

STEEL AND THE NATIONAL DEFENSE



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**American
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Institute**



U.S. STEEL INDUSTRY ANALYSIS:

**IMPORTANCE OF DOMESTICALLY-PRODUCED STEEL TO
OVERALL NATIONAL DEFENSE OBJECTIVES
AND
ECONOMIC AND MILITARY SECURITY**

January 2007

Introduction

This analysis presented by the U.S. steel industry addresses the importance of domestically-produced steel to our nation's overall national defense objectives and the increased need for steel to bolster our economic and military security. The President and other U.S. government leaders have recognized repeatedly the critical interdependence of steel and national security. The American steel industry and the thousands of skilled men and women who comprise its workforce produce high quality, cost-competitive steel products for military use in applications ranging from aircraft carriers and nuclear submarines to Patriot and Stinger missiles, armor plate for tanks and field artillery pieces, as well as every major military aircraft in production today. These critical applications require consistent, high quality on-shore supply sources.

While leading-edge defense applications represent only a small portion of overall domestic sales of steel products, defense-related materials are produced on the same equipment, using some of the same technology, and are developed by the same engineers who support the larger commercial businesses of steel companies in the U.S. Thus, the companies are not typical defense contractors who derive the majority of their sales and profits from their defense business. It is the overall financial health of U.S. steel producers, and not simply the profitability of their defense business, that is essential to their ability to be reliable defense suppliers.

The domestic steel industry also believes that, over an extended period of time, the United States could lose much of its steel-related manufacturing base if U.S. steel consumers continue to move production offshore due to market-distorting foreign government incentives and due to unsound economic policies at home. If we continue to lose our manufacturing base due to market-distorting foreign competition or U.S. economic policies that are hostile to domestic investment and U.S.-based manufacturing, it could become impossible to produce here; the U.S. military would lose its principal source of strategic metals; and we as a nation would become dangerously dependent upon unreliable foreign sources of supply.

The U.S. steel industry, consisting of all carbon and alloy steel producers and specialty metal producers, employs more than 160,000 highly skilled workers who produce over \$60 billion of high quality steel and high-technology specialty alloy products annually. The industry includes state-of-the-art, large and small electric arc furnace producers (or "mini mills") that make steel from recycled scrap, and highly efficient large "integrated" steel producers who make steel from virgin materials and recycled steel.

Steel is produced in many forms, including flat-rolled and long products, carbon pipe and tube products, wire and other fabricated products. Carbon and alloy steel is used in all major end-use markets, including construction, automotive, machinery, appliance and containers. Specialty steels are high technology, high value materials, produced by small and medium-sized companies. These specialty metals are used in extreme environments that demand exceptional hardness, toughness, strength and resistance to heat, corrosion and abrasion, such as in the aerospace and chemical processing industries. All segments of the domestic steel industry contribute directly or indirectly to the defense industrial base.

Criticality of the Steel Industry to the National Defense and the Defense Infrastructure

The U.S. carbon/alloy and specialty steel industries are vital partners to American defense contractors and to the DOD. Domestic and specialty metals are found in virtually every military platform. Whether it is missiles, jet aircraft, submarines, helicopters, Humvees® or munitions, American-made steels and specialty metals are crucial components of U.S. military strength. A few examples follow:

1. The Joint Strike fighter F135 engine, the gears, bearings, and the body itself, will use high performance specialty steels and superalloys produced by U.S. specialty steel companies.
2. Land based vehicles such as the Bradley Fighting Vehicle, Abrams Tank, and the family of Light Armored Vehicles use significant tonnage of steel plate per vehicle.
3. Steel plate is used in the bodies and propulsion systems of the naval fleet.
4. The control cables on virtually all military aircraft, including fighter jets and military transport planes, are produced from steel wire rope.

Numerous additional examples illustrating how steel and specialty metals directly support the U.S. defense industrial base are provided in Appendices 1 and 2. These materials are an integral part of many diversified military applications and, as such, are in a continuing state of technological development.

Steel's importance to the military must also be looked at in a broader context to include both direct and indirect steel shipments to the military infrastructure that are needed to support our defense efforts, both at home and overseas -- e.g., all of the steel that goes into the rails, rail cars, ground vehicles, tanks, ships, military barracks, fences and bases, which are not classified as shipments to ordinance, aircraft, shipbuilding or other military uses.

The September 11 attacks on the United States made it clear that (1) steel will be needed to "harden" existing U.S. infrastructure and installations and (2) a strong and viable domestic steel industry will be needed to provide immediate steel deliveries when and where required. Consider the potential difficulties the U.S. would face in defending, maintaining and rebuilding infrastructure in an environment where our nation is largely dependent upon foreign steel. By

becoming even more dangerously dependent upon offshore sources of steel, the United States would experience sharply reduced security preparedness in the face of:

- Highly variable, and certainly higher, costs;
- Uncertain supply, impacted by unsettled foreign economies and politics;
- Quality, design and performance problems;
- Inventory problems, long lead times and extended construction schedules.

In Appendix 3 of this paper, we illustrate how the U.S. depends upon a healthy American steel industry to meet the growing U.S. demands for steel-intensive infrastructure. Engineers and contractors on sophisticated infrastructure projects require an uninterrupted supply of quality steel that they can depend upon to meet the performance characteristics of a project's design, delivered on time, and at a competitive cost. U.S. national economic security requires a strong and viable domestic steel industry to meet all of these criteria on a consistent basis.

Major Economic Policy Considerations Flowing from the Criticality of Steel to U.S. National Security

Economic Policies that Encourage Continued Investment in the United States

If the U.S. is to maintain its strategic capability to produce steel and other strategic metals critical to the national defense, it must pursue economic policies that encourage continued investment in the United States in both manufacturing and technology. These policies must be based on the following assumptions:

1. U.S. multinational companies will continue to invest here if the "investment" playing field is relatively level because investing in the United States will be a viable, reasonably low-cost option with considerably less business risk;
2. It is not necessary or even desirable to stop investment overseas by multinational companies. It is only necessary to create an environment that encourages significant, ongoing investment here; and
3. If investment continues to occur in the United States at a reasonable rate, the U.S. will maintain its manufacturing base and the competitive advantage that it currently enjoys in steel production.

There are numerous areas where we can and should ensure that domestic government policies facilitate, rather than hinder, the most efficient cost structures in the U.S. For example, we should ensure that cost factors related to energy, environmental regulations, other regulatory requirements and post-retirement benefits are not disproportionately high for manufacturers of steel and specialty metals in the United States. In this regard, effective U.S. economic policies

would help ensure that we have a “level cost” playing field. Such policies should include initiatives that would:

- Significantly lower energy costs for domestic manufacturers;
- Demand that the environmental control systems in foreign countries increase to levels comparable to those used by U.S. manufacturers;
- Reduce non-value added regulatory costs; and
- Remedy the competitive disadvantage suffered by domestic manufacturers that provide pre- and post-retirement employee benefits.

In addition, corporate income taxes are higher in the U.S. compared to other countries, particularly with regard to their effect on investment decisions in manufacturing. Many other economies use value-added tax (VAT) systems to encourage/subsidize their exports.

Keeping Research and Development at Home

Another critical area that would help ensure a strong domestic steel industry and one capable of meeting all of the new and growing challenges in the spheres of national defense and homeland security is to have a healthy and viable R&D effort at home. In this regard, there are important joint industry/Department of Defense (DOD) R&D initiatives that reflect recognition of the continuing importance of these materials to the national defense.

In conjunction with the DOD, for example, numerous steel companies in the U.S. regularly participate in joint R&D activities that have led to many breakthroughs in metals technology for both military and commercial applications. In the carbon and alloy steel segment, U.S.-based steel and automotive companies, along with the University of Louisville and the U.S. Army, collaborated on Project IMPACT -- the Improved Materials and Powertrain Architecture for 21st Century Trucks -- to design, through a combination of advanced material technology and forging technology, the next generation tactical vehicle. The IMPACT designs make optimum use of new-age steels to create lighter tactical vehicles, while retaining performance, cost and safety.

Another example of a successful joint industry/DOD R&D effort is the Materials Affordability Initiative, a collaboration among the defense industry, specialty metals industry and DOD, that has resulted in reduced manufacturing process costs and has developed specific solutions to military applications ranging from the Joint Strike Fighter to the F-22 and F-18 E/F fighters.

A third example is the Specialty Metals Processing Consortium (SMPC) which, in conjunction with Sandia Laboratories, is directed toward improving the quality of ingots with the two-fold aim of enhancing the competitiveness of U. S. industry and maintaining high quality suppliers to the DOE Nuclear Weapons Complex. The SMPC research deals with the foundation materials in high performance hardware, such as gas turbine aircraft engines.

These programs reflect the understanding that the research and development, which is critical to these high technology military applications, is inextricably linked to the production and

processing capabilities of the industry. It is important to note that no distinct line exists separating critical defense-related technologies from important processing technology related to the manufacture of these same specialty metals for commercial applications. If commercial production moves offshore, so too does the ability of the industry to develop the specialty steels and other metals that are critical to the defense industrial base.

Free Trade Policies

Companies make investment decisions based on the expected rate of return on their investments relative to their cost of capital. This factor, however, is considerably different in other parts of the world: each year the field seems to tilt further in favor of investment outside the United States, and there is a need for U.S. government action aimed at leveling the playing field in response to foreign government interventions that are antithetical to free trade.

The list of incentives to invest overseas is long and continues to increase. It includes favorable tax treatment, lower operating costs due to foreign government intervention, outright subsidies (including currency manipulation) and inconsistent application of the principles of free and fair trade, which end up favoring foreign investment. Foreign market access is another reason to invest overseas, but foreign governments often manipulate this access. It is becoming increasingly linked to a rapid transfer of “best available” technology from the U.S. to foreign countries.

Trade is not always “free and fair.” Many countries are not respecting the rules of free trade, including those established by the World Trade Organization (WTO). As recent history has shown, U.S. manufacturers need to counter inappropriate foreign government interventions and anti-free trade foreign competition. Such competition may take several forms, including massive government subsidies, currency manipulation and dumping. The U.S., while encouraging the reduction of tariffs in the pursuit of free trade, must demand the enforcement of free trade principles by our trading partners as stipulated in WTO agreements. To do otherwise would be tilting the table in favor of foreign investment rather than encouraging investment here.

Domestic Sourcing Restriction on Specialty Metals

An important part of a sound policy is the Domestic Sourcing Restriction on Specialty Metals, which requires the Department of Defense to utilize domestically-melted specialty metals in the production of virtually all weapons systems and military aircraft. Originally included in the Berry Amendment, the domestic source requirement for specialty metals reflects the continued recognition of the importance of the specialty metals industry to national defense and the need to help insure the industry’s long-term survival. Virtually all alloy and specialty steels are covered by this provision. The ongoing importance of this provision to national defense has been confirmed virtually every year during debate in Congress on the Berry Amendment, and most recently in 2006, when Congress separated the specialty metals requirement from the Berry Amendment, and enacted a new provision entitled “Protection of Strategic Materials Critical for National Security.” The new provision not only underscored the longstanding principle embodied in the Berry Amendment with respect to the need to preserve the defense industrial base, it specifically underscored the importance of that principle as it applies to specialty metals.

Major Threats

The ability of the domestic steel industry and its workforce to meet the needs of the military can also be affected by developments taking place overseas. These developments can distort the commercial market place in ways that can impact the financial viability of U.S. steel producers. As previously noted, the steel industry's ability to meet the nation's defense needs turns largely on the industry's ability to remain competitive in the commercial market, while simultaneously maintaining a manufacturing presence in the U.S. The growth of China as a competitor, and the continued structural problems caused by government subsidization, are two factors that jeopardize that presence.

China

Any discussion regarding the importance of steel to national security must take into account the growing impact of China on the U.S. steel industry. China is unquestionably the most important factor influencing the global steel industry. The growth in China's steel sector has been unprecedented. Its appetite for raw materials has had an effect on the cost structure of virtually every steel producing nation, including the U.S. Most importantly, China's shift in 2005 to a position of net steel exporter and its continued plans to increase productive capacity pose a major threat to the viability of a U.S. domestic steel industry that only recently has seen its markets recover from the post-9/11 recession.

The facts regarding the Chinese steel sector are straightforward and indisputable.

- By the end of 2006, China was producing steel products at the rate of 500 million metric tons per year – far more than the next three largest world steel producers combined.
- China became a net steel exporter in 2005 for the first time and, by the end of 2006, it had become a major net steel-exporting nation -- with net steel exports in some months approaching a 40 million metric ton annualized rate and with total steel exports to the world approaching a 60 million ton annual rate.
- In addition, over the last 6 months of 2006, China – a non-market economy -- was the leading foreign supplier of steel to the U.S. market, and its steel exports to the United States in 2006 are expected to approach or exceed 5 million net tons.
- China's intense demand for raw materials, including scrap, has altered the cost structure of steel production world wide, including in the United States. China has also used government money to purchase equity interests in offshore companies that can supply critical raw materials.
- China's government remains intimately involved in its steel industry -- providing significant subsidies in the form of favorable tax treatment, export credit support, R&D support and direct funding of new projects.

- China is already in a steel oversupply situation, and its announced capacity expansions in the steel sector between 2005 and 2009 are estimated to exceed 200 million tons. The level of these expansions far exceeds Chinese domestic demand and ensures the country's continued growth as a major net steel exporter.

The growth of China's steel sector has been heavily influenced by government intervention. China has: manipulated its currency; provided significant incentives for foreign investment; and, in many instances, tied investment incentives to the transfer to China of the "best available" steel producing technology. Many of these technologies are critical to the development of leading edge defense applications. As production moves, so too does the research and development that is tied directly to that production.

Moreover, as China continues to expand its production and its productive capacity – far in excess of its domestic needs – it is certain to avail itself of opportunities to gain market share abroad. China's ability to gain that market share is enhanced by: a currency that is undervalued by as much as 40%; a cost structure that, in many cases, does not reflect enforcement of comprehensive environmental, health and safety regulations; and an economic system that remains government-directed.

Given the importance of steel to U.S. national security, it is vital that America does not become dangerously dependent on offshore sources of supply. Yet, the growth of the Chinese steel sector gives rise to such concerns. U.S. economic policy toward China, and in particular towards its steel sector, must be considered in the context of our own domestic steel industry and the national security consequences of allowing the U.S. steel industry to become the victim of a foreign government-directed industrial policy that has already targeted the U.S. market from the standpoint of access to raw materials, technology and greater market share.

Subsidization

According to the OECD, global capacity in the steel industry rose to approximately 1.3 billion metric tons in 2005. While some of this capacity growth no doubt reflected growth in world demand and market-based funding, a sizable share of this added capacity can be attributed to government support and other types of aid. This additional capacity would not exist in normal market conditions and will inevitably contribute to excess production and market-distorting international competition – leading to trade remedy responses. It is, therefore, incumbent upon governments to exercise restraint and refrain from subsidizing the growth of capacity. The capacity spawned by government intervention can become virtually impossible to reverse. Markets, not governments, must determine whether and where capacity is added.

The domestic steel industry continues to advocate a steel subsidies agreement that prohibits all subsidies specific to the steel sector. The possible exception would be the carefully circumscribed assistance linked to permanent capacity closure, such as assistance to facilitate worker adjustment and/or to cover other social and environmental costs incidental to permanent capacity closure.

Foreign government intervention in the form of export restrictions in raw materials markets is another example of the type of structural problem facing the steel industry today. There has been an increase in the number and variety of measures taken by foreign governments to restrict exports in key steelmaking inputs, such as ferrous scrap, coke, iron ore and pig iron, to ensure domestic supply at artificially depressed prices for their steel producers. Such measures, which contribute to supply constraints and price increases in global raw materials markets, encourage over-consumption in markets where prices for these commodities are kept artificially low -- thereby supporting inefficient steel producers and damaging otherwise efficient steel producers in other countries.

The message is a simple one: Many of the problems related to inappropriate foreign government interventions that have plagued the world steel industry for decades remain unsolved today. In certain cases, they may have become even worse. Continued foreign government interventions in the marketplace put the stability of the domestic steel sector in serious jeopardy and portend potentially escalating trade frictions.

Conclusions

- ❑ *A strong and viable domestic steel industry is critical to America's national defense, national economic security and homeland security. Virtually every military platform is dependent on U.S.- produced steels and specialty metals.*
- ❑ *The U.S. steel industry's ability to supply our defense establishment will depend on the steel industry's continued ability to compete in its commercial markets and maintain a domestic manufacturing presence.*
- ❑ *Announced global steel capacity increases in China, India and other countries are enormous; they are far in excess of projected world steel demand growth; and much of this announced growth in foreign steel capacity is attributable to foreign government support and other types of aid. The U.S. government must call upon other governments to exercise restraint and refrain from subsidizing the growth of capacity that will jeopardize our commercial markets -- and thereby undermine the industry's ability to supply the smaller defense market. The U.S. government must also ensure that the trade policies of foreign competitors are consistent with international rules -- thereby permitting domestic producers to compete on the basis of genuine comparative advantage.*
- ❑ *The U.S. government must adopt policies that encourage continued investment in domestic manufacturing. Otherwise, the research and development that is critical to the development of strategic metals will follow our production capabilities offshore. This would seriously compromise military preparedness and force the U.S. military to become more dependent upon foreign sources of supply.*
- ❑ *The Chinese government's support of its steel industry provides an artificial advantage in international competition. If left unchallenged, this support will result in the transfer of significant U.S. manufacturing capability to China.*

- *Steel the material -- and a strong and viable U.S. steel industry -- remain more essential than ever to our nation's (1) energy security infrastructure; (2) transportation security infrastructure; (3) health and public safety; and (4) commercial, industrial and institutional buildings.*

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APPENDIX 1

U.S. Domestic Steel Shipments for Application in Defense and Weapons Systems, 2002-2006

Steel Product Description	Application/Project/Program	Additional Comments/Information
Cold Finished Steel Bars	Hydra 70 missile & Zuni nozzle body	
Cold Finished Steel Bars	Medium caliber ammunition	
Hot Rolled Carbon Bands	Shell casings	Defense priority rating DO-A5
Hot Rolled Carbon Bars	155mm M107 projectile	High volume ordnance program
Hot Rolled Carbon Bars	120mm mortar	
Hot Rolled Round Bar, SAE 1030, EFM	25mm cartridge cases	
Hot Rolled Round Bar, SAE 1144, EFM	Munitions - live	
Hot Rolled Round Bar, SAE 1215, EFM	Munitions - practice	
Hot Rolled Round Bar, SAE 5160H, EFM	Bradley track pins	
Hot Rolled Round Bar, SAE 8650H, EFM	Bradley track pins	
Plates-Carbon, HSLA and 4140 Alloy, 3/8-3"X72-120"X120-1,000"	Unknown - Shipped through SSCs	
Plates	Stryker Vehicle	
Plates - Carbon, HSLA, Military Alloy	Naval Shipbuilding and Repair	
Plates	M1 Tanks, Bradley Fighting Vehicles	refurbishment, rebuilding, upgrading
Plates	Future Combat System (FCS) Vehicles	weight reduction program
Plates	Long Term Armoring Strategy (LTAS) Trucks	weight reduction program
Special Bar Quality - Grade 8650HD 1 5/16" Rounds	Tank track pins	
Steel wire	Tow missiles	

AISI/SMA February 2006 Survey of Member Companies

APPENDIX 2

SUMMARY OF SSINA DEFENSE-RELATED BUSINESS

Type	Application	Specialty Metals Classification
Missiles	Guidance	Magnetic/Electronic
	Motors	Magnetic/Electronic
	Locking Pins	Stainless Steel
	Engine	High Temperature Alloy
	Control Fins	Magnetic/Electronic
	Fuel Cell	Stainless Steel
	Solenoid Switch	Stainless Steel
	Wave Tube Assembly	Magnetic/Electronic
	Air to Air Missile	High Strength Alloy
	Thrust Nozzle	Titanium Alloy
	Gas Bottle	Stainless Steel
	Cut Core Transformers	Magnetic/Electronic
	Structurals	Stainless Steel
	Steering Vanes	High Strength Tungsten
	Missile Casings	High Strength Alloy Steel
	Gas Generator Reducer	Niobium Alloy
Missile Components	Alloy Steel	
Aircraft Missile Bearings	Stainless Steel	
Aircraft	Magnetic Shield	Magnetic/Electronic
	Guidance	Magnetic/Electronic
	Generators	Magnetic/Electronic

Type	Application	Specialty Metals Classification
	Structurals	Stainless Steel
	Blades	High Temperature Alloy
	Rings	High Temperature Alloy
	Shafts	High Strength Alloy Steel
	Disks	High Temperature Alloy
	Engine Blade	Magnetic/Electronic
	Engine Mounts	High Strength Alloy Steel
	Wing Controls/Navigation	High Temperature Alloy
	Pylon Assembly	Stainless Steel
	Gear Assembly	High Strength Alloy Steel
	Jet Engine Case	High Temperature Alloy
	Engine Drive Shaft	High Temperature Alloy
	Landing Gear	High Strength Alloy Steel
	Lift Fan Gear	Alloy Steel
	Engine Components and Fasteners	High Temperature Alloy Steel
	Engine Manifold	Stainless Steel
	Engine Power Unit	Stainless Steel
	Generator Laminations	Magnetic/Electronic
	APU's, Generators	Magnetic/Electronic
	Bolts	Alloy Steel
	Blind Rivets	Stainless Steel
	Rivets	Corrosion Resistant Alloy
	Rivets - Aircraft Brake Shoes	Stainless Steel
	Airframe/Structural/Gears	Alloy Steel
	Landing Gear	Stainless Steel
	Engine and Transmission Bearings	High Temperature Bearing Steel
	Tail Hooks	High Strength Alloy Steel

Type	Application	Specialty Metals Classification
	Flap Actuators	High Strength Alloy Steel
	Rocket Engine Castings	Alloy Steel
	Gas Turbine Engines	Nickel/Cobalt High Strength Alloy
	High Pressure Hydraulics	Titanium Alloy Tubing
	Jet Engine Tail Feathers	Niobium Alloy
	Rocket Nozzle Thrust Skirt Extension	Niobium Alloy
	Vectoring Nozzle	Vanadium Alloy
	Hot Gas System	Tantalum Alloy
	Single Crystal Turbine Blades	High Temperature Alloy
	Hypersonic Scramjet Engine	Niobium Alloy
	Gun Barrels	Alloy Steel
	Catapult Rails	Stainless Steel
	Honeycomb Applications	Titanium Alloy
	Aircraft Fasteners	High Temperature Nickel Alloy
	Aircraft Structural	High Strength Alloy Steel
	Aircraft Components	Alloy Steel
Helicopters	Main Gear	Alloy Steel
	Engines	High Temperature Alloy
	Rotor Housing	Stainless Steel
	Rotor Gear	Alloy Steel
	Main Rotor	Alloy Steel
	Engine Compressor	High Temperature Alloy
	Blade Stabilizer	Stainless Steel
	Transmission Gears	Chromium-Nickel-Steel
	Rotor Shafts	Low Alloy Nickel Steel
	Rotor Flanges	Low Alloy Nickel Steel

Type	Application	Specialty Metals Classification
	Rotor Flanges	Stainless Steel
	Engine and Transmission Bearings	High Temperature Bearing Steel
M-1 Tank	Engine Cover	Stainless Steel
	Engine Blade	High Temperature Alloy
	Torsion Bars	High Strength Alloy Steel
Bradley	Gun Turret	High Strength Alloy Steel
	Torsion Bars	High Strength Alloy Steel
Humvee	Door struts	Stainless Steel
	Armor	Titanium Alloy
Stryker	Light Weight Road Wheels	Titanium Alloy
Submarines	Piping Systems	Stainless & Hi-Temp.
	Launcher Tube	Stainless Steel
	Propulsion Shaft Magnetic	Magnetic/Electronic
	Propulsion	Nickel/ Titanium Alloy
	Power Generation	Nickel/ Titanium Alloy
	Weapons support	Nickel/ Titanium Alloy
	Reactor Core	Magnetic/Electronic
	Fasteners	High Strength Superalloy
Munitions	Fuse Devices	Stainless Steel
	Fuses	High Strength Alloy Steel
	Bunker Buster Bombs	High Strength Alloy Steel

Type	Application	Specialty Metals Classification
Artillery	Cannon Barrels	High Strength Alloy Steel
Space Shuttle	Engine Ring	High Temperature Alloy
	Resistor	Magnetic/Electronic
	Booster Rocket Skin	High Strength Alloy Steel
Marine/Navy	Rivets	Corrosion Resistant Alloy
	Nuclear Systems	Stainless Steel, Zirconium Alloy
	Nuclear Fasteners	Alloy Steel
	Turbines	Stainless Steel
	Shipboard Water Filtration	Titanium Alloy
	Torpedo Launch Systems	Titanium Alloy
	Shafts	Stainless Steel
Other	Bolts	Alloy Steel
	Nuclear Weapons Components	Magnetic/Electronic
	Reactor Core	Magnetic/Electronic
	Radar Aegis System	Magnetic/Electronic
	Night Goggles Glass to Metal Seal	Magnetic/Electronic
	Missile Castings	High Strength Alloy Steel
	Honeycomb Applications	Titanium Alloy

APPENDIX 3

A Strong U.S. Steel Industry:
Critical to Protecting U.S. Infrastructure,
Homeland Security and Economic Security

*"Steel is an important jobs issue; it is also an important national security issue. I am here to trumpet one of the great values of America. That's the enterprise of the American worker, the hardworking American citizens who make this economy go. And those are the steelworkers of America. I appreciate what you do for our country."
President George W. Bush, August 26, 2001*

The President and many other U.S. government leaders recognize that steel and national security go hand in hand. The North American Security and Prosperity Partnership (SPP), in the first Ministerial "Report to Leaders" (June 2005), identifies steel as a "strategic" industry. Given the tragic events of September 11, 2001 and the subsequent global war on terror, the importance of a strong and viable American steel industry to U.S. national infrastructure, homeland security and economic security cannot be overstated.

It is vital to U.S. national economic security and to our homeland security that America does not become dangerously dependent on offshore sources of supply for:

- ❑ The steel that goes into our energy infrastructure such as petroleum refineries, oil and gas pipelines, storage tanks, electricity power generating plants, electric power transmission towers and utility distribution poles;
- ❑ The steel that goes into our transportation security infrastructure such as highways, bridges, railroads, mass transit systems, airports, seaports and navigation systems;
- ❑ The steel that goes into our health and public safety infrastructure such as dams and reservoirs, waste and sewage treatment facilities, the public water supply system and, increasingly, residential construction;
- ❑ The steel that goes into our commercial, industrial and institutional complexes such as manufacturing plants, schools, commercial buildings, chemical processing plants, hospitals, retail stores, hotels, houses of worship and government buildings.

In the above context, this paper provides a summary and enhancement of a December 2001 report prepared by America's steel-producing community, entitled "A Strong U.S. Steel Industry: Critical to National Defense and Economic Security." It is submitted here in

connection with the revised draft National Infrastructure Protection Plan (NIPP). This paper covers: the role played by steel in all its forms in homeland security and economic security; the nation's increased need for steel to bolster our homeland security and economic security; and the role that domestically produced steel must play to meet our overall security objectives.

I. The U.S. Steel Industry

The steel industry in the United States employs about 160,000 skilled, efficient workers who make over \$60 billion worth of high quality carbon, alloy and specialty steel products annually, using state-of-the-art equipment and technology to produce flat and long products. Independent producers make pipe and tube products, wire and other fabricated steel products. In addition to the many direct applications of steel in individual weapons systems, steel is critical to the nation's infrastructure.

As described in an April 2005 report entitled "*The Transformation of the North American Steel Industry: Drivers, Prospects and Vulnerabilities*" (by Professor Timothy J. Considine of Pennsylvania State University), a restructured and globally competitive "New American steel industry" today plays a key strategic role in developing high quality, more durable manufactured goods and stronger, longer-lasting infrastructure.

As the *Cuomo Commission on Trade and Competitiveness* stated in its 1998 report, "industries are interdependent and a broad base of industrial activity is necessary for a healthy economy." The U.S. steel industry is an important source for employment and tax revenues for local and regional economies. In the United States, for every one job in the steel industry, seven additional jobs are created in other economic sectors, such as raw materials, transportation, computers and related technical services. These inter-relationships demonstrate that the steel industry maintains a key role in economic development. In particular, steel remains integral to the manufacturing sector. A strong domestic steel industry is vital to ensuring a sound manufacturing base.

In 2005, the world consumed more than 1 billion tons of steel. This extraordinarily wide use of steel reflects its critical role in nearly all aspects of manufacturing. A financially strong, technologically-advanced, and environmentally-sustainable steel industry in the United States is essential to serving the material -- and homeland security -- needs of American society in the 21st century. Besides the direct environmental benefits from improving the energy and material efficiency of U.S. manufacturing, higher quality steels generate a wide array of other benefits throughout our society. New steels and steel applications are providing more durable and hazard-resistant structures. Light weight, high strength steels -- which are gaining increasing acceptance in automotive applications -- are achieving more fuel-efficient vehicles while improving passenger

safety. Likewise, new armor plated and alloyed steels can play an increasingly important role in serving our nation's growing homeland security needs.

II. Importance of U.S. Steel Industry to U.S. Infrastructure, Homeland Security and Economic Security

In the wake of September 11, we are justifiably concerned about the security of the physical underpinnings of our society, especially its essential infrastructure. Virtually all elements of this infrastructure -- energy, transportation, health, public safety and buildings -- are dependent upon steel for their construction and security. The importance of a strong and viable domestic steel industry to U.S. national economic security and to our homeland security is clear.

The September 11 attacks on the United States illustrate that (1) steel will be needed to "harden" existing U.S. infrastructure and installations and (2) a strong and viable domestic steel industry will be needed to provide immediate steel deliveries when and where required. We need only consider the potential difficulties that the U.S. would face in defending, maintaining and rebuilding vital infrastructure in an environment where our nation is largely dependent upon offshore sources for steel. If the U.S. were to become even more dangerously dependent upon offshore sources of steel, we would experience sharply reduced security preparedness in the face of:

- ❑ Highly variable, and certainly higher, costs;
- ❑ Uncertain supply, impacted by unsettled foreign economies;
- ❑ Quality, design and performance problems;
- ❑ Inventory problems, long lead times and extended construction schedules.

In this submission, we will examine U.S. infrastructure, segment by segment, all of which are highly steel-intensive. We will cite specific examples of our infrastructure need, the importance of steel as a material to this need and the importance of a strong and viable domestic steel industry to meet this need.

Even prior to September 11, the American Society of Civil Engineers reported that \$1.3 trillion would be needed through 2005 alone for major infrastructure improvements in the United States. The situation has likely worsened since publication of the figures below. According to authoritative government and consuming industry studies:

- ❑ 25 percent of U.S. bridges are currently either structural deficient or obsolete, so roughly 150,000 of our nation's bridges will need to be modernized and rebuilt;

- ❑ 27 percent of America's highways are judged to be poor-to-mediocre, so more than a quarter of the U.S. highway system will need to be rebuilt and upgraded;
- ❑ 21 percent of U.S. rail track is rated as "less than good," so more than a fifth of our nation's railway system will need to be better maintained or rebuilt;
- ❑ 30 percent of U.S. airport runways are classified as "needing repair," so nearly a third of our nation's airport runways will require upgrading.

Our country depends upon a healthy American steel industry to meet these and other growing U.S. demands for steel-intensive infrastructure. Engineers and contractors on sophisticated infrastructure projects require an uninterrupted supply of quality steel that they can trust to meet the performance characteristics of their project's design, delivered on time and at a competitive cost. U.S. national economic security requires a strong and viable domestic steel industry to meet all these criteria on a consistent basis.

Summarized below are examples of how domestic steel is a critical component of key infrastructure sectors. Nearly every sector needs to be expanded to meet growing demand, and also requires extensive maintenance for safety and longevity. Additional details are available.

Energy Security Infrastructure

A typical refinery contains miles of specialty pipe, large sophisticated boilers and process pressure vessels, thousands of custom made valves and fittings -- all made from steel designed expressly for critical applications

Pipelines, the vehicles by which petroleum and natural gas are delivered to refineries and then on to consumers, are made from technically demanding plate steel in wide and very heavy gauges. Prompt and effective maintenance and restoration of pipelines are vital to our national energy security infrastructure and to our national economy

Electric power generation is an engine for our economy. Steel is not only present in the structures, but in the huge generators, which use large quantities of sophisticated electrical lamination steel sheet, and in the boilers, pressure vessels and pipe that is needed to produce and deliver the steam or water to the generators. Transmission towers, made entirely of steel, carry high voltage electric wires and provide support for our nation's microwave, cellular and other communications equipment. Steel utility distribution poles provide the structures by which electricity is routed to commercial and domestic customers.

Transportation Security Infrastructure

An efficient national highway system is crucial to the defense and security of our country. The Eisenhower Interstate Highway System was created and implemented with this important objective. Maintaining and improving this vital transportation link is a top national priority, and steel plays a vital role through reinforcing steels (rebar), guardrails, signage, light poles and other supporting structures. In addition, building our transportation security infrastructure with steel saves energy. Continuously reinforced concrete roadways have been shown to improve fuel efficiency in heavy vehicles by as much as 20 percent, and steel-intensive transportation infrastructure improvements are also helping to reduce commuter delays - a tangible way to decrease the billion of dollars wasted in burning excessive fuel.

Bridges are the critical links along roads, highways and rail lines. Routine maintenance and replacement are required for the normal and emergency movement of people and goods. The many thousands of bridges in the United States that are structurally obsolete are a threat to U.S. national economic security, and steel is providing a competitive alternative with the introduction of high-performance steel (HPS) plate for bridge girders - developed through a partnership between steel trade associations, the U.S. Navy and the Federal Highway Administration. More than 200 high-performance steel bridges have been opened to service in 43 states since its introduction in 1997.

U.S. railroads are an important component in the long distance movement of freight and people. Effective maintenance and repair of roadbed, railroad bridges and rolling stock is essential, and all are highly dependent upon the availability of sophisticated steels with unique specifications. In addition, and looking to the future, U.S. cities and regions have begun to explore seriously the possibility of using new "maglev" trains -- which use technologically sophisticated electrical and magnetic steels, and vast amounts of carbon steel plate for the rail beds -- as a cost effective means of moving large numbers of people quickly.

Public safety in major urban areas depends upon reliable mass transit. Steel is a significant component of mass transit rail systems -- from the stainless steel found in our subway cars, to the electrical steel used for the "hot" third rail in our subway systems to the carbon steel used for the rails themselves along the thousands of miles of track in our cities' mass transit systems.

There are over 19,000 public and private airports across the United States. Steel is an important component of airport facilities -- from the structural steel framing in terminals to the reinforcing steel in runways, to the sound barriers and runway approach lighting structures.

Port construction and maintenance are very steel-intensive, requiring large quantities of steel piling, plate, rail and structural units. In addition, support equipment, such as cranes, is steel-intensive.

Health and Public Safety

Public health and safety dictate reliable and efficient sewage, wastewater treatment and management facilities. Steel components, such as tubular goods, tanks, culverts, storm water management and storm sewers are integral to the construction and operation of these facilities.

Safe, potable water is essential for all Americans. Steel is unsurpassed as a conduit for water. Relatively thick plate steel for pipe dominates, but thinner steel plate is also in great demand. Steel tanks meet zero tolerance leakage standards, and they are safer than other materials in tornadoes, earthquakes, mudslides and extreme temperatures.

Whether for flood control, irrigation, recreation, industrial or drinking water reservoir use, dams must be protected and maintained. Steel plays a vital role in certain types of dam structures.

Approximately 90 percent of canned food is packaged in steel cans. Commonly referred to as “tin cans,” these packages are the most reliable container as it relates to tamper resistance and food safety.

In recognition of steel’s unique properties to withstand fires, hurricanes and other natural disasters, steel is also being used increasingly in residential construction (framing, roofing, etc.). While the total damage from hurricanes Katrina and Rita is still being tallied, it is clear that (1) much of the damage that occurred was due to the wrong building materials and (2) the use of steel (whether in the rebuilding and strengthening of the levies in New Orleans, or in the reconstruction of transportation infrastructure and buildings throughout the Gulf Coast region) is part of the solution. Steel is not only strong; it is also sustainable and environmentally responsible. In this regard, it is worth stressing that the U.S. steel industry has the highest recycling rate in the world.

In considering these varied uses of steel in our nation’s transportation security infrastructure, it is also important to recognize that, in an emergency situation, problems would only be compounded if we were forced to rely on long offshore lead times, e.g., for I-10 replacement spans. In addition, if segments of the domestic steel industry are diminished (e.g., due to unfair trade), injury usually follows to the downstream sectors to which U.S. steel producers normally ship (think of rod/wire, wire/wire rope, etc.). Indeed, for some major products and applications that are important to homeland security, entire domestic manufacturing sectors are involved.

Commercial, Industrial and Institutional Buildings

Buildings support vital elements of our nation's economic base. Steel is essential to the construction of commercial, industrial and institutional buildings (CIIBs). Steel construction can be faster and less expensive than other types, and high-rise structures can be built only from steel. According to John Knapton, a professor of structural engineering at Newcastle University in England, "tens of thousands of lives ... [were] saved by the structural integrity of the [World Trade Center] building. It had a lot of structure taken out, yet remained intact for more than an hour, allowing thousands to escape."

The construction industry is the largest single U.S. market for steel. Industrial, retail, education and office buildings are the largest sectors. Most of the structural, plate, sheet and reinforcing steel used in building construction must be fabricated before delivery to the construction site, then erected in place. There is no competitive steel fabrication and construction industry anywhere in the world that relies primarily on imported steel.

Turning to the public schools, more than \$112 billion is needed to upgrade many of the 88,000 K-12 aging and deteriorating public school buildings in the United States. Problems with roofs, heating, air conditioning and plumbing plague about half the schools, and some 14 million children. Our public schools will also need to accommodate 2 million additional students by 2010, causing makeshift classroom usage. Over \$73 billion is required to construct new schools for these students.

Pre-engineered building systems, which rely on steel for all their major components, are designed and fabricated in a factory environment, then assembled at the job site. These systems are ideal for many low and mid-rise applications, including offices, manufacturing, retail, warehousing, worship and education, because they are cost effective, use flexible designs and can be completed relatively quickly.

As we consider these and other contributions of steel to our nation's infrastructure, we need also to be concerned about our ability to control specifications and standards. If we do not have sufficient U.S.-based production of numerous steel and steel-intensive products involved in infrastructure applications, our country's future would be at the mercy of other countries' standards. In some cases, the problem is as simple as sizes being different. If we were to lose control of our standards, the obsolescence factor would be huge, and we would, at best, be less able to make major repairs quickly in an emergency (e.g., think of the challenge, if not outright impossibility, of trying to supply "non-commercial" quantities of fittings, sections, tubulars, etc. in an emergency).

III. Conclusions

- *A strong and viable U.S. steel industry is critical to America's infrastructure, national economic security and homeland security.*
- *U.S. steel industry sales to defense industries and joint federal government-steel industry R&D efforts are important, but they do not tell the whole story of steel's critical importance to our infrastructure and overall national security.*
- *In the wake of September 11, 2001, America's citizens and political leaders have become re-sensitized to the critical importance of growing steel-intensive infrastructure needs related to homeland security.*
- *Steel the material -- and a strong and viable U.S. steel industry -- remain more essential than ever to our nation's (1) energy security infrastructure, (2) transportation security infrastructure, (3) health and public safety and (4) commercial, industrial and institutional buildings.*

The steel industry appreciates this opportunity to provide comments to the Department of Homeland Security on the revised draft of the NIPP Base Plan.

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