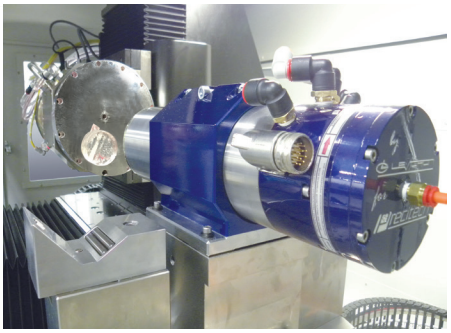
precitech

Global Manufacturer of Innovative Ultra Precision Machining Solutions

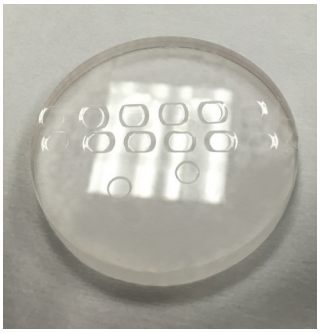
Micromilling of crystalline material (CaF_2)

INNOVATIVE **APP**NOTE

Freeform® L



Setup photo



Part photo

Goal:

To demonstrate the surface finish and flatness results achievable on calcium fluoride using a Freeform® TL machine and a Levicron milling spindle.

Process:

3 Axis milling (X, Y, Z)

Feature Details:

Test patch size: 4 mm
Material: Calcium fluoride

Process Details:

Tool radius: 1.0 mm
Milling tool: Ball End mill
Milling spindle speed: 30,000 rpm
Cutting time: 25 minutes
Feed rate: 50mm/min
Step over: 0.01 mm
Depth of cut: 40 µm
Coolant: Odorless mineral spirits

Measurement methods:

***Finish*:** **Instrument:** Taylor Hobson CCI
Sample area: 0.82mm x 0.82mm

Form: **Instrument:** Taylor Hobson CCI
Sample area: 3.6mm x 3.6mm

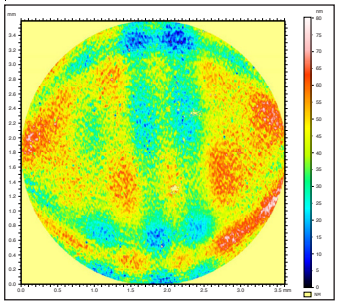
Results:

- **Surface finish:** 3.9 nm Ra
- **Flatness:** 80.2 nm PV

Flatness (Form)

4 mm diameter

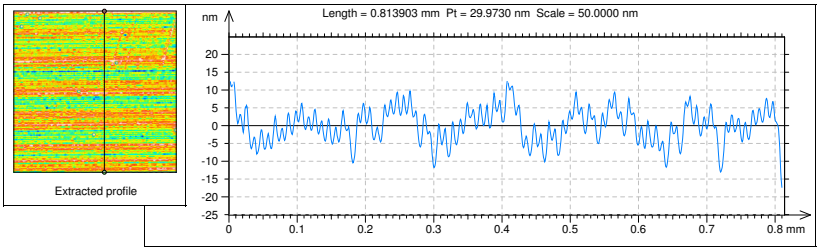
Ball endmill test - CaF2
30000rpm f50 2.0um depth finish 0.010mm step over, 2 flats 51 min



ISO 12781				
Flatness parameters				
FLTt	80.2300	nm	not filtered	Peak-to-valley flatness deviation of the surface

Surface finish

ISO 25178			
Height Parameters			
Sa	3.97053	nm	*Arithmetic mean height*
Sq	4.88939	nm	*Root mean square height*
Sz	30.3540	nm	*Maximum height*



ISO 4287				
Amplitude parameters - Roughness profile				
Ra	2.63645	nm	*Gaussian filter, 0.08 mm*	*Arithmetic Mean Deviation of the roughness profile.*
Rz	13.6443	nm	*Gaussian filter, 0.08 mm*	*Maximum Height of roughness profile.*
Rq	3.26199	nm	*Gaussian filter, 0.08 mm*	*Root-Mean-Square (RMS) Deviation of the roughness profile.*

AMETEK® Precitech, Inc.
44 Blackbrook Road • Keene, NH 03431 USA
Phone: 603-357-2511 • Fax: 603-358-6174
www.precitech.com

AMETEK®
ULTRA PRECISION TECHNOLOGIES