania around the Allegheny and Monongahela Rivers, and the Hudson River valley in New York and New Jersey. Most of these firms remained small because of the high cost and low efficiency of available fuel to run their furnaces. When Americans switched fuels from charcoal or wood to coal in the early nineteenth century, larger operations became possible. The discovery of huge iron ore deposits in the northern Great Lakes region during the s gave a further boost to production. The Expansion of Iron Production in the Nineteenth Century The widespread adoption of puddling as a technique to make iron also contributed to growth in production. In the early days of American ironmaking, craftsmen used a method called fining to produce iron. This meant that the mixture of iron and slag expelled from a blast furnace was separated out by hammering it. Puddling involved adding iron oxide to the blast furnace charge because the chemical reaction made it easier to separate impurities from the iron. Puddlers did the separating by stirring the melted product with a long iron rod. The slag that rose was poured off the top and the iron at the bottom was shaped into balls. Puddling required many judgment calls based on experience. Therefore, it could take up to two years of training to become a skilled puddler. Many puddlers in the mid-nineteenth century were successful enough to later move into the ranks of owners. Both fining and puddling were pioneered in Great Britain and adopted by American producers in subsequent decades. As they gained more experience, American iron-masters developed their own variations of these English techniques, depending on local resources like the quality of their iron and the efficiency of their fuel. A means of automating iron production was not developed until the s. In the nineteenth century, the American iron market produced a wide variety of products. Stoves, gun parts, cannons, and machinery were among key early uses for iron. Iron also played a crucial role in the development of railroads. Once again, the English pioneered techniques for making high-quality iron rails. In fact, American railroads imported all their rails from British mills until The resulting increase in productivity made the railroad boom of the next two decades possible. That all changed with the application of the Bessemer process. Henry Bessemer was a British inventor who created a way to refine iron into steel using air alone in His machine, the Bessemer converter, blew air over molten iron from a blast furnace so as to remove impurities and create a substance of a uniform consistency. The American engineer Alexander Holley brought Bessemer technology to America in , but did not perfect the Bessemer design until he created his first plant from the ground up as opposed to adapting an existing facility. The mill, which opened in , was the model for all subsequent Bessemer facilities. His genius was to champion technological innovations like the Bessemer converter and the Jones mixer, which sped the delivery of iron from the blast furnace to the converter, in order to cut production costs and undersell his competitors. Carnegie also had a genius for picking good associates. For example, William R. His firm eventually controlled supplies of everything needed to make steel: By the s, Carnegie Steel made more steel than the entire country of Great Britain. Between the mids and the early s steel replaced iron in more and more markets that iron had once dominated, such as rails and nails. The key reason for this was increased steel production. And because the

Bessemer method required less skill than ironmaking, labor costs dropped too. As steel prices dropped dramatically, consumers increasingly chose the cheaper, harder, more durable metal. As this trend accelerated, puddlers began to find that their skills were no longer needed. Steelmakers came to depend on immigrant labor, particularly workers from southern and eastern Europe. From to , American steelmakers operated in an almost entirely union-free environment. Steel Corporation As in other industries, many steel producers joined forces at the beginning of the twentieth century. However, the effect of the great merger movement in the American steel industry is particularly noteworthy. Morgan decided to buy out Andrew Carnegie so that the latter would no longer undercut their selling price. This figure represented one sixty-seventh of the total wealth of the United States at that time. Steel controlled 72 percent of Bessemer steel production in the United States and 60 percent of the market in open hearth steel, a new steelmaking process that made steel in a furnace which achieved high heat by recycling exhaust gases. Like Carnegie Steel, the U. Steel Corporation was also vertically integrated, with substantial interests in iron ore, coal, shipping, and railroads. Although it held one of the largest monopolies in an age of monopolies, U. Steel deliberately let its market share decline over the first few decades of its existence to avoid dissolution through antitrust prosecution by the federal government. Even though the Justice Department filed suit against U. Steel in , this policy helped it survive when the Supreme Court resolved the case in Bethlehem Steel, for example, grew big during the war by selling armaments to Europe and ships to the U. Nevertheless, other firms took their cues from U. Steel for everything from product prices to wages and labor policy. Steel chairman Elbert Gary, helped spread many of U. This system dictated that all steel prices be based upon the costs of production and transportation from Pittsburgh, no matter where the steel was originally produced. This allowed producers based in Pittsburgh to compete with local producers all around the country, since these producers were unable to undersell steel made in markets that U. Although its origins are obscure, Pittsburgh Plus was firmly in place by and U. Steel championed its continued existence. Despite losing a suit by the Federal Trade Commission in , U. Steel fought to keep the Pittsburgh Plus system in place in a modified form until it lost a U. Supreme Court decision on the matter in The Steel Industry and Organized Labor Throughout the early twentieth century, steel executives were determined to prevent the return of organized labor to their industry. Managers fought off national organizing campaigns in , , and through a combination of the carrot and the stick. They used hard-nosed tactics like spies, blacklists, and the fomenting of racial strife along with softer policies like safety improvements and employee stock ownership plans. Rather than risk a costly strike at a time when production was just beginning to recover from the Depression, U. Rather than recognize the union on terms similar to those agreed to by their larger competitor, these firms started the Little Steel Strike of Despite violence, particularly the so-called Memorial Day Massacre in Chicago, the Little Steel firms won the strike relatively easily. Some of this increase was a result of production returning to full capacity after the depression, but new plants also came on line. For example, the government loaned the shipbuilder Henry J. Kaiser enough money to build the first steel mill on the West Coast so as to ensure his yards would have enough product to meet his many navy contracts. Steel used both its money and money from the federal government to expand its production capacity during the war, particularly around Pittsburgh. When the war ended, steelmakers wanted to roll back union gains that the administration of Franklin D. Roosevelt had forced the industry to accept, but the USWA had grown too big to destroy. Between and , the USWA struck five times in an effort to win higher wages and more control over workplace conditions for its members. Each of these strikes shut down the industry. The dispute lasted days and was the largest single strike in American history. The cost of these wage gains contributed to the collapse of the industry in subsequent decades. Countries like Japan and Germany first became major players in the international steel market during the s. Later on, countries like Brazil and South Korea would break into the American market to the detriment of domestic producers. This process, which used pure oxygen as the only fuel in the furnace, was much more efficient than the then-traditional open hearth method. No major American steelmaker adopted this technology until Steel, still the largest firm in the industry, did not commission its first BOF unit until Close proximity to cheaper raw materials was another advantage that foreign steel producers had over their American counterparts. The collapse of the steel industry began in the late s and has only grown worse since then. Old-line firms like Wisconsin Steel and Republic

Steel went bankrupt and ceased operations. Even survivors like U. Steel closed old plants in order to cut back capacity. The Monongahela River valley around Pittsburgh lost approximately thirty thousand jobs during the s. Many of these workers experienced significant psychological distress as they went from having high-paying jobs to joining the ranks of the long-term unemployed. Alcohol and drug abuse, depression, and suicide all increased dramatically as deindustrialization progressed.

Chapter 4 : Iron and Steel Production in Birmingham | Encyclopedia of Alabama

Iron and Steel Industry Historically, iron and steel have been the backbone of industrialization. Throughout the s world steel production remained flat: at the lowest, million metric tons in , and at the highest, million tons in

The crisis facing the U. A surge in unfairly traded imports hurts the U. Gibson and Chuck Schmitt say. Story highlights If steel industry is to survive, U. The views expressed are their own. There are a lot of reasons to take pride in American steel. But today, our steel industry is being hurt by an unprecedented surge in unfairly traded imports, with record amounts of foreign-produced steel flooding into the United States. Cheap, subsidized foreign imports are taking steel jobs away. In , almost one in three tons of steel sold in the United States was produced outside the country. The import crisis is now beginning to get the national attention it deserves. The crisis has become the topic of presidential debates, candidate interviews and stump speeches. Gibson Steel supports hundreds of thousands of American jobs. But because of these unfairly traded imports, many American steel producers have had to make difficult decisions affecting steelmaking communities. Steel companies have closed down major facilities, or reduced production at those plants, resulting in devastating layoffs and job losses for many families who have made steel for generations. At the same time, U. Read More Chuck Schmitt Many presidential candidates are realizing that global overcapacity of steel -- in part due to massive subsidization by foreign governments -- is a huge problem and a chief contributor to the crisis the American steel industry faces. The Organization for Economic Co-operation and Development estimates that there are about million metric tons of excess steel capacity globally today. As has been said by one steel company CEO in testimony before the U. The Chinese government recently set a goal to cut steel excess capacity by between about million metric tons and million metric tons over a five-year period, but it failed to specify how it proposes to achieve these reductions. Meanwhile, a representative of the Chinese steel industry recently conceded that China must reduce its government-owned steel overcapacity by around million metric tons if it is to address the problems caused by past Chinese government industrial policies, according to Reuters. And it must make these reforms now, before further damage is caused, both in China and around the world. China is not the only source of the surge in steel imports into the United States. Other major offshore suppliers of steel have seen substantial increases in their volumes of exports to the U. With the rising tide of cheap imports entering the U. We must begin this effort by ensuring that our trade laws are aggressively enforced. Congress recently passed legislation to improve enforcement at our borders to try to catch those who evade tariffs by deliberately mislabeling where the steel comes from, in addition to other clever tricks that are undermining the American steel industry. Worse still, some of our trading partners manipulate their currency to make their exports to the United States even cheaper. Domestic steel producers are already seeking some relief by filing trade cases with the Commerce Department and the International Trade Commission on all the major flat-rolled steel products, including corrosion-resistant steel, hot-rolled steel and cold-rolled steel. Congress gave the Commerce Department new tools last summer when it enacted legislation that made improvements to the trade remedy laws, and now it is critical that the department aggressively use them. Ultimately, this is a critical time for the American steel industry. For years, the steel industry has played a central and indispensable role in building this nation.

Chapter 5 : Iron & Steel Casting Market Size - Industry Outlook Report

The iron and steel industry is a basis for the development of a number of industries in the global economy: the defense industry, transportation and heavy engineering, energy and construction (including aeronautical and shipping construction).

Would it not be wise to start blast furnaces in Cleveland? Twenty years later, the primary iron and steel industry in Cleveland employed almost 3, about of these "children and youths" in 10 establishments. Because the Lake Superior ore districts were geographically isolated, without coal or major markets nearby, iron ore could not be smelted to pig or bar iron and sold at a profit. The only profitable way to exploit the ore was to transport it in bulk to distant blast furnaces on the lower Great Lakesâ€"to places like Cleveland, Chicago, and Ashtabula, OH. The opening of the Sault Ste. Marie Canal in marked the beginning of ore shipment in quantity, and the movement of this raw material is the same today as it was then: Mather was the driving force behind the Cleveland Iron Mining Co. Cleveland-Cliffs was the leading iron mining company on the Marquette Range when it was incorporated in , a position it still held a century later. Mather, together with other Cleveland industrialists at the helm of such companies as M. Ford established the Lake Erie Iron Works in Ohio City to forge axles for railroad cars and locomotives, and heavy shafts for steamboats. That year, the Railroad Iron Mill Co. Smith in partnership with others, erected a plant in the same location to reroll worn rails. Two years later, taking advantage of new transportation routes, including the Sault Ste. Following an infusion of capital from Andros B. Stone, the enterprise expanded rapidly, reorganizing as the Cleveland Rolling Mill Co. In the company installed a pair of Bessemer converters, the first such installation west of the Alleghenies and only the third successful one in the nation. Cleveland Rolling Mill became a major integrated producer of pig iron, Bessemer steel, and steel products, employing a work force of more than 8, at the height of its independent existence in the late s. Wellman to oversee construction and serve as chief engineer and superintendent of its Lakeside Works on the lakefront at Lawrence East 33rd St. Wellman installed the first commercially successful basic open-hearth furnace in the U. By , according to the annual report of the Cleveland Board of Trade, there were establishments in Cleveland devoted to the manufacture of iron and steel and their products. In addition to 11 manufacturers of iron and steel products the primary industry employing 5, workers, these figures included 30 establishments producing hardware and tools employing 2, , 4 producing sewing machines 1, , 48 producing boilers and machinery 1, , 13 foundries 1, , and 9 producing nuts, bolts, and other fasteners By the annual output of the Superior mines had risen to almost 2 million gross tons. Until ore was unloaded entirely by hand labor. Between and , portable steam engines were used to hoist tubs of ore out of the hold, but laborers still had the back-breaking job of filling the tubs by hand and wheeling the ore to the dock. It drastically reduced labor costs and unloading times, and led to larger boats especially designed to accommodate the Huletts. Signaling the growing dominance of large firms, in the Cleveland Rolling Mill Co. Two new plants established in the early 20th century would provide the foundation for the modern steel industry. Between and , Corrigan, McKinney built 2 additional furnaces and a steel works for the production of blooms, sheet bars, and billets. The problem of industrywide integration led the company to add merchant mills for the production of finished steel products in In , under the aggressive leadership of chairman TOM M. Otis, meanwhile, greatly expanded its capacity with the construction in of a new Riverside Works on the west bank of the Cuyahoga River. With the acquisition of the adjacent Cleveland Furnace Co. The American steel industry historically has had a volatile relationship with labor, adopting from the beginning a staunch antiunion stance. In the s the Cleveland Rolling Mill Co. Thanks to pent-up consumer demand, the industry enjoyed a long period of postwar prosperity. Five years later, the steel giant closed 6 plants, including its Cuyahoga Works in Cuyahoga Heights, after the United Steelworkers of America rejected concessions demanded by the company. With increased demand for its products, especially flat-rolled steel supplied to the automotive, appliance, and electrical equipment industries, LTV rebounded. The centerpiece of its modernization efforts is a direct hot-charge complex, completed in , which enables LTV to convert molten steel to a coil of hot-rolled steel in a continuous process. Exemplifying the massive changes that have swept

the industry in recent years, M. Hanna, an old-line mineral resources company whose history is rooted in iron mining, has transformed itself into a company focused on rubber and plastics. In , meanwhile, a new steel fabricating company bought the former Cuyahoga Works of U. The iron and steel industry continues to be an economic mainstay of Greater Cleveland. In , the primary metal industries in Cuyahoga County employed 14, while almost twice that number 27, were employed in the manufacture of fabricated metal products. Facts on File,

Chapter 6 : â€¢ U.S. steel industry: employment | Statistic

The Ministry of Steel is facilitating setting up of an industry driven Steel Research and Technology Mission of India (SRTMI) in association with the public and private sector steel companies to spearhead research and development activities in the iron and steel industry at an initial corpus of Rs crore (US$ 30 million).

Last Edited March 4, Iron is the primary raw material used to produce steel â€” itself an alloy of concentrated iron with a minute amount of carbon. Operator using an oxygen lance to clean out the ladle at the continuous casting facility, Stelco Hilton Works, Hamilton courtesy Stelco Hilton Works. Iron is the primary raw material used to produce steel â€” itself an alloy of concentrated iron with a minute amount of carbon. Globally, steel production drives 98 per cent of the demand for iron, while electronics and non-metallurgical uses drive the remaining 2 per cent. It occurs in certain minerals, the most important being magnetite, hematite, goethite, pyrrhotite, siderite, ilmenite and pyrite. The term "iron ore" is used when rock is sufficiently rich in iron minerals to be mined economically. Pyrite and pyrrhotite, although plentiful, are rarely used as iron ores because of the high amounts of sulphur they contain. Canadian iron ores consist mostly of hematite or magnetite, and some siderite and ilmenite. Besides oxides of iron, iron ores contain gangue â€” minerals such as quartz or fluorite not wanted in iron making. Ores containing proportions of iron of 54 per cent or more are considered high-grade, while those containing lower proportions of iron must be upgraded in order to become technically marketable as iron ore. Iron-bearing rock may be upgraded by removing gangue through concentration. This requires fine grinding of the ore, followed by separation of the iron-rich from the gangue particles e. The upgraded iron-rich material "concentrate" must be agglomerated into larger lumps prior to smelting, either by tumbling it into pellets "pelletizing" or by heating the concentrate until its particles stick together "sintering". Combined, these provinces account for virtually all of the iron ore mined in Canada. First discovered in , the Trough has been the site of iron extraction since and in recent years has garnered increasing attention from the extractive sector as demand for the resource has grown. Without steel, the world as we know it would not exist: Given the huge quantities of steel produced, it is fortunate that the material is easy to recycle. Today, every remaining steel mill in the country is owned by foreign investors and Canada is a net importer of the manufactured product. Iron and Steel Production Iron production requires iron ore, coal and stone limestone , dolomite. Steel production requires iron, steel scrap and flux "lime" â€” calcined limestone. The iron ore is smelted to produce an impure metal called "hot metal" when liquid, or "pig iron" when solid. The hot metal is refined to remove impurities and to develop the desired composition. The liquid steel is continuously cast into blooms, slabs or billets, and these semi-finished products are processed into the desired shapes by rolling or forging. Industry Components The iron and steel industry is divided into four groups: Iron and Steel Integrated Producers Iron and steel integrated producers ore-based are typically large firms that operate ore and coal mines frequently as joint ventures , as well as iron and steelmaking plants. Integrated Steel Producers Integrated steel producers depend on scrap as their source of iron. They can make the same range of semi-finished slabs, blooms and billets and finished steel products as the larger iron and steel integrated producers hot- and cold-roll strip, plate, rod, bars, shapes. Integrated steel plants are located wherever it is economically feasible to bring together large quantities of the raw materials required. The biggest steel plants in Canada have been built along the Great Lakes St. Other integrated steel plants, however, have been built in areas where abundant scrap and a ready market for finished steel exists. Steel Processors Steel processors purchase semi-finished and hot- and cold-rolled steel products from the integrated companies and custom process them for resale to fabricators wanting steel quantities too small for the integrated companies to handle economically. Scrap recycling companies are included in this group. The molten metal is ladled or poured into sand or metal moulds. The cast parts produced can be complex in shape, and often designed to meet one-of-a-kind end uses. Fabricators take the various primary steel mill products and turn them â€” cut-to-size, shape, machine, thread, punch, join, protective coat, etc. Foundries and fabricators include such companies as Baycoat Ltd. Iron Making When iron is being made ore, coke and stone are introduced through the top of the blast furnace at regular intervals. Coke is the partially graphitized solid

residue left after the volatile components of bituminous coal are removed by heating in coke ovens. As they slowly descend down the furnace shaft, these materials "burden" are heated by rising hot gases. The carbon monoxide in these gases reacts with the iron oxides in the ore to form metallic iron and carbon dioxide. The iron formed melts and, as it percolates through the coke column, dissolves carbon. By the time it reaches the hearth, it is saturated with carbon, and it also contains silicon, phosphorus, manganese and sulphur. The stone and ore form a low-melting, free-running liquid slag, which absorbs most of the sulphur entering the furnace coke is the main sulphur source. Liquid slag, composed of gangue minerals and oxide components of stone, floats on the liquid iron and is separated from the molten metal during furnace tapping. Direct Reduction Several solid-state reduction processes have been developed in which iron ore is converted to metallic iron without melting. Many of these solid-state processes use natural gas as the fuel and as the reducing agent carbon monoxide and hydrogen. During the steelmaking process, the gangue in DRI is removed; the gangue minerals contained in DRI combine with the added lime to form a fluid slag. DRI is superior to scrap in purity and uniformity of composition but these benefits come at a higher cost. Steelmaking Steel is an alloy of pure iron and carbon in which the carbon content varies from about 0. Alloy steels contain additional elements such as manganese, nickel , chromium , vanadium, molybdenum that give them greater strength and specific properties. Stainless steel, for instance, is an alloy of chromium and nickel. In addition to carbon, hot metal and pig iron may contain unwanted elements such as silicon, phosphorus and sulphur. During the steelmaking process, these elements, which make steel brittle, must be removed. In the process of steelmaking, the hot metal, along with some scrap, is fed into a refractory-lined vessel "converter". Oxygen gas is then injected into the bath of hot metal. Also, lime is added to produce a slag that dissolves sulphur and other unwanted impurities, but does not corrode the converter lining. The injected oxygen gas oxidizes the carbon dissolved in the hot metal to form carbon monoxide and generate heat. When the carbon content of the molten bath drops to the desired level, alloying elements are added, and the liquid steel is tapped into a preheated ladle. Scrap-based steel producers use electric arc furnaces. The scrap is charged into the furnace and three graphite electrodes descend through the furnace roof. As the electrodes approach the scrap, arcs form high-voltage power. Due to its higher electrical resistance and to the intense heat radiated by these arcs, the scrap quickly heats to melting temperatures. Ladle Refining The liquid steel destined for demanding applications is further refined in ladle treatment units. The remaining impurities, such as sulphur, hydrogen, nitrogen, and non-metallic inclusions, are removed. The methods used include argon stirring, powder desulphurization, and vacuum degassing. Continuous Casting Some years ago, the majority of steel was cast into ingots. Ingots are large, rectangular blocks of steel, most of which are subsequently shaped into semi-finished products â€” blooms, slabs, billets or special shapes â€” by primary rolling or forging. Today, continuous casting CC is the principal way to solidify and shape liquid steel into semi-finished products. CC eliminates the primary operations. In the CC machine, liquid steel is poured into the top of a water-cooled, oscillating copper mould, and the slab, bloom or billet is discharged continuously from the bottom. In recent years, thin slab casting has gained favour as it eliminates several production steps. Hot and Cold Rolling For the most part, slabs, blooms and billets are reduced in rolling mills to hot- and cold-rolled products such as plate, strip, rail, structural shapes, bar and wire rod. Heat Treatment Heat treatments include annealing, normalizing, quenching, and tempering. These treatments change the properties of steel by altering its crystalline microstructure. Protective Coatings When subjected to certain environments, steel corrodes. To slow the oxidation of steel rusting steel products are coated. The most common coatings include zinc , tin, aluminium , vitreous-enamel and organic coatings e. It consisted of two charcoal-fired blast furnaces, a forge with two sets of water-powered hammers and special hearths for the production of iron bar. In the late 19th century both the Marmora and the Saint-Maurice ironworks were closed; they could no longer compete with more modern ironworks in Ontario and Nova Scotia, which employed coke-fired blast furnaces. Steel products were first manufactured in Canada in the s. By the early s steelmaking centres had been established in Hamilton and Sault Ste. Marie , Ontario, and in Sydney , Nova Scotia. Iron and steel production grew slowly until the Second World War and then rapidly as the postwar economic boom created a tremendous demand for steel. The Bessemer Process, invented in England in , was the first large-scale steelmaking process. This method was followed by the

invention, a few years later, of the open-hearth process, which from about to the early s accounted for most of the steel production in the world. By the Bessemer Process was no longer in use in North America. Dofasco Inc introduced the BOP to North America in and since then the dominant open-hearth process steadily declined, and none are in use today. Canadians have made notable contributions to the advancement of the iron and steel industry. In the early s Canadian Liquid Air designed an injector that made it possible to introduce pure oxygen through the bottom of BOP vessels. This method was developed to industrial scale in Germany in The first successful continuous casting machine for steel in North America was developed by Atlas Steels, Welland , Ontario, in In , Stelco Inc introduced low slag volume blast furnace practice that decreased coke consumption by about 40 per cent, saving the world over million tonnes of coal a year. Stelco developed the Stelmor rod cooling process, and the Coilbox, a major energy-saving device used in hot-strip rolling mills. Also, it developed the short annealing cycle, another energy-saving development, universally adopted by the steel industry. And Stelco developed the Ardox spiral nail. Lasco developed a slit-rolling technique to make two bars from a single billet. Ipsco was the first company to install a spiral-weld pipe mill.

Chapter 7 : Iron and Steel Industry

The iron and steel industry is one of the largest consumers of energy; as a result, it is a source of a considerable amount of carbon emissions. To reduce carbon.

Steel production is the largest iron ore application. It is basically an iron alloy along with carbon, and other additive metals such as boron, manganese, nickel, titanium, chromium, molybdenum, and vanadium. These additive metals impart different characteristics to steel in order to make it suitable for multiple applications. Major ores include hematite, limonite, magnetite, goethite and siderite. Based on carbon content, there exists pig iron, wrought iron and cast iron. Pig iron has dominated the market in the past, and it is expected to continue to dominate the market over the forecast period Growing demand from the building and construction industry owing to rapid infrastructure initiatives undertaken by governments especially in the emerging regions is projected to aid in industry growth. Emerging economies such as Brazil, China, Russia, and India have witnessed rapid automotive demand owing to factors such as rising disposable income, rapid urbanization, and increase in population. This trend is presumed to continue over the forecast period, and thus, assist the regional market in the near future. Economic scenario in the developed regions such as North America has witnessed a revival in the recent years after the global economic meltdown. European economy is projected to witness a similar revival owing to strong steps taken by the concerned governments. Initiatives such as these are projected to complement the regional markets. Environmental concerns regarding excessive mining have resulted in several regulations being implemented to curb mining. Emerging economies such as China, which is the largest consumer of steel, has witnessed government regulations mandating steel companies to limit its production in a bid to reduce mining. Such regulatory framework is anticipated to hamper the regional as well as global market. China has witness brisk demand growth in the recent past. This growth has encouraged several industry participants to increase their production capacity in a bid to meet the demand. However, such rapid growth in production capacities has resulted in chronic overcapacity which has driven down prices. Any impact in the Chinese market cascades across the global market as China is the largest consumer and producer of steel. Global economic meltdown has resulted in decreased infrastructure spending and manufacturing initiatives. Though the economic scenario is looking positive in the near future, end-use industries are projected to take some time before reaching their pre-economic meltdown stage. Increase in awareness related to harmful mining effects has resulted in increasing iron recovery from scrap. Recovery from scrap also has the benefit of being cheaper than mining. Thus, changing consumer preferences and increasing awareness have resulted in the scrap industry witnessing brisk growth over the recent past. Fluctuating prices are projected to further aid the scrap industry owing to its economic benefits. Developing steel with superior characteristics that meet the customer specifications is another key area that is expected to promise abundant scope for rapid growth and development. Asia Pacific is estimated to witness fastest growth rate and is thus poised to dominate the global market. Economies such China, India, and other South-East Asian economies are presumed to lead the regional market. Developed regions such as North America and Europe are projected to experience a positive market outlook owing to considerable economic revival over the forecast period.

Chapter 8 : Iron and steel industry report | Deloitte CIS | Manufacturing

HarbisonWalker International (HWI) has been keeping the iron and steel industry moving for more than years. We are one of the largest suppliers of refractories to the US iron and steel industry. As the inventors of COMANCHE Â®, we revolutionized ladle refractory practices.

Chapter 9 : Iron & Steel industry

Iron and steel are key products for the global economy. Since , global steel production has grown by 75%, reaching

billion tons of steel in 1 The sector is the largest industrial emitter of CO 2 (with direct emissions of Gt in) and second largest industrial user of energy (consuming 24 EJ in).