The Science of Making...

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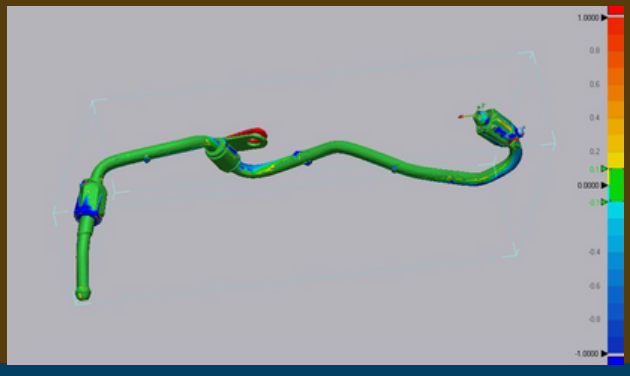
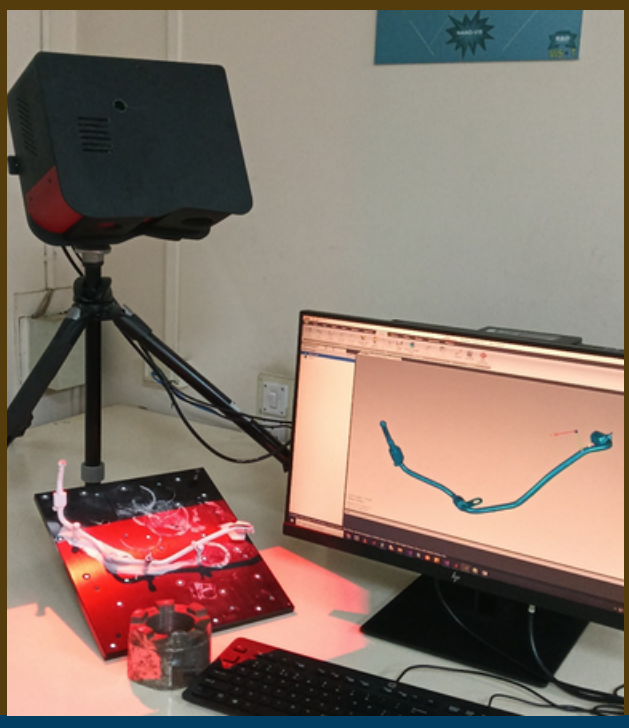
TECHNICAL ACHIVEMENTS

AAKAR-3D: THE 3D SCANNER DEVELOPED BY CMTI IS SUCCESSFULLY DEMONSTRATED FOR SCANNING A FUEL PIPE USED IN FOUR-WHEELER

The Vision Technology group of C-SVT has developed Aakaar 3D, an indigenous structured light-based 3D scanning system that integrates high-resolution CMOS cameras, DLP projection technology, and advanced algorithms for system calibration, point cloud generation, and multi-view registration. Engineered for high-precision applications, Aakaar 3D is ideally suited for 3D inspection, reverse engineering, dimensional verification, and defect detection in geometrically complex components.

In a practical deployment, Aakaar 3D was used to scan a four-wheeler fuel pipe. The 3D scan data of a reference component was superimposed onto a faulty test component to accurately identify dimensional deviations and geometric interferences within the 3D space. With a measurement accuracy of up to 25 microns, the system is highly effective for precision inspection tasks across the automotive and engineering sectors.





DEMONSTRATION/ VISITS AT CMTI

"BORN TO WIN, BENGALURU" VISITS CMTI LIBRARY

On 5 June, 2025, Mr. Ramkumar Seshu and Ms. Sharada Shankar from Born to Win Learning Services Private Limited, Bengaluru visited the CMTI. The guests interacted with library personnel and faculty members to understand the existing knowledge resources and discussed potential avenues for integrating motivational and skill-building content into institutional training programmes.

INDIAN NAVY TEAM VISIT

Indian Navy team - Lieutenant Alankar Singh Bhagel and Lieutenant Raghavendra Pratap Singh visited CMTI on 9 June 2025 and discussed about the possible areas in which development work can be carried out for deployment of additive manufacturing technologies in Naval applications.

VARROC ENGINEERING TEAM VISIT

A team of Engineers - Dr. Adil Usman and Mr. Gourab Ghosh from Center of e-mobility, Varroc Engineering Limited (VEL)- Tech Center (TC), Pune visited CMTI on 11 June 2025 to explore potential areas of collaboration in additive manufacturing for electrical applications. During the visit, fruitful discussions were held on possible joint initiatives, and the team was given a guided tour of AM facilities. This interaction marks a step forward in fostering industry-institute partnerships to drive innovation in advanced manufacturing.

ACHIEVEMENTS

CMTI SCIENTISTS AWARDED PRESTIGIOUS INDO-GERMAN FELLOWSHIP

CMTI is proud to announce that Dr. Anusha Epparla (Scientist-C) and Dr. Manjunath Karanam (Scientist-B) have been awarded the prestigious Paired Early Career Fellowship in Applied Research (PECFAR)-2025 by the Indo-German Science & Technology Centre (IGSTC). This esteemed recognition underscores their dedication to impactful research in applied sciences and reflects the growing international collaborations between Indian institutions and global research organisations. The fellowship also highlights the increasing engagement of CMTI in international scientific partnerships aimed at advancing technology-driven solutions. CMTI congratulates these young Scientists and wish them better research career ahead.

COLLABORATIONS

ADDITIVE MANUFACTURING TEAM CONDUCTS CRITICAL TRIALS AT SLTL ON DED-AM MACHINE UNDER DEVELOPMENT

The Additive Manufacturing team, Mr. Vinod A R, Scientist-D & Group Head - AM, and Dr. Anusha Epparla, Scientist-C, visited Sahajanand Laser Technologies Limited (SLTL) in Gandhinagar from June 2 to 4, 2025. The visit was a key activity under the industry accelerator project funded by MHI for the development of a laser Directed Energy Deposition (DED) machine in which SLTL is the industry partner. The DED machine under testing has the largest built volume. The team performed extensive experimental trials and process optimisation to identify robust parameters for metal 3D printing using the developed wire-fed laser DED machine. These efforts were crucial for testing the new machine and refining the DED process.

PUBLICATIONS

1. Aruna Mondal, Debeshi Dutta, Soumen Sen, Nripen Chanda, Soumen Mandal, AI-IoT assisted wearable bio-impedance sensor for classification of smoking habits on Fagerstrom scale, Measurement, Volume 256, Part A, 2025, 118171, DOI: 10.1016/j.measurement.2025.118171, Impact Factor- 5.8.
2. T Narendra Reddy, Ponnappa, N.P., Vinod, P. et al. Overall equipment efficiency module and losses using machine-to-machine connectivity for smart factory. ISSS J Micro Smart Syst (2025). https://doi.org/10.1007/s41683-025-00134-0 (ISSS Journal of Micro and Smart Systems

INTERNSHIPS

SUMMER RESEARCH FELLOWS JOIN CMTI FOR TWO-MONTH INTERNSHIP

CMTI hosts about 250 interns this summer. These were imparted practical training, while engaging them under various ongoing R&D projects, for a period of one to three months, depending on the funding scheme and/or their university norms. This includes seven interns supported under the Summer Research Fellow Programme (SRFP) of the Indian Academy of Sciences.

TRAINING INITIATIVES

TRAINING PROGRAM ON “MEASUREMENT UNCERTAINTY FOR CHEMICAL & MECHANICAL PARAMETERS BY GUIDE FOR UNCERTAINTY MEASUREMENT (GUM) METHOD"

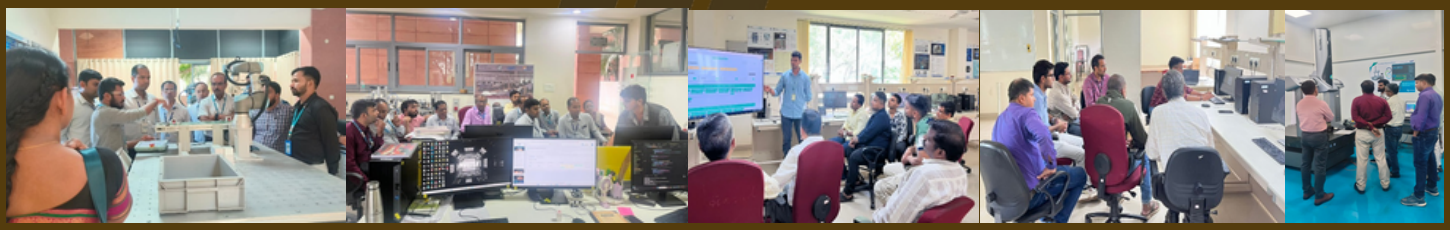
A two-day training programme titled "Measurement Uncertainty for Chemical & Mechanical Parameters by Guide for Uncertainty Measurement (GUM) Method" was conducted from June 2–3, 2025. Coordinated by Champuri Srinivasa Rao (Scientist-D), the programme featured sessions by experts, including Niranjan Reddy K, Dr. Ashish Varade, B. Krishnamohan, and Champuri Srinivasa Rao. The training covered fundamental concepts such as systematic and random errors, precision, uncertainty, and GUM-based estimation methods. It included detailed discussions on statistical terminologies, confidence levels, and distribution factors, along with case studies related to spectrometric (OES), wet analysis (gravimetric), and mechanical testing (hardness and tensile). The programme concluded with a Q&A session and feedback from participants.

TRAINING PROGRAM ON "THIN FILM DEPOSITION TECHNIQUES AND CHARACTERIZATION METHODOLOGIES"

CMTI, Bangalore, organized a three-day training programme on "Thin Film Deposition Techniques and Characterisation Methodologies" from June 9–11, 2025. Coordinated by Dr. K Manjunath and Dr. Prabhanjan Kulkarni, the programme included expert-led sessions on vacuum technologies, PVD/PECVD, electron beam deposition, electroplating, and plasma-enhanced chemical vapor deposition. It also featured hands-on practical sessions on sample preparation, DLC coating, CNT growth, and thin film characterization techniques, including SEM/EDS, nanoindentation, and contact angle measurements. The training concluded with lab visits to CMTI and NMTC, offering participants a comprehensive understanding of both theoretical and applied aspects of thin film technologies.

TRAINING PROGRAM ON "SMART MANUFACTURING SYSTEMS AND INDUSTRY 4.0/5.0"

From June 11 to 13, C-SMPM successfully conducted an exclusive training programme on Smart Manufacturing and Industry 4.0. The programme was attended by 24 employees from Hindustan Aeronautics Limited (HAL), along with a diverse group of executives from organizations such as BEML, DGQA, and academic institutions including NITK and NITW. This course was coordinated by Mr. Narendra Reddy, Sct. D & Group Head Smart Manufacturing Cell (SMC), and his team. The program provided comprehensive theoretical and hands-on exposure to core Industry 4.0 technologies like IoT, industrial automation, data analytics, AI, and robotics. Participants gained insights into leveraging these technologies for enhanced productivity and flexibility, received a briefing on Industry 4.0 principles, and experienced real-world applications at the Smart Manufacturing Demo and Development Cell (SMDDC) and HAL-CMTI Experimental Learning Labs. A key focus was on how smart manufacturing benefits Micro, Small, and Medium Enterprises (MSMEs) by improving resource efficiency, product quality, reducing operational costs, and fostering innovation. The program successfully equipped HAL personnel with essential tools for driving smart manufacturing initiatives and underscored CMTI's dedication to advancing India's manufacturing sector.



UPCOMING TRAINING PROGRAMS

- "Advanced Signal Processing in Micro-manufacturing & Automation", Course Code: 4204, from 21–22 July 2025, at CMTI, Bengaluru
- "Materials and Metallurgy for Non-Metallurgists", Course Code: 1305, from 16–18 July 2025, at CMTI, Bengaluru
- "Mechatronics & Manufacturing Automation", Course Code: 7102, from 14–18 July 2025, at CMTI, Bengaluru
- "Microscopy & Analysis: SEM, AFM, STM, Confocal Microscope, Optical Profiler, etc", Course Code: 2304, from 09–11 July 2025, at CMTI, Bengaluru

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