

# **Access to Knowledge for Technology Development and Dissemination (A2K+)**

- 1. A2K+ - Studies**
- 2. A2K+ - Events**
- 3. Technology Development and  
Utilization Programme for Women  
(TDUPW)**
- 4. Technology Development and  
Demonstration Programme (TDDP)**



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# Access to Knowledge for Technology Development and Dissemination (A2K+)

Access to Knowledge for Technology Development and Dissemination (A2K+) is a scheme targeted towards developing mechanisms to disseminate science, technology and innovation related information to industries, research and academic institutions, In-house R&D units of industry, Scientific & Industrial Research Organizations (SIROs), consultants, industry associations, techno-entrepreneurs, government departments and others.

Programmes supported are the following:

- 1: Supporting industrial technology related studies (A2K+ Studies)
- 2: Supporting the organization of national and international conferences, exhibitions etc. (A2K+ Events)
- 3: Support for Technology Development and Utilization Programme for Women
- 4: Technology Development and Demonstration Programme (TDDP)

## 1. A2K+ STUDIES

The main objective of the programme is to undertake industrial technology related studies on frontier areas of technology that impact the country. The study-reports are aimed at providing a useful information and knowledge base to industry, industry associations, academia, research institutions, consultants, entrepreneurs, research students and policy makers for initiating useful projects and carrying out further work in these areas.

Studies on frontier areas of technology that impact the country are being undertaken. These include technology status studies in specific product and process areas, analytical reports of specific industry clusters, cases studies bringing out industry practices, research studies on industry related subjects, technology norms of industrial sectors, and other categories of reports.

Following are the details of ongoing Studies:

1. Framework of Industry-University Linkage (UIL) in Research study being conducted by PHD Chamber of Commerce and Industry, New Delhi

The main objective of the study is to entail suggestions to enhance the growth and competitiveness of the growth oriented and promising sectors not only at the aggregate level but also with state specific suggestions which will be useful to enhance the growth and competitiveness of our industry sector and help Make in India programme of the Government to provide fruitful results as well as create synergies between industry and Academia to create more and more employment opportunities in the economy.

The major findings of study are as follows:

- The University – Industry Linkages differ from state to state. University – Industry Linkages are very strong in the State of Karnataka, Kerala and the linkages are weak in the State of Manipur.
- Other states have strong University-Industry linkages such as Uttar Pradesh, Madhya





Pradesh, Maharashtra, Odisha, Tamil Nadu, Jharkhand, Delhi, Telangana, Chhattisgarh, Bihar, Andhra Pradesh, West Bengal and Himachal Pradesh. The states of Goa, Punjab, Rajasthan, Uttarakhand, Tripura, Sikkim, Jammu & Kashmir, Gujarat, Meghalaya and Haryana have moderate linkages in research and development which needs to be strengthened in the coming times. On the other hand, states such as Assam, Arunachal Pradesh, Mizoram, Nagaland and Manipur are the states with weak linkages between the universities and industry.

2. Technology diffusion in the Millet processing industry specific to Karnataka, Andhra Pradesh and Maharashtra states study being conducted by CSIR-Central Food Technological Research Institute (CFTRI)

The study covers the technology diffusion in the millet processing industry with emphasis to ragi processing technologies specific to Karnataka; barnyard millet & foxtail in Andhra Pradesh and Sorghum in Maharashtra. The study also aims on evolving an appropriate platform for technology transfer mechanism targeted to millet farming community.

The major findings of study are as follows:

- Brochures on Millet based technologies in English, Hindi and Kannada was brought out for reaching out to the entrepreneurs. This was distributed widely in major exhibitions/platforms.
- Millets-Pro Mobile application is also developed to popularize and educate the importance of Millets. In this application, user will easily get to know about millets and it consists of sliding menus which quickly navigates to respective modules. The App is hosted in Google Play for potential entrepreneurs to download and use it Android based Mobile sets.
- Web Site for promoting the Millet based Technologies also developed and the main purpose is to enhance the visibility and innovations related to Millet based products

in the rural and urban populations. This compilation is brought in order to help in creating a sustainable ecosystem for the growers and processors.

3: Study on “Effective Grain storage for better livelihoods of Indian Farmers for food and nutritional security in the new millennium” by Indian Institute of Food Processing Technology (IICPT).

Objectives of the study are:

- To determine safe storage guidelines based on moisture, temperature and quality of pulses for tropical weather conditions, with special emphasis on the coastal regions of Tamil Nadu.
- To design and develop eco-friendly safe storage structures with provisions for physically eliminating insect pests to store pulses for small scale enterprises, retailers, rural livelihoods, pulse growers, millers and Farmer producer organizations.
- To disseminate the technology to small and medium enterprises and to pulse growers in the coastal regions of Cauvery Delta.

Safe storage guidelines for storing black gram under tropical conditions with respect to different moisture and temperatures have been developed. Storage time decreases with increase in moisture content and grain temperature. Safe storage guidelines chart for black gram have been developed which will be helpful to the farmers by notifying them the number of days before which the grain has to undergo post harvest treatment without spoilage. Storage studies were conducted in bag, bin and hermetic bulk storage structures. Airtight bins were designed and fabricated at IIFPT for storing pulses at farm and household level. The main aim of designing the bins were to store the pulses without usage of chemicals and pesticides at farm level.

Bulk storage of pulses using cocoon bags for long term storage under open storage conditions were tried. Multi layered bags are found to be effective for storing pulses for more than six months without altering the quality parameters



and the usage of chemicals and pesticides were curtailed.

Developed insect traps to mechanically eliminate insects during storage of pulses Electronic stack probe trap with UV-LED strip was used for attracting insects from the stack.

Two in one trap was designed to control and monitor pulses. This setup consists of a hopper bottom bin painted both sides with yellow colour, which makes the trap more attractive to insects. This trap could collect insects more effectively. Usage of natural insect repellents in addition to light is also possible to attract more number of insects in short span.



*Different bags used to store pulses*



*Insect trap cum bin*

## 2. A2K+ EVENTS

The sub-scheme on A2K+ Events supports organization of workshops, interactions, training programmes, exhibitions and other events and provides a platform for exchange of views among industry, consultancy organizations, academic and research institutions that will assist in developing useful insights on issues relating to industrial research and technological innovation and in evolving tools and techniques to remain competitive in today's business climate. The scheme also aims at identification of collaborative projects between academia, institutions and industry during their participation in the events, organized under the scheme.

## Achievements:

During the financial year, proposals were received from a number of agencies to organize workshops, stakeholder meetings, interaction meets, training programmes, exhibitions and other events on topics related to promotion of industrial research and innovation. These proposals will be discussed in Technical Advisory Committee (TAC) Meeting and proposals recommended by TAC will be processed for financial concurrence & approval before sanctioning of the event. Some events that were supported by the department during the year are illustrated below:

Title of Event	Organized by	Date
TechKnow 2017	Anna University, Chennai	07-08 Apr 2017
ASSOCHAM Pollution Control Conclave: Emerging Technology in Industrial Pollution Control & Environmental Engineering	The Associated Chambers of Commerce and Industry of India, Chennai	21 Apr 2017
National Conference on Water Management – Technology Innovation Sustainability	The Associated Chambers of Commerce and Industry of India, New Delhi	28 Apr 2017
National Conference on Technology Transfer to MSME Clusters, National and Institutional Levels for Optimising IPR	PHD Chamber of Commerce and Industry, New Delhi	30 Jun 2017
International Conference on Clean Technologies and Sustainable Development	National Institute of Technical Teachers Training and Research, Chandigarh	23-24 Feb 2018





### 3. TECHNOLOGY DEVELOPMENT AND UTILIZATION PROGRAMME FOR WOMEN (TDUPW)

The program is aimed to meet specific needs of women and to enhance their contribution towards technology capability building. The objectives of the programme are:

- Promoting the adoption of new technologies by women.
- Awareness creation and training of women on technology related issues with regard to women.
- Promoting Technology up gradation (through technologies developed by scientific establishments) of micro, small and medium enterprises run by women Self Help Groups (SHGs)/entrepreneurs .
- Showcasing of appropriate technologies developed by scientific establishments and organizing demonstration programmes for the benefit of women.
- Design and development of products, processes (by utilizing waste) beneficial to women.
- Diffusion of technologies developed by scientific establishments for reduction of drudgery and empowerment of women.

The following projects were in progress:

#### ***(i) Capacity Building of Economically Backward Rural Women Through Participatory Training on Integrated Fish Farming with Improved Backyard Poultry Breeds in Homestead Ponds***

The main objectives of the proposal received from Bidhan Chandra Krishi Viswavidyalaya, Directorate of Research, P.O: Kalyani, Pin- 741 235, District Nadia, West Bengal are capacity building of rural women on integrated poultry-fish farming in their homestead ponds through participatory training and demonstration programmes for income generation and nutritional support as well as for dissemination of the technology in the adjoining villages through organizing training and demonstration programmes in association with different panchayats of adjoining

Block of the village. Twenty integrated poultry-cum-fish farming units have been developed and are being utilized for both participatory training and demonstration purposes. The work regarding capacity building activity of the beneficiaries has been started on participatory mode. Data is being generated on their income generation and nutritional support from the activity. Two Self-Help Groups have been formed with ten beneficiaries in each group. Savings Bank Account of each beneficiary has been opened. Earning from the activity is being deposited in their respective bank accounts. Group meetings are organized in the presence of Panchayat Member of Dewli GP and villagers from time to time. Regular monitoring is being done of each and every unit from time to time. Vaccination programmes of chicks are being followed according to the schedule of standard poultry farming method.

The integrated poultry-fish farming offers great efficiency in resource utilization, as waste or by-products from one system is effectively recycled. It also enables effective utilization of available farming space for maximizing production. Fish culture in combination with agriculture or livestock is a unique and lucrative venture and provides a higher farm income, makes available a cheap source of protein for the rural population, increases productivity on small land-holdings and increases the supply of feeds for the farm livestock. Thus, it provides more employment, and improves socio-economic status of farmers and contributes towards betterment of rural economy. The project is being implemented in Nadia district of West Bengal.

#### ***(ii) Enhancing the Livelihoods of Tribal Women through Technological Intervention of Trainings on Non-Wood Forest Products (Identification, collection, storage, processing and marketing of Non-Wood forest products)***

The main objectives of the proposal, received from Department of Agricultural Extension and Rural Sociology, Tamil Nadu Agricultural University,



Coimbatore are to train the tribal women on collection, storage, processing, value addition and marketing of Non-wood Forest Products (NWFPs) and assess the impact of the trainings on the livelihood status of tribal women. The project deals with strengthening the Non-Wood Forest Products (NWFPs) sector by means of training the tribal people regularly on aspects related to proper collection methods, storage, processing, value addition techniques and marketing of NWFPs to improve socio-economic status of the beneficiaries of the project areas. During the period of one year, six training programmes were organized, which covered two districts (Coimbatore and Erode), six taluks (Pollachi, Mettupalayam, Thondamuthur and Bhavanisagar, sathayamangalam, Anthiyur, six blocks, around twenty four self-help groups (SHG) including around 300 beneficiaries. The women beneficiaries were given theoretical and hands on training on collection, storage, processing, marketing and demonstration of value added products/ value addition of non-wood forest products like amla, tamarind, honey, Kadukkai, Shikkai, Nutmeg, amla candy, amla pickles, leaves powder, broom stick and Squash etc. The beneficiaries were also given technical manual on value added product development from NWFPs. The project is undergoing.



*Training programme in progress*

***(iii) Empowerment of rural women by Promoting the adoption of appropriate Sericulture Technologies in Chittoor (Dist) of Andhra Pradesh***

The main objectives of the proposal, received from Department of Sericulture, S.P. Mahila Visvavidyalayam, Tirupati, Andhra Pradesh are to disseminate knowledge and technological skill improvement techniques for adoption of scientific sericultural practices for bringing improvement in production and quality of silk for self sustenance and empowerment of women through on-farm training cum demonstrations; to enhance the bio-organic based technological interventions towards improvement of environment, productivity and sustainability of sericulture; Promotion of sericultural entrepreneurship among women and to entice women farmers to adopt Sericulture as a source of livelihood and enhance their economic status. The proposed project is aimed at imparting Integrated Capsule Training in Sericulture Technology (ICTST) to women Sericulture farmers on various appropriate advanced sericulture technologies in Chittoor District of Andhra Pradesh. The target group for the proposed program is primarily women farmers who are practicing sericulture and also, women interested to take up sericulture as their livelihood.

***(iv) Socio-economic development of rural women of Uttar Pradesh by educating & training in the cultivation of medicinal plants, their processing for health care product development and marketing for gainful employment***

The main objectives of the proposal, received from Amity Institute of Herbal Research & Studies; Amity University, Noida (Uttar Pradesh) are to educate and train rural women of the SC/ST, backward and economically weaker section of the society in the identification, cultivation, and uses of medicinal plants and to train women of the target area/population (Muzaffarnagar district, UP) in the cultivation of medicinal plants at home stead and on community land and processing





सत्यमेव जयते

for personal health care, product development and their marketing for gainful employment and income generation. Training programmes are being conducted to educate and train the target group of women for the cultivation, processing, storage, pre and post-harvest methodology and techniques for the processing and cultivation of a number of selected medicinal plants. They will be encouraged to utilize the possibility of growing medicinal plants in home stead, kitchen garden or available under-utilized land and marketing for gainful employment. Some important medicinal plants having good market potential and utility in Indian system of medicines have been selected depending on the agro-climatic condition of the selected area. The project is being implemented through coordination with local NGOs, village panchayat, Gram Pardhan, Angan-wadi workers, local school teachers, Krishi Vigyan Kendras (KVKs), followed by formation of Self-Help Groups of the beneficiaries. Conducted 6 training programs in 4 villages namely Hussainpur Bopada, Ghasipura, Beghrajpur and Jaroda (Dist. Muzaffarnagar). A total of 129 rural women attended and participated in the training programmes. They were trained on the medicinal values of the selected medicinal and aromatic plants, their cultivation practices and method of preparation of herbal health care products from lemon grass and moringa.



*Moringa plantation at village Sandhawali, Dist. Muzaffarnagar*

***(v) Empowerment of women through bee keeping and value addition of honey products for income generation in rural areas***

The main objectives of the proposal, received from Tamil Nadu Agricultural University, Department of Agricultural Entomology Agricultural College and Research Institute Madurai are to create awareness among women on bee keeping, post harvest technology, honey based value added products through trainings, exposure field visit; to motivate women groups by training, demonstration on bee keeping and post harvest technology of honey products; to motivate of land less women entrepreneurs on paid bee pollination in increasing productivity of various crops and to empower women and entrepreneurship development through Hands-on-training on bee keeping and value addition. Bee keeping is one of the income generation ventures for farmers and other entrepreneurs. Through this project, bee keeping techniques will be transferred to communities through effective extension methods like training and demonstrations. Knowledge on beekeeping and its value addition will be imparted to women groups, comprising of land less women from Sedapatti, Alankannallur and Madurai east blocks of Madurai District.

***(vi) Training of women groups in processing of horticultural and wild fruit resources for marketable health product development and employment generation in Higher Himalayan region***

The main objectives of the proposal received from Society for Environment & Employment Development (SEED), Uttarkashi are to organize village women of border area of Uttarakhand in groups for capacity building in utilization of wild tree based fruits for self employment development; training and technology transfer to village women groups for utilization of pulp and oil for marketable products development and to provide support for small entrepreneurship development for income and employment





generation. Training will be imparted to women groups in processing of horticultural and wild fruit resources for marketable health product development with special focus on Chulu, Apple, Plums and Peaches.

***(vii) Capacity building of rural women for enhancing household income and nutrition through mushroom cultivation***

The main objectives of the proposal, received from ICAR-Indian Institute of Horticultural Research, Bengaluru are to enhance awareness about mushrooms and their nutraceutical properties among women; impart skill development training to rural women for oyster mushroom cultivation; impart training on methods to fortify daily diet with dry mushrooms to enhance nutrition and to impart training for production of mushroom value added products. The emphasis has been given on creating awareness about the health and nutrition benefits of mushrooms, methods to utilize fresh and dried oyster mushrooms in daily diet and make mushroom cultivation as a part of kitchen garden as well. The rural women are initially being helped through the Ready to Fruit (RTF) bag concept developed by ICAR-IIHR which helps rural women with minimal resources to grow a nutritious vegetable like mushroom at home. Hands on training to 200 women belonging to 5 villages (Sadenahalli, Chokkanhalli, Honnenahalli, Rajankunte and Chikkanahosanahalli) of Rajankunte and Dodaballapur taluk were given in oyster mushroom cultivation and preparation of daily diet products like Mushroom rasam, mushroom chutney powder, mushroom pulogirae powder to enhance the daily nutrition. Hands on training to women will help in development of knowledge as well as skill among the beneficiaries and the women will learn the technique of mushroom production at home as well as develop the necessary expertise in making value added products from fresh/ dry mushrooms.

***(viii) Nutrition on Reproduction of Ornamental Fishes and Transfer of Ornamental Fish Culture Technology for Employment Generation of Rural Women from SC/ST and Fishers Population of Thiruvananthapuram District, Kerala***

The main objectives of the proposal, received from Amity Institute of Marine Science & Technology, Amity University, Noida (Uttar Pradesh) is to impart training on ornamental fish culture and breeding. Common ornamental fishes such as gourami, goldfish, guppy, molly, sword tail, angel fish and platy will be used. Survey will be carried out on ornamental fish farms located in various areas/regions all over Kerala. Training will be imparted on all aspects of ornamental fish culture, breeding, rearing the young ones, feed formulation and pelletisation, aquarium fish keeping and management, capacity building in ornamental fish culture and glass aquarium tank fabrication. Three Training Programmes have been conducted. 59 women were trained on various aspects of ornamental fish culture and aquarium management. The week long training programmes imparted hands on experience on all vital aspects such as ornamental fish breeding, larval rearing, live feeds culture, supplementary feed preparation, aquarium tank fabrication, setting up of aquarium tanks, their upkeep and maintenance, common diseases and health management, packing the fishes, transportation, quarantine rules and present status of ornamental fish trade. The trainees were given a hand book on ornamental fish culture, a glass tank, (3ft x 1.5ft size), fish fingerlings, fish feed and an aerator for starting the ornamental fish culture. The trainees were also taken for one day field visit to see the fresh water ornamental fish aquarium and breeding center at Neyyar Dam, Thiruvananthapuram and the Marine aquarium and research center of CMFRI, Vizhinjam to understand how fishes are maintained in the aquarium and to see other activities going on at these two centers.





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#### 4. TECHNOLOGY DEVELOPMENT AND DEMONSTRATION PROGRAMME (TDDP)

The Department has been providing 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 on 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.

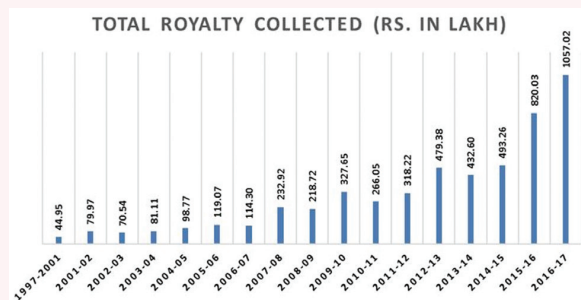
The partial financial support by DSIR in the above areas primarily covers prototype development and pilot plant work, testing and evaluation of products from such R&D, user trials, etc. Bulk of the cost of the project is met from the proposer industry's resources.

The Technology Development and Demonstration Programme (TDDP) is started in 1992, the department has supported 254 R&D projects of Industrial units with a total

project cost of Rs. 750.60 crores in which DSIR support is Rs. 280.40 crores. The projects cover a number of industry sectors and the share of these industry sectors in the project supported are: 32% engineering; 27% electronics; 21% Chemical; 7% energy and waste utilization and 13% Health & Pharma. The projects supported have been spread over 22 states of the country and the share of top five states in the number of project supported is: Andhra Pradesh 18%, Karnataka 15%, Maharashtra 13%, Delhi 10% and Tamil Nadu 10%.

98 technologies developed under the scheme have been commercialized (**Annexure 11**) and the department has received a cumulative royalty of around Rs.52.54 Crore during 1997-2017.

During the current financial year, progress of on-going projects were monitored and 4 projects were successfully completed.



Year-wise royalty received from the commercialized products/processes developed under TDDP projects.

4.1 Status of TDDP Projects on-going from Eleventh Plan and monitored during the financial year 2016-17

#### (i) 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

The main objectives of the project were to scale-up the process for producing B-amino acid based DPP IV inhibitor using novel heterocyclic, structurally unrelated to any DPP-IV inhibitors known so far and to conduct clinical safety and efficacy trials of the drug molecule. It is a new DPP-IV inhibitor



that has better half-life, advantageous potency, stability and selectivity, less toxicity and/or better pharmacodynamics properties. Preclinical Toxicology studies have been successfully completed on tablet formulations. The stability studies of 36 months duration and accelerated studies have been successfully completed. A modified controlled release formulation for once a week dosage form has been successfully developed and its long term stability studies are in progress. For this New Chemical Entity (NCE), the company has filed patents worldwide and has been granted in countries like China, France, Germany, Japan, Switzerland, United Kingdom and United States of America. The project is technically completed and the clinical trials are under progress. After successful completion of clinical trials, the product will be commercialized.

**(ii) FUEL CELL BUS DEVELOPMENT PROGRAMME BY M/S TATA MOTORS LTD, MUMBAI**

M/s Tata Motors Ltd, Mumbai has taken up project on development and demonstration of Fuel Cell Bus. Hydrogen is emerging as a leading contender for the energy carrier options of future. The project is aimed at design, development and demonstration of Fuel Cell Buses which will be fueled by Hydrogen. A total of ten prototype buses with successive design improvements are targeted to be demonstrated in the project. Hydrogen refuelling infrastructure with approval of Petroleum and Explosives Safety Organisation (PESO), Ministry of Road Transport and Highways (MORTH) / Central Institute of Road Transport (CIRT) for testing of fuel cell bus at TML Sanand Gujarat has been created and regular field trials on the prototype is under progress at TML facility at Sanand. Four proto buses (one Gen1 & three Gen2) are under testing and trial. All the learning from Gen1 has been incorporated into Gen2 buses. The buses have accumulated cumulatively 14000 km. The maximum coverage done by bus No 2 is 10500 km. The project has met all the technological development objectives. TML is in the advanced stage building another three buses. With necessary approvals from CIRT/

MORTH, buses are expected running on public road soon as demonstrator. One to two buses are expected to be brought to IOCL Faridabad. Tata Motors has collaborated with IOCL and facilitated creation of Hydrogen refuelling infrastructure at IOCL, R&D Faridabad for demonstration of buses for trail on road at Delhi- Faridabad. The Project is under progress.



*(Proto shown in Auto expo)*

**(iii) DEVELOPMENT AND COMMERCIALIZATION ON LOW TEMPERATURE POLYMER EXCHANGE MEMBRANE FUEL CELL AND STACK BY M/S ELPRO ENERGY DIMENSIONS PVT. LTD., BANGALORE**

The project is aimed for Development of Polymer Exchange Membrane fuel cell stacks for stationary applications. The development of fuel cells is very critical in view of the energy and environmental considerations. The development and fitting of all the required supporting equipment such as gas chamber, flow path, test bench, etc. has been completed. The project has achieved a maximum current density of 665 mA/cm<sup>2</sup> with O<sup>2</sup> and 347 mA/cm<sup>2</sup> with air for a single 300 cm<sup>2</sup> cell. The company has fabricated 1 kW fuel cell stack successfully and developed indigenous Membrane Electrode Assembly (MEA). The project is now integrating multiple cells for developing 3 kW fuel cell stack using indigenous MEA. The Project is under progress.

**(iv) DEVELOPMENT OF SPIRAL COBALT RADIOTHERAPY MACHINE BY M/S PANACEA MEDICAL TECHNOLOGY PVT. LTD., BANGALORE**

The project is dealt with the development of Spiral Cobalt Radiotherapy Machine for treatment of





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cancer. The company has developed fully functional prototypes for Rotational Gamma Beam machine to achieve conformal therapy. The developed machine is able to offer the 3D conformal therapy using cobalt 60. The overall cost of treatment delivery with such a configuration will be lowest, while offering the 3D conformal treatment. Isotope based tele-therapy machine work with maximum advantage when the distance from source to tumor is lower. This machine offers a very low distance of 60 cm. This is a major breakthrough in tele-therapy and it will be first of its kind Made in India product in the world. This Spiral Cobalt Radiotherapy Machine is precise, accurate, rugged and reliable for conformal therapy at a fraction of the cost of competing technologies in developing countries. It is operated by a built in battery with low power consumption, suitable for rural India. Since the cost of this “Made in India” machine is about 1/4<sup>th</sup> of the other imported machines, this makes the equipment affordable and will get proper place in global competition and hence have huge marketing potential. The project has been completed successfully.



*Spiral Cobalt Radiotherapy Machine*

**(v) DEVELOPMENT & COMMERCIALIZATION OF RAPID CAST TECHNOLOGY FOR MANUFACTURING OF STAINLESS/STEEL CASTINGS OF WEIGHT 5000 KGS SINGLE PIECE BY M/S. PTC INDUSTRIES LIMITED, LUCKNOW**

The objective is to set up a pilot plant facility of Rapidcast Technology for production of the cast upto 5000 Kg single piece and to reduce the cumbersome process of making dies and mold of the product which requires lot of time and

investment. The technology “Rapidcast” have been used to cast a 5000 Kg stainless steel casting of single piece with better quality, consistency and surfaceness. This technology involves much faster speed of production. The existing processes like sand moulding, shell moulding, investment castings etc do not fulfill these features. The high point of the project is that the parts developed did not need any Tooling and are poured in partial vacuum. A state of Art Plant for Rapidcast Technology has been established for the project. Equipments have been Engineered for Project. The total project cost is Rs. 1800.00 Lakhs and DSIR support is Rs 500.00 Lakhs. The project has been successfully completed.



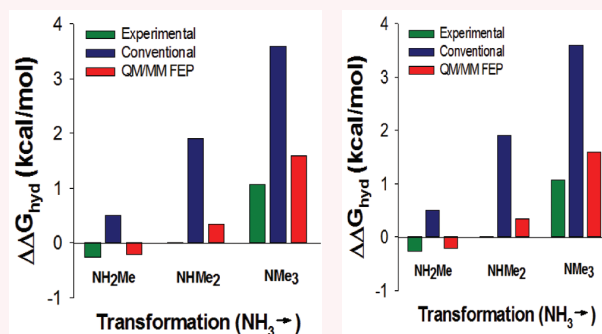
*5000 kg single piece stainless steel rapid cast technology*

**(vi) DEVELOPMENT AND VALIDATION OF A NOVEL COMPUTER AIDED DRUG DESIGN (CADD) TECHNOLOGY FOR DRUG DISCOVERY BY M/S. RATIONAL LABS PVT LIMITED, HYDERABAD**

The project is dealt with the development of an integrated CADD technology for drug discovery, validation for relative salvation free energies of small molecules and validation for a diverse set of small molecules for some Drug Targets viz. anticancer, anti diabetics and anti-bacterial. The company has developed QM/MM based FEP method, which is claimed to have the potential to automate calculations (both qualitative & quantitative) and thereby increases the use of free energy calculations in the drug design, expecting more accurate results leading to better drug candidate prioritization and ultimately to shorter discovery times. The new QM/MM based FEP method has the potential



to automate in calculations (qualitative and quantitative) and thereby increases the use of free energy calculations in the drug design. Due to the uniqueness of the technology, it is claimed to huge marketing potential in India and overseas. The project has been successfully completed.



Calculation of Hydration Free Energies of Simple Alkyl Amine Analogs by M/s. Rational Labs Pvt Limited, Hyderabad

**(vii) Switch Reluctant (SR) Motor and control for hybrid car on transmission shaft by M/s. S K Dynamic Pvt. Ltd., Roorkee**

The project is aimed to develop, fabricate, test and commercialize switched reluctance motor and control system for a hybrid car that can be mounted on the transmission shaft. The hybrid electric Vehicle (HEV) has been developed. Two times development test and three times emission tests has been conducted at ARAI, Pune. Improvement in fuel economy has been noted during developmental tests. Company will commercialize SR motor and control system for variety of applications such as e-vehicles, e-auto, e-rikshaw, e-tempo, e-car etc. within one year as demand of hybrid vehicle is no longer exist. The project was successfully completed.



