



NEW HORIZON COLLEGE OF ENGINEERING

Autonomous College, Permanently Affiliated to Visvesvaraya Technological University, Belagavi
Approved by AICTE & UGC, Accredited by NAAC with 'A' Grade, Accredited by NBA



A Report

AICTE IDEA Lab – Skill Development Program

A Six days – Skill Development Program was successfully organized at New Horizon College of Engineering under the initiative of the AICTE IDEA LAB and the Department of Research and Development.

Chief Mentor	: Dr. Manjunatha, Principal
Faculty Coordinator	: Dr. Revathi V, Dean R&D
Faculty Co Coordinator	: Dr. A. Sujin Jose, Associate Professor- R&D/Mech
Date	: 19 January 2026 to 24 January 2026
Participants	: Students of New Horizon College Of Engineering
Trainers	: Dr. A. Sujin Jose, Mr. Rakesh, Mrs. Agalya, Mr. Thanuj Kumar N, Mr. Amrit Das

Objectives

- To make the participants aware of Intellectual Property Rights (IPR) and the patenting process, and to encourage them to identify and document their patentable innovations.
- To impart comprehensive training on the Design Thinking methodology (Empathize, Define, Ideate, Prototype, and Test) to encourage systematic and user-centric innovation.
- To make the participants aware of the latest prototyping machines like the Heavy-Duty Laser Cutting Machine, CNC Wood Router, 3D Printing Machine, PCB Mate Machine, and Vinyl Cutting Machine to create functional prototypes of products.
- To enable the participants to gain hands-on knowledge of the latest industry-specific software like Solid Edge, ArtCAM, RD Works, EAGLE, CopperCam, Mach3 Mill, Flexi_10, slicing software, and digital sketching tools like Sketch.IO with Artificial Intelligence integration.
- To enhance the participants' creative thinking, critical analysis, and problem-solving skills through design, fabrication, and prototyping exercises.

Overview

- The initiative was conceptualized to encourage Design Thinking as a problem-solving approach and an efficient teaching-learning method, taking the participants through the process of Empathize, Define, Ideate, Prototype, and Test.
- In-depth training was conducted on the use of advanced prototyping machines such as the PCB Mate Machine, Heavy Duty Laser Cutting Machine, CNC Wood Router, 3D Printer, and Vinyl Cutting Machine, including the theoretical knowledge and operational know-how.
- The initiative was to enable the participants to have the necessary technical knowledge to effectively use the facilities provided in the AICTE IDEA Lab to convert their innovative ideas into a functional prototype.

Day 1 (19 January 2026) : Patent Filing

Venue : IDEA Lab

Trainer : : Mrs. Agalya

Introduced to the **patent applying process** to help them understand how innovative ideas can be legally protected and transformed into intellectual property. This session highlighted the importance of safeguarding creative solutions developed during the ideation and prototyping stages. Participants learned about the various steps involved in filing a patent, including conducting a prior art search to verify the novelty of their ideas, preparing a detailed patent specification with claims and drawings, and submitting the application to the appropriate patent office. They were also guided through the examination, publication, and grant procedures, emphasizing how patents not only protect an inventor's rights but also encourage further innovation and commercialization. This introduction aimed to equip participants with practical knowledge about the value of patents and motivate them to think beyond design solutions—toward innovation ownership and real-world implementation. The patent filing process begins with an idea or invention that must be new, useful, and non-obvious. The first step involves performing a patent search to ensure that the invention has not been previously patented or disclosed. Once confirmed, the inventor prepares a patent application, which includes a detailed specification, claims, abstract, and drawings that describe the invention clearly.



Introduction to Heavy Duty Laser Cutting

Trainer : : Mr. Thanuj Kumar N

The trainers began the session by providing a thorough introduction to the operation of the Heavy Duty Laser Cutting Machine along with the RD Works software, which is integral to controlling the laser cutting and engraving process. Participants were familiarized with the machine's hardware components, safety protocols, and maintenance procedures to ensure smooth and safe operation. Following the demonstration, participants were encouraged to create their own unique designs using the RD Works software, applying the skills they had learned to customize shapes, texts, and patterns suited to their projects. Once the designs were finalized, the lab instructors took turns operating the laser machine, learning to correctly position the materials and execute the cutting or engraving processes. Through this hands-on experience, participants successfully produced precise physical models of their digital designs, reinforcing their understanding of the entire workflow from concept to prototype.



Day 2 (20 January 2026) : 3D printing

Venue : IDEA Lab

Trainer : : Mr. Thanuj Kumar N

The trainers also began the session by giving a detailed introduction to product design using Solid Edge software alongside slicing software and 3D printing materials. In order to provide participants with a better understanding of product design, they were first introduced to the core tools and features of Solid Edge, including sketching, dimensioning, and imposition of geometric constraints, as well as modeling of 3D models using “extrude,” “revolve,” and other modeling tools, including consideration of accurate modeling and parametric modeling. Once participants were able to complete their 3D modeling, they proceeded to export their design in STL format, which is further imported into slicing software, where they learned to set essential factors such as layer thickness, infill, support material, speed, and temperature settings depending on the specific type of material selected for printing, such as PLA, in addition to making use of material facets, filaments, bed leveling, and calibration tools focused on generating quality products. Once they were able to finalize their configuration settings in slicing software, participants also learned to operate the 3D printer, including effective integration of filaments and successfully completing the printing task, thereby understanding product design in terms of concept, process, and product realization.



Day 3 (21 January 2026) : CNC Wood routing

Venue : IDEA Lab

Trainer : : Mr. Thanuj Kumar N

The trainer started off by providing a comprehensive overview of the operation of the CNC Wood Router Machine as well as the operation of the ArtCAM Software Tool. The participants also had access to information about the main hardware components of the CNC Wood Router Machine. For example, the different hardware components covered in the session included the spindle, collet, cutting tools, work table, and control panel. In relation to how to ensure the efficient and effective operation of the CNC Wood Router Machine, the trainers also provided information about the importance of safety as well as undertaking regular maintenance during the sessions. After receiving information about the operation of the CNC Wood Router Machine, the second part of the presentation covered the different aspects involved in the designing using the ArtCAM software. Using the software, the participants learned different concepts involved in designing, including the creation of vector drawings, adding dimension information to the design, using the features provided by the software, and generating different toolpaths for cutting wood. After completing the design work using the computer, the participants then took turns actually operating the CNC Wood Router Machine and cutting wood using appropriate toolpaths.



Day 4 (22 January 2026) : Design Thinking

Venue : IDEA Lab

Trainer : : Dr. A. Sujin Jose

The trainer started the workshop by giving a thorough introduction to the entire Design Thinking Methodology, with a focus on the first three steps of the modeling tool: Empathize, Define, and Ideate. The participants were introduced to the Empathize step of the modeling tool. In this step, the participants were advised on the importance of grasping users' needs, problems, and experiences through careful observation, user interaction, and active listening. Various activities were used to help participants gain a thorough insight and deeper understanding of real-world problems and concerns. The participants were later introduced to the second step of the modeling tool, namely the Define step. In this step, the participants were presented with a chance to analyze the gathered information and clearly state the defining problem statements, such that the problems presented were user-based and well outlined. During the Ideate step of the modeling tool, the participants were given a chance to take a brainstorming meeting through "How Might We" questions and methods such as mind mapping, among others, to get a plethora of creative ideas without limitations. The participants showed a thorough understanding of the entire process with the use of the modeling tool.



Introduction to PCB Mate machine

Trainer: Mr. Thanuj Kumar N

The session started on an even higher note as the attendees were introduced to the comprehensive features of the PCB Mate Machine and the software skills needed to work with the machine, including EAGLE, CopperCam, Auto Leveller, and Mach3 Mill software. Additionally, the trainer explained the major components of the machine and the process of operation, as well as safety precautions to be taken in handling the machine to ensure the efficiency of its operations. Next, the trainer explained to the students the process of designing the PCB layout using EAGLE software to create schematic diagrams and then convert them to detailed PCB layouts. Finally, the designed board layouts were exported and imported into CopperCam software to generate the required G-Code data required in the milling process. After creating the G-Code, the students were instructed on the features of the Auto Leveller software, which will be needed to correct surface errors by adjusting the milling depth to ensure perfect and consistent engraving on the board during the milling process. After completing the process, the G-Code generated in CopperCam was loaded into Mach3 Mill software to operate and work with the PCB Mate Machine to perform the milling process.



Day 5 (23 January 2026) : Design Thinking

Venue : IDEA Lab

Trainer : : Dr. A. Sujin Jose

The session continued with a dedicated introduction to the Prototype and Test phases of the Design Thinking methodology, where the emphasis was on the translation of ideas into concrete solutions and their validation by user feedback. During the Prototype phase, the participants were shown how to develop their chosen ideas into low-fidelity and high-fidelity prototypes using basic materials, computer simulations and basic functional models. The trainers emphasized the need for rapid prototyping, urging the participants to prototype quickly, test liberally, and develop their ideas without any apprehensions about failure. The trainers also focused on the functionality, usability, and relevance of the prototypes to the specified problem statement. After the development of the prototypes, the session moved on to the Test phase, where the participants showcased their models to the users or to a group of peers to collect feedback. The session included systematic evaluation processes like observation, user interaction, and feedback sessions to evaluate the efficacy and feasibility of the solutions. After collecting the feedback, the participants identified the need for improvements and modifications based on the learnings, thus reiterating the importance of the iterative process in design thinking.



Introduction to Vinyl Cutting Machine

Trainer : Mr. Amrit Das

The training began with a detailed introduction to the Vinyl Cutting Machine and its associated design software, Flexi_10. The trainer explained the machine's major technical parameters, including cutting speed control, blade calibration and alignment, pressure control, and compatibility with various vinyl sheet materials. A detailed tour of the Flexi_10 software interface was also conducted, highlighting major toolbars, graphic and editing tools, vectorization processes, and correct file preparation techniques necessary for accurate cutting. The trainees were demonstrated how to import vector graphics, design customized text and logos, control dimensions, and set up appropriate cutting parameters before transmitting the design to the machine.

The training then progressed to hands-on training with the vinyl cutting machine. The trainees were demonstrated the entire process of setting up the machine, including loading the vinyl roll or sheet, aligning the sheet, establishing the origin point, and performing the cutting operation through the software interface. With the trainers' close supervision and guidance, each trainee successfully designed and worked with their own machine, observing the accurate translation of digital designs

into carefully cut physical outputs. This hands-on training not only reinforced their understanding of the digital-to-fabrication process but also boosted their confidence in operating sophisticated prototyping equipment on their own.

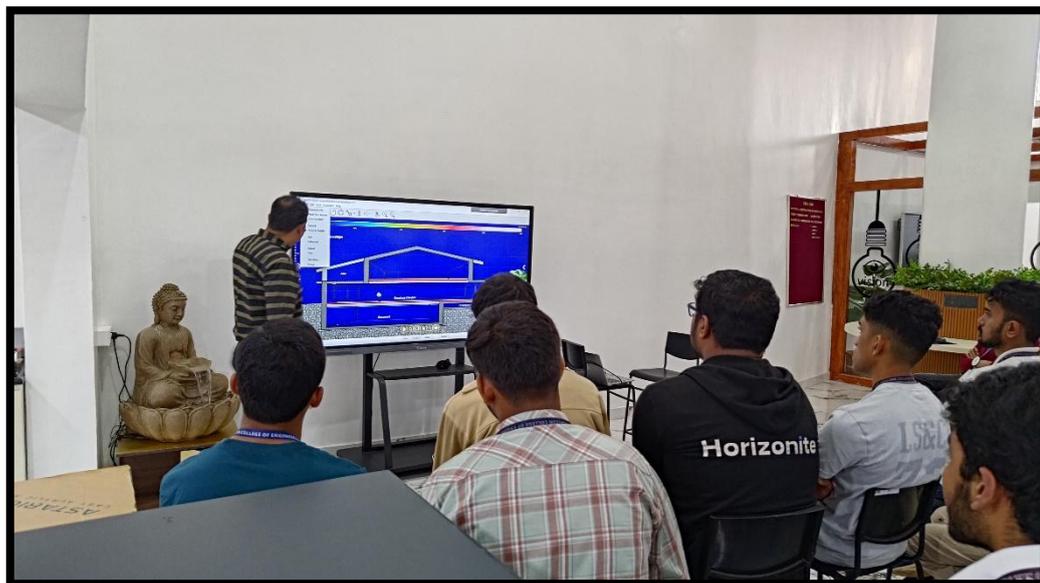
Day 6 (24 January 2026) : Designing of sketch and using Artificial Intelligence

Venue : IDEA Lab

Trainer : : Mr. Rakesh

The training started with a detailed introduction to digital sketch designing using Sketch.IO and the use of Artificial Intelligence tools to boost creativity and productivity. The trainer introduced the participants to the Sketch.IO interface and discussed the necessary tools required for effective sketch designing, such as brushes, shapes, layers, color palettes, and editing options. The participants were also taught how to create organized sketches, enhance outlines, add color schemes, and manage elements using layers for effective design management. The training emphasized the importance of proportion, alignment, and clarity while developing ideas into attractive digital sketches.

After completing the basic design training, the participants were introduced to the use of Artificial Intelligence in the design process. The participants were trained on how to use AI tools to support design idea generation, provide color combination suggestions, improve image quality, separate backgrounds, and develop rough sketches into sophisticated digital artwork. The trainer demonstrated how to use AI tools for rapid design improvement and concept development, allowing participants to efficiently explore different variations of a single design idea. By doing so, the participants practiced creating their own sketches using Sketch.IO and applied AI tools to optimize their designs.



Hands on training on all the machine

The training course culminated in an integrated practical session where the participants actively worked with all the sophisticated prototyping and fabrication equipment that had been introduced during the training course. Supervised by the trainers, they worked with the Heavy-Duty Laser Cutting Machine, CNC Wood Router, 3D Printer, PCB Mate Machine, and Vinyl Cutting Machine, using the corresponding software tools such as RD Works, ArtCAM, Solid Edge with slicing software, EAGLE with CopperCam and Mach3, and Flexi_10. The participants also worked with digital sketching tools such as Sketch.IO, along with Artificial Intelligence tools, to develop their designs before the fabrication process. Each participant worked with the entire process, from designing to preparing files and then setting up, configuring parameters, and finally executing the process. They also gained hands-on experience with materials, machine calibration, safety standards,

and minor issues in machine functioning. By translating their digital designs into accurate physical prototypes on various platforms, the participants gained a thorough understanding of contemporary design and manufacturing techniques. This comprehensive hands-on training experience greatly improved their technical skills, problem-solving skills, and confidence levels to work independently with sophisticated manufacturing and prototyping equipment.

Outcomes

- Developed an understanding of Intellectual Property Rights (IPR) and the patenting process, allowing participants to recognize and record patentable innovations.
- Built a robust understanding of the Design Thinking methodology (Empathize, Define, Ideate, Prototype, and Test) for structured and user-centric innovation.
- Gained practical experience in using advanced prototyping machines like the CNC Wood Router, 3D Printer, PCB Mate Machine, Heavy Duty Laser Cutting Machine, and Vinyl Cutting Machine.
- Improved technical skills in using industry-specific software like Solid Edge, ArtCAM, RD Works, EAGLE, CopperCam, Mach3 Mill, Flexi_10, slicing software, and AI-based design tools.
- Successfully converted digital designs into tangible physical prototypes, comprehending the entire process flow from design to production.
- Enhanced problem-solving, creativity, collaboration, and teamwork skills through hands-on activities and projects.

Conclusion

The training program on Design Thinking, digital design, advanced prototyping tools, and patenting was very effective and result-oriented. The program was able to successfully merge the learning process with hands-on training, which helped the participants move from the stage of idea generation to the development of prototypes and even patenting. The program helped enhance technical skills in the use of advanced fabrication tools and software, along with developing innovation and problem-solving abilities. The initiative has made a significant contribution to the development of technical expertise and innovation through research.