JFE Engineering†

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JFE Engineering has been established as a result of a merger between NKK and Kawasaki Steel, both are the major manufacturing companies in Japan, on April 1, 2003. Its former organization was the engineering divisions of the both companies and their subsidiaries. Our company started a new step forward to serve our customers with the best solution available based on the leading technology in the industry to assist them in the current business environment that has been in constant progress and change on a global scale.

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JFE Engineering inherited a tradition of manufacturing based on leading technologies from NKK and Kawasaki Steel. JFE Engineering sets constant improvement of its technologies as company priority and will focus research and development resource to the expansion of businesses and the promou rom as au¾ es and t

Kawasaki Steel in order to actively extend its engineering business across the world through technology exchanges and procurement.

JFE Engineering already has the world's best technology in a number of felds such as energy supply/ ngidocy ftihky distribution engineering glpd /ip pline " yst2s y d ! Oay life ë and all d

combining these technologies.

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Aiming at effcient management in response to various products and market felds, JFE Engineering is organized in business divisions and centers. Specifically, JFE Engineering consists of 5 divisions (Energy Industries Engineering Div., Environmental Industries Engineering Div., Water and Waste Water Engineering Div., Steel Engineering Div., Steel Structure Engineering Div.) and 2 centers (Solution Engineering Center, Machinery Center). JFE Engineering has also established the JFE Engineering Research Center for technology development, and the Business/Project Planning & Marketing Dept. for promotion of new businesses.

Each division and center performs as an "independent company" in conjunction with functionally dedicated subsidiaries in JFE Engineering Group. Divisions' and centers' directors are named as the "company head" to implement cross-company management strategies and maximize consolidated profts. The organization of JFE Engineering and the related JFE Engineering Group are shown in **Cfd+.**.

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not exist without energy. Consumption of natural gas is continuously rising because of stability in supply, environmentally friendliness and high conversion effciency. Efforts are being made for its application expansion and technology development for higher effciency in use. JFE Engineering supplies integrated engineering services for natural gas from upstream treatment, LNG production, receiving and storage to disbursement, transportation, and use feld. JFE Engineering supplies integrated engineering services for natural gas treatment, LNG storage and transmission and distribution pipelines, and for the use in a variety of felds. JFE will continue to contribute to clean and effcient use of natural gas. Furthermore, we will supply energy systems of next generation such as fuel cells, for more effcient energy use, energy cost reduction, and environmental preservation.

The main products of Energy Industries Engineering Div. are as follows:

(1) Pipeline Systems (Oil pipelines, Gas transmis-

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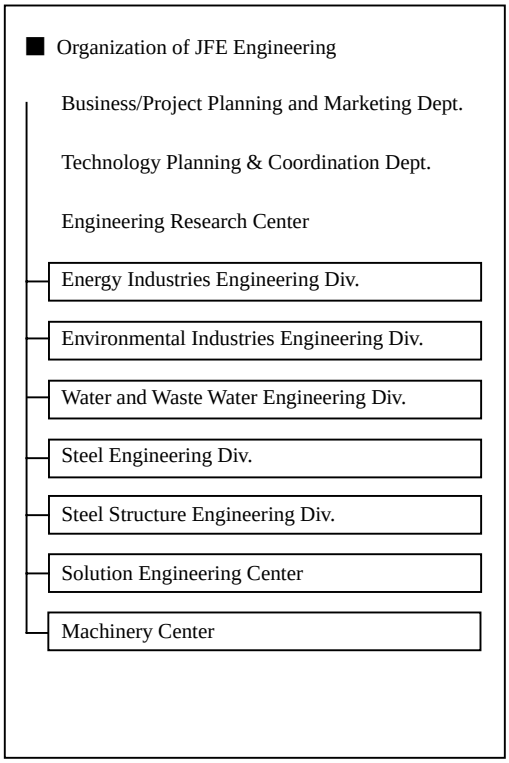

sion and distribution pipelines, Submarine pipelines, SCADA (supervisory control and data acquisition) systems, Airport fuel supply facilities, shown in **Melql .**)

(2) Storage Terminals (LNG storage facilities, LPG storage facilities, Oil and gas storage facilities, Nuclear plant related facilities, shown in **Melql /**)

(3) Process Plants (Oil and gas production facilities, Chemical plants, Gas treatment facilities, shown in **Melql 0**)

(4) Energy Solution System (On-site energy supply systems, Regional heating and cooling systems, Co-generation systems)

(5) Offshore Facilities (Offshore structures, Platforms)

(6) Geothermal Energy System (Steam generation systems for geothermal power generation)

(7) Inspection and Maintenance Services (Pipeline inspection services, IT maintenance services, Steel structure inspection and maintenance services,

(3) Sewerage Treatment (Rain water/combined sewerage treatment system, System for sewerage treatment machines, Advanced treatment facilities, Submerged propeller OD (oxdation ditch) system)
(4) Sludge Treatment (Concentrators, Digesters, Digestion gas generation system, Incineration system, Sludge recycling system, shown in **Melql 3**)
(5) Night Soil/Seepage Treatment (Sludge regeneration treatment facilities, landfll waste water treatment system)
(6) River Purifcation/Pig Waste Treatment (River purifcation systems, Compost systems, Bigadan methane fermentation system)

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This division was created by merging the Steel Engineering and Consulting Div. of NKK and Steel Plant Engineering Div. of Kawasaki Steel and serves as Steel Plant Engineering Div. for the JFE Group as a whole. Based on the world top-class steel plant technologies which the steel manufacturing divisions of NKK and Kawasaki Steel cultivated in diverse steel-related felds over many years, the organization has developed a wide range of businesses from the supply of technical know-how and licensing to the supply of complete steel manufacturing plants and operational guidance. In the future as well, it will be the policy of the Steel Engineering Div. to supply the optimum steel engineering services to clients both inside and outside of Japan, and to provide strong support for the development of clients' steel businesses by making comprehensive use of the resources of the JFE Group.

The main products of Steel Engineering Div. are as follows:

(1) Ironmaking
- Blast furnace, Sintering plant, Coke oven
- Coke dry quenching (CDQ)
- Pulverized coal injection (PCI)
- Hybrid palletized sintering process (HPS/SSW)

(2) Steelmaking
- Hot metal pretreatment—Hot metal dephosphorization, Hot metal desulfurization technology
- BOF (Combined blowing technology/Refractories, etc.)
- Continuous casting technology
—Mold electromagnetic stirring technology, etc.
- Stainless steelmaking technology

(3) Rolling
- Hot rolling mill, Pickling line
- Cold rolling mill
- Long product (shape steel) rolling mills
- Continuous annealing line (CAL)
- Continuous galvanizing line (CGL)
- Electrolytic tinplating line (ETL)
- Billet continuous rolling technology (EBROS)

(4) Control Systems
- Steel plant-related control systems

(5) Environment/Energy Saving Technology
- Exhausted-gas treatment equipment (Desulfurization, Denitrifcation)
- Waste plastic injection technology into blast furnace
- Dust collecting/dust treatment technologies
- Blast furnace top gas pressure recovery turbine (TRT)
- Environment-friendly electric arc furnace (ECOARC)
- Regenerative burner

taking advantage of the excellent properties of steel, based on a strong program of technical development.

The main products of Steel Structure Engineering Div. are as follows:

(1) Bridges and Bridge-Related Products (**Melql 4**)
- Highway bridges, Railway bridges, Pedestrian bridges, Pedestrian decks
- U-rib composite deck, Pre-beam bridge, Waveform steel plate web bridges, Others (Shield tunnel steel shell segments, Underground structures)

(2) Port and Harbor-related Products
- Quays, Wharves, Breakwaters (Hybrid caissons, Steel caissons, Jackets)
- Pontoons/connecting bridges (Hybrid pontoons, Steel pontoons)
- Bridge foundations (Steel shell caissons)
- Tunnels (Submerged tube tunnel, Shafts, Hybrid segments)
- Others (High rise steel fsh shoals, Approach lights, Airport decks)

(3) Hydraulic Gates, Penstocks, and Related Products
- Flood control gates and sluice gates (Gates for rivers and dams, Hybrid piers)
- Penstocks (For general hydro power plants, pumping-up power plants)
- Movable bridges (Balanced drawbridges, gangway)
- Others (Hybrid piers food prevention machinery, With drawal facilities treatment plants, Dam sand removal equipment)

(4) Architectural Steel Structure-Related Products
- Steel frames (inside/outside Japan), Steel towers, Steel stacks
- Steel *torii* gates, silos, beer tanks

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JFE Engineering possesses diverse technologies in the engineering felds of energy, environment, water, steel plants, and steel structures. Based on these technologies, in 2001, the company began developing a solution business which supplies clients with solutions, particularly to market-inherent problems, amid the major transition as the age of cross business feld, advanced information society, or IT age. The Center's policy is to contribute to society by aiming consis-

tently to "prov

research and development on new technologies. For core products which support the company's existing business, JFE Engineering seeks to maintain a position as "No. 1" technology by ceaseless technical innovation in close cooperation with business departments. At the same time, in order to create new growth businesses, the company carries out R&D under the keyword of "Only 1." It is important to note that Only 1 technologies are simply not those which are relatively superior to those of other companies; they must be preeminent and genuinely unique technologies. Researchers seek out proftable future markets with a global vision and, on this basis, positively develop innovative, original Only 1 technologies. **Q^_ib .** shows examples of research and development result which have contributed to the improvement of proftability by R&D with a clarifed market orientation.

In addition to hardware with these advanced technologies as its core, software technologies which supply solutions to the client will be indispensable for engineering business in the future. Therefore, JFE Engineering is putting great effort into the development of comprehensive solution-supply products for infrastructure such as urban energy supply, waste disposal and waterworks for city water and sewerage among other areas.

Energy Plant Systems Research Dept. is developing products built around innovative energy saving technologies. In particular, they include several products developed with funding from the national government: the hydrate slurry air conditioning system (**Melql .-**), which was developed independently by JFE Engineering, effcient cooling and heating technologies which utilize waste heat, and high effciency production equipment for natural gas hydrate (HGH, **Melql ..**). The company is also developing software technologies which will become the core of solution technol-

the standpoint of life cycle cost.

JFE Engineering is mindful of the fact that timely information on these developments is also important. Recent press releases on key items include the following:

(1) Start of demonstration experiments for clathrate hydrate slurry production system[1)]
(2) Development of fne air bubble fuid types high eff ciency NGH production technology[2)]
(3) Successful synthesis of tape-shaped substance from ultra-high purity CNT[3)]
(4) Development of new low cost hydrogen production technology using waste plastic and water vapor[4)]
(5) Development of methane fermentation technology utilizing co-generation waste heat[5)]

In all cases, the results of this new product- and new business-oriented research and development were crystallized in the fo | [illegible]