P4.05 – Chuck System for Integrated IR-Based Temperature Measurement in Rotational Grinding of Sapphire Wafers

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System Basics

- Saphire wafer
- Grinding wheel
- Feed rate $v_f$
- Wheel speed $n_{w}$
- Contact zone
- Wafer speed $n_{w}$
- IR transmission spectrum of a 2 mm thick sapphire and quarz wafer

Measurement Concept

- Machine tool control system
- Grinding spindle
- Grinding wheel
- Sapphire wafer
- IR transparent vacuum chuck
- IR radiation
- IR detector
- Data acquisition chain (DAC)

Developed Chuck System

- Grinding wheel
- Sapphire chuck
- Chuck spindle
- Compressed air sealing supply
- Spindle housing
- Vacuum channel pattern
- Pyrometer measurement spots
- Pyrometer pilot light

Proof of Concept

- 3 Pyrometers
- Spindle power
- Stationary process
- Spindle power
- Sparker out
- 2" Wafer
- Chuck
- Measurement positions

Grinding conditions
- Wafer: 2" C-plane $n_{w} = 2500$ 1/min
- Tool: D20 metal bonded $n_{p} = 50$ 1/min
- Coolant: Water, 200 l/min $v_{p} = 100$ $\mu$m/min

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