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7 January 1993

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Science & Technology

Japan

New Technology Pending Commercialization

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Science & Technology

Japan

New Technology Pending Commercialization

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New Technology Pending Commercialization, 1992

92FE0858A Tokyo RESEARCH DEVELOPMENT CORPORATION OF JAPAN in Japanese
Mar 92 pp i-ii, 9-23, 257-310

[Text] Since its founding in 1961, the Research Development Corporation of Japan (JRDC) has worked through the Commissioned Development Program and Development Mediation Program to promote the development of new technology of domestic origin. With respect to technology transfer, in particular, the JRDC has since 1967 mediated development with corporations through a program of collection and survey-evaluation, focusing consistently on patents held in Japan by national research institutions and universities. More recently the JRDC has put more effort into technology transfer regionally throughout the country, working closely with local technological research institutions and vigorously promoting development mediation for local companies.

Meanwhile, the JRDC produces a technological information report which contains specifics on such technology so that as many people in business as possible can take advantage of the new technologies collected.

We are proud now to publish the "1992 New Technology Report" which notes the technologies newly collected from universities and national and public research institutions. We hope that it will be useful to a large number of people.

March, 1992
Research Development Corporation of Japan
Nobuhisa Akabane, Director

Introduction

The Research Development Corporation of Japan periodically contacts national and public research institutions, national universities, and special incorporated research institutions to obtain information on patents and other research achievements. The JRDC then seeks to bring this technology directly to the attention of people in industry, increase the opportunities to develop new technology, and promote the most effective utilization of research achievements. This the JRDC does by means of the vehicle of this New Technology Report, which is widely distributed.

Of the patents filed for and obtained by the aforesaid research institutions, almost all of the technologies mediated for commercialization and development by the JRDC in 1989 are included in this Report. And all of these technologies are available to any company desiring to implement them.

The information contained herein has been compiled from information prepared by researchers. Only the bare essentials are noted herein, but more detailed information is maintained by the JRDC for perusal or investigation, and the JRDC will also introduce interested parties to the researchers.

In order to have these patents, etc., for which there is great potential for commercialization introduced on a national scale and in line with the state of industry in the various regions, the country has been divided into eight districts and an office established in each district to serve as a center for mediation activity. New technology mediators are on the job in each district to introduce patents, etc. Thus development mediation, introductions, and patent information are also available at these district offices.

All those wishing to implement any of the patents noted in this Report, as well as those desiring any further information about the content of the Report or the JRDC's programs, should contact one of the offices listed on the next page.

Electric, Electronics

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36	Radar system	M. Jinriki	Technical Research & Development Institute, Defense Agency	91095

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38	Ranking circuit	T. Yoshimi	Electrotechnical Laboratory, AIST	90235
39	Beam light extracting circuit	T. Yoshimi	Electrotechnical Laboratory, AIST	90236
40	Magnetic recording simulation software	K. Nakamura	Telecommunications Research Lab., Tohoku Univ.	90305
41	Magnetic recording medium	K. Nakamura	Telecommunications Research Lab., Tohoku Univ.	90306
42	System for detection, display of 3D image formation data based on sensitivity set	N. Sasaki	Industrial Science & Technology Center, Gifu Prefecture	91029
43	Optical calculating device	K. Kobayashi	Tokyo Univ. of Agriculture & Technology	91128
44	Fuzzy controller based on neural network	K. Uchikawa	Engineering Dept., Nagoya Univ.	91139

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48	Surge-suppressing electrical transmission path	K. Watanabe	JAERI	91037
49	Superconductor coil & fabrication method	H. Ando	JAERI	91038
50	Superconductor electric path	E. Tada	JAERI	91039
51	Superconductor coil for converter	Y. Yoshida	JAERI	91040
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53	Superconductor accelerator	E. Minehara	JAERI	91061

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57	Green concrete quality measuring device	K. Takahashi	Engineering Dept., Iwate Univ.	90227
58	Non-visible light detection method	K. Katsu	Saitama Medical College	90274
59	3D position - attitude measuring system for robots using ultrasonic sensors	S. Aoyanagi	Engineering Dept., Kanazawa Univ.	90289
60	Rotating flux magnetic sensor and flaw detection device	M. Enokizono	Engineering Dept., Oita Univ.	90290

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62	Laser ultrasonic flaw-detection method and apparatus	K. Naruo	Power Reactor & Nuclear Fuel Development Corp.	91005
63	Beam probe	T. Inoue	Naha Laboratory, JAERI	91042
64	Dosimeter based on photostimulation fluorescent method	M. Matsuda	Takasaki Laboratory, JAERI	91051
65	Electrical cable deterioration diagnostic method	Y. Hiuma	Takasaki Laboratory, JAERI	91053
66	Method, apparatus for measuring high-temperature thermal expansion coefficient	N. Arai	Tokai Laboratory, JAERI	91056
67	Material testing device	M. Konoe	JAERI	91065
68	Variable-temperature test tank	I. Goto	JAERI	91069
69	Device for measuring liquid droplet properties	T. Mayumi	National Research Institute for Metals, STA	91076
70	Quick cut testing device	S. Yamamoto	National Research Institute for Metals, STA	91085
71	Quick-response stretch meter for measuring radial distortion	H. Meguri	National Research Institute for Metals, STA	91086
72	Solution-employing flow-speed measuring device	S. Kawamata	National Research Institute of Fisheries Engineering, Fisheries Agency	91097
73	Method and apparatus for detecting position of Z coordinate in non-contact 3D coordinate detection systems	K. Maruyama	Tokyo Institute of Technology	91134
74	Method of measuring moisture content	F. Sato	Koyama Technical High School	91153
75	Photo-thermal laser vacuummeter	N. Inaba	Gifu Technical High School	91155
76	Magnetic field sensor	T. Kobayashi	Basic Engineering Dept., Osaka Univ.	91157
77	Configuration of optical distance sensor for surface condition detection	M. Dezawa	Institute of Physical & Chemical Research	91172
78	Apparatus for capturing 2D information	M. Nakadate	Institute of Physical & Chemical Research	91190
79	Phase-shift laterally displaced spectrum polarized-light interferometer	M. Nakadate	Institute of Physical & Chemical Research	91197

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81	Ultrasonic visualizing apparatus	K. Yagi	Engineering Dept., Toyama Univ.	90263
82	High-temperature fiberscope	Y. Anoda	Tokai Laboratory, JAERI	91064
83	Device for extending pulse width of pulse lasers	R. Sugiyama	Tokai Laboratory, JAERI	91070
84	Ultra-short light pulse generator	T. Kobayashi	Basic Engineering Dept., Osaka Univ.	91146
85	Electromagnetic wave generator	T. Kobayashi	Basic Engineering Dept., Osaka Univ.	91147
86	Optical 3D coordinate input device configuration	M. Dezawa	Institute of Physical & Chemical Research	91171

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87	Apparatus for diagnosing and treating cardiac disorders using mechanical vibration	Y. Oiwa	School of Medicine, Tohoku Univ.	90194
88	Pulmonary artery catheter for measuring pressures in lung capillaries	S. Yamada	School of Medicine, Tokyo Univ.	90218
89	Developing thermography apparatus for medical use	A. Nagasawa	Hiroo Hospital, Shibuya-ku, Tokyo	90288
90	Photo-transmitting electrocardiograph	H. Takagi	University of Occupational and Environmental Health	90293
91	Proton-beam treatment apparatus	T. Inada	Tsukuba Univ.	91123
92	Gas-driven heart and lung machine	S. Tokunaga	Hiroshima Univ.	91149
93	Contact lens	K. Takeuchi	Institute of Physical & Chemical Research	91193

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94	Manipulator protecting cover	T. Nakamura	Power Reactor & Nuclear Fuel Development Corp.	91006
95	Nuclide-separating precipitator	M. Katagiri	Tokai Laboratory, JAERI	91054
96	Method of actinoid separation based on centripetal flow distribution chromatography	S. Usuda	Tokai Laboratory, JAERI	91055
97	Nuclear reactor control method	Y. Higashiyama	Tokai Laboratory, JAERI	91062
98	Experimental plate-form nuclear reactor fuel element	S. Watanabe	Tokai Laboratory, JAERI	91063

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100	Gas mixing unit	H. Hiratsuka	JAERI	91034
101	Connector	H. Ohba	Tokai Laboratory, JAERI	91057
102	Ironing method and ironing die	K. Miyauchi	Institute of Physical & Chemical Research	91173

(Mechanical Devices, Systems)

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104	Thin material drive unit using electrostatic power	H. Higuchi	Engineering Dept., Tokyo Univ.	90196
105	Flat membrane filtering unit	H. Masuda	Electrotechnical Laboratory, AIST	90247
106	Technique for polishing inner walls of non-magnetic round pipe that uses rotating magnetic field	T. Susumimura	Engineering Dept., Utsunomiya Univ.	90281
107	Metal mold wear monitoring device	H. Matsuyama	Fukui Engineering and Technology Center	91028
108	Exhaust-gas treatment filter unit equipped with duct for filter efficiency tests	H. Matsumoto	Tokai Laboratory, JAERI	91060
109	Test tank sealing device	M. Konoe	JAERI	91066
110	Material tester checking device	M. Konoe	JAERI	91067
111	Automatic welding device for thermocouple temperature-measurement contacts	H. Itoh	National Research Institute for Metals, STA	91084
112	Bullet - projectile recovery device	M. Fujihara	First Research Center, Technical Research & Development Institute, Defense Agency	91088

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114	Variable-position relay optical system	S. Fukui	Industrial Products Research Institute, AIST	90239
115	Variable-direction, variable-position optical system	S. Fukui	Industrial Products Research Institute, AIST	90240

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116	Heat-storing heat pump	E. Akiba	National Chemical Laboratory for Industry, AIST	90243
117	Variable-capacity helium turbine expander for generator brake	T. Kato	JAERI	91041
118	Heat-exchanger tube	A. Shimooke	Tokai Laboratory, JAERI	91059

(Transportation)

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119	Jet thrust generator for ship propulsion	T. Kezuka	Hokkaido Broadcasting Corporation	90266
120	Parking brake	T. Namba	Technical Research & Development Institute, Defense Agency	91094

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(Metals, Metallurgy)

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121	Positive electrode material for secondary batteries having alkaline metal (alloy) negative electrodes	N. Kumaya	Engineering Dept., Iwate Univ.	90228
122	Magnetic polishing method and magnetic polishing agent	K. Suzuki	Engineering Dept., Nippon Institute of Technology	90259
123	Method for removing binders from green bodies, green body materials and configuration	T. Kawano	Government Industrial Research Institute, Iwate Prefecture	91016
124	Manufacturing method for granular colloids, magnetic fluids	K. Nakatani	National Research Institute for Metals, STA	91073
125	Alloy film for hydrogen separation	M. Furumaki	National Research Institute for Metals, STA	91075
126	Dispersion joining method	O. Ohashi	National Research Institute for Metals, STA	91078
127	High-purity TiN Sintering Synthesis Method	O. Odawara	Tokyo Institute of Technology	91132
128	Method of manufacturing ultra-low-oxygen titanium	H. Oishi	Kyoto Univ.	91143
129	Method of manufacturing inter-metal compound Al_3Ti	T. Suzuki	Kyoto Univ.	91144
130	Laser-based solid high-purification method	K. Takeuchi	Institute of Physical & Chemical Research	91195

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132	Method of manufacturing high-strength-clay compound ceramics	M. Tsunemura	National Chemical Laboratory for Industry, AIST	90248
133	Method of using steam to manufacture black clay, plaster, lime-based porous material	K. Ikeda	Engineering Dept., Yamaguchi Univ.	90261

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135	Method of manufacturing $Na_{1-x}Ti_{2+x}Al_{5-x}O_{12}$ compound whiskers	Y. Fujiki	National Institute of Research in Inorganic Materials, STA	90285
136	Method of forming thermal-stress-relaxation layer in joining ceramics and metals	M. Kawahara	Government Industrial Research Institute, Iwate Prefecture	91014
137	Method of manufacturing rare-earth garnet monocrystals	H. Kimura	National Research Institute for Metals, STA	91072
138	Black pigment composition	K. Nakatani	National Research Institute for Metals, STA	91083
139	Apatite cement design support device	H. Kadoma	National Institute of Research in Inorganic Materials, STA	91099
140	Glass design support device	T. Makishima	National Institute of Research in Inorganic Materials, STA	91100

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142	Method of manufacturing 1.3-dithiolane-2-one superconductor	Y. Taguchi	National Chemical Laboratory for Industry, AIST	90244
143	Method for multi-stage hydrogenation cracking of fossil fuels	Y. Miki	National Chemical Laboratory for Industry, AIST	90246
144	2'-0-tetrahydropyranilnucleoside derivative	K. Furusawa	Research Institute for Polymers & Textiles, AIST	90249
145	Manufacturing method for optically active epoxy compound	S. Tanaka	Research Institute for Polymers & Textiles, AIST	90254
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149	Leucine encephaline	S Ohashi	Research Institute for Polymers & Textiles, AIST	90258
150	Method of manufacturing diols with light irradiation	Y. Shimizu	Takasaki Laboratory, JAERI	91044
151	Method of manufacturing polyvinyl alcohol hydrogel	K. Makiuchi	Takasaki Laboratory, JAERI	91045
152	Method of manufacturing oligogalacturon acid	S. Ogawa	Institute of Physical & Chemical Research	91180
153	Method of manufacturing soluble phthalocyanine complex benzo-substituted at selective positions	A. Hatano	Tohoku Univ.	91121
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155	Conductive charge-moving complex	H. Yamada	Institute of Physical & Chemical Research	91174
156	Cyclo-oligomannos and method of manufacture	S. Ogawa	Institute of Physical & Chemical Research	91181

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158	Electrical migration gel material having new migration characteristics	S. Katayama	Pharmaceutical Dept., Shizuoka Prefectural University	90221
159	Technology for fabricating organic silicon foam	S. Katayama	Pharmaceutical Dept., Shizuoka Prefectural University	90222
160	Functional polymer electrolytic gel having new swelling properties	S. Katayama	Pharmaceutical Dept., Shizuoka Prefectural University	90223
161	Various types of heat-responsive polymer gels	S. Katayama	Pharmaceutical Dept., Shizuoka Prefectural University	90224
162	Technology for imparting water-absorbing properties by polymer-alloying with poly-olefin fibers	M. Shibayama	Mikawa Fiber Technology Center, Aichi Prefecture	89250
163	2-n-decyl-3-hydroxy-n-tetradecanic acid and esters thereof	T. Kamata	National Chemical Laboratory for Industry, AIST	89304
164	Polyamide resin composition and plating method therefor	H. Sasaki	Government Industrial Research Institute, Iwate Prefecture	91015
165	Vulcanized natural rubber latex graft-polymerized with methylmeth-acrylate, and manufacturing method therefor	F. Yoshii	Takasaki Laboratory, JAERI	91052
166	Functional polymer and synthesizing method therefor	C. Sawawatari	Shizuoka Univ.	91138
167	Polyamine derivative manufacturing method	M. Iwata	Institute of Physical & Chemical Research	91182
168	Polyamine derivative	M. Iwata	Institute of Physical & Chemical Research	91184

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170	Method of manufacturing non-permeable carbon-fiber reinforced composite material	S. Ishiyama	Tokai Laboratory, JAERI	91058
171	Composite magnetic material and fine-particle structure therein	K. Nakatani	National Research Institute for Metals, STA	91074
172	Ceramics nano-composite material	S. Niihara	Industrial Science Research Institute, Osaka Univ.	91117
173	Method of surface-treating solid specimens	K. Otori	Engineering Dept., Yokohama Prefectural University	91136
174	Carbon-fiber-reinforced cement composite material	A. Kotori	Gunma Technical High School	91154

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175	Electrolytic oxidation of titanium and alloys	F. Mitsumatsu	Industrial Technology Center, Gifu Prefecture	91023
176	Water elimination by hydrolysis and agents	H. Kawamura	JAERI	91068
177	Fluidized reaction method	M. Itagaki	National Research Institute for Metals, STA	91080
178	Hydrogen-brittleness-prevention surface treatment	R. Hamano	National Research Institute for Metals, STA	91081

Forestry, Agriculture, Fisheries, Biology

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180	Method of manufacturing anti-tumor agent phenoxysazine compound	A. Tomoda	School of Medicine, Kanazawa Univ.	90229
181	Method of promoting and controlling growth and functional diversification in living cells	J. Fukuda	School of Medicine, Tokyo Univ.	91127
182	DNA chains that encode cyclomaltodextrin glucanotransferase, recombinant plasmid DNA containing such DNA, and form-transition microbes containing such plasmid DNA	H. Horikoshi	Institute of Physical & Chemical Research	91169
183	Cyclomaltodextrin glucanotransferase and DNA chains that encode it	H. Horikoshi	Institute of Physical & Chemical Research	91189
184	Cell recognition method	H. Fukuda	Institute of Physical & Chemical Research	91192

(Agriculture, Forestry, Fisheries)

Page	Theme	Researcher	Institution	Ref. No.
185	Method of culturing forced-ventilating plants	M. Aoki	Dept. of Agriculture, Hokkaido Univ.	90193
186	Method of reinforcing wooden beams with stretch materials	K. Honma	Industrial Technology Center, Akita Prefecture	90260
187	Plant-growth stimulation by irradiation with pulsing light	H. Nakazawa	Engineering Dept., Waseda Univ	90301
188	Ladder-type seaweed holding device	S. Kawamata	National Research Institute of Fisheries Engineering, Fisheries Agency	91096

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191	Solar chimney	M. Fujiwara	Electrotechnical Laboratory, AIST	90233
192	Electrical generation system using closed-cycle MHD generator unit	S. Shioda	Tokyo Institute of Technology	91130

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195	Method of treating waste water containing uranium and fluorine	Y. Omuku	Power Reactor & Nuclear Fuel Development Corp.	91002
196	Recycled sheets and manufacturing method	K. Honda	Paper Industry Testing Laboratory, Gifu Prefecture	91024
197	Recycling of soft vinyl chloride resin wastes	M. Tanaka	Osaka Municipal Industrial Research Institute	91032
198	Method of separating mercury from water phase and mercury extraction reagent used therein	Y. Baba	Saga Univ.	91151
199	Metal ion adsorption agent	K. Inoue	Saga Univ.	91152

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200	Cover for protecting vehicles from wind	H. Takagi	Univ. of Occupational and Environmental Health	90292

Research Institutions Contributing New Technologies Recorded (Past 5 Years)

Defense Agency

Technical Research & Development Institute

Science & Technology Agency (STA)
Head Agency
National Aerospace Laboratory
National Research Institute for Metals
National Institute for Research in Inorganic Materials

National Disaster Prevention Science & Technology Center

Ministry of Education
Hokkaido University
Muroran University
Iwate University
Akita University
Tohoku University
The Technological University of Nagaoka
Yamagata University
Yamanashi University
Tsukuba University
Tokyo Medical & Dental University
Tokyo Institute of Technology
Tokyo University
Tokyo University of Agriculture & Technology
Tokyo University of Mercantile Marine
Yokohama National University
Saitama University
Gunma University
Unomiya University
Chiba University
Toyohashi University of Technology
Kyoto University
Osaka University
Toyama University
Kanazawa University
Shizuoka University
Nagoya University
Nagoya Institute of Technology
Gifu University
Aichi University
Hiroshima University
Tottori University
Kyushu University
Kyushu Institute of Design
Miyazaki Medical College
High-Energy Physics Research Institute
Okazaki National Joint Research Organization
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Sendai Technical High School
Miyazaki Technical High School
Nagaoka Technical High School
Gunma Technical High School
Yashiro Technical High School
Ibaraki Technical High School
Takamatsu Technical High School
Tokuyama Technical High School
Kagoshima Technical High School
Koyama Technical High School
Space Science Research Institute

National Institute of Agro-Environmental Sciences, MAFF

Agency of Industrial Science & Technology (AIST), MITI
National Chemical Laboratory for Industry
Electrotechnical Laboratory
Industrial Products Research Institute
Research Institute for Polymers & Textiles
Mechanical Engineering Laboratory
National Research Laboratory of Metrology
Government Industrial Research Institute, Hokkaido
Government Industrial Research Institute, Tohoku
Government Industrial Research Institute, Nagoya
Government Industrial Research Institute, Osaka
Government Industrial Research Institute, Chugoku
Government Industrial Research Institute, Shikoku
Government Industrial Research Institute, Kyushu
National Research Institute for Pollution & Resources

Meteorological Agency, Ministry of Transportation
Meteorological Research Institute

Ministry of Posts & Telecommunications
General Communications Research Institute
Radio Research Laboratory

Ministry of Construction
Building Research Institute

Special Corporations (*Tokushu Hojin*)
Japan Atomic Energy Research Institute (JAERI)
Institute of Physical & Chemical Research
Power Reactor & Nuclear Fuel Development Corporation

Regional Government
Kanagawa Prefecture
Wakayama Prefecture
Jichi Medical School
Industrial Technology Center, Fukui Prefecture
Food Industry Testing Laboratory, Nagano Prefecture
Industrial Technology Center, Aichi Prefecture
Food Industry Testing Laboratory, Aichi Prefecture
Shimane Prefectural Industrial Technology Center

Foundation Corporations (*Zaidan Hojin*)
Railroad General Technological Research Institute
Sugami Central Chemical Research Institute

Public Universities
Tokyo Metropolitan University

Private Universities
Waseda University
Toyo University
Kanagawa University
Shibaura Institute of Technology
Tokai University
Meisei University
Kanazawa Institute of Technology
Kansai University
Aichi Institute of Technology
Shirayuri Women's College
Nippon University

Re New Technology Development Mediation Program

1. Development Mediation Program

This program is designed to screen the research achievements of national and public research institutions, national universities, and special corporate bodies for technologies which can be developed independently by private companies, at relatively little risk, and introduce these to interested companies. In this way, by promoting technological implementation, the program contributes to industrial development. The program further promotes the development of new technology by providing funding for technological processing according to the necessity of implementing a new technology, and also finances smaller businesses, when they have inadequate capital to develop new technologies introduced to them.

2. Development Mediation Method

The JRDC publishes the "New Technology Report," which contains synopses of new technology that is oriented toward development-mediation, and distributes this publication to companies and other parties in order to increase opportunities for commercialization. The JRDC also sponsors the "New Technology Conference" on technology expected to have wide applications in diverse fields, introduces technology through specialty publications and periodicals published by various organizations, and promotes joint research between researchers. In these ways, the JRDC conducts development-mediation for new technologies. The JRDC has divided Japan up into eight districts (Hokkaido, Tohoku, Kanto, Chubu, Kansai, Chugoku, Shikoku, Kyushu), and searches for suitable companies though new-technology mediators in these districts, thereby actively conducting new-technology development-mediation with those companies. In addition, the JRDC actively provides new technological information through new-technology coordinators to 23 prefectures in six special regions (Oita, Shizuoka, Toyama/Ishikawa, Tohoku, Kyohanna, Chushikoku), and conducts new-technology development-mediation activities grounded in these special regions, working closely with R&D institutions and companies in those regions.

The JRDC also introduces companies overseas to new technology which can be licensed overseas, cooperating with affiliated overseas agencies.

When a company requests to implement a new technology through such development-mediation as this, the JRDC consults with the owner of the new technology and with representatives from the company concerning the scope of the implementation rights to be granted, the level of technological guidance to be provided, royalties, and other conditions of implementation. Two new-technology development-mediation contracts are then drawn up, with the owner of the new technology and the JRDC parties to one and the JRDC and the company parties to the other. After these contracts have been concluded, the company begins developmental work to commercialize the new technology as the new-technology researchers disclose know-how and give technical guidance.

Once the development work on the new technology is complete and the company begins marketing the new product, the company begins paying royalties to the JRDC. For domestic mediation, roughly 90% of these royalties are returned to the owner of the new technology. For overseas mediation, roughly 80% are returned.

3. Related Operations

In cases where development is associated with considerable risk, where considerable development costs are entailed, and where the company is not able by itself to raise the needed capital, the JRDC finances up to half of the needed capital, to a limit of ¥10 million, as a "mediation-promotion fund," so that the development-mediation can be conducted effectively. And in cases where multiple technologies must be combined or converted to new applications in order to effectively employ the new technology, the JRDC provides financing in the form of a "technological process fund."

(1) Mediation-Promotion Fund

(A) Recipient: Company receiving new-technology development mediation

(B) Amount: Up to half of development capital, to a limit of ¥10 million (collateral required)

(C) Repayment: No repayment is required for a grace period of 2 years following the termination of the loan agreement pertaining to the new-technology mediation-promotion fund. Repayment shall be made in equal annual installments beginning the day after the last day of the grace period.

(D) Special Mediation Fee: In cases where the new technology is commercialized, a "special mediation fee" equal to 20% of the royalties shall be paid to the JRDC in addition to the royalties provided for in the new-technology development-mediation contract(s).

(2) Technological Process Fund

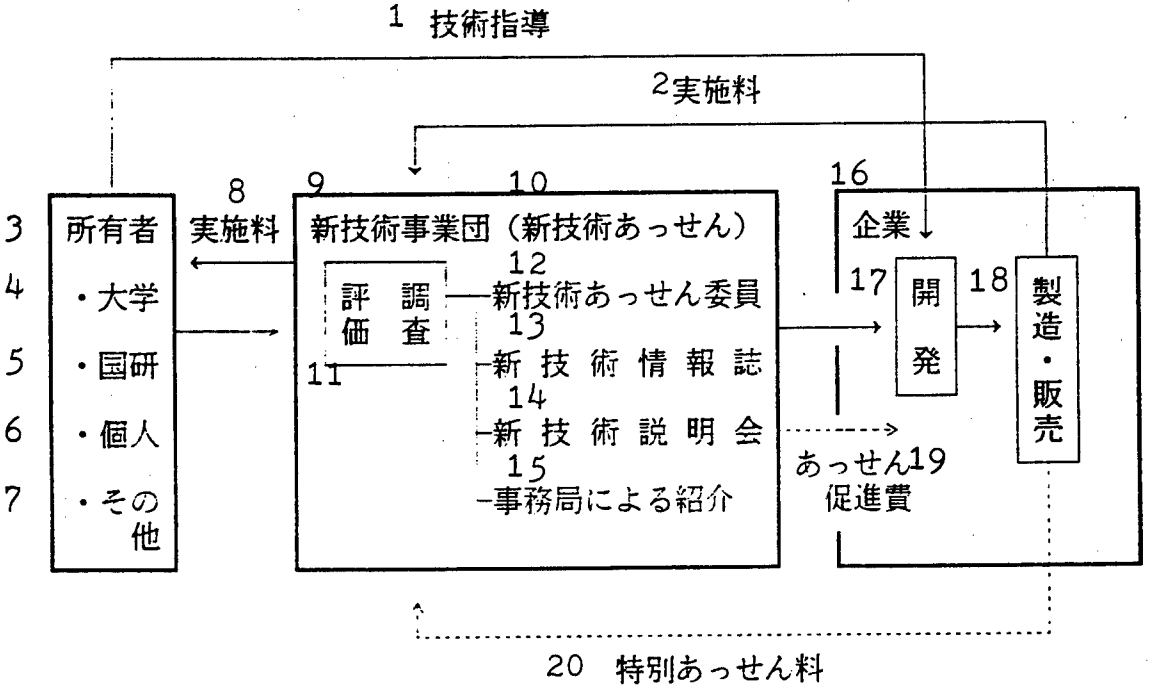
(A) Recipient: Either the company seeking to receive new-technology development mediation, the inventor, or a third-party R&D institution competent to conduct the technological process.

(B) Amount: Amount needed for technological process, or about ¥3 million.

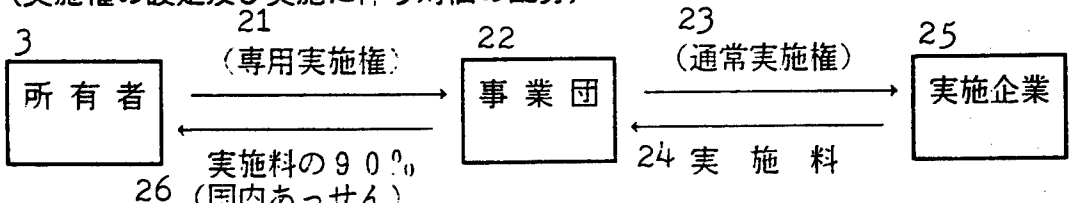
(C) Repayment: No repayment necessary. However, the disposition of the materials obtained from the technological process after the technological process is complete shall be determined by mutual agreement.

(D) Special Implementation Fee: In cases where the new technology for which the technological process fund was provided is implemented, an special implementation fee shall be paid to the JRDC which shall be a specified percentage of the royalties.

A (新技術の開発あっせんの流れ図)



B (実施権の設定及び実施に伴う対価の配分)



Key: A. (Flowchart for New-Technology Development Mediation) B. (Royalty Determination, Distribution of Fees Accompanying Implementation) 1. Technical guidance; 2. Royalties; 3. Owner; 4. University; 5. National laboratory; 6. Individual; 7. Other; 8. Royalties; 9. Corporation; 10. (New-technology mediation); 11. Evaluation survey; 12. New-technology mediator(s); 13. New Technology Report; 14. New technology conference(s); 15. Introductions from office(s); 16. Company; 17. Development; 18. Manufacture, sales; 19. Mediation promotion fee; 20. Special mediation fee; 21. (Exclusive right to use); 22. Corporation; 23. (Ordinary right to use); 24. Royalties; 25. Implementing company; 26. 90% of royalties (domestic)

(Appendix)

Mediated Development Tasks

I. Tasks Contracted in 1990—Research Corporation of Japan

Task	Researcher	Company or Companies Receiving Mediation
Radiated heat transmission analysis program	H. Taniguchi (Hokkaido U.), et al.	Daiko Denshi Tsushin KK (Daiko Telecommunications Co., Ltd.)
Charged particle beam generator	Y. Sakamoto (Toyo U.)	Nippon Koshuha KK (Japan High Frequency Co., Ltd.)
Thin-planar actuator using static electricity	H. Higuchi (Tokyo U.)	Shinozaki Seisakujo KK, Asumo KK, Fujitsu Ltd., Mitsubishi Chemical Industries Ltd.
STM precision positioning device using piezoelectric element(s)	H. Higuchi (Tokyo U.)	Mitsutoyo Ltd.
Short fiber coating technology	K. Horii (Shirayuri Women's College)	Akubi Kagaku Kogyo (Akubi Chemical Industries, Ltd.), Otsuka Chemical Co., Ltd.
Temperature distribution measuring device	M. Kamiwano (Yokohama National U.)	Soken Kagaku KK
Manufacturing technology for high-performance ferronitride magnetic fluid	K. Nakatani (National Research Institute for Metals)	Nippon Seiko KK, Eneoke KK, Otsuka Chemicals Co., Ltd., Tomoishi Seihin Gijutsu Kenkyujo, Nippon Pira Kogyo KK, Mitsubishi Petrochemical, Tabuchi Electric Co. Ltd., Nittetsu Mining Co.
Device for measuring minute quantities of impurities in gases	M. Waki (High Energy Physics Laboratory)	Iwaya Sangyo KK
Foam generator using Coanda spiral flow	K. Horii (Shirayuri Women's College)	C. Itho Fine Chemicals
Manufacturing technology for amorphous silica	K. Kosuga (Nat. Res. Inst. for Pollution & Resources)	Toho Oribin Kogyo KK
Metal mold surface treatment technology using photographic plate technique	H. Yoshiura (Gov. Indus. Res. Inst., Oita)	Nippon Kikinzoku (Nippon Precious Metals) KK, Oita Alloy Industries KK
Electrolytic polishing device	M. Kunieda (Tokyo U. of Ag. & Tech.)	Nagase Tekkojo (Nagase Steel)
High-resolution detector for vacuum ultraviolet light	Y. Suga (Osaka U.)	Huristic KK
Sucking device using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Yamaha Hatsudenki (Yahama Generator) KK
Manufacturing technology for high-performance ferronitride magnetic fluid	K. Nakatani (National Research Institute for Metals)	Asukaru KK
Refining technology for heat-resistant DNA ligase	T. Uchida (Mitsubishi Chemical Industries, Ltd.)	Toyobo KK
Device for testing wear-resistance of thin films	H. Yoshida (Institute of Phys. & Chem. Res.)	Shimadzu Corp.
Light scanning tunnel microscope	G. Otsu (Tokyo Inst. of Tech.)	Nikon KK
Tunnel-structure whisker manufacturing technology	Y. Fujiki (Nat. Inst. of Res. in Inorganic Materials)	Kubota Ltd., Otsuka Chemical Co., Ltd.
Temperature-gradient electric oven	S. Kinoshita (NKK)	Ishikawajima-Harima Heavy Industries
Mesbaur spectroscopic drive mechanism	N. Sakai (Inst. of Phys. & Chem. Res.)	Laboratory Equipment Corp.
Unit assembly frame	K. Suzuki (Nat. Inst. of Radiological Sciences)	Nakazawa Seisakujo KK
Manufacturing apparatus for radiating agent	K. Suzuki (Nat. Inst. of Radiological Sciences)	Sumitomo Heavy Industries, Ltd.
Multiangular pitot-tube probe analysis software	A. Nakatani (Nat. Aeronautical Lab.)	Rika Seiki Kogyo KK
Blower device using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Yamaha Hatsudoki KK

Remediated Tasks

Task	Researcher	Company or Companies Receiving Mediation
Metal particle manufacturing method	H. Suga (National Research Institute for Metals)	Hikari Sozai Kogyo KK
Logics gear	S. Nagata (Nippon Inst. of Tech.)	Fuji Koko KK

(Appendix) (Continued)

Remediated Tasks

Task	Researcher	Company or Companies Receiving Mediation
Powder transport using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Toa Kikai Kogyo KK, Kansai Kinzoku Kogyo KK
Needle-form barium ferrite for perpendicular magnetic recording medium	M. Sugimoto (Saitama U.)	Otsuka Chemical Co. Ltd.
Dolly for x-ray inspections	K. Kitahama	Nippon Auto-Running Systems KK
Wheelchair which permits defecation	K. Kitahama	Nippon Auto-Running Systems KK
Device for diagnosing brain function impairment	H. Nakamura (Tohoku U.)	Sun Frontier Technology KK
Technology for forming transparent colored films	K. Makishima (Nat. Inst. of Res. in Inorganic Materials)	Haimirra (High Mirror) KK
Thread supply control device for ring sewing machines	K. Matsuhara	Moromoto Seisakujo KK
Micro-moving device using piezoelectric elements	H. Higuchi (Tokyo U.)	Mitsubishi Chemical Industries Ltd., Onoda Cement KK
Technology for forming complex multi-layer films	Y. Murayama (Toyo U.)	Daiwa Tokin Kojo KK
Surface treatment technology using atmospheric-pressure plasmas	S. Okazaki (Sophia U.)	Kimototech KK
Lithium niobate elastic surface film piezoelectric base plate	K. Shibayama (Tohoku U.)	Pirukinton KK
Reverse-gravity filtering apparatus	K. Tokunaga	Nippon Ryutai Kogyo KK
Measuring equipment for ultra-microscopic life-form material	N. Kato	Seiki Denshi Kogyo (Seiki Electronic Industries)

II. Main Development-Mediation Tasks Up To 1990

1. Natural Resources, Energy

Task	Researcher	Company or Companies Receiving Mediation	Year
Single-valve wave power generator	Y. Masuda (Tech. Res. & Devel. Inst., Defense Agency)	Rokuseisha KK	1975
Ignition plug with built-in condenser	K. Yasui (Tokyo Inst. of Tech.)	Ekku KK	1978
Energy-saving technology for nursery facility	T. Fujii (Japan Garden Productivity Laboratory (Nippon Engei Seisanken))	Taiyo Kogyo KK	1979
Air conditioning system using metal hydrides	S. Ono (Kakengi)	Sekisui Kagaku Kogyo KK	1981
Incinerator	T. Koizumi (Tohoku Agricultural Testing Lab.)	Kansai Sangyo KK	1981
Iron-titanium-oxygen-based hydrogen-storing material	T. Amano (National Research Institute for Metals)	Daido Tokushuko (Daido Specialty Steel), Nippon Heavy Chemical Industries, Ltd., Mitsubishi Steel Mfg. Co., Ltd.	1982
Control system for plant growing facility	H. Nakazawa (Waseda U.)	Aiya KK	1984
Heat-insulating material structure	H. Ishimaru (High-Energy Physics Lab.)	Oike Kogyo (Oike Industries) KK	1984
Municipal gas manufacturing technology using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Buyo Gas KK	1987
Manufacturing method for fibroid spherical elements with attached out-flow tube	A. Nakamura	Taiyo Kogyo (Taiyo Industries) KK, Ikehara Kogyo	1988
Geothermal technology	S. Kimura (Agricultural & Engineering Testing Lab. (Nogyo Dobokushi))	Hisaku KK	1988
Downward-facing ventilated cupola	N. Ozaki (Ozaki Kogyo)	Netsugen Kogyo KK, Morikawa Sangyo KK	1988
Radiated heat transmission analysis program	H. Taniguchi (Hokkaido U.), et al.	Daiko Denshi Tsushin KK (Daiko Telecommunications Co., Ltd.)	1990

II. Main Development-Mediation Tasks Up To 1990 (Continued)

2. Medical, Pharmaceutical, Public Welfare (Including Biotechnology)

Task	Researcher	Company or Companies Receiving Mediation	Year
Delayed-wiring scintillation camera	E. Tanaka et al. (Nat. Inst. of Radiological Sciences)	Toshiba Ltd. Hitachi Medico Ltd.	1970 1973
Culture method for Naiseria bacteria	Y. Tsunematsu (Tokyo U.)	Eiken Kagaku KK	1974
Low-background liquid scintillation detector	Y. Kashida (Nat. Inst. of Radiological Sciences)	Aroka KK	1975
Fibrin-dissolving enzyme manufacturing method	A. Muramatsu et al. (Tokushima Bunri U.)	Godo Shoji KK	1976
Manufacture of life-form models for medical training	I. Kirigae (Jichi Med. School)	Koken KK	1977
Manufacture of pain-sensation measuring instrument	H. Nakahama (Tohoku U.)	Koto Denki KK	1977
Manufacture of silicone double waste-liquid tube	T. Inaba (Tokyo Med. & Dental U.)	Dow Corning KK	1977
Urokinase manufacturing method	T. Yamamoto (Osaka Metro U.)	Japan Pollution Control Center	1979
Medical tool holder	T. Inaba (Tokyo Med. & Dental U.)	Owa Tsusho KK	1979
Needle-form colloid osmosis pressure measuring device	M. Kakiuchi (Hokkaido U.)	Omron KK Seiseido Iryoki Kogyo KK	1979 1983
External blood circulating apparatus for skin and fat transplant	N. Shiodani et al. (Hokuri U.)	Arukomu KK	1979
Vaccine for pyocyanosis	M. Honma et al. (Tokyo U.)	Hokuri Research Inst.	1979
Artificial respirator using biomorph vibrator pump	T. Narasaki (Nat. Aeronautical Lab.)	Senko Ika Kogyo KK	1981
Argon laser irradiation device for endoscope	T. Kato (Electrotech. Lab.)	Aroka KK	1982
Porous apatite molded body manufacturing method	H. Kadoma (Nat. Inst. of Res. in Inorganic Materials)	Sankin Industries Ltd.	1982
Laser beam coalescing device	T. Kato (Electrotech. Lab.)	Nidekku KK	1982
Liquid injection/extraction device for anesthesia aspirator	M. Sato (Tottori U.)	Akoma Ika Kogyo KK	1984
Apatite cement curing method	H. Kadoma (Nat. Inst. of Res. in Inorganic Materials)	Sankin Industries Ltd. Onoda Cement KK	1984 1986
Electric stimulation training and treatment apparatus	Y. Handa (Shinshu U.)	Engineering Systems KK Nippon Denki Sanei KK	1984 1988
Method of manufacturing hardened products of calcium phosphate cement for dental and orthopedic prosthetics	H. Kadoma (Nat. Inst. Res. in Inorganic Materials)	Dainippon Toryo (Dai-Nippon Paint) KK	1986
Method of manufacturing metal denture plates	H. Yamada (Kyoto U.)	Toho Seisakujo KK Nakashima Propeller KK Nippon Kokan KK	1986 1987 1989
Active endoscope	S. Kise (Tokyo Inst. of Tech.)	Olympus Optical Co., Ltd.	1987
Urination impairment treatment device	Y. Yanda (Shinshu U.)	Eiji KK	1987
Diagnostic reagent for testing fetus/uterus functions	A. Kubodera (Science U. of Tokyo)	Nippon Mediphysics KK	1987
Method of manufacturing material for electric swimming analysis	T. Ogawa (Fuji Photo Film Co., Ltd.)	Fuji Photo Film Co., Ltd.	1987
Small experimental respiration collection device	A. Suzuki (Nat. Res. Inst. for Pollution & Resources)	Shinano Seisakujo KK	1987
Dolly for x-ray examinations	K. Kitahama	Eiji KK Nippon Auto-Running Systems KK	1987 1990

II. Main Development-Mediation Tasks Up To 1990 (Continued)

2. Medical, Pharmaceutical, Public Welfare (Including Biotechnology)

Task	Researcher	Company or Companies Receiving Mediation	Year
Wheelchair which permits defecation	K. Kitahama	Eiji KK Nippon Auto-Running Systems KK	1987 1990
Body turning apparatus	K. Kitahama	Eiji KK	1987
Monochronal antibody	S. Hinuma (Kyoto U.)	Fuji Rebio KK	1987
Apatite-hydrate powder manufacturing method	H. Kadoma (Nat. Inst. of Res. in Inorganic Materials)	Japan Steel Works, Ltd.	1987
Immune reaction measuring device	T. Musha (Tokyo Inst. of Tech.)	Olympus Optical Co., Ltd.	1987
Brain function diagnostic device	H. Nakamura (Tohoku U.)	Toyobo Seiko Denshi Kogyo KK San Frontier Technology KK	1988 1989 1990
Anesthesia apparatus employing mass flow control	A. Ishida (Tokyo Med. & Dental College)	Aika KK	1988
Pump for artificial heart and lung machine	K. Doi (Waseda U.)	Tonokura Ika Kogyo KK	1988
Simplified 3D imaging device	S. Yoshii (Yamanashi Medical School)	Japan EM KK	1988
Optical trauma-treatment device	F. Inaba (Tohoku U.)	Hamamatsu Photonics KK	1988
Phantom using material similar to soft human tissue	T. Hiraoka (Nat. Inst. of Radiological Sciences)	Kyoto Kagaku KK	1988
Gamma-ray dosage correcting device using positron CT	E. Tanaka (Nat. Inst. of Radiological Sciences)	Hitachi Medico Ltd.	1988
Measuring method for ATLA antibodies	T. Hinuma (Kyoto U.)	Medical & Biological Res. Inst. KK	1988
Crescent sewing instrument for knee joints	H. Wataai (Teikyo U.)	Iso Medical Instruments KK	1988
Manufacturing technology for copolymer composite featuring slow breakdown of radioactive substance	T. Asano (JAERI)	Tagi Chemical KK	1989
Measuring device for ultra-microbe substances	N. Kato (Tokyo U.)	Funakoshi Pharmaceutical KK Seiko Electronic Industries, Ltd.	1989 1990
Technology for refining limited endonuclease	T. Uchida (Mitsubishi Chem. Indus. Ltd.)	Mitsubishi Chem. Indus. Ltd.	1989
Technology for refining heat-resistant DNA ligase	T. Uchida (Mitsubishi Chem. Indus. Ltd.)	Toyobo Ltd.	1990
Radioactive medical agent manufacturing apparatus	K. Suzuki (Nat. Inst. of Radiological Sciences)	Sumitomo Heavy Industries, Ltd.	1990

3. Municipal, Construction, Transportation

Task	Researcher	Company or Companies Receiving Mediation	Year
Soil bearing capacity measuring device	N. Kaneko (Tech. Res. & Devel. Inst., Defense Agency)	Tanifuji Machine Industries KK	1972
Steel frame with couplers and assembly method	S. Shimura	Kobe Steel	1974
Ring cutter	M. Takaoka (Nat. Res. Inst. for Pollution & Resources)	Koga Mining	1974
Rust-prevention method for concrete metal forms	T. Shibata (OIT)	Polymer Chemistry Res. Inst.	1975
Composition for hardening ground	N. Kojima (Chuo Geological Consultants KK)	Nippon Cement	1977
Cut fiber for steel-fiber-reinforced concrete	T. Nakagawa (Tokyo U.)	Aida Engineering Kobe Steel	1977 1979
Steel-reinforced concrete structure prefab technology	S. Shimura	Kobe Steel Sumitomo Metal Industries Tokyo Senko	1978 1978 1986

II. Main Development-Mediation Tasks Up To 1990 (Continued)

3. Municipal, Construction, Transportation

Task	Researcher	Company or Companies Receiving Mediation	Year
Automatic open-water-passage measuring & hydrolysis device	K. Minami (Kyoto U.)	Kyonan Erekusu Marushima Aqua-systems Yoshida Tekkojo	1978 1978 1987
Device for connecting couplers and steel frame	S. Shimura	Kobe Steel, Sumitomo Metal Industries	1978
Emergency bridge	K. Adachi (Tech. Res. & Devel. Inst., Defense Agency)	Nippon Aluminum Industries	1980
Testing device for ground survey	N. Ohara (Geological Survey Inst.)	Tanifuji Machine Industries	1981
Vacuum storage facility made of concrete	O. Hayashi (Nippon Vacuum Technology)	Takenaka Komuten	1983
Floating ocean station	T. Tadake (Kyushu U.)	Mitsui Ocean Development	1983
Hole digging machine	A. Senda (Pub. Works Res. Inst.)	Nisseki, Nittoku Kensetsu, Nippon Hyumukan, Kato Kensetsu	1984
Caisson installation technique	S. Senda (Pub. Works Res. Inst.)	Nisseki, Nittoku Kensetsu, Nippon Hyumukan, Kato Kensetsu Taisei Kensetsu, Obayashigumi Okumuragumi and 8 more companies Sumitomo Construction and 11 more companies Takenaka Doboku and 5 more companies	1984 1985 1986 1987 1989
Slurry mud treatment apparatus	S. Senda (Pub. Works Res. Inst.)	Toa Machine Industries	1987
Snow flowing channel	S. Senda (Pub. Works Res. Inst.)	Mitsubishi Consultants	1988
Technology for manufacturing building material made of fly ash	T. Tozaka (Yamaguchi U.)	Ishikawa Seito	1989
Compost toilet	H. Shimizu (Iwate U.)	Bio Kogaku	1989
Soundproof wall	S. Fujiwara (Kyushu Inst. of Design)	Tokyo Rope Mfg. Co.	1989

4. Environmental Protection, Disaster Prevention

Task	Researcher	Company or Companies Receiving Mediation	Year
Fire detection head which uses resonant radiation of flame	K. Nakashima (Fire Defense Res. Inst.)	Ubo Bosai Kogyo	1970
Industrial waste water treatment method using polymer coagulant	N. Shikazono (Gov. Indus. Res. Inst., Tokyo)	Dai-Ichi Kogyo Seiyaku	1972
Rain meter	Y. Hosono (Fire Defense Res. Inst.)	Nakaasa Sokki, Ogasawara Keiki Seisakujo	1973
Foam assimilation agent	M. Hoshino (Fire Defense Res. Inst.)	Musashino Kogyo	1973
Oxygen-generating lifesaving mask	T. Takahashi (Fire Defense Res. Inst.)	Shigematsu Seisakujo	1974
Technology for treating waste water containing PVA	M. Ozono (Fermentation Res. Inst.)	Kuraray	1976
Device for purifying gasses containing organic solvents	H. Tamura (Indus. Creative Res. Inst.)	Tokyo Scientific Instruments	1976
Ground stability enhancement technique using anti-stretch materials	M. Fukuoka (Pub. Works Res. Inst.)	Kumayagumi Okamitsu Kogyo Fudo Kensetsu Construction Planning Consultants	1977 1982 1985 1986
Deodorant using thermophilic microbe masses	K. Hayashi (High Max)	Daiseru	1978
Deodorizing technology based on thermophilic microbe masses	K. Hayashi (High Max)	Max Minichemicals	1978
Technology for reducing nitrogen oxides	O. Ishii (Nagoya U.)	Sun Ray Cooling & Heating	1978
Water-jet water-surface purification device	H. Ishizuka (Waterway Technol Res. Inst.)	Mitsubishi Heavy Industries Toa Tekko, Kure Mechanical Industries	1978 1989

II. Main Development-Mediation Tasks Up To 1990 (Continued)

4. Environmental Protection, Disaster Prevention

Task	Researcher	Company or Companies Receiving Mediation	Year
Method of incinerating organic materials for mercury analysis	K. Horimoto (National Chemical Laboratory for Industry)	Sugiyama Moto Iriki	1979
Device for treating combustible wastes	S. Wakabayashi (Tech. Res. & Devel. Inst., Defense Agency)	Mitsui Eng. & Shipbuilding	1979
Rubbish incinerator	S. Wakabayashi (Tech. Res. & Devel. Inst., Defense Agency)	Mitsui Eng. & Shipbuilding	1979
Magnetic oil/water separator	E. Nagata et al. (Tech. Res. & Devel. Inst., Defense Agency)	Miura Kagaku Sochi (Miura Chemical Equipment) KK	1979
Automatic explosion-propagation prevention apparatus	Y. Matsukuma (Nat. Res. Inst. for Pollution & Resources)	Ueno Seisakujo	1980
Inorganic nitrogenic measuring technique	K. Hiiro (Gov. Indus. Res. Inst., Osaka)	Operex Kimoto Denshi Kogyo	1980 1983
Waste-water treatment technology for photosensitive resin panels containing PVA	S. Suzuki (Fermentation Res. Inst.)	Kuraray	1980
Ornament containing agent to extinguish tempura oil fires	T. Suzuki (Nagoya Fire Dept.)	Rekku	1981
Sewage treatment using anaerobic, aerobic high-concentration active sludge method	S. Hashimoto (Osaka U.)	Takuma	1981
Air purification device	M. Kawashima	Nippon Electric, Koken Nichiere	1982 1985
Foam fire extinguishing agent	H. Kobayashi (Arubesu)	Shin-Nippon Rika	1983
Insulated underwater suit	T. Suzuki (Tech. Res. & Devel. Inst., Defense Agency)	Fujikura Koso KK	1985
Electric-field inducing filter-type air purification device	M. Yanagikawa	Ishimori Seisakujo Denki Kogyo Minamiichi Air Tech., MOM,	1985 1987 1988
Technology for treating waste water containing phenols	Y. Kaneko (Nagoya U.)	Sanko Seisakujo	1987
Electrostatic dust removal device	M. Yanagikawa	Seidensha	1987
Thin-cake layer filtering device	M. Shirado (Nagoya U.)	Nakagawa Chemical Equipment	1987
Tool for recovering underwater samples	K. Satake (Nat. Res. Inst. for Pollution & Resources)	Rigosha	1988
Snow melting system for roofs	T. Nakagawa (Kanezawa Inst. of Tech.)	Kokusai Chiken	1988
Structure of rainwater holding materials and method for building flood control basins	M. Arami	Sanwa Jushi Kakosho, Daiko Shoji	1988
Manufacture of volcanic ash soil containing organic materials and building of contaminated water purification system	M. Arami	Sanwa Jushi Kakosho, Daiko Shoji	1988
Plant plankton monitor	M. Nanjo (Electrotechnical Lab.)	Mitsubishi Cable Indus.	1989

5. Food, Agriculture, Forestry, Fisheries

Task	Researcher	Company or Companies Receiving Mediation	Year
Sucrose denaturing technology using oxygen method	Y. Sato (Nat. Food Res. Inst.)	Nagase Seikagaku Kogyo and 4 other companies Nippon Shokuhin Kako	1971 1975
Method of manufacturing matsutake (mushroom) alcohol	Y. Fujita (Gov. Indus. Res. Inst., Osaka)	Kanto Koatsu Kagaku	1971
Technology for manufacturing soluble potassium fertilizer	K. Suzuki (Gov. Indus. Res. Inst., Tokyo)	Nisso Kinzoku	1971
Roach attraction agent	S. Ishii (Kyoto U.)	Sanbun Yuka	1971
Potato digger	K. Sato (Central Ag. Exper. Stn.)	Nakamura Seisakujo	1976

II. Main Development-Mediation Tasks Up To 1990 (Continued)

5. Food, Agriculture, Forestry, Fisheries

Task	Researcher	Company or Companies Receiving Mediation	Year
Root harvester	T. Imazono (Central Ag. Exper. Stn.)	Ishikawajima-Shibaura Machine Keibunsha Seisakujo	1979
Momoshinkuiga pheromone	K. Yushima (Nat. Inst. of Ag. Sciences)	Earth Pharmaceuticals, Shinetsu Chemical Indus., Takeda Pharmaceutical	1981
Technology for manufacturing microbe coagulant	R. Kurane (Fermentation Res. Inst.)	Nagase Seikagaku Kogyo	1981
Lumber treatment technique	G. Sugiura (Forestry Testing)	Nitamura Forestry Asso., Shimane Prefec. Shimokawamura Forestry Asso., Hokkaido	1985 1987
Automatic selective waste-water salt-removal device	K. Minami (Kyoto U.)	Nikko Gate Yoshida Steel	1986 1988
Hydronecotine separation & refining method	M. Hayashi (Ochanomizu U.)	Koken Ito Ham	1987 1987
Method of manufacturing transparent egg white	N. Kitabatake (Kyoto U.)	Otsuka Chemical	1987
Plant freshness preservative	T. Yoshida (Kinki U.)	Mushugen Kogyo	1989

6. Industry

(1) Electric, Electronic, Physics

Task	Researcher	Company or Companies Receiving Mediation	Year
High-tech transistor watch	S. Kawarada (Magnetic Applications Res. Inst.)	Yamaguchi Toyo Tokei	1964
Method of preventing burning loss in semiconductors	S. Saito (Aoyama Gakuin)	Oizumi Seisakujo	1969
Method of manufacturing metal thin-film resistors using vacuum deposition	K. Katsube (Gov. Indus. Res. Inst., Osaka)	Riken Dengu Seizo	1970
Superconductor wire	H. Mori (Electrotech. Lab.)	Shinku Jigane	1971
Technology for manufacturing wire for superconductor magnets	S. Futabagawa (National Research Institute for Metals)	Shinku Jigane, Sumitomo Electric Indus., Furukawa Elec. Indus. Hitachi Cable	1974 1985
Microwave automatic tracking system	N. Nakahashi (Radio Res. Lab.)	NEC	1976
Technology for manufacturing piezo-electric elements	K. Nishida (National Research Institute for Metals)	Yamatake Honeywell	1976
Method of manufacturing Nb_3Sn composite superconductor	S. Futabagawa (National Research Institute for Metals)	Furukawa Elec. Indus. Hitachi Cable Kobe Steel Sumitomo Elec. Indus.	1979 1981 9183 1989
Underwater suspension cable	A. Nagayama (Tech. Res. & Devel. Inst., Defense Agency)	Fujikura Cable	1980
Silver-zinc internal oxide alloy contact material	H. Sato (National Research Institute for Metals)	Tokuriki Honten	1980
Manufacture of P-type piezoelectric element for high-temperature use	K. Nishida (National Research Institute for Metals)	TDK Komatsu Electronics, Tottori Sanyo Denki Idemitsu Petrochemical	1980 1982 1989
Microwave-band radiowave absorbing paint	A. Kishimoto, T. Yoshino (Tech. Res. & Devel. Inst., Defense Agency)	TDK	1982
Method of manufacturing wire-form polymer	R. Yamamoto (Tokyo Inst. of Tech.)	Showa Denko	1982
Semiconductor position detector	K. Fushimi (Tokyo U.)	Tokyo Nuctronics	1983
Peak hold amp	K. Nigi (Electrotech. Lab.)	Zebekku	1983
Temperature sensor	M. Kimura (Tohoku Gakuin U.)	Ishizuka Electronics	1984

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(1) Electric, Electronic, Physics

Task	Researcher	Company or Companies Receiving Mediation	Year
Glass-fiber light transmission channel	O. Kato (Electrotech. Lab.)	Fujikura Cable, Mitsubishi Cable Indus., Showa Densen Denki, Hitachi Cable, Sumitomo Electric Indus.	1985
Thermoelectric generating material	K. Nishida (National Research Institute for Metals)	Komatsu Electronics Daiwa Shinku Kogyo	1985 1987
Vertical magnetic recording and play-back head	S. Iwazaki (Tohoku U.)	Kao	1986
Electromagnetic coil	H. Sasaki (High-Energy Physics Res. Inst.)	Hitachi Cable	1986
Needle-form barrium ferrite for vertical magnetic recording medium	M. Sugimoto (Saitama U.)	Kanto Denka Kogyo Otsuka Chemical	1986 1990
Technology for manufacturing magnetic resistor element thin film	M. Oshita (Shizuoka U.)	Nippon Automation	1988
Lithium niobate elastic surface film piezoelectric base plate	K. Shibayama (Tohoku U.)	Crystal Technology Pirukinton	1988 1990
Vacuum beam duct for particle accelerator	H. Ishimaru (High-Energy Physics Res. Inst.)	Ishikawajima-Harima Heavy Industries	1989
Audio treatment apparatus	S. Suzuki (Gen. Telecom. Res. Inst.)	Mitsui Eng. & Shipbuilding	1989
High-frequency power supply output stabilizing device	S. Otani (Nat. Inst. of Res. in Inorganic Materials)	Seidensha Electronics	1989
False terite solid laser host	K. Yamagishi (Mitsui Mining & Smelting)	Mitsui Mining & Smelting	1989
Optical force sensor	S. Hirose (Tokyo Inst. of Tech.)	Nitta	1989

(2) Chemicals, Ceramics (Including Biotechnology)

Task	Researcher	Company or Companies Receiving Mediation	Year
Phthalocyanin pigment manufacturing method	Y. Bansho (Gov. Indus. Res. Inst., Tokyo)	Dainichiseiki Colour & Chemicals	1970
Beryllium compound refining technique	H. Suzuki (Nat. Inst. of Res. in Inorganic Materials)	Nippon Glass	1973
Quick method for making graphite from amorphous carbon	H. Honda (Nat. Res. Inst. for Pollution & Resources)	Tanken Seiko	1974
Acrylic photosensitive resin	K. Kawaai (Gov. Indus. Res. Inst., Osaka)	Sanpo Chemical Res. Inst.	1975
Carbonyl compound manufacturing method	M. Mukaiyama (Tokyo U.)	Shinetsu Chemical Indus.	1977
Method of manufacturing fibroid alkali-metal titanate	Y. Fujiki (Nat. Inst. of Res. in Inorganic Materials)	Otsuka Chemical	1977
Method of manufacturing magnesium titanate monocrystals	O. Shinto (Nat. Inst. of Res. in Inorganic Materials)	Shinkosha Asukaru	1978 1984
Opal-form substance manufacturing method	K. Shimodaira (Nat. Inst. of Res. in Inorganic Materials)	Shinkosha	1978
Method of manufacturing pentenic-acid esters	A. Matsuda (Nat. Chem. Lab. for Indus.)	Ihara Chemical Industries	1979
Manufacture of high-density chromium oxide sintered body	A. Yamaguchi (Nagoya U.)	Nippon Chemical Industrial Co.	1979
Explosive composition	S. Fujiwara (Nat. Chem. Lab. for Indus.)	Hosotani Kako	1980
Method of manufacturing fibroid alkali-metal titanate (melt method)	Y. Fujiki (Nat. Inst. of Res. in Inorganic Materials)	Otsuka Chemical	1980
Method of manufacturing orthoganal crystalline boron nitrate	T. Endo (Nat. Inst. of Res. in Inorganic Materials)	Showa Denko	1980

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(2) Chemicals, Ceramics (Including Biotechnology)

Task	Researcher	Company or Companies Receiving Mediation	Year
Method of manufacturing cyclodextrin crosslinked derivative	A. Makino (Tohoku U.)	Seikagaku Kogyo	1980
Method of manufacturing chromium oxide sintered body and refractory material	A. Yamaguchi (Nagoya Inst. of Tech.)	Nippon Chemical Industrial Co.	1980
Method of manufacturing silicon carbide sintered body	Y. Inomata (Nat. Inst. of Res. in Inorganic Materials)	Nippon Pira Kogyo Taiheiyo Random, Ibiden Nippon Fine Ceramics Sumitomo Metal Industries	1980 1984 1986 1989
Manufacture of low-melting-point expansion glass composition	S. Imano (Nat. Inst. of Res. in Inorganic Materials)	Shibata Halio Glass	1980
Method of manufacturing photosensitive resin	S. Tabu (Res. Inst. for Polymers & Textiles)	Shin-Nisso Kako	1980
Electron carrier	T. Yagi (Shizuoka U.)	Yatoron, Kokusai Shiyaku	1980
Method of manufacturing fine spheroid silica gel	Y. Morita (Nat. Chem. Lab. for Indus.)	Jyado	1980
Manufacture and use of thermoplastic resin filler	S. Onishi (Res. Inst. for Polymers & Textiles)	Nippon Firaito	1980
Development of reagents for synthesis of photo-active alcohols	M. Mukaiyama (Tokyo U.)	Tokyo Chemical Industrial Co.	1981
Alumino-silicate glass	Y. Hasegawa (Nat. Inst. of Res. in Inorganic Materials)	Hoya	1981
Technology for manufacturing electrically conductive polyacetylene	H. Ikeda (Tokyo Inst. of Tech.)	Showa Denko	1981
Self-enhancing photosensitive material	T. Nishikubo (Kanagawa U.)	Sekisui Fine Chemical	1981
High-pressure floating band melting apparatus	O. Shinto (Nat. Inst. of Res. in Inorganic Materials)	Yukei Denki Seisakujo	1981
Solvent moving-type monocrystal lift device	O. Shinto (Nat. Inst. of Res. in Inorganic Materials)	Yukei Denki Seisakujo Asukaru Seidensha Electronics	1981 1984 1989
Method of manufacturing oxides using chemical phase separation	K. Kaneda (Nagaoka Tech.)	Rikuun Denki	1982
Method of manufacturing high-quality cubic crystalline boron nitrides	T. Endo (Nat. Inst. of Res. in Inorganic Materials)	Showa Denko	1982
Sonic floating band melting apparatus	O. Shinto (Nat. Inst. of Res. in Inorganic Materials)	Yukei Denki Seisakujo	1982
Monocrystal growing technique for inorganic composite oxides	M. Tsukiminami (Nat. Inst. of Res. in Inorganic Materials)	Tagi Chemical	1983
Heat-resistant alumino-silicate glass	Y. Hasegawa (Nat. Inst. of Res. in Inorganic Materials)	Hoya	1983
Method of manufacturing high-purity cubic boron nitride sintered body	T. Endo (Nat. Inst. of Res. in Inorganic Materials)	Sumitomo Electrical Industries	1983
Oil composition	T. Makishima (Nat. Inst. of Res. in Inorganic Materials)	Inakkusu	1983
Film separation method	K. Watanabe (Nat. Food Res. Inst.)	Awata Kogyo	1983
Fine short fiber sintered polishing material	N. Nakagawa (Tokyo U.)	Shinto Plater	1983
Polymer filler	Y. Kumaya (Nat. Food Res. Inst.)	Sanken Kako	1984
Titanate fiber manufacturing method	Y. Fujiki (Nat. Inst. of Res. in Inorganic Materials)	Kubota	1984
Method of manufacturing colored transparent alumina	Y. Moriyoshi (Nat. Inst. of Res. in Inorganic Materials)	Hokiriku Yogyo	1984

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(2) Chemicals, Ceramics (Including Biotechnology)

Task	Researcher	Company or Companies Receiving Mediation	Year
Manufacturing method for beta-type silicon carbide	H. Tanaka (Nat. Inst. of Res. in Inorganic Materials)	Bridgestone Tokai Konetsu Kogyo Sumitomo Metal Indus.	1984 1988 1989
Zirconia or thoria pipe-shaped electric furnace	K. Hirota (Nat. Inst. of Res. in Inorganic Materials)	TEP	1984
Method of manufacturing giant molydenum crystals	T. Fujii (National Research Institute for Metals)	Tokyo Tungsten, Nippon Mining	1985
Manufacture of bismuth compound composite polycrystals	M. Okubo (Kyoto U.)	Sapporo Ikuseidan	1985
Method of sintering cubic crystalline silicon carbide powder	Y. Inomata (Nat. Inst. of Res. in Inorganic Materials)	Nippon Pira Kogyo Eagle Industries	1985 1986
Freeze-molding method	N. Nakagawa (Tokyo U.)	Mitsubishi Trading Co.	1985
Ceramic molding method	H. Kobayashi (Tekko Jr. Col.)	Kobe Cast Iron Works	1985
Sterilization device	K. Yanagigase (Kyusan U.)	Nippon Karitto, Awamura Seisakujo	1985
Composite material mixing method	K. Horii (Shirayuri Women's College)	Akubi Kagaku Kogyo	1986
Technology for manufacturing high-quality black oxide coatings	Y. Murayama (Toyo U.)	Daiwa Tokin Kojo	1986
Supply and recovery apparatus for ultra-high-purity oxygen isotopes	K. Nakamura (National Research Institute for Metals)	Kusano Kagaku Kikai Seisakujo	1986
Method of manufacturing benzoic acid derivatives	Y. Ikeda (Nat. Chem. Lab. for Indus.)	Kanran Yakuhin Kogyo	1986
Technology for manufacturing rutile monocrystals	S. Kimura (Nat. Inst. of Res. in Inorganic Materials)	Chichibu Cement Kamaishi Kosan	1986 1988
Vacuum arc reactive vapor deposition apparatus	J. Arano (National Research Institute for Metals)	Kobe Steel	1986
Radiation-concentrating heating apparatus	O. Shindo (Nat. Inst. of Res. in Inorganic Materials)	Asukaru	1986
Method of manufacturing pyroelectric magnetic thin film	G. Takahashi (Nat. Inst. of Res. in Inorganic Materials)	Sumitomo Metals & Mining	1986
High-pressure heating device	K. Hirota (Nat. Inst. of Res. in Inorganic Materials)	Mitsubishi Heavy Industries	1986
Active variety generator	S. Okazaki (Sophia U.)	Kusano Kagaku Kikai Saisakujo	1986
High-quality LB film manufacturing apparatus	K. Miyata (Tokyo Ag. & Tech. U.)	Nippon Laser Electronics	1987
Technology for joining ceramics and metals	Y. Iseki (Tokyo Inst. of Tech.)	Tokai Konetsu Kogyo	1987
Technology for manufacturing polythenilline exhibiting good solubility and electrical conductivity	R. Yamamoto (Tokyo Inst. of Tech.)	Showa Denko	1987
Technology for manufacturing heat-resistant aromatic polyamide imide resins	Y. Imai (Tokyo Inst. of Tech.)	Sanken Kako	1987
Technology for manufacturing soluble aromatic polyamide resins	Y. Imai (Tokyo Inst. of Tech.)	Sanken Kako	1987
Technology for manufacturing artificial lacquer	A. Terada (Kyushu Inst. of Tech.)	Dokai Kagaku Kogyo	1987
Technology for manufacturing polyimide resins containing thiophene	Y. Imai (Tokyo Inst. of Tech.)	Sanken Kako	1987
Technology for manufacturing ceramic coated bodies	T. Tokushima (National Research Institute for Metals)	Nara Kikai Seisakuju	1987

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(2) Chemicals, Ceramics (Including Biotechnology)

Task	Researcher	Company or Companies Receiving Mediation	Year
Transparent colored film forming technology	K. Makishima (Nat. Inst. of Res. in Inorganic Materials)	Okamoto Glass Shinagawa Refractories High Mirror	1988 1989 1990
Technology for manufacturing compounds by self-propagating high-temperature synthesis	Y. Ueda (National Research Institute for Metals)	Kyoritsu Yogyo Genryo	1988
Technology for manufacturing carbon-fiber reinforced cement composite material	A. Kojima (Gunma Tech. High School)	Inax Corp.	1988
Technology for manufacturing polyazomethene resin	Y. Imai (Tokyo Inst. of Tech.)	Sanken Kako	1988
Mono-domain LB film manufacturing apparatus	K. Miyata (Tokyo Ag. & Tech. U.)	Nippon Laser Electronics	1988
Composite multi-layer film forming technology	Y. Murayama (Toyo U.)	Orient Watch Co. Daiwa Tokin Kojo	1988 1990
Technology for joining graphite and metals	S. Ishiyama (JAERI)	Toyo Carbon	1988
Technology for manufacturing ferromagnetic organic compounds	S. Otani (Gunma U.)	Osaka Gas	1988
Calcium phosphate water-hardening cement composition	H. Kadomi (Nat. Inst. of Res. in Inorganic Materials)	Mitsubishi Material	1988
Surface treatment technology based on atmospheric-pressure plasma	S. Okazaki (Sophia U.)	EC Chemical Industries, Kobe Electric, Sumitomo Precision Industries Sumitomo Heavy Indus., Sun Frontier Technology Kimoto Tech.	1988 1989 1990
Decorative colored coating forming technology	Y. Murayama (Toyo U.)	Mizuno Kakugankyo	1989
Technology for manufacturing epoxy acrylic rubber	T. Nishikubo (Kanagawa U.)	Nippon Mechtron	1989
Method of manufacturing heat-resistant, alkali-resistant alumino-silicate glass	T. Makishima (Nat. Inst. of Res. in Inorganic Materials)	Nippon Clean Gauge	1989
Directional laminar unimolecular film manufacturing apparatus	K. Miyata (Tokyo Ag. & Tech. U.)	Nippon laser electronics	1989
Technology for manufacturing organic compounds using glow-discharge plasmas at atmospheric pressure	S. Okazaki (Sophia U.)	Otsuka Chemical	1989
Short fiber coating treatment technology	K. Horii (Shirayuri Women's College)	Akubi Kagaku Kogyo, Otsuka Chemical	1990
Amorphous silica manufacturing method	K. Osuga (Nat. Res. Inst. for Pollution & Resources)	Toho Oribin Kogyo	1990
Technology for manufacturing tunnel-structure whiskers	Y. Fujiki (Nat. Inst. of Res. in Inorganic Materials)	Kubota, Otsuka Chemical	1990

(3) Metals

Task	Researcher	Company or Companies Receiving Mediation	Year
Liquid spray unit	A. Tamura (National Research Institute for Metals)	Nippon Atomize Kako, Kawasaki Steel Nippon Shinkinzoku Nippon Kokan, Sumitomo Metal Indus.	1969 1970 1979
Electrical joining alloy	M. Tanaka (Electrotech. Lab.)	Chisumi Metal Industries	1969
High-Mn high-nitrogen heat-resistant alloy steel	R. Ida (Nat. Res. Inst. for Metals)	Riken	1972
Oxidation-resistant magnetic powder	K. Kimura (Nat. Res. Inst. for Metals)	Taiyo Bussan	1974
Technology for manufacturing low-apparent-density steel powder	A. Tamura (Nat. Res. Inst. for Metals)	Nippon Atomize Kako	1974

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(3) Metals

Task	Researcher	Company or Companies Receiving Mediation	Year
Device for testing properties of metallurgical raw materials	Y. Omori (Tohoku U.)	Nishimura Kogyo	1976
Titanium acid-removal regulation steel	H. Araki (Nat. Res. Inst. for Metals)	Kobe Steel	1976
Silver-based alloy contact material containing oxides of rare-earth elements	I. Morimoto (Nat. Res. Inst. for Metals)	Tokuriki Honten	1976
Heat-resistant copper alloy	M. Tanaka (Electrotech. Lab.)	Ishifuku Kinzoku Kogyo	1977
Multi-color treatment technology for aluminum anodized film	K. Wada (Nat. Inst. of Res. in Inorganic Materials)	Sekido Seisakujo Toho Meiban	1978 1986
Composite powder manufacturing method	A. Tamura (Nat. Res. Inst. for Metals)	Nippon Atomize Kako Mitsubishi Material Nihon Solder	1979 1980 1982
Technology for manufacturing short metal fibers	N. Nakagawa (Tokyo U.)	Aishin Seiki, Sumitomo Electric Indus. Tokyo Steel, Toyo Cable, Kobe Cast Iron Nippon Cable	1980 1981 1982
Metal modifying agent	M. Ikebe	Himenuma Chuzo	1982
High-quality diecast product manufacturing technology	M. Kiuchi (Tokyo U.)	Taiyo Kiken Kogyo	1982
Fine metal granule manufacturing apparatus	Y. Uda (Nat. Res. Inst. for Metals)	Daia Shinku, Hosokawa Micron Fuji Denpa Koki, Hitachi Ltd.	1983 1985
Flame-coating pressurized sintering method	K. Okane (Nat. Res. Inst. for Metals)	Rasa Kogyo	1983
Method of manufacturing fine metal granules	Y. Uda (Nat. Res. Inst. for Metals)	Mitsui Metal Indus., Tokyo Steel Daido Special Steels Taiheiyo Kinzoku Idemitsu Petrochemical Nisshin Steel	1983 1984 1985 1986 1987
Method of manufacturing fine metal granules	H. Suga (Nat. Res. Inst. for Metals)	Ishifuku Kinzoku Kogyo and 9 other companies	1983 1983-1990
Continuous vacuum or gas atmosphere arc melting furnace	H. Suga (Nat. Res. Inst. for Metals)	Mineruba Kiki	1983
Method of manufacturing fiber-diffused Nb_3Sn superconductor wire	S. Tachikawa (Nat. Res. Inst. for Metals)	Furukawa Electric Indus.	1983
Metal surface multi-coloring method	K. Makishima (Nat. Inst. of Res. in Inorganic Materials)	Hibi Yukosha	1983 1987
Method of manufacturing fibroid alkali-metal titanates (gradual-cooling technique)	Y. Fujiki (Nat. Inst. of Res. in Inorganic Materials)	Otsuka Chemical	1983
Fiber sintered type self-lubricating sliding material	N. Nakagawa (Tokyo U.)	Shinto Plater, Kobe Cast Iron	1984
Super-vacuum aluminum material treatment process	H. Ishimaru (High-Energy Physics Lab.)	Hakudo Fuji Seiko SMC	1984 1984 1987
Method of manufacturing tough molydenum material	H. Hiraoka (Nat. Res. Inst. for Metals)	Toho Kinzoku	1984
Manufacturing method magnetic fluid	K. Nakatani (Nat. Res. Inst. for Metals)	NOK and 11 other companies	1986-1988
Magnetic fluid manufacturing apparatus	K. Nakatani (Nat. Res. Inst. for Metals)	Showa Shinku	1986
Charged machined surface precision finishing device	T. Masuzawa (Tokyo U.)	Shizuoka Seiki	1987
Method of manufacturing iron-chromium-nickel allow electrodeposite film	Y. Ishikuro (Shizuoka U.)	Sakae Riken Kogyo	1987
Technology for manufacturing Nb_3Al compound superconductor wire	K. Inoue (Nat. Res. Inst. for Metals)	Furukawa Electric, Sumitomo Electric, Kobe Steel	1988
Technology for manufacturing high-performance nitride ferromagnetic fluids	K. Nakatani (Nat. Res. Inst. for Metals)	Nippon Seiko, NOK, Otsuka Chemical, and 5 other companies	1990

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(3) Metals

Task	Researcher	Company or Companies Receiving Mediation	Year
Surface treatment technology for metal molds using photolithographic techniques	H. Yoshiura (Gov. Indus. Res. Inst., Oita)	Nippon Kikinzoku, Oita Alloy Kogyo	1990
High-performance nitride ferromagnetic fluid manufacturing apparatus	K. Nakatani (Nat. Res. Inst. for Metals)	Asukaru	1990

(4) Mechanical

Task	Researcher	Company or Companies Receiving Mediation	Year
Liquid-seal rotary pump	I. Amatoshi (Nippon Kayaku)	Jingen Seisakujo	1963
Two-component synthesis vertical vibration stage	I. Yamagawa (Gunma U.)	Maekawa Shikenki Seisakujo	1964
Deep wringing technology under added gas pressure	M. Kuriya (Nihon U.)	Amada	1967
Perspective drawing apparatus	H. Takatsu (Tokyo U.)	Takefuji Kogyo	1967
Perpendicular extrusion method	M. Kuriya (Nihon U.)	NTN	1967
Inclined microscope	T. Taoka (Nat. Res. Inst. for Metals)	Union Optics	1968
Cutting tool	T. Kubota (Mech. Eng. Lab.)	Toshiba Tungalloy	1969
Doffer web stripper for card machine	S. Hasegawa (Gov. Indus. Res. Inst., Nagoya)	Yoshida Steel	1969
Welding control device	N. Inagaki (Nat. Res. Inst. for Metals)	Mitsubishi Electric	1971
Technology for detecting and controlling reverse-wave bead in single-sided arc welding	N. Inagaki (Nat. Res. Inst. for Metals)	Kawasaki Heavy Indus.	1972
Technology for manufacturing die-cast items using atmosphere-flow die casting	T. Makiguchi (Nat. Res. Inst. for Metals)	Seiei Die-Cast Kogyo Asahi Die-Cast Kogyosho	1973 1975
Welding arc control technology using inert gas injection	N. Inagaki (Nat. Res. Inst. for Metals)	Dai-Ichi Jitsugyo Mitsubishi Electric Hitachi Seiko, Babcock Japan	1974 1978 1979
Machine for making fine mixtures	K. Yamashita (Mech. Eng. Lab.)	Konoe Seiko	1974
Plastic gear manufacturing method	H. Arai (Nagoya U.)	Toyoda Gosei	1975
Plasma jet generator	Y. Kawana (Nat. Res. Inst. for Pollution & Resources)	Nippon Kakoki Kogyo	1975
NC machine tool tab holder	K. Kaneko (Defense Agency)	Shibata Kenki Kenkyujo	1976
Metal electrolysis apparatus	H. Nakamura (Nat. Res. Inst. for Metals)	Mineruba Kiki	1977
Quick-release mold for rigid-plate laminates	N. Nakagawa (Tokyo U.), et al.	Aida Engineering, Sanyo Electric, Nisshin Steel, Sanyo, Yamaha Motors, etc.	1978-1980
Simplified NC automatic drafting apparatus	T. Yamaguchi (Tokyo Denki U.)	Kyuwatto	1978
Hammer device	N. Yanagibara (Tamagawa Gakuen)	Sato Tekko	1980
Gate valve	H. Ishimaru (High-Energy Physics Lab.)	Osaka Shinkuki Seisakujo	1980
Air mixer for gas burner	S. Imano (Nat. Inst. of Res. in Inorganic Materials)	Shibata Kagaku Kikai Kogyo	1980
Conveyor apparatus using linear step motor	H. Higuchi (Tokyo U.)	Seiko Electronic Indus., Hitachi Kiden Kogyo, Tsubakimoto Chain	1981
Aluminum flange joint	H. Ishimaru (High-Energy Physics Lab.)	Hakudo, Fuji Seiko, Ulvac Corp., etc.	1982-1987
Elbow valve	H. Ishimaru (High-Energy Physics Lab.)	Fuji Seiko	1982
Gate valve for vacuum vessel	H. Ishimaru (High-Energy Physics Lab.)	Fuji Seiko	1982
Vibrating processor	N. Nakagawa (Tokyo U.)	Funikoshi Towa Seiki	1982 1983

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(4) Mechanical

Task	Researcher	Company or Companies Receiving Mediation	Year
Impeller for centrifugal pump	K. Uenojo (Nat. Aero. Lab.)	Ishikawajima-Harima Heavy Indus.	1983
Ion pump	H. Ishimaru (High-Energy Physics Lab.)	Fuji Seiko	1983
Heterogeneous shape forming apparatus	H. Higuchi (Tokyo U.)	Nissei Urawa	1983
Inspection device for vehicle scale	M. Murata (Nat. Res. Lab. of Metrology)	Daiwa Seiko	1983
Automatic feeder	T. Chibu (Tokyo U.)	Natsume Seisakujo	1984
Underwater confining & releasing apparatus	S. Minamigumo (Tokyo U.)	Nichiyu Giken Kogyo	1984
Governor for variable-pitch windvane	M. Sotodachi (Nat. Aero. Lab.)	Sumitomo Precision Industries	1984
Ion beam processing device	T. Masuzawa (Tokyo U.)	Erionics	1985
Piezoelectric element valve	H. Hiratsuka (JAERI)	Sanrin Eri	1985
Micro-transport apparatus	H. Higuchi (Tokyo U.)	NTN	1985
Wrapping tool	Y. Shinoda (Tokyo U.)	Fuji Dies	1985
Plasma generator	Y. Sakamoto (Inst. of Phys. & Chem. Res.)	Tokyo Seihin Kaihatsu Kenkyujo (Tokyo Product Development Research Institute)	1985
Magnetic adhesion device	S. Hirose (Tokyo Inst. of Tech.)	Kanetsu Kogyo	1985
Snow transport apparatus	S. Senda (Pub. Works Res. Inst.)	Kawatetsu Shoji	1985
Logics gear	S. Nagata (NIT)	Kyoiku Haguruma, Hitachi Funmatsu Yakin, Yokoyama Tekkojo, Fuji Kiko	1986-1990
Water-driven rock crusher	K. Takagi (Japan National Railway)	Furukawa Mining	1986
Vacuum vessel coated with metal nitride, and parts	O. Hayashi (Nippon Vacuum Technology)	Hakudo	1986
Powder transport using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Kao, Toa Kikai Kogyo, Mitsui Miike Kakoki, etc.	1986-1990
Crawler	S. Hirose (Tokyo Inst. of Tech.)	Takadake Seisakujo	1986
Ship anchor	A. Koyama (Tokyo Maritime U.)	Nippon Chain Anchor	1987
Automatic sewing machine control	R. Matsubara	Mitsubishi Electric, Juki, Nara Machine Indus., Futaba Electric, Singer Nikko	1987-1988
Punching mud extractor	K. Satake (Nat. Pollution Res. Inst.)	Rigosha	1987
Laser processing apparatus	K. Masumoto (Nagoya U.)	Ushino Kikai	1987
Vacuum heat-treatment oven	H. Ishimaru (High-Energy Physics Lab.)	Akaboshi Kogyo, Seiko Denshi Buhin, Sukegawa Denki Kogyo	1988-1989
Vibrating attenuator	Y. Hamafuji (Tech. Res. & Devel. Inst., Defense Agency)	Nippon Taiyo Kaitei Densen	1988
Revolving wing	S. Fujii (Nat. Aero. Lab.)	Onishi Denki Kogyo	1988
Propeller having mixed inclined revolving blades	S. Fujii (Nat. Aero. Lab.)	Onishi Denki Kogyo	1988
Long-life vent tube	K. Horii (Shirayuri Women's College)	Mitsui Mining	1988
Vibrator unit for machining hard, brittle material	N. Nakagawa (Tokyo U.)	Funikoshi	1988
Technology for controlling thread supply in ring sewing machine	R. Matsubara	Pegasus Machine Mfg. Co. Moromoto Seisakujo	1988 1990
Minute transport apparatus using piezo-electric elements	H. Higuchi (Tokyo U.)	Suruga Seiki, Takashu, Shinku Kagaku Kenkyujo, Toray Precision, Mitsubishi Chemical Indus., Onoda Cement	1988-1990
Metal mold surface polishing device	M. Kunie (Tokyo U. of Ag. & Tech.)	Enshu Seisaku	1988
Small hole machining unit	T. Masuzawa (Tokyo U.)	Toray Precision, Matsushita Giken	1988

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(4) Mechanical

Task	Researcher	Company or Companies Receiving Mediation	Year
Lining technology using Coanda spiral flow	K. Horii (Shirayuri Women's College)	EC Chemical Indus.	1988
Mixture pump	H. Tanaka	Yuko Kogyo	1988
Multi-eye viewing device	S. Hirose (Tokyo Inst. of Tech.)	Sumitomo Electric Indus.	1988
Blast process technology using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Shokosha	1988
Toyota diffusion process	S. Arai (Toyota Central Res. Inst.)	Indasutoriheruderiettosha	1988
Bio-engineering micro-manipulator using piezoelectric elements	H. Higuchi (Tokyo U.)	Prima Ham	1989
Reverse gravity filtering apparatus	K. Tokunaga	Suzuroku Yushi Kogyosho and 4 other companies	1989-1990
Continuity forming tester	H. Hattori (Nagoya U.)	Nagoya Denki Kogyo	1989
Negative-pressure adherance transport apparatus	S. Hirose (Tokyo Inst. of Tech.)	Nippon Kansen Kogyo	1989
Magnetic adherance wall moving apparatus	S. Hirose (Tokyo Inst. of Tech.)	Ishikawajima-Harima Heavy Indus.	1989
3D moving apparatus	S. Hirose (Tokyo Inst. of Tech.)	Ishikawajima-Harima Heavy Indus.	1989
Wire passing technology using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Toa Kikai Kogyo	1989
Device for changing CRT light-source color and object color	J. Kubota (Industrial Technology Center, Niigata)	Sakata Inks	1989
Gas burner device using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Sun Frontier Technology, Toa Kikai Kogyo, EC Chemical Indus.	1989
Hard material cutting technology using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Toa Kikai Kogyo	1989
Polishing method using screw vibration	K. Suzuki (NIT)	Taga Electric	1989
Charged particle beam generator	Y. Sakamoto (Toyo U.)	Nippon Koshuha	1990
Electrostatic thin surface actuator	H. Higuchi (Tokyo U.)	Shinozaki Saisakujo, Fujitsu, Mitsubishi Chemical	1990
STM precision positioning device using piezoelectric element	H. Higuchi (Tokyo U.)	Mitsutoyo	1990
Foam generator using Coanda spiral flow	K. Horii (Shirayuri Women's College)	C. Itoh Fine Chemical	1990
Electrolytic polishing device	M. Kunie (Tokyo U. of Ag. & Tech.)	Nagase Tekkojo	1990
Suction device using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Yamaha Motors	1990
Temperature-gradient electric furnace	S. Kinoshita (NTT)	Ishikawajima-Harima Heavy Indus.	1990
Unit assembly frame	K. Suzuki (Nat. Inst. of Radiological Sci.)	Nakazawa Seisakujo	1990
Blowing apparatus using Coanda spiral flow	K. Horii (Shirayuri Women's College)	Yamaha Motors	1990

(5) Measuring Instruments

Task	Researcher	Company or Companies Receiving Mediation	Year
Flow speedometer, flow volume meter using semiconductors	T. Ikui (Kyushu U.)	Shibata Kagaku Kikai Kogyo	1965
Automobile speed and distance recorder	M. Saito	Uchiyama Keiki Seizo	1967
Precision manometer	T. Ikui (Kyushu U.)	Shibata Kagaku Kikai Kogyo	1968
Device for automatically tracking curves on recording paper	K. Ikeda (Hokkaido U.)	Mitamura	1968
Automatic RPM recorder	Y. Uchiyama	Daikin Seisakujo	1968

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(5) Measuring Instruments

Task	Researcher	Company or Companies Receiving Mediation	Year
Automatic leather rendering temperature measurement device	H. Sugano (Gov. Indus. Res. Inst., Tokyo)	Nippon Denki Sanei	1969
Element analyzer	Y. Masuko (Gov. Indus. Res. Inst., Tokyo)	Hitachi Ltd.	1971
Automatic magnetic scale	T. Hirone (Tohoku U.)	Narise Kagaku Kikai	1973
Oxygen concentration meter	A. Tasaki (Osaka U.)	Sokkisha	1975
Low-temperature chromatography	K. Enohara (Tokyo Inst. of Tech.)	Nippon Bunko Kogyo	1975
Automatic depth regulating method for underwater bodies	K. Irikawa (Ishikawa Seisakujo)	Oki Electric Indus.	1975
Method and apparatus for measuring surface shapes in fiber products	R. Murase (Kikoken)	NTN Toyo Seiki Seisakujo	1975
Hardness-softness measurement device	T. Tsuchibayashi (Res. Inst. for Polymers & Textiles)	NTN Toyo Seiki Seisakujo	1975
High-temperature, high-pressure environment reaction speed measuring device	A. Ohba (Nat. Res. Inst. for Metals)	Narise Kagaku Kikai	1975
Multi-dimensional thermal wire flowmeter	T. Ikui (Kyushu U.)	Shibata Kagaku	1976
Granularity distribution measurement device	I. Yamaguchi (Inst. of Phys. & Chem. Res.)	Resuka	1977
Spark-chamber beta camera	T. Aoyama (Nagoya U.)	Aroka	1977
Cosmic-ray snow gauge	M. Wada (Inst. of Phys. & Chem. Res.)	Taiyo Keisoku	1977
Signal extractor for laser doppler flowmeter	M. Itsumi (Nat. Aero. Lab.)	Nippon Kagaku Kogyo	1978
Parallel vibrating density measuring device	O. Senda (Nat. Res. Lab. of Metrology)	Shibata Kagaku	1979
Device for measuring thermal conductivity of fluids	Y. Eguchi (Kyoto U.)	Shinku Riko	1979
Vacuum current induction terminal	H. Ishimaru (High-Energy Physics Lab.)	Kyocera Sumitomo Cement	1979 1989
Silicon radiation detector	K. Fushimi (Tokyo U.)	Tokyo Nuctronics	1979
Radiation spectrometer employing magnetic recording and playback of digital signals	S. Okano (Inst. of Phys. & Chem. Res.)	Aroka	1979
Device for measuring heat conductivity of high-temperature molten bodies	Y. Eguchi (Kyoto U.)	Sankon Engineering	1980
Device for measuring ash content in thin film paper using limited x-rays	K. Takahashi (Tokyo Rika U.)	Softex	1980
Portable pH meter using semiconductor ion sensor	M. Matsuo (Tohoku U.)	Tokyo Nuctronics	1980
Method of measuring precision screws with optical interference	A. Yamamoto (Tokyo Inst. of Tech.)	Mitsui Precision Indus. Kuroda Seiko Tokyo Sokuhan	1981 1981 1982
Water sampler	A. Taniguchi (Gov. Indus. Res. Inst., Chugoku)	Rigosha	1981
Sun-shadow sunshine meter	S. Kishida (Kyushu Agricultural Testing Station)	Ogasawara Keiki Seisakujo	1981
Test sample vector	T. Nagai (Nichidenken)	Sankusu	1981
Planar pattern shape measuring device	K. Yamaguchi (Inst. of Phys. & Chem. Res.)	Resuka	1981
Super-precision pressure differential meter	T. Ikui (Kyushu U.)	Shibata Kagaku	1982
Method of automatically compensating for electrolyte resistance decline	H. Kodama (Nat. Res. Inst. for Metals)	Hokusu Denko	1982
Supersonic injury test piece	K. Kimura (Nat. Res. Inst. for Metals)	Nippon Hihakai Kensa Kyokai	1982

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(5) Measuring Instruments

Task	Researcher	Company or Companies Receiving Mediation	Year
Snow depth recorder	H. Yugawa (Hokkaido U.)	Murakami Boeki	1982
Sample light-emission life measuring device	Y. Shinto (Hokkaido U.)	Horiba Seisakujo	1982
Photographic measurement system based on coordinate analysis	T. Murata (Nat. Res. Inst. of Police Sci.)	Mitsuhide Denshi Kogyo	1983
Non-contact electrical solution concentration measuring device	K. Ehara (Tokyo Inst. of Tech.)	Yanagimoto Seisakujo	1983
Wind speedometer calibration device	K. Uehara (Nat. Res. Inst. for Pollution & Resources)	Sanoya Tekkojo	1983
Asynchronous measurement of stable isotopes of carbon and nitrogen using mass analysis	A. Otsuki (Nat. Res. Inst. for Pollution & Resources)	Nichiden Aneruba	1984
Pre-spectroscope for spectroscopic measurement	S. Fujii (Nat. Aero. Lab.)	Nippon Kagaku Kogyo	1984
Reference cell for Raman-scattering spectroscopic measurement	S. Fujii (Nat. Aero Lab.)	Nippon Kagaku Kogyo	1984
Wave meter	M. Tokuda (Nat. Fire Prevention Ctr.)	Union Engineering	1984
Surface shape measuring device using scanning electron microscope	T. Sato (Tokyo U.)	Akaishi Seisakujo	1985
Flow speed measuring probe	S. Yoshida (Hokkaido U.)	Nippon Kagaku Kogyo	1985
Material fatigue tester	H. Nishijima (Nat. Res. Inst. for Metals)	Toshin Kogyo	1985
Impeller vibration measuring device	M. Endo (Nat. Aero Lab.)	Murata Electric Yoshino Electric Ono Sokki	1985 1986 1989
Well three-axis AE measuring system	H. Arazuma (Tohoku U.)	Tohoku Electronic Indus.	1985
Laser interference measuring device	T. Akuta (Toyoda Inst. of Tech.)	Nippon Seiko	1986
Non-contact 3D shape measuring device	T. Akuta (Toyoda Inst. of Tech.)	Nippon Seiko	1986
Automatic optical positioning device	H. Hattori (Nagoya U.)	Nippon Seiko, Toyoda Jido Kikai Seisakujo	1986
Method and apparatus for measuring concentration and size of floating particles	S. Hayashi (Nat. Aero Lab.)	Tonichi Computer Applications Aerometrics	1986 1989
Method of measuring plasma probe characteristics and energy distribution	K. Shimizu (Inst. of Phys. & Chem. Res.)	Nippon Koshuha	1986
Method and apparatus for remote measurement of high-level winds and temperatures	E. Fukushima (Radio Research Lab.)	Nippon Musen	1987
Direct motorized drive positioning device using compound eccentric rotor	A. Nakatani (Nat. Aero Lab.)	Funikoshi Kawasaki Heavy Indus.	1987 1989
Tester for semi-porous films used in gas separation	S. Matsuda (Nat. Chem. Lab. for Industry)	Nippon Bunko Kogyo	1987
Seismograph	K. Muramatsu (Gifu U.)	Tokyo Sokushin	1987
Tester for connecting screws in flexible, plastic areas	K. Maruyama (Tokyo Inst. of Tech.)	Tokyo Seimitsu Sokki, Minebea	1987
Drawing recognition system using optical filters	K. Shimizu (Ibaraki Indus. High School)	Mori Gijutsu Kenkyusho	1987
Apparatus for measuring particle size and distribution	K. Shimizu (Ibaraki Indus. High School)	Mori Gijutsu Kenkyujo	1987
Tri-axial solid compass	T. Yamaguchi	Yoku Kemikaraijingu Kenkyujo	1987 1988
Surface characteristics measuring device	S. Baba (Tokyo U.)	Shimadzu Resuka	1987 1988
Portable dust monitoring device	K. Kojima (Nat. Inst. of Radiol. Sci.)	Oyo Koken Kogyo	1988

II. Main Development-Mediation Tasks Up To 1990 (Continued)

6. Industry

(5) Measuring Instruments

Task	Researcher	Company or Companies Receiving Mediation	Year
Multiangular pitot-tube probe analysis software	A. Nakatani (Nat. Aeronautical Lab.)	Rika Seiki Kogyo Tokyo Kuko Keiki	1988 1989
Device for measuring fine particle size and size distribution	S. Hayashi (Nat. Aero Lab.)	Nikkiso	1988
Rangefinder based on synthetic wavelength technique	K. Matsumoto (Nat. Res. Lab. of Metrology)	Sokkisha	1989
Multiple-input DC squid magnetic measuring device	H. Shirae (Osaka U.)	Daihan Gas	1989
Liquid material thermal property measuring device	I. Yata (Nagoya U.)	Shinku Riko	1989
Preform analyzer	I. Sasaki (Hokkaido Inst. of Tech.)	Sapporo Sogo Kenkyujo	1989
Uniaxial direct-bombardment ion scattering spectroscopic microscope	M. Aono (Inst. of Phys. & Chem. Res.)	Shimadzu	1989
Laser spectrum distortion measuring device	I. Yamaguchi (Inst. of Phys. & Chem. Res.)	Hamamatsu Photonics	1989
Temperature distribution measuring device	M. Uekazuno (Yokoyama Nat. U.)	Soken Kagaku	1990
Device for measuring minute impurities in gas	M. Waki (High-Energy Physics Lab.)	Iwaya Sangyo	1990
High-resolution detector for vacuum ultraviolet radiation	Y. Suga (Osaka U.)	Huristic	1990
Thin-film wear-resistance measuring device	H. Yoshida (Inst. of Phys. & Chem. Res.)	Shimadzu	1990
Optical scanning tunnel microscope	G. Otsu (Tokyo Inst. of Tech.)	Nikon	1990
Mesbaur spectroscopic drive mechanism	N. Sakai (Inst. of Phys. & Chem. Res.)	Laboratory Equipment Corp.	1990
Multiangular pitot-tube probe analysis software	A. Nakatani (Nat. Aeronautical Lab.)	Rika Seiki Kogyo	1990

Re Development Commissioning Program

1. Selection of Candidate Themes for Development Commissioning

Some of the new technologies submitted are more suitable for the Development Commissioning Program because they involve great development risks. The JRDC studies the research results and the priorities for similar technologies, investigates the demand trends, evaluates the technologies in terms of novelty and economy, and finally selects candidates for development commissioning. During this process, the opinions of the New Technology Council, made up of experts, are highly respected.

2. Development Commissioning

After the candidate themes for development commissioning have been selected, solicitations are made through government organs and newspapers, etc., for companies interested in development. Of the companies which respond, those thought to be most suitable in terms of technological strength and enthusiasm for development are selected and the development is commissioned. When research is done jointly with a certain company, however, the development is commissioned directly to that company.

Next, the JRDC consults with the owner of the new technology and the company to be commissioned, works out a development schedule, development program, and funding schedule, determines the goals which are to be achieved, and sets the royalty that will be applicable if the technology is commercialized. When concluding this agreement or contract, the patent rights are exclusively licensed from the owner of the new technology, and the JRDC ordinarily grants implementation rights to the company. Some of the development costs—namely equipment costs and operating costs (labor, raw materials, travel, surveys & testing, etc.)—are financed by the JRDC. These development funds are transferred to the company on a quarterly basis, in the amounts necessary, in advance of the development work.

Development is accompanied by irregular factors. A flexible policy is therefore followed, increasing the amount of development funding or extending the development period, as necessary.

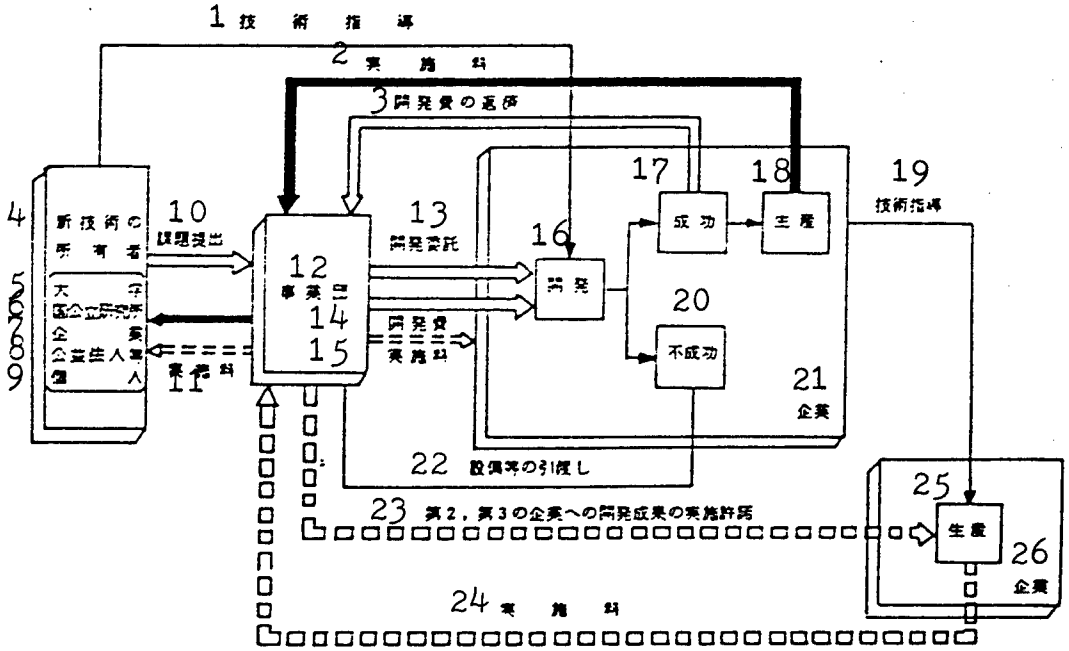


Figure: Development Commissioning Flow

Key: 1. Technological guidance; 2. Royalties; 3. Repayment of development cost; 4. Owner of new technology; 5. University; 6. National or public research institute; 7. Company; 8. Public corporation; 9. Private individual; 10. Theme submitted; 11. Royalties; 12. Corporation; 13. Development commissioned; 14. Development cost; 15. Royalties; 16. Development; 17. Success; 18. Production; 19. Technical guidance; 20. Failure; 21. Company; 22. Transfer of equipment, etc.; 23. 2nd- or 3rd-party company allowed to take over development achievements; 24. Royalties; 25. Production; 26. Company

3. Measures Taken When Development Is Completed

When the development work is completed, the JRDC determines whether or not the development was successful, considering also the opinion of the New Technology Council. The criterion for determining success or failure is whether or not the original development goals have been met. If the development was successful, then the development funds provided by the JRDC must be repaid (with no interest) in equal annual installments over a 5-year period.

If the development was unsuccessful, there is no requirement to repay the development funding, but the equipment and material purchased with that funding must be transferred to the JRDC.

4. Implementing Development Achievements

After a development success, if the commissioned company wants to commercialize the technology, the JRDC concludes a development achievement implementation agreement with the commissioned company. In such cases, the JRDC receives royalty payments in connection with sales, but, as a general rule, the JRDC pays half of these amounts to the owner of the new technology.

If another company desires to commercialize the development achievements, this may be permitted, after considering supply & demand and other factors. Usually, however, the commissioned company is give a priority implementation period of 3 years out of consideration for its developmental efforts. Royalties are distributed among the commissioned company and owner of the new technology according to their interests in the technology.

(Appendix)

Commissioned Development Tasks

I. Tasks Commissioned in 1990—Research and Development Corporation of Japan

Task	Researcher	Commissioned Company	Development Funding (millions of yen)
Blood fat peroxide high-sensitivity measurement device	T. Miyazawa (Tohoku U.)	Tohoku Denshi Sangyo	110
Technology for manufacturing complex oxide thin films using hydrothermoelectric chemistry	A. Yoshimura (Tokyo Inst. of Tech.)	Murata Mfg.	400
Respiratory muscle function measuring device	N. Takishima (Tohoku U.)	Chest MI	130
Technology for manufacturing semiconductor acceleration sensor with built-in decision-making circuitry	K. Atsuno (Sophia U.)	Fujikura Electric Cable	710
Technology for manufacturing high-density glass fiber films	A. Takahisa (Tokyo Inst. of Tech.)	Nisshinbo Indus.	550
Technology for manufacturing independent metal super-microparticles	O. Hayashi (Sozo Kagaku Jigyo)	Shinku Yakin	260
Ring-resonating optical fiber gyroscope	G. Otsu (Tokyo Inst. of Tech.)	Tokyo Koku Keiki	300
Semiconductor laser excited rubidium atom oscillator	G. Otsu (Tokyo Inst. of Tech.)	Anritsu	160
Polymer micelle anticarcinogenic	Y. Sakurai et al. (Tokyo Women's Medical College)	Nippon Kayaku	1000
Spot welding technology using increasing-resistance material	T. Watanabe (Osaka U.)	Toyoda Automatic Loom Works	360
Chemical gassification method using plasma (for semiconductor wafers)	I. Mori (Osaka U.)	Niigata Steel	400
Technology for manufacturing oxide semiconductor (Bi-based)	K. Fueki (Tokyo Rika U.)	Sumitomo Elec. Indus.	1203

II. Main Tasks Commissioned Up Until 1990

1. Resources, Energy

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1962	Manufacture of wave-force generator buoy	Y. Masuda (Tech. Res. & Devel. Inst., Defense Agency)	Nisso Kogyo	18
1963	Production technology for geothermal powder generation	M. Hayakawa, H. Nakamura (Geological Survey Inst.)	Japan Metals & Chemicals Co.	306
1966	Technology for manufacturing V-flow floating washer	K. Nakamura	Otsuka Steel	14
1967	Technology for manufacturing coke for steelmaking using preheated carbon injection	H. Sato (Coal Res. Inst.)	Nippon Kokan	214
1969	Technology for manufacturing fibers from weed carbon	Mitsui Toatsu Kagaku	Mitsui Toatsu Kagaku	407
1971	Uranium electrolytic reducing technology	K. Nakamura (Pwr. Reactor & Nuclear Fuel Devel. Corp.)	Asahi Chem. Indus.	104
1972	Technology for large-scale geothermal power generation	Geothermal Power Research Group, Japan Metals & Chemicals (T. Morihana, et al)	Japan Metals & Chemicals	1058
1975	Technology for manufacturing heat-, alkali-resistant glass fiber	K. Nomoto (Gov. Indus. Res. Inst., Kagoshima)	Nippon Baruka Kogyo	300
1978	Technology for manufacturing high-efficiency ferrosilicon	Y. Nakamura (Japan Metals & Chemicals)	Japan Metals & Chemicals	990
1979	Air conditioning system using metal hydrides	S. Suda (Kogakuin U.)	Sekisui Chemical	200

II. Main Tasks Commissioned Up Until 1990 (Continued)

1. Resources, Energy

Year	Task	Researcher	Commissioned Company	Devel. Funding ¥ (millions of yen)
1979	Technology for manufacturing slender skeletal structures using blast-furnace slag dry granulating method and for heat recovery	M. Kuniwake (Musashi Inst. of Tech.)	Sumitomo Metal Indus., Ishikawajima-Harima Heavy Indus.	419
1979	Continuous steelmaking technology using automobile scrap	R. Nakagawa (Nat. Res. Inst. for Metals)	Mitsubishi Heavy Indus.	1360
1980	High-efficiency hot-water supply system using heat pump and boiler	H. Taniguchi (Hokkaido U.)	Maekawa Seisakujo	185
1980	Bagasse-based pulp manufacturing method	Y. Kobayashi (Gov. Indus. Res. Inst., Shikoku)	Hitachi Zosen Corp.	201
1980	Technology for manufacturing amorphous metals for power transformer cores	T. Masumoto (Tohoku U.)	Nippon Steel Corp.	1688
1981	Technology for gassification of plastic-containing industrial wastes using deep fluid levels	O. Kunii (Tokyo U.)	Tsukishima Kikai	307
1981	Water-ice pool system utilizing solar heat	J. Hasegawa (Int'l. Science Promotion Foundation)	Taiyo Kogyo	114
1982	Shore fixed wave-power power generation system	Y. Masuda (Ctr. for Marine Sci. & Tech.)	Fuji Electric, Mitsui Zosen	60
1983	Technology for making oil from polyolefin plastics using contact decomposition	K. Saito (Gov. Indus. Res. Inst., Hokkaido)	San'esu	74
1990	Technology for manufacturing oxide superconductors (Bi-based; under development)	K. Fueki (Tokyo Science U.)	Sumitomo Electric Industries	1203

2. Medical, Pharmaceutical, Public Welfare (including Biotechnology)

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1968	Notobaiotsu [phonetic] (mouse and rat) production technology	T. Saito (Jitchuken)	Nippon Kureya	63
1969	Technology for manufacturing hematocyte resistance measuring device	M. Koga (Osaka Municipal U.)	Sankon Engineering	16
1970	Technology for manufacturing brainwave processing unit for group diagnosis	Y. Nakagawa (Nat. Mental Health Res. Inst.)	Nippon Denki Sanei	41
1970	Technology for manufacturing dialysis-pack artificial kidney	T. Ima (Iwamizawa Municipal Gen. Hosp.)	Senko Ika Kogyo	33
1972	Ultrasonic circulatory diagnostic unit	Ultrasonic Circulatory Diagnostic Research Group	Aroka	72
1972	I/O system for clinical tests	Y. Kashida (Int'l. Medical Info. Ctr.)	Sumitomo Elec. Indus.	64
1973	Body sample analysis unit manufacturing technology	M. Koga (Tokyo U.)	Sankon Engineering	50
1974	Technology for manufacturing electronic artificial leg	I. Kato (Waseda U.)	Konsen Gijutsu Kenkyujo	76
1975	Technology for manufacturing blood purifier	M. Kodaka (Chiba U.)	Teijin	270
1976	Technology for manufacturing high-sensitivity x-ray photography equipment for medical uses	T. Kawamura (Osaka Munic U.)	Katsuragawa Electric	287
1976	Technology for manufacturing frozen blood preparation agent	S. Kumada (Fukuoka Nat. Central Hosp.)	Osaka Sanso Kogyo	84

II. Main Tasks Commissioned Up Until 1990 (Continued)

2. Medical, Pharmaceutical, Public Welfare (including Biotechnology)

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1976	Technology for manufacturing dental and orthopedic prosthetics using synthetic apatite	K. Kato (Tokyo Med. & Dental College)	Asahi Optical	300
1977	Technology for manufacturing multi-dimensional measuring device for physiological materials	A. Wada (Tokyo U.)	Otsuka Electronics	56
1978	Brainwave diagnostic device for hepatogenic brain disease	N. Inoue (Hepatogenic Brain Disease Research Group)	Asahi Medical	50
1978	Body simulator for resuscitation training	Y. Sakurai (Tokyo Women's Medical College)	Koken	41
1979	Technology for manufacturing antithrombotic material using gland-activating substances	M. Oshiro (Osaka U.)	Konichika	104
1979	Ultrasonic device for measuring characteristics of cranial blood vessels	M. Yoshimura (Tokyo Jikeikai Medical U.)	Hayashi Electric	56
1979	Development of interferon producing agent from cells taken from human leucocytes	T. Suyama (Green Cross)	Green Cross	1082
1980	Development of interferon producing agent from human double cells	A. Miyake (Toray)	Toray	1077
1980	Portable electron scanning microscope diagnostic system	K. Ito (Tokyo U. of Ag. & Eng.)	Aroka	172
1980	Active oxygen enrichment and supplying system for medical use	H. Sato (Tottori U.)	Osaka Sanso Kogyo	91
1980	Kana-, dot-printing typewriter	N. Ohanashi (Tekunoeito)	Tekunoeito	57
1981	Technology for producing experimental animals (mice, rats) by pluralistic cross-breeding	K. Enosaki (Jitchuken)	Nippon Kureya	195
1981	High-frequency heat-treatment device	T. Sugawara (Kyoto U.)	Yamamoto Binita	450
1982	Development of leucocyte reproduction factor from human urine (under development)	S. Takahisa (Tokyo U.)	Morinaga Milk, Green Cross	995
1982	D-dimer test reagent for thromboid formation diagnostics	H. Inada (Tokyo Inst. of Tech.)	Teikoku Zoki Seiyaku	86
1982	System for diagnosing scoliosis using laser torsograph	A. Ishida (Tokyo Med. & Dental U.)	Anima	80
1983	Technology for manufacturing B-hepatitis vaccine using recombinant DNA	K. Matsubara (Osaka U.)	Inst. for Chem. & Seriological Treatment Research)	830
1984	Technology for manufacturing artificial capillaries (under development)	Y. Ikada (Kyoto U.)	Nippon Medical Supply	295
1984	Technology for manufacturing orthopedic prosthetics from crystallized glass	T. Yamamuro (Kyoto U.)	Nippon Electric Glass	315
1985	Small heart-aiding system (under development)	T. Akutsu (Int'l. Center for Respiratory Research)	Aishin Seiki	415
1985	Respiration-coordinated gas supply system	K. Sato (Tottori U.)	Sanyo Electronic Indus.	67
1985	Ultrasonic internal temperature distribution display device (under development)	M. Saito (Tokyo U.)	Yamamoto Binita	200
1985	High-resolution positron CT system	E. Tanaka (Nat. Inst. of Radiol. Sci.)	Hamamatsu Photonics	390
1986	Artificial lung coated with anti-thrombotic material having microdomain structure (under development)	N. Ogata (Sophia U.)	Terumo	373

II. Main Tasks Commissioned Up Until 1990 (Continued)

2. Medical, Pharmaceutical, Public Welfare (including Biotechnology)

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1986	Technology for manufacturing carbon-based artificial dental roots	S. Otani (Gunma U.)	Mitsubishi Chem. Indus.	337
1986	Reagent for bacterial infection diagnosis based on toxin detection	M. Takeda (Tokyo U.)	Himizu Seiyaku	120
1986	Physiological function reconstructing device using multi-channel electric shock	Y. Handa (Shinshu U.)	Nippon Denki Sanei	95
1987	Monochronal antibody producing cell motion selecting device (under development)	S. Funakubo (Shibaura Inst. of Tech.)	Sumitomo Elec. Indus.	306
1987	Blood-sampling device using film separation (under development)	M. Tamura (Tohoku U.)	Ube Industries	389
1988	Brain activity analyzer (under development)	T. Musha (Tokyo Inst. of Tech.)	Chuo Denshi (Central Electric)	410
1989	Technology for manufacturing specific antibodies using chicken immune system	T. Yamamoto (Fukuyama U.)	Taiyo Chemical	300
1989	Small, lightweight intra-aorta balloon pumping device (under development)	J. Koyanagi (Tokyo Women's Medical College)	Nippon Denko Kogyo, Tokai Medical Products	160
1989	Urethra stone pulverizing technology using minute waves (under development)	C. Watanabe (Kyoto Prefec. Medical School)	Hosotani Kako, Morita Seisakujo	240
1990	High-sensitivity measuring device for peroxide fat in blood (under development)	T. Miyazawa (Tohoku U.)	Tohoku Denshi Sangyo	110
1990	Respiratory muscle function measuring device (under development)	J. Takishima (Tohoku U.)	Chest MI	130
1990	Polymer micelle anticarcinogenic (under development)	Y. Sakurai (Tokyo Women's Med. Col.)	Nippon Kayaku	1000

3. Municipal, Construction, Transportation

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1965	Cold roll formation technology for expanded material	K. Goto (Tokyo Inst. of Tech.)	Sumitomo Metal Indus.	23
1966	Seamless flexible container manufacture	M. Ikeda (Seisan Kaihatsu Kaken)	Taiyo Kogyo	54
1967	Rapid firing technology for porcelain products using synthetic granite	Y. Soki (Tokyo Inst. of Tech.)	Nippon Tile Indus.	132
1969	Technology for manufacturing central monitoring system for train operation	A. Hayashi (Tokyu Electric Railroad)	Kyosan Seisakujo	137
1970	Technology for manufacturing chemical epoxy plywood using electron-beam curing	T. Imoto (Osaka Munic U.)	Eidai Sangyo	224
1970	Technology for manufacturing lightweight fireproof building material	R. Naito (Gov. Indus. Res. Inst., Nagoya)	Arita Bussan	56
1971	Technology for manufacturing resin concrete products	K. Shiroyama (Bldg. Res. Inst.)	Shiroyama Seisakujo	132
1973	Technology for building double-spiral loop ferroconcrete structures	T. Onishi (Japan Housing Corp.)	Kobe Steel	171
1979	By-product ferrite magnetic sign system	A. Tazaki (Tsukuba U.)	NEC	385
1979	Manufacture, assembly of panel-form 3D welded steel frames	H. Takemoto (Takemoto Architectural Research)	C. Itoh, Chita Metal Indus.	294
1988	Multi-dimensional x-form steel frame assembly (under development)	H. Wakabayashi (Japan Gen. Architectural Research Lab.)	Nagatani Ko Corp.	449
1989	High-speed formed-steel cutter (under development)	M. Nakamura (Kansai U.)	Asano Sogyo	120

II. Main Tasks Commissioned Up Until 1990 (Continued)

4. Environmental Protection, Disaster Prevention

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1969	Technology for manufacturing electrolytic chromatographs for continuous water-quality testing	T. Fujinaga (Kyoto U.)	Shibata Kagaku	26
1970	Weather observation system in large deep offshore waters	S. Takahashi (Harbor & Bay Res. Inst.)	Kaijo Denki	46
1971	Waste water treatment agent made from silica soil	A. Terui (Gov. Indus. Res. Inst., Ishikawa)	Hokuriku Kakoki	110
1971	Plastic waste utilization technology (sludge mixing apparatus)	T. Ayugawa	Niigata Steel	181
1972	Treatment of fermentation wastes	K. Kitahara (Tokyo Ag. U.)	Kyowa Sanko Kogyo	77
1972	Treatment of sewage sludge by staged burning	N. Hirayama (Toritsu U.)	Tsukishima Kikai	122
1973	Technology for manufacturing fine dust	A. Watanabe (Keio U.)	Trinity Indus.	55
1975	Stainless steel acid-wash waste treatment using solvent extraction	K. Watanabe (Nishimura-Watanabe Extraction Res. Inst.)	Nisshin Steel	368
1978	Aircraft noise identifying, tracking, and measuring device	G. Nishimiya (NHK Gen. Res. Lab.)	Rion	86
1981	Technology for recovering acid by extracting iron from steel acid-wash waste liquid	K. Watanabe (Nishimura-Watanabe Extraction Res. Inst.)	Kawasaki Steel	650
1981	Technology for manufacturing emergency escape descender using rotation control oil	Z. Kitagawa (Nippon Polymer Chemistry Res. Inst.)	Ronshiru Kogyo	75
1982	Remote gas exploration and monitoring system using optical fiber	F. Inaba (Tohoku U.)	Showa Denko	190
1984	Automatic measuring system for forecasting red tides	K. Hiiro (Gov. Indus. Res. Inst., Osaka)	Namura Zosen	147
1984	Technology for manufacturing phosphagene fireproofing-treatment agent	E. Kobayashi (Nat. Chem. Lab. for Indus.)	Nippon Soda	79
1989	Technology for manufacturing fireproof polyethylene foam (continuous foam) (under development)	K. Kaji (JAERI)	Sanwa Kako	420

5. Foods, Agriculture, Forestry, Fisheries

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1962	Orize (natural) cheese manufacture	T. Nakanishi (Tohoku U.)	Ishijirushi Milk	9
1962	Orize (process) cheese manufacture	T. Nakanishi (Tohoku U.)	Kyodo Milk	14
1973	Technology for synthesizing and commercializing sex pheremones	T. Yuzaki (Nat. Inst. of Ag. Sci.)	Takeda Chem. Indus.	83
1976	Technology for continuous manufacture of enriched protein food product from fish	T. Suzuki (Marine Products Res. Inst., Tokai Dist., Fisheries Agency)	Niigata Steel	428
1976	Technology for manufacturing maltole by electrolytic organic synthesis	T. Atsuno (Kyoto U.)	Otsuka Chemical	512
1977	Hog raising by automatic nursing device	S. Higaki (Chikusanshi)	Nippon Nosan Kogyo	140
1978	Technology for manufacturing fixing enzymes by radiation polymerization	K. Umeda (Nat. Food Res. Inst.)	Oriental Yeast Indus.	132
1978	Technology for manufacturing processed foods by freeze-pulverizing	T. Yamamoto (Osaka Munic U.)	Taiyo Chemical	228
1981	Sugar solution purification technique using magnesia	S. Imori (Nat. Chem. for Indus.)	Mitsui Seito	595
1981	Technology for manufacturing seaweed panels	T. Suzuki (Hokuriku Jisho)	Suii Seni Kogyo	238

II. Main Tasks Commissioned Up Until 1990 (Continued)

5. Foods, Agriculture, Forestry, Fisheries

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1981	Technology for manufacturing fish to activate alcohol fermentation mash	K. Mizuhara (Clean Japan Ctr.)	Kyowa Hakko	100
1982	Vegetable producing factory system for cold regions using artificial light	I. Wataribe (Chiba U.)	Toyo Engineering	141
1984	Micro-capsulizing technology for hydrophilic substances	A. Horikawa (Osaka U.)	Morishita Jintan	188
1986	Technology for manufacturing plant hormone blasino-steroids (under development)	N. Ikegawa (Tokyo Inst. of Tech.)	Nippon Kayaku, Tama Seikagaku	714
1986	Technology for manufacturing malto-pentaose by fixing enzyme method	S. Kobayashi (Nat. Food Res. Inst.)	Ensuiko Sugar Refining Co.	355

6. Industrial

(1) Electric, Electronics, Physics

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1961	Manufacture of multi-layer thin-film optical products	H. Kubota (Tokyo U.)	Kogaku	20
1962	Manufacture of highly stable crystal vibrator	A. Arita (Radio Res. Lab.)	Kinseki	20
1962	Discharge processing technology using new electrode material	H. Kaneko (Tohoku U.)	Japacks	46
1963	Manufacture of multi-anode counting discharge tube	Y. Yata (Tohoku U.)	Mitsubishi Electric	16
1965	Manufacture of small high-stability crystal oscillator	Y. Miyake (Nippon U.)	Kinseki	19
1965	Manufacture of thin-film circuit by electron beam continuous automatic vapor deposition device	E. Sugata (Osaka U.)	Fujitsu	49
1965	Manufacture of analysis data retrieval device	M. Kisawa (Electrotech. Lab.)	Tiakku	21
1967	Manufacture of large composite ferrite monocrystals	M. Sugimoto (Inst. of Phys. & Chem. Res.)	Fuji Electrochemical	69
1967	Technology for manufacturing tantalum metal coated resistors	Z. Kiyasu (Tohoku U.)	Hokuriku Elec. Indus.	61
1967	Technology for manufacturing ultrasonic pulse amplifier	A. Ikuzaki (Osaka U.)	Teikoku Tsushin Kogyo	59
1968	Technology for manufacturing super-high-frequency semiconductor element	S. Ito (Waseda U.)	Toshiba	327
1968	Continuous process for semiconductor manufacture	S. Nanpa (Inst. of Phys. & Chem. Res.)	Hitachi	317
1969	Technology for manufacturing x-ray vizacon	T. Horii (Shizuoka U.)	Hamamatsu Photonics	64
1969	Technology for manufacturing super-dense pattern generator	K. Joryo (Tohoku U.)	Kokusai Electric	128
1970	High-performance magnetic tape manufacturing technology	R. Ueda (Nagoya U.)	Shinku Yakin	108
1972	Continuous manufacture of light-emitting diodes (GaAlAs)	J. Nishizawa (Semiconductor Research Promotion Asso.)	Stanley Electric	200
1972	Technology for manufacturing audio transistors	J. Nishizawa (Semi. Res. Prom. Asso.)	Nippon Yakuhin Seizo	191

II. Main Tasks Commissioned Up Until 1990 (Continued)

6. Industrial

(1) Electric, Electronics, Physics

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1973	Technology for manufacturing monolithic display elements	J. Nishizawa (Semi. Res. Prom. Asso.)	Oki Electric Indus.	188
1973	Multi-cathode ionized plating technology	K. Matsubara (Mech. Eng. Lab.)	Citizen Watch	112
1973	High-frequency excitation ionized plating technology	Y. Murayama (Toyo U.)	Oito Seisakujo	89
1974	Technology for manufacturing high-output supersonic wave generator	J. Nishizawa (Semicon. Res. Prom. Asso.)	Tokin	278
1974	Technology for manufacturing flexible surface-wave elements	K. Shibayama (Tohoku U.)	Nippon Denpa Kogyo	195
1974	Technology for manufacturing high-performance flexible printed circuit boards	H. Takagi (Kyoto U.)	Sumitomo Bakelite	113
1975	Fluoride resin film surface processing	J. Nakai (Osaka U.)	Nitto Denko	298
1975	Technology for manufacturing cold electron discharge element	K. Nishida (Shizuoka U.)	Hamamatsu Photonics	146
1976	Gas-plasma semiconductor wafer oxidizing apparatus	T. Sugano (Tokyo U.)	Ulvac Corp.	195
1976	Technology for manufacturing large-output transistors for microwave applications	J. Nishizawa (Semicon. Res. Prom. Asso.)	Mitsubishi Electric	393
1977	Functional optical thin-film formation	Y. Murayama (Tohoku U.)	Nikon	188
1977	Technology for manufacturing hot electron radiating cathode using lanthanum boride monocrystal	S. Kawaai (Nat. Inst. of Res. in Inorganic Materials)	Denki Kagaku Kogyo	160
1977	Technology for manufacturing magnetic resonant element using garnet monocrystal	S. Kimura (Nat. Inst. of Res. in Inorganic Materials)	Fuji Electrochemical, Advantest	215
1978	Technology for manufacturing high-performance slide-wave vibrator	Y. Mochizuki (Shizuoka U.)	Toyo Tsushinki	143
1980	Technology for manufacturing high-output magnetron (500 kW class)	T. Okabe (Daido Inst. of Tech.)	Shin-Nippon Musen	254
1981	Technology for manufacturing high-yield-strength optical thin films for laser applications	Y. Murayama (Toyo U.)	Showa Koki Seizo	119
1982	High-speed continuous coating technique for IC mounting materials	Y. Murayama (Toyo U.)	Sumitomo Electric Indus.	332
1982	Carbon monoxide laser device	S. Fujioka (Keio U.)	Ishikawajima-Harima Heavy Indus.	102
1982	Technology for manufacturing high-efficiency photoelectric cell using amorphous silicon carbide	K. Hamagawa (Osaka U.)	Kanebuchi Chemical Indus.	673
1983	Semiconductor charge-capturing central high-performance measuring device	T. Sugano (Tokyo U.)	Shimada Rika Kogyo	116
1983	Optical circuit integrated semiconductor laser	Y. Matsubara (Tokyo Inst. of Tech.)	Sumitomo Electric Indus., Fujikura Cable	810
1983	Small high-speed simulator	T. Hoshino (Tsukuba U.)	Mitsui Zosen	145
1983	Low-power non-volatile semiconductor memory (NVRAM)	Y. Hayashi (Electrotech. Lab.)	Seiko Electronic Indus.	645
1984	Epitaxial growth device using ionized molecule beam	S. Ito (Waseda U.)	Nichiden Aneruba	212
1984	Technology for manufacturing multi-color electro-luminescence element	K. Hamagawa (Osaka U.)	Fujitsu	400

II. Main Tasks Commissioned Up Until 1990 (Continued)

6. Industrial

(1) Electric, Electronics, Physics

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1984	Technology for manufacturing large-capacity gate turn-off thyristor	K. Matsuse (Meiji U.)	Meidensha	449
1984	High-frequency power failure backup device	E. Namba (Tech. U. of Nagaoka)	Toyo Electric Mfg.	158
1984	Technology for manufacturing cobalt-nickel thin-film magnetic disks	H. Maeda (Nat. Res. Inst. for Metals)	Hitachi Metals	738
1984	Technology for manufacturing transparent tin oxide electrodes	Y. Hayashi (Electrotech. Lab.)	Taiyo Yuden	247
1985	Technology for manufacturing semiconductor high-speed supplemental memory	Y. Hayashi (Electrotech. Lab.)	Citizen Watch	550
1985	Technology for manufacturing super-luminescent diode for light communications	F. Inaba (Tohoku U.)	Mitsubishi Cable Indus.	225
1985	Technology for manufacturing super-luminescent diode for OA equipment	F. Inaba (Tohoku U.)	Ricoh	347
1985	Highly stable electric field radiating electron gun	S. Ishizawa (Nat. Inst. of Res. in Inorganic Materials)	Akaishi Seisakujo	131
1985	Small electron wave ring for x-ray exposures (under development)	T. Hatamasu (Electrotech. Lab.)	Sumitomo Elec. Indus.	1471
1986	High-output glass laser device	H. Kuroda (Tokyo U.)	Hoya	72
1986	Technology for manufacturing planar light-emitting semiconductor laser	K. Iga (Tokyo Inst. of Tech.)	Sanyo Elec.	420
1986	Isothermal scanning distribution measurement device for levels deep inside semiconductors	Y. Tokumaru (Electrotech. Lab.)	Nippon Micronics	101
1986	Iodine laser processing device	S. Fujioka (Indus. Creation Res. Inst.)	Kawasaki Heavy Indus.	554
1986	Technology for manufacturing GaN blue LED	I. Akasaki (Nagoya U.)	Toyoda Gassei	554
1987	Technology for manufacturing image pick-up for x-ray use	Y. Hatakenaka (Shizuoka U.)	Hamamatsu Photonics	283
1987	Technology for manufacturing large full-color liquid-crystal display (under develop.)	J. Dyushan (French Atomic Energy Agency), T. Uchida (Tohoku U.)	Stanley Electric	2305
1987	Technology for manufacturing gas sensors with highly sensitive thin films (under develop.)	T. Masumoto (Sozo Kagaku Jigyo)	Riken	296
1988	Technology for manufacturing high-performance photo-isolator (under develop.)	N. Koshizuka (Electrotech. Lab.)	Namiki Seimitsu Hoseki	287
1988	Technology for manufacturing GaAs monocrystals using steam pressure control (under develop.)	J. Nishizawa (Sozo Kagaku Jigyo)	Mitsubishi Material	261
1988	Technology for manufacturing integrated semiconductor pressure sensor (under develop.)	M. Esashi (Tohoku U.)	Toyoda Machine Works	717
1988	Technology for manufacturing fuzzy-logic microprocessor (under develop.)	H. Yamakawa (Kumamoto U.)	Omron	615
1988	Technology for manufacturing high-yield-strength thin films for ultraviolet lasers (under develop.)	K. Yoshida (Osaka U.)	Canon	513

II. Main Tasks Commissioned Up Until 1990 (Continued)

6. Industrial

(1) Electric, Electronics, Physics

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1989	Technology for manufacturing optical monocrystals (lead molydenumate, etc.) for multi-stage reactors (under develop.)	M. Tsukioka (Nat. Inst. of Res. in Inorganic Materials)	Tagi Chemical, Mishiro Bukken	306
1989	Technology for manufacturing color-variable electro-luminescent element for automobiles (under develop.)	K. Hamagawa (Osaka U.)	Nippon Denso	700
1989	Opposing-target sputtering device for aluminum thin films (under develop.)	M. Naoe (Tokyo Inst. of Tech.)	Osaka Shinku Kiki Seisakujo	300
1990	Technology for manufacturing composite oxide thin films by hydrothermoelectrochemical method (under develop.)	A. Yoshimura (Tokyo Inst. of Tech.)	Murata Mfg.	400
1990	Technology for manufacturing semiconductor acceleration sensor with built-in decision circuitry (under develop.)	K. Atsuno (Sophia U.)	Fujikura Cable	710
1990	Semiconductor laser exciting rubidium atom generator (under develop.)	G. Otsu (Tokyo Inst. of Tech.)	Anritsu	160
1990	Chemical gassification using plasmas (for semiconductor wafers) (under develop.)	Y. Mori (Osaka U.)	Niigata Steel	400

(2) Chemicals, Ceramics (Including Biotechnology)

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1959	Manufacture of artificial crystals	M. Kunitomi (Yamanashi U.)	Toyo Tsushinki	27
1959	Manufacture of carbon materials directly from coal	H. Honda (Resource Res. Inst.)	Toyo Carbon	62
1962	Manufacture of lithium hydride aluminum	R. Tsuchida (Osaka U.)	Honso Chemical	39
1962	Manufacture of pressure-molded products using rubber press	C. Kawashima (Tokyo Inst. of Tech.)	Nippon Kagaku Togyo	45
1963	Manufacture of high-pressure reaction device	K. Abe	Nissan Chem. Indus.	145
1963	Manufacture of high-strength new glass-type ceramics	H. Saito (Hokkaido U.)	Nippon Glass	103
1964	Technology for manufacturing aromatic mercaptans	O. Sato (Japan Technology Consultants)	Sugai Chem. Indus.	36
1965	Manufacture of epoxy resins from B-B distillate	S. Kiryu (Yokohama Nat. U.)	Dainippon Ink	140
1965	Manufacture of carbon-black graft polymers	K. Okita (Niigata U.)	Mitsubishi Gas Chemical	87
1966	Manufacture of ceramic tools with hot-press method	Y. Hamano (Gov. Indus. Res. Inst., Osaka)	Nippon Tungsten	64
1966	Paper processing using oligomers	K. Shinohara (Waseda U.)	Tomoegawa Paper-making	117
1966	Technology for manufacturing electronic photographic materials using oligomers	K. Shinohara (Waseda U.)	Ricoh	95
1967	Technology for manufacturing defluoridized triphosphate lime using flow burning	T. Kurokami	Ishihara Sangyo	72
1967	Technology for manufacturing isobutylene polymers	M. Miyoshi (Nippon Petrochemical)	Nippon Petrochemical	299
1969	Technology for manufacturing new organic gelling agents	K. Hamada (EC Chem. Indus.)	Shin-Nippon Rika	84

II. Main Tasks Commissioned Up Until 1990 (Continued)

6. Industrial

(2) Chemicals, Ceramics (Including Biotechnology)

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1969	Technology for manufacturing large refractory products using two-stage pressure rubber press	C. Kawashima (Seikei U.)	Shinagawa Refractories	153
1971	Technology for manufacturing nylon photosensitive resin plates	M. Hasegawa (Res. Inst. for Polymers & Textiles)	Tokyo Oka Kogyo	153
1972	Technology for manufacturing thermocuring resin molding material	K. Sasaki	Showa Polymer	178
1973	Hydrostatic sintering technology for ceramics (Al_2O_3 x TiC, etc.)	M. Koizumi (Osaka U.)	Nippon Tungsten	181
1973	Continuous forming technology for crystal glass for watches	H. Shimizu (Gov. Indus. Res. Inst., Nagoya)	Namiki Seimitsu Hoseki	39
1974	Synthesis of high-grade dibasic-acid esters	S. Tsutsumi (Osaka U.)	Okamura Seiyu	206
1974	Manufacture of high-purity synthetic quartz glass	K. Akaishi (Tokyo U.)	Nippon Silicon	98
1975	Technology for manufacturing polyphenol-based heat-resistant resins using addition polymerization	K. Kanazaki (Kita Kyushu Indus. High)	Maruzen Petrochemical	310
1975	Technology for manufacturing boron nitride tools with ultra-high-pressure sintering	S. Saito (Tokyo Inst. of Tech.)	Nippon Oils & Fats	375
1975	Caustic soda refining by direct cooling	N. Kawasaki (Nat. Chem. Lab. for Indus.)	Mitsui Zosen	134
1976	Technology for manufacturing heat-resistant enzymes	K. Imabori (Tokyo U.)	Mitsubishi Petrochem.	238
1976	Technology for manufacturing amino-acid surfactants	S. Moriyama (Osaka Munic Industrial Res. Inst.)	Taiyo Chemical	187
1979	Technology for manufacturing battery barrier films by pre-irradiation graft polymerization	K. Okada (JAERI)	Yuasa Battery	51
1979	Technology for manufacturing polyvinyl alcohol high-speed ion-exchange fiber	A. Yamauchi (Res. Inst. for Polymers & Textiles)	Nichibi	234
1979	Technology for manufacturing adenocine triphosphate reproduction enzymes	K. Imabori (Tokyo U.)	Unitka	184
1980	Technology for manufacturing silicon carbide fibers using organic silicon polymers	T. Yasaki (Tohoku U.)	Nippon Carbon	1086
1980	Technology for manufacturing high-purity, readily sinterable alumina powder	S. Kato (Gov. Indus. Res. Inst., Nagoya)	Daimei Chem. Indus.	145
1981	Technology for manufacturing aromatic aldehydes by selectively oxidizing aromatic side chains	T. Torii (Okayama U.)	Otsuka Chemical	770
1982	Continuous manufacture of high-performance ceramic films	Y. Ozaki (Seikei U.)	Mitsubishi Material	676
1982	Technology for manufacturing thyalon sintered bodies	M. Mitsutomo (Nat. Inst. of Res. in Inorganic Materials)	Shinagawa Refractories	235
1983	Technology for manufacturing high-purity diamond sintered bodies	S. Fukunaga (Nat. Inst. of Res. in Inorganic Materials)	Toshiba Tungalloy	249
1983	Automatic monitoring, control system for fermentation processes	I. Inoue (Inst. of Phys. & Chem. Res.)	Komatsugawa Kakoki, Fuji Facom Seigyo	70
1983	Technology for manufacturing silicon nitride sintered bodies by gas-pressure sintering	M. Mitsutomo (Nat. Inst. of Res. in Inorganic Materials)	Nippon Tokushu Togyo	507

II. Main Tasks Commissioned Up Until 1990 (Continued)

6. Industrial

(2) Chemicals, Ceramics (Including Biotechnology)

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1983	Technology for manufacturing new acrylic photosensitive resins	K. Kawaai (Gov. Indus. Res. Inst., Osaka)	Sanpo Chemical Res. Inst.	160
1983	Low-pressure gas-phase synthesis of diamond films (for cutting tools, etc.)	N. Sedaka (Nat. Inst. of Res. in Inorganic Materials)	Mitsubishi Material	150
1983	Low-pressure gas-phase synthesis of diamond films (for heat-radiating bases, etc.)	N. Sedaka (Nat. Inst. of Res. in Inorganic Materials)	Seiko Electronic Indus.	208
1984	Technology for manufacturing high-quality reverse-transfer enzymes	A. Ishihama (Nat. Genetic Res. Inst.)	Nisseiken, Hoshuzo	143
1984	Technology for manufacturing glass-impregnated carbon material	R. Fujii (Gov. Indus. Res. Inst., Osaka)	Toyo Carbon	187
1985	Bulk refining technology for physiological polymers	T. Miyauchi (Sci. U. of Tokyo)	Koken	93
1985	Technology for manufacturing non-oxide ceramic powder	M. Mitsutomo (Nat. Inst. of Res. in Inorganic Materials)	Nippon Cement	310
1985	Technology for manufacturing white electroconducting material for composite materials	K. Morimoto (Production Development Res. Inst.)	Otsuka Chemical	368
1986	High-speed growing of large KDP monocrystals	C. Yamanaka (Osaka U.)	Goheishima Chem. Indus.	53
1986	Hydrothermal zirconia ultra-fine particle manufacturing technology (under develop.)	S. Somiya (Tokyo Inst. of Tech.)	Chichibu Cement	336
1986	Technology for manufacturing laminated lead ceramic capacitor material	S. Shirozaki (Nat. Inst. of Res. in Inorganic Materials)	Sakai Chem. Indus.	398
1987	Technology for manufacturing electro-optical ceramic PLZT	S. Shirozaki (Nat. Inst. of Res. in Inorganic Materials)	Nippon Mining	317
1987	Technology for manufacturing an agent for separating optically heterogeneous bodies using polyamino acids (under develop.)	H. Oniwa (Sozo Kagaku Jigyo)	Mitsubishi Chem. Indus.	472
1988	Technology for manufacturing high-density silicon carbide sintered bodies (under develop.)	H. Kijima (Nat. Inst. of Res. in Inorganic Materials)	Sumitomo Cement	306
1988	Technology for manufacturing high-purity, polycrystalline cubic-crystalline boron nitride (under develop.)	N. Yamaoka (Nat. Inst. of Res. in Inorganic Materials)	Denki Kagaku Kogyo	396
1988	Technology for manufacturing high-quality graphite (under develop.)	S. Yoshimura (Sozo Kagaku Jigyo)	Matsushita Electronic Components	306
1988	Technology for enriching stable C^{13} isotopes using laser technique (under develop.)	A. Isomura (Inst. of Phys. & Chem. Res.)	Nippon Steel Chemical, Nippon Steel Corp.	544
1989	Technology for manufacturing titanium boride sintered bodies (under develop.)	H. Saito (Toyoda Inst. of Tech.)	Toshiba Ceramics	350
1989	Technology for manufacturing thermoplastic polyimides (under develop.)	S. Imai (Tokyo Inst. of Tech.)	Shin-Nippon Rika	753
1990	Technology for manufacturing high-density glassiform carbon films (under develop.)	A. Takahisa (Tokyo Inst. of Tech.)	Nissinbo	550

II. Main Tasks Commissioned Up Until 1990 (Continued)

6. Industrial

(3) Metals

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1959	Manufacture of ring-form graphite cast iron, etc.	N. Netani (Tohoku U.)	Tohoku Specialty Steel	62
1960	Product manufacture by nickel electro-casting	J. Ogoshi (Inst. of Phys. & Chem. Res.)	Ikenoue Kingata Kogyo	43
1964	Manufacture of low-carbon ferrochrome by vacuum decarbonization	J. Moriyama (Kyoto U.)	Nippon Kokan	214
1965	Manufacture of high-purity oxide steel using chlorination	K. Funaki (Tokyo Inst. of Tech.)	Kanto Denka Kogyo	77
1965	Manufacture of superconducting magnet wire (alloy)	N. Yasugawa (Nippon U.)	Ulvac Corp.	92
1968	Technology for manufacturing superconducting magnet wire (intermetallic alloy)	S. Tachikawa (Nat. Res. Inst. for Metals)	Ulvac Corp.	99
1970	Technology for manufacturing iron-manganese-chromium semi-hard magnet	R. Yoda (Nat. Res. Inst. for Metals)	Hitachi Metals	314
1971	Metal surface treatment technology	M. Yoshioka (Osaka Prefec. U.)	Toho Metals	36
1974	Technology for manufacturing aluminum sintered products	A. Tamura (Nat. Res. Inst. for Metals)	Mitsubishi Material	80
1974	Technology for manufacturing high-chrome super-anticorrosive steel	N. Netani (Tohoku U.)	Showa Denko	369
1976	Technology for manufacturing non-ferro-magnetic inba [phonetic] alloy	H. Saito (Tohoku U.)	Tohoku Specialty Steel, Nippon Steel Corp.	148
1977	Technology for manufacturing amorphous metals for electromagnetic materials	T. Masumoto (Tohoku U.)	Hitachi Ltd., Hitachi Metals	376
1977	Amorphous metals application technology (high-permeability materials)	T. Masumoto (Tohoku U.)	Matsushita Elec.	369
1977	Amorphous metals application technology (highly magneto-strictive materials)	T. Masumoto (Tohoku U.)	Sony	215
1984	Technology for manufacturing metal powder using atomizing	T. Takeda (Nat. Res. Inst. for Metals)	Nippon Atomize Kako	130
1987	Technology for manufacturing electrodes for surface amorphous electrolysis (under devel.)	K. Hashimoto (Tohoku U.)	Taiki Rubber Indus.	200
1987	Technology for purifying high-melting-point metals by organic refining (under devel.)	M. Nanjo (Tohoku U.)	Tohoku Toso Kagaku	405
1987	Technology for manufacturing Fe-Si-Al alloy monocrystalline magnetic material	K. Suzuki (Tohoku U.)	Mitsumi Denki	262
1988	Technology for manufacturing tungsten monocrystals (under devel.)	T. Fujii (Nat. Res. Inst. for Metals)	Tokyo Tungsten	346
1990	Technology for manufacturing independent metal superfine particles (under devel.)	O. Hayashi (Sozo Kagaku Jigyo)	Shinku Yakin	260

(4) Mechanical

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1962	Manufacture of Uemura-type super-high-speed camera	T. Uemura (Tokyo U.)	Nikon	31
1964	Electrolytic quenching technology	T. Kuroda (Gov. Indus. Res. Inst., Osaka)	Amada	35
1965	Technology for manufacturing super-high-precision standard measure	Y. Doi (Mechanical Testing Lab.)	Mitsui Precision	36
1966	Manufacture of complete-cross-section excavator	H. Suzuki (Resources Research Lab.)	Sumitomo Heavy Indus.	90

II. Main Tasks Commissioned Up Until 1990 (Continued)

6. Industrial

(4) Mechanical

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1968	Technology for manufacturing biaxial turning friction pressure applicator	J. Hasui (Nat. Res. Inst. for Metals)	Toyoda Auto Loom Works	22
1969	Technology for manufacturing large snake pipe	M. Moriko (Tokyo Inst. of Tech.)	Tokyo Rasenkan Seisakujo	45
1969	Technology for manufacturing pure fluid element	K. Yamaya (Mechan. Eng. Lab.)	Yamada Yuki Seizo	62
1971	Technology for manufacturing stratified air-supply engine	S. Onishi	Yanmar Diesel	45
1974	Technology for manufacturing high-speed interactive plotter	Y. Okino (Hokkaido U.)	Hitachi Seiko	86
1974	Technology for manufacturing swing-drum line printer	K. Endo (Dentsu U.)	Juki	114
1977	Production control system for sewing processes	K. Nobuta (Gov. Indus. Res. Inst., Fukuoka)	Omron	91
1980	Automated metal mold processing system	T. Kurino	Japacks	73
1981	Gas compression device using high-efficiency motor	G. Masumoto (Nat. Res. Inst. for Metals)	Maekawa Mfg.	43
1983	Technology for hot extrusion of hard-to-process materials by lateral pressure	T. Oguchi (Nat. Res. Inst. for Metals)	Hitachi Metals	236
1985	Magnetic floating actuator	H. Higuchi (Tokyo U.)	Nippon Seiko	119
1986	Liquid raising pump using vertical vibrating pipe	H. Hashimoto (Tohoku U.)	Jingen Mfg.	154
1989	Water-pressure servo system (under devel.)	E. Urada (Kanagawa U.)	Jingen Mfg.	130
1990	Spot-welding technology using material of increasing electrical resistance (under devel.)	K. Watanabe (Osaka Jr. Col.)	Toyoda Auto Loom Works	360

(5) Measuring Equipment

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1959	Manufacture of double-convergence mass analysis device for solid analysis	S. Sasaki (Kyoto U.)	Nippon Denshi	46
1963	Manufacture of fast automatic analyzer for amino acids	M. Kondate (Tokyo U.)	Shibata Kagaku Kikai Kogyo	9
1963	Manufacture of scanning x-ray analysis device for 3D photography	E. Fukushima (Toritsu U.)	Rigaku Denki	34
1963	Manufacture of gas chromatograph	T. Fujinaga (Kyoto U.)	Yanagimoto Seisakujo	12
1963	Manufacture of direct-display photoelectric light intensity meter	H. Baba (Hokkaido U.)	Hitachi Ltd.	8
1964	Manufacture of Raman-scattering light intensity meter	T. Sotomura (Kanazawa U.)	Kawaguchi Denki Seisakujo	25
1966	Manufacture of low-background beta-ray spectrometer	E. Tanaka (Nat. Inst. of Radiological Sci.)	Fuji Electric	16
1968	Technology for manufacturing gear meshing tester	J. Ishikawa (Tokyo Inst. of Tech.)	Osaka Seimitsu Kikai	21
1970	X-ray image rapid processing system	S. Imamura (NHK Basic Res. Inst.)	Rigaku Denki	140
1971	Electronic spectroscopic microanalyzer	C. Ichinokawa (Waseda U.)	Meiseki Seisakujo	76
1972	Technology for manufacturing infrared humidity fluctuation measuring device	Y. Yamamoto (Tohoku U.)	Nippon Bunko Kogyo	46

II. Main Tasks Commissioned Up Until 1990 (Continued)

6. Industrial

(5) Measuring Equipment

Year	Task	Researcher	Commissioned Company	Devel. Funding (millions of yen)
1975	Technology for manufacturing dielectric spectrum measuring device	A. Wada (Saitama U.)	Ando Electric	40
1976	Technology for manufacturing micro-particle analyzer	T. Yoshida (Osaka Prefec. U.)	Shimadzu	31
1977	Device for measuring oil deterioration by minute weak emitted light	F. Inaba (Tohoku U.)	Tohoku Denshi Sangyo	27
1979	Digital electronic circuit testing system using random pulse input	K. Oteru (Waseda U.), S. Hashimoto (Toho U.)	Ando Electric	101
1981	High-speed repeating material tester	T. Kishi (Tokyo U.)	Meiseki Mfg.	387
1981	High-sensitivity high-speed liquid chromatograph based on photo-audio detection	T. Sawada (Tokyo U.)	Toso	137
1982	Laser doppler flowmeter using optical fiber	J. Koyama (Osaka U.)	Nippon Kagaku Kogyo	87
1983	Specific-heat measuring device	A. Ikuzaki (Tokyo U.)	Shinku Riko	47
1983	AE measurement system based on frequency analysis	T. Sato (Tohoku U.)	Asahi Chem. Indus.	89
1983	Enriching 2D electric migration device	M. Ohashi (Tokyo Prefec. Geriatric Res. Inst.)	ADS	80
1984	DNA base arrangement analyzer	A. Wada (Tokyo U.)	Seiko Electronic Indus.	92
1985	High-resolution electron energy loss spectroscope	T. Oshima (Nat. Inst. of Res. in Inorganic Materials)	Eiko Engineering	77
1985	Ultrasonic microscope for biomedicine	M. Tanaka (Tohoku U.)	Honda Denshi	107
1987	High-speed system for determining bacterial strains and microbe counts (under devel.)	K. Endo (Inst. of Phys. & Chem. Res.)	Hitachi Electronic Engineering	158
1988	Technology for manufacturing electrostatic quantitative moisture-sensitive element (under devel.)	T. Yamamoto (Shizuoka U.)	Kurabe	154
1989	Surface micro-structure system based on measurement of reflected electron energy loss (under devel.)	S. Usami (Yokohama Nat. U.)	Toso	300
1989	Electron layer growth monitoring device based on total-reflected x-ray spectroscopy (under devel.)	M. Ino (Tokyo U.)	Ulvac Corp.	366
1989	Underwater photographic device using audio holography (under devel.)	H. Yamazaki (Tokyo U.)	Mitsui Zosen	300
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1989	Wireless low-temperature wide-region temperature control system (under devel.)	D. Uchiyama (Electrotechnical Lab.)	Tokyo Denpa	286
1990	Ring-oscillating optical fiber gyroscope (under devel.)	G. Otsu (Tokyo Inst. of Tech.)	Tokyo Koku Keiki	300

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