

CVDE

Equipment Corporation

Application Note: Dynamic Hotzone Temperature Control™ for SiC Physical Vapor Transport Systems

Description

DHTC™ is an option that addresses some of the temperature dependent contributors to yield loss. DHTC™ is video processing software and mechanical hardware for temperature measurement accuracy and dynamic temperature measurement position tracking. DHTC™ combines video processing software and mechanical hardware for tracking the center of rotation, position of crucible viewport, and pyrometer alignment to determine, record, and compensate for misalignment of the hotzone for optimized temperature control.

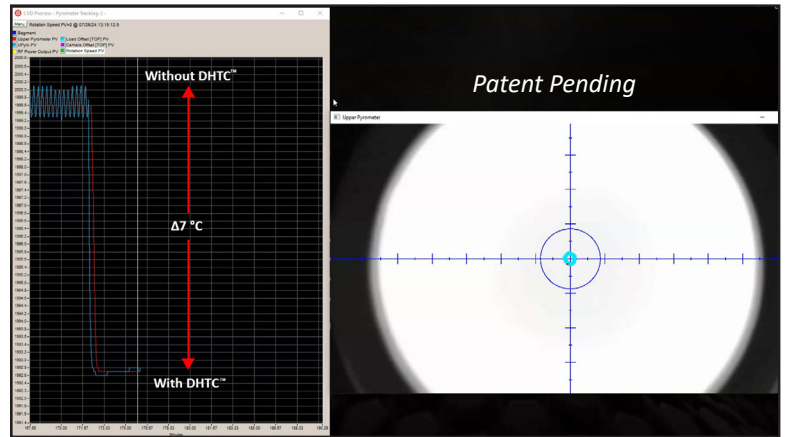
Our solution enables operating PVT systems in temperature control mode, allowing highly repeatable temperature measurements in the center of viewport and dynamically compensates for misalignment of top or bottom viewport, and eliminates temperature mis-reading due to hotzone shift. DHTC™ ensures consistent temperature measurement and control during SiC boule growth runs.

Benefits

- Yield Improvement for SiC Crystal Growth by Optimizing Temperature Measurement & Control
- Minimizing Impact of Misalignment from Hotzone Degradation, Assembly, & Loading
- Improved within Run, Run-to-Run & System-to-System Temperature Measurement Consistency

Availability

Offered as an option on all of CVDE's PVT systems. Can also be integrated with in-house manufactured PVT systems. Learn how DHTC™ has the potential to improve yield and system fleet productivity.



The actual temperature is 7 °C lower due to the misalignment, contributing to boule yield loss without DHTC™

Differentiating Features & Options:

- Video Processing Software & Mechanical Hardware for Temperature Measurement Accuracy & Dynamic Temperature Measurement Position Tracking
- Automated Pyrometer Tracking & Alignment to Hotzone (Recording of Position During Run)
- Offered as an Integration Option with CVDE's PVT200™
- An Integration Option Offered for Your Existing PVT System

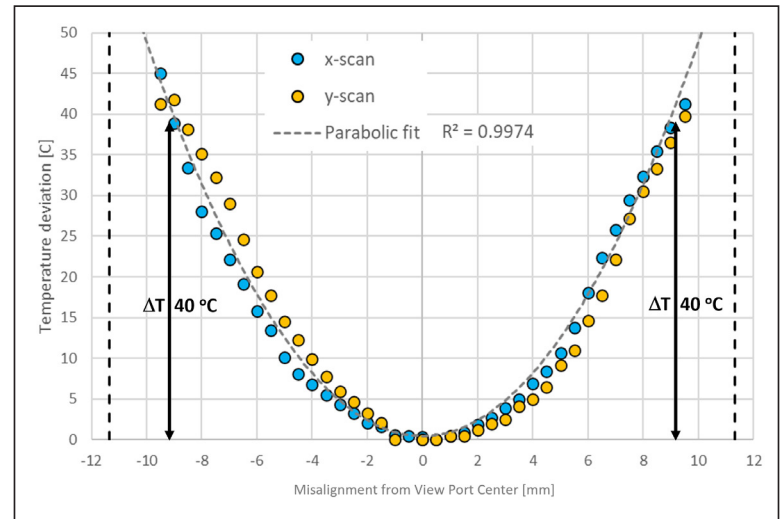
Temperature Control

- Temperature Variation is considered to be contributor to yield loss
- Misalignment of the hotzone will likely impact the PVT system repeatability run-to-run and yield
- Impacts from misalignment include inaccurate temperature measurement and in turn can cause lower yields
- Variations in temperature can be as much as 40 °C due to misalignment

Temperature Plot Measurement

- Temperature measurement conducted under constant power mode
- Static Deposition (no rotation)
- Set for 2075 °C in the center of top viewport

X-Y Pyrometer Scan of Viewport

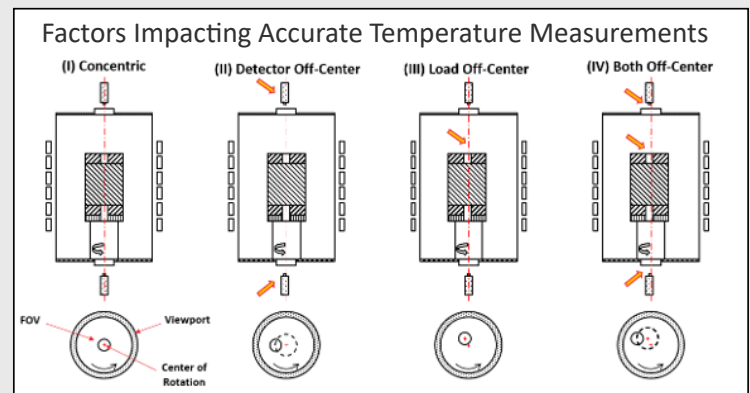


Temperature variation is up to 40 °C at 9 mm from center

Accuracy of Temperature Measurement is Critical to Ensure within Run, Run-to-Run and System-to-System Repeatability

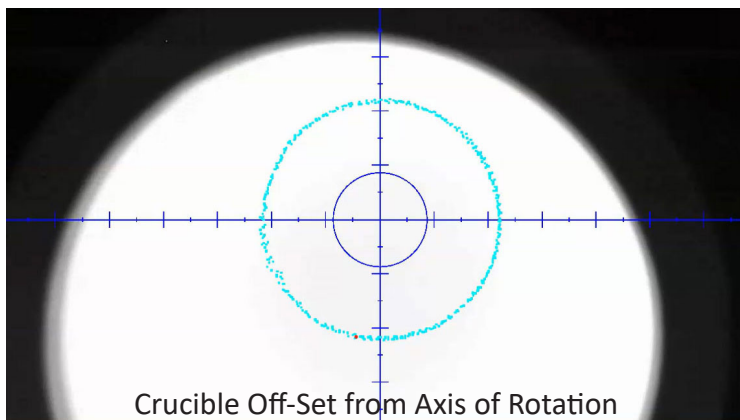
Inaccuracy in temperature measurement can lead to variations up to 40 °C. Key variables that can impact the temperature measurements within a process run

- Misalignment from manual hot zone assembly
- Misalignment from manual loading
- Detector can become off-center with time



DHTC™ is CVD Equipment's solution to enable improved temperature measurement for PVT Systems.

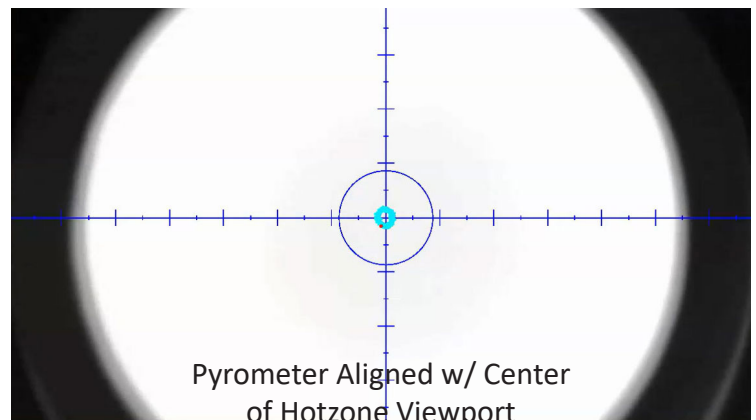
DHTC™ Inactive



Real time position tracking of pyrometer and hot zone center to record misalignment deviation.

Dynamic Hotzone Temperature Control (DHTC™) is patent pending CVDE innovation.

DHTC™ Active



Precise temperature measurements at the center of viewport.

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