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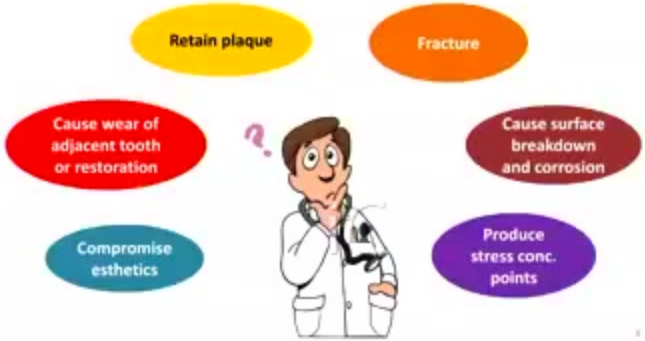
SPIT AND POLISH
Dr. Amit Gurbuxani

RATIONALE

- Rough surfaces are more likely to-



Post Ortho
(2014)

- Initial Build Up

7 years later

2021

In vivo studies showed that the mean surface roughness threshold for bacterial plaque retention is above 0.2 µm. Furthermore, it is reported that patients can detect with the tip of their tongue a surface roughness of 0.3 µm.

Therefore, it is widely reported that a surface roughness value below 0.2 µm is considered the acceptable threshold for dental restoratives.

Thus, the finishing and polishing protocol is considered a critical step to achieve a favourable aesthetic outcome and increase the longevity of the restoration

•A.F. Reis *et al.* Effects of various finishing systems on the surface roughness and staining susceptibility of packable composite resins Dent. Mater. (2003)

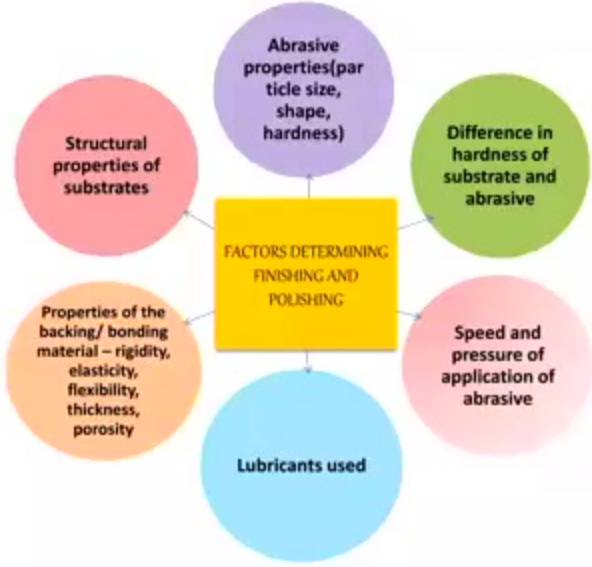
Jefferies SR. Abrasive finishing and polishing in restorative dentistry: a state-of-the-art review. Dental Clinics of North America 2007;51:379–97

- ***Finishing and polishing*** in restorative dentistry refers to the following steps:

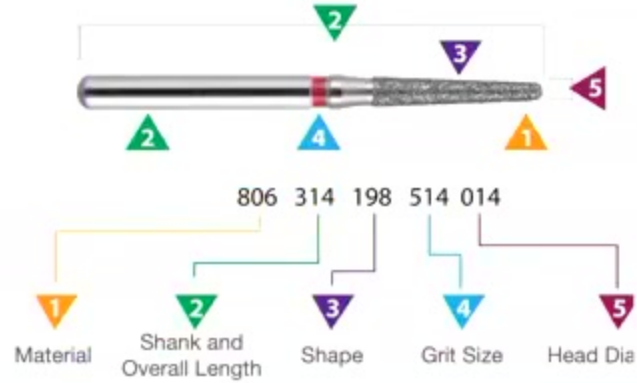
1) Gross contouring of the restoration to obtain the desired anatomy.

2) Reduction and smoothing of surface roughness and scratches created by finishing instruments in the process of gross reduction and initial polishing.

3) Process of producing a highly smooth, light-reflective, enamel-like surface through final polishing.

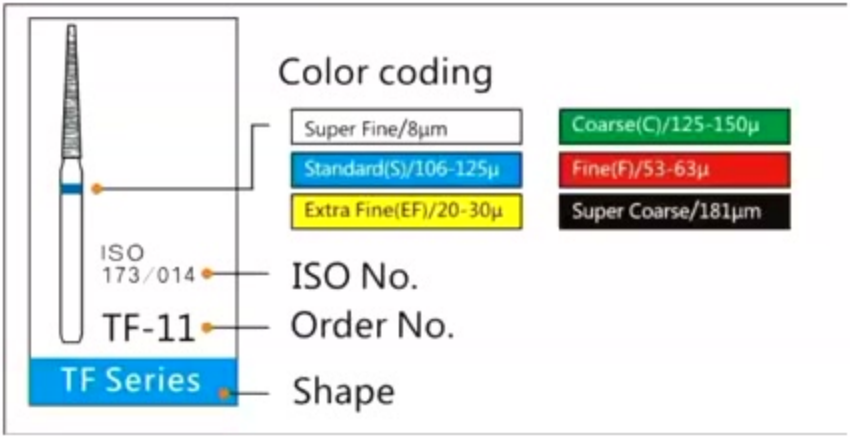

FACTORS DETERMINING FINISHING AND POLISHING
Abrasive properties(particle size, shape, hardness)
Difference in hardness of substrate and abrasive
Speed and pressure of application of abrasive
Lubricants used
Properties of the backing/ bonding material – rigidity, elasticity, flexibility, thickness, porosity
Structural properties of substrates

Know your burs



A good way to understand all about dental burs is to start by considering the 5 aspects which the **ISO classification** takes into account:

1. By type of material
2. By shank
3. By shape
4. By grit size
5. By head diameter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Coarse(C)/125-150μ
Standard(S)/106-125μ
Fine(F)/53-63μ
Extra Fine(EF)/20-30μ
Super Coarse/181μm
ISO
173/014
ISO No.
TF-11
Order No.
TF Series
Shape

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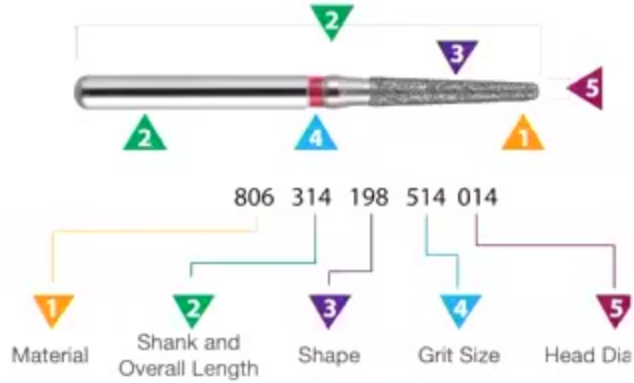

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1. By type of material
2. By shank
3. By shape
4. By grit size
5. By head diameter

- Dental abrasive grits based on particle size are
  - Coarse
  - Medium coarse
  - Medium
  - Fine
  - Superfine

The effects of finishing and polishing techniques on surface roughness and color stability of nanocomposites

Nihan Gonulol *, Fikret Yılmaz ; Journal of Dentistry 2012

Finishing diamonds were best suited for gross removal and contouring due to their high cutting efficiency of composite surfaces,

while carbide finishing burs would be best suited for smoothing and finishing, as a result of their low cutting efficiency.

Standard Diamond Bur

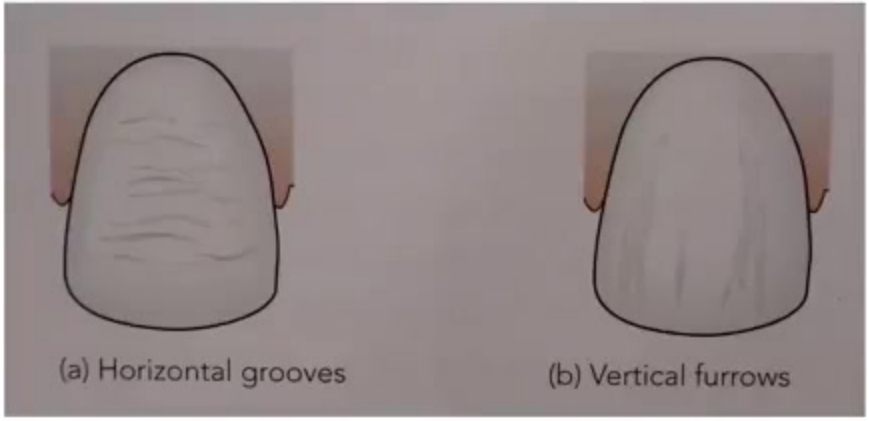
- 106-125 microns
- Blue Band

	BULK REDUCTION	CONTOURING
CARBIDE BUR	8-12 FLUTED	12 - 16 FLUTED
ABRASIVE S	>=100µm	30 - 100 µm

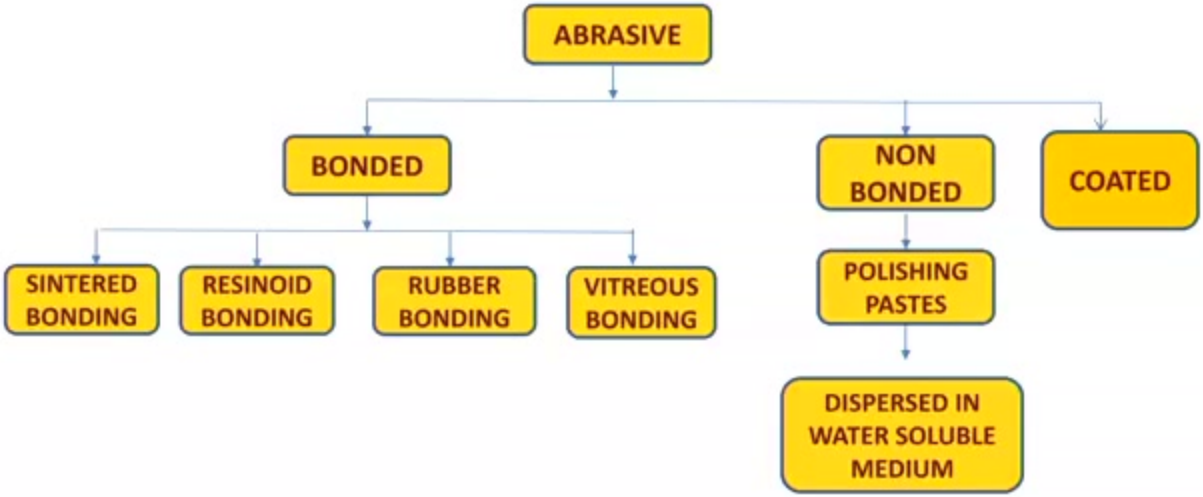
Standard Diamond Bur

- 106-125 microns
- Blue Band

Finishing Diamond burs can also be used to add tertiary anatomy and texture



Classification of abrasives.



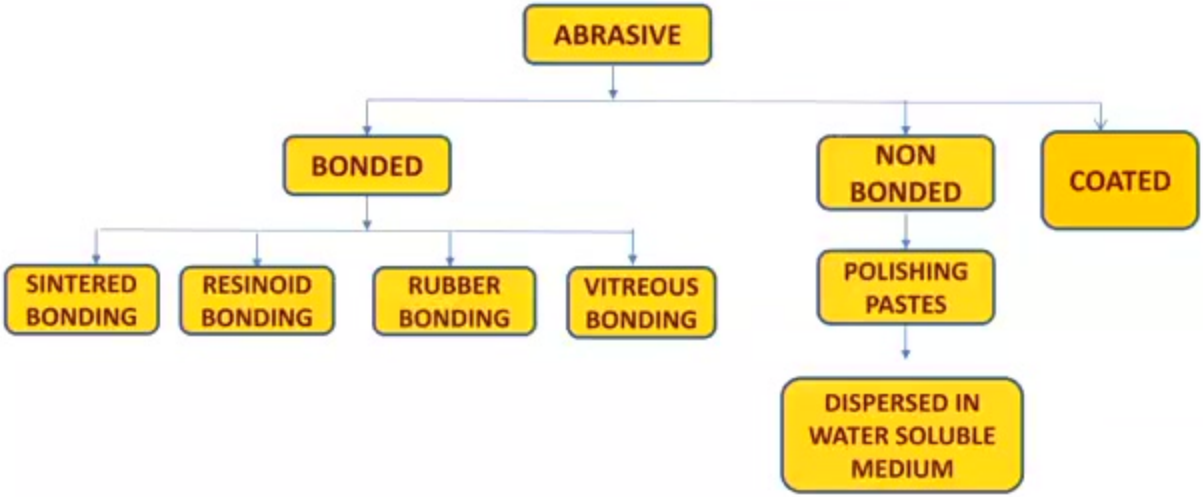
Sintered Diamond points

Vitreous bonded abrasives

Resinoid bonded abrasives

Silicone bonded abrasives

Classification of abrasives.



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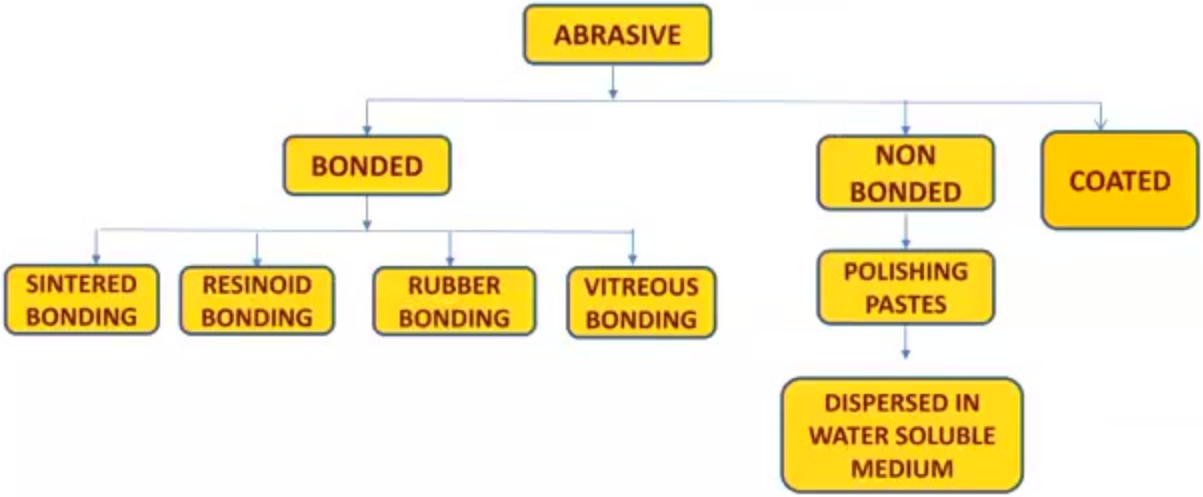
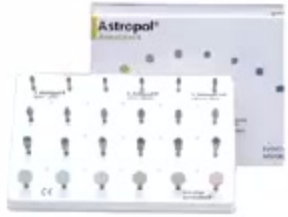


Eg : silicon-impregnated rubber abrasives

Composite Polishing – Rubber abrasives

- Used to put very high finish on composites.
- Variety of shapes.
- Use dry.
- Avoid heavy pressure.



Composite Polishing – Rubber abrasives

GRITS

Description	Grit (micron)	Color code
Finisher	26.5 (silicon carbide)	Gray
Polisher	12.8 (silicon carbide)	Green
High Polisher	3.5 (diamonds + aluminum oxide)	Pink

Finisher wears out the fastest, while the High Polisher is very durable.

Non Bonded Abrasives

- Dispersed in gel or paste form
- Polishing pastes →Fine or ultrafine Al_2O_3(<1μm)or diamond particles(1-10μm)
- Applied to substrate with a nonabrasive device - synthetic foam, rubber, felt, chamois cloth, wheel.
- Dispersed in water soluble medium such as glycerin

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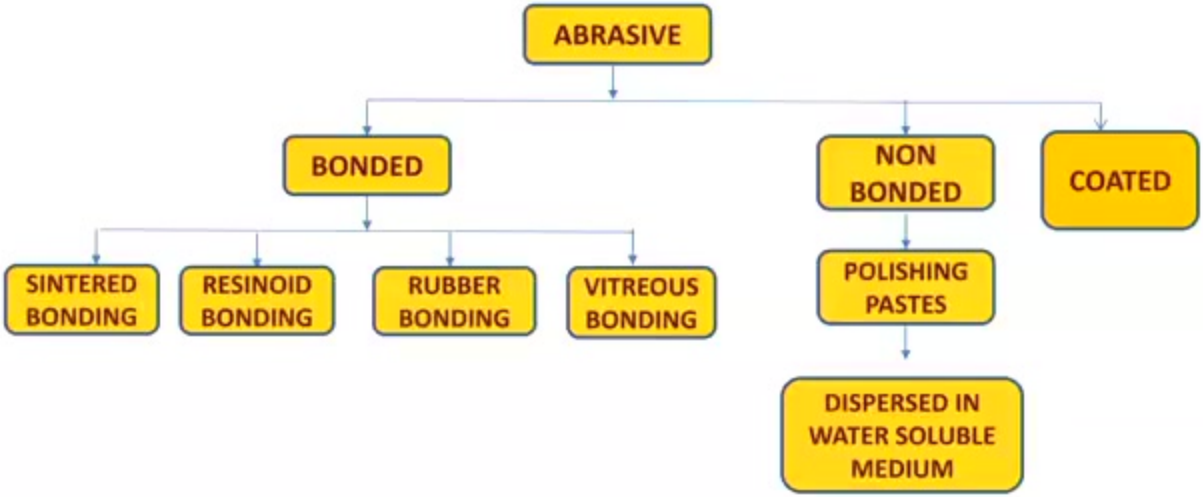

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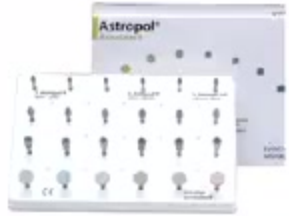

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A comparison of different techniques for finishing and polishing amalgam

Rune Eide & Anne Bjørg Tveit

Pages 147-151 | Received 01 Feb 1987, Published online: 02 Jul 2009

 https://doi.org/10.3109/00016358709098853

Abstract

Three different methods for finishing and polishing amalgam surfaces were studied by determining the roughness (R_a) of specimens at different stages of the procedures. Method I consisted of green stone, followed in sequence by finishing bur and pastes of pumice, powdered chalk, and SnO_2. Method II was similar to method I but included brown and green Shofu polishers after the finishing bur. In method III medium and fine sandpaper and fine cuttle-paper discs were used before the pastes. A dramatic decrease in the R_a values was observed after the specimens


Brownie, cup
For smooth surface
Brownie, Mini-Point
For smooth surface
Greenie, KN7
For lustrous polish
Greenie, PC2
For lustrous polish
Supergreenie, WH6
For superpolish

Braz Dent J (2005) 16(1): 39-44 Surface roughness of composite resins. Effect of Different Finishing and Polishing Techniques on the Surface Roughness of Microfilled, Hybrid and Packable Composite Resins

COMPOSITE POLISHING

- The findings of the present study showed that flexible aluminum oxide discs yielded the lowest Roughness values for micro-filled, hybrid and packable composite resins, and may be accepted as a clinical standard for polishing composites.

Abrasive discs :

- Gross reduction, contouring, finishing, and polishing of restoration surfaces
- Coated with aluminum oxide abrasive

Abrasive strips :

- With plastic or metal backing are available for smoothening and polishing the interproximal surfaces of direct and indirect bonded restorations

- Ultradent Jiffy Diamond strips

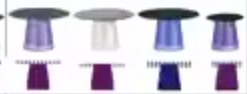
Braz Dent J (2005) 16(1): 39-44 Surface roughness of composite resins. Effect of Different Finishing and Polishing Techniques on the Surface Roughness of Microfilled, Hybrid and Packable Composite Resins.

Table 2. Techniques and finishing/polishing procedures.

Technique	Finishing and Polishing Procedures
A	12-fluted (FG 7214F) and 30-fluted (FG 9642FF) carbide finishing burs (KG Sorensen Ind. e Com. Ltda, Barueri, SP, Brasil), sequentially applied for 20 s each, using a water-cooled high speed handpiece, moved in a single direction on the entire specimen surface
B	Fine (2135F) and extrafine (2135FF) diamond burs (KG Sorensen), applied in the same way as described for technique A
C	Sof-Lex aluminum oxide discs (3M/ESPE, St Paul, MN, USA) applied in progressively finer grits (coarse, medium, fine and extrafine) for 20 s each, using a low-speed handpiece with circular movements and without water-cooling.
D	Super Snap aluminum oxide discs (Shofu, Kyoto, Japan) applied in the same way as described for technique C
E	Polishing rubber points (8062, Viking; KG Sorensen) applied as described for technique C plus application of fine and extrafine polishing pastes (Prisma Gloss; LD Caulk/Dentsply) for 10 s each, using a felt polishing disc
F	Diamond burs, applied as described for technique B, plus polishing rubber points and polishing pastes, applied as described for technique E.
G	Diamond burs applied as described for technique B, plus medium,

- the Super Snap system (H) produced smoother surfaces than the SofLex system (G) for all materials, suggesting a better ability of the Super-Snap discs to remove the scratches left by the diamond burs when compared to the Sof-Lex discs.

- On the other hand, the use of rubber points and polishing pastes after application of diamond burs (F) were much less efficient.

Shape Category	Contouring		Finishing				Polishing		Super-Polishing	
Super-Snap Shape										
	Black (Coarse)		Violet (Medium)				Green (Fine)		Red (Super Fine)	
Refills (50's a box)	L506	L507	L508	L509	L528	L522	L501	L519	L502	L521
Super-Snap X-treme Shape	-									
	-						Green (Fine)		Red (Super Fine)	
Refills (50's a box)	-						L511	L531	L512	L532

Coatings 2022, 12(7), 914; https://doi.org/10.3390/coatings12070914
Submission received: 15 May 2022 / Revised: 21 June 2022 / Accepted: 23 June 2022 / Published: 28 June 2022
(This article belongs to the Special Issue Advances and Innovations in Dental Materials and Coatings)

The Effect of Various Polishing Systems on the Surface Roughness of Two Resin Composites—An In Vitro Study

by Marta Ewa Szczepaniak [1,*], Michał Krasowski [2] and Elżbieta Bołtacz-Rzepkowska [1]

The effects of finishing and polishing techniques on surface roughness and color stability of nanocomposites

Nihan Gonulol *, Fikret Yılmaz ; Journal of Dentistry 2012

- Aluminium oxide discs abrade resin matrices and filler particles equally, they promote smoother surfaces.
- Sof-Lex discs and the Enhance polishing systems similar surface roughness values .
- Baseren reported that silicone impregnated rubber polishers might alone be insufficient to polish the surfaces finished with diamond or carbide burs.

Use of finishing discs

Discs allow us to:

- Refine incisal edges and embrasures
- Smooth junction between composite and tooth without significant effect on enamel

Wet or Dry?

- Personal preference
- Equal results
- Dry finishing simplifies view of enamel composite interface

Enhance

- single-use diamond impregnated cured **urethane dimethacrylate resin.**

- Choi et al* investigated the changes in surface characteristics and discoloration of five different dental resin composites after polishing with Sof-Lex, Enhance, and SuperSnap systems. They reported that although no significant difference was recorded in surface roughness values, the composites polished with the aluminium oxide polishing systems showed higher changes in color (DE) than those polished with the Enhance system. They suggested that other parameters for surface roughness, such as the mean peak spacing (Sm), might influence the color of resin composites.

- Choi MS, Lee YK, Lim BS, Rhee SH, Yang HC. Changes in surface characteristics of dental resin composites after polishing. Journal of Materials Science Materials in Medicine 2005;16:347–53.

One Step Vs Multi Step

One-step polishing system used PoGo in their studies for 40 s and 30s, respectively, and they reported lower surface roughness values than the multistep systems.

When application times are considered, the sequential use of four different Sof-Lex discs caused the longest polishing period. Therefore, this might be another factor for consideration – for surface smoothness.

Surface Gloss

- Surface gloss is an important factor to consider when restoration aesthetics are evaluated.
- Simply put, *surface gloss is a measure of the quality of a surface* and can be greatly influenced by a number of factors; the perception of gloss relates to finish (the magnitude, frequency, randomness and scale of curvatures), texture (changes in reflecting properties over the surface) and how a specimen is illuminated and viewed

•S.D. Heintze *et al.* Surface deterioration of dental materials after simulated toothbrushing in relation to brushing time and load Dent. Mater. (2010)

•C.M.L. Bollenl *et al.* Comparison of surface roughness of oral hard materials to the threshold surface roughness for bacterial plaque retention: a review of the literature Dent. Mater. (1997)

01

Correlations between **surface gloss** and the **surface roughness** parameter (Ra) have been found and it is generally accepted that the by reducing the surface roughness the gloss is increased.

02

However, the relationship remains somewhat non-linear as various filler properties have a significant influence on the surface gloss and the optical properties of the material.

03

Evidence is also limited and there is lack of consensus on the required threshold levels of surface roughness that would provide acceptable surface gloss.

Diamond and Silica carbide impregnated brushes

Great for posterior teeth -occlusal grooves and anterior teeth line angles

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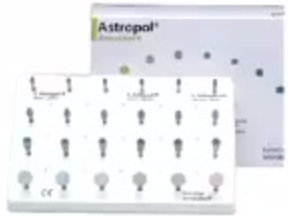
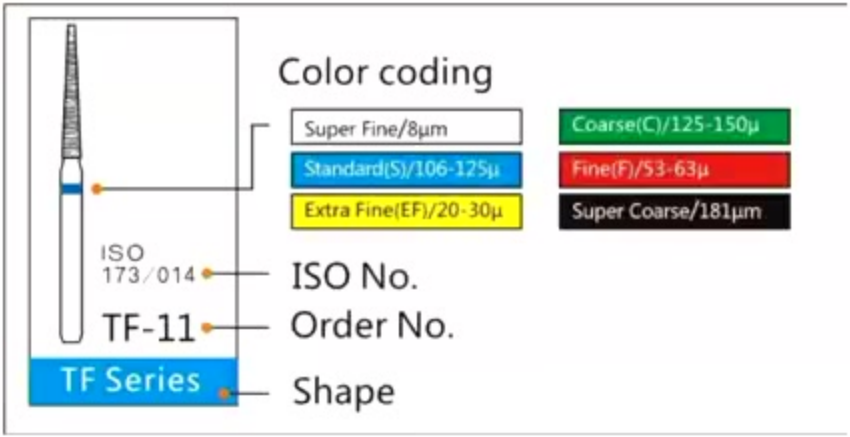
Composite Polishing – Rubber abrasives

- Used to put very high finish on composites.
- Variety of shapes.
- Use dry.
- Avoid heavy pressure.



Eg : silicon-impregnated rubber abrasives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Diamond and Silica carbide impregnated brushes

Great for posterior teeth -occlusal grooves and anterior teeth line angles

Surface Gloss

Can also be used at periodic review appointments to reduce plaque accumulation and extend the life of the restorations.

Composite Polishing - Pastes

- Aluminium oxide abrasive

Use goats-hair brush or felt disc.
Place on composite.
Moisten more with the pastes as finishing progresses.

Polishing Monolithic IPS e.max® and Zirconia Restorations

Two major forms of monolithic ceramics are used in dentistry today. One of them is glass ceramic, which is created from a controlled crystallization of glass with the crystalline phase consisting of about 70% lithium disilicate crystals in a matrix of approximately 30% SiO2-based glass. The most well-known product in this category is IPS e.max® (Ivoclar Vivadent, www.ivoclarvivadent.com).[1] These products can be pressed by a lost-wax process or machined from a partially crystallized "blue block," and then undergo final crystallization in a porcelain oven. The other more recently developed type of monolithic ceramic material is a form of solid-sintered zirconia-based ceramics (eg, Lava™ Plus, 3M ESPE, www.3mespe.com or BruxZir, Glidewell Laboratories, www.bruxzir.com)[2] that is more translucent than original versions delivered to the market. These materials are dense polycrystalline solids with no glass phase and with an average particle size less than 0.5 µm. Both materials have essentially replaced metal ceramic restorations as the first choice for posterior full-crown restorations.

Edward A. McLaren, DDS, MDC | Johan Figueira, DDS | Luis Sanchez, DDS | Carlos Trujillo, DDS

Figure 4

Figure 5

Figure 6

Figure 6

Figure 7

The specimens were polished with air-driven contra angle clinical handpieces (Figure 4) with water using the special intraoral polishing system designed for IPS e.max, the Dialite LD Extra-Oral Polisher System (Brasseler), following the directions of the manufacturer (Figure 5 through Figure 8). In Figures 9 through Figure 11, a new polisher, Dialite Feather Lite, was used, as this system allows better access to polish grooves. One operator did all the polishing so as to better calibrate the manual results. Also, with air-driven it is not possible to control the speed, or RPMs, so 60 seconds was allotted for each polished piece. The air pressure was calibrated to 4.5 bars to get as much torque as possible. Dialite Extra-Oral Polishing Paste (Brasseler) was used with a small round brush 60 seconds with each grit (Figure 12 and Figure 13).

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13

Figure 14

Figure 15

Figure 16

Figure 17

Figure 18

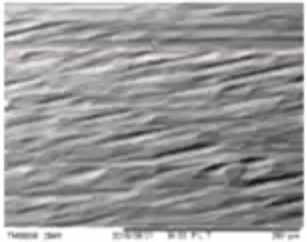

Figure 20

After Diamond Adjustment

After rubber polishers in Air driven hand piece

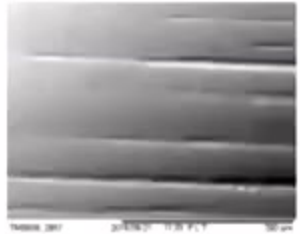

Figure 22

After rubber polishers in Electric driven hand piece (CONSTANT TORQUE)

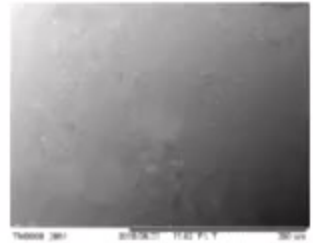

Figure 24

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Figure 12

Figure 13

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Effects of different surface treatments on stainability of ceramics

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Statement of problem

Final adjustments may result in a loss of ceramic glaze, a situation which must be corrected by reglazing or polishing to obtain clinically successful restorations; such restorations may be susceptible to staining.

Figure 14

Figure 15

Figure 16

Figure 17

Figure 18

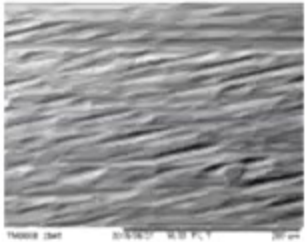

Figure 20

After Diamond Adjustment

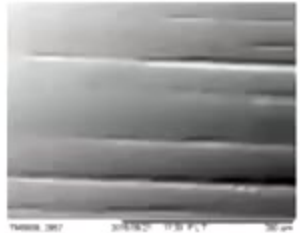

Figure 22

After rubber polishers in Air driven hand piece

After rubber polishers in Electric driven hand piece (CONSTANT TORQUE)

Figure 24