Contributing through Products and Technologies

JFE provides a large number of products, technologies, and services which contribute to the environment. In addition to its in-company environmental protection program, JFE is working to develop products and services which minimize environmental impacts in society as a whole while meeting diverse customer needs.

Contributing through Steel Products and Technologies

JFE has a long history of developing steel products to meet customer requirements for higher performance, including higher strength, toughness, ductility, and corrosion resistance, elimination of toxic substances, and recycling. Applying the concept of Life Cycle Assessment (LCA), JFE is making important contributions to energy conservation and reduced environmental loads in society at every stage of product use.

In addition to ecological products R&D, JFE has strengthened its marketing and created a marketing system for ecological products. It is also actively responding to the entire range of customer needs related to ecological products, which include implementation of EMS, reduction of toxic substances, submission of environmental load data, development of judgment criteria for green procurement materials, and proposal systems.

JFE has created a Green Procurement Network to enable company-wide sharing of information on customers’ green procurement programs and studies regulatory and social trends to better serve customers with product information and direct contact. As an ultimate goal, JFE is working to establish a definitive evaluation method based on Life Cycle Assessment (LCA).

JFE’s Approach to the Automotive Product Life Cycle

Life Cycle Assessment for Steel and Engineering Products

JFE has participated in studies of LCA in the International Iron and Steel Institute (IISI) since 1995 and in the MITI (now METI) LCA Project since 1996 as part of an effort to establish reliable methodologies and collect data. Data for 12 types of steel products have been completed, and work to further expand product data and research on use of LCA data is continuing. In engineering, LCA is applied to environment-related plant as an engineering product, and independent databases have been constructed to support high-environmental performance plant design.

Terminology

@Ecological products

JFE defines ecological products as products which contribute to energy saving and/or environmental protection in society, mobilizing the full resources of the JFE Group. Examples include products and services which respond to social and customer needs for resource and energy conservation, recyclability, low waste, long life, and/or low environmental loads, with environment-friendly eco-design and eco-processes as a precondition.

Steel Ecological Products

Preventing Global Warming

High Strength Automotive Steel Sheets (HITEN)

High strength steel makes it possible to reduce part thickness without sacrificing strength. JFE’s full line of high strength automotive steel sheets (HITEN) contributes to improved fuel efficiency through body weight reduction while also improving collision safety. Galvannealed HITEN for inner and outer body panels includes virtually all grades and features excellent press formability, coating adhesion, spot weldability, and fatigue strength.

Non-oriented Electrical Steel Sheets for High Efficiency Motors

High Strength, Light Weight, High Formability Tubes for Automotive Applications

Weight reduction, which is indispensable for fuel economy, can be achieved by substituting tubes for heavier sheets and solid bars. JFE’s high strength, high formability HISTORY tube and ERW tube are products which can be formed into parts with complex shapes, contributing to weight reduction.

TMCP High Strength Steel

The trend toward larger structures in construction and shipbuilding requires high-strength, high-toughness steel plates and high-efficiency welding and other properties. TMCP (Thermo-Mechanical Control Process) high strength steel plates satisfy both of these performance requirements. JFE possesses the world’s most advanced TMCP technology (Super-OLAC online accelerated cooling). Products are used in large quantities in large-scale crude oil tankers and container ships, improving transportation efficiency, and in columns and beams in high rise structures where seismic design is applied.

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JFE was the world’s first steelmaker to provide total solutions for the auto industry from the viewpoint of the auto life cycle from design to recycling. Its tailor welded blank (TWB) business is one example. TWB is a technology for press-forming welded blank of different materials and thickness. Commercial production began in October 2001 and is contributing to auto weight reduction.

Non-oriented Electrical Steel Sheets

JFE has expanded the range of functions of non-oriented electrical steel sheets, which are used in various applications, from stator cores and rotors for motors to suspension members. These products are characterized by their excellent high-pressure formability, resistance to deformation, and high strength.

Tailor Welded Blank

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JFE Environmental Report 2003
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From design / production to recycling

Processing & evaluation technologies

Evaluation / analysis of collision deformation
Body crashworthiness analysis (strength / rigidity)
Forming/shape: Tailor welded blank

Eco-energy

D ME

High pressure oxygen for easy-care

Recycling

Waste plastic (for BF feed)

Tailor welded blank

JFE’s expanded range of functions

From design / production to recycling

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Tailor Welded Blank


door panel test produced with 1200t press at JFE

Example of application of HITEN

(Tailor welded Blank: Technology for press-forming welded blank of different materials and thicknesses, etc.)

Non-oriented Electrical Steel Sheets for High Efficiency Motors

Speed control drive systems dramatically improve motor efficiency. While pursuing low core loss in motor materials, JFE’s high efficiency non-oriented electrical steel sheets were developed with particular emphasis on reducing high frequency core loss. JFE has also led other makers in developing reactor material products which prevent or reduce power source noise, meeting the requirements of new, high frequency electrical products.

Non-oriented Electrical Steel Sheets

Electrical sheets are steel sheets in which magnetic properties are improved by silicon addition, etc., and are used in transformers and motors. Non-oriented electrical sheets are a class of electrical steel with a highly random crystallographic axis orientation.

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Life Cycle Assessment

A systematic examination of all stages of a product’s life cycle: from the extraction of raw materials, energy consumption, and environmental load evaluation, to the transportation, manufacturing, use, and recycling, to the materials used and waste generated.

Eco-energy

D ME

High pressure oxygen for easy-care

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### Grain-oriented Electrical Steel Sheets for High Efficiency Transformers

JFE produces grain-oriented electrical steel sheets with the world's highest magnetic properties, and exports more than half of these products to foreign markets. Because core loss in high efficiency grain-oriented electrical steel sheets has improved by 20-30% in the last 30 years, substantial long-term energy savings can be expected in iron cores.

### Alloy Steel Powder for Sinter-hardening

The trend toward higher strength levels in sintered mechanical parts, particularly for automotive applications, requires heat treatment after sintering. However, energy saving in heat treatment processes is also needed. JFE therefore developed an alloy steel powder which uses after sintering as a heat treatment process (sinter-hardening). Eliminating conventional heat treatment results in substantial energy savings in part manufacture.

### Grain-oriented Electrical Steel Sheets

Grain-oriented electrical steel sheets are a type of electrical steel sheet with the easy axis of magnetization in the crystallographic structure oriented in the rolling direction. Displays excellent magnetic properties in the sheet rolling direction.

### Weathering Steels

Oku-Aso Bridge constructed using weathering steel, which use rust to prevent rust to possess good corrosion resistance without painting because the steel is designed to form a protective rust film. Widely used in civil engineering and construction, and particularly in bridges, weathering steels extend the life of steel structures to 50-100 years without painting. JFE has also developed Ni-added high performance weather steels for use in environments with high airborne salt concentrations, which was impossible with conventional weathering steels, expanding the range of applications and contributing to global environmental preservation.

### Weathering Steels

Rust stabilizer preserve the good appearance of structures by preventing rust streaks on weathering steels. For environmental protection, JFE developed a new rust stabilizer which is 100% free of chrome, lead, and other heavy metals and meets a variety of requirements for formation of a dense protective rust layer, helping expand the application of environment-friendly weathering steels.

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### Sustainable Product Life Cycle

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For High Efficiency Transformers

Grain-oriented electrical steel sheets

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Building a Recycling-oriented Society

Heat-treated Rails

Using a unique heat-treatment process, JFE has dramatically improved the hardness and wear resistance of railway rails, which show improvement of approximately 60% in wear tests. The extended rail life resulting from improved wear resistance reduces energy consumption and waste accompanying rail maintenance and replacement. These heat-treated rails have been commercialized for Japanese railways and heavy axle-load railways in North America and elsewhere.

Steel-framed House

JFE’s steel-framed house offers excellent earthquake resistance, safety, and durability. With its extremely long life, this environment-friendly housing product contributes to forest preservation and protection of the global environment.

Blast Furnace Cement

Granulated BF Slag

JFE produces high quality blast furnace slag powder from water-granulated BF slag, which is a byproduct of ironmaking. Used as an admixture in cement, it displays outstanding properties including strengthening, reduced heat of hydration, and improved chemical resistance. Environmental advantages include energy and resource savings, effective use of resources, and reduction of greenhouse gases.

Chromate-free Coated Steel Sheet


Stainless Steel Sheets and Tubes for Automotive Exhaust Systems

In the form of sheets and tubes, JFE manufactures much of the ferritic stainless steel which is now used in automotive exhaust system components such as exhaust manifolds, converter cases, and mufflers. In particular, JFE manufactures a unique high oxidation resistance stainless steel, which the company itself developed, as a metal honeycomb catalyst carrier material for the catalytic converter used to remove CO and NOx from exhaust gas, and has won high marks from users for many such devices.

Martensitic Stainless Steel Tubes

Natural gas is enjoying rising demand as a countermeasure for global warming, but development of this resource requires steel tubes with high corrosion resistance in high temperature environments. Martensitic stainless steel 0CtG (oil country tubular goods) and Ineplip can be used in these environments without inhibitors (corrosion prevention agents), contributing to environmental protection.

Reducing Environmental Loads

Weathering Steels

Oku-Aso Bridge constructed using weathering steel

Steel sheet

Part for power tool

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Leak-free Sheets for Fuel Tanks

Recognizing the need to reduce leak lead use, JFE developed a 100% leak-free sheet steel as a replacement for the lead-in coated steel sheet long used in fuel tanks. Features of the Pb-free sheet include a special two-side organic film coating which gives excellent press formability, weldability, corrosion resistance, and resistance to gasoline-induced degradation.
Water-permeable Steel Sheet Pile

Water-permeable steel sheet piles are a novel type of sheet pile with pretcut water-passage holes. In reclamation and embankments they maintain water circulation between the land and water sides approaching that in nature, preserving, creating, and restoring the complex ecological systems around such structures. Placing mattocks works on the front side and gabion works, or stones on the back, produces a synergistic ecological preservation effect. This type of composite construction can already be seen in project for creation of rivers richly-endowed with nature at the Niagara River, where it has proven its effectiveness in preserving the ecosystem.

Fire Resistant Steel Products for Building Structures

JFE developed a lead-free free-cutting steel offering a combination of good machinability and cold forging properties, which had been consid- ered impossible without Pb addition. In spite of its high carbon composition, this steel has an excellent cold forging property, and at the same time, has better machinability than Pb-added free-cutting steel because a graphite, which has a lubricant effect, is used in place of lead. It has a good balance of fatigue strength after quenching and tempering, giving it a particularly out- standing combination of properties as an automotive steel material for processing by cold forging – machining – heat treatment.

Fire Resistant Steel Products

Lead-free Free-cutting Steel for Machine Structural Use

This combination of properties as an automotive steel material for processing by cold forging – machining – heat treatment.

Circulation of Steel in Japan

Each year, Japan produces approximately 100 million tons of steel, which is used in construction machinery, shipbuilding, and auto industry, and other fields. When products reach the end of their useful life, virtually all of this steel is recycled to the steel industry, including materials with long lives of 100 years or more. Recovered steel is used any number of times, demonstrating that steel is well-suited as a basic material for a recycling-oriented society. The total accumu- lation of steel in Japan is now more than 1.2 billion tons and is a resource which can be passed on to future generations.

CHS is a new thermal transportation system using waste heat in sewage. CHS is a two-phase fluid comprised of fine particles of clathrate hydrate and its aqueous solution and holds latent heat in the same temperature range (5–12°C) as water for air conditioning, but its thermal density is more than double that of cold water. As a result, the pumping flow rate can be reduced by at least half, reducing pumping power consumption by up to 80% and thermal storage tank size by 50% or more.

Preventing Global Warming

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Gas Engine Cogeneration

Since JFE delivered its first gas engine cogeneration system in 1981, it has supplied systems with outstanding reliability and durability using the WAKUKEHA gas engine, which has earned an extremely high reputation with users around the world. Because this is a high efficiency system which greatly reduces CO₂ emissions, and furthermore, burns clean gas made from natural gas, it generates no dust or SOx, while NOx is minimized using various reduction technologies.

Wind Power Generation

Wind power generation has drawn considerable attention as form of clean energy and has been intro- duced rapidly in recent years. JFE manufactures 750kW units fea- turing a variable rotor speed, direct drive transmission, synchronous gener- ator in Japan and supplies total en- gineering for wind power plants from site selection through design, manu- facture, construction, and mainte- nance, JFE is Japan’s leader in the field, with a record of orders received for 121 units, mainly of the 750kW class, and a total installed capacity of 84,000kW (end of March 2003). As a clean power producer, JFE is par- ticipating in wind power projects in Hokkaido and Mie Prefecture to en- courage wider use, and has also in- troduced a large-scale 2,000kW wind power generator from Gamesa (Spain), giving it a strong presence in the large-generator sector.