



## Wet Milling Zirconium Dioxide

### The Benefits of Wet Milling Zirconia

Despite various claims to the contrary, there are many benefits to wet-milling zirconia. These benefits extend beyond the added expense and noise associated with the required filtration and vacuum systems required for dry milling applications. These vacuum and filtration systems, while removing a large amount of the caustic zirconia dust generated by the machining process, do not remove all of the dust- the balance of which becomes air born in the lab or dental office environment and creeps into machine components thereby compromising or shortening their operational lives.



Zirconia sludge (the mixture of zirconia and water) is by far easier to deal with than dry zirconia dust, does not infiltrate machine components and is significantly less destructive to machine components than caustic and abrasive dry zirconia swarf (by-products of the machining process).

Users not only enjoy longer machine and tool life, lower operating expense, and reduced system maintenance, but also realize the benefits of highly detailed and lustrous post-sinter units, superior surface finishes and sharp margins without extensive margin reinforcement- "do-overs" due to chipped or blown out margins are very rare and if present, usually attributed to worn tooling.

We recommend washing/cleaning out the machining area, of any mill, machining any material, be done daily as part of a preventative maintenance program. It does not take very long and is not difficult to do. Flushing with a water hose works well. Use of compressed air should be done carefully with low pressure, especially with "dry" machines that do not have adequate sealing of the machining enclosure.

Do this and the machine will reward you with smooth operation and longer, care-free life.

### Post Processing of Wet Zirconia

The significant difference with the wet milling of zirconia is the need to let the water evaporate from the zirconia prior to staining and sintering.

*Below you will find the recommended procedure for post processing wet milled zirconia.*

1. Extract the disc from the mill.
2. Remove excess water using an air gun, or paper towel, with the units still in the disc
3. Remove units from disc and reduce remnants of support pins in the same method used with dry milling

4. Use an air gun to remove any excess Zirconia dust paying special attention to the inner prep area.  
**CAUTION: ZIRCONIA DUST WILL BOND TO THE CROWN DURING SINTERING AND AFFECT FIT.**
5. Dry the units utilizing one of the methods shown below.
  - a. Bench set. (size of the unit will dictate the time needed)
  - b. Use a dehydrator.
  - c. Use a heat lamp.  
**CAUTION: DO NOT TO PLACE THE LAMP TOO CLOSE OR LEAVE THE UNITS TOO LONG.**
  - d. Use a standard convection/toaster oven—recommended.

NOTE: IF NO STAINING IS TO BE COMPLETED AN IDLE STEP CAN BE PROGRAMMED IN MOST SINTERING FURNACES PRIOR TO FIRST TEMPERATURE RAMP-UP WHICH ENABLES THE CROWNS TO BE PLACED IN THE FURNACE IMMEDIATELY.

## Approximate Drying Times

	Temperature -70°C (-158°F)	Temperature -140°C (-284°F)
Single tooth restorations	≥ 15 min.	5-10 min.
Restorations with 2-4 units	≥40 min.	≥25 min.
Restorations with 5 units and more	≥50 min.	≥25 min.

NOTE: ZIRCONIA'S PROPERTIES WITH LIQUID CAN EASILY BE COMPARED TO A SPONGE. IT CAN ONLY ABSORB A CERTAIN AMOUNT OF LIQUID. IF WATER IS STILL PRESENT PRIOR TO STAINING, THE SHADES WILL COME OUT LIGHTER THAN INTENDED.

6. Once dried, the staining of zirconia will be the same as with dry-milled zirconia and is a function of the stains being used.
7. The sintering of zirconia should respect the Zirconia manufacturer's sintering parameters and not the sintering oven's capabilities.