

II-A. INDUSTRIAL R&D PROMOTION PROGRAMME

1. OBJECTIVES

The broad objectives of the Industrial Research & Development Promotion Programme are to:

- Bring in-house R&D into sharper focus;
- Strengthen R&D infrastructure in industry and Scientific and Industrial Research Organisations (SIROs);
- Promote R&D initiatives of the industry and SIROs;
- Ensure that the contributions made by the in-house R&D centres and SIROs dovetail adequately in the overall context of technological and industrial development.

2. AREAS OF COVERAGE

The specific areas covered under the component scheme are:

- In-house R&D in Industry
- Scientific and Industrial Research Organisations (SIROs)
- Fiscal Incentives for Scientific Research

Activities and achievements in each of above areas are presented below:

3. IN-HOUSE R&D IN INDUSTRY

3.1 Recognition of In-house R&D Units

A strong S&T infrastructure has been created in the country. This covers a chain of national laboratories, specialised R&D centres, various academic institutions and training centres, which continuously provide expertise, technically trained manpower and technological support to the industry. Various policy measures have been introduced from time to time, to meet the changing industrial and technological requirements of the industry. The Government has been giving

special attention to promotion and support to industrial research in industry. Several tax incentives have also been provided which encourage and make it financially attractive for industrial units to establish their own in-house R&D units.

A scheme for granting recognition to in-house R&D units in industry is operated by the DSIR. A number of incentives and support measures are made available to in-house R&D units.

The in-house R&D units qualifying for recognition are expected to be engaged in research and development activities related to the line of business of the firm, such as, development of new technologies, design and engineering, process / product / design improvements, developing new methods of analysis and testing; research for increased efficiency in use of resources, such as, capital equipment, materials and energy; pollution control, effluent treatment and recycling of waste products.

The R&D activities are expected to be separate from routine activities of the firm, such as, production and quality control. The in-house R&D units should have staff exclusively engaged in R&D and headed by a full-time R&D manager who would have direct access to the chief executive or to the board of directors depending upon the size of the unit. The in-house R&D units are also expected to maintain separate identifiable infrastructure and R&D accounts.

Number of in-house R&D units recognised by DSIR increased steadily from about 100 in 1973 to about 275 by 1975, to over 700 by 1980, around 925 by 1985, over 1100 in 1990 over 1200 in 1995 and thereafter is hovering between 1200 to 1250; and was 1253 in December 2007. Of these, nearly 1180 are in

the private sector and the remaining units are in public/joint sector. A revised and updated 'Directory of Recognised in-house R&D Units' was brought out during November 2007. This Directory lists 1247 recognised in-house R&D units, giving registration number, name and mailing address of the company, location of the in-house R&D unit(s) and validity of DSIR recognition. The data on these R&D units has been computerised and updated.

For the purpose of recognition, the R&D units have to apply to DSIR as per a prescribed proforma. The proforma and other details about the scheme are provided to the interested companies on request. The proforma and details of the scheme are also available at DSIR website (<http://www.dsir.gov.in>). The applications received are scrutinised for their completeness in the DSIR and are then circulated for comments to various other departments/agencies such as concerned administrative ministries, MSME, CSIR, ICAR, ICMR, ICAS, DBT, DCPC, DoT, DRDO, DIT and NRDC. The units seeking recognition are visited, if need be, by expert teams comprising of representatives of DSIR, as well as outside agencies, like, administrative ministries, CSIR, NRDC, DBT, ICAR, ICMR, DRDO, DIT, DoT, IITs and local educational and Research Institutions before they are taken up for consideration. In order to obtain first hand information on R&D activities of the applicant firms, discussions with the chiefs of the R&D unit and executives of the firm are also held in DSIR in many cases. During the discussions outside experts are invited and their comments are sought. The applications along with comments from outside agencies, visit reports, and the Department's own evaluation are considered by an Inter-Departmental Screening Committee constituted by the Secretary, DSIR. The

Committee meets every month to consider the applications and makes recommendations to the Secretary, DSIR based on its evaluation of R&D infrastructure and R&D activities of the applicant firms.

During the year 2007, the Screening Committee met 12 times and considered 138 applications for recognition; 92 R&D units were granted fresh recognition and 31 applications were rejected. Approval of balance R&D units is under process.

The pendency at the end of December 2007 was 60, including 15 applications received during the month of December, 2007. A statement giving month-wise receipt, disposal and pendency of applications for recognition of in-house R&D units is given at **Annexure 1**.

During the year 2007, over 300 discussions/meetings were held with heads of in-house R&D units. Also, expert teams visited a number of in-house R&D units.

3.2 Renewal of Recognition

Recognition to R&D units is granted for a period ranging from 1 to 3 years. The R&D units are advised to apply for renewal of recognition well in advance (3 months prior to the date of expiry of the recognition). Applications received for renewal of recognition are circulated to CSIR, NRDC and/or the concerned administrative department of Government of India for comments. The applications are examined in DSIR taking into account the inputs received from other agencies for taking suitable decision on their renewal. During the year 2007, 480 in-house R&D units were due for renewal of recognition beyond 31 March 2007; of which 425 applications were received. Based on the evaluation of the performance of the R&D units, renewal of recognition was granted to 420 R&D units.

Recognition granted to 5 companies could not be renewed because their R&D performance was not up to the mark. A statement showing month-wise receipt, disposal and pendency of the cases of renewal of recognition of the R&D units is given at **Annexure 2**.

3.3 Zonal Distribution of In-house R&D Units

The in-house R&D units are distributed throughout the country. There are around 185 units in the Northern Zone (Delhi, Haryana, Punjab, Uttar Pradesh, Jammu & Kashmir), around 110 units in Western Zone (Rajasthan and Gujarat), around 475 units in the Central Zone (Maharashtra, Madhya Pradesh and Orissa), around 392 units in the Southern Zone (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu) and around 85 units in the Eastern Zone covering Bihar, West Bengal, Assam and other North-Eastern states and remaining in other places.

3.4 R&D Expenditure

The expenditure incurred by in-house R&D units in industry has steadily increased. During 1980-81 it was of the order of Rs.300 crores. In 1985-86, it was of the order of Rs.500 crores. It is estimated that the present R&D expenditure of the 1253 recognised R&D units is of the order of Rs.6800 crores. The share of public and joint sector is about 20% and that of private sectors about 80%. 147 In-house R&D units spend over Rs.5 crore each on R&D, 303 in-house R&D units spent between Rs.1 crore to Rs.5 crore each per annum on R&D. The lists of these R&D units are given in **Annexure 3 and 4** respectively.

3.5 R&D Infrastructure

The in-house R&D centres have created impressive infrastructural facilities for R&D including sophisticated testing facilities, laboratory equipment and pilot plant facilities.

Analytical facilities such as HPLCs, IR spectrophotometers, UV-Vis spectrophotometers, NMR spectrometers, electron microscopes, particle size analyzers, portable particle counting systems; vibration test equipment, calorimeter and wind tunnel for complete evaluation of automobile air-conditioning system, ultra filtration equipment, sonicator, spectro fluorimeter, protein purification set up, digital viscometer, high temperature test and evaluation facilities, CAD-CAM facilities, rapid prototype building machines, greenhouse and tissue culture laboratory facilities are available with many in-house R&D units.

3.6 R&D Manpower

There has been a steady increase in R&D manpower employed by the in-house R&D units. By 1975-76, about 12,000 R&D personnel were employed by recognised in-house units, and by 1981-82, the figure was over 30,000. The present estimated manpower for the 1253 in-house R&D units is around 65,000, out of which around 20,000 R&D personnel are employed in public sector in-house R&D units and around 45,000 R&D personnel are employed in the private sector in-house R&D units. Of the total 65,000 R&D personnel, around 3500 are Ph.D's, 21,000 Post Graduates, 21,000 graduates and the rest are technicians and support staff.

3.7 Sectorwise Break-Up of In-house R&D Units

A broad sector-wise break-up of the recognised in-house R&D units is as below:

Chemical and Allied industries	521
Electrical & Electronics industries	275
Mechanical Engineering industries	184
Processing industries (Metallurgical, Refractories, Paper, Cement, Ceramics, Leather and others)	151
Agro and food processing industries and others	122

3.8 Achievements of In-house R&D Units

Some of the R&D achievements reported by the recognised in-house R&D units are listed below:

Chemical and Allied Industries

- Development and commercialization of processes for manufacture of P-Ethoxy ethyl Benzoate; P-Iso propoxy ethyl benzoate; 4-Methoxy benzoic acid; 2-Ethoxy benzoic acid; PHBA solvent process; Ethyl benzoate; Ethyl paraben sodium; Benzyl paraben; Ortho anisic acid; Methyl-5-Chloro-Ortho methoxy benzoate; Gujsol-01 (mixture of parabens); 4-Methyl salicylic acid and Iso propyl myristate.
- Development and commercialization of the anti oxidants:
 - a) Tris (2,4-di-tert. butylphenyl) phosphate (kinox-68)
 - b) 1,3,5-Tris(3,5-di-tert.butyl-4-hydroxybenzyl)-1,3,5-Triazine-2,4,6 (1H, 3H, 5H)-trione (kinox-34),
 - c) N¹-Hexamethylene-bis(3-(3,5-di-teri. butyl-4hydroxyben-3ylphenyl) propionamide) (kinox-98)
 - d) 1,3,5-Trimethyl-2,4,6-tris(3,5-di-tert. butyl-4-ydroxybenzyl)benzene (kinox-30) and
 - e) ntaerythrityl-tetrakis-[-3-(3,5-di tert-butyl -4 hydroxy phenyl) propionate (kinox-10 SnF) .
- Invented 5-Loxin, a novel anti-inflammatory & anti- arthritic product.
- Developed solid Catalyst – external donor system for polypropylene technology based on current generation supported titanium catalyst system which enables polymer production without removal of catalyst residues due to higher productivity; polymer with desired molecular weight distribution; polymer

with controlled degree of stereo-regularity without requiring removal of undesirable polymeric fractions.

- Technology development for conversion of industrial waste to value added products:- Production of forskolin of drug grade; Production of policosanol; Technology development for manufacture of industrial diols: - 1,2 - Hexanediol; 1,2 - Octanediol and Technology development for manufacture of resveratrol by a facile synthetic route.
- Developed novel route of synthesis for commercial manufacture of Olanzapine - antipsychotic; Gabapentine- anti-convulsant; Isradipine – antihyper-tensive antiangial; Quinapril – antihypertensive; Meprobamate - anxiolytic and 2 – Carboxymethoxy -3 –thiophene-sulfonyl Chloride – pharma indicate. The product have been commercialized.

Computer Software

- Development of SHAKTI Artillery combat command & control system (ACCCS). SHAKTI is a subsystem for tactical command, control and communication intelligence system for Indian Defence forces. System is for automation of all operational procedures and data management of artillery with complete support for command and control levels of corps, division, regiment, battery and guns.
- Design, development & optimization of multimedia subsystem (wireless embedded software for mobile phones).The package has subsystem which have been developed; Stored multimedia player; DVD-H Applica-tions; Streaming media player; 2 Way real-time video telephony over a circuit switch

network; Voice over IP & video over IP; Image viewer; Image capture; Camcorder.

- Development of Remote multi-pass wire drawing simulator (RMWDS). Its main features are:- Numerical modeling of multi-pass wire drawing; Virtual wire drawing platform for various innovative ideas and analysis; An interface for use of the model by production personal; Platform for optimization of die schedule with respect to power consumption & quality of wire; Mass deployment of model using remote connection for multi-location production sites; Platform to analyse the effect of the different parameters on wire drawing process.

Drugs & Pharmaceuticals Industries

- Development of two new molecules antidiabetic (DPP IV inhibitor); anti-inflammatory (PDE4 inhibitor).
- Development of New Drug Delivery systems based on liposomes. Two products namely Fungisome gel (liposomal Amphotericin B Gel) and Psorisome Gel(Liposomal Dithranol Gel). Both these products are based on application of liposomal technology for controlled delivery of drugs encapsulated in the liposomes.
- Development of a scientific method for identifying optimum packaging for pharmaceutical formulations; effective counterfeiting solution to the pharmaceutical solid dosages through innovative packaging material.
- Development of five new drug processes which drastically reduced the price of the five anti cancer drugs. Gefitinib an anti cancer drug used mainly in non small cell lung cancer; Bortezomib a new drug for multiple myeloma – a new polymorph of

the drug developed; Amifostine is a radio protective drug given after the radiation therapy; Zoledronic acid is mainly used in bone cancer patients; Letrozole: is mainly used in the post menopausal breast cancer.

Electrical and Electronic Industries

- Development of technology for high-energy Permanent Magnet Machines (PMM) to meet the requirements of defence sector, space applications and power sector.
- Development of energy efficient electronically controlled new generation brushless DC motors (Voyager – railway carriage fan). Developed brushless DC railway carriage fans which are electronically controlled.

Electronics / Opto Electronics Industries

- Design, development and commercialization of Universal Temperature Controller, 4 Channel Sequential Timer with relay output , and 15 Channel Sequential Timer with Solid state output, HM-300-Hour Meter with RS232 Communication.
- Development of new technology using their in-house R&D for handling power distribution system of India. Development of cluster metering and associated technologies result in development of highly integrated end to end energy measurement /auditing/ management solutions to the utilities.
- Development of cutting –edge technologies for recordable optical media such as DVD-RW 4 X Digital Versatile Disc, Mini RW Disc (Cam-Recorder Application) and high –speed (8X) re-writable digital versatile disc (DVD+RW) (8X) Disc.

- Development of 8/16/32/40 Channel Dense Wavelength Division Multiplexing (DWDM) System: Dense Wave Division Multiplexing (DWDM) technology is the latest development in the Telecom Transport Systems in the Optical Domain.
- Development & commercialization of Curtain flame ignition system for ignition in sinter mix in sinter plants at Bokaro Steel Plant and Rourkela Steel Plant.

Infrastructure Development

- Geo-textile sand container mattresses (GSCM) lining for temporary river diversion channels. An innovative high performance cost & time efficient, environment friendly alternative method of lining diverted channels. Uses technically superior synthetic material. Successfully developed & implemented at Teesta Low Dam Hydroelectric Project Stage-IV site, Jalpaiguri, West Bengal.

Mechanical Engineering Industries

- Development of indigenous “Dual plate check valves”.
- Development of innovative solutions to irritant judder and rattling phenomenon observed in multi-plate wet clutches in Motorcycles being manufactured in the country.
- Design and development of “Intelligent illuminated non contact handle bar switch for motor cycle” with novel features such as non contact mechanism, illumination in handle bar switch, self cancellation blinkers and body control unit for motorcycle. The newly designed control system include domain such as elector-magnetism, optics, and electronics and the system has been packaged in ergonomically styled switch consoles.
- Design, development& commercialization of “Integral receiver dryer condenser”

(IRDC) also called “Subcool Condenser”. The novel feature of the sub cool condenser is integration of receiver dryer and the condenser, thus to improve the performance of the A.C. system and at the same time to eliminate the need for separate packaging space in the engine cabin and associated cost of the pipe connectors mounting brackets and manufacturing operations in the car assembly line.

- Design, development and test of “dampolators” an innovative product which combines functions of both isolator and harmonic balancer providing benefits of both these parts in a single unit.

New Materials

- Development of three composites. The high temperature resistant laminates permaglass 22 CIN (PM1) can insulate continuously at a temperature of 500⁰ C. Stable insulation can be attained in any heated area such as Dry Arc Electric Furnaces and Drying Ovens.
- Development of bake hardening (BH) steels with a higher initial yield strength and good formability properties. These steels have shown 40 to 50 % increased strength as compared to conventional grades such as low carbon EDD and extra low carbon Interstitial Free Steel. The increase in strength of this new steel led to decrease in the thickness (hence decrease in weight) with an improvement in dent resistance of the material.

Pollution Control & Environmental Protection

- Development and manufacture of Gas Monitoring devices for fumigation industry, Flammable gas detection devices for industrial & domestic segments,

Breath Alcohol Analyzer for Traffic police, railways, hospital and Gas Sensors.

Processing Industries

- Development of a process to reduce the hexavalent chromium to trace levels (less than 0.01 ppm) in concentrates by using an organic reductant known as Myrobalam in collaboration with Central Leather Research Institute, Chennai.

Agro and Food Processing Industries

- Development and promotion of technology & products for environment friendly management of tissue borers of sugarcane using indigenously synthesized sex pheromones and patented water trap. Developed bollworm resistant high yielding high quality Bt cotton hybrids utilizing modern tools of biotechnology combined with traditional breeding methods.

3.9 Imports Made by In-house R&D Units

The recognised in-house R&D units have imported a variety of equipment, raw materials and samples for their R&D activities. These include: NMR, GLC, IR Spectro Photometer, HPTLC, GC-FTIR system, FT-NMR spectrometer, inverted phase contrast fluorescence microscope, microshen digital opacity reflectometer, colour image analysis system, laser based particle size analyzer, laser scanning microscope, dionex ion chromatography system, mass emissions analysis system, digital distortion analyser, dielectric loss analyser, X-ray fluorescence spectro-photometer system, portable particle counting system, ultra filtration equipment, probe sonicator, protein purification set up digital viscometer, stereo zoom microscope, Auto Titrator, UV-Vis dual beam spectro-

photometer, trinocular phase contrast microscope, cryptometer, elisa system, mass emission analysis system, prototyping machine, electrophoresis unit, microprocessor double ended inertia dynamometer, logic analyser, fibre optics evaluation kit, intelligent universal programmer, reference standards for chemical raw material testing purpose, microwave accelerated acid digestion system, pump for ultra filtration system and auto hardness tester, fuel ratio analyser, ignition timing meter, paper permissibility meter.

3.10 Other Benefits Availed by the Recognised R&D Units

The Department provides assistance to recognised in-house R&D units in a number of ways, such as cases of industrial R&D units requiring allotment of special controlled materials for R&D, permission to export of specialised products reserved for small scale industries by medium scale industries for test marketing in other countries and disposal of imported R&D equipment/instruments and pilot plant produce are examined for making suitable recommendations to concerned agencies.

Few cases regarding locational clearance with respect to expansion of R&D have been dealt with. A number of applications regarding disposal of R&D equipment and also, pilot plant produce; and permission for allotment for controlled materials required for R&D were examined and the decisions of the Department conveyed.

3.11 Conference, Awards and Publications

21st National Conference on in-house R&D in Industry

DSIR organised the 21st National Conference on in-house R&D in Industry, in association with the Federation of Indian Chambers of

Commerce and Industry (FICCI) during 15-16, November 2007 in New Delhi. The theme of the Conference was “R&D Innovations: For Indian Growth Dynamics“ The Conference had four technical sessions viz. “Creating Infrastructure for R&D Innovations”; “Innovative R&D: Some success stories”; “Innovative R&D: Inclusive Growth” and “Government Incentives for Innovative R&D ”. Attended by over 500 delegates from industry, National laboratories, IITs and universities, Scientific and Industrial Research Organisations (SIROs), Consultancy organisations, Government Departments, the Conference was inaugurated by Dr. T. Ramasami, Secretary, DST and Dr S.K. Brahmachari, Secretary, DSIR who also presented the DSIR National Awards for Outstanding in-house R&D Achievements (2007) to nine industrial units. Dr. K.T. Chacko, Director, Indian Institute of Foreign Trade (IIFT) delivered the valedictory address on 16th November 2007.

National Awards for Outstanding In-house R&D Achievements

In order to provide recognition to the efforts of industry towards innovative research and technological development, the National Awards for R&D Efforts in Industry were instituted in 1987 by the DSIR. These awards are in the form of silver shields and are presented along with citations at the inaugural session of the annual National Conference on in-house R&D in Industry. So far, 171 companies have won the DSIR National R&D Awards for Outstanding in-house R&D achievements. The list of the award winners in the year 2007 is as follows:

- ***Chemical and Allied Industries***
Laila Impex, Vijayawada (A.P)
- ***Agro & Food Processing Industries***
Pest Control (India) Pvt. Ltd, Bangalore

- ***Pollution Control & Environmental Protection***
United Phosphorous Ltd, Vapi (Gujarat)
- ***Mechanical Engineering Industries***
Minda Industries Ltd, Gurgaon
- ***Electrical Industries***
Crompton Greaves Ltd, Mumbai
- ***Electronics / Opto Electronics Industries***
Ananth Technologies Ltd, Hyderabad
- ***Computer Software***
Sasken Communication Technologies Ltd, Bangalore
- ***Technology Absorption of Imported Technologies***
Reliance Industries Ltd, Surat
- ***Successful Commercialization of Technologies acquired from others***
Tata Steel Ltd, Jamshedpur

3.12 Publications

Outstanding In-house R&D Achievements - 2007

The DSIR publication “Outstanding in-house R&D Achievements (2007),” covering the award winning achievements of 9 companies, was released during the inaugural session of the 21st National Conference on in-house R&D in Industry.

In-house R&D in Industry – An Information Update

As the number of in-house R&D Centres has increased while the activities of DSIR have also diversified significantly with respect to in-house R&D units, it was felt appropriate to devise a communication system between DSIR and in-house R&D units. Accordingly, the DSIR started bringing out a quarterly Information Update on in-house R&D in industry on a regular basis since April 1988. The Information Update intended to provide a fast communication link between DSIR,

in-house R&D units and SIROs and serve to disseminate useful and important information relevant to R&D in Industry. During 2007, three issues of in-house R&D in Industry were brought out in April, July, October 2007. These have been widely disseminated to industry, SIROs, Government Departments and others.

Research and Development in Industry : An Overview

A publication entitled “*Research and Development in Industry : An Overview*” was brought out on the occasion of the 21st National Conference on in-house R&D in Industry (November 2007). The publication gives details of resources devoted to scientific and technological activities, international comparison of S&T indicators, fiscal incentives and support measures available for research in India, promotional schemes for R&D operated by DSIR and other Government Departments.

4. SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATIONS

4.1 Recognition of Scientific and Industrial Research Organisations (SIROs)

The DSIR had launched a scheme of granting recognition to SIROs in 1988. SIROs recognised by DSIR are eligible for Customs Duty Exemption and Excise Duty Waiver in terms of notification Nos. 51/96-Customs dated 23.7.1996 and 10/97-Central Excise dated 1.3.1997 respectively.

The DSIR has brought out Guidelines for Recognition of SIROs, which give procedural details and application proforma for seeking recognition under the SIRO Scheme. Functional SIROs having broad based governing council, research advisory committee, research personnel, infrastructural

facilities for research, well defined, time bound research programmes and clearly stated objectives of undertaking scientific research, are considered eligible for recognition by DSIR. The investments of surplus funds not needed for immediate research should be in accordance with the Income-tax Act, 1961.

Applications for seeking recognition under the SIRO scheme are considered in DSIR by an Inter- departmental Screening Committee with members from Council of Scientific and Industrial Research (CSIR), Indian Council of Medical Research (ICMR), Indian Council of Agricultural Research (ICAR), Indian Council of Social Sciences Research (ICSSR) and University Grants Commission (UGC). The recommendations of the Screening Committee are put up for approval of Secretary, DSIR. The recognition is effective from the date of approval of Secretary. Retrospective approval is not granted.

During the period January 2007 to December 2007, the Screening Committee met 8 times and recommended 27 cases for recognition as SIROs under 1988 Scheme of DSIR. These include cases in the natural and applied sciences, agricultural, medical sciences and social sciences. List of these SIROs is furnished at **Annexure 5**.

Recognition granted to SIROs is for duration ranging from 1 to 3 years. The SIROs are advised to apply for renewal of recognition well in advance (3 months prior to the date of expiry of recognition). Such applications received for renewal of recognition are examined by Research Review Groups by involving representatives from ICAR, ICMR, CSIR and ICSSR depending on the area. Based on the evaluation made by the Research Review Groups, renewal of recognition is granted to SIROs.

At present there are 570 SIROs duly recognised by DSIR; of these, 198 are in the

area of natural and applied sciences, 200 are in the area of medical sciences, 38 are in the area of agricultural sciences, 108 are in the area of social sciences and 26 are universities/colleges. Of these 570 SIROs, the renewal of recognition beyond 31.3.2007 of 31 SIROs is under consideration for want of further information/ clarification. DSIR has brought out a directory of recognised SIROs in November 2007.

The SIROs have employed qualified scientists and researchers and have also established good infrastructural facilities for research. They have developed new processes, procedures, techniques and technologies and also filed several patents. They have also organised seminars/ symposiums/ workshops and published research papers / reports / books.

5. FISCAL INCENTIVES FOR SCIENTIFIC RESEARCH

Government has evolved, from time to time, fiscal incentives and support measures to encourage R&D in industry and increased utilisation of locally available R&D options for industrial development. New incentives to encourage investments in R&D by industry are announced in the Union Budget.

Fiscal incentives and support measures presently available include:

- Income-tax relief on R&D expenditure;
- Weighted tax deduction U/s 35 (2AA) of IT Act 1961 for sponsored research programs in approved national laboratories, universities and IITs;
- Weighted tax deduction u/s 35(2AB) of IT Act, 1961 on in-house R&D expenditure in chemicals, drugs, pharmaceutical (including clinical drug trials, obtaining approvals from any regulatory authority under any Central, State or Provincial Act

and filling an application for a patent under Patent Act, 1970), bio-technology, electronic equipment, automobiles and its components; computers, telecommunication equipment and manufacture of aircrafts and helicopters as approved by the Prescribed Authority (Secretary, DSIR)

- Customs duty exemption on capital equipment, spares, accessories and consumables imported for R&D by approved institutions/SIROs;
- Customs duty exemption on specified goods (comprising of analytical and specialty equipment) for use in pharmaceutical and biotechnology sector;
- Excise duty waiver on indigenous items purchased by approved institutions/SIROs for R&D;
- Ten year tax holiday for commercial R&D companies approved upto 31.03.2007
- Excise duty waiver for 3 years on goods produced based on indigenously developed technologies and duly patented in any two of the countries out of India, European Union (one country), USA and Japan;
- Accelerated depreciation allowance on plant and machinery set-up based on indigenous technology;
- Customs duty exemption on imports for R&D projects supported by Government.

Information on some of these fiscal incentives is given in the following paragraph.

5.1 Depreciation Allowance on Plant and Machinery Setup Based on Indigenous Technology

Secretary, DSIR, Ministry of Science and Technology, is the Prescribed Authority to certify expenditures where higher rate of

depreciation is to be allowed for the plant and machinery using indigenous know-how as per provisions of rule 5(2) of IT Rules. Guidelines have been issued for making applications for obtaining the aforesaid certificate. All such applications received are examined in the department, and discussions and visits by experts to verify the claim are made to the plants by expert teams. Based on a detailed examination, certificates in deserving cases are issued for eligible expenditure.

During the year 2007, 5 certificates involving Rs.6797.7 lakhs on cost of plant and machinery were issued by DSIR. Details are given at **Annexure 6**.

5.2 Reference Under Section 35(3) of Income-Tax Act, 1961 Regarding Scientific Research

In the implementation of various incentive schemes for the promotion of research and development, the Income-tax Act, inter-alia, provides that expenditure made on capital equipment and related to research activities are allowed to be written off 100% in the year in which the expenditure are incurred. The Government has provided that if a question arises under section 35 of Income-tax Act, 1961 as to whether and, if so, to what extent any activity constitutes or constituted or any asset is or was being used for scientific research, the Central Board of Direct Taxes would refer the question to the Prescribed Authority. Director General Income-tax (Exemptions) in concurrence with Secretary, DSIR is the Prescribed Authority for deciding such cases. On receipt of the reference in DSIR, the department collects information/background regarding the description of the activity claimed as scientific research, date of commencement of the relevant projects, date of completion of research work as also the results obtained from the specific project.

After obtaining all these details, the matter is examined in DSIR. In case where it is considered necessary, a team of technical experts is constituted for on the spot appreciation of the research work done at the premises of the company. After receiving the technical assessment report from the visiting team, a discussion is also normally held so that the point of view of the Company is taken into account before arriving at a decision. After completing the processing of the case in the above fashion, the case file is placed before the Secretary, DSIR for giving a decision. The Secretary, DSIR gives his decision by setting out a reasoned order duly signed by him, which is communicated, to Director General (Income-tax Exemptions).

During the year 2007, request of one company has been under consideration.

5.3 Approval of Commercial R&D Companies

In order to promote research and development activities in the commercial research and development companies, the Finance Act, 2000 provided for a ten-year tax exemption from income-tax under section 80-IB(8A) of the Income-tax Act, 1961, to approved companies, whose main objective is scientific and industrial research. Secretary, DSIR is the Prescribed Authority vide Gazette notification no. S.O.85 (E) dated 31 January, 2001, issued by Department of Revenue, Ministry of Finance for granting approval under section 80IB(8A) of the IT Act. The notification was valid upto 31st March, 2007 and this scheme was not extended further by the Government.

The approval to commercial R&D companies is given initially for a period of 3 years, which can be extended up to 10 years based on evaluation of its performance.

The tax exemption is available to a company, which is accorded approval by the Prescribed

Authority at any time after the 31st day of March 2000 but before the 1st day of April 2007. So far, 45 R&D companies have been approved including 13 approved during the year 2007. Details are given at **Annexure -7**.

5.4 Customs Duty Exemption to Recognised SIROs

All SIROs recognised by DSIR are eligible for Customs Duty Exemption on the import of scientific equipment, instruments, spares, accessories as well as consumables for research and development activities and programmes.

The procedure for issuing the essentiality certificates to SIROs for obtaining the customs duty exemptions has been formalised. A Committee was set up in DSIR to examine the applications received from SIROs. The committee met periodically to examine the requests. The recommendations of the Committee were put up to the Head of the Industrial R&D Promotion Programme, for approval. As per the new notification No. 24 /2007 dated 1st March, 2007 the director or head of the institute / organization is empowered to sign the essentiality certificate.

5.5 Central Excise Duty Exemption to Recognised SIROs

All SIROs recognised by DSIR are eligible for Excise Duty Exemption on purchase of scientific and technical instruments, apparatus, equipment (including computers); accessories and spare parts thereof and consumables; computer software, Compact Disc - Read Only Memory (CD-ROM), recorded magnetic tapes, micro films, microfiches; and prototypes for research and development activities and programmes.

This provision was introduced by Ministry of Finance (Department of Revenue) vide

notification No. 10/97-Central Excise dated 1st March, 1997. A Committee was set up in DSIR to examine the applications received. The Committee met periodically and essentiality certificates were issued with the approval of Head of RDI Scheme. As per the new notification No.10/ 2007 dated 1st March, 2007 the director or head of the institute / organization is empowered to sign the essentiality certificate.

5.6 Registration of Public Funded Research Institutions, Universities, etc.

Public funded research institutions, universities, IITs, IISc., Bangalore; Regional Engineering Colleges (other than a hospital) are eligible for availing customs duty exemption on import of equipment, spares and accessories and consumables for research purposes through a simple registration with the DSIR. The head of the public funded research institutions / organisations duly registered with DSIR can certify the R&D goods for duty free import as per the notification No. 51/96-Customs dated 23 July 1996. As per the Government notification No. 10/97-Central Excise dated 1.3.1997, the above Public Funded Research Institutions registered with DSIR are also eligible for Central Excise Duty Waiver on purchase of indigenously manufactured items for scientific research purposes.

Coinciding with the presentation of Union Budget for the year 2004, Ministry of Finance amended the notification No. 51/96-customs vide notification No. 28/2003-Customs dt. 1.3.2003. As per the amendment, departments & laboratories of central government and state governments (other than a hospital) are not required to register with DSIR for availing the customs duty exemption. They can clear the consignments by producing a certificate from the Head of the institution certifying that

the said goods are required for research purposes only. Another significant change in the notification is that regional cancer centres (cancer institute) have been included in the list of institutions eligible for DSIR registration for importing goods for research purposes at a concessional rate of customs duty of 5%.

The registration of above institutions is recommended by an inter-departmental Screening Committee constituted by the department for considering the requests from various institutions. The Screening Committee met 3 times during the year and considered 35 applications from various public funded research institutions.

During the year 2007, 28 registration certificates were issued to such public funded research institutions for availing customs duty exemption on import of scientific equipment, spares and accessories, consumable items and Central Excise Duty exemption on indigenous purchases for Scientific Research Purposes.

The registration to public funded research and other institutions mentioned in the notification is granted for maximum period of five years. The registered institutions are advised to apply for renewal of registration well in advance of the date of expiry of the registration.

During the year 2007, 70 institutions were due for renewal of registration. The department received 66 renewal applications. These were processed on individual files and approval of Secretary was obtained and 60 renewal certificates were issued ;and 2 cases were rejected as these are now not falling under the definition of Public Funded Research Institutions. The remaining applications are under process.

5.7 Approval of In-house R&D Centres u/s 35(2AB) of I.T. Act 1961

Finance Act 1997 introduced a sub-section (2AB) in Section 35 of the IT Act 1961. This sub-section was introduced in order to encourage research & development in drugs, pharmaceuticals, electronic equipment, computers, telecommunication equipment, and chemicals. The sub-section provided for weighted tax deduction of a sum equal to one and one-fourth times of any expenditure incurred on scientific research (not being expenditure in the nature of cost of any land and building). The weighted tax deduction was further raised to 150% by the Finance Act, 2000. The in-house Research and Development facilities of the companies engaged in the business of manufacture or production of the above said items should be approved by the 'Prescribed Authority' i.e. Secretary, DSIR. Also, the company should enter into an agreement with the Prescribed Authority for co-operation in such research and development facility and for audit of the accounts maintained for that facility. Through a separate notification, manufacture of aircrafts and helicopters was included in the list eligible under this section.

The provision was introduced for expenditure on R&D incurred up to 31st March 2000. The Ministry of Finance, Department of Revenue, Central Board of Direct Taxes, notified the provision vide Notification No. S.O.259 (E) dated 27 March 1998. Finance Bill 1999 introduced in Lok Sabha on 27 February 1999 extended this provision till 31 March 2005. The provision was further extended upto 31.03.2007 by the Finance Act 2005 and again upto 31.03.2012 by the Finance Act 2007. The sub-section was amended by the Finance Bill 2001, to include expenditure on in-house R&D by units engaged in the business of biotechnology, as well as cover expenditure on clinical trials, filing of patents

under Indian Patent Act (1970) and obtaining regulatory approvals, for weighted tax deduction @ 150% under section 35(2AB) of Income-tax Act. During the year 2004, CBDT has notified automobile including automobile components as an article or thing eligible for the weighted deduction under the section 35(2AB) of IT Act.

During the year 2007, 43 new applications for approval in Form 3CM received by the Prescribed Authority. Secretary, DSIR is designated as the Prescribed Authority under section 35(2AB) of Income-tax Act, 1961.

Fresh / renewal of approval were accorded to 82 companies by the prescribed authority. These approvals were communicated in Form 3CM, after Agreements of cooperation for research & development were signed with these companies on behalf of the Secretary, DSIR. Further, the detailed R&D expenditures of the approved companies have also been examined by DSIR and 61 reports have been forwarded to DGIT(E) in Form 3CL as required under the IT Act. A list of companies approved under Section 35 (2AB) of IT Act, is furnished in **Annexure-8**.



An Award Winner Receiving the DSIR National R&D Award (2007)



Prof. Samir K. Brahmachari, Secretary DSIR and Dr. T. Ramasami, Secretary, DST and Sh. Y.K. Modi, Ex President FICCI Releasing the DSIR Special Publication



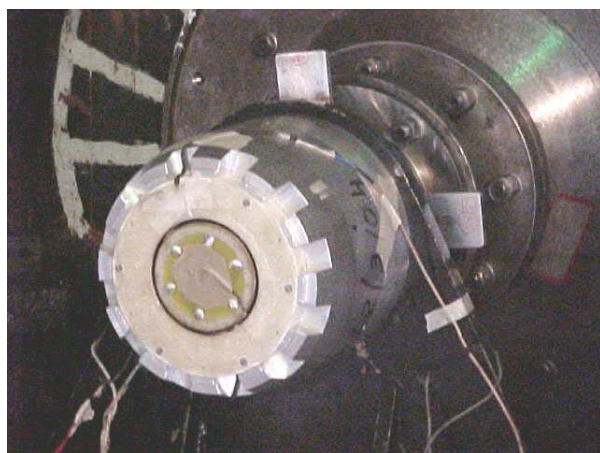
*Prof. Samir K. Brahmachari, Secretary, DSIR
Inaugurating the 21st National R&D Conference*



*Dr. K.T. Chacko, Director Indian Institute of Foreign
Trade, during the Valedictory Session*



*Recovery of Cyclohexane from waste RB bottom Stream in
Polyethylene Manufacturing*



*12 channel rotary telemetry system mounted in the rig
for spin test*

II-B. TECHNOLOGY DEVELOPMENT AND INNOVATION PROGRAMME

The programme has two sub-components, viz.

- (i) **Technology Development and Demonstration Programme (TDDP)** to support technology development efforts of industry – R&D system and
- (ii) **Technopreneur Promotion Programme (TePP)** to nurture the innovative spirit of individuals.

1. TECHNOLOGY DEVELOPMENT & DEMONSTRATION PROGRAMME

1.1 Objectives

The programme aims at catalyzing and supporting activities relating to technology absorption, adaptation and demonstration including capital goods development, by involving industry and R&D organization. The specific objectives of the programme are:

- Supporting industry for technology development, demonstration and absorption of imported technology
- Building indigenous capabilities for development and commercialization of contemporary products and processes of high impact.
- Involvement of national research organization in joint projects with industry
- Technology evaluation in selected sectors

1.2 Activities

The Department provides, on a selective basis, partial financial support to research, development, design and engineering (RDDE) projects proposed by industry in the following areas:

- Development and demonstration of new or improve product and process

technologies including those for specialized capital goods, for both domestic and export markets.

- Absorption and up-gradation of imported technology.

The partial financial support by DSIR in the above areas, primarily covers prototype development and pilot plant work, test & evaluation of products from such R&D, user trials, etc. Bulk of the cost of the project is met from industry's resources. TDDP has now been expanded by adding two more components, namely "TDDP-Start Up" and "TDDP-Small Business" under which support would be provided, as the name indicates, to Start Up companies to start their commercial operations and to small business to carry out both lab/pilot scale R&D as well as commercialization.

The Department, under this activity has so far supported about 193 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 and industrial machinery, chemicals and explosives, etc. 111 projects have so far been completed and over 35 technologies developed under the scheme have been commercialized or under commercialization. During the year, 52 Technology Development Demonstration projects supported under the scheme were reviewed for progress.

The list of running projects of various industrial units are given in **Annexure 9**. The details of new projects approved during the year are given below:

Microbial Production of Arachidonic Acid, An Omega-6 Polyunsaturated Fatty Acid Essential for Human Health, submitted by M/s ABL Biotechnologies Ltd., Chennai

Arachidonic Acid (ARA) is a polyunsaturated fatty acid and is a precursor of eicosanoids. Eicosanoids, which are made by oxygenation of twenty-carbon essential fatty acids, (EFAs) are signaling molecules that act as messengers in the central nervous system and also exert complex control over many bodily systems, principally in inflammation or immunity. Absence of ARA or such other polyunsaturated fatty acids can lead to many and varied disorders such as pre-menstrual syndrome, schizophrenia, rheumatoid arthritis, multiple sclerosis, etc. ARA is also deemed as essential for the healthy development of the brain in infants and, to this end, is recommended in infant foods together with other polyunsaturated fatty acids such as docosahexaenoic acid (DHA).

ARA is an essential requirement of most mammals and for many mammals, the requirement is met by converting linoleic acid. Plants and plant oils do not contain ARA, and at present, the commercial source of this important fatty acid is a group of fungi belonging to the genus *Mortierella*. Many patents have been taken on individual strains of the fungus as well as the use of ARA in various formulations.

The present project proposes to establish a high yield strain of the fungi available in the Indian sub-continent and to optimise the conditions for the growth of this culture with a view to scale up for commercialisation. When they succeed, it will be for the first time that a commercial production of ARA would be set up in India.

This project has been supported by DSIR with a support of Rs. 180 Lakhs out of a total project cost of Rs. 471 Lakhs.

Development of Process for the Manufacture of Nano Labeled DNA/RNA Compounds, submitted by M/s Ogene Systems (I) Pvt. Ltd., Hyderabad

The labelling compounds that are referred to above are used in research for gene expression, automated nucleic acid synthesis/sequencing, quantitative PCR and in situ hybridization. It is believed that the nano-labelled compounds proposed to be developed under the project are the latest state-of-the-art second generation compounds with such a high level of sensitivity that they could enable the detection of the presence of even a single molecule in the sample. The technology for the production of such compounds has been developed at laboratory scale by M/s BioGenex of USA. Ogene proposes to commercialise this technology.

The proposal has been supported by DSIR with a support of Rs. 110 Lakhs out of a total project cost of Rs. 308 Lakhs.

Development of Novel Therapeutics based upon Natural Products from Indian Medicinal Plants, Joint Project Proposal of Chemistry Department, Delhi University, and VP Chest Institute, University of Delhi, Delhi

The proposal proposes to identify natural product based molecules which have better efficacy than the compounds already identified till now. The proposal also includes medicinal chemistry analysis on potential anti-inflammatory, and anti-platelet aggregation and vasorelaxation compounds already identified by them.

The proposal has been supported by DSIR with a support of Rs. 226 Lakhs out of a total project cost of Rs. 226 Lakhs.

Green Process Technology for the Manufacture of Cephalosporin G, Submitted by Orchid Chemicals & Pharmaceuticals Ltd., Chennai

Cephalosporins are bactericidal and belong to a group of beta-lactam antibiotics (such as penicillins). Like other beta-lactam antibiotics, they inhibit the synthesis of a structural component of the bacterial cell wall. In the case of Cephalosporins, they disrupt the synthesis of the peptidoglycan layer of bacterial cell walls.

Cephalosporins are much more expensive than penicillins. One reason is that some cephalosporins are made from penicillins by a number of chemical conversions. One of the necessary chemical steps involves the expansion of the 5-membered penicillin ring structure to a 6-membered cephalosporin ring structure. This complex chemical processing is both expensive and noxious to the environment. Another reason is that, so far, only cephalosporins with a D-5- amino-5-carboxypentanoyl side chain, such as Cephalosporin C, could be fermented. Cephalosporin C, by far the most important starting material in this respect, is very soluble in water at any pH, thus implying lengthy and costly isolation processes using cumbersome and expensive column technology. Being less potent, Cephalosporin C obtained in this way has to be converted into therapeutically used cephalosporins by a number of chemical and enzymatic conversions.

Cephalosporins are antibiotics characterized by a cephem ring system in which a beta-lactam ring is fused to a dihydrothiazine ring. The cephem ring system is synthesized

by expansion of the five-membered thiazolidine ring of the penicillin to the six-membered dihydrothiazine ring. The enzyme that catalyzes this reaction is the deacetoxycephalosporin C synthetase (DAOCS)—often called expandase. This has been covered under numerous patents.

OCPL claims to have identified and developed competitive mutants of expandase, which would not only be proprietary but also commercially relevant and have filed for intellectual protection by its applications ((Modified expandase enzyme and its use - India, 366/CHE/2004, 22.04.04; India, 838/CHE/2004, 23.08.04; PCT, IB05/01040, 20.04.05). PCT, IB05/01040, 20.04.05 application has been cleared for filing with individual countries.

They have completed laboratory scale trials and now propose to go in for pilot scale trials before going on for commercialization. A successful outcome in the project could enable OCPL to play a dominant role globally in this area.

The proposal has been approved by DSIR and the agreement is under negotiation.

2. TECHNOPRENEUR PROMOTION PROGRAMME (TePP)

Department of Scientific and Industrial Research (DSIR) under its Technology Development and Innovation Programme of TPDU Scheme and Technology Information Forecasting and Assessment Council (TIFAC) of Department of Science and Technology (DST) jointly operate “Technopreneur Promotion Programme (TePP)”. TePP endeavour to tap the vast innovative potential of the citizens of India. Financial support is provided to individual innovators having original ideas to convert them into working models, prototypes etc. It is expected that

thirty new projects would be supported during the whole financial year of 2007-2008 by DSIR. The details of the completed, on-going and approved projects supported under TePP during the year under report are given in **Annexure 10**.

3. OTHER ACTIVITIES

3.1 To expand the reach of TePP among common mass, **ten** TePP Outreach Centres of DSIR were set up at Sponsored Research and Industrial Consultancy (SRIC), IIT Kharagpur (W.B.), Society for Innovation and Entrepreneurship (SINE), IIT Bombay, ERDC-Hartron, Ambala Cantt. (Punjab), Acharya Nagarjuna University, Guntur (A.P.), Technopark, Trivandrum (Kerala), Foundation for Innovation & Technology Transfer (FITT), IIT Delhi, Shri Siddhartha Institute of Technology (SSIT), Tumkur (Karnataka), Science & Technology Entrepreneurs' Park(STEP)- National Institute of Technology(NIT), Surathkal (Karnataka), TREC-STEP, Trichy (T.N.) and JSSATE-STEP, NOIDA(U.P.). Besides these, six additional TePP Outreach Centres were also set up by TIFAC at PSG-STEP, Coimbatore, Vellore Institute of Technology- Technology Business Incubator (VIT-TBI), Vellore, Central Glass Ceramics Research Institute(CGCRI), Kolkata, Institute Industry Partnership (IIP) Cell, IT-BHU, Varanasi and SIDBI Innovation & Incubation Centre (SIIC), IIT Kanpur, Kanpur, IIT Roorkee and College of Technology & Engineering, Udaipur (Rajasthan).

3.2 With a view to sensitize larger mass, **nine** TePP Innovation Funding Camps were organised at Kanpur (6th April), Karad (13th April), Satara(14th April), Patna (21st April), Bhopal (28th April), Baddi (17th May), Mohali (18th May), Jabalpur (28th July) and Sholapur respectively.

3.3 DSIR participated/ organised in a number of exhibitions/ workshop to showcase the strengths and capabilities of R&D projects supported under TePP as well as to sensitize academia and network partners about the philosophy of TePP during the year.

- An interaction meet of TePP officials with family business managers was organized on 4th April, 2007 at S.P. Jain Institute of Management & research, Mumbai.
- TePP participated in All India Junior Robotics Championship – TRICS, 2007 at IIT Bombay on 29th April, 2007 to create awareness among young children about TePP scheme.
- TePP participated in India Innovation Summit at Bangalore organized by Confederation of Indian Industry(CII), Southern Chapter, June 15-16, 2007, wherein products/working models of TePP innovators were displayed.
- TePP Orientation Programme for Representatives of TePP Outreach Centres at SIDBI Innovation & Incubation Centre(SIIC), IIT Kanpur, July 30-31, 2007.
- 2-day training programme on “Creativity and Problem Solving” at TIFAC, New Delhi, September 26-27, 2007.
- Two (2) brain-storming sessions were organized to explore the possibilities for setting up “Innovation Export Promotion Council” in association with CII, Gurgaon at FITT, IIT Delhi on 28th September, 2007 and at Indian Institute of Management Bangalore on 22nd October, 2007.
- Business Plan Competition “METAMORPHOSIS” in association with Indian School of Business(ISB), Hyderabad is being organized for select TePP innovations. The final of the event

has been planned to be held on 17th December, 2007 at Hyderabad.

The aim of these activities were to disseminate information on TePP to its clientele.

3.4 To diffuse the achievements of TePP innovations, a publication entitled “CREATIVE INDIA, Vol. II” consisting 51

profiles of innovators was published and distributed among concerned groups.

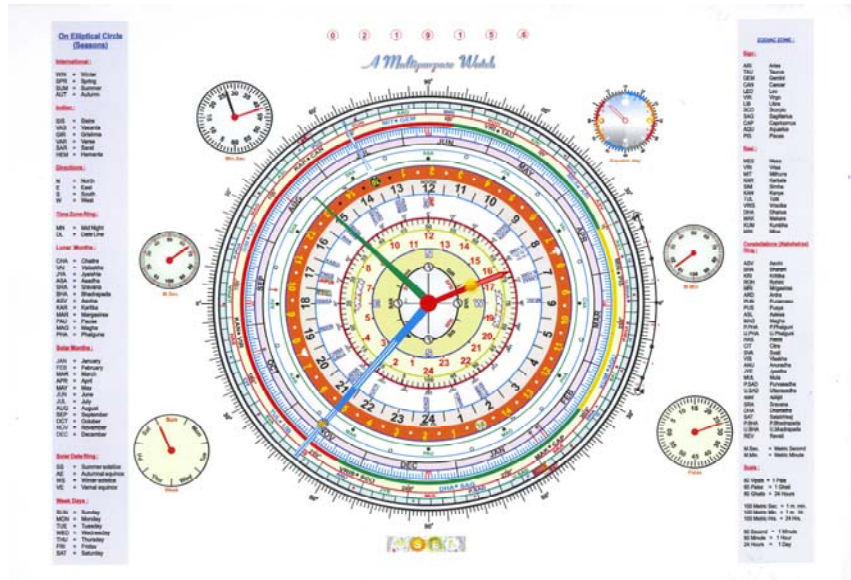
3.5 To make wider dissemination of TePP through print media as well as to solicit proposals from independent innovators, network partners, an advertisement was given in around 150 newspapers in leading national dailies and regional newspapers.



Mobile operated remote switch



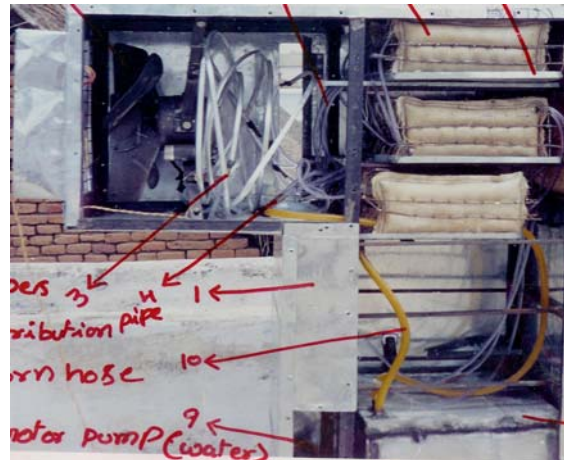
Hybrid system for solar distillation and drying application



A Multipurpose Watch, <http://www.uselwatch.com>



Digital Talk Friend(STF) for Speed Warning and Limiting Device



Natural air cooler

II-C. TECHNOLOGY MANAGEMENT PROGRAMME

1. PREAMBLE

The Technology Management Programme continued its operations during the year 2007-08 and completed a number of activities that were targeted for the year.

2. OBJECTIVES

The major objective of the Programme is to provide technical inputs and support mechanisms for efficient transfer and management of technology. Technology management aspects have gained special significance in the current era of intense technological competition. The programme is, therefore, aimed at enhancing technology management capability in industry, R&D and consultancy organizations, academic institutes and other establishments.

3. ACTIVITIES

The activities under the programme are aimed at enhancing knowledge and skills in the efficient management and transfer of technology. The major activities undertaken are aimed towards:

- Enhancing knowledge base in respect of technologies specific to the nation, including rural based technologies and region/sector specific technologies by undertaking analytical studies, technology status and development studies;
- Providing information to industry, Government departments and researchers through targeted research studies and policy research;
- Promoting industry-institute interaction by setting up resource centers on technology management in appropriate locations;
- Curriculum development exercises;

- Enhancing academic interest and contribution through active collaborations and memorandums of understanding with academic institutes;
- Providing assistance in efficient transfer of technology, through information in respect of foreign collaborations approved and analysis of such approvals as well as focused studies;
- Initiating state level agencies and research organizations to take up activities in the realm of Technology Management;
- Information dissemination on Technology Management related aspects through newsletters, manuals, and other forms
- Promoting an understanding of Technology Management in the Indian scenario through case studies of manufacturing and research organizations in the country, etc.
- Conducting awareness programmes, focused training courses, seminars and management development programmes, and providing guidance to trainers.

4. WORK COMPLETED/UNDER-TAKEN DURING THE YEAR

During the year, in addition to the on-going work, some more need based programmes and activities have been taken up.

4.1 Analytical, Technology Status and Development Studies

Sector-specific and region-specific studies of technologies, including rural based technologies are important in identifying technology gap, ensuring technology transfer and enhancing efficiency of industries. Some of the studies which have been completed/undertaken under this category include the following:

Studies on 'Potential of Minor Forest Produce (MFP) based industries in select regions'

Status studies of minor forest produce (MFP) and industries based on non wood forest produce of select regions have been undertaken. The study pertaining to the State of Gujarat has been taken up by Gujarat Industrial and Technical Organization Ltd. (GITCO); that of Tamil Nadu by Industrial and Technical Consultancy Organization of Tamil Nadu Ltd. (ITCOT); that of West Bengal by West Bengal Consultancy Organization Ltd., (WEBCON) Kolkata; and that of Andhra Pradesh by APITCO, Hyderabad. The reports are the outcome of surveys carried out in the respective States to assess the availability of MFP and also to assess the industries which are dependent on MFPs as raw materials for their industries. The studies analyze the status of technologies available in the region of concern and suggest measures towards generation of value added products based on MFP as raw material. Select project profiles relevant to the specific regions have also been brought out. The findings of the studies on Potential of MFP in Gujarat, and Tamil Nadu have been widely disseminated through the organization of workshops in Ahmedabad and Coimbatore respectively.

Study on Status of Technology and Scope of Technology Improvement in Handloom, Powerloom, Readymade Garments Sector in West Bengal by West Bengal Consultancy Organization Ltd. (WEBCON), Kolkata

The objective of the study taken up by West Bengal Consultancy Organization Ltd. (WEBCON), Kolkata was assessment of technology status and scope for improvement in the handloom, power loom and ready made garments sector in West Bengal. The report has brought out an overview of the handloom, powerloom and readymade garment industries

in West Bengal, technologies in use and technologies for improvement of these sectors. It includes a SWOT analysis of the technologies and the practices in use, brings out the availability of newer technologies, issues involved in marketing, raw material, infrastructure, etc. for improving the productivity in these sectors.

The findings of the study have been widely disseminated through a workshop organized in Kolkata during the year.

Study on development of beel fisheries and various species of bamboo in NE states

The study has been entrusted to the North Eastern and Technical Consultancy Organization Limited (NEITCO), Guwahati. The draft report brought out by NEITCO was discussed in an Evaluation Committee Meeting comprising of concerned Government Departments, industry and academic representatives, research agencies and experts. The report is based on an analysis of data collected on quantitative availability and characteristics of various species of bamboo as well as beel fisheries in the whole of northeastern region. Conclusions have been drawn and recommendations indicated to better the prospects of the involved agencies and individuals, both in the short term as well as in the long term.

Study on Status of Technology in Castor Oil & its Derivatives in India

The study has been entrusted to Gujarat Industrial & Technical Consultancy Organization Ltd. (GITCO), Ahmedabad. The objective of the study is to assess technology status and scope for improvement in the production of Castor Oil & its Derivatives in India. The report will broadly bring out an overview of the Castor Oil & its Derivatives in India, technologies in use, technologies for improvement of these sectors, research and development, a SWOT analysis of the technologies and the practices

in use, bring out the availability of newer technologies, issues involved in marketing, raw material, infrastructure, etc. for improving the productivity in these sectors. The project is in progress.

4.2 Studies on Technology and Innovation Management Issues

Technological dynamism has become the order of the day and new approaches; tools and techniques are being developed in technology and innovation management areas. Studies in such emerging areas for harnessing knowledge creation, technology transfer and technology up-gradation, have been taken up. These are listed below:

Study on the status and prospects of Industry-Institute Collaborations in Emerging Technologies by Confederation of Indian Industry (CII), Gurgaon

The study has been entrusted to Confederation of Indian Industries (CII), Gurgaon. The basic objective of the study, the status and prospects of industry-institute collaborations in the field of nano technology. The draft report brought out by CII was discussed in an Evaluation Committee Meeting attended by concerned industry representatives and experts. The report was revised on the basis of the recommendations made at the Meeting. The final report has been brought out and the project has been completed.

Study on 'Management of Technology in the Automotive sector'

The study was assigned to Management Development Institute (MDI), Gurgaon. The main objective was to study aspects related to management of technology in the automotive sector that have potential to grow and develop further in the country, and suggest measures for furthering innovations in this vibrant sector. The report has based its analysis on

general developments in the Indian automotive industry sector and on cases of technology development and innovations carried out by Sona Koya Steering Systems, Hero Honda. The report includes a case study of technology forecasting and assessment relating to use of magnesium in automobile vehicles. The study has been completed and the final report has been received.

Study on 'Social Capital and Technology'

The study has been undertaken in association with T A Pai Management Institute (TAPMI), Manipal. The study report is an outcome of research and analysis on the manner in which technology has shaped and continues to shape social capital among professional groups. Both a qualitative as well as a statistical analysis has been undertaken, as part of the project. The report concludes that Information and Communication Technology related developments have decisive impact on social capital. The research has indicated that social capital does promote better utilization of other forms of capital such as finance and human capital. The survey findings in respect of inter organizational linkages have led to an understanding of how ICT technologies can be dealt with to enhance social capital, which is seen to be an important organizational asset. The project has been completed.

Technology audit of Fish Processing Industry in the Coastal Districts of Karnataka

The project has been taken up by NITK Science & Technology Entrepreneurs" Park, Karnataka. The objective is to assess the existing practices of fish harvesting being deployed along the coastal districts of Karnataka and to suggest innovative and cost effective technologies for the same. An analysis of the present status of post harvest technologies in the region is also included. The draft report brought out by NITK-STEP was discussed in an Evaluation Committee

meeting comprising of representatives of concerned Government Departments, industry, academic and research organizations. Workshops have been organized to disseminate the findings. The report is under finalization.

4.3 Targeted Research Studies on Specific Issues in Technology Transfer and Innovation Management

There is need for serious research on management of technology in different sectors to develop an objective understanding of complex situations demanding a focused direction. Such research efforts not only result in comprehensive information of a specific nature but also enable objective decision-making. The studies undertaken during the year in this regard are listed below:

Study on ‘An empirical analysis of the status of collaborative R&D in India’

The study has been entrusted to IIM Indore. The main objective of the study is to understand the perception of Indian industries related to collaborative R&D, identify the factors that impede Indian industry from carrying out collaborative R&D, estimate the impact intensity of these factors on the probability of adopting collaborative R&D and bring out the difference across industries as well as technologies, in this regard. The draft report brought out by IIM Indore was evaluated by an Evaluation Committee comprising of representatives of concerned agencies and experts. The report has been finalized based on the recommendations of the Committee.

Study on ‘Managing strategic transformation of high-tech firms in India’

The study has been entrusted to IIM Calcutta. The broad objective of the study is to research into the process of strategic transformation by

companies that wish to move up the value chain, in the case of two specific industries, namely the pharmaceutical and information technology. The draft report was discussed in an Evaluation Committee. The findings indicate that a number of IT companies and Pharmaceutical firms have made strategic moves to be at the forefront of global leadership by making use of emerging opportunities. The report is under finalization.

Study on ‘Building technological capabilities through strategic development of industrial clusters’

The study has been entrusted to IIM Ahmedabad. The project aims to broadly study the mechanisms that firms use to learn from each other in order to enhance their technological capabilities and consequently their competitiveness and identify what allows clusters to achieve this objective. The draft report submitted was discussed in an Evaluation Committee Meeting. The report brings out important factors involved in determining capabilities and productivity in clusters; and includes an analysis of the structure of the cluster – size distribution, characteristics of entrepreneurs, product composition and location in the cluster life cycle. The report has been finalized and the project has been completed.

Research Study on Competitiveness Evaluation for Emerging Technologies

This study has been taken up by Department of Management Studies, IIT Delhi. The basic objective of the study is to identify key elements of a strategy to enhance competitiveness of emerging industries; understand the dynamics of competitiveness in emerging industries of different countries; understand the dynamics of competitiveness in emerging industries to identify key success factors, and evolve criteria of evaluating competitiveness of the industries and assess the availability, cost and quality of data for

the purpose. The final report of the study has been received and its findings have been disseminated in a workshop organized in collaboration with IIT, Delhi and IIT, Bombay in Mumbai.

Study of Knowledge Management in Auto Component SME Clusters in the NCR Region

The project has been taken up by Institute for Integrated Learning in Management (IILM), New Delhi. Objective of the study the current status of knowledge management practices in the Auto Component SME Clusters covering the aspects of technology, process and people of knowledge management and to identify strength and weaknesses in knowledge management practices in this sector. An Evaluation Committee comprising of concerned experts and representative industry, academic and Government organizations reviewed the draft report. The report is under finalization.

4.4 Case Studies covering Technology Management aspects

The objective is to generate learning from best practices and to study and analyze the manner in which technology is managed in Indian enterprises. Apart from being useful for pedagogic use, these case studies also provide useful information to consultants and executives from industry.

Case Studies on Industrial Clusters by IIT, Kanpur

Case Studies on select industrial clusters in the State of Uttar Pradesh has been taken up in association with IIT, Kanpur. The objective is to understand and document the issues that underline the sustained competitive advantages of three clusters – the leather processing cluster of Kanpur, the silk producing cluster of Varanasi and the brass work cluster of Moradabad. The draft report

has been discussed in an Evaluation Committee meeting and the report is under finalization.

4.5 Collaborative Work with Academic and Research Institutes

In order to give the necessary thrust to formal education and develop a base of teaching tools on technology management aspects, the Department has been collaborating with academic institutes, especially those concerned with technical and management education. Different activities, inclusive of management development programmes and projects on technology and innovation management in association with IIM Ahmedabad, IIM Kolkata and IIM Indore are under progress. Work taken up at IIT Bombay, IIT Kanpur, IIT Delhi, IIT Madras has progressed. Projects undertaken in partnership with other institutes, including ASCI Hyderabad, IISc Bangalore, PSGIM Coimbatore, NITK, Management Development Institute Gurgaon, T.A. Pai Management Institute Manipal and others have also under progress.

4.6 Industry-Institute Networking with State Level, Research and other Agencies on Technology Management

Interactions with several State level bodies across the country were continued apart from continuing the existing collaborations with research institutions. Collaborative activities have been taken up in partnership with Madhya Pradesh Council of Science & Technology, Karnataka Council for Technological Upgradation, different State level Technical Consultancy Agencies including MPCON Bhopal, APITCO Hyderabad, NEITCO Guwahati, MITCON, Pune, GITCO Ahmedabad, ITCOT Chennai, WEBCON Kolkata and CDC New Delhi.

4.7 Centres for Technology Management (CTM)

Centres for Technology and Innovation Management have been set up in different locations of the country where there is access to information on aspects concerned with the subject that are of specific interest to the region of concern, expertise to advise and provide guidance on issues concerned with technology management, and generate long-term as well as short-term solutions. The activities taken up have been wide ranging: training, research, cluster development studies, case studies, scouting innovation, manpower development, interfacing between academia and industries, data generation, sharing of knowledge and providing solutions to industries, preparation of technology related policy studies, developing training tools and modules.

Centre for Technology Management (CTM) at PSG Institute of Management, Coimbatore

Phase III of the project is currently underway. The activities completed in Phase I & II include: development of a local data base of select industry SME units, three work studies and two case studies and organization of 6 workshops/seminars, publication of a booklet on Patent Procedures, twelve issues of CTM newsletter and Study on 'Technology Upgradation in Pump Industry'.

Survey on Common Modern Tool Room, preparation of audio visuals on technology management related aspects and augmentation of the content of the TM portal are in progress. Some of the programmes and publications are in the vernacular medium, so that the local SME industry participants at various levels can also benefit from the activities of the Centre.

Centre for Technology Management at MPCOST, Bhopal

After successful completion of Phase-I activities under the Technology Management Centre, Phase-II activities were started. The activities proposed include need-based sectoral technology status studies, case studies, theme-oriented workshops on emerging issues concerning Technology Management, short-duration training programme on TM, bringing out quarterly newsletter, development of a portal on TM, scouting/trouble-shooting services to the industries on TM aspects, etc. Priority activities with respect to the need and relevance of the industry for the State of Madhya Pradesh are being taken up in consultation with the State functionaries and organizations.

Centre for Technology Management at IIT, Bombay

Work has been undertaken as set of collaborative activities under an MOU with the School of Management at IIT Bombay. Phases I and II had been completed earlier.. Phase III has now been initiated with Management Development Programme on R&D Management for industry executives and one newsletter issue. A Programme Advisory cum Monitoring Committee has been set up and has met to finalize the work content of the phase. Case studies of select organizations, augmentation of portal content, training of trainers programmes for academic and industry participants, management development programmes for industry executives and other activities are under implementation.

Centre at Karnataka Council for Technological Upgradation (KCTU)

Collaborative activities in association with the Karnataka Council for Technological Upgradation Bangalore, a joint venture

organization between the Central and Karnataka State Government, were continued. Cluster level case studies, focused training programmes, information dissemination of technology management aspects specific to the region and bringing out of newsletters are among the activities taken up during successful completion of phase I. An audio visual programme on Technology management, covering initiatives under the MOU with KCTU, has also been prepared. Phase-II has now commenced. Activities taken up include: studies on technology upgradation in select industry clusters of the State, training and human resource development, TM awareness programmes in targeted regions of the State, cases studies, preparation of audio visuals, and publications on TM.

Centre at Administrative Staff College of India, Hyderabad

Collaboration with Administrative Staff College for building institutional capability in Technology Management has been continued. Four phases covering a range of activities that have evolved over a period of time; including case studies of manufacturing and research organisations, technology policy studies, and training programmes on various TM issues; have been completed. Phase V has now been initiated comprising several activities that include a comprehensive Technology Management Case Study on a specific industry, Case Studies from Manufacturing Industry and research Organizations, Training Programmes on Technology Management aspects of two weeks duration each, Research Publications and augmentation of the Web enabled portal.

Centre for Technology & Innovation Management at IED Patna, Bihar

With the objective of developing technology management capabilities in the State of Bihar and to serve as a resource center, this

Technology Management Centre is being set up at Institute of Entrepreneurship Development at Patna in Bihar. The project has been commissioned after completion of due formalities.

Centre for Technology & Innovation Management at IHBT, Palampur in Himachal Pradesh

With the objective of developing technology management capabilities in the State of Himachal Pradesh and adjoining areas to serve as a resource center, this Technology Management Centre is being set up at IHBT, Palampur in Himachal Pradesh. The project has been commissioned after completion of due formalities.

Support to the existing Centre of Innovation & Technology Management at IMI, New Delhi

With a view to develop technology management capabilities and create a greater awareness about Technology and Innovation Management, targeted training programme for trainers and awareness programme are being supported at IMI, New Delhi to be carried out by the existing Centre for Innovation & Technology Management at the institute. The project has been commissioned.

4.8 Curriculum Development

An initiative towards curriculum development in Technology management has been taken up and preparation of five course modules has prioritized. Each module consists of twenty topics and specific topic writers have been identified and task of writing had been assigned. Four course modules have been completed and the fifth one is under preparation.

4.9 Information Dissemination

To enhance understanding and appreciation of the importance of the aspects concerned with management of technology, mechanisms for

information dissemination on technology management aspects have been initiated. These include: Newsletters, Manuals, Paper contests on specific technology related issues, Compilations of articles, Audio-visual aids, Portals and others. Information that is region specific, or relating to globally world wide emerging aspects, or nationally important issues, or sector specific information and even general educative articles are all included to impart the requisite information and value, depending upon the actual medium or product, and its specific use.

Newsletters

Newsletters on specific technology management aspects in association with IIT Bombay, PSGIM Coimbatore, KCTU Bangalore and MAPCOST Bhopal, is being brought out regularly.

Electronic Newsletter

An electronic newsletter developed in collaboration with IIT Madras has been launched and eight issues have been published. The objective of the Newsletter is to enhance technological creativity and interest in technology development among various target groups. The newsletter features information on various technologies, case studies, and technology morphologies; and provide basic foundation on various aspects of technology management.

Portals for information dissemination

Portals and other interactive media have been developed in association with ASCI Hyderabad, IIT Bombay, PSGIM Coimbatore and other organizations and these are being continuously augmented to provide contemporary information on a periodic basis.

4.10 Training/ Interaction Meets/ Management Development Programmes

During the year, the following programmes were organized ;

- National Workshop on Leveraging Innovation for SME Competitiveness at Pune in collaboration with CDC, New Delhi and MITCON, Pune.
- National Workshop on Competitiveness in Emerging Industries at Mumbai in collaboration with IIT, Delhi and IIT, Bombay.
- National Workshop on Technology Status and Potential for Improvement in Handloom Powerloom and Readymade Garment Sectors in West Bengal at Kolkata in collaboration with WEBCON, Kolkata.
- National Workshop on Status and Potential for Minor Forest Produce based Industries in Gujarat at Ahmedabad in collaboration with GITCO, Ahmedabad.
- A National Workshop on Status and Potential for Minor Forest Produce based Industries in Tamil Nadu at Coimbatore in collaboration with ITCOT, Chennai.
- Interaction Meet under TM for Best Paper Contest in collaboration with Anna Malai University, Anna Malai Nagar.
- Seminar on Technology Management Programme for unorganized SSI sector through Agargami Handicapped Samity, West Bengal.
- A 6-month Training Programme in Technology Management in Food Technology, Herbal and Medicinal Plant Processing Technology and Information Technology for 30 candidates each in collaboration with Institute of Entrepreneurship Development, Patna.
- Management Development Programme on 'R&D Management' in collaboration with IIT Bombay for the benefit of industry participants.
- Training Programme for senior scientists on 'Technology Commercialization' in association with ASCI Hyderabad.