

## Constructive and technological solutions applicable to superfinishing systems of symmetrical revolution surfaces.

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### Abstract

For years, grinding wheels and bonded abrasive stones, abrasive sheets—even slurries— have constituted the usual means for resurfacing, dimensioning and polishing rolls and cylindrical parts. These traditional methods of roll finishing are typically slow and leave room for operator error. Fortunately, film-backed and flexible diamond abrasives offer fast, easy-to-use predictable alternatives.

### 1. Introduction

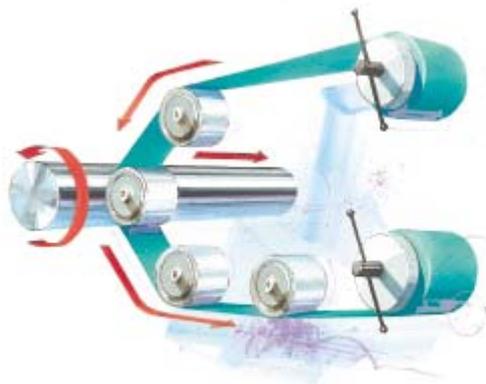
Once you take a close look at the film-backed and flexible diamond abrasives, you'll see why they are better suited for finishing cylindrical parts like crankshafts and camshafts and for grinding ceramic rolls.

### 2. More cost-effective ways to obtain uniform roll finishes

Film-backed and flexible diamond abrasives provide predictable, consistent and repeatable performances every time for your roll finishing operations. These film-backed and flexible diamond abrasives enable you to quickly remove traverse marks and feed lines, eliminate chatter, follow existing geometry (including crowns) and consistently obtain sub-1 micro inch Ra (.025 microns) or finer finishes on chrome, compressed paper, nylon, chilled iron, rotogravure, epoxy and polyurethane rolls and other non-roll surfaces.



***Controlled pressures, belt tension and workpiece rotational speeds result in consistent stock removal and dimensional accuracy to prepare a uniform surface for further polishing.***



*The combination of continuously fed film-backed abrasives and the rotation of the workpiece give you the capability to create uniform, consistently even finishes down to sub-1 micro inch Ra.*

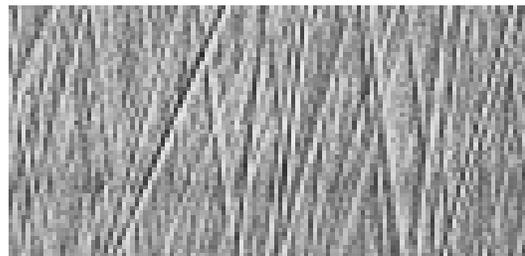
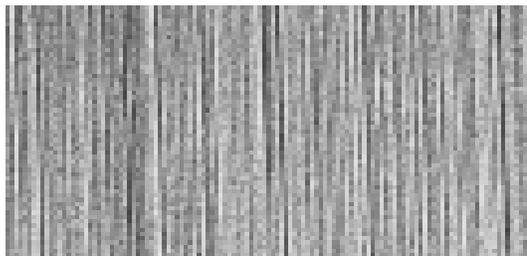
## Roll Grinding

Roll grinding is typically the first step in the system. Flexible Diamond belts are introduced to a rotating cylindrical workpiece. The flexible diamond abrasive quickly dimensions parts by removing lobes and leaving the workpiece surface ready for further superfinishing. Flexible diamond abrasive belts enable you to match tighter tolerances for diameter, roundness, profile flatness and bearing ratio.

## Superfinishing

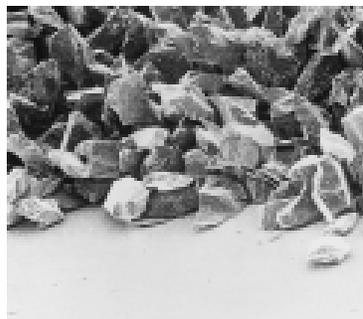
Superfinishing is an extremely versatile way to produce predictable, repeatable finishes on rolls used for a variety of industrial tasks. The ability to generate consistently uniform finishes enables operators to extend roll life by eliminating the damage caused by traditional roll grinding methods.

Superfinishing with film-backed abrasives also allows operators to choose a variety of surface textures from linear scratch to cross-hatching.



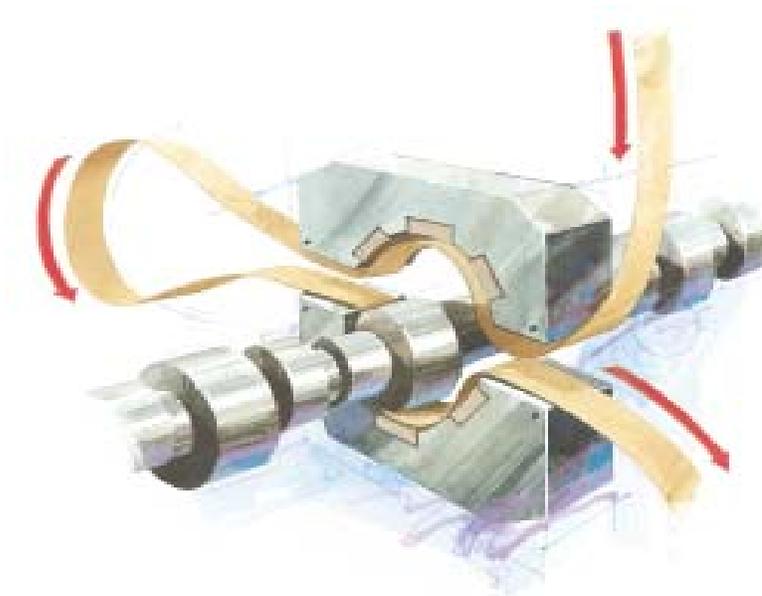
*Oscillating abrasive across an existing straight line scratch rapidly reduces the existing peaks and valleys. Different oscillation frequencies create different scratch patterns and allows the operator to see when previous scratches have been removed and the finishing step is completed.*

Compared to conventional cloth and paper backings, film is a far more consistent substrate for the precise application of resins and micron-graded mineral. Film backings hold abrasive particles on top of the substrate, do not compress or lose particles in the backing.

*Film**F weight paper**J weight cotton cloth*

## Microfinishing

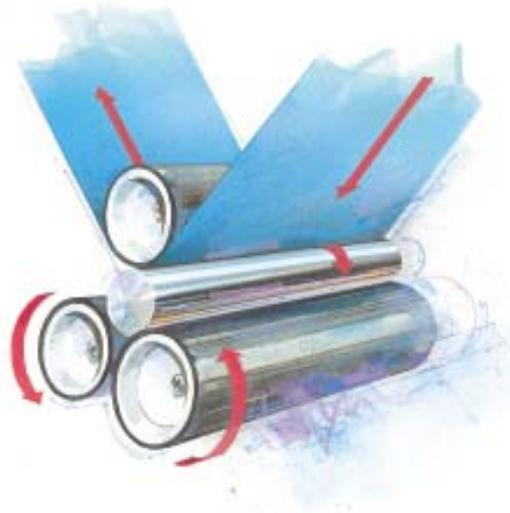
Usually, a microfinishing process employs rigid shoes instead of a contact roller or platen to support the abrasive film. The workpiece, such as a crankshaft or camshaft, is turned and oscillated between centers as shoes introduce the abrasive to the work interface. Fresh abrasive is incrementally indexed after each part is processed, resulting in uniform stock removal and finish, part after part. Microfinishing removes the damaged or amorphous layers to improve the surface finish and roundness of the part and, in many cases, can eliminate the need for an entire grinding operation.



***Microfinishing enables you to correct geometry and obtain fine finishes (as low as 1 to 2 micro inches or 0.025 to 0.05  $\mu$ m Ra).***

## Centerless Microfinishing

Centerless Microfinishing is ideal for cylindrical parts that are not effectively processed in lathes or between centers. The process utilizes the consistent, uniform film backing and micron graded minerals of 3M microfinishing abrasives to eliminate lead lines and traverse patterns while letting you control cycle time, oscillation frequency, abrasive advance and workpiece rotational speeds. Rolls of abrasive are easily changed in minutes to produce sequentially finer finishes.



*Centerless microfinishing plunges the workpiece into the abrasive to remove stock or provide a polished finish.*

### 3. Conclusion

Film-backed and flexible diamond abrasives provide a predictable, consistent and repeatable finish for all types of industries, including: steel mills, aluminum mills, film extruders, decorative stainless, paper mills, textiles, printing industry, copper foil electrodeposition and other non-roll applications.

Film-backed and flexible diamond abrasives are ideal for roll finishing on tungsten carbide, chilled iron, forged steel, chrome plating, stainless steel, rubber, nylon, copper, brass, tool steel, aluminum, epoxy, thermal spray ceramics, tungsten carbide, nickel, polyurethane, ceramics and more.

### 4. REFERENCES:

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- [2] – Catalog 3M – Germany, 2006