



**Building Industrial Research & Development
And
Common Research Facilities
(BIRD-Crf)**



Building Industrial Research & Development and Common Research Facilities (BIRD-Crf)

This scheme focuses on creation of Common Research facilities for micro and small enterprises i.e. CRTDH (Common Research and Technology Development Hubs) with an aim to enhance translational research and foster industry institution interaction targeted towards innovative product development.

Common Research and Technology Development Hubs (CRTDH)

1. Preamble

Micro, Small and Medium Enterprises (MSMEs) play a pivotal role in the overall economy by promoting equitable development in India. They need to be sensitized towards translation of public funded R&D into products and processes. Their higher involvement, especially in application-oriented R&D is expected to enhance the private sector's share in national R&D expenditure.

Common Research and Technology Development Hubs (CRTDHs) aim to enhance translational research and foster industry institution interaction targeted towards innovative product development. DSIR extends grants to institutions for setting up of these hubs/centres, which include R&D facilities/infrastructure, analytical test facilities, design centres, pilot plant production facility, design engineering and prototype development, demonstration units, product display centre etc. The facilities at CRTDHs are used by the Micro, Small and Medium Enterprises (MSMEs), Innovators and start-ups. The CRTDHs evolve a business model for self-sustainability and operate on a

cost plus non-commercial basis.

In the first phase, during 2014-15, Department approved setting up of following three CRTDHs:

S. No.	Location	Sector
1.	CSIR - Centre for Cellular and Molecular Biology (CCMB), Hyderabad	Affordable Healthcare
2.	CSIR - Institute of Himalyan Bioresource Technology (IHBT), Palampur	Affordable Healthcare
3.	CSIR - National Institute for Interdisciplinary Science & Technology (NIIST), Thiruvananthapuram	Environmental Interventions

In the second phase, during 2016-17, Department approved setting up of following four CRTDHs:

S. No.	Location	Sector
1.	CSIR - Central Mechanical Engineering Research Institute (CMERI), Durgapur	Low Cost Machining
2.	CSIR - Central Electronics Engineering Research Institute (CEERI), Pilani	Electronics/ Renewable Energy
3.	Indian Institute of Technology, Roorkee (IIT-R), Roorkee	New Materials
4.	Indian Institute of Technology, Gandhinagar (IIT-Gn), Gandhinagar	Chemical Process

In the third phase, during 2018-19, Department approved setting up of following five CRTDHs:



S No.	Location	Sector
1.	CSIR-Central Drug Research Institute (CDRI), Lucknow	Affordable Healthcare
2.	Indian Institute of Technology, Kharagpur	Affordable Healthcare
3.	CSIR-Central Scientific Instruments Organisation (CSIO), Chennai	Electronics/ Renewable Energy
4.	CSIR-Indian Institute of Toxicology Research (IITR), Lucknow	Environmental Interventions
5.	CSIR - Institute of Minerals and Materials Technology (IMMT), Bhubaneswar	New Materials / Chemical Process

1.1 Aims and Objectives

The CRTDH programme is aimed at creation of common research facilities equipped with analytical equipment and pilot plant facilities to facilitate and encourage innovators, startups and micro, small and medium enterprises for R&D and technology development. The highlights of the achievements of the CRTDHs established are summarized below.

1.2 CRTDHs set up in first phase (2014-15)

Three hubs set up in first phase are working on the needs of enterprises that were earlier identified through seminars and workshops as well as through interaction with the MSME Development Institutes (MSME-DI), Directorate of Industries (DIC), S&T Councils and other state government bodies. Technological development involving MSMEs/start-ups/innovators and host institutions in project mode is ongoing and

several agreements have been signed with enterprises as well as state government agencies for the benefit of the MSMEs and start-ups.

1.2.1 CRTDH at CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad

The CRTDH at CCMB, Hyderabad is set up with the objectives to support and nurture product development in the field of health care and modern biology covering inter alia, diagnostics, bio-pharma and medical devices. In particular, the products and technologies that are targeted, relate to development of DNA based diagnostic kits for screening of eye infections, acute encephalitis, septicaemia, antibiotic resistance, and others.

Around 10,000 sq. ft. of fully functional air conditioned facility has been created under CRTDH that can physically accommodate 6-10 incubatee companies. The CRTDH has all the essential facilities including modular lab tables, discussion tables, chairs, cubicles / partitions, modular movable tables with granite top and wheels, staff sitting room, a conference hall with sitting space for 30 people, band width of 8 MBPS and a video conferencing facility.

The area has open lab facilities with access to industrial biological equipment such as super speed centrifuge, Sorvall Lynx 6000, SU8Station, (Photolithography), Micro fluidic controllers, Stereomicroscope with Camera, Class 1000 clean room etc.

07 companies have been incubated so far at this CRTDH and are working on process/product/technology development in a project mode with set targets and defined deliverables. They are being mentored by CCMB scientists and offered technical support for usage of facility at a nominal charge. Currently 22 persons of 06 incubating companies are working at CCMB CRTDH



facility. More than 60 companies have utilized the sophisticated research and testing facilities available at CRTDH.

The start-ups/MSMEs incubated at CCMB-CRTDH so far not only have been successfully utilizing facilities at the hub but have been able to file patents and secure grants during their period of stay at CRTDH. One of the company working on cell engineering to produce protein drugs has been awarded DBT/BIG grant of Rs. 50 lakhs, has filed 6 patents and 3 trademarks for two technologies developed by it, and is now a DSIR recognized start-up in biotechnology. Another company working on a novel process for production of medical grade water was awarded DBT/BIG grant of Rs. 50 lakhs. Another incubate company working on POC based on DNA amplification for a virus on prawns has received a grant of Rs. 2 Crores from National Fisheries Development Board. Another company working on production of peptide drugs for diabetes has filed 2 patents on an improved process for preparation SMW protein/peptide. Earlier one of the incubate company that was also DBT/BIG Grantee, raised US\$ 500 K (~ in Rs. 3.5 Cr.) from Mumbai Angels in the month of March 2018 and successfully exited CRTDH.

The CRTDH has been constantly sensitizing industry to engage with it through different workshops/seminars and outreach events. The team has organized several events during the current year to publicize the facilities available under CRTDH including trainings on instrumentation / facilities, lectures from experts on funding opportunities for startups, mentoring researches to successful entrepreneurs etc. The centre organized an Outreach event for DERBI-EMERGE acceleration Program to “focus on late stage tech startups that are into Health Care”. The team also participated in Bio Asia 2019 to reach out to established MSMEs with the

complete suite of analytical services offered by CRTDH. More than 60 MSMEs actively engaged with CRTDH team during the event, some of whom have already contacted the team.

To bring the successes and learning from the 12 CRTDH centres set up so far, DSIR organized a Conclave during 8th-9th November, 2019. It brought together coordinators and the MSME beneficiaries of these centres. The workshop was held under the aegis of CRTDH set up at CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad that has successfully engaged with the enterprises and evolved a business model for self - sustainability. The conclave was inaugurated by Dr. Shekhar C. Mande, Secretary, DSIR and DG, CSIR who also gave a keynote address highlighting how CRTDH scheme has facilitated small industry and innovators to take up research, and technology development activities including commercialization in select cases. The conclave was attended by various experts from industry, academia and officials from state government agencies. It was used as a platform to urge small & medium enterprises, innovators, researchers as well as the state government agencies and various associations such as Invest India, FISME, WASME, IDMA, IKP knowledge park and T-Hub to associate with DSIR-CRTDHs and become partners in R&D, innovation and technology development. A short video film on CRTDH programme was also released during the event. Secretary, DSIR also held a press conference and the event was very well covered by both local and national newspapers.



CRTDH stall at BIOASIA event held in Hyderabad on 25.02.2019



Open lab facilities at CRTDH, CCMB, Hyderabad

1.2.2 CRTDH at CSIR - Institute of Himalayan Bioresource Technology (IHBT), Palampur

The CRTDH at IHBT, Palampur has been

setup in the area of Affordable Health to take advantage of the institute's expertise in development of value added products such as thermo-stable enzymes, zero-calorie sugar substitutes etc. The hub aims to catalyse development of bio-pharmaceutical ingredients such as black carrot anthocyanin, beetroot betaine, mango peel carotenoids etc. by industries located in its vicinity.

The equipment and pilot plant facilities under CRTDH have been housed in a Pilot Plant, set up under Natural Plant Products (NPP) Division and are functional.

Pilot scale trials were carried out for anthocyanin rich fraction extraction from *Brassica Oleracea* (Wild cabbage plants), Red rose and Rhododendron. While animal trails have been conducted on black carrot colour for its anti-diabetic properties under research regulatory lab, acute oral toxicity studies have been conducted for pomegranate peel extract. Extraction of nutraceuticals from mango pomegranate peel and citrus peel has also been done at the pilot scale. The team has also standardized natural colorant extraction and purification process at pilot scale in case of beet root, black carrot and red cabbage. Technical data related to entire process has been generated and functional properties as well as quality assessment of standardized products has been achieved. The techno-economic feasibility studies are also being done.

The institute has now established an incubation centre/area which is now fully functional and compliments the facilities available under CRTDH for food processing. A complete ready to eat canning unit and crispy fruit manufacturing facility were installed for incubates and start-ups in the incubation centre.

Subsequent to being identified as an 'Empanelled Incubator' to nurture new

ideas/ innovations to support them in their entire life cycle till the same is turned into a commercial enterprise, CSIR-IHBT in February, 2019 signed agreements with 04 new incubates/start-ups in addition to 13 incubates supported earlier. Both CRTDH as well as Incubation facility are being utilized to support 17 incubates working on different products/processes/technology development. One of the incubate working on processing of stevia leaves and its value added products like stevia drops has successfully exited and the products are now being marketed in the states of HP and Punjab. Another incubate who worked on fruit juices has set up his unit for selling premium juices with about 2 months' shelf-life. Also, one of the incubate working on Kangra tea is also currently marketing the product as ready to serve beverage. In all, 11 incubates were working at CSIR-IHBT in the year 2019 in the areas of aloe vera processing, value addition of herbal produce, detox drink, fruits and vegetables products etc. The institute has signed technology transfer and licensing agreements with 07 enterprises in food processing sector so far.

An industry meet was organized on 18th Feb, 2019 at CSIR-IHBT, where 72 industries participated and visited the facilities available with CRTDH and incubation centre.

One of the participating industry M/s. A Qube Inc., Ludhiana is currently incubated in IHBT and working in food processing area with licensed technology from the institute. Within days of incubation, this company has been able to supply 1 lakh cans/ 55 tons of dal-chawal-aloo ready to eat packs for Orissa flood hit areas during May, 2019 by utilizing facilities such as complete 50 kg capacity canning unit, a commercial scale freeze dryer etc. available at the incubation facility.



Incubation facility at CSIR-IHBT, Palampur and products made therein

1.2.3 CRTDH at CSIR - National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram

The objectives of CRTDH at NIIST, Thiruvananthapuram are to develop products, technologies, testing facilities and treatment systems addressing environmental



issues; determine data such as air pollutant emission factors from various process industries for design of pollution control systems etc. The institute's experience in technologies related to odour control, anaerobic treatment, nitrification treatment, water quality analysis and others are being used to provide R&D solutions to MSME's to improve their environmental performance.

Part of the equipment purchased has been housed in Engineering hall of Process Engineering and Environmental Technology Division of the institute. In addition, the Dioxin Research Laboratory has been upgraded with new instruments and equipment such as GC-triple quadruple mass spectrometer, automated sample preparation system, sample concentrator, isokinetic stack sampler, ambient air PUF sampler and high temperature oven. CSIR-NIIST has got NABL accreditation as per ISO/IEC 17025:2005 for dioxin and PCB analysis in environmental and food samples. In addition, NIIST is already recommended by Mo EFCC as a referral laboratory for dioxin analysis for environmental clearances.

NIIST had earlier submitted a study report on emission factor of dioxins from open burning of municipal solid wastes in Kerala to Kerala State Pollution Control Board (KSPCB), CPCB & MoEF in April 2019. Studies are now being conducted using different waste samples collected from different districts of Kerala. The team has completed sampling and analysis from 10 out of 14 selected districts during the year. The team conducted ambient air and residual ash sampling during the solid waste dumpyard fire break out at Brahmapuram Plant, Kochi during 22nd - 25th February 2019.

In February 2019, CSIR-NIIST conducted a comprehensive three-day workshop "DIOXIN India 2019" on "Advanced training in sampling, sample preparation

and quantification of dioxins and PCBs" under the skill development programme of the institute. The programme was attended by various experts from CPCB, other state pollution control board, testing laboratories etc., of which 14 participants were trained.

CRTDH at NIIST, Kerala has also been working to address environmental issues of plywood manufacturing industries in the state. CRTDH team carried out measurements of formaldehyde (toxic VOC) emissions from plywood hot press etc. and proposed an exhaust ventilation system to capture the emissions and a bio filter system for removal and destruction of VOC. Based on the measurements, CRTDH team submitted proposal to the KSPCB for installation of an emission control system comprising hoods, ducts, suction blower and bio filter at a model factory in the cluster. KSPCB has now sanctioned a project to CSIR-NIIST for setting up of a model demonstration emission control unit at an identified plywood factory in Kerala.

CRTDH team has also taken up environmental issues related to Cashew industry, conducted visits to cashew factories in Kerala and collected emission data. They are working on fabrication of a 20Kg modified rotary drum roaster based on biomass gasification system using cashew-nut shell as alternate fuel. Besides, the NIIST-CRTDH is also providing environmental solutions in terms of consultancy and technical services to hospital wastewater treatment plants, prawn feed factories, ice cream factories, fish canning factories etc.

Setting up CRTDH in environmental interventions in Kerala has shown to be extremely important as the state has a number of small industries in areas of cashew, plywood, fisheries, and spices etc. that require S&T interventions especially in solving the environmental issues.



1.3 CRTDHs set up in second phase (2016-17)

In the second phase, during 2016-17, the department approved setting up of four new hubs in the sectors of Low cost machining, New Materials/ Chemical Process and Electronics/ Renewable Energy. These hubs are currently engaged in activities like procurement of equipment, setting up of infrastructure and essential facilities for R&D. The hubs have identified R&D needs of the enterprises through seminars and workshops as well as through interaction with the MSME-DIs, DICs, S&T Councils, industry representatives and associations and other state government agencies.

1.3.1 CRTDH at CSIR - Central Mechanical Engineering Research Institute (CMERI), Durgapur

The objective of the CRTDH at CSIR-CMERI is to meet the R&D requirements of MSMEs regarding improvements in product design & manufacturing involving sizing & shaping, patterns & finishing, special purpose machines, CAM for ensuring product conformity and automation.

DSIR-CRTDH center at CSIR-CMERI, Durgapur was inaugurated by Secretary DSIR and Director General CSIR in month of June 2019. Approx. 2160sq.foot ground floor area has been provided for installations of machines along with approx. 2017sq.foot first floor area for conducting training and lecture sessions. Common Research and Technology Development Hub at CSIR-CMERI, Durgapur intends to support MSMEs by providing R&D, technology related facilities and services. The CRTDH will also impart training and skill development programs to MSMEs. CRTDH had interactions with various target clusters, viz. Bargachia Cluster of Metal Product Manufacturers, Howrah; Surgical Instruments Industry

Cluster, Baruipur, 24-Parganas; Shuttlecock Manufacturing Cluster, Uluberia, Howrah; Fan Manufacturers Cluster Foundation of Bansdrani, Kolkata; Metal Casting Foundry Cluster, Howrah; Zari Embroidery Cluster, Sankrail, Howrah; Gems and Jewellery Cluster and Imitation Ornaments Cluster, Domjur, Howrah; Makhana cluster in North Bengal, Brass Cluster of Goghat; Oil expelling cluster of Dinajpur, etc.

The center has developed Anchor Bolt and Copper Nozzle for gas cutting/welding torch for Bargachia Spare Parts Manufacturing Cluster (BCMPM) and surgical tools such as Artery Forceps and Needle Holders for Baruipur Surgical Instruments Manufacturers Welfare Apex Association (BASIMAA) Cluster. During current year, the center has organized five major events and around 108 persons have benefited from MSMEs of various clusters i.e. i) Bargachia Cluster of Metal Product Manufacturer Howrah; ii) Sandesh khali Mongalsutra Manufacturing Cluster, North 24 Parganas; iii) Association of Ludhiana Machine Tool Industry (ALMTI); iv) Makhana Cluster in North Bengal, through DIC Maldah and v) Sandesh khali Mongalsutra Manufacturing Cluster, North 24 Parganas.

1.3.2 CRTDH at CSIR - Central Electronics Engineering Research Institute (CEERI), Pilani

The MSMEs in electronics and renewable energy face several problems such as lack of access to modern technologies, state of the art hardware and software tools to carry out innovative R&D, testing and technology upgradation, and advanced design engineering centres. The objective of the CRTDH at CEERI, Jaipur is to conduct high quality and relevant product oriented research to meet specific industry requirements; disseminate first hand research information to MSMEs/ Start-ups for product



innovation; create state-of-the-art facilities for engineering design and product evaluation; and ideate for innovative electronic products in collaboration with MSMEs.

DSIR-CRTDH is located at Jaipur in Malviya Industrial Area and is functional. Some of the major facilities that are in place include Grid-tied inverter test equipment system, design engineering facility, conference hall, video conference facility, interwoven incubation unit and centre of eminence for skill development. Facilities like Mechanical design facility; Electronic design facility have been created at the center.

In current year, this hub organized 7 major events and around 14 industries have drawn benefits from this Hub apart from generation of associated employment. Around 30 Member industries of Rajasthan Solar Association and around 25 Member Industries of Federation of Rajasthan Trade & Industry (FORTI) have visited the site and are at different stages of discussion for projects/technical services/consultancy.

1.3.3 CRTDH at Indian Institute of Technology, Roorkee (IIT Roorkee), Roorkee, Uttarakhand

The seamless integration of high speed digital communication systems and the ever increasing usage of the mobile phones demand the shielding of harmful electromagnetic radiation which has an adverse effect on the human body. The objective of the CRTDH at IIT Roorkee is to work towards development of microwave absorbing materials and its characterization for social, stealth and electronics applications. With the creation of such facilities under CRTDH, the institute is expected to meet growing challenges of enterprises regarding testing of microwave absorbing materials that have potential for various applications in the commercial as well as defence space.

Material testing and characterization proposed in this CRTDH requires isolated space for each instrument / set up. Therefore, IIT Roorkee allocated 2500 sq. ft. of isolated space for DSIR-CRTDH and the same has been renovated as per approved layout plan. The facility includes separate rooms for material measurement, SAR measurement, Dark room, an operator room, dedicated space for Anechoic Chamber, a literature zone, an office space as well as a discussion room. Development of Infrastructure and renovation of identified lab space was completed at IIT Roorkee in March, 2019.

During the year, the institute has developed and hosted website of the centre and the details of the available facilities along with upcoming facilities have been uploaded on the website. A brochure on available facilities in the centre was circulated among the Micro, Small and Medium enterprises of the state of U.P.

The team has developed various microwave absorbing materials and also conducted preliminary tests for fabrication and measurement of camouflage net. The team has fabricated specifications of RCS measurement equipment by holding technical presentation from different companies and anechoic chamber that is likely to be procured.

1.3.4 CRTDH at Indian Institute of Technology Gandhinagar, Gandhinagar, Gujarat

Effluents from the dyes and dye intermediate chemical industries always remain a concern. The waste generation from the chemical industry and its proper treatment is a major environmental issue and a big challenge. Some of these industries are very water intensive and most of them use older technologies which may require optimization of water usage/recycling, process improvement etc. To mitigate some of these problems and help



the industry members in the region, DSIR has setup a Common Research and Technology Development Hub at IIT Gandhinagar in area of Chemical Processes with the objective to develop and customize R & D requirements of different dye industries for both waste minimization and waste treatment.

CRTDH has come with state-of-the-art facilities for chemical process and wastewater related research & development. It is equipped with several sophisticated instruments such as OES for elemental analysis, TOC analyser for carbon content, multi-mode plate reader for microbial studies, fluorescence spectrometer and UV-Vis spectrophotometer for determining optical properties of products and raw materials, HPTLC for compound identification, GC for gas analysis and spray dryer for liquid to solid processing in the powder form. The facilities for water quality testing such as BOD, COD, TNb and TDS, pH, TDS, Salinity, Conductivity, NH₃-N, DO, TSS, Turbidity, etc are also installed and functional.

The institute has started engaging dye industries in the nearby clusters and caters to their technical and R&D needs for management of dye effluent, including testing requirements. Presently, CRTDH team is working with several MSMEs on few techniques for reducing COD, color and heavy metals and a few customized solutions have been proposed to these industries. The focus essentially is on making the treatment process cost-effective for textile effluent, testing the scalability of the process. The team has filed a provisional patent application (Indian) in respect of one such technology for reduction of COD.

One of the industry in Gujarat that had a product for treatment of sewage water, approached CRTDH team for technical support. The product was tested in both lab and pilot scale trials in 200 L and 400 L and

was found to work efficiently to decrease the TSS in STPs (Bhavnagar and IITGN). Trials were also conducted in Nadiad and the results were found to be encouraging.

The team is also working on water treatment using micro/nano bubbles technology, improving the dissolution of dyes, silica aerogel and LDH for dye adsorption, continuous product washing system, TOC reduction etc. In terms of training manpower, five JRFs, two Post-Doctoral Fellows, five UG students and eight PG students have been trained in the CRTDH Lab.

1.4 CRTDHs set up in third phase (2018-19)

In the third phase, during 2018-19, the department approved setting up of five new hubs in the sectors of Affordable Health, Environmental Interventions, New Materials/ Chemical Process and Electronics/ Renewable Energy. These hubs are currently engaged in activities like procurement of equipment, setting up infrastructure and essential facilities for R&D. The hubs have started identifying needs of the enterprises through seminars and workshops as well as through interaction with the enterprises.

1.4.1 CRTDH at CSIR - Central Drug Research Institute (CDRI), Lucknow

The focus of CRTDH at CDRI is to set up and operate a Pharmaceutical Formulation Development and National Clinical Trial Batch Production Facility that will develop via Quality by Design (QbD) industrially-scalable process-cum-product technology packages for oral, topical and sterile products and manufacture batches of drug products and corresponding placebos for Phase I and Phase II clinical trials under Form 29 license from State Licensing Authority of UP.



The hub also aims to establish and operate a Unit for GLP-compliant Pre-clinical and Clinical Bioanalysis (PK, BA, BE) and Drug Testing Laboratory (DTL) that will undertake activities pertaining to generation of chemical and pharmaceutical information on API and formulations; quality assurance, monograph and final/batch release specifications including Stability Studies; in vitro pharmacokinetics and metabolism; preclinical pharmacokinetics, absorption, distribution, metabolism and excretion; and bioanalysis for clinical pharmacokinetics, including bioavailability and bioequivalence.

The setting up of infrastructure and facilities has commenced. A few equipment for setting up test item preparation and analytical areas under CRTDH have been purchased. GLP certification of both the above areas has also been achieved.

Equipment required for conducting accelerated stability and photostability testing of medicinal preparations has also been procured and made fully operational during the year. Installation and commissioning of manufacturing facility are also in progress.

The CRTDH team has also started effective engagement with MSMEs/start-ups. In September 2019, a technical workshop was held at the CRTDH in participation with CDSCO whereby UP Drug Manufacturing Association with about 156 MSME members participated.

1.4.2 CRTDH at Indian Institute of Technology Kharagpur, Kharagpur

The focus of CRTDH at IIT Kharagpur is to design and develop a research and innovation hub for healthcare system through which entrepreneurs, startups and MSEs can get support and facilities to carry out their research and development activities. The hub aims to develop novel

portable devices that can be deployed at rural healthcare centres, for affordable quick and reliable diagnosis; taking the above products from bench to bedside (rural health kiosks); and provide training and consultancy to the MSE for skill development and augmenting technical knowledge. The CRTDH aims to collaborate with MSE to design and develop new diagnostic devices and healthcare services related to point-of-care diagnosis for detection of multiple blood constituents, development of image-based diagnostic device integrated with a tele-control smart chair for diagnosing multiple health conditions, developing telemedicine software and systems etc.

The institute allocated an earmarked space for the pilot plant at Dr. BC Roy Institute of Medical Sciences & research (upcoming Super-Specialty Hospital at IIT Kharagpur) and additional space at the Diamond Jubilee building at IIT Kharagpur. After being handed over to CRTDH, the team finalized the necessary drawing, design and infrastructure for the space. To create synergy and take forward the initiative, a meeting with 25 MSMEs from the region and senior Government officials (Director, MSME Development Institute, Head, MSME Tool Room, Kolkata etc. was held in February, 2019.

The CRTDH team has identified an initial list of Ten (10) technologies being worked up on by the team (till prototype stage) that could be offered to MSMEs for technology transfer. These technologies include a paper-based device for colorimetric detection of blood hemoglobin level, a generic paper-based device for simultaneous detection of multiple diseases using a single drop of blood, a CD-based microfluidic device for disease detection using colorimetric techniques, a diagnostic device for non-



invasive evaluation of oral/skin cancer or pre-cancer using thermal imaging etc.

The team has procured various medical devices and trained rural health assistants prior to starting clinical validation study across rural locations in Kolkata. The team conducted clinical validation study on paper-based device for colorimetric detection of plasma glucose using mobile based app (as opposed to current POC devices which tests blood sugar and therefore is of less clinical value) at Salboni Super-Specialty Hospital located in a remote rural area about an hour from IIT Kharagpur.

1.4.3 CRTDH at CSIR-Central Scientific Instruments Organisation (CSIO), Chennai

The CRTDH at CSIO, Chennai centre is being set up to provide technical support, infrastructure and sophisticated analytical as well advanced research equipment facility to the local renewable energy and electronic MSMEs for carrying out competitive technological research to translate new ideas into marketable products. The hub aims at identifying and promoting actions that the local industrial community can take to accelerate the pace of innovation in renewable energy by way of testing and certification, skill development and serving as a platform for collaboration among industries, R&D, academia, government, civil society and selected innovation alliances who share a vision for a sustainable future.

This hub organized four major events and around 110 industrial participants have drawn benefits from this Hub. Besides this, center has conducted Technologist Industrialist meet and Expo 2019, where around 12 who have attended the event industries and Around 40 industrial participants and entrepreneurs from country took part in event.

1.4.4 CRTDH at CSIR - Indian Institute of Toxicology Research (IITR), Lucknow

The objective of the CRTDH at CSIR-IITR is to meet the R&D requirements of MSMEs regarding the clean air/water and effluent management sector to develop indigenous & effective solutions for environmental monitoring, water treatment, and effluent management. The Hub at CSIR-IITR, Lucknow was inaugurated by Dr. Mande, Secretary DSIR and Director General CSIR and a brochure as well as website of Environmental Monitoring Hub were released. Currently, two facilities viz., instrumentation laboratory and analytical facility are established for the use of testing services and training programmes. Procurement of capital equipment is as per the project plan and purchase procedure is underway. Prototyping of water treatment, effluent treatment and air quality have been initiated.

1.4.5 CRTDH at CSIR-Institute of Minerals and Materials Technology (IMMT), Bhubaneswar

The CRTDH at CSIR-IMMT, Odisha is being set up with the objectives to meet the emerging market needs for sustenance of a large number of MSEs working on processing of metal, alloy and materials, chemical processes etc. in the state of Odisha and providing R&D inputs/ interventions. The CRTDH is developing customized solution to the needs of industries related to coating and plating processes of metals/ materials to suppress chemical corrosion and aberrations and development of cost efficient polishing technology for gem and conch shell industries. A dedicated testing facility for chemical corrosion, structure, composition, optical properties etc. is being created.

During the year, the institute has awarded



works contract for setting up an industrial shed of approx 7000 sq. ft. Procurement process for purchase of equipment for CRTDH is ongoing and is at various stages of processing. In order to sensitize various MSME stakeholders regarding CRTDH initiative, the institute organized a workshop on 22nd August 2019. The team is also mentoring MSMEs desirous of seeking R&D

intervention in their existing products and processes in the areas such as chemicals for mineral processing applications, utilization of industrial waste and byproducts etc.

One of the MSME entrepreneurs that have been mentored at the institute has been recognized as the best Start-up of the country by Ministry of MSME, Govt. of India in the year 2019.