

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.

The Department, under this programme has so far supported about 200 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. Over 41 technologies developed under the scheme have been commercialized or under commercialization. During the period from January 2008 to March 2009, 7 new Technology Development Demonstration projects were supported under the programme and 54 projects were reviewed for progress.

1.3 New Projects supported during the period

Development of Dorzolamide HCl, submitted by M/s Sequent Scientific Ltd., Mangalore

Dorzolamide hydrochloride is an optically active compound which is being used as a sterile ophthalmic solution for glaucoma. It is still being used both as a monotherapy as well as, for better

efficacy, in combination with timolol. There are several patents and publications for the preparation of this compound. Each route has its own advantage and shortcomings. Among those, one route patented in 1990, appeared to have advantages with respect to non-formation of side products and shorter reaction time. This had been taken up by M/s Sequent Scientific Ltd., for further R&D. In their endeavor to develop a route which does not infringe upon the existing patents, they had attempted at the replacement of LAH by NaBH_4 in one of the reductive processes and also replacement of oxone and boron trifluoride etherate/ NaBH_4 instead of hydrogen peroxide and boron dimethylsulfide respectively for the oxidation and reductive processes. They are in the process of filing their patent on this modified process.

The present project is a pilot scale study of about 14 months duration to standardize the protocols for manufacturing the product based on their modified process and has been supported by DSIR with a grant of Rs. 86 Lakhs out of a total project cost of Rs. 215 Lakhs.

Development of 90 KW Brushless Eddy Current Clutch Gear Unit for Radiator Cooling Fans in Diesel Electric Locomotives of Indian Railways, submitted by M/s Eddy Current Controls (I) Ltd., Chalakudy, Kerala

The Radiator Fan is used in Diesel Electric Locomotives to bring down the temperature of

the Diesel Engine cooling water to the desired level. Drive between the Engine and Radiator Fan consists of an Eddy Current Clutch (ECC) which is capable of providing variable speed and a suitable Gear Box which provides mechanical coupling between the Clutch and the Fan. Eddy Current Clutch Gear units presently being used by Diesel Locomotive Works (DLW), Varanasi for Indian Railways, are brush type couplings with rotating winding and copper coated drums and are inherently prone to frequent breakdowns. Brushless Eddy Current Clutch Gear Units for Radiator Cooling Fans, due to non contact type technology, have relatively lower maintenance costs and longer life. Under the present project, M/s Eddy Current Controls (I) Ltd. have undertaken the design and development of 90 KW Brushless Eddy Current Clutch Gear Unit for Radiator Cooling Fans with the additional constraints imposed by the limited space available and high ambient temperature environment prevailing in the engine space where presently ECC is housed.

This project has been supported by DSIR with a support of Rs. 27.5 Lakhs out of a total project cost of Rs. 65 Lakhs.

Process Development and Pilot Plant Trials towards Commercialisation of (i) A Pentapeptide with a Natural Triterpenoid Conjugate (ii) Extraction of Pterostilbene



Prototype Brushless Eddy Current Clutch Gear Unit at Test Bed

Ophthalmic Grade Purified Water System for preparation of Dorzolamide HCl

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from Pterocarpus Marsupium & Conversion to Resveratrol, submitted by M/s Sami Labs Ltd., Bangalore (SLL).

Several pentapeptides have been found to have collagen blocking properties that retard skin ageing. M/s SLL have attempted at combining the pentapeptide with triterpenic acid – a naturally available anti-inflammatory agent commonly found in olive leaves. This new molecule, (triterpenoyl-pentapeptide) when tested for anti-elastase, anti-collagenase and anti-hyaluronidase activities, has exhibited 5-6 times higher potency and effectiveness vis-a-vis similar compounds like Matrixyl available in the market.

Resveratrol is a powerful antioxidant that is used as a food supplement and is also being tried as an anti-cancer agent. Both pterostilbene and resveratrol belong to a group of chemicals called phytoalexins, which are produced by plants in response to fungal infection, ultraviolet light, and various chemical and physical stressors. M/s SLL have developed a process of O-demethylation of poly-O-methyl ethers to get poly-phenolic compounds. Using this process M/s SLL have been able to get Resveratrol from pterostilbene. After screening many promising plants, M/s SLL has identified 'Pterocarpus marsupium' as a source for many stilbenoids including pterostilbene. This is a large tree that commonly grows in the central, western, and southern parts of India and in Sri Lanka and is locally known in Hindi as 'Bibla' or 'Vijayasar' or 'Bijasar' or, in English, as 'Indian Kino'. In the process developed by M/s SLL, Pterocarpus marsupium wood is processed to obtain pterostilbene and then finally resveratrol.



Pterostilbene Solid (from Pterocarpus marsupium) and Resveratrol Powder (from Pterostilbene)

This project which aims to develop a commercial process for both the molecules has been supported by DSIR with a support of Rs. 75 Lakhs out of a total project cost of Rs.194 Lakhs.

Development of small PV-Wind hybrid power plant for rural application, submitted by M/s Rajasthan Electronics & Instruments Ltd., Jaipur (REIL)

The concept of hybrid power plants has been tried in many countries and in some of them this has received huge acceptability. Solar Photovoltaic (SPV) modules & system is a well known and proven technology in the field of lighting and electricity generation. SPV technology is based on silicon (amorphous, crystalline and thin film), whereas a typical wind power plant system consists of a Wind Generator, a Generator controller, a Battery Bank and an Inverter. Under the present proposal, the M/s REIL envisages to develop an indigenous small (172 W) SPV-Wind hybrid power plant for rural application, which is



Prototype Small PV-Wind hybrid power plant for rural application

economically viable and meets the power requirement of the common man.

This project has been supported by DSIR with a support of Rs. 22.32 Lakhs out of a total project cost of Rs. 44.65 Lakhs.

Glargin Process Improvement, submitted by M/s BIOCON Ltd., Bangalore

Glargin, similar to Aspart and Lispro are newly developed human insulin analogs. Their

manufacturing process involves fermentation of methylotrophic yeast followed by cell harvesting. The cell free liquid is then taken for further purification and conversion to the final bulk product. Purification steps involve multiple, large scale, sophisticated high pressure chromatography systems which can separate closely eluting impurities. The final processing steps are carried out in high quality, electro polished, steam sterilisable equipment in a classified environment. It is generally accepted that purity of insulin preparations is more important for immunogenicity and allergenicity than the species specificity. Insulin impurities, not the insulin itself, were responsible for the immunogenicity of recrystallized insulin in patients. Purity abolishes and overcomes insulin resistance. Hence, the purer the insulin the better it is for clinical efficacy and safety profile. In view of this, M/s Biocon has taken up this project to improve the purity of glargine developed to levels higher than 99.5%. The optimized conditions would be run at pilot scale to evaluate the process during scale up. The pilot scale study would provide insight on the behavior of purification steps at production scale. The scale up results would be evaluated to control the process parameters in order to reach higher



Centrifuge System for Glargine Process Improvement

process yield, product purity and throughput of the manufacturing plant.

This project has been supported by DSIR with a support of Rs. 170 Lakhs out of a total project cost of Rs. 429.5 Lakhs.

Development and Demonstration of process for manufacture of Hydrogel at Pilot Plant Scale, submitted by M/s Earth International Pvt. Ltd., New Delhi.

Hydrogels, also known as Super Absorbent Polymers (SAP), are substances that have a unique 40,000 to 50,000% water absorption capacity. This property can be a boon for agriculture since absorbed water along with nutrition and other desirable substances can continuously provide all requirements of the plants. Hydrogel is a cross-linked polymer which when put in water traps the water and forms swollen networked structures, forming a gel like substance. The Hydrogels developed by IARI, in its dry form are capable of absorbing 400-500 times its weight of water, can withstand up to 50°C temperature, have repetitive gelling character, biodegradable with a shelf life of 2 years. These hydrogels besides meeting water demands of the plant improves germination and minimizes soil erosion. These hydrogels in combination with drip irrigation can transform the barren land to a productive one. The performance trials and test runs on various crops in different climates are under way by the company. The company is scaling up the lab process up to pilot scale and developing field trials data for commercialization of the lab scale technology on use of Hydrogels.

This project has been supported by DSIR with a support of Rs. 86 Lakhs out of a total project cost of Rs. 257 Lakhs.

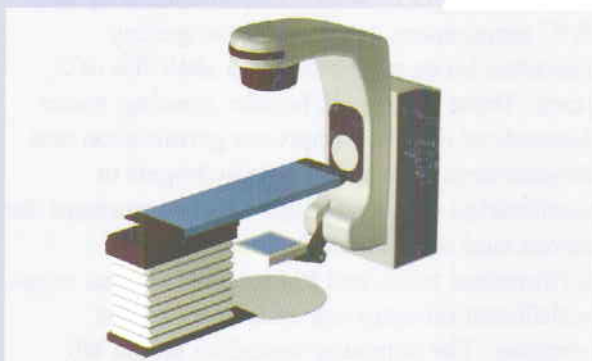
Development of Indigenous Radiotherapy Simulator (RTS) for Radiation Treatment of Cancer, submitted by M/s Elim Meditech Pvt. Ltd., Kanyakumari, Tamil Nadu.

Radiotherapy (Radiation treatment) plays a major role in multidisciplinary cancer treatment. Delivering accurate radiation dose conforming to the tumour volume is one of the most important needs in Radiotherapy. To achieve this radiation conformal treatment for all types of cancer, Radiotherapy Simulator (RTS) is the basic hardware equipment. RTS is basically a Radiological Imaging System, mimicking all the mechanical functions of a Teletherapy treatment

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machine (Telecobalt Machine or Linear Accelerator), which is used for radiation treatment of cancer. With Radiotherapy Simulator it is possible to get 2D & 3D body imaging and is possible to create all types of image reconstruction, storage, networking and result output. This project undertaken by the M/s Elim Meditech Pvt. Ltd is to design, develop and demonstrate Indigenous Radiotherapy Simulator (RTS) for Radiation cancer treatment including development of radiological image processing software system with lot of new additional software and digital control electronics features.

This project has been supported by DSIR with a support of Rs. 30 Lakhs out of a total project cost of Rs. 103 Lakhs.



Proposed Indigenous Radiotherapy Simulator (RTS) Design

TDDP Seminar/ Workshops Under Taken During the Period

During the period, in addition to ongoing work, five seminars on 'Need for Technology Development', with a view to give wider dissemination of the TDD Programme has been organized at:

1. Vadodara, Gujrat, (17th January, 2008) in association with Federation of Gujarat industries, Vadodara.
2. Mangalore, Karnataka (29th January, 2008) in association with District Committee for Science & Technology, Dakshin Kannada and Kanara Chamber of Commerce and Industry, Mangalore
3. Deharadun, Uttarakhand (14th March, 2008) in association with UP Industrial

Consultants Ltd., State Industrial Development Corporation of Uttarakhand and Uttarakhand Chamber of Commerce.

4. Chennai, Tamilnadu (15th March, 2008) in association with ITCOT Consultancy Services Ltd., CII (Southern Region), and Tamilnadu Chamber of Commerce.
5. Noida, UP (20th March, 2008) in association with UP Industrial Consultants Ltd., Director of Industries, Govt. of UP and UP Chamber of Commerce.

2. TECHNPRENEUR PROMOTION PROGRAMME

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. The department has supported **one hundred and sixteen (116)** new projects during the period from January 2008 to March, 2009. The details of the completed, on-going and approved projects supported under TePP during the period under report are given in **Annexure 9**.

3. OTHER ACTIVITIES

3.1 To expand the reach of TePP among common mass, **twenty-eight (28) TePP Outreach Centres** have been set up by DSIR. These are located at Sponsored Research and Industrial Consultancy (SRIC), IIT Kharagpur (W.B.); Society for Innovation and Entrepreneurship (SINE), IIT Bombay; ERDC-Hartron, Ambala Cantt. (Haryana); 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.); JSSATE-STEP, NOIDA (U.P.); PSG-STEP, Coimbatore (T.N.); Vellore Institute of Technology- Technology Business Incubator (VIT-TBI), Vellore(T.N.); Central Glass Ceramics Research Institute (CGCRI), Kolkata(W.B.); Institute Industry Partnership (IIP) Cell, IT-BHU, Varanasi (U.P.); SIDBI Innovation & Incubation Centre (SIIC), IIT Kanpur, Kanpur (U.P.); Intellectual Property Rights(IPR) Cell, IIT Roorkee(Uttarakhand) ; College of Technology & Engineering, Udaipur (Rajasthan); National Institute of Technology (NIT), Silchar (Assam); Institute of Himalayan Bio-resources Technology (IHBT), Palampur (H.P.); Central Mechanical Engineering Research Institute (CMERI), Durgapur (W.B.); Central Scientific Instruments Organisation(CSIO), Chandiharh; National Environmental Engineering Research Institute (NEERI), Nagpur (Maharashtra); Shri Padmavati Mahila Vishwavidyalayam (SPMVV), Tirupati (A.P.); International Crop



Solar Water Heater with fused tube lights

(ICRISAT), Hyderabad (A.P.), Central Electronics Engineering Research Institute (CEERI), Pilani (Rajasthan); NSEIT, Jorhat; TBI-e-Health, Bangalore (Karnataka); Chhattisgarh Swami Vivekanand Technical University (CSVTU), Bhilai (Chhattisgarh).

3.2 The DPR for Rajiv Gandhi Institute of Creativity has been prepared and accepted.

3.3 A number of other activities have been conducted/planned by TePP during the year to sensitize academia, network partners and impact



Process Technology for Production of Photographic Films



Merlyn D3 Low Cost Modular Bomb Disposal Robot with Flexible Chassis System



Automatic Scan Lock for Bikes & Cars



Nimble Carpet Shearing Machine



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generation among common masses:

- Sensitization camps on TePP by APCOST, Hyderabad in the state of Andhra Pradesh.
- Participation of TePP in HUGO's 13th International Human Genome meeting at Hyderabad, September 27-30, 2008.
- 5-days entrepreneurial training for TePP Innovators at S.P. Jain Institute of Management & Research (SPJIMR), Mumbai, September 2-6, 2008.
- Participation in Indian Science Congress at Shillong in January, 2009.
- Participation in ISBA in January, 2009.

- TUC Coordinator's meet in February, 2009.
- 3-days Innovator's Meet 2009 (Technical Workshop) at CMERI, Durgapur, March 25-27, 2009.

The purpose 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. III**" consisting 46 profiles of innovators and "**CREATIVE INDIA, Vol. IV**" consisting of 47 profiles of start-ups and innovators were published and distributed among concerned groups respectively.

3.5 To diffuse the activities of TePP to a larger mass, an Annual Calendar was published consisting of profiles of 12 TePP Outreach Centres.