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Jigs and Fixtures for Manufacturing

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Abstract

This research examines the crucial function of jigs and fixtures in improving the accuracy, efficiency, and productivity of manufacturing operations. It provides a historical context regarding their development, technological progress, and contemporary applications, demonstrating how their incorporation with computer-aided design (CAD), computer-aided manufacturing (CAM), and additive manufacturing has transformed both design and functionality. The paper highlights the benefits of employing jigs and fixtures, such as enhanced production rates, reduced costs, interchangeability, high precision, a decreased need for inspections, increased safety, potential for automation, and facilitation of machining intricate components. It stresses the importance of using rigid yet lightweight materials for constructing jigs and fixtures, particularly recommending mild steel for its strength and cost-effectiveness. The study includes calculations to affirm the structural integrity of a 16 mm diameter mild steel component, ensuring precise machining and consistent product quality. It also advocates for allowing sufficient flexibility in design to accommodate variations in component sizes during manufacturing. In conclusion, this research underscores the significance of jigs and fixtures in modern manufacturing and their ongoing evolution to meet the demands for accuracy and efficiency.

Keywords
Jigs, fixtures, design, manufacturing