HBM

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

**F. Klocke[1], O. Dambon[1], M. Herben[1], D. Veselovac[2], O. Adams[2], E. Kuljanic[3], M. Sortino[3], G. Totis[3]**
[1] Fraunhofer Institute for Production Technology IPT, Aachen, Germany
[2] Laboratory for Machine Tools and Production Engineering, RWTH Aachen University, Germany
[3] Department of Electrical, Management and Mechanical Engineering, University of Udine, Italy

## System Basics

Saphire wafer
Grinding wheel

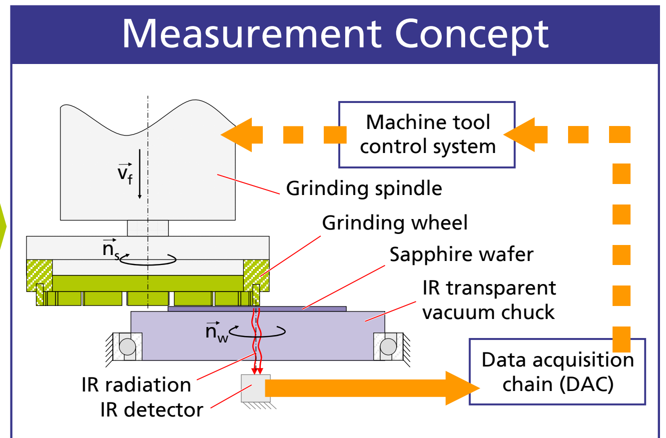
Feed rate $v_f$
Grinding wheel
Wafer
Wheel speed $n_s$
Contact zone
Wafer speed $n_w$

IR transmission spectrum of a 2 mm thick sapphire and quarz wafer

IR bandwidth of common detectors
- **SWIR** (1-3 µm) InGaAs detectors
- **MWIR** (3-5 µm) InSb, HgCdTe and PbSe detectors

Sapphire
Quarz
SWIR
MWIR
Source: Korth Kristalle
3 µm
5 µm

## Measurement Concept




## Developed Chuck System

Grinding wheel
Sapphire chuck
Chuck spindle
Compressed air sealing supply
Spindle housing

Pyrometer measurement spots
Vacuum channel pattern
Pyrometer pilot light

## Proof of Concept

3 Pyrometers
Spindle power
ramp
stationary process
spark out
Power [kW]
t [s]

Measurement positions
2" Wafer
Chuck

| Grinding conditions | |
|---|---|
| Wafer: 2" C-plane | $n_s$ = 2500 1/min |
| Tool: D20 metal bonded | $n_w$ = 50 1/min |
| Coolant: Water, 200 l/min | $v_f$ = 100 µm/min |

Fraunhofer IPT
UNIVERSITAS STUDIORUM UTINENSIS
WZL RWTHAACHEN
SEVENTH FRAMEWORK PROGRAMME

The presented work was supported by the 7th Framework Programme of the European Commission within the project entitled „ThermoGrind"