Pride in Value Smelter
Smelt Passion, Refine Future!
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The Copper has evolved over the History of Human Civilization. The Copper Smelting Technology has been improved unceasingly in the flow of the everlasting time from the Bronze Age to IT and Space Era. The world with “Copper” becomes brighter, warmer and more convenient. The company, “LS-Nikko”, which has led the Industrial Development in Korea with “Ardent Eagerness” and “Challenge Spirits”, is a real standard of smelting companies. Now, “LS-Nikko Copper Inc.” will explore the “Pleasant Future”.

New Name and New Start of ‘LG-Nikko Copper Inc.’
“More Convenient World, Pleasant World”
Explore the Future with Copper Smelting Technology!
Dynamic 70 years, the Proud Footprints.
The history of ‘LS-Nikko Copper Inc.’ is also that of ‘Non-ferrous Smelting Industry’ in Korea.

1936~1970 » Laid foundation for Non-ferrous metal smelting industry
In 1936, the history of non-ferrous metal smelting industry in Korea started on the spur of the moment igniting the furnace in Chang-Hang refinery. The industry experienced ordeals, such as the cease for a while over the periods from the Independence Day to the Korean War. However, full-scale works for extensions and supplements of the facilities began to start with the foundation of Korean Mining and Refining Organization in 1962. As a result, the steppingstone of the refining industry for non-ferrous metals, which is the core of the heavy and chemical industry, was built.

1971~1981 » The cultured potential power to leap
Changhang Refinery became to have the international competitiveness in the production capacity and the quality producing ‘electrolytic copper cathode’ by more than 50,000 tons per year. On the other hand, the government built a big scale of copper smelting factory in On-San in 1976 following the needs at the times when the industrial structure in the country had to be changed into the one with the heavy and chemical industry. On-San Copper Smelting factory started to operate the facilities after equipping the “Flash Smelting” facility which could produce 80,000 tons per year for the first time in Korea in 1979.

1982~1998 » The best honor acquired by challenges and renovation
The merge between Korean mining and refining, Co, Ltd. and On-San copper smelting, Co, Ltd. in 1982 marked the big turning point to leap one step in the refining industry for non-ferrous metals in Korea. Since then, the inner capacity has been strengthened through the enlargement of the business area and the renovation in the various administration sciences and the company name was changed into “LG Metals” in 1995.

1999~2005 » New start for the best in the world
LG-Nikko Copper Inc. was found with the joint venture between LG Metals’ and ‘Japan Korea Joint Smelting (J.K.J.S)’ in September, 1999. The vision, “Achieving the goal to be the top refinery in the world” was set in 2004 and the company name was changed into LS-Nikko Copper Inc.” in 2005. It was the new start to navigate in the copper material market in the world with the pride that the company is the only one as the copper smelting company in Korea.
The Output of Electrolytic Copper Cathode

Two Processes in A Company

- Outokumpu Flash Smelting Process
- Mitsubishi Continuous Process

Technology

- Power Efficiency 99.0%, acquired the world best (in 2004)
- Development and adoption of element technology
- Quality achievement for anode crude copper with active interchanges between pre-process and current process.
- Problem solving through S_DMAIC cycle

Adoption of a new technology, Bi-M.R.T. (Molecular Recognition Technology) in 2004

By this technology, Bi is absorbed to Resin (SuperLig-83) and separated selectively. It is a new technology that is commercialized for the first time in the world. And the removed by-product is sold as Bi-sulfate.

In the electrolytic refining process, ‘KIDD’; adoption of ‘Robotic CSM’ for the first time in the world in 2005

In the process, ‘KIDD’ that uses ‘Permanent Cathode’, ‘Robotic Type CSM’ is being used for the first time in the world.

Current Product Certifications

- Electrolytic Copper Cathode
  - Silver: ‘Good Delivery’ by LBMA in 1991

- Precious Metals
  - Silver: ‘Good Delivery’ by LBMA in 1991

Electrolytic Refining

Current Product Certifications

Electrolytic Copper Cathode

Current Stage

Onsan Factory 430 KT 3.1% 2

Classification Output Composition Rate Rank

Changhang factory 500 KT 2.8% 2

Comparison to 2005 (The composition rate is compared to the output in the world.)

Ordinary Profit

Unit (100 million Won)
“LG-Nikko Inc.”, that has grown with your interest and supports, newly starts as the name of “LS-Nikko Inc.” with a new mission and corporate identity. “LS-Nikko Inc.” has contributed to the development of Electronic and Electrical Industry in Korea by supplying the high quality of basic raw material to the industry and it is exploring the future of “Copper Smelting & Refining” with the technology acknowledged worldwide.
“LS-Nikko Inc.” will do the best effort in order to develop the world-best technology further in the future without being satisfied with the past results and we will be always with you as an environment-friendly enterprise that considers the nature first. We hope your constant interest and affection in order for us to grow as the “World-Best Copper Inc.”

Thank you.

Representative Director & Vice Chairman
Cha-Myung Koo
Pride in Value Smelter
Smelt Passion, Refine Future!

“World’s Global Player”

VISION
Long or Mid-term Growth Strategy
No.1 Members I No.1 Company

Future Image
The best material company contributing to the development of the customers and human civilization creating unlimited value of the natural source with the technology and pride as the first in the world

Core Values
- Trust
- Eagerness
- Renovation

Core Capabilities
- Cost Competitiveness
- Advanced Technology
- Atmosphere as leaders
- New Business Development Abilities
- Global Administration Capabilities

Aims & Business Capacity
- **Aims:** growing as a Global Player within a decade
- **Business Capacity**
  - Investment Amount: 1.23 trillion Won
  - Selling Amounts: 3.4 trillion Won (4.5 trillion Won) *
  - Operating Profits: 0.3 trillion Won (0.38 trillion Won) *
  - When the management index of 2005 is adopted: Exchange Rate, LME, Selling Pre. T/RC, etc

Strategic Tasks
- **Strengthening the profitability of the existing business (Smelting)**
- **Entering into a new business opportunity**
  - Starting a general recycling business
  - Promoting foreign businesses
    - Resource development,
    - Smelting business (dry refining)
- **Strengthening R&D**
Hope of Copper Smelting Technology. “Two Processes in A Factory” acknowledged worldwide.

‘LS-Nikko Copper Inc.’ produces the world class of electrolytic copper cathode in OnSan and ChangHang factories. Especially, “Two Processes in a Factory” of OnSan factory is famous for its unique system over the world. It suggests the possibility to lead the copper smelting technology in the world since the system with two processes can maximize the smelting capacity supplementing each process.
Manufacturing Facilities

Onsan Smelter & Refinery
The construction was started in 1976 to be able to produce around 80,000 tons a year and then the factory began to produce in 1979. The factory has the superior position in the production capacity and the quality of electrolytic copper cathode worldwide.

- **Smelting Factory**
  - It produces anode by Outocumpu Flash Smelting Process and Mitsubishi Continuous Process.

- **Electrolytic Refining Factory**
  - It produces electrolytic copper cathode by KIDD process.

- **Factory for Precious Metals**
  - It produces platinum, palladium, and selenium as well as 99.9% purity of high-class gold and silver bars.

- **Factory for Chemicals**
  - It produces various chemical products including sulfuric acid, sulfuric acid for semi-conductor, L-SO3, L-SO2, plaster, liquid argon, etc.

Changhang Refinery
The factory that has been operated since 1936 has been the base manure for non-ferrous metal refining industry in Korea.

- **Factory for Chemicals**
  - The factory produces electrolytic copper cathode by a conventional process, using anodes and end plates that are produced during the smelting process.

Seoul Office
- Seoul Office (in ASEM Tower) has the operations for marketing activities, Materials purchase, fund raising / operation and public administration.
Electrolytic Copper Cathode and LS-Ferro sand

Electrolytic Copper Cathode that is registered as the best grade, ‘Grade A’, in LME is the high concentration of copper that the superior quality is acknowledged internationally. Also, the usage of LS-Ferro sand, environment-friendly stabilized Hyaline, is enlarged for cement production, Sand Blast, and concrete aggregates, etc.

The Anodes made through Outokumpo Flash Smelting Process and Mitsubishi Continuous Process become 99.99% of Electrolytic Copper Cathodes by Electrolysis. Electrolytic Copper Anodes have high electrical conductivity, heat conductivity, formability, corrosion resistance, so, the scope to apply is various and wide.

This company has the capacity to produce total 510,000 tons of electrolytic copper cathodes a year at this moment in 2005. LS Ferro sand is the product that is granulated by fast-cooling and water treatment in the melted condition after mixing steel elements included in copper ores with silica stones. LS Ferro sand is widely used for ferrous raw materials for cement, raw materials for Remicon and Brick products, sand blast for ships and fillings for Caisson of civil engineering since it has high concentration of ferrous elements, stabilized chemical features and uniform beads size. Also, it has high safety for environment, so that the scope to adopt construction and civil engineering as aggregates that replace the natural aggregates in the future is increasing gradually.
### Electrolytic Copper Cathode and LS Ferro sand

#### Electrolytic Copper Cathodes

- **LS Ferro sand**

#### Product Name

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Size</th>
<th>Productivity per year</th>
<th>Usage</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS Ferro sand</td>
<td>Fe &gt; 40%, Fe_3O_4 &lt; 20%</td>
<td>900 kt</td>
<td>Cement Manufacturing</td>
<td></td>
</tr>
</tbody>
</table>

#### Current Product Certifications (Electrolytic Copper Cathode)

- Onsan Smelter & Refinery I: LME ‘Grade A’ (in 1982)
- Onsan Smelter & Refinery II: LME ‘Grade A’ (in 2000)
- Changhang Refinery: LME ‘Grade A’ (in 2001),
- Korean Standards Association ‘KS’ (in 1986):
Sulfuric Acid and Fine Chemicals that are widely used in the industrial fields are acknowledged in the superior quality as well as in the production efficiency by exact process control and thorough quality control with computer.

The chemicals by ‘LS-Nikko Copper Smelter & Refinery’ are produced with the long experiences and technology in the fine chemicals area. Especially, the technology that produces Sulfuric Acid for Semi-conductor using Sulfur Dioxide emitted during the Copper Smelting process is the unique in the world. Currently, Onsan factory provides the main raw materials for related industry area by producing Sulfuric Acid for semi-conductor and industry, L-SO3, L-SO2, Plaster, Liquid Argon, etc.
<table>
<thead>
<tr>
<th>Product Name</th>
<th>Purity</th>
<th>Productivity per year</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric Acid</td>
<td>98.96%</td>
<td>1,360kt</td>
<td>Manufacturing Fertilizer, Alumina, Gunpowder, Wastewater disposal, catalyst, etc.</td>
</tr>
<tr>
<td>L-SO₂</td>
<td>SO₂ &gt; 99.9%</td>
<td>13.2kt</td>
<td>Chemicals for Textile bleaching and de-colorization, chemicals for photography</td>
</tr>
<tr>
<td>L-SO₃</td>
<td>SO₃ &gt; 99.8%</td>
<td>83kt</td>
<td>Medium for dye stuffs and pigments, surfactant</td>
</tr>
<tr>
<td>PSA</td>
<td>H₂SO₄ 96～99.5% &lt; 0.1ppb</td>
<td>15kt</td>
<td>Washing Silicon Wafer</td>
</tr>
<tr>
<td>Plaster</td>
<td>SO₃ &gt; 38% CaO &lt; 40%</td>
<td>62kt</td>
<td>Retarding agent for Cement. Raw materials for plaster board, Structural Shapes for China, Chalk manufacturing.</td>
</tr>
<tr>
<td>Liquid Argon</td>
<td>More than 99.999%</td>
<td>1,300t</td>
<td>Gas for wafer manufacturing process and semi-conductor depositing process</td>
</tr>
<tr>
<td>Liquid Oxygen</td>
<td>O₂ &gt; 99.9%</td>
<td>400t</td>
<td>For medical and welding uses</td>
</tr>
<tr>
<td>Crude Sulfuric Acid Nickel</td>
<td>Ni &gt; 18%</td>
<td>1,300t</td>
<td>Nickel Inducing Chemicals</td>
</tr>
<tr>
<td>Bi-Cake</td>
<td>Bi &gt; 45%</td>
<td>40t</td>
<td>Bismuth Inducing Chemicals and Metal</td>
</tr>
<tr>
<td>Te-Cake</td>
<td>Te &gt; 45%</td>
<td>25t</td>
<td>Tellurium Inducing Chemicals and Metal</td>
</tr>
</tbody>
</table>
Precious Metals

Platinum, palladium, selenium as well as gold and silver with the purity over 99.99% that are acknowledged worldwide are produced in this company.

The precious metals, such as gold and silver, etc. that are produced in the last process of copper smelting are used in various areas, such as industrial raw materials since they have high electrical and heat conductivity and corrosion resistance as well as they are processed as accessories, high class of art works. Especially, gold that is processed the most in Korea is registered in LBMA (London Bullion Market Association) and TOCOM (Tokyo Commodity) and silver is registered in LBMA. That's why those qualities are acknowledged worldwide.
Precious Metals

Gold

Silver
99.99% (Granule, Ingot, 10kg) 600T Accessories, welding rods, contacts, films LBMA (1991)

Platinum
99.8% (200g Ingot, Sponge) 80kg Catalyst for vehicles, accessories, Dental materials

Paradium
99.95% (Sponge), 99.9% (400g Ingot) 1,000kg Catalyst for vehicles, accessories, Dental materials

Selenium
99.95% (Granule Ton=25kg) 400T Coloring agent for glass

Current Product Certifications (Precious Metals)
Gold: ‘Good Delivery’ by LBMA in 1994 and ‘Good Delivery’ by TOCOM in 1996
Silver: ‘Good Delivery’ by LBMA in 1991
Green Enterprise assimilated to nature with environment-friendly administration, firmly laid foundation for future growth.

‘LS-Nikko Copper Inc.’ with the competitiveness ahead of one step by the perfect environment and the incidental facilities considers human beings and nature first.
Technological developments should be beneficial to both nature and human beings. With the belief, LS-Nikko Copper Inc. has the perfect facilities for air and water pollution protection through all the processes.

LS-Nikko Copper Inc. performs the activities for sustainable future for the purpose of making ‘Green Smelter’ and sound workplace. Since the first operation of the factory, the company has invested around 170 billion won to equip the facilities related to environment until now. Moreover, the company spends around 30 billion won every year. And also, all the staffs are doing the efforts in order to establish the pleasant working environment by safety sanitation system and facilities improvements.

**Oxygen Factory**
The factory has the facility to produce up to 5,000 Nm³ of oxygen per hour and the produced oxygen is provided to the first factory for smelting.

**Water Treatment Factory**
The factory provides industrial water, such as filtering water, pure water, soft water, drinking water, etc to all the factories.

**Wastewater disposal factory**
The factory processes the wastewater discharged from all of the factories physically and chemically and thus purifies the water.

**Independent Environment Measurement**

**LS-Nikko Copper Inc.** has various incidental facilities, such as the exclusive harbor cargo facility, crude ore shelter, oxygen factory, water disposal factory, waste water disposal factory, etc that supplement the main production line.

**Harbor Cargo Facilities**
The maximum, 20,000 tons of ship can dock alongside the harbor of On-San factory and the harbor has the exclusive harbor cargo facilities. Furthermore, on the harbor and inside the factory, there are crude ore shelter that can store around 110,000 tons of copper ores.
Administration for able men who build the creative enterprise environment. Entrepreneurship respecting personnel allows us to set the reviving working place.

*LS-Nikko Copper Inc.* respects the staffs’ creativity and autonomy and is creating ‘Reviving Company Atmosphere’ that each personnel is able to show their best abilities through the performance-oriented administration as well as various welfare benefits.
The company is providing the housing for 246 families of the workers and 67 units of housing for solos on the purpose of promoting their stabilized lives and welfare. And it holds physical facilities, such as indoor gymnasium, lawn grounds, tennis courts, volleyball courts, physical training centers, etc in order for the workers to enjoy their leisure activities after work. And Condominiums and LG live education and training center are used as a place for the staffs to revive their lives.

Requirements for the Personnel

- The person who always renovates the status quo with broad thoughts and progressive acting power
- The person who shows his creativity in order to provide better values to the customers
- The person who achieves the organizational goals with high sense of duty and the brave challenge spirits
- The person who aims at becoming the top specialist in his area through continuous self-development

Welfare Facilities

High-Potential
- Strengthening the competitive elements for recruiting
- Exchanges with superior educational institutes outside and inside the country
- Various routes to recruit
- Ability-oriented evenly selected personnel management

Nourishment of Education
- Specialization
- Globalization

Evaluation
- Nourishing points
- Performance-Oriented
- Fairness

Remuneration
- Performance-Oriented Type
- Anaiming at the best in the same fields
- Performance-Based
The world best smelting technology that was achieved by ceaseless study and technology development. That is the pride and honor of ‘LS-Nikko Copper Inc.’

The lights of the R&D center of ‘LS-Nikko Copper Inc.’ glisten brightly night and night since they are the symbols of the pertinacity and efforts of the researchers for the best technology.

R&D Center

The center does active R&D activities for the process modification, new process development, enlargement of marketable metal products and New Biz in order to hold the best competitiveness and future core technology.

- **Study for dry refining**: development for core refining technology, new technology development for refining area
- **Study for wet refining**: wet refining process development for copper ores
- **Study for recycling technology**: technology development for resources collecting
- **Study for new non-ferrous metal item**: technology development for new marketable item among ore elements.
The Enterprise that marches dynamically on the stage of the world. ‘LS-Nikko Copper Inc.’ creates our future today and it goes.

‘LS-Nikko Copper Inc.’ has unlimited potentiality. The heart thinking the customers first on each item and the attitude to do the best for the best quality and world class of the product make “LS-Nikko” today and the future of the company that we are to create.
www.lsnikko.com
The plant is operated with a perfect process controlling system that is environment-friendly.

The factory produces chemical products using sulfurous acid gas that is made during copper smelting. The precise process control by computers and the quality control enable the plant to produce high quality of goods and the high-tech manufacturing equipments are also supportive for the plant to operate the environment-friendly process.

### Factory Functions and Features

<table>
<thead>
<tr>
<th>Factory</th>
<th>Functions and Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sulfuric Acid Plant I</strong></td>
<td>It produces sulfuric acid products using sulfurous acid gas that is made in the Smelting Plant I and has the conversion rate by more than 99.8% using Lurgi’s Double Contact Process.</td>
</tr>
<tr>
<td><strong>Sulfuric Acid Plant II</strong></td>
<td>It produces sulfuric acid products using sulfurous acid that is made in the second smelting plant and has the electrification rate by more than 99.8% using Monsanto Double Contact process with Cs catalyst. And it also can process high density of SO2 gas(13.2%) using the compact equipments.</td>
</tr>
<tr>
<td><strong>L-SO2 Plant</strong></td>
<td>It produces L-SO2 by deoxidizing refined SO3 gas.</td>
</tr>
<tr>
<td><strong>L-SO3 Plant</strong></td>
<td>It produces L-SO3 by liquefying refined SO3 from the sulfuric acid plant.</td>
</tr>
<tr>
<td><strong>PSA Plant</strong></td>
<td>Especially, the factory produces sulfuric acid for semi-conductors with premium purity.</td>
</tr>
<tr>
<td><strong>Gypsum Plant</strong></td>
<td>It produces gypsum for cement from waste acid using CaCO3 and Ca(OH2) counteragents in the sulfuric acid plant.</td>
</tr>
<tr>
<td><strong>Desulphurization Plant I</strong></td>
<td>It contributes to maintain fresh environment by absorbing and filtering environment unfriendly gas made in the smelting plant using Mg(OH2).</td>
</tr>
<tr>
<td><strong>Desulphurization Plant II</strong></td>
<td>It contributes to maintain fresh environment by absorbing and filtering sulfuric acid tail gas once more using CaCO3.</td>
</tr>
<tr>
<td><strong>Desulphurization Plant III</strong></td>
<td>It also contributes to maintain fresh environment by absorbing and filtering sulfuric acid tail gas once again using Mg(OH)2.</td>
</tr>
</tbody>
</table>
Precious Metals Plant

The plant has inherited the best value, the best quality, leading technology over the history.

The plant produces the various precious metals including gold and silver with high purity by refining semi-finished gold or silver as well as slime during the electrolytic smelting process. Especially, demands for precious metals are increasing in its trends as accessories and materials for industry since they can be elaborated easily as well as their superior chemical features.

The Processes for Precious Metals

Gold
The quality of gold, which is widely used as various industrial material and dental material as well as accessories, from the plant is well acknowledged worldwide registered in LBMA and TOCOM.

Silver
It is used as material for electric contacts, welding rods, galvanizing, accessories, etc. and registered in LBMA, therefore it is also acknowledged in its superiority.

Platinum and Palladium
They are usually used as processing promoters in car or petrochemical industries and also used as material for accessories and dental care.

Selenium
Selenium that is exported to Europe, the Middle East, America, South America, by 95% in its produced quantity is used as various industrial materials, mainly as coloring agents for glass.
LS-Nikko’ Copper Smelter & Refinery, Co, Ltd. produces the world-best class of ‘Electrolytic Copper Cathode’ at the factories in On-san and Chang-Hang. Especially, the factory in On-San is famous for its system that has two kinds of smelting processes operated at the same time in a factory. The maximized smelting technology, which is mixed cooperatively with the benefits of each process, may show the way to lead the copper smelting technology in the world.

The manufacturing System by “two processes in a factory” which is acknowledged worldwide. It is the pride of ‘LS-Nikko’ Copper Smelter & Refinery, Co, Ltd. that aims at making the very best product.

‘LS-Nikko’ Copper Smelter & Refinery, Co, Ltd. produces the world-best class of ‘Electrolytic Copper Cathode’ at the factories in On-san and Chang-Hang. Especially, the factory in On-San is famous for its system that has two kinds of smelting processes operated at the same time in a factory. The maximized smelting technology, which is mixed cooperatively with the benefits of each process, may show the way to lead the copper smelting technology in the world.

It is the process to produce various chemical products or precious metals as well as Electrolytic Copper Cathode with the high purity over 99.99% after putting 25~50% of Cu grade copper concentrates, into the furnace and filtering off impurities in the concentrates.

It is the process to smelt copper concentrates using the oxidized thermal energy that is emitted during the oxidation reaction of iron and sulfur in copper concentrates triggered by the oxygen enriched air. Currently, around 50% of copper in the world is produced by this processing method.

As a process that can produce ‘Blister Copper’ continuously from ‘Copper Concentrates’, it is an up-to-date technology which reduced the drawbacks, such as investment cost, logistics cost, energy cost, etc. compared to the existing copper smelting process.
Outokumpu Flash Smelting Process

It is the process to smelt copper concentrates using the oxidized thermal energy that is emitted during the oxidation of iron and sulfur in copper concentrates triggered by the oxygen enriched air. Currently, around 50% of copper in the world is produced by this processing method.

Features of Outokumpu Flash Smelting Process

Superior Thermal Energy-Efficiency
It takes pride in high energy efficiency which does not need any additional energy source by smelting concentrates using steel and sulfur in the concentrates.

Flexibility in processing various materials (including copper scraps)
The plant recycles ingots, impurities coming from the electrolytic refining process, precious metals produced by the smelting, the residues and copper scraps naturally left while the waste water is treated.

Flexibility to process Concentrates
It has the capability to process the inconsistent components of each concentrate flexibly, so it is also possible to process comparatively low grade of concentrates.

The accumulated technology allows it to make the best quality of products.

The plant that has been operated from 1979 uses “Outokumpu Flash Smelting Process” that has been traditionally used worldwide adopting “Oxygen Fractionation” Especially, the factory was designed to equip the environment-friendly facilities with the world best anti-pollution facility in the fine consideration of environment from the beginning.
Smelting Plant II

The Best Competitiveness originates from the Best Facilities

The plant has been operated since 1998 after adopting ‘Mitsubishi Continuous Process’. The area, 21,600 square meters, for the plant building has a high space capacity with the compact design and has the utmost economical benefits by minimizing the logistics and by the automated computer processing control.

Features of Mitsubishi Continuous Process

Mitsubishi Naoshima refinery adopted this process in 1974 on the purpose of developing environment-friendly refinement as well as supplementing the demerits in using a reverberatory furnace with high-energy consumption rate. It is the newest smelting process adopted only by 5 refineries in the world including Onsan factory.

Features of Mitsubishi Continuous Process

This process has rather more merits compared to the other smelting processes since any environmentally harmful gases are not emitted by the technology moving the launder of the molten metal. Therefore, it has no difficulties in controlling the operation.

Economic Aspects

- Small numbers of workforce through equipments automation
- Cost reduction in logistics by the technology in moving the molten metal through the launder
- High retrieval rate of copper
- Investment cost reduction for sulfuric acid plant by producing high concentration of SO2
- Cost reduction in the plant construction by establishing the simplified facilities.

Environmental Aspect

Environment-friendly process with the retrieval rate of SO2 by 99.8%
Environment cost reduction by minimizing the factors to emit environmentally harmful gases.

Quality Aspect

The quality improvement of electrolytic copper through the high filtering rate for impurities
Electrolytic Smelting Plant

The production efficiency gets high with the mix of accumulated technology and the state-of-the-art process.

The plant has the accumulated technology and superior equipments. And also the electrolytic copper registered in LME is highly acknowledged in the quality worldwide. It maintains the highest productivity by stabilizing DK up to 330A/m².

Features of KIDD process
By using only STS Blank Sheet as a cathode instead of using Mother Blank Sheet Electrolytic Smelting, time, workforce and costs are saved and the highly concentrated copper can be produced by using the STS sheets suspended by 3 mm thick cathodes.

Electrolytic Smelting Plant
This KIDD uses Permanent Cathode and the plant uses Carousel Type CSM for the first time in the world.

Electrolytic Kidd Process
Active Carbon Process
MRT process
Copper removal process
Arsenic removal process
Concentration process

This KIDD uses Permanent Cathode and the plant uses Carousel Type CSM.
### 1. Summarized Balance Sheet

<table>
<thead>
<tr>
<th>Title of Account</th>
<th>2004</th>
<th>2003</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Assets</td>
<td>1,059,044</td>
<td>975,641</td>
<td>983,996</td>
</tr>
<tr>
<td>Current Assets</td>
<td>621,207</td>
<td>494,346</td>
<td>431,222</td>
</tr>
<tr>
<td>Fixed Assets</td>
<td>437,837</td>
<td>481,295</td>
<td>552,774</td>
</tr>
<tr>
<td>Total Liabilities</td>
<td>548,417</td>
<td>574,243</td>
<td>595,620</td>
</tr>
<tr>
<td>Current Liabilities</td>
<td>454,368</td>
<td>402,771</td>
<td>319,048</td>
</tr>
<tr>
<td>Fixed Liabilities</td>
<td>94,049</td>
<td>171,472</td>
<td>276,572</td>
</tr>
<tr>
<td>Total shareholders’ equity</td>
<td>510,627</td>
<td>401,398</td>
<td>388,376</td>
</tr>
<tr>
<td>Capital</td>
<td>283,204</td>
<td>283,204</td>
<td>283,204</td>
</tr>
<tr>
<td>Earned Surplus</td>
<td>229,747</td>
<td>122,131</td>
<td>103,795</td>
</tr>
<tr>
<td>Capital Adjustment</td>
<td>(2,324)</td>
<td>(3,937)</td>
<td>1,377</td>
</tr>
</tbody>
</table>

### 2. Summarized Income Statement

<table>
<thead>
<tr>
<th>Classification</th>
<th>2004</th>
<th>2003</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>2,210,735</td>
<td>1,765,097</td>
<td>1,385,226</td>
</tr>
<tr>
<td>Cost of Sales</td>
<td>2,044,235</td>
<td>1,617,126</td>
<td>1,229,466</td>
</tr>
<tr>
<td>Gross Profit</td>
<td>166,500</td>
<td>147,971</td>
<td>155,760</td>
</tr>
<tr>
<td>Selling &amp; Administrative Expenses</td>
<td>70,304</td>
<td>82,023</td>
<td>83,229</td>
</tr>
<tr>
<td>Operating Income</td>
<td>96,196</td>
<td>65,948</td>
<td>72,531</td>
</tr>
<tr>
<td>Non-operating Income</td>
<td>80,404</td>
<td>29,067</td>
<td>49,837</td>
</tr>
<tr>
<td>Non-operating Expenses</td>
<td>30,543</td>
<td>46,836</td>
<td>38,173</td>
</tr>
<tr>
<td>Ordinary Income</td>
<td>146,057</td>
<td>48,179</td>
<td>84,195</td>
</tr>
<tr>
<td>Income tax expenses</td>
<td>21,449</td>
<td>7,185</td>
<td>11,762</td>
</tr>
<tr>
<td><strong>Net Income</strong></td>
<td>124,608</td>
<td>40,994</td>
<td>72,433</td>
</tr>
</tbody>
</table>

### 3. Summarized Cash Flow

<table>
<thead>
<tr>
<th>Classification</th>
<th>2004</th>
<th>2003</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Activities(a)</td>
<td>(23,364)</td>
<td>198,910</td>
<td>66,608</td>
</tr>
<tr>
<td>Investing Activities(b)</td>
<td>(15,682)</td>
<td>(60,217)</td>
<td>(43,278)</td>
</tr>
<tr>
<td>Inflow</td>
<td>44,238</td>
<td>7,268</td>
<td>370</td>
</tr>
<tr>
<td>Outflow</td>
<td>(59,920)</td>
<td>(67,485)</td>
<td>(43,648)</td>
</tr>
<tr>
<td>Financing Activities(c)</td>
<td>(16,640)</td>
<td>(109,843)</td>
<td>33,013</td>
</tr>
<tr>
<td>Inflow</td>
<td>1,789,865</td>
<td>1,116,137</td>
<td>1,080,904</td>
</tr>
<tr>
<td>Outflow</td>
<td>(1,806,505)</td>
<td>(1,225,980)</td>
<td>(1,047,891)</td>
</tr>
<tr>
<td>Increase in cash(a+b+c)</td>
<td>(55,686)</td>
<td>28,850</td>
<td>56,343</td>
</tr>
<tr>
<td>Cash at the beginning of year</td>
<td>86,862</td>
<td>58,012</td>
<td>1,669</td>
</tr>
<tr>
<td>Cash at the end of year</td>
<td>31,176</td>
<td>86,862</td>
<td>58,012</td>
</tr>
</tbody>
</table>

### 4. Credit Rating (CP)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea Ratings</td>
<td>A2+</td>
<td>A2</td>
<td>A2-</td>
</tr>
<tr>
<td>National Information &amp; Credit Evaluation Inc.</td>
<td>A2+</td>
<td>A2</td>
<td>A2-</td>
</tr>
</tbody>
</table>

*Note* CP(Commercial Paper) Evaluation Grade : A1~D