

# TempTAB™

## *Control and Monitor Dental Sintering Furnaces for Accuracy, Uniformity and Consistency with Ease*



Ceramic Materials, like dental zirconia, undergo important changes as they are heated, changes that are necessary to develop properties like strength and color. To produce a Dental implant from zirconia, control over the heating cycle is critical in developing those key product properties. **Control of temperature alone is not an effective method for producing a quality product.** Ceramic materials are affected by both the *temperature* and the length of *time* they are exposed to temperature. Properly monitoring both the time and temperature are essential for maintaining control. TempTAB measure the

amount of energy input into the Sintering process, commonly referred to as heatwork, the combined effect of time and temperature. TempTAB are made from ceramic materials similar to those associated with producing ceramic products. Therefore, the TempTAB react to heatwork in the same manner as the ware by undergoing a high degree of shrinkage. Orton's engineers have developed precise data tables to convert the shrinkage to an equivalent sintering temperature.

## Why use **TempTAB** and when are they used?

- Process improvement
- Process control
- Process verification
- Preventative maintenance



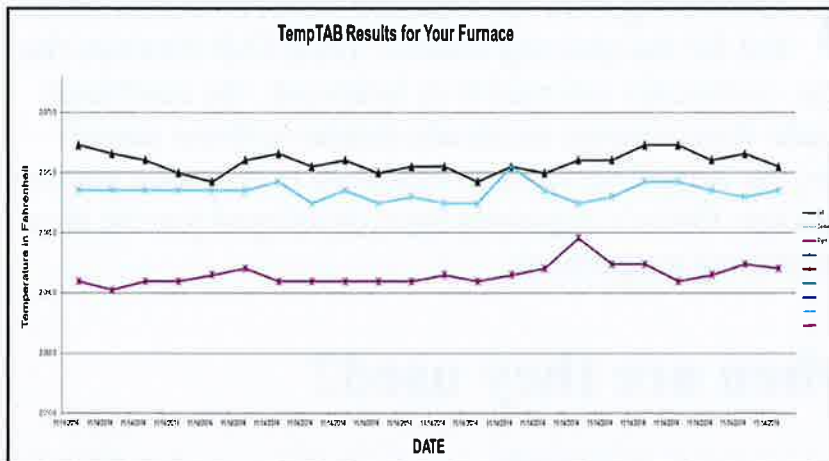
The actual temperature inside a furnace when measured by a thermocouple does not give a true representation of the amount of heat absorbed by the product within the furnace. A thermocouple can only report the temperature at a fixed location, usually in the roof or along the sidewall of the furnace. TempTAB can be placed within the furnace to determine the amount of heatwork at that location. The TempTAB report the amount of energy absorbed over time within the ware setting. The heatwork measurements can be used to monitor the accuracy and repeatability of the furnace.

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Thermocouples and electronic equipment used to control furnaces are effective tools, but are subject to errors. Thermocouples can degrade over their useful life and can break without warning. Electronic controllers need to be calibrated and can drift off calibrated settings over time, all the while reflecting a false temperature reading. Since TempTAB *are not* subject to degradation, they can be relied upon to report actual changes in the process. Through daily use, they can be used to spot trends and react to them before the product is adversely affected. Start using them immediately with a new furnace or after having your existing furnace calibrated to insure it continues to sinter properly.

## Can TempTAB be used for Statistical Process Control?

**Yes**, using Orton's TempTracker software, up to nine locations can be monitored to see the uniformity, accuracy, and the repeatability of the process. Orton provides the TempTracker software free, a typical chart is seen below.



## TempTAB products:

TempTAB 300	850°C - 1100°C (1475°F - 2012°F)
TempTAB 400	1000°C - 1200°C (1832°F - 2192°F)
TempTAB 600	1100°C - 1300°C (2012°F - 2372°F)
TempTAB 650	1225°C - 1520°C (2237°F - 2768°F)
TempTAB 700	1450°C - 1750°C (2642°F - 3182°F)

**Packaged in sleeves and case packs.**

**Each sleeve holds 25 TempTAB.**

**Each case holds 10 sleeves.**



## How are TempTAB measured?

Gather the TempTAB after completion of the sintering cycle, measure the fired diameter using the Orton Desktop gauge or a handheld digital caliper. Each TempTAB can be labeled beforehand using a high temp marker or inscribed with some identification using an engraving tool. It is best practice to place the TempTAB in as close to the same location every time. Enter the measurement into the TempTracker software and monitor the results.



## How is the shrinkage converted to temperature?

Orton conducts several firings in a tightly controlled furnace to generate data for the shrinkage conversion tables they provide with each batch of TempTAB. Orton's engineers use a set heating profile when conducting calibration firings. The profile uses a final heating rate of 300°C/hr followed by various hold times at peak temperature. You choose the hold time that is closest to your sintering profile. If using a different sintering profile, a correlation is needed. The temperature indicated by the TempTAB does not represent absolute temperature, but rather an equivalent temperature as related to the heat-work applied by the furnace to the sintered parts. The accuracy is +/- 5 degrees C. Orton can provide technical support to assist you in developing a correlation for your specific application.



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## TempTAB features and benefits:

- Shelf stable, does not degrade over time
- Cost effective, less than \$2 each
- Easy to use
- Free Charting software
- Product identification on each part for traceability
- Technical support from Orton
- Can sense process changes quickly
- Highly accurate measuring gauge

## Where can I purchase the TempTAB?

You can purchase directly from the Orton website:

<https://www.ortonceramic.com/en/TempTABs/>

Questions can be directed to:

[info@ortonceramic.com](mailto:info@ortonceramic.com)



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***Scope: Manufacture Products and Equipment for Evaluating,  
Validating, and Supporting the Thermal Processing of Materials***