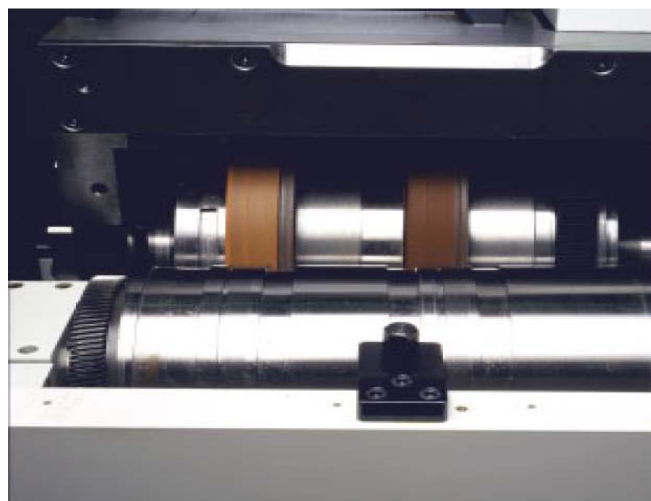
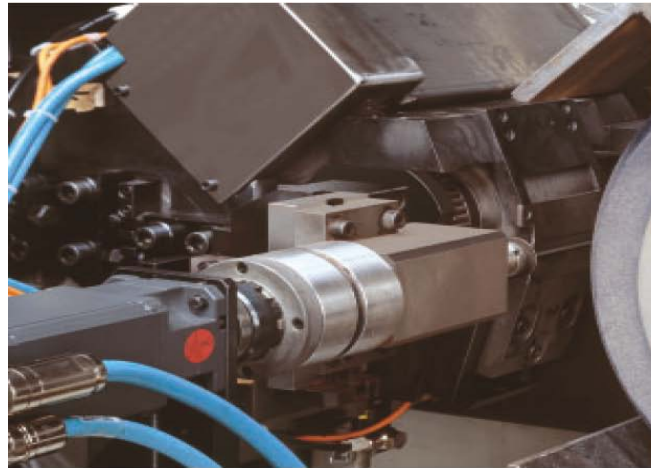




GRINDING TECHNOLOGY

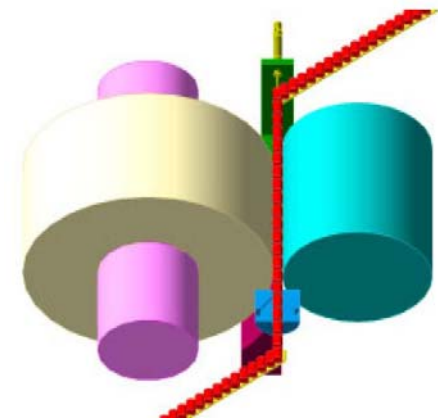
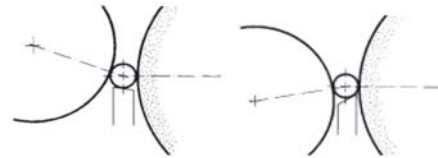
Concepts - Solutions - Applications



The Main Groups of our Manufacturing Program

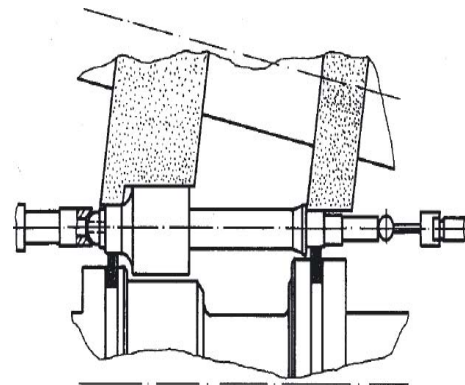
1. Centerless Grinding by Steel or Carbide Steel Regulating Wheel

- 1.1 Static Theory
- 1.2 Geometric Theory
- 1.3 Results
- 1.4 Auto-Sizing by Air-Nozzle System
- 1.5 Integrating Dressing by the Oscillating Diamond Roller, for Particular Good Quality
- 1.6 Generating Convex Parts by Through-feed
- 1.7 Grinding and Lap Grinding of Cylindrical Parts by Through-feed
- 1.8 Grinding of Short Cylindrical Parts Square to the Flat End Faces
- 1.9 Automatic Super Precise Match Grinding according to the Bore Sizes of Bodies
- 1.10 Grinding of Taper Rollers in Steel Worm drive Feed Wheels
- 1.11 Taper Rollers and Cylindrical Rollers with Convex O.D.



2. Centerless Plunge Grinding

- 2.1 Plunge Match Grinding
- 2.2 Centerless Inclined Plunge with Shoulders and End Faces

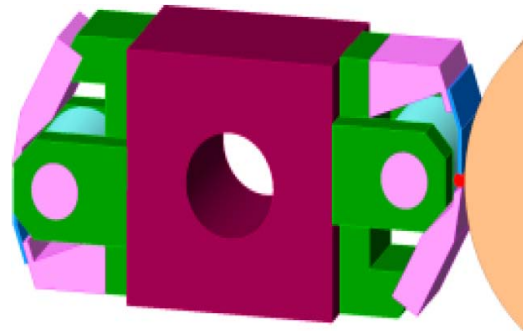


3. Centerless Shoe Grinding by our Multi-Station Index Drum

- 3.1 Finish Grinding of Spherical Rollers
- 3.2 The 2 x 2 System for Combustion Chambers

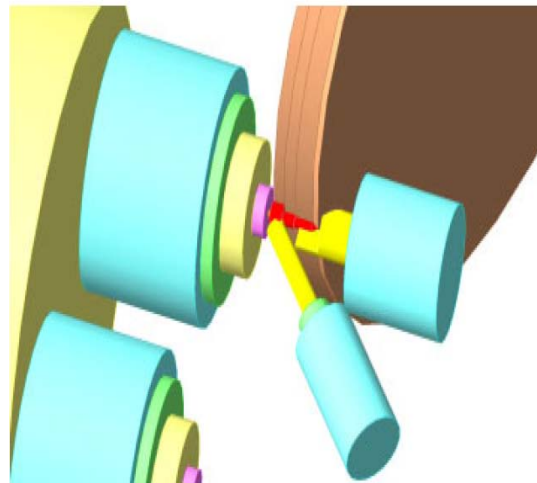
4. The 4-station Index Drum for Centerless Shoe Grinding

- 4.1 Centerless Grinding of Engine Valves by Conventional Grinding Wheels
- 4.2 The 4 x 2 Station System
- 4.3 4-Cross Joint to Grind by One Pass
- 4.4 Finish Grinding of Valves „from solid“ by a 3-Station special Shoe Centerless Grinding



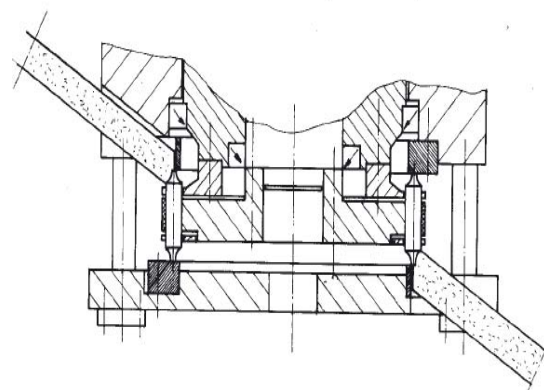
5. The Index Drum for Grinding between Centers, on Mandrels or in Collets

- 5.1 Grinding of Drive Shafts, Inclined Plunge from 2 Sides in one Chuck
- 5.2 The Outer Profile of Nozzle Bodies
- 5.3 The Nose Profile of Nozzle Bodies
- 5.4 The Complete Outer Profile of Nozzle Bodies
- 5.5 Grinding of Plungers, the Shoulders Equidistant to a Cross Hole
- 5.6 Face Lap Grinding by little Concavity
- 5.7 Special Vanes in Special Collets



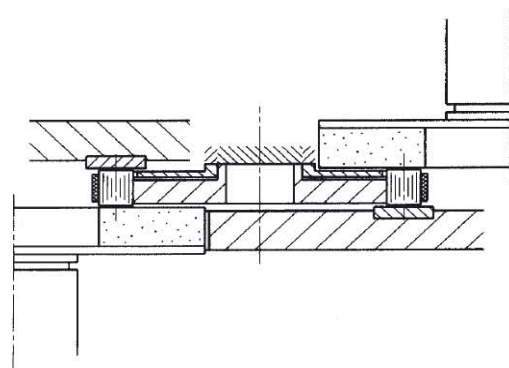
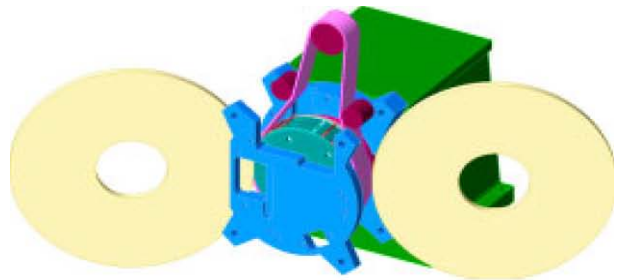
6. Grinding of Precise End Profiles Concentric to Existing Cylindrical Parts (Centerless Copy Grinding)

- 6.1 Grinding the End Profiles of Bearing Needles "from solid"
- 6.2 Corner Radius, Chamfer and Flat Faces of Piston Pins
- 6.3 Nozzle Bodies Concentric to the Bore
- 6.4 Nozzle Needles "from solid"



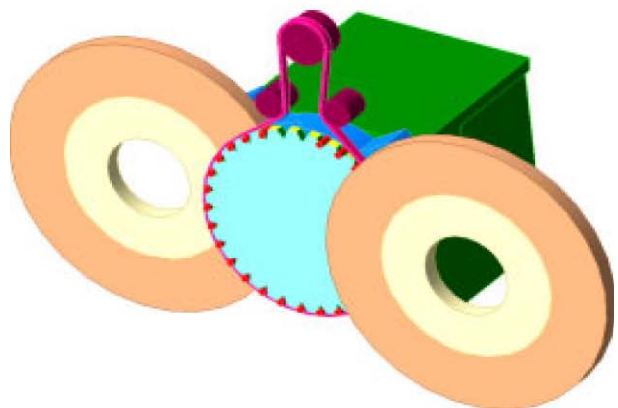
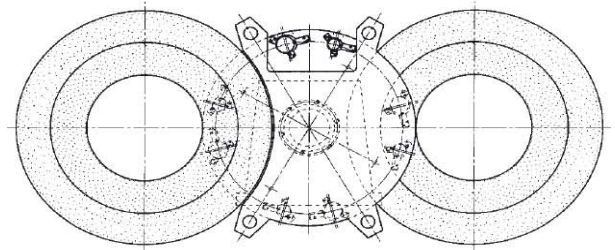
7. Grinding the End Faces of Parts by Centerless Rotation in a Cage

- 7.1 Convex Ends of Taper Rollers or Spherical Rollers
- 7.2 Convex Ends of Valve Lifters
- 7.3 Cylindrical Rollers - Cylindrical Parts
- 7.4 Grinding of 2 Convex Ends by One Grinding Wheel
- 7.5 End Faces and Profiles of Tappets for High Pressure Pumps



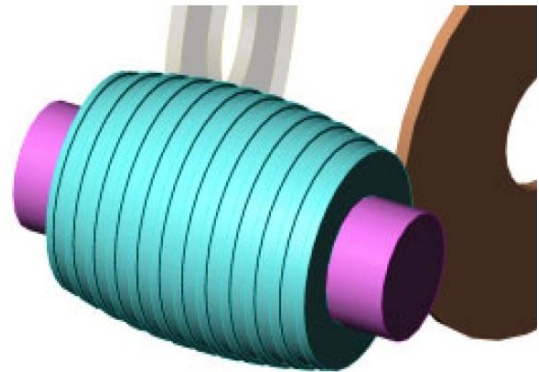
8. Fully Automatic Plane Grinding to Achieve Lap Quality - Without Rotation of Parts Inclusive Integrated Dressing

- 8.1 End Face Grinding of Cross Journals
- 8.2 Rotors and Stators for Rotary Pumps
- 8.3 Inner Rings of Taper Roller Bearings
- 8.4 Connect Rods and Other Semi-Heavy Parts
- 8.5 Duplex End Face Grinding of Inlet or Exhaust Valves
- 8.6 Duplex Grinding of Compressor Valve Plates
- 8.7 Grinding of Spherical End Faces
- 8.8 FINIMAT for Low Batches but High Quality
- 8.9 Support Plates for High Pressure Pumps



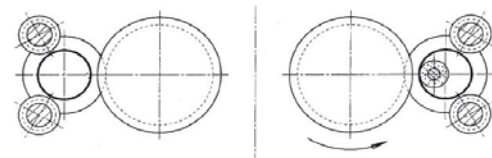
9. 6-Axis CNC Controlled Profile and/ or Worm Drive Thread Grinding

- 9.1 Grinding the Raceway of Regulating Wheels for Taper Rollers or Cylindrical Rollers
- 9.2 Grinding of Convex or Concave Feed Wheels
- 9.3 Grinding the Non-Round Cam Profile at Cam Shafts



10. Internal Grinding by Two- or Multi-Station Indexing Drum

- 10.1 Internal Face Grinding of Valve Plates
- 10.2 Internal Grinding of Two Tapers
- 10.3 Simultaneous Internal and External Grinding
- 10.4 Combined Internal and External End Face Grinding Inclusive Brushing Operation by 6 Centerless Stations



11. Production Line for Taper Rollers

12. Production Lines for Inlet and Exhaust Valves

- 11.1 "Small" Production Line for Valves



13. Extrusion Forging of Engine Valves



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