

Superabrasives Engineering Certification Course

Super-finishing

Operating Characteristics

Super-finishing is a fine material removal process. This process usually involves very low surface roughness values (between $0.012\mu\text{m}$ – $0.025\mu\text{m}$). The roughing process involves a relatively large grained stone removing much of the desired stock while simultaneously eliminating macro-geometric defects. The finishing process imparts the final form and required surface roughness by using a fine-grained stone. The heat due to friction is low compared to other machining processes and is not detrimental to the work piece. Hence, structural changes in the work piece grains and cracking are avoided. Also, the cycle time is very low and is suitable for mass production. An oscillating abrasive stone, applied with pressure to a rotating work piece, fundamentally characterizes super-finishing. The stone typically oscillates between 10 to 20 degrees of arc. Super-abrasives used in super-finishing are Diamond and Cubic Boron Nitride (CBN), as opposed to conventional grinding abrasives made from Aluminum Oxide (Al_2O_3) and Silicon Carbide (SiC).

Experimental Set-up

Machine Tool:	Thielenhaus KM 26 Super-finishing Machine
Tooling & Fixtures:	Ball-bearing race grinding
Material:	M50 Ball Bearing-steel races
Experiment:	CBN vs. Aluminum Oxide or Silicone Carbide
Description:	Compare grinding performance of the indicated materials at a test sample size of 10 parts (20 second cycles per part)
Measurements:	Quality; surface roughness & stock removal Tool performance; Super-finish ratio (stock removal / tool wear) Abrasive efficiency; Stone hungriness (Material removal rate / power consumed)
Conclusion:	Student will draw conclusions based on test results