jota
SWITZERLAND

# FINISHING AND POLISHING SOLUTION
## FOR COMPOSITES AND 3D-PRINTED RESINS



Foto By Dr. Daniel Rosa

## The Importance of Finishing in Modern Dentistry

A surface roughness of less than 0.2 µm may contribute to bacterial retention and supports clinical longevity.[1]

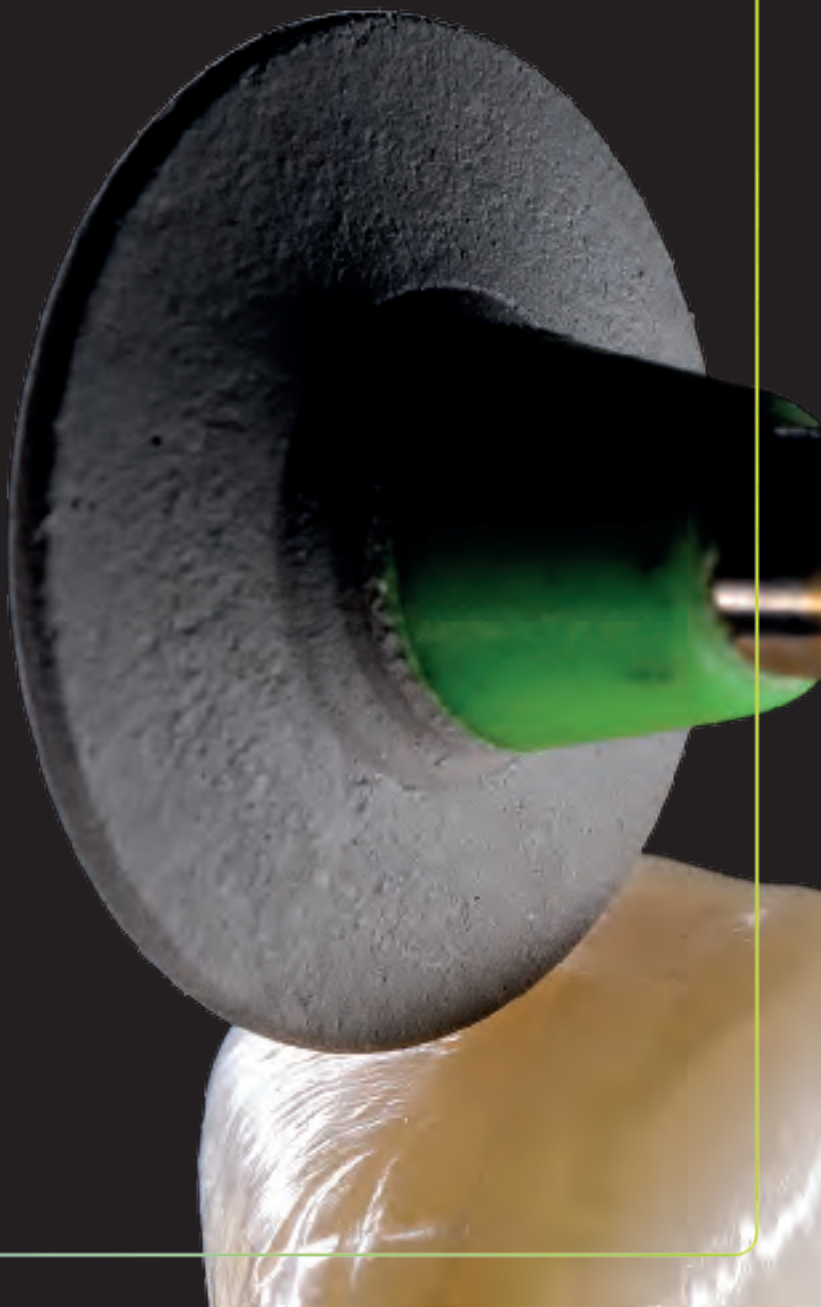
The finishing and polishing of composite restorations is not just a matter of aesthetics. It is a fundamental part of:

Biocompatibility: a smooth surface reduces bacterial adhesion.

Durability: Proper finishing supports reducing abrasion and marginal wear.

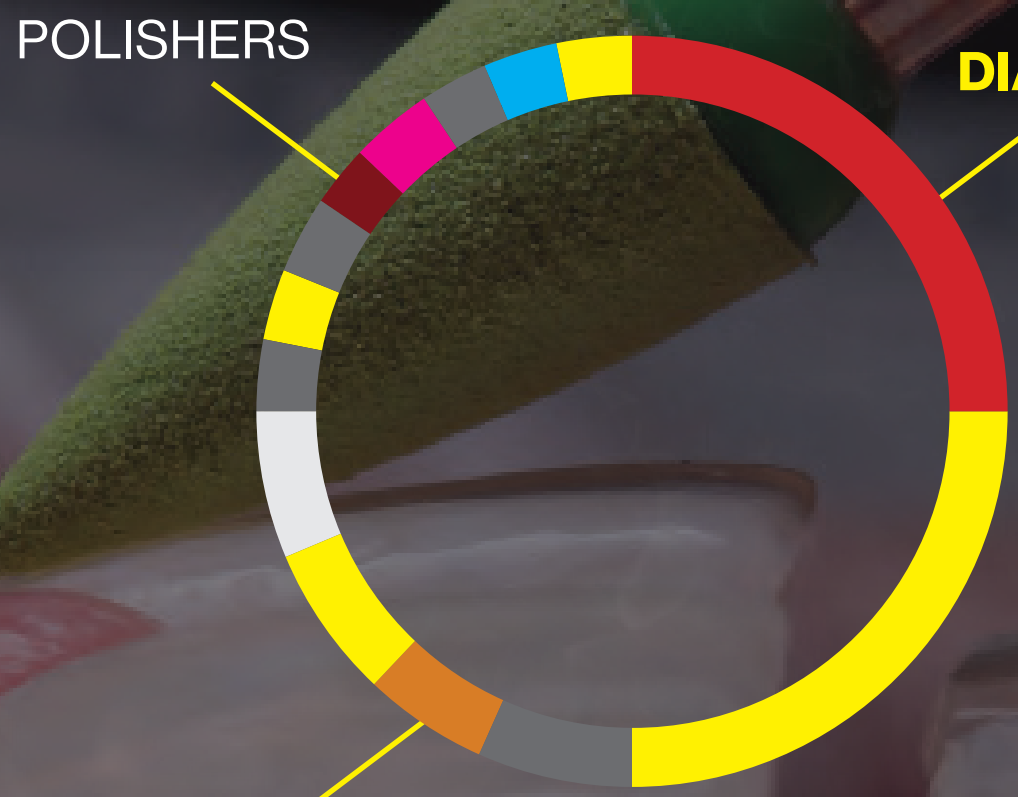
Aesthetics: Polished surfaces can achieve a surface texture and gloss similar to natural enamel.

*"A well-finished surface contributes to long-term clinical performance and patient satisfaction."*



[1] Jaramillo-Cartagena, R.; López-Galeano, E.J.; Latorre-Correa, F.; Agudelo-Suárez, A.A. Effect of Polishing Systems on the Surface Roughness of Nano-Hybrid and Nano-Filling Composite Resins: A Systematic Review. Dent. J. 2021, 9, 95.

# COMPOSITE FINISHING
## INSTRUMENTS

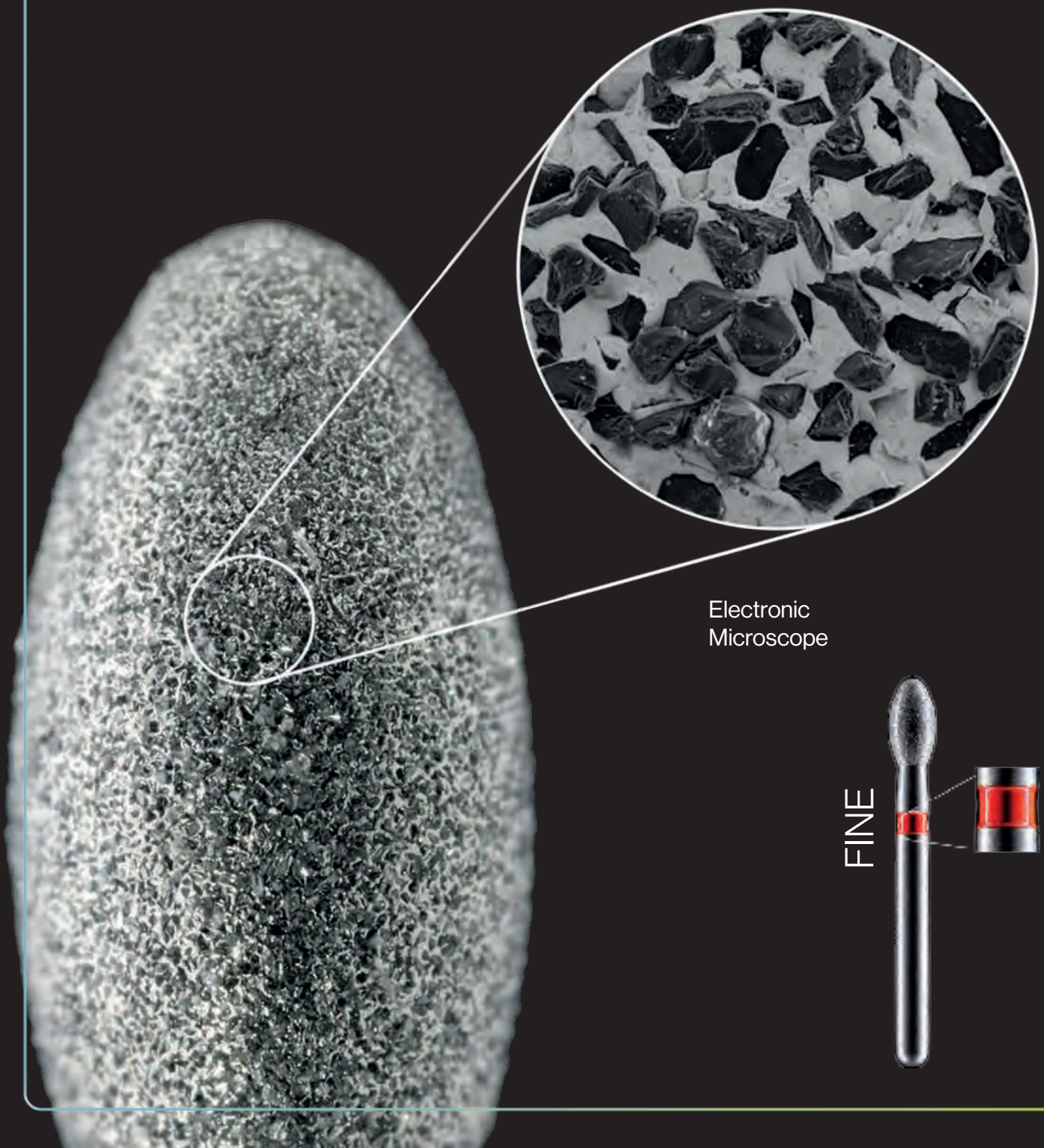



**Each with optimized geometry for precision, durability, and clinical control.**

Diamonds

# RED RING

38 - 45 micrometers



Electronic
Microscope



FINE

# RED RING

38 - 45 micrometers



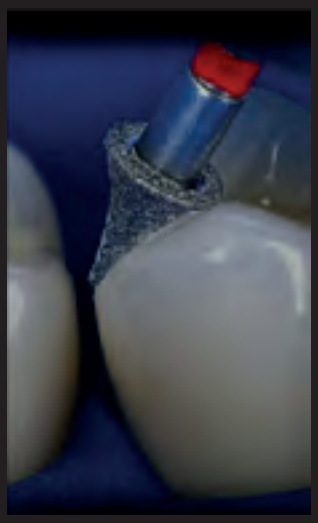

Those Diamond burs are shaped especially for anatomical contouring of different tooth surfaces, both anterior and posterior.

They support the shaping of occlusal profiles, the controlled removal of excess material in interdental areas, and the contouring of vestibular surfaces of restorations. Proper finishing and polishing can support an aesthetic appearance comparable to natural dentition.

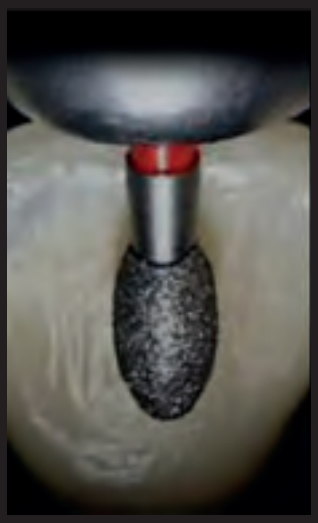


# CLINICAL APPLICATIONS

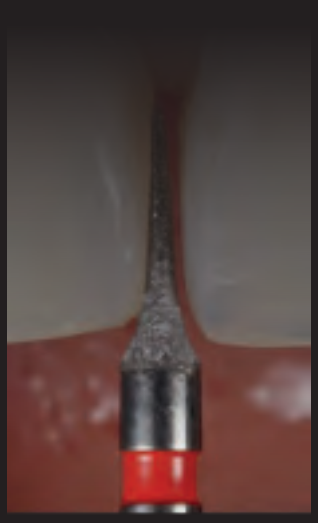
JOTA manufactured diamond burs made from natural diamond grit, designed for efficient material removal and long-term performance under appropriate conditions.
Red Diamonds are recommended for contouring.



Anatomical



Palatal



Interproximal

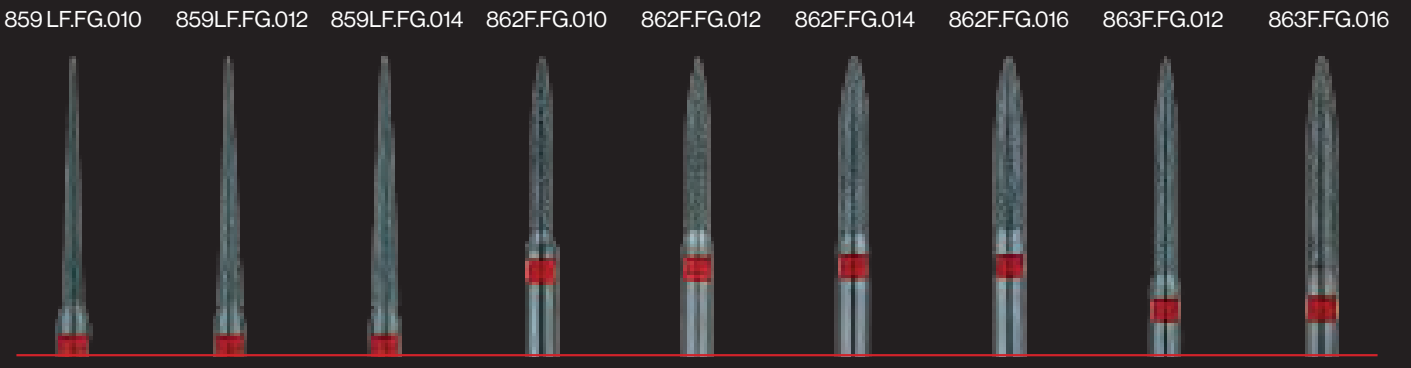


Diamonds

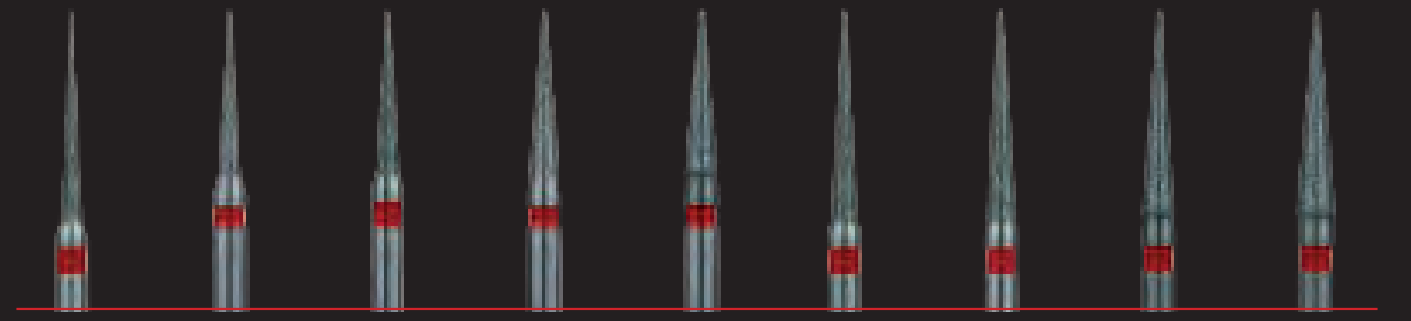
# RED RING

38 - 45 micrometers

## Vestibular and straight surfaces



| 859 LF.FG.010 | 859LF.FG.012 | 859LF.FG.014 | 862F.FG.010 | 862F.FG.012 | 862F.FG.014 | 862F.FG.016 | 863F.FG.012 | 863F.FG.016 |
|---|---|---|---|---|---|---|---|---|
| 806314167514010 | 806314167514012 | 806314167514014 | 806314249514010 | 806314249514012 | 806314249514014 | 806314249514016 | 806314250514012 | 806314250514016 |
| L=12.0 mm | L=12.0 mm | L=12.0 mm | L=8.0 mm | L=8.0 mm | L=8.0 mm | L=8.0 mm | L=10.0 mm | L=10.0 mm |

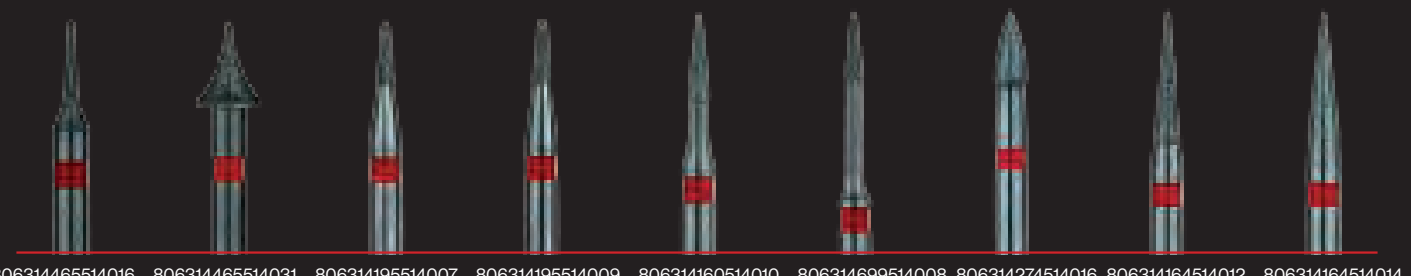


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|---|---|---|---|---|---|---|---|---|
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| L=10.0 mm | L=10.0 mm | L=10.0 mm | L=10.0 mm | L=10.0 mm | L=8.0 mm | L=8.0 mm | L=8.0 mm | L=8.0 mm |

## Occlusal, palatal and interproximal surfaces



| 811F.FG.033 | 829F.FG.027 | 830F.FG.016 | 830F.FG.018 | 830F.FG.021 | 830F.FG.023 | 525F.FG.012 | 525F.FG.017 | 526F.FG.023 |
|---|---|---|---|---|---|---|---|---|
| 806314038514033 | 806314463514027 | 806314257514016 | 806314257514018 | 806314257514021 | 806314257514023 | 806314525514012 | 806314525514017 | 806314526514023 |
| L=4.0 mm | L=5.0 mm | L=4.5 mm | L=4.5 mm | L=5.0 mm | L=5.0 mm | L=4.0 mm | L=4.0 mm | L=4.0 mm |

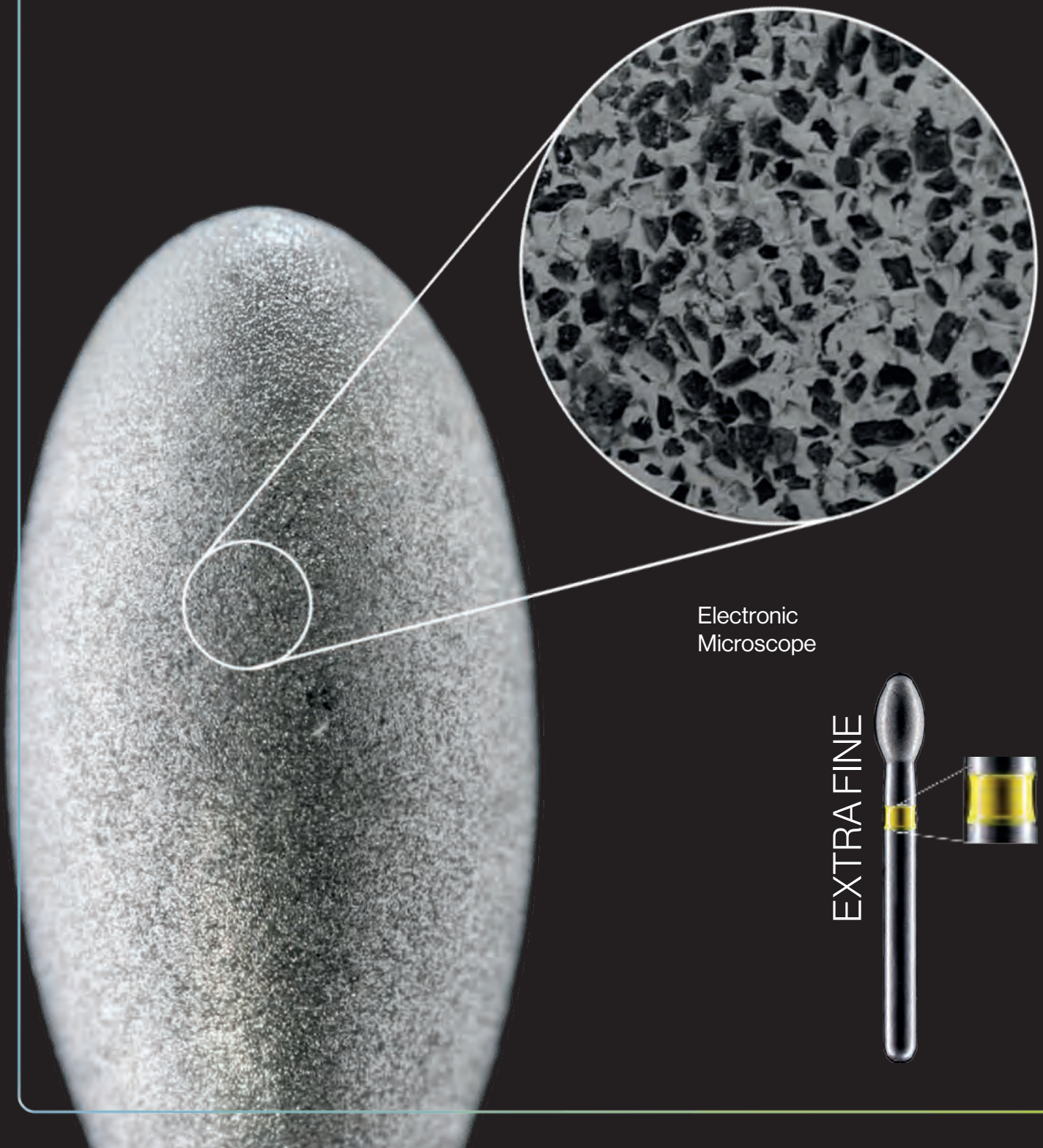


| 820F.FG.016 | 820F.FG.031 | 855LF.FG.007 | 855LF.FG.009 | 890F.FG.010 | 890LF.FG.008 | 895F.FG.016 | 898F.FG.012 | 898F.FG.014 |
|---|---|---|---|---|---|---|---|---|
| 806314465514016 | 806314465514031 | 806314195514007 | 806314195514009 | 806314160514010 | 806314699514008 | 806314274514016 | 806314164514012 | 806314164514014 |
| L=5.0 mm | L=4.0 mm | L=5.0 mm | L=5.0 mm | L=4.0 mm | L=3.0 mm | L=3.5 mm | L=6.0 mm | L=6.0 mm |

Diamonds

# YELLOW RING

20 - 30 micrometers



Electronic
Microscope



EXTRA FINE

# CLINICAL APPLICATIONS

Extra Fine diamond burs are specially selected for the contouring and finishing composites and even 3D Printed resins always before the Pre-polisihing step.


Occlusal


Approximal


Vestibular



## EXTRA FINE

JOTA Extra-Fine diamond burs are designed for achieving an exceptional clinical finish in composite resin and 3D (CAD/CAM) resin restorations. With a natural grain size of approximately 20–30 µm precisely calibrated, they enable highly controlled micrometric cutting under appropriate conditions.

The homogeneous diamond distribution and stable cutting edges support increased durability, consistent cutting performance with reduced surface roughness.
Internal comparative evaluations indicate surface roughness values of approximately Ra 0.88 µm, supporting the creation of highly smooth surfaces and efficient final polishing.
The result is a refined surface texture that contributes to high-gloss restorations with reduced plaque adhesion and a natural tactile sensation during clinical exploration.

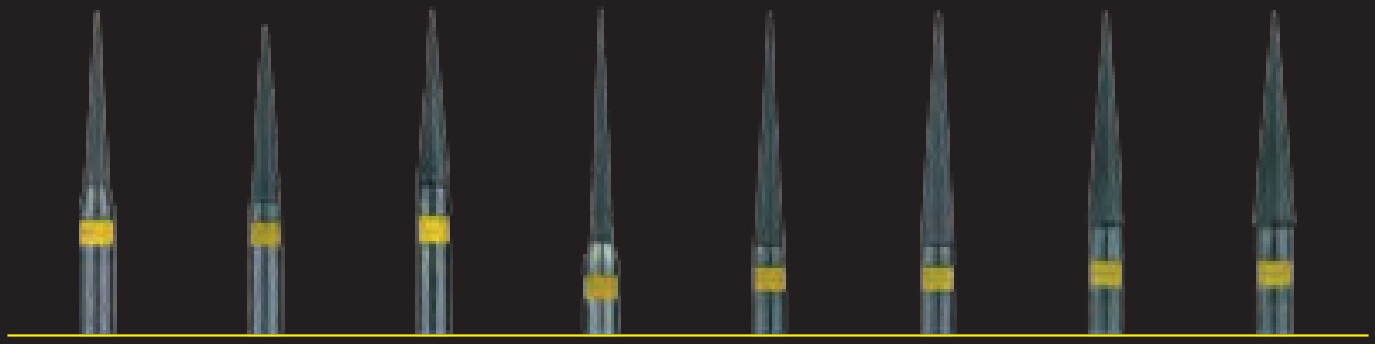
Key Performance Benefits:
Contributes to smoother surfaces with highly accurate anatomical contouring.
Helps reduce polishing time and enhanced esthetics.
Designed with natural diamond quality for reliable long-term performance.

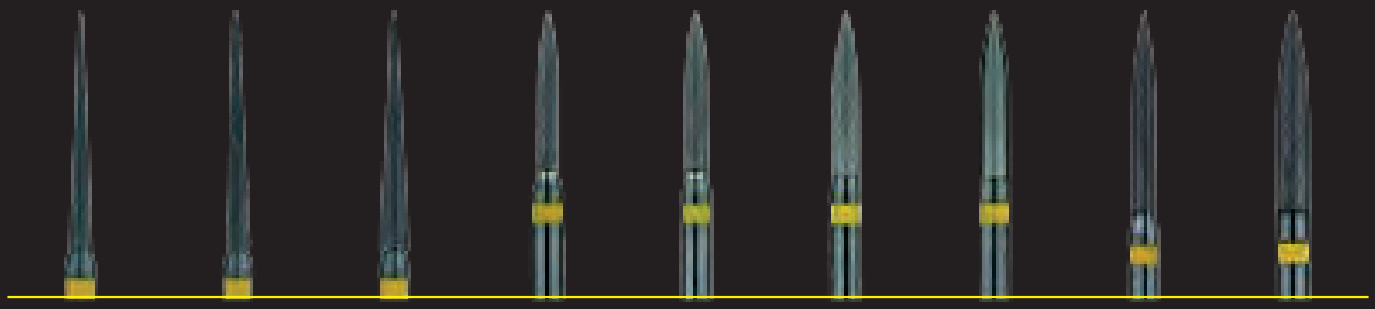
Diamonds

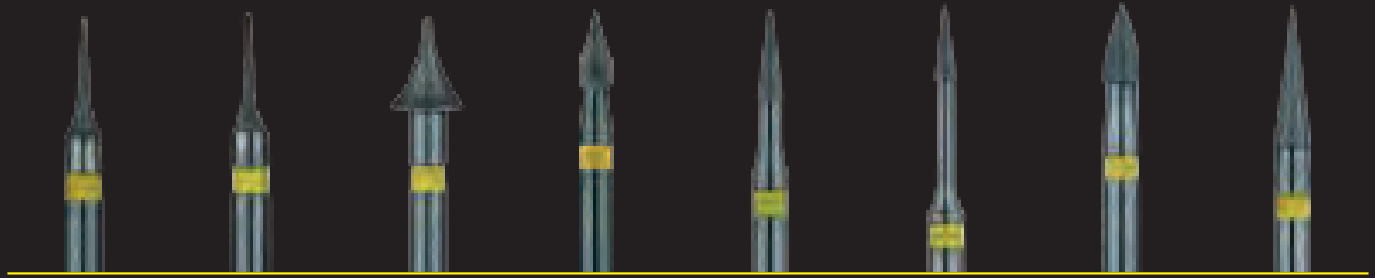
# YELLOW RING

20 - 30 micrometers

## Vestibular and straight surfaces

| 858EF.FG.010 | 858EF.FG.012 | 858EF.FG.014 | 859EF.FG.010 | 859EF.FG.012 | 859EF.FG.014 | 859EF.FG.016 | 859EF.FG.018 |
|---|---|---|---|---|---|---|---|
|  | | | | | | | |
| 806314165504010 | 806314165504012 | 806314165504014 | 806314166504010 | 806314166504012 | 806314166504014 | 806314166504016 | 806314166504018 |
| L=8.0 mm | L=8.0 mm | L=8.0 mm | L=10.0 mm | L=10.0 mm | L=10.0 mm | L=10.0 mm | L=10.0 mm |

| 859LEF.FG.010 | 859LEF.FG.012 | 859LEF.FG.014 | 862EF.FG.010 | 862EF.FG.012 | 862EF.FG.014 | 862EF.FG.016 | 863EF.FG.012 | 863EF.FG.016 |
|---|---|---|---|---|---|---|---|---|
|  | | | | | | | | |
| 806314167504010 | 806314167504012 | 806314167504014 | 806314249504010 | 806314249504012 | 806314249504014 | 806314249504016 | 806314250504012 | 806314250504016 |
| L=12.0 mm | L=12.0 mm | L=12.0 mm | L=8.0 mm | L=8.0 mm | L=8.0 mm | L=8.0 mm | L=10.0 mm | L=10.0 mm |

| 820EF.FG.014 | 820EF.FG.016 | 820EF.FG.031 | 827EF.FG.018 | 890EF.FG.010 | 890LEF.FG.008 | 895EF.FG.016 | 898EF.FG.014 |
|---|---|---|---|---|---|---|---|
|  | | | | | | | |
| 806314465504014 | 806314465504016 | 806314465504031 | 806314464504018 | 806314160504010 | 806314699504008 | 806314274504016 | 806314164504014 |
| L=5.0 mm | L=5.0 mm | L=4.0 mm | L=3.0 mm | L=4.0 mm | L=3.0 mm | L=3.5 mm | L=6.0 mm |

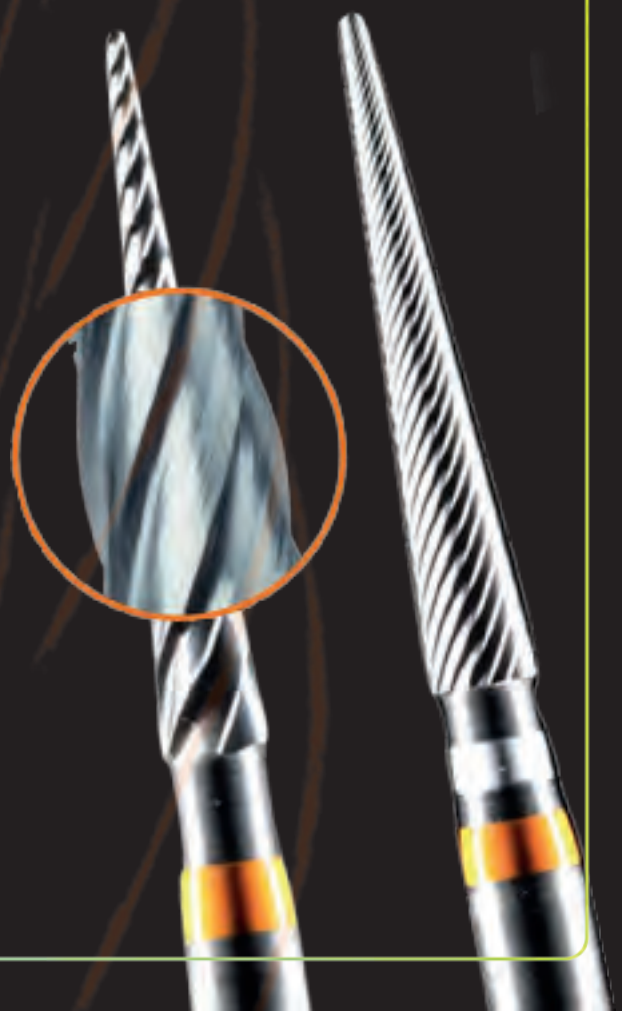
## Occlusal, palatal and interproximal surfaces

| 830EF.FG.016 | 830EF.FG.018 | 830EF.FG.021 | 830EF.FG.023 | 525EF.FG.017 | 526EF.FG.023 | 893HEF.FG.023 |
|---|---|---|---|---|---|---|
|  | | | | | | |
| 806314257504016 | 806314257504018 | 806314257504021 | 806314257504023 | 806314525504017 | 806314526504023 | 806314707504023 |
| L=4.5 mm | L=4.5 mm | L=5.0 mm | L=5.0 mm | L=4.0 mm | L=4.0 mm | L=7.6 mm |

Foto By Dr. Milko Villaroel

# DRALL FINISHERS

## THE GEOMETRY OF THE PERFECT FINISH

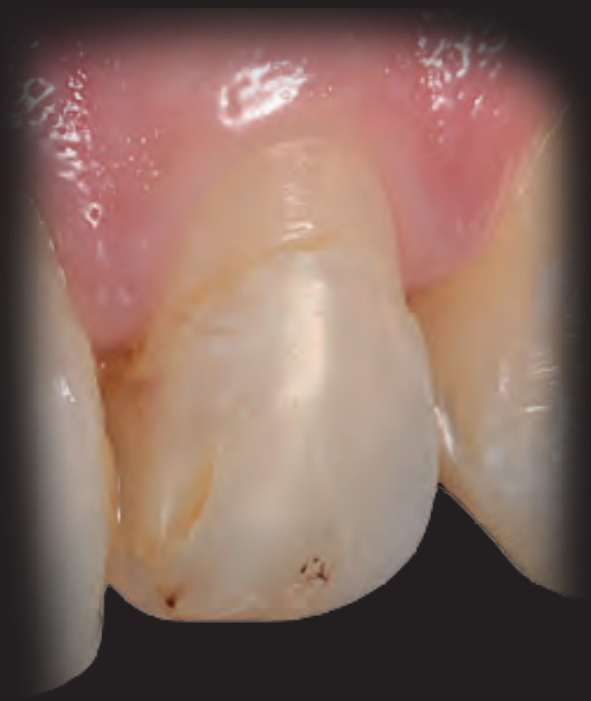


# Drall Carbide Finishing Burs: Scientific Excellence in the Finishing of Composite Resins and 3D-Printed Materials

## The Clinical Relevance of Finishing and Polishing in Restorative Dentistry

In modern restorative dentistry, finishing and polishing procedures play a key role in achieving high-quality clinical outcomes that go beyond aesthetic appearance alone. The surface quality of a composite resin restoration is an important factor influencing its durability and long-term performance in daily clinical use.

In sufficient finishing and polishing may negatively influence clinical outcomes and contribute to a range of biological and mechanical effects. These factors can affect both, the long-term performance of the restoration and health of the surrounding tissues. Potential negative consequences may include:



**Increased susceptibility to plaque accumulation:**
adhesion and biofilm formation, which can be associated with an increased risk of periodontal irritation.

**Potential for gingival irritation:**
A rough surface at the restoration margin may contribute to chronic inflammation of the adjacent gingival tissues.

**Increased risk of extrinsic stains:**
may promote the adhesion of dietary pigments, which can affect color stability and the long-term aesthetic appearance of the restoration.

**Increased susceptibility to secondary caries:**
Plaque accumulation at the margins of insufficiently polished restorations may be associated with an increased likelihood of recurrent caries development.

**Reduced durability and clinical performance:**
Increased surface roughness may contribute to accelerated wear of the restoration and the opposing dentition, which can affect the durability of the treatment.

To mitigate these risks, it is imperative that the clinician understands the scientific parameters that define an optimal surface and selects the appropriate instruments to achieve it.

The success of a finishing procedure is not evaluated solely subjectively but is measured objectively through scientific parameters. The main indicator of surface quality is average surface roughness (Ra), defined as the arithmetical mean of all absolute distances of the profile within the measuring length. This value quantifies the microscopic irregularities (peaks and valleys) of a surface and is the gold standard for assessing the effectiveness of polishing systems.

From a biological perspective, surface roughness has a direct clinical implication on bacterial adhesion. Research has established a critical roughness threshold below which plaque retention is not significantly reduced further. This surface roughness threshold for bacterial retention is 0.2 µm. Therefore, the goal of any finishing and polishing procedure is to achieve an Ra value as close as possible to or below this threshold promote long-term biocompatibility and periodontal health.

To clinically contextualize Ra values, surface roughness can be classified according to its condition. The following table details the most relevant roughness classes for restorative dentistry:

| Roughness class | Rugosity Ra (µm) | Condition Surface |
|---|---|---|
| N1 | 0.025 | Extremly fine, mirror-like finish. No visible marks. |
| N2 | 0.05 | |
| N3 | 0.01 | |
| N4 | 0.02 | Equivalent to the biological threshold |
| N5 | 0.04 | Very fine finish. Marks are not visible and are imperceptible to the touch. |
| N6 | 0.08 | |

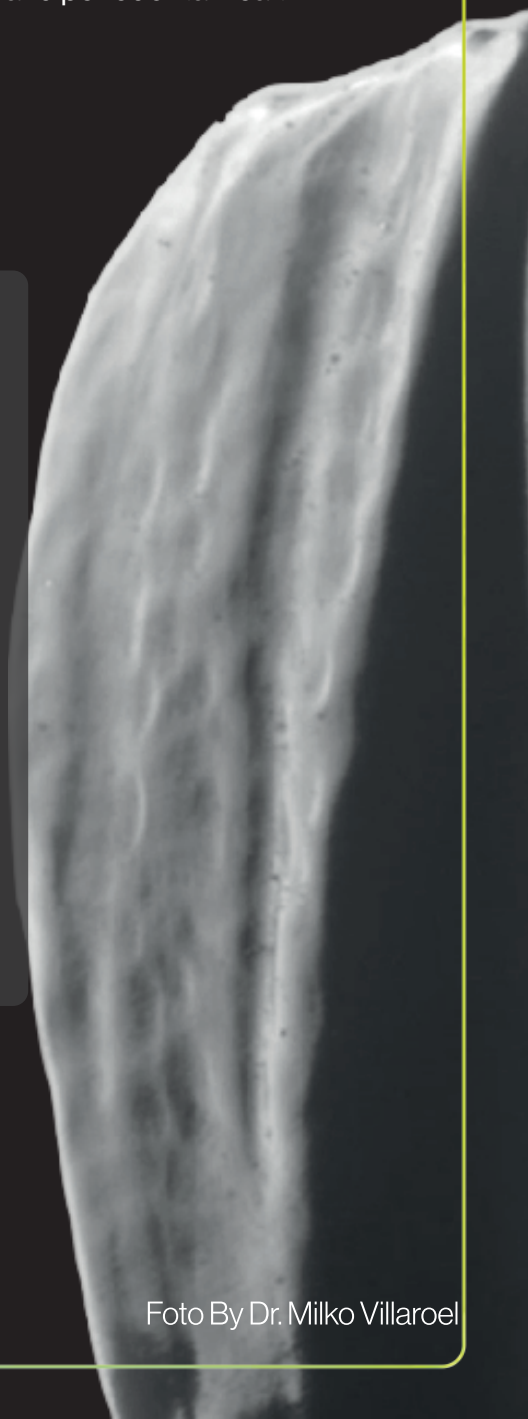
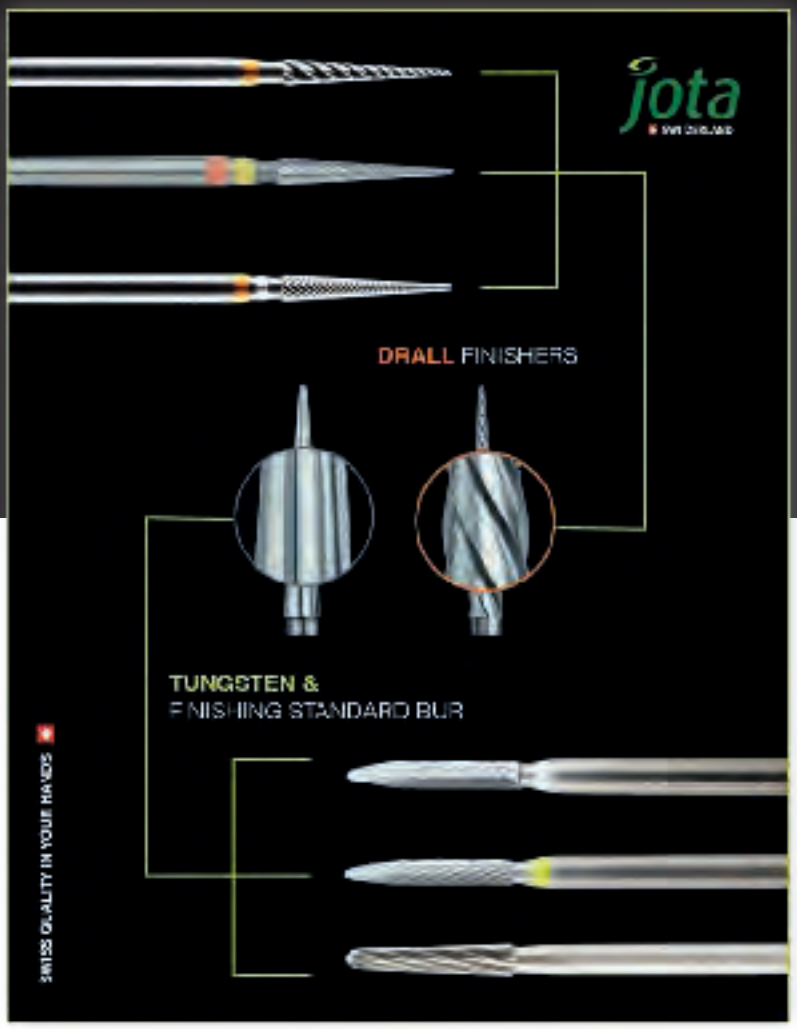


Foto By Dr. Milko Villaroel

In response to the need for superior finishing instruments, JOTA has developed the Drall Carbide Finishers, an innovative solution designed specifically for contouring and finishing composite resins. Their unique design is oriented toward overcoming the limitations of conventional finishing instruments, such as diamond or standard carbide burs, providing an highly smooth surface prepared for final polishing.




The distinctive features of the Drall Finishers provide highly precise and consistent finishing performance. Their design and composition have been optimized to provide highly precise and consistent finishing performance.





# PRECISION **GEOMETRIC** **HELICAL**

**Innovative Blade Design:**
The flutes of the Drall Finishers have a unique design that promotes stable low-vibration operation. This stability allows for a much finer and more controlled cutting action than standard carbide burs, reducing the risk of creating deep scratches or damaging the restorative material.



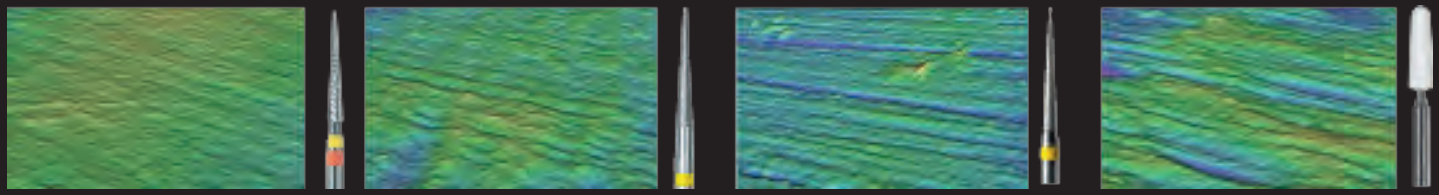
**Extremely Smooth Surface:**
Thanks to their optimized cutting geometry, these burs leave a highly refined surface with minimal visible marks on the composite surface. The result is a highly smooth finish that may help to reduces the time required in the subsequent polishing stages.







**Quantifiable Performance:** The superior performance of the Drall Finishers can be measured objectively. These burs achieve an average surface roughness of Ra = 0.67 µm, a remarkably low value that places a benchmark in rotary finishing instruments.



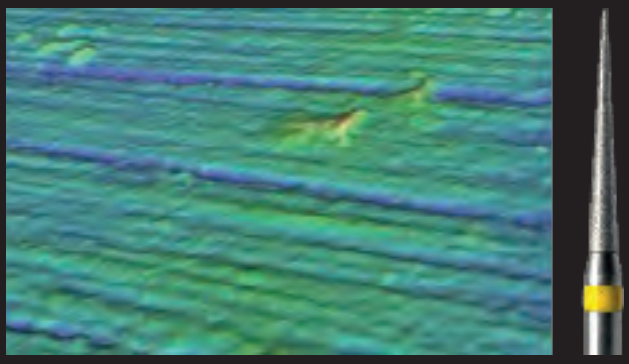
DRALL CARBIDE FINISHERS RA=0.37 µm

YELLOW CARBIDE FINISHERS RA=0.6 µm

YELLOW DIAMOND FINISHERS RA=0.88 µm

ARKANSAS STONE FINISHERS RA=0.7 µm

This quantitative analysis reinforces the principle that the cutting action of carbide burs is superior for finishing resins. This is evidenced by observing that the Yellow Diamond Bur (Ra = 0.88 µm), acts by abrasion, generating significantly greater roughness than all carbide options.



Yellow Diamond Finishers RA=0.88 µm



Drall Carbide Finishers RA = 0.37 µm

The superior performance of Ra = 0.37 µm places the Drall Finishers in the N5 finishing class (“very fine”) , while other instruments such as the Yellow Carbide Finishers (0.6 µm) and the Arkansas Stone Finishers (0.7 µm), barely reach the N6 class, demonstrating a qualitative and quantitative difference in the final result.
This clear performance translates into direct clinical benefits not only for traditional composite resins but also for the emerging challenges presented by new 3D printing materials.



# CLINICAL APPLICATIONS AND ADVANTAGES

The main objective when finishing a composite resin restoration is to achieve a smooth and homogeneous surface that mimics the texture of dental enamel. This is not only crucial for aesthetics but also for minimizing abrasion, helping to minimize the risk of marginal microleakage, and reducing plaque accumulation. Carbide burs are ideal for this purpose because their mechanism of action is cutting, unlike diamond burs, which act by abrasion, which may generate more irregular scratch pattern on the composite
surface.

KIT 1327




With a quantified performance of Ra = 0.37 µm, the Drall Finishers position themselves as a tool of excellence. “This value is classified within category N5, corresponding to a „very fine finish“ with marks imperceptible to the touch. Crucially, this result approaches the critical threshold of 0.2 µm, below which bacterial plaque retention does not increase.This makes the Drall Finishers an ideal option for preparing the restoration surface for final polishing, ensuring a more biocompatible and durable result.

Finishing 3D-printed materials presents a unique challenge due to the nature of their fabrication. The additive manufacturing process, which builds the object layer by layer, generates an inherent “stepwise effect” on the surface. The initial roughness of a printed piece is influenced by multiple factors, such as print orientation and layer thickness, making F&P procedures indispensable to achieving a clinically acceptable surface. The Drall Finishers instruments are ideal for achieving an optimal and predictable result on the complex surfaces of printed materials.

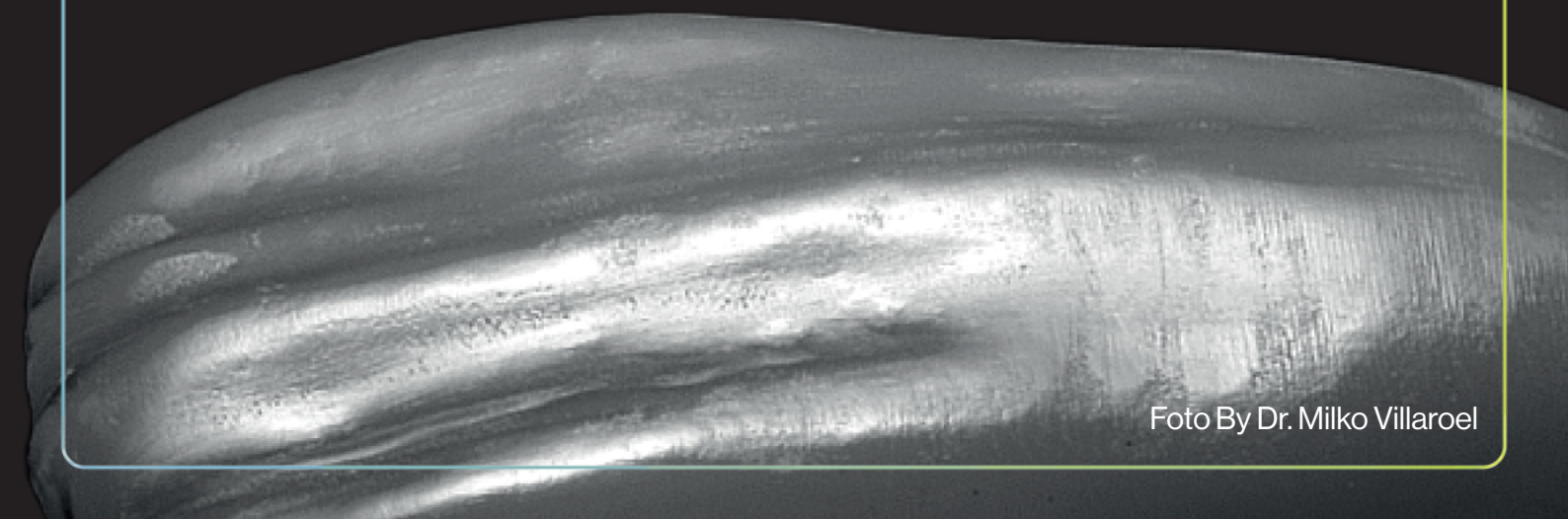


Foto By Dr. Milko Villaroel

# DRALL FINISHERS
The Geometry of the Perfect Finish



Orange ring fine CD- 8-12 blades



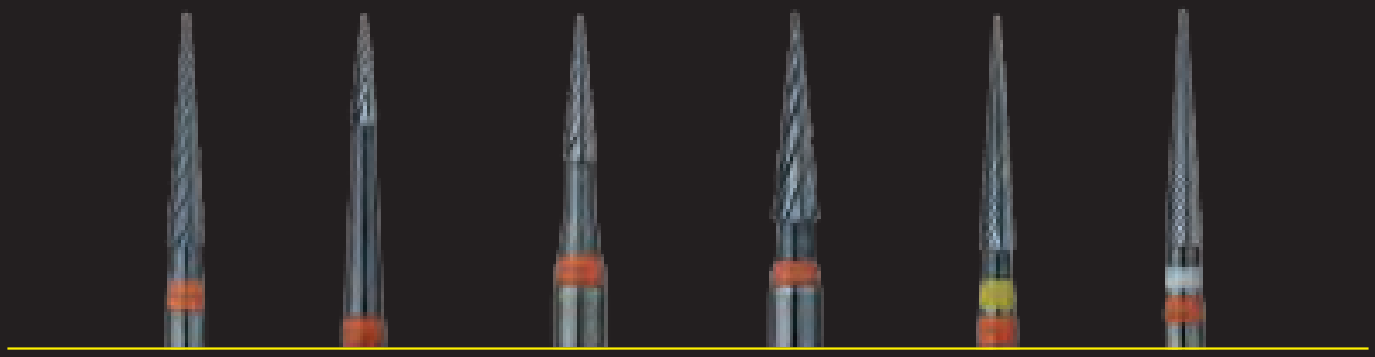
Yellow/Orange ring extra fine CD-F 16-20 blades



White/Orange ring Ultra fine CD-U 30 blades



## Vestibular and straight surfaces



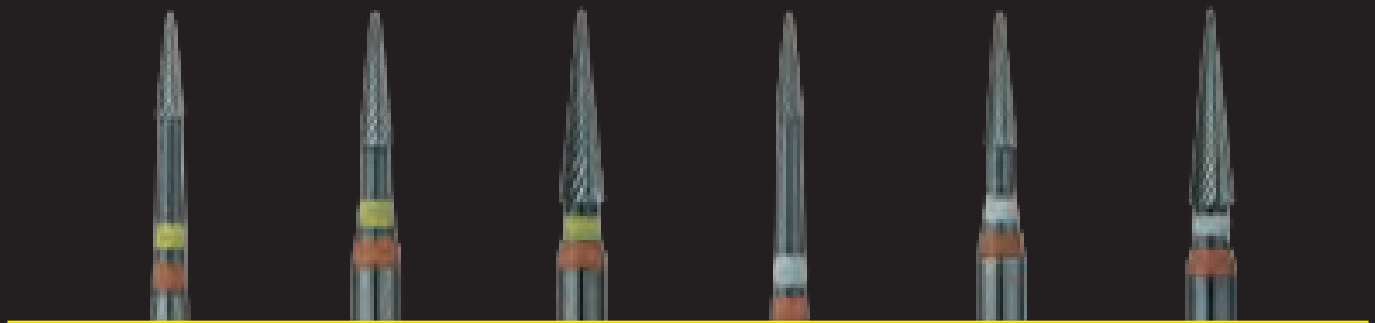
| CD135.FG.014 | CD132.FG.008 | CD133.FG.010 | CD134.FG.014 | CD135F.FG.014 | CD135U.FG.014 |
|---|---|---|---|---|---|
| 500314166072014 | 500314699072008 | 500314159072010 | 500314164072014 | 500314166042014 | 500314166032014 |
| L=9.0 mm | L=3.1 mm | L=4.2 mm | L=6.0 mm | L=9.0 mm | L=9.0 mm |

## Palatal and lingual surfaces



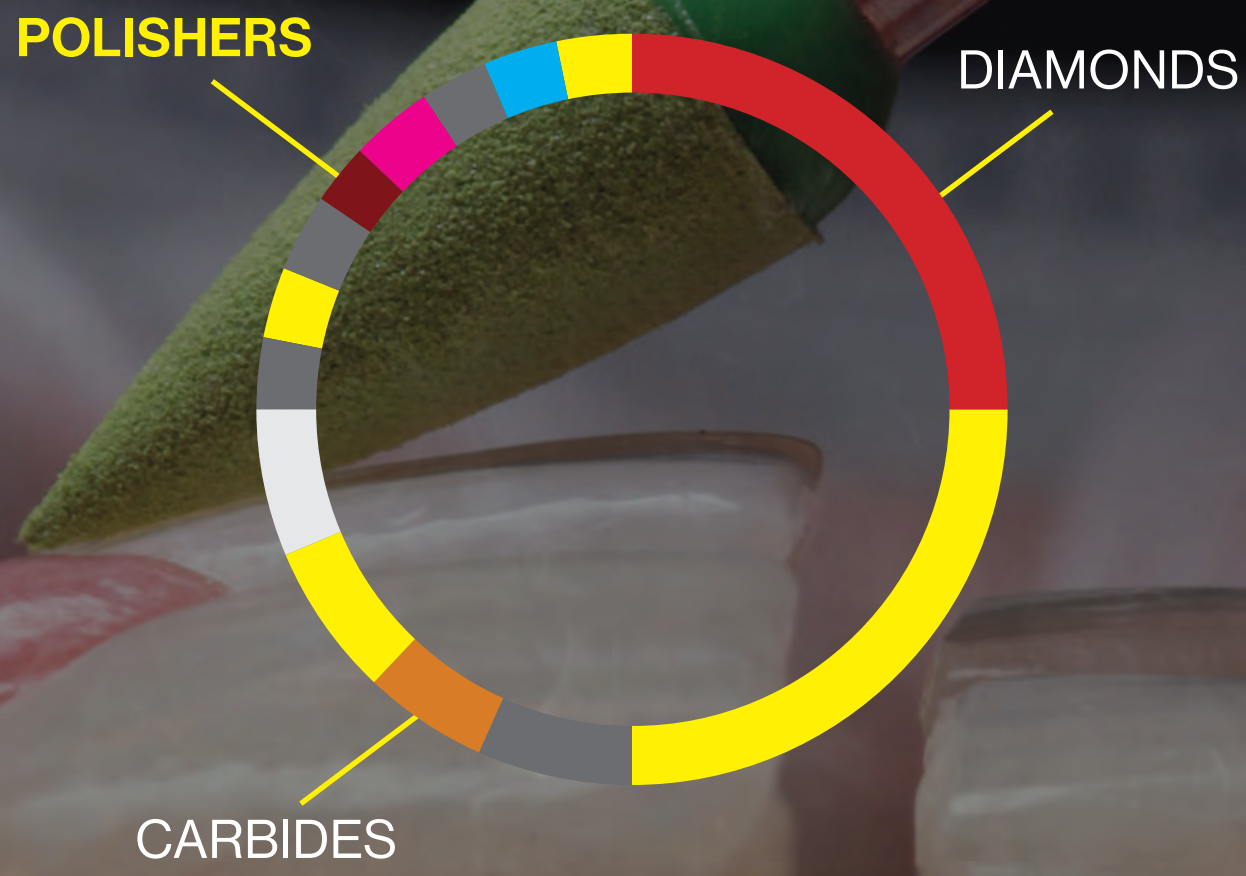
| CD379.FG.018 | CD379.FG.023 | CD379F.FG.018 | CD379F.FG.023 | CD379U.FG.018 | CD379U.FG.023 |
|---|---|---|---|---|---|
| 500314277972018 | 500314277972023 | 500314277942018 | 500314277942023 | 500314277932018 | 500314277932023 |
| L=3.5 mm | L=4.2 mm | L=3.5 mm | L=4.2 mm | L=3.5 mm | L=4.2 mm |

## Occlusal and approximal surfaces



| CD132F.FG.008 | CD133F.FG.010 | CD134F.FG.014 | CD132U.FG.008 | CD133U.FG.010 | CD134U.FG.014 |
|---|---|---|---|---|---|
| 500314699042008 | 500314159042010 | 500314164042014 | 500314699032008 | 500314159032010 | 500314164032014 |
| L=3.1 mm | L=4.2 mm | L=6.0 mm | L=3.1 mm | L=4.2 mm | L=6.0 mm |

# COMPOSITE FINISHING
## INSTRUMENTS




**Each with optimized geometry for precision, durability, and clinical control.**

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# DIAMOND POLISHERS VS SILICONE POLISHERS



Foto By Dr. Daniel Rosa

# PHYSICOCHEMICAL AND TRIBOLOGICAL PROPERTIES

Diamond polishers employ diamond abrasives with ultrafine particle sizes (1–6 µm), providing extremely high hardness (Mohs 10), markedly superior to that of composite resin (Mohs ~2–4). This hardness differential enables precise material removal through direct mechanical abrasion. In contrast, silicone polishers incorporate aluminum oxide grains (5–40 µm) embedded in an elastomeric matrix, favoring polishing through friction and controlled plastic deformation with reduced aggressiveness. From a tribological standpoint, diamond polishers tend to produce lower volumetric material loss but carry a higher risk of inducing microcracks within the organic matrix and filler particles, whereas silicone polishers better preserve the degree of conversion of the composite resin.

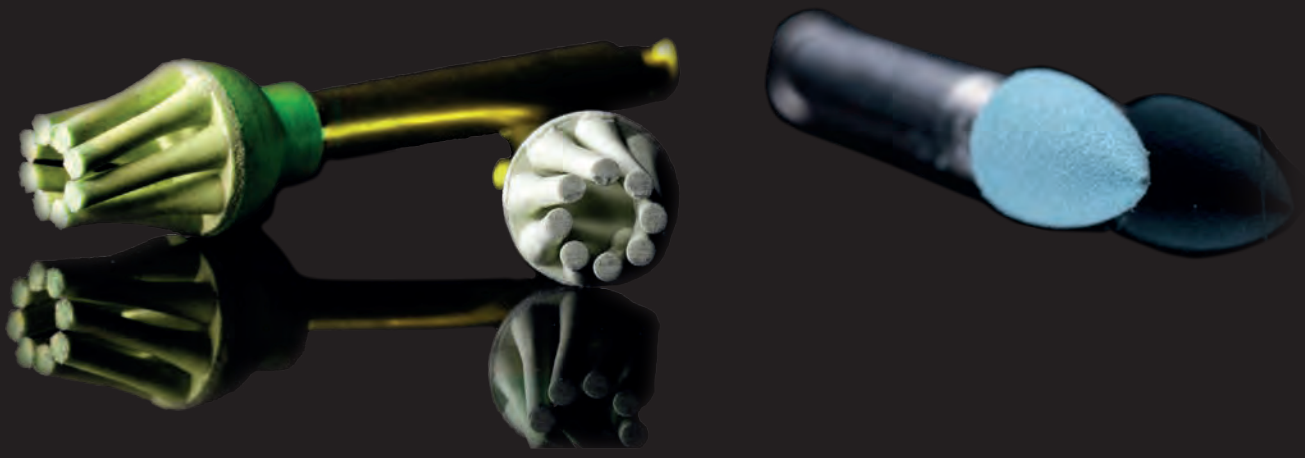


Foto By Dr. Daniel Rosa

# DIAMOND POLISHERS

| Abrasive: | Hardness: | Mechanism: |
|---|---|---|
| Ultrafine diamond | Very high (Mohs 10) | Direct mechanical abrasion |



# SILICONE POLISHERS

| Abrasive: | Hardness: | Mechanism: |
|---|---|---|
| Aluminum oxide / silicon-based particles | Medium (Mohs ~9) | Elastic friction |




jota
SWITZERLAND
Diamond polishers for composite resin incorporate diamond particles within a rigid matrix, whereas silicone polishers use abrasives such as aluminum oxide or silicon carbide embedded in a flexible silicone matrix. These structural differences result in distinct effects on surface roughness (Ra), gloss, and wear behavior of composite resin restorations.
Foto By Dr. Daniel Rosa

# PHYSICOCHEMICAL AND TRIBOLOGICAL PROPERTIES

| Property | Diamond Polishers | Silicone Polishers |
|---|---|---|
| Type of abrasive | Ultrafine diamond | Aluminum oxide / silicon-based abrasives |
| Grain size / distribution | 1–6 µm, uniform | 5–40 µm, polydisperse |
| Relative hardness vs. composite resin | Very high (Mohs 10) | Medium (Mohs ~9) |
| Polishing Mechanism | High, direct abrasion | Moderate, elastic friction |
| Matrix flexibility | Low / rigid | High / elastic |
| Optimal operating speed | 3,000–10,000 rpm | 5,000–8,000 rpm |

Data based on comparative experimental studies and surface characterization using AFM, SEM, and profilometry.

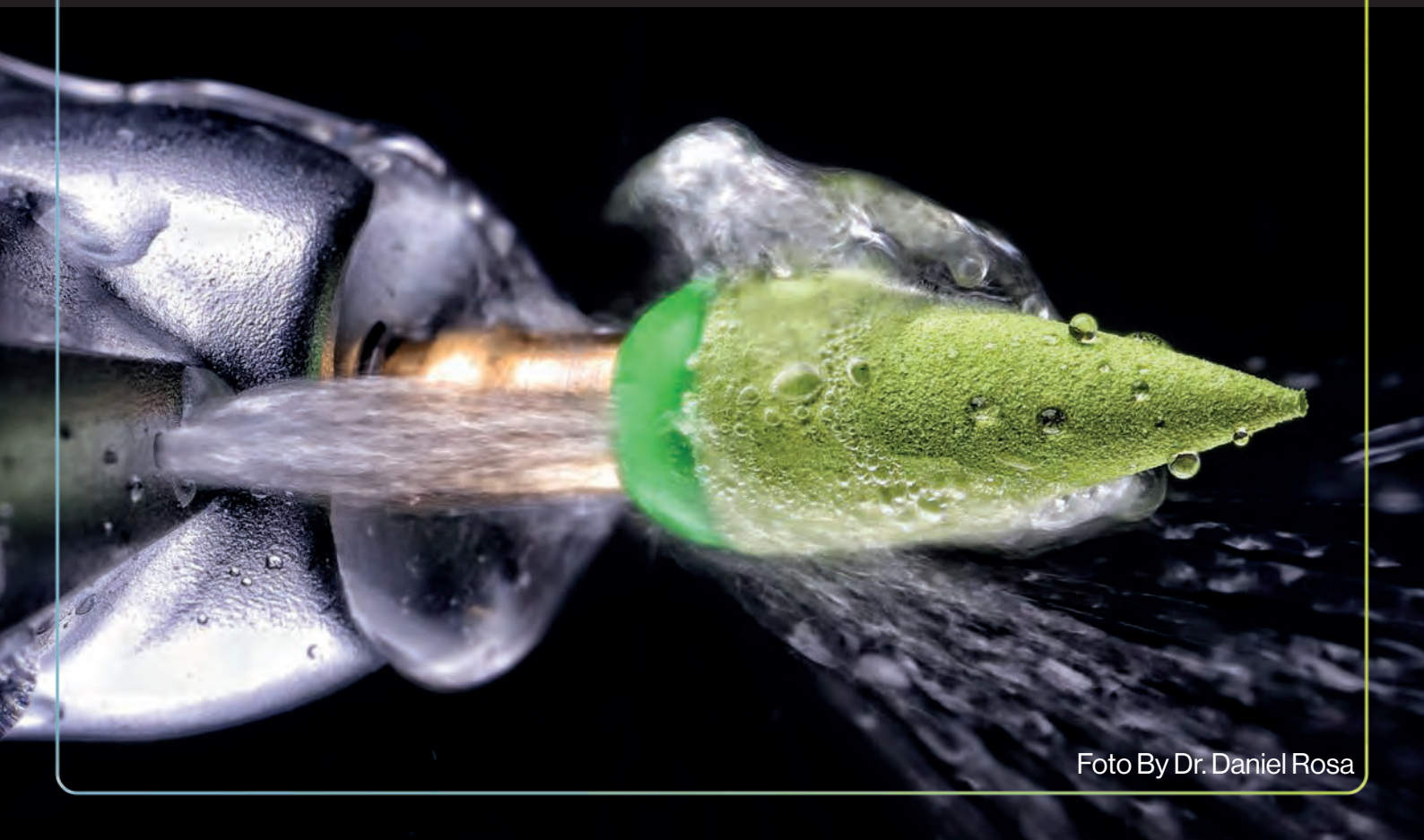


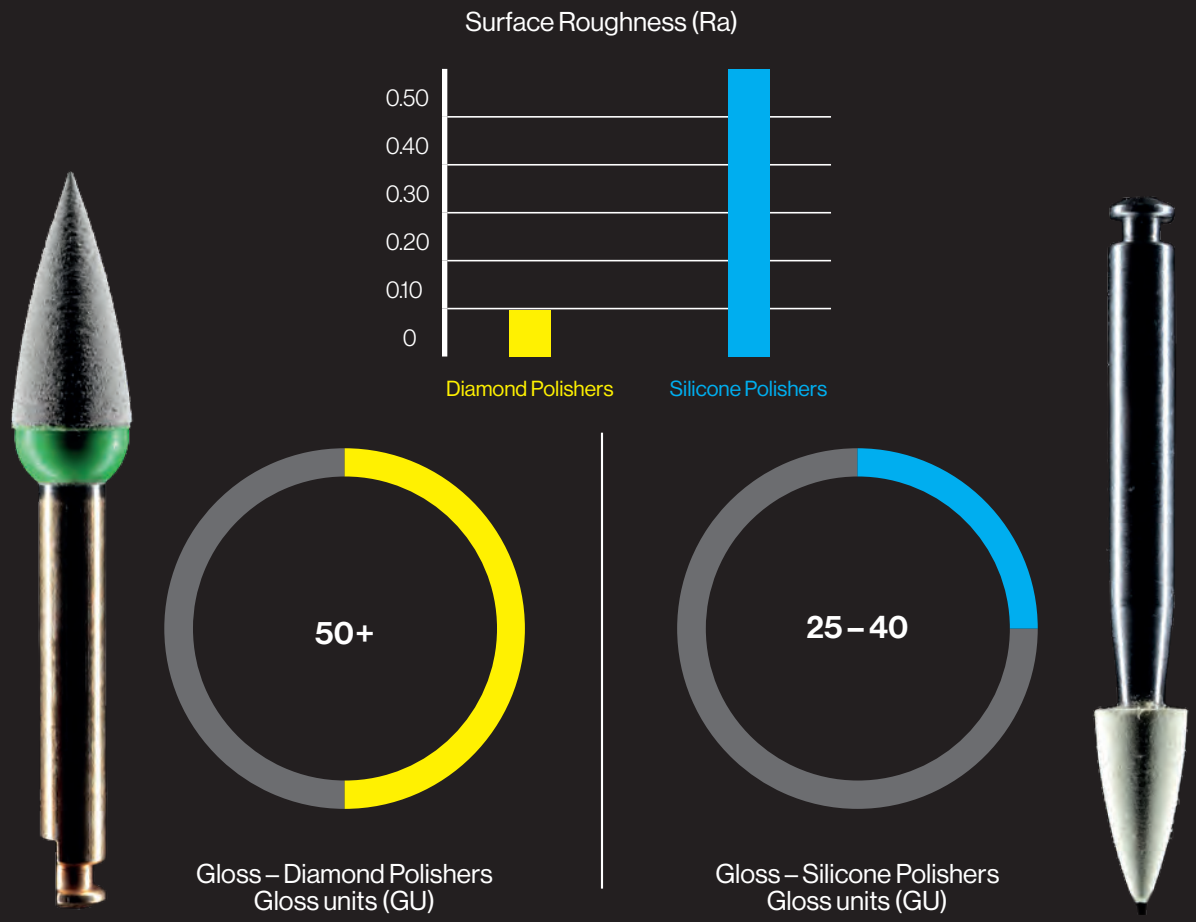
Foto By Dr. Daniel Rosa

# CLINICAL AND LABORATORY OUTCOMES

In vitro studies demonstrate that diamond polishers achieve a final surface roughness of Ra < 0.2 µm and gloss values exceeding 50 GU in nanofilled composite resins, outperforming conventional silicone polishers (Ra = 0.3–0.5 µm; gloss = 30–50 GU). JOTA diamond polishing systems exhibit reduced volumetric loss during finishing procedures (approximately 5–10% less), contributing to greater preservation of restorative material.

Conversely, JOTA silicone polishers with Swivel technology demonstrate superior control during the polishing phase, significantly reducing microcrack formation and enhancing anatomical adaptability in direct restorations. The flexible Swivel mounting allows the polisher to self-adjust to complex surface morphologies, minimizing excessive pressure and angulation errors.

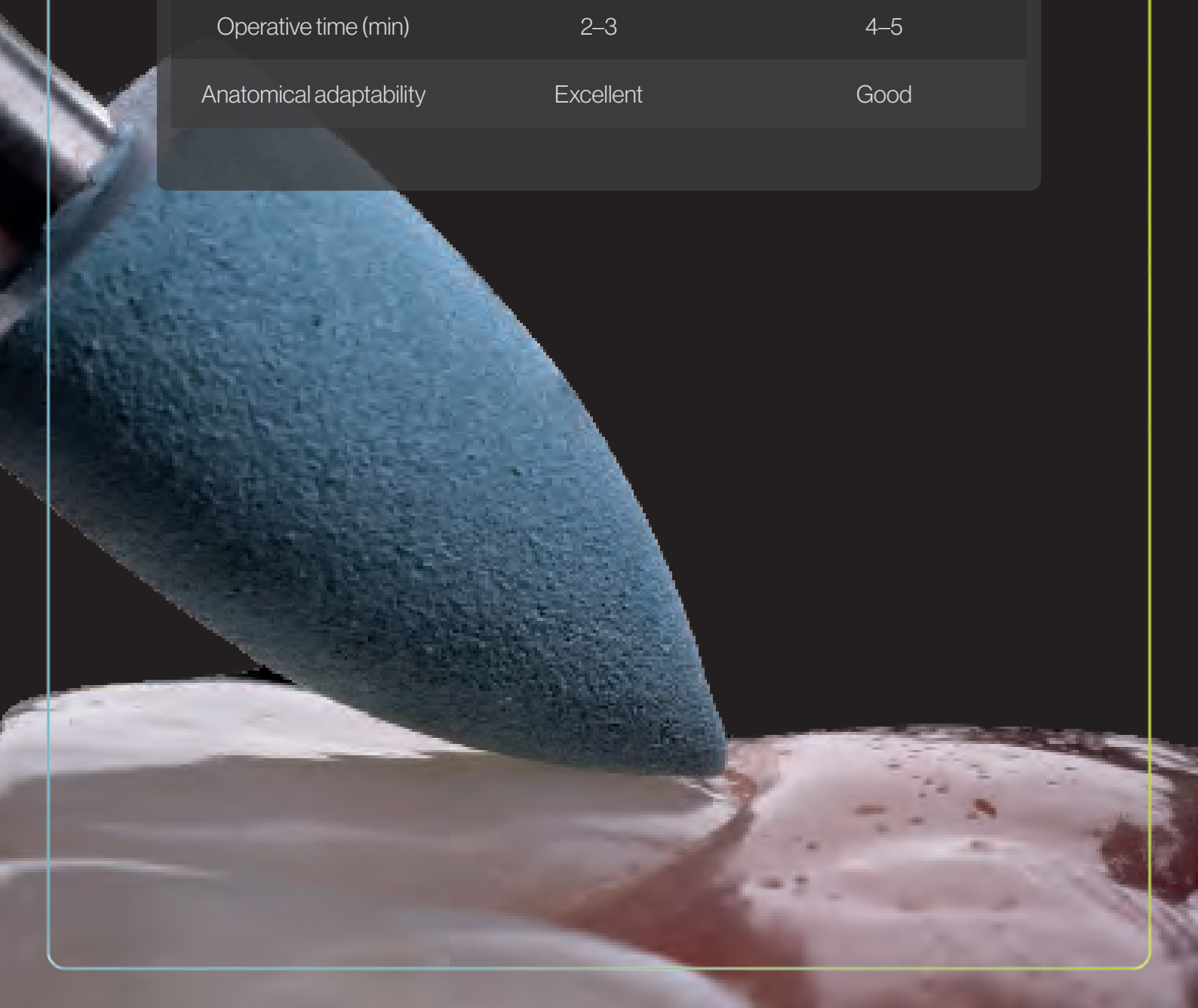
Limited clinical trials suggest that diamond polishers may shorten operative time by 20–30%. However, silicone-based Swivel polishers show a lower susceptibility to early surface staining, supporting their use in the final polishing stages where surface integrity and long-term esthetics are critical.




In dentistry, Gloss Units (GU) quantify the shininess of restorations, with values typically around 40-60 GU considered aesthetically acceptable, mimicking natural enamel. Measured by a glossmeter, higher GU means higher gloss, achieved by reducing surface roughness, which also helps prevent plaque buildup, staining, and inflammation for better long-term success of resin composites.

# CLINICAL AND LABORATORY OUTCOMES

| Parameter | Diamond Polishers | Silicone Polishers |
|---|---|---|
| Final surface roughness (Ra, µm) | 0.1–0.2 | 0.3–0.5 |
| Gloss (GU) | >50 | 25–40 |
| Volumetric loss (%) | Low (5–10%) | Moderate (≈15%) |
| Operative time (min) | 2–3 | 4–5 |
| Anatomical adaptability | Excellent | Good |



# ADVANTAGES AND LIMITATIONS

## DIAMOND POLISHERS

### Advantages

- Superior surface smoothness (Ra = 0.08-0.15 um)
- Higher gloss levels (> 50 GU)
- Faster polishing protocols (2-3 steps)
- Reduced wear rate, scratch resistance
- Durability and stain resistance

## SILICONE POLISHERS

### Advantages

- Better adaptaton to curved surfaces
- Moderate gloss levels (25-40 GU)
- Longer-lasting shine after curing
- Minimal resin wear, easier sterilization
- Low heat generation, safe for margins






## DIAMOND POLISHERS

Prioritize tribological precision and immediate esthetic outcomes through hard abrasive mechanisms, making them well suited for high-demand oral rehabilitation procedures; however, they may compromise long-term structural integrity.

Foto By Dr. Daniel Rosa

## SILICONE POLISHERS

In contrast, promote greater surface stability through gentler polishing mechanisms, reducing wear under clinical conditions. This distinction directly affects esthetic stability: diamond polishers achieve superior initial gloss (GU), whereas silicone polishers demonstrate better polish retention after material degradation.



Foto By Dr. Daniel Rosa

# SCIENTIFIC CONCLUSION

## Fundamental Difference

**From a biomaterial's perspective:**
Diamond polishers provide high-precision direct mechanical abrasion, whereas silicone polishers deliver controlled friction with greater structural preservation.

## Clinical Implications

**In oral rehabilitation:**
The choice between systems depends on balancing immediate esthetic outcomes (diamond polishers) with long-term surface stability and material integrity (silicone polishers).

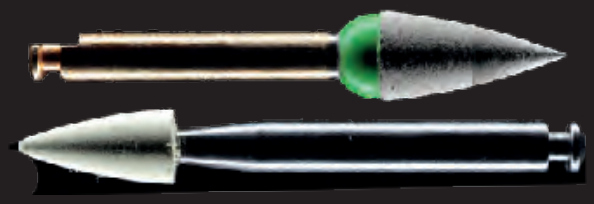
## Esthetic Performance

**Long term:**
Silicone polishers better maintain surface integrity and stain resistance over time, despite providing lower initial gloss levels.

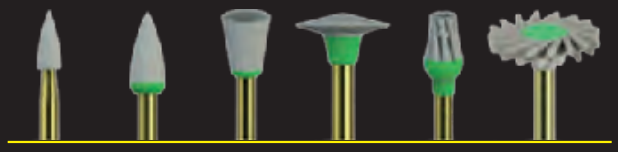
## Scientific References

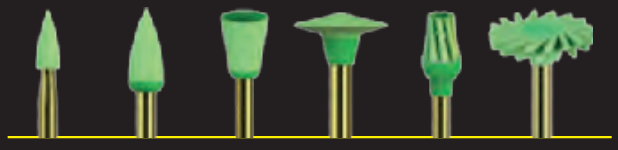
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# DIAMOND POLISHERS VS SILICONE POLISHERS



## TYPES AND SHAPES
## DIAMOND POLISHERS FOR COMPOSITE




KIT 1551



KIT 1394



## SILICONE POLISHERS FOR COMPOSITE







KIT 1899



jota
SWITZERLAND

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