

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 AND DEMONSTRATION PROGRAMME

1.1 Preamble

Technology Development and Demonstration Programme (TDDP) is a component programme of 'Technology Promotion Development and Utilization (TPDU) Programmes. The genesis of TDDP is PATSER Scheme, which commenced in VIII Five Year Plan in 1992. The PATSER Scheme continued in the VIII and IX Plan and was designated as TDDP in the X Plan. TDDP aims to support technology development efforts of industrial R&D system.

1.2 Objectives

The programme aims at strengthening the interface between industry, R&D establishments and academic institutions and provides catalytic support for development and demonstration of innovative product and process technologies, traversing the journey from proof of concept or laboratory stage to pilot stage / prototype, rendering them fit for commercialization in all sectors leading to their entry in the market. The objectives of the programme are:

(a) Development and demonstration of

innovative need-based technologies for making industry globally competitive, and

(b) Strengthening the interface between industry, R&D establishments and academic institutions

1.3 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:

(a) Development of a new or improved product resulting in prototype development and ending with demonstration in commercial environment.

(b) Development of a new or improved process resulting in establishment of process know-how, development of process equipment and demonstration of yield, efficacy etc in a pilot plant.

(c) Absorption and up-gradation of imported technology.

(d) Priority technology development projects of PSUs in consultation with and co-financing from economic ministries. Under this, consortium projects for development of technologies of common interests for group of industries or associations to be undertaken by industrial units, national laboratories, user industries in important focused areas such as Electronics and Communications, Railways, Drugs, Chemicals and Fertilizers etc.

(e) Development and demonstration of technologies for common use by industry clusters.

- (f) Development and demonstration of technologies for government's flagship and mission mode projects.

The partial financial support by DSIR in the above areas primarily covers prototype development and pilot plant work, testing and evaluation of products from such R&D, user trials, etc. Bulk of the cost of the project is met from the purpose industry's resources.

The Department, under this programme has so far supported about 220 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. 51 technologies developed under the scheme have been commercialized or are under commercialization are given in Annexure-8.

During the period under report, more than 80 new proposals received against open advertisements in leading daily newspapers. Total 40 proposals were recommended through three Technical Advisory Committee meetings. 18 new proposals in the field of engineering, manufacturing, electronics, drugs, chemicals & fertilizers, etc. were awarded to different companies. DSIR has committed to support ₹ 165.65 Crores for these new 18 projects out of total project cost of ₹ 433.00 Crores

1.4 Status of the Projects Supported During the Eleventh Plan

Microbial production of Arachidonic acid, an Omega-6 polyunsaturated fatty acid essential for Human health by M/s ABL Biotechnologies Limited, Chennai

Arachidonic Acid (ARA) is a precursor of eicosanoids, a group of compounds that play an essential role in varied processes such as homeostasis, blood clotting, gastrointestinal functions and immune system. A range of disorders such as rheumatoid arthritis, multiple sclerosis, schizophrenia and pre-menstrual syndrome may be caused in the absence of polyunsaturated fatty

acids, such as ARA. It is also essential for the healthy development of the brain in infants. This fatty acid, therefore, is a recommended ingredient in infant food formulae together with another polyunsaturated fatty acid (PUFA), the docosahexaenoic acid (DHA). In the present project the commercial source of this fatty acid is a group of fungi belonging to the genus *Mortierella*. This project aims on the commercial production of an important nutraceutical for infant and adult health care, namely the essential, omega-6 fatty acid, arachidonic acid.

In the present work, 13 strains of *Mortierella* have been screened for biomass, lipid production and ARA content to select the best strain for further development. ARA was extracted on a lab scale and being analyzed for purity. In addition to this, the total crude lipid production (g/l) and percentage of lipids in dry biomass was estimated. Scale-up studies (20L Fermenter) are also being carried out.

The project is under progress.

Development of Process for manufacture of nano-labelled DNA/RNA compounds by M/s. Ogene Systems (I) Pvt. Ltd (OSPL), Hyderabad

The rapid growth of biotechnology has triggered an increasing demand for modified oligonucleotides dedicated mostly to diagnostic and therapeutic applications. Labeled oligonucleotides and nucleic acids find various applications in detection of amplification products of polymerase chain reaction, solid phase DNA sequencing, hybridization probes etc. Application of DNA/RNA probes in the diagnosis of infectious diseases is a recent alternative to the established isolation and determination of micro-organisms by cultural and serological methods. Design and development of labeling reagents, with exponential magnitude for high sensitization, which will allow detection of even single molecule in diagnosis and life science area using the nanomaterials in this advanced area. This is also useful in vivo imaging and detection of small size tumors.

M/s Ogene Systems (I) Pvt. Ltd. has successfully completed the project activities on the synthesis

of 6-carboxy-tetrachlorofluorescein, 6-carboxy-hexachlorofluorescein and the cyclohexyl backbone for the requirement of Bio-genex. During the synthesis of the above products Cyanation reactions were upscaled to 1000gms, synthesis of cyclohexyl backbone was completed and achieved 95 per cent purity with 3-isomer impurity less than 5 per cent. Reaction of trimethoxypropoane aminisilane with fluorescein moiety was carried out and this coupled product was conjugated with nanosilica. The incorporation of fluorecein moiety on silica nano particle was also carried out.

The project activities were successfully completed except for release of final installment.

Development of 90 KW Brushless Eddy Current Clutch Gear Unit for Radiator Cooling Fans in Diesel Electric Locomotives of Indian Railways 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.

In 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. The company, improving upon the initial prototype could overcome the

problem of excessive heating of drum, clutch voltage saturation etc. and has developed 90 KW Brushless Eddy Current Clutch Gear Unit. The testing of the prototype as per the specifications and field requirements is under trial.

The project is under progress.

Development of small PV-Wind hybrid power plant for rural application by M/s Rajasthan Electronics and 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 and 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.

In the present project, the company envisages to design, develop and integrate small hybrid power plant (172 W, SPV-Wind) for rural applications which is economically viable and meets the power requirement of the common man. It was proposed to fabricate substantial number of prototypes for field trial runs to study system efficacy and improvement. The company, improving upon the initial prototype system by incorporating inverter system, efficient load design, maximum power tracking characteristic etc., has fabricated and installed ten systems at different locations for carrying the optimization of system performance. The project is completed successfully.

Glargine Process Improvement by M/s BIOCON Ltd., Bengaluru

Glargine, similar to Aspart and Lispro, are newly developed human insulin analogs. Their manufacturing process involves fermentation of methylotrophic yeast, followed by cell harvesting. Purity abolishes and overcomes insulin resistance. Hence, the purer the insulin the better it is for clinical efficacy and safety profile.

In the project, M/s Biocon has taken up to improve the purity of Glargine developed to levels higher than 99.5 per cent at pilot scale to evaluate the process during scale up. During the scale-up trials the process parameters are studied at development scale for improvement of process yields and reduction of cost of goods. Process improvements inferred by optimizing, process conditions have scaled-up to pilot scale. The scale up experiments are performed at pilot plant, with proposed process improvements, were studied for process robustness and consistency. The increase in purity of final product from 97.5 per cent to purity of >99.0 per cent have resulted in producing Insulin Glargine of purity equivalent to innovators in Market. The final product complying USP/EP specifications would be the first step towards regulatory requirement.

The project is successfully completed.

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

Hydrogels also known as Super Absorbent Polymers (SAP), are substances that have a unique 40,000 to 50,000 per cent 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 in Indian Agriculture Research Institute (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 in progress by the

company. The company is scaling up the lab process up to pilot scale (initially in a batch of 5 kg with the maximum of 25 kg) and developing field trials data for commercialization of the lab scale technology on use of Hydrogels.

The project is under progress.

Development of Indigenous Radiotherapy Simulator (RTS) for Radiation Treatment of Cancer 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 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 machine (telecobalt Machine or Linear Accelerator), which is used for radiation treatment of cancer. With Radiotherapy Simulator it is possible to create all types of image reconstruction, storage, networking and result output.

The project of M/s Elim Meditech Pvt. Ltd. made progress in assembling all the hard ware mechanical sub-system of the old RTS system and developed new electronics sub systems and software controls for the design, development and demonstration of Indigenous Radiotherapy Simulator for Radiation cancer treatment

The project is under progress.

1.5 New Project Proposals

During the period under report, against open advertisements in leading daily newspapers, more than 80 new proposals were received. Total 40 proposals were recommended through three Technical Advisory Committee meetings. 19 new proposals in the field of engineering, manufacturing, electronics, drugs, chemicals & fertilizers, etc. were awarded to different

companies. The short brief of these projects are given below:

Process Up-scaling & Clinical Evaluation- PBL 1427 - A Novel Long Acting DPP IV Inhibitor for the Treatment of Type 2 Diabetes by M/s Panacea Biotec Ltd., New Delhi

PBL1427 has exhibited potent, reversible competitive inhibition in human DPP IV enzyme activity with an IC₅₀ of 12 nM. It has > 15000 fold selectivity for DPP IV over DPP8 / 9. PBL 1427 binds more strongly to the DPPIV enzyme as compared to Sitagliptin and Vildagliptin as suggested by a better K_{off}. PBL 1427 showed a good in vivo efficacy in lean mice and rats in terms of improvement in oral glucose tolerance test suggesting a better glycemic control. Further it results in an increase in active GLP-1 which leads to glucose dependent secretion of Insulin. PBL 1427 also improves the oral glucose tolerance in various animal models of diabetes like db/db and ob/ob mice. In addition it exhibits a body weight reduction in leptin receptor deficient db/db mice. PBL 1427 appears to be metabolically stable in in-vitro metabolism studies performed in pooled liver microsomes from various species such as mice, rats and humans. It exhibits a favorable pharmacokinetic profile in mice and rats with an oral bio-availability of 50-70 %. PBL 1427 did not show any accumulation of drug in any of the organs studied. PBL 1427 did not show any mutagenicity or cytotoxicity in AMES assay even upto a concentration of 3000 g/plate. 14 days repeat dose probe toxicity in SD rats with oral formulation did not show any adverse event suggesting a NOAEL of >100 mpk. In summary, PBL 1427 is a novel long acting DPPIV inhibitor with an attractive profile that meets the need for promoting safer drugs to treat T2DM in growing patient population. The company is in the process of filing foreign patent application on this product.

The present project is to develop a commercially viable process for up scaling PBL 1427 and to build a capability of a cGMP compliant API manufacturing facility in five years duration.

Development of Large Size CNC Rotary Table 2500 x 2500 with Translation Movement - Model URH - SQ 2500 - X by Uday Computer Aided Manufacturing (P) Ltd., Bangalore

Large size CNC rotary tables, a highly specialized machine tool, are imported in the country and these not being built by Indian industries. Uday Computer Aided Manufacturing Ltd is a leading manufacturer and exporter of small size CNC Rotary Tables and diversified products for various industry sectors and Machine Tool Builders. They have established capability for CNC Rotary Tables of sizes, viz. of 100 mm - 1600 mm dia. Under this proposal, development of a Large Size CNC Rotary Table of size 2500 x 2500 with Translation Movement will be demonstrated for application in the domestic as well as global market. The project has been supported by DSIR for duration of 18 months.

Indigenous Development of FTIR Spectrophotometer by M/s ELICO Limited, Hyderabad

The objective of the project involves indigenous development of FTIR in the Price band less than 5 Lakhs Rupees to make it affordable to academic & research institutions and Industry Sector. The targeted FTIR Instrument would come with configurable optics, application specific accessories, in-built PC Processing capabilities, and advanced Human / Machine Interfaces like Touch Screen, USB Mass Driver storage, USB Printing, and TCP/IP for networking. The project has been supported by DSIR for duration of 30 months.

Development and commercialization of Aliskiren and its Intermediates by M/s. Penn Bio-Chemicals (India) Pvt Ltd.

The overall objective of this proposal is to produce Aliskiren and its intermediates. The Aliskiren compound is complex molecule with four stereo centers in the structure. For the sake of convenience, the company is targeting to synthesize three fragments and market all these three synthons. Design and synthesis of novel approach for the

three fragments (AK1, AK2 and AK3), the work will be carried out in-house R&D centre and the scale up will be done by using pilot scale. The long term goal is to develop the most efficient operating conditions for large scale synthesis of the Aliskiren and its intermediates to market the finished product in the India as well as in the world markets. The project has been supported by DSIR for duration of 3 Years.

Liquid Coolant Recovery System by Pure Tech India, Trichy

The objective of the proposal is to enhance the Research and Development activities of the product Liquid Coolant Recovery System and customize it to suit all types of working environments with an aim to make the equipment economical & tradition. The project has been supported by DSIR for duration of three years.

Development of Magnesium alloy Pressure Die Castings for Automotive applications by M/s. Sundaram-Clayton Limited

The objective of the project is to develop environment friendly, cover gas technology (in lieu of SF₆ currently being used) for processing magnesium pressure die castings, to further extend it to the stage of putting-up an automated pre-commercial production plant and finally converting it into a commercially viable production plant for manufacturing magnesium alloys die castings for transport applications. The project has been supported by DSIR for duration of three years.

Design & Development of Capacitance Type Fuel Level Sensor for Flexi Fuels by M/s. Pricol Ltd., Coimbatore

The objective of the project is to design and develop a reliable automotive fuel level sensor with capacitance principle compatible for all types of fuels (Flexi fuels) such as RME (Rapeseed Methyl Ester), PME (Palm Methyl Ester), FAME (Fatty Acid Methyl Ester), Ethanol blended fuels -Grade E10, E15, E20 & E85 at optimum cost. The project has been supported by DSIR for duration of two years.

New Product Development (Nitroscanate) by P.I. Drugs & Pharmaceuticals Ltd., Thane

Synthesis of nitroscanate (1-isothiocyanato-4-(4-nitrophenoxy) benzene (C₁₃H₈N₂O₃S)).

Nitroscanate is an anthelmintic of the diphenyloxy group. Nitroscanate is known to interfere with and inhibit the synthesis of ATP in *Fasciola hepatica* while A.M.P. levels are increased. The alterations in A.T.P. levels are shown to be irreversible and continuous with time. An initial increase in end-product formation, namely acetate and lactate is observed, possibly due to increased levels of the enzyme phosphofructokinase resulting from depletion of A.T.P. levels, but this increase is later abolished. In the nematode *Haemonchus contortus* adenine nucleotide pools are depressed by nitroscanate. Efficacy of nitroscanate is increased approximately four-fold if given with food due to slower passage of the drug through the gastrointestinal tract, with increased contact time with the parasite. The process involves novel way for isolation of pure 4-(4-nitrophenoxy) aniline HCl salt by using methanolic HCl. The process involves methyl ethyl ketone purification to get the required quality. The project has been supported by DSIR for duration of eighteen months.

Optimization of an innovative process and its cost effective manufacturing of a fast acting anti diabetic recombinant drug product insulin Lispro, a rapid acting insulin analogue, and testing its clinical comparability (safety and efficacy) with the innovator's product by Biocon Limited, Bangalore

The objective of the project is development of Biosimilar Insulin Lispro process, a fast acting Insulin analogue and its commercialization in Indian market. Eli Lilly had the first insulin analogue with "lispro" as a rapid acting insulin analogue. It is marketed under the trade name Humalog. The cost of 3ml Humalog cartridge is Rs. 450, which is almost 10times higher than the cost of regular Insulin. Biocon's vision is to provide the affordable as well as good quality drug product to the Indian and world Diabetic patient population. Biocon is confident about achieving the target and meeting the deliverables with the cost effective

proposed process plan. The project has been supported by DSIR for duration of three years.

Development of Long acting hormonal intra-uterine contraceptive device by M/S Famy Care Ltd., Mumbai

The project is to make a substitution of MIRENA. The innovative product is very expensive (About Rs. 8000/- per piece) and cannot be afforded by the masses of our country. LNG-IUS is imported in India from the innovator by Cadilla healthcare. There is no manufacturer in India or for that matter anywhere in the world other than the innovator who can provide the product at an affordable cost. An import substitution is the need of the hour. The objective in this endeavour is to manufacture LNG containing long acting intrauterine contraceptive devices which is generically equivalent to Mirena®. Due to the cost of the existing IUS product, most of the NGO's use a copper based device for contraception as opposed to safer and more effective LNG-IUS. The copper containing device has many problems during its insertion regimen like excessive bleeding, pain during insertion, irregular menses, etc. LNG-IUS overcomes all the problems of copper based IUD's and provides a safe and highly effective means of contraception. The project has been supported by DSIR for duration of three years.

E-waste Recycling & Precious Metal Recovery by Eco Recycling Ltd., Mumbai

E-waste is a growing concern and will continue to rise with the socio-economic developments; the present generation of 500,000 tons per annum will shortly reach to a million ton. This 'waste' is resource rich and also very hazardous too and therefore can't be ignored. Presently 'Kabadies' are dismantling end of life electrical & electronic equipments in their own style and leaving behind polluted air, water and soil for us to inhale, drink and eat toxic mixed eatables. The present proposal will provide complete solution to address all the relevant concerns and will help in recovering the precious metals from Printed Circuit Boards. The project has been supported by DSIR for duration of two years.

Manufacture of Magnesium & Calcium Metal Powder by M/s Ardee Business Services Pvt. Ltd.

The objective of the project is to manufacture of Magnesium and Calcium Metal Powder through Pidgeon process for use in steel industries. The project is aimed at manufacturing a total quantity of 10 MT of Magnesium and Calcium Metal Powder through various batches with varied operating conditions and the test the product in laboratory as well as industrial trial for their purity, performance and steel industry acceptability. For De-sulphurisation the use of Magnesium powder when indigenously developed will result in cost savings to the extent of around Rupees 3 to 4 thousand per Tonne of hot metal. So also Calcium metal will result in saving of around Rupees 2 to 3 thousand per Tonne of Steel. Traditional methods generates a huge amount of carbon di-oxide by burning Coal for heating the retorts. The present proposal will reduce energy requirement substantially. The project has been supported by DSIR for duration of eighteen months.

DSP based high-end active professional audio speakers by DSP based high-end active professional audio speakers by M/s Sonodyne Technologies Pvt. Ltd

The project will produce the following range of high quality DSP based active professional speakers for application in studio, live and installed sound applications, converting core research into products by way of advanced testing and measurement, and creation of tools, and dies and fixtures to make production ready. The products have a world market. Importantly, there is also a large requirement in India. Primarily since these products are linked with development (FM, Bollywood performances, corporate presentations, product launches, entertainment venues, airport, railway stations). These are mushrooming all over a developing India. The project has been supported by DSIR for duration of two years.

Development of Coal dry beneficiation system - X-Ray based Sorting system for Indian Coals of

size range 13-50mm (ArdeeSort) by Ardee Hi-Tech Pvt Ltd, Vishakhapatnam

The project is for development of field scale X-ray based sorting system to provide complete solution for coal dry beneficiation for particle size, in the range of 13-50 mm. This technology will yield similar results as compared to the existing technologies without using water as a beneficiating media but with lower water consumption, thus, leading to lesser effluent generation. The system electronics, removal technology, logic of separation is totally different than its competitors and there is no conflict on technology issues. The project has been supported by DSIR for duration of one year.

NLT 40% L-Dopa from Mucuna Pruriens Seeds by BACFO Pharmaceuticals (I) Ltd., New Delhi

The objective of this project is to develop a process for Commercial Manufacturing of Standardized Extract NLT 40 % L- Dopa from Mucuna pruriens (Kaunch) seeds. Mucuna pruriens (Kaunch) seeds have L-Dopa with hundreds of compounds, of different chemical groups. The potential ingredients from the seeds have been separated by the company with pH selective extraction, as combination of synergistic ingredients, with L-Dopa, highly useful in treatment of Parkinson's disease. Laboratory Experiments of 1.0 Kg. batch size have been successfully completed to produce free flowing yellow brown powder having NLT 40 % L-Dopa with 61 gm yield. Now the company will develop Commercial Manufacturing of Standardized Extract NLT 40 % L- Dopa from Mucuna pruriens (Kaunch) seeds at 500 Kg. batch size pilot plants. The project has been supported by DSIR for duration of two years.

Development of Indigenous Technology of Materials for Nano Photofunctional Applications by IICT, Hyderabad, and Sapala Organics (P) Ltd., Hyderabad

The project is to develop the pilot scale process to manufacture two ruthenium polypyridyl complexes based materials for Nano Photofunctional

Applications used in Dye sensitised solar cells (DSC) dyes. The technology at bench scale level (2 grams) has been developed at IICT, Hyderabad. The proposal aims to develop the technology at 500 grams to 1 Kg level in pilot plant. Dye sensitised solar cells (DSC) have emerged as a very promising source of energy at considerably lower costs. The functioning of DSC mimics natural photosynthesis in that the photoreceptor and charge carriers are different elements unlike a PV cell where the semiconductor assumes both the functions. This separation of functions reduces the stringent purity requirements of the raw materials and consequently makes DSC a cheaper alternative. The advantages of DSC, apart from being a low cost alternative, include Good performance under standard reporting conditions, Stable performance under non-standard conditions of temperature, incidence angle etc., Semi-transparency and multi-colour range possibilities. The dye in the DSC needs to fulfil several requirements, the most notable ones being a broad absorption spectrum, adequate ground and excitation states, long stability, no toxicity and good adherence. The most successful dyes to date belong to the family of ruthenium complexes. Other alternatives are still being pursued due to the scarcity of ruthenium. There are no manufacturers of DSC or the dyes for DSC in India. The project is supported by DSIR for duration of 24 months.

Purification of Gas Gangrene Clostridium Toxins & Development of Monovalent and Polyvalent Antitoxins by VINS Bioproducts Ltd., Hyderabad

The objective of this project is production of gas gangrene causing toxins from three different Clostridium strains namely C. perfringens, C. septicum and C. novyi, purification of toxins from the culture media by chromatography based methods, development of strategic immunization schedule for obtaining high titre antitoxin from equines, standardization of F (ab')₂ purification from equine plasma and testing the efficacy of the purified antitoxin by animal assays and user trials. The project has been supported by DSIR for duration of forty two months.

Development of Small size pistons for Two Stroke Engines by high pressure die casting process by Abilities India Pistons & Rings Ltd., Delhi

There is current trend to revive the 2 stroke version of the engines for the smaller versions of the engines for applications like Chain saws, Brush cutters, Hedge trimmers and agricultural sprayers basically from the point of view of utilizing the inherent advantages of the 2 stroke engines with upgraded technology in the manufacture of the components with lesser weight, lower inertia masses with added cost advantage coupled with high productivity. One of the upgraded technologies currently being tried out internationally is to produce the most vital component like the Pistons for the Engines in High pressure die casting process which offers the possibility of producing the components with intricate shapes and contours with thin walled sections with "Near Final Shape" with out any additional machining for achieving these shapes which render the engine more efficient in terms of improved fuel economy and reduced emissions.

Under the project the company proposes to develop small size Pistons (size 44mm for 50cc Engines and size 37.08mm for 33cc engines) with high silicon content for two stroke engines employed in specialized applications like chainsaw, brush cutter, trimmer etc. adopting the high pressure die casting process, which is being attempted for the first time in India. The project has been supported by DSIR for duration of 24 months.

The details of TDDP projects commercialised are given in **Annexure-8**

2 . TECHNOPRENEUR PROMOTION PROGRAMME (TePP)

Department of Scientific and Industrial Research (DSIR) under its Technology Development and Innovation Programme of TPDU Scheme operates the "Technopreneur Promotion Programme (TePP)". TePP along with its network partners provides grants support is provided to individual

innovators having original ideas to convert them into working models, prototypes etc. The department has supported forty three (43) new projects during the period from January, 2010 to December, 2010. The details of the completed, on-going and approved projects supported under TePP during the current year under report are given in **Annexure-9**. The details of some of the completed projects are given below:

Intralock Intravenous Cannula

The Intralock Intra Venous Cannula is an innovation in the field of medical sciences by Shri T.S. Raman of Jaipur. The simple Intra Venous Cannula is open by both sides due to which it is difficult to lock the Intra Venous Cannula immediately as injectable medicines is given. This results in blood and inject able medicines coming out. This creates jamming of blood circulation in blood vessel due to clotting of blood in the Intra Venous Cannula and gives unbearable pain if it medicines/blood is re-injected in to the body of patient repeatedly.

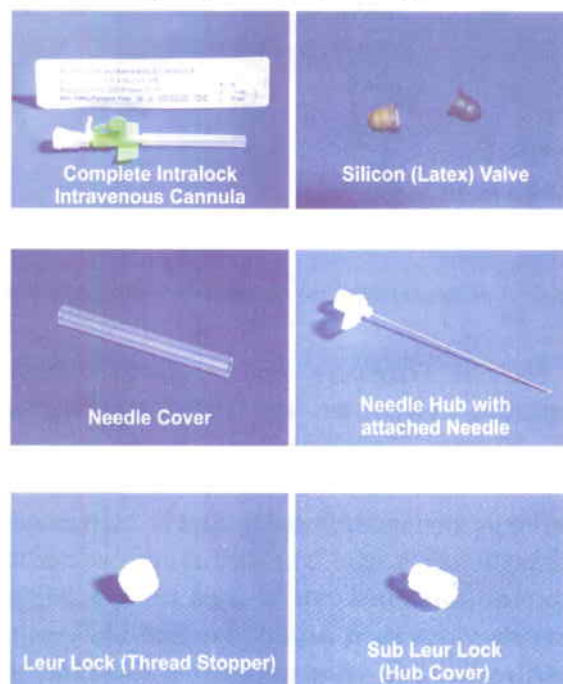


Fig. 1: Various components of Intra Lock Intravenous Cannula

The new Intralock Intra Venous Cannula has soft silicon rubber valve fitted in the structure of cannula chamber itself with lure lock. This feature provides

convenience to patient and nursing staff both and reduces human errors. This innovation eliminates the chances of blood clotting or coagulation. The innovation has been patented.

New Suspension type Extendable Width Cultivator

Shri Rajendra Kumawat from Tonk (Rajasthan) has developed extendable width cultivator to modify the existing implements to cope up with the increasing demand of agriculture activities. The new cultivator has the capability to extend the width of cultivator from 9 tines to 11 and 13 tines. The same implement can be used with tractors of more horse power (HP) simply by increasing the number of tines and there is no need to purchase a new matching implement. The introduction of new suspension system reduces the cost considerably.



Fig. 2: New Suspension type Extendable Width Cultivator

A Novel Tamper Proof, Tear Proof, Durable Leather as Printing Paper for Niche Application

The innovation is developed by Shri K. Mohammed Fakruddin of Chennai. The special purpose leather paper as developed can be used for specialized printing work such as College and University certificates, high value documents, Government awards, tamper proof security papers, photos, hand paintings and artistic works, invitation cards and holy books. The leather paper is tamper proof, durable, water resistant, tear resistant, heat resistant and also has high strength. The paper can be made in various colours and thickness.

Augmentative and Alternative Communication (AAC) device

The device is developed by Shri Ajit Narayanan from Chennai. The children with neural motor conditions are intelligent and aware of the world around them, but have poor muscle control. This often includes muscles that make speech.

The innovator has termed innovation as AVAZ, which is a portable device that constructs messages from coarse muscle movements. These messages are then converted into speech. AVAZ is thus an artificial voice for such children.

AVAZ works on a principle called scanning. It shows various options on a screen, and presents a highlight that moves between the different options. When the highlight dwells upon the option that the child wishes to choose, the child makes a large muscle movement - such as shaking the head, or touching anywhere on the screen with the hand. This selects the highlighted option. When a full sentence has been constructed, AVAZ converts the message into speech.



Fig. 3: Augmentative and Alternative Communication (AAC) device

Scanning in AVAZ is made faster using grouping, ordering, and prediction. The options are arranged in groups, so it is quicker to navigate and correct mistakes. The options are also arranged in decreasing order of frequency, which makes common words quicker to select. AVAZ also tries

to automatically predict words based on their starting alphabets and their preceding words. A child using AVAZ in text mode can make a sentence in as fast as 1 minute.

In order to cater to a wider spectrum of disabilities, AVAZ is also available in picture mode with support for Indian languages. Children with better muscle control may also use AVAZ faster through a direct touch-screen interface, without scanning.

3. OTHER ACTIVITIES

To expand the reach of TePP among common masses, **twenty-nine (29) 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), Chandigarh; National Environmental Engineering Research Institute (NEERI), Nagpur (Maharashtra); Shri Padmavati Mahila Vishwavidyalayam (SPMVV), Tirupati (A.P.); International Crop Research Institute for Semi-Arid Tropics (ICRISAT), Hyderabad (A.P.); Central Electronics Engineering Research Institute (CEERI), Pilani

(Rajasthan); NEIST, Jorhat; TBI- e-Health, Bangalore (Karnataka); Chhattisgarh Swami Vivekanand Technical University (CSVТУ), Bilai (Chhattisgarh), Technology Business Incubator- University of Madras (TBI-UoM), Chennai.

A number of other activities organised/ participated by TePP during the year to sensitize academia, disseminate information on TePP to the larger mass of the populace network partners and impact generation among common masses:

- TePP innovators participated in Pride of India Science Exhibition (97th Session of ISC-2010) at Thiruvananthapuram (3rd - 7th January, 2010).
- A project titled 'Scouting, Recognising and Supporting Innovations of Engineering Students' was completed by Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) with TePP grant. The large data base of students projects is available on web portal (<http://techpedia.sristi.org>)
- TePP innovators participated in ISBA Conference 2010 during February 8-10, 2010 and exhibited their innovation in the event.
- Organization of Training-cum-Orientation Programme for representative of TUCs in association with FITT, IIT Delhi during June 4-5, 2010 at Delhi.
- Participation of TePP in NAVONMESH 2010 - a business plan competition organised by Shailesh J. Mehta School of Management, Indian Institute of Technology Bombay, October 23-24, 2010.
- TePP innovators participated in CSIR Technofest 2010 concurrently organized during India International Trade Fair 2010 at Pragati Maidan, New Delhi [November 14-27, 2010].
- With training and process maturity attained, TUCs were empowered to recommend small support primarily to student innovators to experiment with novel concepts with support amount of less than Rs 75,000/- per innovator during the year 2009-10. This effort would continue during the current year i.e. 2010-11 as well.

- TUC network has further been expanded. During the current year six new TUCs are being created at IIT Guwahati; UCOST (Dehradun); NCL, Pune; ICICI Knowledge Park, Hyderabad; NDBI-NID, Ahmedabad and EDC, University of Kashmir.

To diffuse the achievements of TePP

innovations, a publication entitled "**CREATIVE INDIA, Vol. V**" consisting of 49 profiles of start-ups and innovators have been compiled and published.

To diffuse the activities of TePP to a larger masses, an Annual Calendar consisting of profiles of TePP Outreach Centres is under print.