



## Top 10 New Korean Techs in 2005

### World First, World Best

To suggest new vision for state-of-the-art technologies and upgrade the climate for technology development along with acceleration of practical use, the ministry has selected and announced the top 10 new technologies every year since 1999.

## Feel Butterfly Effect

Since 1999, MOCIE has selected and announced 10 new technologies each year to accelerate their commercialization, suggest new visions and spread a favorable technology development environment.

- They consist of three cutting-edge electronics and information technologies; two new materials technologies; one biotech; three technologies to lead basic industries; and one new growth-engine industry technology.
- State-of-the-art IT & electronic information, new material, bio science and basic industries-leading technologies selected from large and small and medium enterprises, either commercialized as substantial global market leader or having strong potential to emerge as technologies to lead the global market.
- In selection, focus was placed on domestic original technologies developed particularly by small and medium enterprises, considering expected stimulating ripple effects on the industrial technology development of the nation.



## Summary of Top 10 New Technologies for 2005

Company	Developed Tech Name	Gist of Technology
Daewoo Shipbuilding & Marine Eng'g	LNG carrier with LNG reception terminal function	<ul style="list-style-type: none"> <li>- World's first mounting of LNG reception terminal function on an LNG carrier</li> <li>- Built-in semi-submerging-type turret mooring and gas supply systems</li> <li>- Equipped with LNG re-gasification mock/simulation testing devices</li> </ul>
Samsung Electronics	50nm-class 16 Gbit NAND flash memory	<ul style="list-style-type: none"> <li>- World's first 50nm-class-technology-applied product</li> <li>- Realized world's largest single-chip capacity (16 Gbit)</li> <li>- Technology one-year more advanced than firms of competitor nations</li> </ul>
Optomagic Co.	Zero-water optical fiber for optical communication	<ul style="list-style-type: none"> <li>- Expanded usable wave range by 200% with elimination of OH radical in optical fiber</li> <li>- A world-class high-quality product</li> <li>- Market expected to increase sharply due to rising demand for sub-networks of optical communications</li> </ul>
LG Electronics	High-definition DVR flat panel DTV	<ul style="list-style-type: none"> <li>- World's first developed and commercialized DVR flat panel DTV with built-in HDD</li> <li>- Developed world's highest level DVR-use chip and software</li> <li>- A strategic product to take world's No.1 market share</li> </ul>
Qualiflo Nara Tech Co.	12" silicon single-crystal grower	<ul style="list-style-type: none"> <li>- A 12" silicon wafer producing device for world's largest-size semiconductors</li> <li>- Realizes world's highest productivity compared with foreign-made equipment</li> <li>- A unique technology that distributes semiconductor materials evenly within crystals</li> </ul>
Inus Technology Co.	Quality control software utilizing 3D scanning data	<ul style="list-style-type: none"> <li>- World's first process-centered quality control software</li> <li>- World's top-level calculation precision</li> <li>- Uniquely supports ANSI/ASME Y14.5 measurement standards</li> </ul>
LS Industrial Systems	Open network-based 28nsec PLC	<ul style="list-style-type: none"> <li>- World's smallest, highest-speed PLC (1/2 the size and several 10s times the speed of existing products)</li> <li>- A strategic export product as industrial PLC</li> <li>- A new driver for automation of equipment industries, PDP, LCD, automobiles, etc.</li> </ul>
Adaptive Plasma Technologies Co.	ACP source for etching semiconductor wafers	<ul style="list-style-type: none"> <li>- World's first ACP source for use in etching semiconductor wafers</li> <li>- Applied to mass production of semiconductor wafer etching chambers for the first time in Korea</li> <li>- Raises productivity of semiconductor processes and enhances yield rates</li> </ul>
NexGen Biotech Co.	Human protein drug produced from plants	<ul style="list-style-type: none"> <li>- World's first developed and commercialized human TSH protein from plants</li> <li>- Opens huge markets by securing base technology for protein drugs</li> </ul>
Ucon System Co.	Ground control system for unmanned for airplanes	<ul style="list-style-type: none"> <li>- Remotely controls unmanned airplanes from the ground</li> <li>- Tactical control system utilizing collected information</li> <li>- Converted into an export product to advance into the ranks of industrialized nations in the field</li> </ul>



## Profiles of Korea's 10 Top New Technologies in 2005

- LNG carrier with LNG reception terminal function (LNG-RV) 5
  - 50nm-class 16Gbit NAND flash memory 6
- Zero-water optical fiber for optical communication 7
  - High-definition DVR flat digital TV 8
  - Silicon single-crystal grower 9
- Quality control software utilizing 3D scanning data 10
- Open network-based 28nsec Adaptively Coupled Plasma (PLC) 11
  - ACP source for etching semiconductor wafers 12
  - Human TSHR protein drug produced from plants 13
  - Ground control system for unmanned airplanes 14



## LNG Carrier Equipped with LNG Reception Terminal Function (LNG-RV) Daewoo Shipbuilding & Marine Engineering (DSME)

### Characteristics

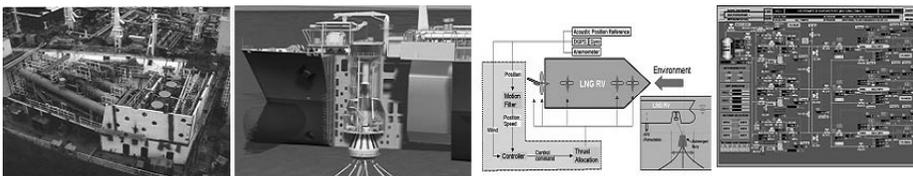
Usually, LNG is transported by LNG carriers and supplied to consumers after storage at inland LNG reception bases. Since storage bases require large tracts of land, nearby residents oppose these facilities. Compared with inland storage bases, LNG-RV (Re-gasification Vessel) is cheaper and faster to construct, which means that LNG can be supplied more economically to consumers, and also is mobile. DSME's LNG-RV has a high-tech crystalline structure comprehensively integrating not only cutting-edge design/construction techniques but also chemical engineering, piping, seamanship, satellite navigation, environmental and other technologies.

### Core Technologies

The vessel's design was optimized to install RV facilities in a limited space of 200 pyong (about 660 sqm). DSME's original and unique design, STL (Submerged Turret Loading System), enables gas supply even under the worst ocean conditions including hurricanes. MAPS (Maneuvering Aids & Positioning System), which actively controls the movement and location of LNG-RV, was designed with DSME's latest technology and developed to link the vessel with sea buoys to within 1 meter, even in the great expanse of the ocean. The LNG-RV simulator is a testing device for the ship's re-gasification operation, linkage with buoys, maintenance of sailing route, etc.

### Economic Ripple Effects

DSME has received global orders for a total of six LNG carriers (2 carriers delivered in 2005 and four under construction). Starting in 2006, the company plans to build two LNG-RVs, worth US\$260 million each, annually. For the time being, no domestic orders are expected but DSME can supply vessels to Jeju and North Korean regions in the future. DSME intends to maintain a 100% global market share, while carrying out technology R&D on a continued basis in order to reflect shipowners' requirements.



## 50nm-Class 16Gbit NAND Flash Memory Samsung Electronics Co., Ltd. (SEC)

### Characteristics

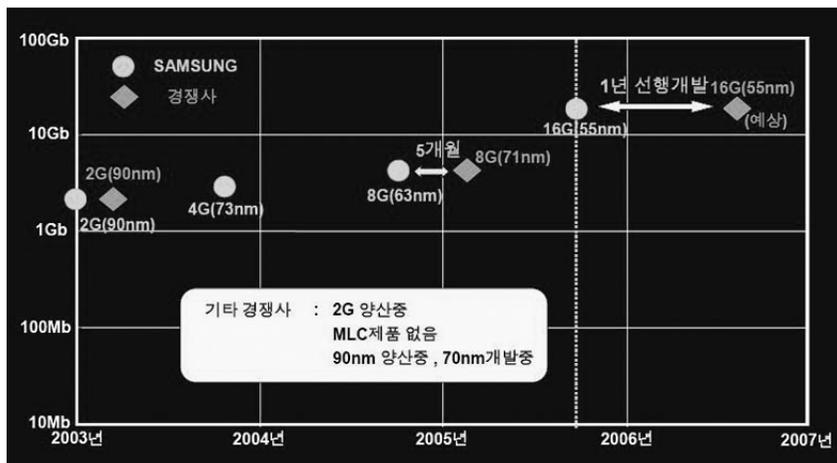
SEC's NAND flash memory chip is a non-volatile memory type that preserves data even when electric power is cut off. It has excellent shock resistance and rapid response speed, while consuming less electric current. It is expected to be a standard storage media for mobile equipment by offering large capacity to the extent that it competes with HDD.

### Core Technologies

With this product, SEC secured the 50nm-class process for MLC memory core, while developing and optimizing Floating Cell Gate, which minimizes the interference of nearby cells at less than 40nm. To minimize the cell area, SEC also converted Bit Line Contact into SAC (Self-Align Contact) and also optimized the process for reduction of the selection transistor's channel length.

### Economic Ripple Effects

SEC expects to realize total sales of US\$2.6 billion in 2007 and US\$7.7 billion in 2008, including domestic sales of US\$230 million and US\$610 million, respectively.



## Zero-Water Peak Optical Fiber for Optical Communications Optomagic Co., Ltd.

### Characteristics

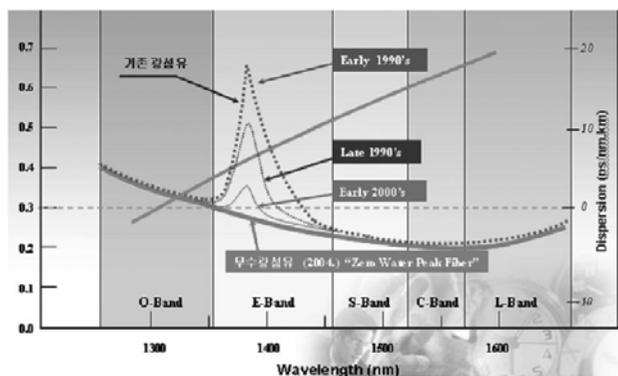
With complete elimination of the OH ion that remains in existing optical fiber, Optomagic's zero-water optical fiber can transmit at all wavelengths (1,260~1,625nm), including E-band (1,360~1,460nm). The company established a mass production system through 100% self-development of the world's top-level anhydrous fiber  $\lambda = 1,383 \pm 3\text{nm}$  (max. OH peak wavelength): 0.280 dB/km (typical)

### Core Technologies

The newly developed optical fiber improves the moisture-elimination process and optimizes the primary clad to curb the inflow of the OH ion into the core, which occurs in the course of forming the secondary clad. With expansion of the transmission range by 200%, the product can increase transmission capacity, reducing total system cost due to expanded channels. A mass-production system also has been established with world-class quality level.

### Economic Ripple Effects

In 2001, Optomagic's sales in the world market reached US\$206 million and its sales in 2005 are estimated at about US\$1.25 billion. The company's sales in 2009 are projected at about US\$2.04 billion. In the domestic market, KT, KEPCO, Hanaro Telecom, and cable TV broadcasters are using the product. And when all wavelengths are utilized, a more than 35% reduction in total system cost is expected along with an import substitution effect. As of 2005, the company exports over 60% of its total production, advancing its vision to become one of the world's top five mass-producers of zero-water optical fiber.



## High-Definition DVR Flat Panel DTV LG Electronics Co., Ltd. (LGE)

### Characteristics

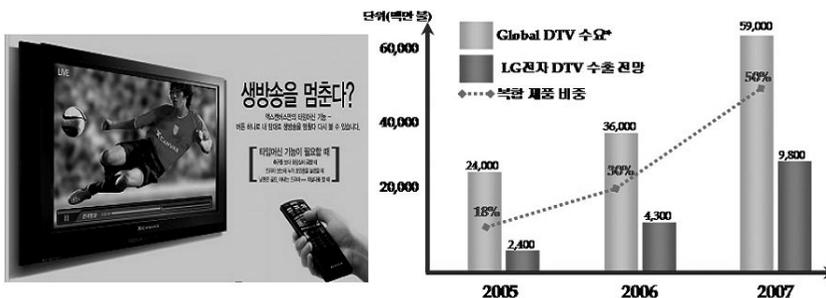
LG Electronics developed prerequisite technology for digital convergence during the growth stage of DTVs. Now for the first time in the world, it has developed and succeeded in the commercialization of high-profile DVR diffusion chip technology, built-in HDD system technologies and DVR core software that can process HD images in the OS on a real-time basis.

### Core Technologies

The HD media storage technology enables processing, optimization and storage of high-capacity images in the built-in OS on a real-time basis, while intelligent-type e-DBMS technology allows the alignment, search and optimization of stored data for reproduction. The product also includes DVR SoC technology with development of the world's highest-function single chip for DVR, thereby realizing 20% cost reduction. With technology that improves 14-bit image quality, clear and natural picture quality is realized as well.

### Economic Ripple Effects

With expanding DTV sales and strengthening of the international competitiveness of the new growth engine, sales forecasts are 1.6 trillion won in 2007 and 6.7 trillion won in 2110. The ratio of DVR DTVs is expected to grow to 30% in 2006 and 50% in 2007. Applicable to related industries, such as DMB phones, automobile DMB and set top boxes, by securing a patent for the core DTV technology LGE also expects expansion of royalty income.



## 12" Silicon Single-Crystal Grower Qualiflo Nara Tech

### Characteristics

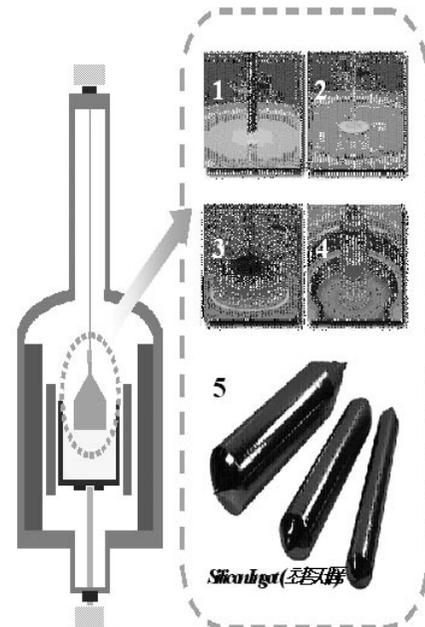
This product melts silicon multi-crystal raw materials at a temperature of over 1,420 °C, rotates the materials after placing a seed onto the melted surface and grows it into a single-crystal silicon ingot, which has the identical crystal alignment as the seed. The largest diameter among existing silicon single-crystal ingots for semiconductors is the 12" product developed and commercialized by Qualiflo.

### Core Technologies

With 12" x 2,000mm/run, Qualiflo's device boasts the highest productivity in the world, an increase of 14% compared with other existing technologies (1,750mm). The device stabilizes the production process by improving the measuring precision level to 0.12mm from the existing 0.4mm through localization of precision measurement and control technologies.

### Economic Ripple Effects

Sales in the world market: 96 billion won in 2004 and 118 billion won projected for 2007. In the domestic market, Qualiflo expects annual average growth of 100%: 14.4 billion won in 2007 from 4.8 billion won in 2004. The company is targeting to totally control the domestic market with a 100% share and take 17.7% of the global market in 2007.



## Quality Control Software Utilizing 3D Scanning Data Inus Technology Co., Ltd.

### Characteristics

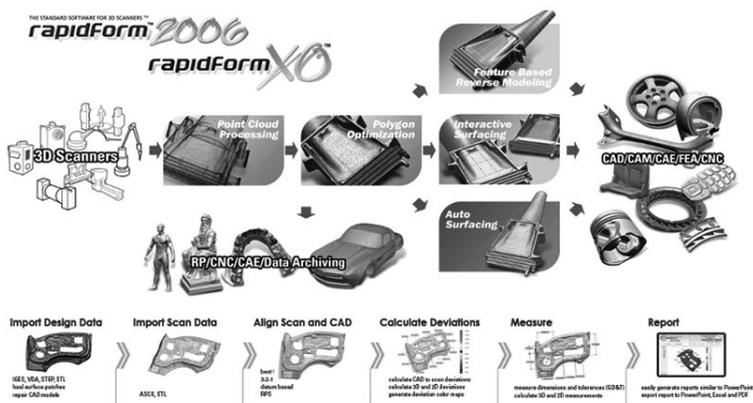
This software is designed to automatically detect and analyze 3-dimensional management objects corresponding to already established standards for quality control of 3D scan data. It provides corporate-level total functionality for 3D scan data-based quality assurance (QA) processes.

### Core Technologies

It is the world's first process-centric quality control software, generating world-class calculation accuracy and certified as first grade by PTB in Germany, NIST in the U.S. and NPL in the U.K. The software fully supports measurement standards defined in ANSI/ASME Y14.5. Securing the world's highest-level calculation speed, it can also process large amounts of data, three to 20 times more than competing products.

### Economic Ripple Effects

In 2004, Inus Technology exported software worth US\$4 million, accounting for 40% of the total global market estimated at US\$10 million. Inus' domestic sales in 2004 amounted to 3.3 billion won, 90% of the total domestic market. The company is targeting an increase in global market share to 60% by the end of 2006.



## Open Network-Based 28nsec Adaptively Coupled Plasma (PLC) LS Industrial Systems

### Characteristics

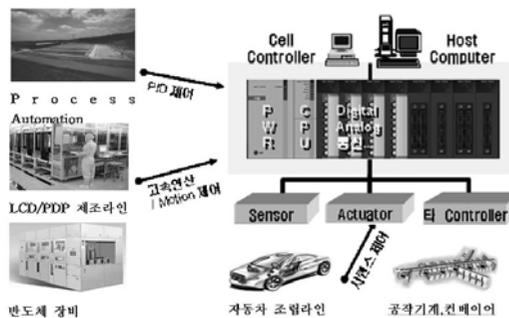
As a device for the programmed control of production facilities, LS Industrial's PLC can also provide high-speed control of large-scale, complex facilities, contributing to the enhancement of localization rates at production facilities for core industries, displays, semiconductors, automobiles, etc. Compared with world-class foreign products, the functions of this PLC are more than 120% higher. Ladder instruction word processing speed: 28nsec, backplane transmission speed: 3.9 $\mu$ s/256 words.

### Core Technologies

Through design of the high-speed processing device, development of backplane data transmission algorithm and 1 million-gate ASIC design, compared with existing products LS Industrial System's PLC realizes world-best functions at 10 times the speed. With the world's smallest scale (98mm) among same-class products, LS' PLC can replace compact Japanese products in semiconductor equipment. Due to provision of networks developed for diverse industries based on reliability, it has applications in all industrial fields from the field level to the information class.

### Economic Ripple Effects

World market size: 6.5 trillion won, domestic market size: 140 billion won. Its import substitution effect is estimated at 16 billion won in 2007 and 42 billion won in 2010 and the facility localization effect is projected at 400 billion to 1.3 trillion won in 2010. LS Industrial Systems plans to expand its PLC business to 80 billion won by 2010 from 45 billion in sales expected in 2005, targeting to rank as the world's seventh leading firm with 2.7% global market share.



## ACP Source for Etching Semiconductor Wafer Adaptive Plasma Technologies Corp. (APTC)

### Characteristics

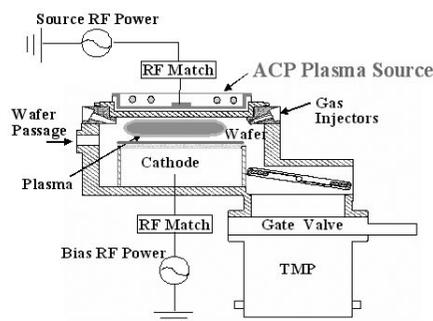
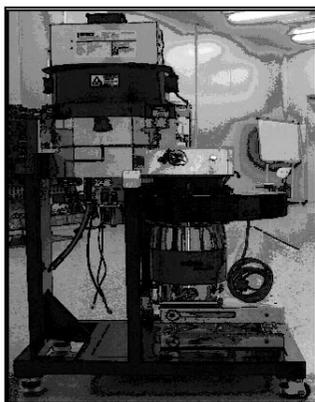
This wafer-etching equipment is designed so that high-energy ions generated from decomposition of plasma gas in a vacuum chamber collide with thin walls or radicals to start a chemical reaction with thin walls, forming volatile reactive products to achieve etching. It is critical equipment to the development of DRAM, NAND flash, CPU, etc.

### Core Technologies

As a multi-spiral-type ACP (Adaptively Coupled Plasma) source, it combines the advantages of both ICP (Inductively Coupled Plasma) and CCP (Capacitively Coupled Plasma). This equipment features excellent and uniform magnetic and electric fields, high plasma density, easy to adjust plasma density, versatile etching selectivity ( $>6:1$  for oxides and  $>2.6:1$  for metals), excellent CD uniformity, etc. Due to low plasma source power, it can be used in wider process ranges and etching speeds. PR selection ratios are also adjustable.

### Economic Ripple Effects

The world market is estimated at US\$3.2 billion in 2006 and US\$2.8 billion in 2008 while the domestic market is projected at 410 billion won in 2006 and 300 billion won in 2008. APTC aims to realize 90 billion won in domestic sales and US\$140 million in exports in 2008.



**Human TSHR Protein Medicine Produced from Plants**  
**NexGen Biotech Co., Ltd.**

**Characteristics**

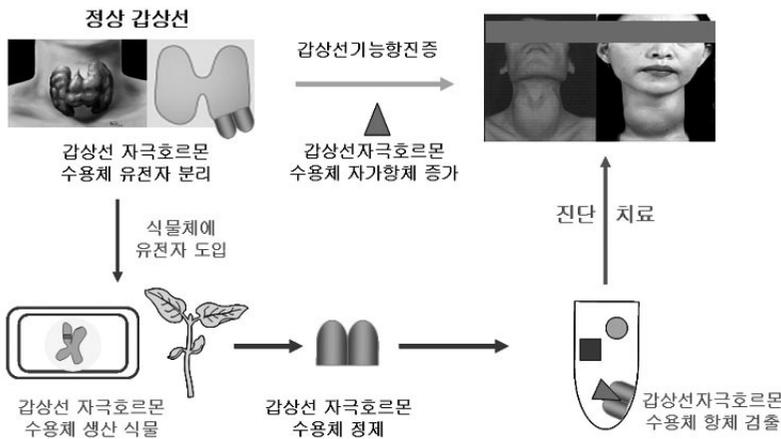
Utilizing plants to manufacture protein, this product is a very safe and inexpensive medicine. With realization of mass-production from human thyroid stimulating hormone receptor (TSHR) plants, this medical protein can be used as a vaccine for thyroid Graves' disease and also for quantitative and qualitative diagnosis of various thyroid diseases.

**Core Technologies**

Transgenic technology to extract optimum human genes from TSHR plants and technologies for gene-character transformation and single-copy transformed plants, NexGen's technologies also include separation of proteins from transformed plants and high-purity refining and manufacture of diagnostic kits and vaccines, utilizing refined proteins.

**Economic Ripple Effects**

World market size: 800 billion won in 2004 and 1.3 trillion won in 2010. Domestic market: 30 billion won in 2004 to grow 20% annually to 90 billion won in 2010. NexGen is targeting 80% of the domestic market and 20% of the global market in 2010.



## Ground Control System for Unmanned Airplanes Uconsystem Corporation

### Characteristics

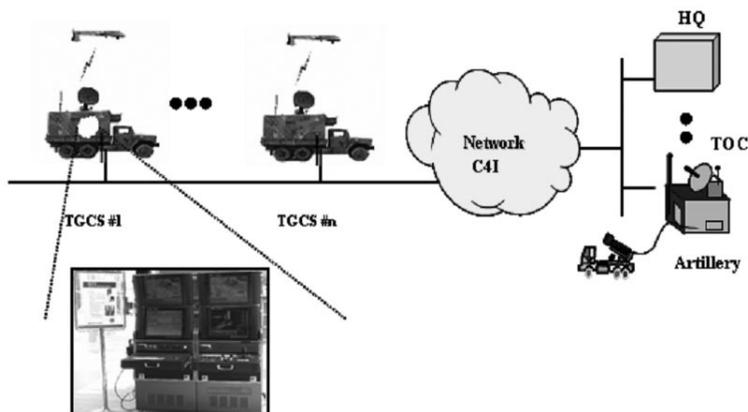
Uconsystem's ground control system (GCS) is a remote control station for UAVs (Unmanned Aerial Vehicles) used in TCS (Tactical Control System). It can transfer information to the external control system. It is designed to control and operate UAVs from the ground as a core element of the pilotless airplane system. It can be utilized with a variety of unmanned systems, UUVs (Unmanned Underwater Vehicles), UGVs (Unmanned Ground Vehicles), etc. as well as UAVs. Uconsystem succeeded in exporting the equipment for the first time from Korea in competition with other world-class firms.

### Core Technologies

The technologies involved feature 3D digital map operation, pre-flight path analysis and simulation, real-time target tracking/target acquisition system, in-flight real-time hazard analysis, control command for autonomous flight and flight path change, real-time image processing, display and editing, flight data analysis and database, etc.

### Economic Ripple Effects

World market size: US\$6 billion in 2007 and US\$10 billion in 2012. The domestic market in 2007 is estimated at 200 billion won. Uconsystem is targeting 1.5 billion won in domestic sales and 3.5 billion won in exports in 2008. It also aims to realize 8 billion won and 6 billion won from domestic and export sales, respectively in 2012.



## Top 10 New Technologies Selected by Year

Year	Company	Technology Name
1999	SK Corporation	Dual function catalyst technology
	SK Chemicals	3rd generation plutonium derivative anti-cancer heptaplatin (Sunpla)
	Samwon Special Machine Co.	Technologies for recycled use of slag and recovery of metals by atomizing method
	Hyundai Motor Co.	All wheel-drive, electronically controlled four-speed transmission device
	Mando Corporation	MGH ABS/TCS system
	LG Chemical	Development of Lithium ion battery
	Hyundai Electronics	0.22 $\mu\text{m}$ 64M DDR synchronous DRAM
	Samsung Electronics	Semiconductor nitrate violet-color LD tech (질화물 반도체 자색 LD 기술)
	Finaldata Inc.	Data restoration software and remotely controlled data restoration
2000	LG Electronics	CD-RW drive technology
	Samsung Electronics	CD-RW/DVD-ROM combo technology
	Gigalink Co.	TDSL (Time-Division-Duplex DSL)
	Daewoo Shipbuilding & Marine	LNG carrier integrated automation system
	Hyundai Motor Co.	Ultra-low polluting/low fuel-consuming electronically controlled passenger car engine
	Samsung General Chemicals	Ultra-high pressure-use 4th-generation PE112 HDPE
	Fibertech Inc.	Metalfiber manufacturing method using ultra-low vacuum and rapid cooling disc system
	Bolak Co., Ltd.	Bio-technological manufacturing method for erythritol
	Samsung SDI	Silicon solar cells with large surface
Interconstech Co.	PSC (prestressed concrete) I-type girder manufacturing technology applying incremental tensioning	
2001	Samsung Electronics	40" TFT-LCD for HDTV
	Samsung Electro-Mechanics	Super high-speed, super multi-layer PCB
	Corecess Inc.	Routing-function IP-based DSLAM
	Hyundai Heavy Ind.	Inland/offshore-use high output medium-speed diesel engine
	Daewoo General Machinery	Ultra-high-speed machining center
	Samsung Heavy Ind.	Ultra-high-speed, large-size passenger ship construction technology
	Hanil Synthetic Fiber	Pollution-free lionel cell (Lyocell) manufacturing method
	Jesechem Co., Ltd.	Manufacturing method of anode for lithium ion battery
	Dong Wha Pharmaceutical	Anti-liver-cancer agent 'Milican'
LG Electronics	Linear compressor for refrigerator	
2002	Korea Aerospace Ind	T-50 supersonic advanced jet trainer
	Hyundai Heavy Ind.	Shore-based building methodology for offshore floating structure using multi-purpose DBU (Double Barge Unit)
	Samsung Techwin Co.	High-speed precision wire bonder for IC
	Samsung SDI	Organic Light Emitting Diode (OLED) display device

Year	Company	Technology Name
2002	LG Electronics	Advanced digital TV system on chip
	Willtek Corporation	Multi-voice & data automatic measurement system for CDMA 2000 1x
	Samsung Electronics	2Gb NAND flash memory
	Hyosung Corporation	Polyester micro fiber by direct melt spinning
	Daejoo Fine Chemical	Barrier rib for plasma display panel
	CJ Corporation	L-Threonine production technology using metabolic pathway reconstruction and chromosomal manipulation
2003	Samsung Electronics	Terrestrial DMB receiver
	Phenix PDE	Transparent dielectric materials for PDP devices
	LG Electronics	Ultra-large full-HD resolution PDP
	InnoTeletek, Inc.	Industrial durable mobile PDA platform
	Rotem/Korea Railroad Research Institute	350km/h-class Korean-type high-speed train
	Daewoo Machinery Co.	Next-generation complex turning center
	New Power Plasma	Environment-friendly plasma source for semiconductor process
	Daewoo Shipbuilding & Marine Eng'g	Double-hull ultra-large (450,000 ton-class) oil tanker
	SKC Co., Ltd.	Lithium ion polymer battery
LG Life Science	New quinolone antibiotic 'Factive'	
2004	Samsung Electronics	5-color ultra-slim DLP TV
	Samsung SDI	32"-wide large thin braun tube
	LG Electronics	Terrestrial DMB phone
	LG Electronics	High brightness/high contrast ratio XGA single scan PDP
	LG Philips LCD	Low-temperature AMOLED for TV
	POSCO	FINEX iron-making technology
	AmorePacific	Colloid-type cosmetics for blocking UV rays
	Hyundai Motor Co.	Soft-type hybrid electric car
	Mando Corporation	Intelligent vehicle stability brake system (ERP)
	PSIA Inc.	Subnano-class metrological AFM (Atomic Force Microscope)

### Selected New Technologies by Company Type and Tech Level

(Unit: No. of Firms)

	1999	2000	2001	2002	2003	2004	Total
Large Enterprises	8	6	8	8	7	9	46
SMEs *	2	4	2	2	3	1	14
World's first	3	5	6	6	4	5	29
World's top	7	5	4	4	6	5	31

\* SME = Small and medium enterprises