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Methodological Aspects of Training the Dual-Qualification Engineering Personnel for Mechanical Engineering

Abstract: The paper presents the results of research on the magnetodynamic method and its practical application directions in metalworking operations of detail part hardening, solid-lubricant coating application, grinding sludge recycling. The essence of the method and its technological equipment have been presented. Analytical dependencies, recommended modes and conditions for performing the magnetodynamic processing during the technological operations have been determined. It has been found that the main source of energy affecting the treated or recycled object is a vibrating magnet layer formed in equipment, which creates the rotating electromagnetic field and provides the technological effect due to the various physical effects taking place in it and intense movement of the dispersed medium particles. By using the rotating electromagnetic field equipment, the design and technological solutions for technological systems have been developed, which ensure the high technical and economic efficiency fulfilment of: hardening the low rigidity and long length detail parts, as well as the parts with hard-to-reach internal cavities; recycling the grinding sludge to get the secondary raw materials for powder metallurgy, tool and foundry production. It has been shown that the magnetodynamic method is quite efficient for applying the solid-lubricant anti-friction coatings on the surface of the parts, it enables: getting the shock-pulse traces of the indentors on the treated spherical and elliptical surfaces that indicates formation of the lubricating coating; decreasing the surface roughness and increasing the nose radius and the true contact area between the coating and metal surface; adhesion of the coating over the entire contact area of the indenter with the metal surface; uniformity of the lubricant coating application on the surfaces of detail parts of almost any difficult shape.