

## Case Study – RAC CVD Diamond Coating

### Detection & Analysis of Raman Spectra of Diamond Coating on Milling Tools



#### Context

RAC Corporation initiated testing to be done on the CVD Diamond Coating of the Talonite® CAD CAM Milling Burs. This variable was examined against OEM and the top 2 burs on the market sold by Competitors A & B.

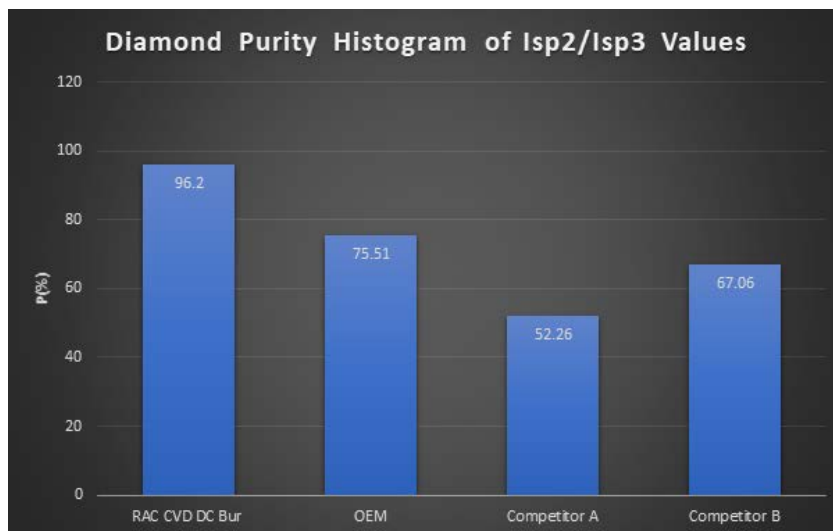
#### Content of the Study

A Raman spectrometer was used to obtain the Raman spectrum curve of the diamond film coating of four tools in the peak range of 1000-1800  $\text{cm}^{-1}$  at room temperature, and then the Gaussian equation was used in Peakfit software. RAC CVD tool diamond coatings were compared to the Original Equipment Manufacturer tool, as well as the top 2 largest competitors offering dental diamond coated milling tools in the market (Competitor A, B).

#### Experimental Preparation

##### A) Experimental equipment and samples

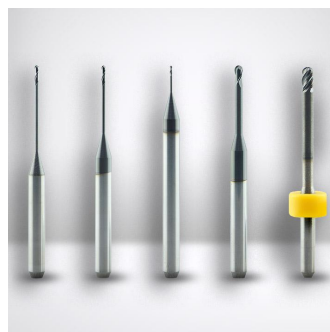
In the experiment, an invia reflex laser micro-Raman spectrometer with a single-crystal silicon third-order peak signal-to-noise ratio of 10: 1 was used to measure four types of milling cutters coated with diamond films with different surface characteristics. The laser wavelength was 632.8 nm, focal length 800 mm, and 600 gr / mm grating.



#### Conclusion

- Isp2 / Isp3 and purity (P) are consistent in the analysis of diamond carbon purity.
- The Diamond purity of the RAC CVD DC bur is the highest with good structural integrity. The non-diamond characteristics in the diamond film of the other outlined tools (OEM, Competitor A, B) **are mainly structural defects**, and a large number of unsaturated carbon atoms; **which will directly negatively affect performance and tool-life.**

From the results shown above, the specific CVD Diamond Coating process by RAC Corporation yields the purest diamond coating of milling tools available on the market.



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