# IEEE MNSU & ASME - 3D Printing & Modeling Glossary

Compiled by: IEEE MNSU & ASME Student Chapters | ECET Department

## I. General 3D Printing Terminology

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| **Additive Manufacturing (AM)** | Process of creating 3D objects by adding material layer by layer. |
| **3D Printing** | Producing three-dimensional objects from digital models using additive manufacturing. |
| **G-code** | Machine instruction file that directs printer movements, speed, and temperature. |
| **Slicing** | Converting a 3D model into printable horizontal layers using slicer software. |
| **Extruder** | Feeds and melts filament, depositing material layer by layer. |
| **Filament** | Thermoplastic material (PLA, ABS, PETG) melted during printing. |

## II. 3D Modeling & Design Terms

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| **CAD (Computer-Aided Design)** | Software for designing 2D/3D models (Fusion 360, SolidWorks, TinkerCAD). |
| **Parametric Modeling** | Uses parameters and constraints to easily adjust dimensions. |
| **STL File (.stl)** | Standard 3D model format for printing, containing surface geometry. |
| **OBJ File (.obj)** | Includes geometry, texture, and color information. |
| **Topology** | Structure of mesh affecting surface smoothness and strength. |

## III. Printer Hardware & Software

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| **FDM (Fused Deposition Modeling)** | Common printing method using melted thermoplastic filament. |
| **SLA (Stereolithography)** | Uses UV light to cure resin for high-detail prints. |
| **Build Volume** | Maximum printable size (X, Y, Z dimensions). |
| **Heated Bed** | Keeps base layers warm to prevent warping. |
| **Firmware** | Software controlling printer hardware and movement (e.g., Marlin). |

## IV. Materials & Finishing

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| **PLA (Polylactic Acid)** | Eco-friendly and easy to print; ideal for prototypes. |
| **ABS (Acrylonitrile Butadiene Styrene)** | Durable and heat-resistant; may warp without a heated bed. |
| **PETG** | Tough and flexible; combines PLA's ease with ABS's strength. |
| **TPU** | Flexible and rubber-like; used for grips and wearable parts. |
| **Post-Processing** | Includes sanding, curing, or painting to improve finish. |

## V. Workflow Summary

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| **1. Design** | Create 3D model using CAD software. |
| **2. Export** | Save as .STL or .OBJ file. |
| **3. Slice** | Use slicer software to generate G-code. |
| **4. Transfer** | Send G-code to printer via SD card, USB, or Wi-Fi. |
| **5. Print & Finish** | Execute print, remove supports, and polish final model. |

## About IEEE & ASME Collaboration

The collaboration between IEEE and ASME at Minnesota State University, Mankato promotes interdisciplinary engagement in engineering design, manufacturing, and innovation. By combining electrical and mechanical engineering expertise, students gain hands-on experience in CAD modeling, 3D printing, and systems integration—bridging the gap between theory and practical application. This initiative supports professional development, creativity, and real-world problem solving in alignment with modern engineering industry standards.