

# Comparative Analysis of Conventional and Hybrid Additive–Subtractive Manufacturing Techniques

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**Abstract:** *The manufacturing industry has experienced significant transformation with the emergence of Additive Manufacturing, commonly known as 3D printing. Conventional manufacturing methods, particularly subtractive manufacturing processes such as milling, turning, grinding, and drilling, have long dominated industrial production because of their precision and reliability. However, limitations related to material wastage, geometric complexity, and production flexibility have encouraged the development of additive manufacturing technologies. Recently, hybrid additive–subtractive manufacturing systems have emerged as an innovative solution that combines the advantages of both approaches.*

*Hybrid systems integrate layer-by-layer material deposition with precision machining operations within a single platform, enabling the production of complex geometries while maintaining high dimensional accuracy and superior surface quality. This review paper presents a comparative analysis of conventional subtractive manufacturing and hybrid additive–subtractive manufacturing techniques. The study examines their working principles, advantages, limitations, applications, economic considerations, and future trends. The findings suggest that hybrid manufacturing offers significant potential for aerospace, biomedical, automotive, and tooling industries by combining design flexibility with machining precision..*

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