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TECHNICAL ACHIEVEMENTS

FIELD TRIALS OF CMTI-DEVELOPED WALNUT HARVESTING SYSTEM & ACCESSORIES AT SKUAST-KASHMIR

The ongoing Techwalnut project under Ministry of Electronics and Information Technology (MeitY), Government of India, an Agri-Excellence Program focused on applying electronics and ICT in Himalayan Region Crop Management, focusing on one of the objective smart harvesting for walnut trees. The team from CMTI, Bangalore - Mr. Manjunath M A (Sct-D), Mr. Syed Imaduddin (PA-I) and Mr. Hemanth S (PA-I) visited SKUAST-Kashmir during the period 15th Sept 2026 to 24th Sept 2026 to carry out field trials of the developed walnut harvesting system & accessories. With prior lab trials at CMTI and SKUAST-K campus orchids, the actual field trials of system were carried at Anantnag and SKUAST-K Walnut Research Station, Kupwara, Kulangam J&K.

The “Kampan-Motor Power System” is a battery-operated, motor-driven power unit developed for the mechanized harvesting of walnuts. The system uses a 60 V, 2000 W electric motor as the

primary power source and is operated through an acceleration-drive-controlled system, enabling controlled variation of motor speed according to the harvesting requirement. A rechargeable battery pack provides the necessary power for independent field operation without requiring an external electrical power supply. The motor is coupled with an integrated gearbox having a reduction ratio, which enhances the available output torque required for effective operation of the walnut harvesting mechanism. The geared arrangement is designed to provide an output torque of approximately 250–300 Nm at an operating speed of around 500 rpm, enabling the system to generate sufficient mechanical force for branch shaking and walnut detachment. The complete power unit is mounted on a compact caster-based platform, which can be easily integrated with or mounted on different mobile platforms such as ATVs, UTVs, rovers, or suspension-wheel



Motor-operated walnut harvesting system

systems. This modular arrangement provides flexibility in deployment across varied orchard terrains. The system integrates the motor, gearbox, rechargeable battery, acceleration control and mounting display platform into a compact and easily deployable power unit, facilitating convenient operation and maintenance.



Engine-operated walnut harvesting system

The “Kampan-Engine Power System” is an engine-driven power unit developed for the mechanized harvesting of walnuts. The system is powered by a petrol engine rated 20 kW (approximately 13 HP) and incorporates a mechanical CVT with belt drive and centrifugal clutch for effective power transmission and torque multiplication. The system delivers an overall achievable torque range of approximately 350–550 Nm, providing the mechanical force required for effective branch shaking and walnut detachment. The complete power unit is mounted on a compact caster-based platform, allowing it to be easily integrated with or mounted on various mobile platforms, including ATVs, UTVs, rovers, and suspension-wheel systems. This modular configuration provides flexibility for deployment across different orchard terrains and operating conditions. The system integrates the petrol engine, CVT, centrifugal clutch, manual/self-start mechanism, and acceleration control into a compact and

easily deployable power unit. The integrated design facilitates easy operation, transportation, maintenance, and field deployment of the walnut harvesting system.

The telescopic pole-based mooring hook arm with vision system is developed for accessing and securing tree branches through ropes during walnut harvesting. The



Telescopic pole-based mooring hook arm with vision system

lightweight carbon-fibre telescopic pole, with a maximum reach of 80 ft, is integrated with an aluminium mooring hook arm capable of handling branches in the 10–200 mm diameter range and a load of up to 20 kg. The integrated wireless vision system enables real-time identification and measurement of branch diameter, while the Raspberry Pi-based processing unit provides image processing and GPS location tagging. A wireless Kivy-based GUI provides live image preview, capture control, and display of key parameters such as branch diameter, height, GPS location, and annotated images. The system has a wireless operating range of approximately 120 ft and a total weight of less than 7 kg, making it suitable for field operation in orchards.



Walnut collector system

The Walnut Canopy Collector System consists of a lightweight aluminium frame structure with an adjustable sliding mechanism, enabling the collector to accommodate varying walnut tree trunk diameters. The collector provides an adjustable coverage diameter of approximately 4–8 mtrs, allowing it to effectively cover the area beneath the tree canopy. High-Density Polyethylene (HDPE) shade cloth is stretched across the aluminium frame to form the walnut collection surface. The frame with cloth is designed with a sloping profile towards the tree trunk, allowing the fallen

walnuts to roll naturally towards the trunk under gravity. This facilitates centralized collection of walnuts, reduces manual gathering effort, and improves the efficiency of the mechanized harvesting operation.



Demonstration of simultaneous harvesting of multiple branches, with effective harvesting performance. The combination of variable ropes with harvesting time of 3 minutes, provided harvesting efficiency above 95%.



Lab Trials at SKUAST-K



Trials on positioning of harvester system



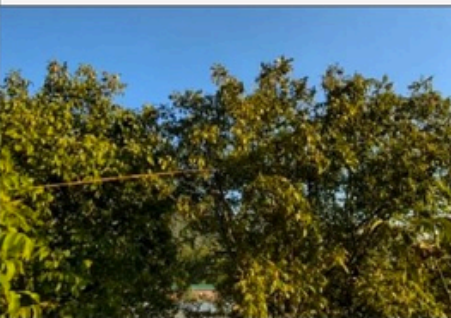
Evaluation of Telescopic pole



Trials with Motor operated walnut harvesting system



Trials with Engine operated walnut harvesting system



Transmission of vibration to branches



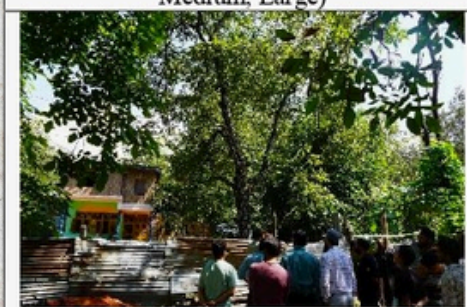
Trials on variable walnut trees (Small, Medium, Large)



Evaluation of interlocking of rope



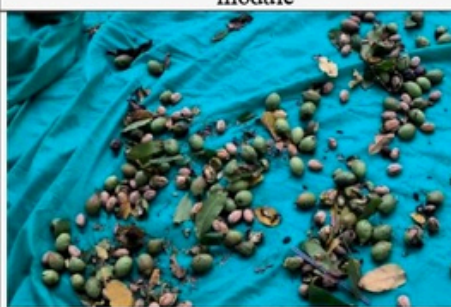
Collection of data through integrated module



Observations on the transfer of forces to branches



Trials at SKUAST-K Campus



Collection of harvested walnuts on canopy collector



Field Trials at Anantnag, J&K



Demonstration of overall setup to Vice Chancellor, SKUAST-K



Field Trials at SKUAST-Walnut Research Station in Kulangam

AWARDS/RECOGNITIONS

TOLIC-4 BENGALURU COORDINATING BY CMTI RECEIVES “सर्वश्रेष्ठ (SARVASHRESHTHA) SHIELD FOR EXCELLENCE IN OFFICIAL LANGUAGE IMPLEMENTATION

The Central Manufacturing Technology Institute (CMTI), Bengaluru, serving as the Convener Office of the Town Official Language Implementation Committee (TOLIC), Office-4, Bengaluru, has been recognized under the “सर्वश्रेष्ठ (Sarvashreshtha)” category with the Shield and Certificate under the TOLIC Incentive Award category.

The award was conferred by the Department of Official Language, Ministry of Home Affairs, Government of India, in recognition of the efforts made to promote the use of Hindi and ensure the effective implementation of the Official Language policy.

Dr Nagahanumaiah, Director CMTI - Chairman, TOLIC (Office-4), along with Shri Rajbhawan, Member Secretary, TOLIC (Office-4), received the award.

The Hindi Diwas - 2026 ceremony held on 15 September 2026 at the CIDCO Exhibition Centre, Navi Mumbai, Maharashtra. On the occasion, the annual magazine “Alankar” of TOLIC (Office-4), Bengaluru, was also released.



ACCREDITATIONS

MATERIAL TESTING LABORATORY SUCCESSFULLY COMPLETES NABL AUDIT

During 30-31 May, 2026, the 22 ISO/IEC 17025 accreditation physical audit of the Material Testing Laboratory under the Centre for Special Purpose Machines was conducted by the National Accreditation Board for Testing and Calibration Laboratories (NABL), which is a Mutual Recognition Agreement Signatory to ILAC as well as APAC for testing and calibration accreditation programs. The audit was successfully completed, reaffirming the laboratory's compliance with international standards for testing and calibration.

CONTRIBUTORY TALKS

On 12 September, 2026, Dr. Kavithaa S (Scientist-E) delivered an invited lecture on “Powder Metallurgical (PM) Cu MMCs for thermal management applications in aerospace electronics packaging” at the International Conference on Advanced Materials and Processing ICAMPS 2026, Trivandrum.

WORKSHOPS/VISITS AT CMTI

TECHNICAL WORKSHOP ON ADVANCED MATERIALS CHARACTERIZATION AND SEMICONDUCTOR METROLOGY

A half-day technical workshop titled “HORIBA Solutions for Advanced Materials Characterization and Semiconductor Metrology: Enabling Innovation, Quality & Data Integrity” was conducted by M/s HORIBA India Pvt. Ltd. at CMTI on 24 August 2026.

INTERNATIONAL INDUSTRY DELEGATION EXPLORES CMTI'S ADVANCED MANUFACTURING CAPABILITIES

On 15 September 2026, CMTI hosted an international delegation comprising industry representatives and exhibitors from various European countries associated with Laser World of Photonics, Electronica and

Productronica, as part of an industry-oriented visit aimed at providing an overview of CMTI's advanced capabilities in smart manufacturing, Industry 4.0, precision engineering, sensing, aerospace and additive manufacturing. The visit provided an opportunity for the delegates to gain insights into CMTI's ongoing technological developments and application-oriented R&D activities. The programme also facilitated interactions between CMTI scientists and the visiting delegates, highlighting potential opportunities for collaboration in advanced manufacturing and related technologies.



MOU/NDA

- CMTI entered into MoUs with Ramaiah Academy Foundation (RAF), Ramaiah Institute of Science & Management (RISM), and Vyuha Deep Science Translational Center Pvt. Ltd. (VDSTI) to foster training, collaborative research initiatives, and technology development & commercialization.
- CMTI and International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI) entered into an NDA for collaboration towards the development of laser-based materials processing.



EVENTS/ WORKSHOPS ATTENDED

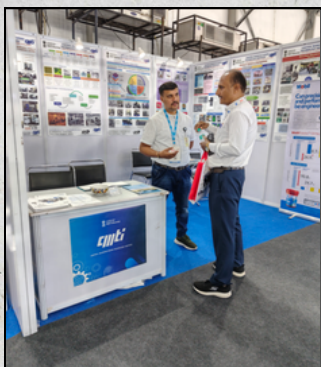
PARTICIPATION IN 2ND VDMA HR CONCLAVE 2026

Mr. Krishna Rathod (Scientist-F and Center Head) and Mr. Bishnu Prasad Sahu (In charge – Business Development Team) attended the 2nd VDMA HR Conclave 2026, organised by VDMA India, at The Lalit Ashok, Bengaluru, on 2 September 2026. The conclave featured focused sessions on “Reinventing Work: Crafting Agile, Empowered & Future-Ready Organisations,” highlighting emerging trends and strategies for building agile and future-ready workplaces.



PARTICIPATION IN PMTX 2026 AND FACTEQ 2026

Mr. Bishnu Prasad Sahu (In charge – Business Development Team) and Mr. Siddharaju K. G. (Senior Technical Assistant-I) attended the 4th edition of Pune Machine Tool Expo (PMTX) 2026 and the 3rd edition of Factory Equipment Expo (FACTEQ) 2026, held from 7–10 September 2026 at the Pune International Exhibition and Convention Centre, Moshi, Pune. The exhibitions, organised by the Indian Machine Tool Manufacturers' Association (IMTMA), showcased emerging technologies, solutions, and developments in the machine tool and factory equipment sectors.



BUSINESS INITIATIVES

SPONSORSHIP OF ‘TOGETHER WE GROW’ – 5TH EDITION

CMTI sponsored the 5th edition of “Together We Grow”, organised by the Ubuntu Consortium of Women Entrepreneurs Associations, on 2 September 2026 at the FKCCI Auditorium, Kempegowda Road, Bengaluru.



SPONSORSHIP OF ICAMPS-2026

CMTI sponsored the International Conference on Advances in Materials and Manufacturing Processes for Strategic Sectors (ICAMPS-2026), held during 11–12 September 2026 at IIM–Uday Samudra, Kovalam, Thiruvananthapuram, Kerala. The conference was organised by the Indian Institute of Metals (IIM), Trivandrum Chapter.

TRAINING PROGRAMMES

TRAINING ON ADVANCED MATERIAL TESTING



A two-day training programme on “Advanced Material Testing” was coordinated by Dr. Kavithaa S (Scientist-E) from 1-2 September, 2026 at CMTI, Bengaluru. The programme covered technical sessions on the significance of materials testing, chemical composition testing of metallic materials, Optical Emission Spectroscopy, and ultrasonic testing. Participants also gained hands-on insights through interactive live demonstrations of advanced mechanical, chemical, and ultrasonic material testing methods led by expert faculty.

TRAINING ON ADDITIVE MANUFACTURING

CMTI organized a three-day training programme on “Additive Manufacturing-DMLS, DMD Machine” from 7-9 September 2026 at Bengaluru. Coordinated by Mr. A.R. Vinod (Scientist-D & GH-AM), the training was designed to provide participants with a comprehensive understanding of Additive Manufacturing (AM) technologies and their industrial applications. Over the three days, sessions covered a wide spectrum of topics including various Additive Manufacturing technologies, Metal Additive Manufacturing, Microstereolithography, Design for Additive Manufacturing, In-situ Process Monitoring and Control, Standardization and Characterization of AM Feedstock Materials and Parts, and Post-processing for AM Components. The programme included expert lectures,



laboratory demonstrations on metal AM processes, in-situ monitoring systems, smart manufacturing technologies, and guided visits to the characterization and post-processing facilities. Participants from 515 Army Base Workshop, Bengaluru; BEML Limited, Mysore; DQA (CV), Chennai and Kirloskar Institute of Management, Harihar attended the programme.

TRAINING ON WELDING TECHNOLOGIES FOR VACUUM BASED SYSTEMS



CMTI, Bengaluru, successfully organized a two-day training programme on “Welding Technologies for Vacuum Based Systems – TIG, Electron Beam, Nitrogen Parallel Seam Sealer” from 7-8 September, 2026. Coordinated by Mr. Pradyumna J (Scientist-D) and Dr. Ajay Jaswal (Scientist-B), the intensive course provided participants with detailed technical insights into vacuum-based welding applications, Electron Beam Welding, Nitrogen Parallel Seam Sealing (NPSS), Helium Leak Detection, GMAW technology, and weld metallurgy/inspection techniques. The programme concluded with a practical industry visit and live GMAW demonstration.

TRAINING ON ADVANCED ROBOTICS (COBOTS)

CMTI, Bengaluru, under the coordination of Ms. Shishuma D S (STA-I), conducted a two-day training programme on “Advanced Robotics (Cobots)” from 9-10 September, 2026. The programme focused on cutting-edge developments in smart manufacturing, collaborative robots (Cobots), Autonomous Mobile Robots (AMRs), and vision technology applications. The participants received comprehensive hands-on exposure through multiple interactive demonstrations, including basic and use-case operations of Doosan Cobots, collaborative robot training, vision technology, AMR integration, and robotic reverse engineering.



TRAINING ON SCANNING ELECTRON MICROSCOPY



A one-day training programme on “Scanning Electron Microscopy - Fractography, Conductive Material imaging” was coordinated by Mr. Murugan A (Scientist-D) on September 11, 2026, at CMTI, Bengaluru. The programme covered crucial aspects of fractography, modes of failure, fractography of various components, semiconductor failure analysis, and non-metallic analysis. The attendees also explored the impact of microstructure and chemistry, environmental causes of material failures, and practical preventive measures.

UPCOMING EVENTS

ADMET-2026: ADVANCING METROLOGY FOR PRECISION ENGINEERING AND ADVANCED MANUFACTURING | REGISTER NOW!

The 10th National Conference on Advances in Metrology (AdMet-2026) will be held on 29–30 October 2026 at CMTI, Bengaluru, under the theme “Metrology for Advanced Manufacturing and Precision Engineering,” preceded by a pre-conference workshop on 28 October 2026. The conference will bring together researchers, academicians, industry professionals, and metrology experts to exchange knowledge and explore emerging advancements in precision measurement and manufacturing technologies. Interested participants are invited to register and be part of this national-level technical gathering. Register now! <https://admet.co.in/index.php?page=registration>



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Central Manufacturing Technology Institute

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