

I. AN OVERVIEW

1. INTRODUCTION

The Department of Scientific and Industrial Research (DSIR) is a part of the Ministry of Science and Technology, which was announced through a Presidential Notification, dated January 4, 1985 (74/2/1/8 Cab.). The Department of Scientific and Industrial Research (DSIR) has a mandate to carry out the activities relating to indigenous technology promotion, development, utilization and transfer. Shri Kapil Sibal is the Minister of State (Independent Charge) for Ministry of Science & Technology and Ocean Development.

The Allocation of Business for the Department is as follows:

- All matters concerning the Council of Scientific & Industrial Research
- All matters relating to National Research Development Corporation (NRDC)
- All matters relating to Central Electronics Limited (CEL)
- Registration & recognition of R&D units
- Technical matters relating to UNCTAD & WIPO
- National Register for Foreign Collaborations
- Matters relating to creation of a pool for temporary placement of Indian scientists & technologists.

The primary endeavour of DSIR is to promote R&D by the industries, support a larger cross-section of small & medium industrial units to develop state-of-the art globally competitive

technologies of high commercial potential, catalyze faster commercialization of lab-scale R&D, enhance the share of technology intensive exports in overall exports, strengthen industrial consultancy & technology management capabilities and establish user friendly information network to facilitate scientific and industrial research in the country. It also provides a link between scientific laboratories and industrial establishments for transfer of technologies through National Research Development Corporation (NRDC) and facilitates investment in R&D through Central Electronics Limited (CEL).

The above objectives are sought to be achieved through the following during the Tenth Plan:

- a) Technology Promotion, Development and Utilization (TPDU) Programmes
- b) Council of Scientific & Industrial Research (CSIR)
- c) Consultancy Development Centre (CDC)
- d) National Research Development Corporation (NRDC)
- e) Central Electronics Limited (CEL)

2. TECHNOLOGY PROMOTION, DEVELOPMENT AND UTILIZATION PROGRAMMES

The scheme “Technology Promotion, Development and Utilization (TPDU) Programmes” has been formulated by merging following Ninth Plan schemes as per the recommendation of the Planning Commission under zero based budgeting exercise:

- *Research & Development by Industry (RDI)*
- *Programme Aimed at Technological Self-Reliance (PATSER)*
- *Scheme to Enhance the Efficacy of Transfer of Technology (SEETOT)*
- *APCTT*

Programmes and activities under the scheme are centered on promoting industrial R&D, development and commercialization of technologies, acquisition, management and export of technologies, promotion of consultancy capabilities, etc. The specific components of the TPDU programme are:

- Industrial R&D Promotion Programme
- Technology Development and Innovation Programme
- Technology Management Programme
- International Technology Transfer Programme
- Consultancy Promotion Programme
- Technology Information Facilitation Programme

2.1 Major Achievements

Industrial R&D Promotion Programme

DSIR is the nodal Department for granting recognition to in-house Research and Development centres of industry. As on 31st December 2004, there were 1195 in-house R&D centres with valid DSIR recognition. Of these centres, 121 in-house R&D centres incurred an annual expenditure of over Rs.5 crores each and 240 in-house R&D centres incurred an annual expenditure in the range of Rs. 1 crore to Rs. 5 crores. During the year 2004, 86 in-house R&D centres were accorded

fresh recognition and 409 in-house R&D units were accorded renewal of recognition.

During the year 2004, 18th National Conference on in-house R&D in industry was organised; DSIR National Awards were presented to 5 industrial units. A publication on “Outstanding in-house R&D Achievements (2004)” and 4 issues of “In-house R&D in Industry Update” were brought out.

Scientific research foundations in the areas of medical, agriculture, natural & applied sciences and social sciences seek DSIR approval as Scientific and Industrial Research Organisations (SIRO) under the DSIR scheme of granting recognition to SIROs. The approved SIROs are eligible for availing customs duty exemption on imports and central excise duty exemption on indigenous purchase of essential scientific & technical instruments, apparatus, equipment (including computers), accessories, spare parts thereof and consumables, required for research and development activities.

During the year 2004, 23 new SIROs have been accorded DSIR recognition. 6 certificates for accelerated depreciation allowance on plant & machinery set-up based on indigenous technology, involving an investment of Rs.5256.63 lakhs; 686 essentiality certificates for claiming customs duty exemptions on imports, amounting to Rs. 4400 lakhs and 85 essentiality certificates for claiming central excise duty exemptions on indigenous purchases, amounting to Rs.340 lakhs were issued by DSIR.

DSIR is nodal Department for registration of public funded research institutions, universities, IITs, IISc., RECs/NITs, for availing customs duty exemption and central excise duty exemptions under notifications 51/96-Customs and 10/97-Central Excise.

During the year, 8 such institutions were registered with DSIR; and 52 institutions were granted renewal of registration.

Secretary, DSIR, who is designated as the Prescribed Authority under section 35(2AB) of Income-tax Act, 1961, approved in-house R&D centres of 22 companies during the year. Agreements of co-operation for research & development were also signed with these companies. R&D expenditure of 42 companies were reported to DGIT (E) in Form 3CL.

Technology Development and Innovation Programme

The programme has two sub-components: Technology Development and Demonstration Programme to support technology development efforts of industry - R&D system and Technopreneur Promotion Programme (TePP) to nurture the innovative spirit of individuals.

The component scheme on Technology Development and Demonstration aims at catalyzing and supporting activities relating to technology absorption, adaptation and demonstration including capital goods development, involving industry and R&D organizations. Under the Scheme, research, development, design & engineering projects for absorption and up-gradation of imported technology as well as development & demonstration of new and improved technologies have been supported. While DSIR support has been catalytic and partial, bulk of the financial contribution in any project has been from the industry.

The Department, under this programme has so far supported about 165 R&D projects of Industrial units. These projects cover products and processes in various important industries such as metallurgy, electrical, electronics,

instrumentation, mechanical engineering, earth moving & industrial machinery, chemicals & explosives. 81 projects have been completed so far since inception of the scheme, further development activities in case of 15 projects have been completed pending receipt of project completion reports. Out of the completed projects, 30 technologies/ prototypes have been commercialized. There are 31 companies paying royalty/ lump-sum as per the terms of agreement.

Technology Development projects have strengthened the linkages with more than 25 national research laboratories/ institutions such as NAL, Bangalore; RRL, Trivandrum; IICT, Hyderabad; CMRI, Dhanbad; IIP, Dehradun; C-DAC, Pune; NML, Madras; Institute of Plasma Research, Ahmedabad; ER&DC, Trivandrum; Dalmia Centre for Biotechnology, Coimbatore; CMTI, Bangalore; which have been collaborating with industry in the specific research, design, development & engineering (RDDE) projects of high techno-socio-commercial impact. The Scheme has been found successful in synergising the R&D efforts of industry and national research organizations.

The Technopreneur Promotion Programme (TePP) (jointly operated by DSIR and DST, under its Home Grown Technology programme of TIFAC), aims to tap the vast innovative potential of the citizens of India. The activities under TePP include providing financial support to individual innovators, having original ideas and convert them into working models, building prototypes etc. So far, 114 projects have been supported under TePP, jointly by DSIR (55) & TIFAC (59) of DST. During the period under report, 9 on-going projects supported through DSIR (7) and TIFAC (2) were successfully completed and 58 are under progress. The projects such as technological upgradation and safety certification of 10 HP tractor, low cost solar

cooker, auto air-kick pump, motorcycle driven plough, design & prototype development of double acting water lifting pump, interlocking tiles, manufacturing of bread improvers, device to lift the chasses of vehicles etc. have been developed by individual innovators and projects such as technological upgradation & safety certification of 10 HP tractor, low cost solar cooker, auto air-kick pump etc. are further being scaled-up towards commercialization. Individual innovators who could be supported under TePP also include farmers, artisans etc. A number of novel products with commercial potential are under development.

Technology Management Programme

The Technology Management Programme includes activities related with National Register of Foreign Collaborations & Technology Management, which the Department continued during the year. A report on the compilation of primary data on foreign collaborations for the year 2002 was brought out. Computerization of data collected on foreign collaborations for the year 2003 has been completed. During the year, several analytical, technology status and development studies including those on technological interventions in manufacture of ethyl alcohol from grains in Maharashtra; Potential of Handloom and Spice Processing Industry with special focus on technology in the North-East; Potential of Minor Forest Produce based industries in Uttaranchal and Uttar Pradesh have been completed or are being finalized. Studies and cases on technology & innovation management that have been completed or under finalization include those on Innovation in Infrastructure Sector in India; Influences of Integration of Technological Strategies with Business Strategies of large Public Sector Organizations and their small & medium scale suppliers; case studies of a paints manufacturing company and manufacturing organization in the engineering

sector. Studies on minor forest based industries in select states, and others are in progress. Studies - including analytical, status, case as well as research based ones, on emerging aspects of technology and innovation management - have been taken up on need basis. With a view to strengthen networking and enhance technology management capabilities in industry including small & medium enterprises, academic institutes, state level enterprises and consultancy/ research organizations; a number of activities have been taken up. Several activities, spanning the interests of industry, faculty, researchers, students, Government bodies and entrepreneurs have been initiated in association with different agencies. Various programmes have been envisaged in collaboration with the industry and industry associations, state-level technical consultancy organizations, CSIR and other research institutions, academic institutes including IIMs & IITs. Programmes covering various aspects of technology management, intellectual property & knowledge management are being organized on need basis. Efforts to disseminate important findings and information of relevance to the subject have been intensified. An electronic newsletter, to enhance technological creativity and interest in technology development among various target groups has been launched. In addition, a portal dedicated to technology management aspects has also been launched.

International Technology Transfer Programme

Major activities carried out under this programme include bringing out a publication on Compendium on Technology Exports – An Illustrative Compilation of Exported & Exportable Technologies from India; releasing four quarterly issues of Newsletter on Technology Exports; organizing a Technology Trade Pavilion at IITF-2004, Pragati Maidan,

New Delhi; support to the activities of Technology Export Development Organisation (TEDO); support to the Centre for International Trade in Technology at IIFT; report on Strategic Approach to Strengthening the International Competitiveness of Knowledge Based Industries; support to a Technology Trade Facilitation Centre at National Research Development Corporation; organising National and International Awareness-cum-Training Programmes on Competitive Advantage through Design; organising an Awareness Programme on Technology Trends & Developments in Packaging Machinery & Systems to Promote Technology Trade; and a project report on Exportable Technologies from SMEs in the Delhi Region.

All these efforts seem to have catalyzed the technology intensive and high value added exports. The percentage of such exports, in the overall exports has steadily increased over the years. A large segment of exporting community has been trained & sensitized towards high value added exports.

International Cooperation

Activities of APCTT

The Department continues to play the role of focal point for the APCTT. The Government of India continued to provide institutional support of US\$ 200,000 in Indian Rupees to the APCTT for both the host facilities and local posts. A programme support of US \$100,000 in Indian Rupees was contributed towards the APCTT Regional Programme on National Innovation Systems.

The activities of the Centre during 2004 were directed towards technology capacity-building, promotion and management of innovation as well as sub-regional and regional networking. DSIR participated in the 20th Technical

Advisory Committee Meeting of APCTT and also the 19th Session of the Governing Board of the APCTT held during 26-30, November 2004 in Dhaka, Bangladesh.

Interactions with UNESCO

The Department continues to be the focal point for UNESCO in India and is a member of UNESCO's Asia Pacific Information Network (APIN).

During the year, the Department deputed several officers to represent in various national/regional/international meets.

Consultancy Promotion Programme

The programme relating to consultancy promotion essentially aims to strengthen our consultancy capabilities for domestic and export markets. During the period under report, the Food Processing Technologies and Services Centre (FPTSC) at Kanpur was under operation.

Besides, a study on Consultancy Needs for Improving Performance/ upgradation of Textile Mills in UP was completed through UPICO. Study on Consultancy Capabilities for Small Hydropower Development in India through IIT, Roorkee was under progress. During the year, Consultancy Development Centre (CDC) was made an autonomous institution of DSIR. Also, technical inputs/support was provided to Consultancy Engineers Association of India (CEAI) and other consultancy promotion organizations.

Technology Information Facilitation Programme

The broad objective of this programme is to generate endogenous capacities for the development and utilization of digital information resources for providing inputs to S&T research. The strategy of this programme

is to concentrate on facilitation of Indian content on S&T; Avoid duplication of efforts; Minimum overlapping; Maximum utilization of existing facilities and utilize internet technology.

During the year under report, four brainstorming sessions at Pune, Bhubaneswar, Chandigarh and Hyderabad were held. In addition to four on-going projects, initiated six new projects. Some of the projects are scouting for grass-root level innovations, compilation & dissemination of information in local languages across India; National websites on S&T subjects; Model (software & procedure) for web-driven distance education system etc.

Information Technology & e-Governance

As a new initiative during the Tenth Plan, IT & e-Gov unit was formed for progressive implementation of e-Governance and establish an IT enabled work environment. The IT action-plan of the Department includes infrastructure development; networking; IT training; Office automation; e-Reports and Website.

During the year under report, one High End Server along with antivirus firewall and IDS level security services was installed. This server hosts INTRADSIR and DMIS (a web based Document Management Information System software developed by NIC). Initiated a new project for development of CINFOSYS – Central Information System and one project on computerization of data on Foreign Collaboration approvals is continuing.

3. COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH (CSIR)

Council of Scientific & Industrial Research, a premier autonomous R&D organization is a multidisciplinary, multilocational set-up,

comprising of 38 laboratories and 47 regional centers has completed sixty one years of its existence. Nourished, fostered and supported by successive governments, since its inception, CSIR is now recognized internationally as an institution which is moving speedily towards achieving global excellence without diluting local relevance. In India, it symbolizes a culture that links science with society through technology and industrial manufacture.

As the nation's strongest holder of intellectual property rights, CSIR leads the way for protecting traditional knowledge strength while adding to the new IPR capital. CSIR was ranked the first amongst major PCT applicants from developing countries. CSIR has also continued to promote excellence in science and is the only S&T organization, which had nurtured and supported human tech from 16 to 65 years of age, through numerous schemes on human resource for scientific research. CSIR helped usher India into a scientific milieu, creating and nurturing talent in science, innovation and technology.

3.1 Significant Developments

Creating massive knowledge networks

A key feature of CSIR's performance was the creation of major and innovative knowledge networks across and beyond CSIR laboratories. Not too long ago, most CSIR laboratories had acted as single units with several laboratory based programmes. CSIR's massive network on 'bioactive molecules', launched three years ago began the process of leveraging the benefit of networking, by bringing together 20 CSIR laboratories and several other institutions. This philosophy was carried forward with vigour. Most of the programmes for the Tenth Plan now have been formulated with networking of resources and capabilities as the major component.

Contributing to the Indian industry

CSIR continued to provide a strong support to Indian industry. The major achievements included successful commercialization of process for conversion of Naphtha to Gas and Gasoline (NTGG); catalyst for speciality polymeric materials based on zirconium tetrachloride; lacidipine process; methane sulphonic acid process; Precipitated Calcium Carbonate (PCC), etc.

Technology for the commercial manufacture of CONSAP, a vaginal contraceptive cream from Sapindas mukorosil, has been licensed to M/s Hindustan Latex Ltd. Bacopa extract (Promind) has been licensed to M/s Lumen Marketing Company and the product has been marketed by them as Memory Power and Memory Perfect. Also, double blind clinical trials for CT-1 (antihyperglycemic) are continuing. Permission has been obtained from DCG(I) to conduct clinical trials of α and β arteether (anti malarial).

CSMCRI has successfully developed Thin Film Composite (TFC) reverse osmosis (RO) high flux membrane in-house. The indigenously developed membrane is suitable for treatment of tertiary treated sewage water. 1 million liters/ day capacity plant has been commissioned at Chennai Petroleum Corporation Ltd (CPCL) Chennai. The use of this new membrane, which is non-biodegradable and which has the ability to work over a wide pH range, would reduce capital investment and operating cost greatly.

Catalyzing civil aviation industry: SARAS - inaugural flight

CSIR has been rendering yeoman service to the Indian aerospace sector. Its contributions and excellence are acknowledged not only nationally but internationally as well. The light transport aircraft programme achieved a

significant milestone on 4th February 2003 when its first prototype of SARAS rolled out. The prototype was named VT-XSD - SD in honour of Dr. Satish Dhawan, a doyen of aerospace & former Chairman of National Aerospace Laboratories (NAL) Research Council at whose instance NAL's Civil Aviation activities were initiated. Major testing activities have been completed for SARAS in preparation of the first flight. It needs to be emphasized that the first journey that began with a Light Combat Research Aircraft in the National Aerospace Laboratories, was taken forward to the series of HANSA aircrafts, resulting finally into an all composite aircraft HANSA-3, that was test certified in 2001, and is productionised and taken to the Indian skies already.

The Director General of Civil Aviation (DGCA) had given clearance to the flight trials of the aircraft and the maiden test flight took place on 29th May 2004 and many further test flights have taken place to check functioning of all systems and subsystems. The inaugural flight took place on 22nd August 2004 at Bangalore in the gracious presence of Honourable Minister of State for Science & Technology and Ocean Development, Shri Kapil Sibal.

Traditional knowledge: Efforts for protection and value addition

CSIR lead the Team India initiative for setting up the first ever Traditional Knowledge Digital Library (TKDL). The TKDL would provide a search interface to retrieval of traditional knowledge information on International Patent Classification (IPC) and keywords in multiple languages. At global level it would act as a bridge between 'Sanskrit Slokas' and a patent examiner.

CSIR presented the concept of Traditional Knowledge Resource Classification (TKRC)

to the IPC Union and it is now being recognized by the IPC Union. India has created approximately 200 subgroups for the classification of medicinal plants in IPC (under a new Group A61K 36/00) instead of existing single sub-group (A61K 35/78). These will be included in the next edition of IPC to be published in July 2005.

Science & Technology for the Society

As a socially conscious organization, CSIR continued its efforts to provide the S&T needed for the masses. During the year, it adopted villages to promote employment generation on one hand and developed diverse technologies to add to quality of life on the other hand. These technologies include: installation of 1200 Litre/hr Brackish water desalination plant in Kisari village of Rajasthan by CSMCRI, under a DST funded project; CSMCRI established a model cultivation for *Jatropha curcus* from which bio-diesel of international specification can be produced; Orchards are simultaneously being raised in Orissa (Huma & Mohuda villages) and Gujarat (Chorvadla village) to make elite germplasm available in sufficient quantity so that cultivation can subsequently be taken up in larger (100-200 hectares) tracts of wasteland. The project has the potential to use wasteland, create several jobs, solve Indian's energy problems and reduce environmental pollution.

New Millennium Indian Technology Leadership Initiative (NMITLI)

New Millennium Indian Technology Leadership Initiative (NMITLI) synergised the best competencies of publicly funded R&D organisations, academia and private industries. With over 50 private sector companies and over 150 institutes & laboratories networked together, NMITLI is the largest public-private partnership in India today.

Under NMITLI, an Investigational New Drug (IND) application from an oral herbal formulation for the treatment of psoriasis, one of the most common dermatological diseases affecting around 2% of the world population, has been filed for the first time in the country. Also, for the first time a versatile portable software for bioinformatics – Biosuite® has been developed. This is a multi-purpose tool for carrying out diverse bio-analyses ranging from gene analysis to comparative genomics.

The mammoth coordinated network programme on bio-actives involving twenty CSIR laboratories, thirteen universities and three well-known entities in the traditional system of medicine is contributing in the area of new drugs discovery. Dedicated discovery groups have discovered some new chemical entities and new herbal formulations. The discoveries covered are cancer, tuberculosis, filaria, malaria, ulcer, Parkinsonism & Alzheimer. Some interesting leads have been obtained on hepato-protective cum immunomodulation as well as memory enhancement. Two entirely new anticancer preparations in the area of women's cancer are being developed further with an Indian firm. Also short-term toxicity of two entirely new antiulcer preparations have been completed and clinical trials protocols have been worked out.

Contribution to New Knowledge

For the first time, CCMB scientists have discovered that interfering RNA can convert euchromatin in to heterochromatin, both components of chromosomes. This can, sometimes, result in virtually stopping the gene expression. The research carried out at CCMB on understanding the mechanism of gene silencing has been published in the prestigious journal 'Science'. This finding is of great importance in treatment of many diseases, particularly cancer.

NCL has made a major contribution by designing novel structures like stacked sheets by using new channel guest system. It was challenging to design them (a) for special shapes and (b) of desired properties. This novel contribution has found a place on the cover page of Journal of Organic Chemistry.

All time high in CSIR's journey during the year

The year saw CSIR reach an all time high in science, patents & earnings. In terms of science, CSIR published 2188 papers in SCI journals, with an average impact factor per paper of 1.75. In terms of patents, it was granted 195 US patents (69% of the patents granted to Indians in India). In terms of its earnings, CSIR's external cash flow was Rs. 287 crores.

4. AUTONOMOUS INSTITUTION

Consultancy Development Centre

The Consultancy Development Centre (CDC) came into being as a registered society in January 1986, and is functioning from its office at India Habitat Centre Complex since May 1994. CDC was approved as an Autonomous institution of Department of Scientific & Industrial Research in December, 2004.

CDC has a membership of 770 as on December 2004, representing various types of consultancy organisations and individuals connected with the consultancy. CDC has concentrated mainly on development of human resources, providing computerized data/information services and strengthening of technological and managerial consultancy capabilities including promoting consultancy exports.

CDC is implementing a programme Consultancy Development, Promotion & Assistance (CDPA), maintains a computerized database of consultants; organizes training courses, particularly on ISO-9001/2000 and ISO-14000 and human resources development programmes for promoting consultancy; conducts consultancy related programmes sponsored by other agencies. DSIR provides recurring and non-recurring support to CDC.

The post-graduate degree, MS programme in Consultancy Management in association with BITS, Pilani, continued. Several interaction meets and training programmes in various areas including ISO-9001/2000 & ISO-14000 systems were organized by CDC.

In order to enhance technological and managerial capabilities as well as the export capabilities of consultants, CDC has been identified to be a nodal agency for Technical Consultancy Development Programme for Asia and the Pacific (TCDPAP) by ESCAP.

The fifth meeting of Executive Committee of Technical Consultancy Development Programme for Asia and Pacific (TCDPAP) was held in New Delhi during October 2004. CDC continued as secretariat for a further period of 4 years upto October 2008.

International Conference on Development of Knowledge Infrastructure: Role of Consultants, was organized by CDC, the TCDPAP Secretariat during October 2004. The Conference was inaugurated by Dr. A.P.J. Abdul Kalam, Hon'ble President of India. On this occasion, National Awards for excellence in Consultancy Services were presented by the Chief Guest. CDC has earned revenues of Rs. 125.46 lakhs during the year 2003-04, as against Rs. 105.14 lakhs during the year 2002-03.

5. PUBLIC ENTERPRISES

5.1 National Research Development Corporation (NRDC)

NRDC with its sustained, hard and dedicated endeavour, continued to achieve satisfactory overall performance and earned profits. The Corporation earned lumpsum premia and royalty of Rs.339.94 lakhs from licensing and commercialisation of indigenous technologies, as compared to Rs.308.89 lakhs in the previous year. The gross profit of the Corporation is expected to be Rs.19.35 lakhs, as compared to Rs. 12.62 lakhs in the previous year.

The Corporation entered into Memorandum of Understanding with several new organisations including CSMCRI, Bhavnagar; NML, Jamshedpur; AICTE, New Delhi and others, for assignment of technologies developed by them, resulting assignment of 45 new processes for commercialization. Some of the commercially important processes assigned to the Corporation during the year are: Design for domestic RO & ED units, solar operated RO unit, Brine purification resins; Bacteriological agar; Integrated process for manufacture of liquid fertilizer and phycocolloid from seaweed; Field Spot test to detect Urea in Synthetic Milk; Rapid Field Diagnostic test for Haemorrhagic Septicaemia (HS); Abrasive Silica; Highly Abrasive Silica; Flame Gun Technology; Plant Tissue Culture Apparatus (PTCA).

The Corporation signed 26 licence agreements during the year as compared to 29 agreements signed in the previous year. Some of the major technologies licensed by the Corporation during the year were Improved Handloom, Fibre Reinforced concrete manhole covers heavy duty, Herbal Beer from Plant Resources, Synergist for Pyrethrum, Herbal Lipstick, Resham Keet Oushad, Phyto Exdysone (Sampoorna), Nutan Deep Kerosene

Wick Lamp-II, Silver Impregnated Contacts, Material Transfer and Evaluation Agreement for Development of Mosquito Larvicide based on Rabdosis species and its constituents, A newly formulated Herbal ophthalmic formulation for the prevention of cataract, Retractable anchoring and locking device. The Corporation signed three major agreements for services/ technology transfer.

The foreign exchange earnings of the corporation amounted to Rs.10.10 lakhs in 2003-04 as compared to Rs. 1.87 lakhs in the previous year.

The Corporation provided cash awards amounting to Rs.5.10 lakhs for eight inventions and two WIPO Gold Medals, one for the best invention for invention Tractor Mounted Multipurpose Deep Trencher and the for best woman inventor for invention Manufacturing Furniture from old used Automotive Tyres on the occasion of Technology Day i.e. 11th May 2003.

5.2 Central Electronics Limited (CEL)

The Company is the nation's pioneer and largest manufacturer of Solar Photovoltaic products and is among the top few producers of crystalline silicon solar cells/modules in the world. It is the only indigenous manufacturer of strategic item Phased Control Module (PCM), which is a building block for phased array radar. The Company also has a leading position in the area of Railway Electronics and Cathodic Protection Systems.

During the year, CEL's production was Rs. 36.47 crores and sales Rs. 38.86 crores. The focus of the company in 2004-05 has been in the areas of Solar Photovoltaics and Strategic Electronics. In 2004-05, exports have been Rs.16.46 crores (till Nov.) as compared to Rs.1.98 crores in 2003-04 (till Nov.).

Some of the significant activities of year 2004-05 were as follows:

CEL has obtained International Standard Certification from ISPRA, ITALY for entire range of SPV modules (from 20 Watt to 75 Watt) to be competitive in global market.

PZT 8 material has been developed for under water applications and new die-electric material for patch antenna to be used in mobile phones.

Procured export order worth Rs. 25 crores for PV modules from Germany, Austria and other European and Asian Market.