



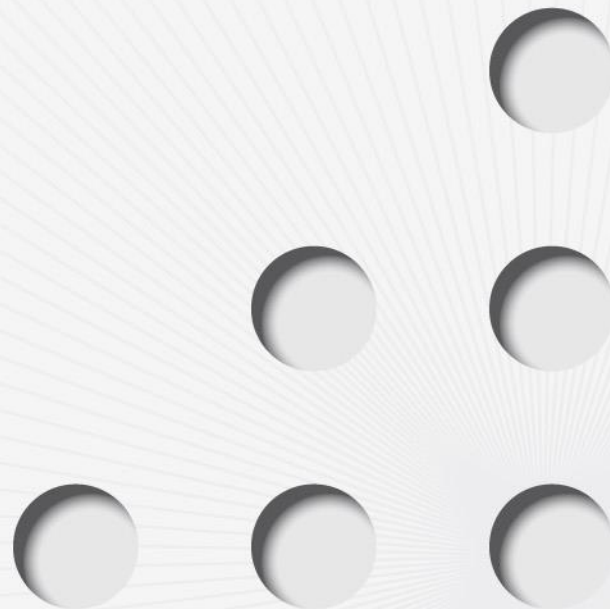
Workshop of Photonics

Manufacturing Glass Spacers For Wafer Level Optics

Dr. Antanas Urbas

EPIC Meeting

Neuchâtel, 7-8 November, 2019





Why We Work With Glass?

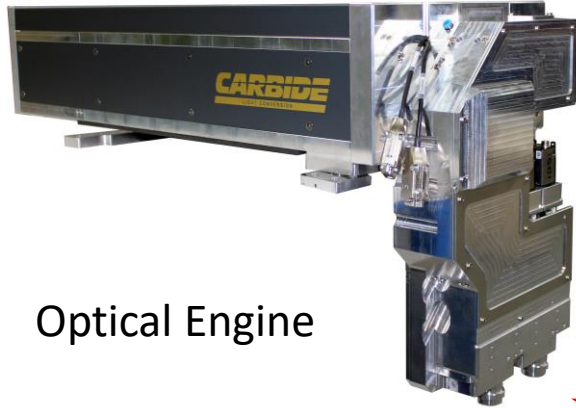
- Rich choice of features – hardness/elasticity, CTE, electric, one can find glass ready for use in almost any application
- Because of that – quite high demand and increasing popularity in use as component material
- We know glass – state-of-the art glass cutting technology developed since 2010, patented in 2012, ammended in 2015. In the market, people consider WOP as ‚glass cutter‘, right?
- We develop it further – another 3 patents pending
- We are familiar with most popular glasses: Corning, Asahi, Ohara, Nippon Electric, Schott, Hoya that supply glass to optics, electronics, MEMS... you name it... manufacturers; borosilicate, alkaline, alkaline free, aluminosilicate, ULE – we know how to deal with most of them

- Market forecasts predict continually increasing demand, with wafer-level cameras breaking 1 billion units. This trend will be accompanied by the evolution of wafer-level cameras toward higher pixel numbers, generating a need for more complex optical systems and, consequently, tighter manufacturing tolerances. (*Michael Kast, EVG in Photonics Media*)

- We, too, want a piece of that cake hence we deployed manufacturing facility dedicated for glass wafer processing along with legacy work in R&D lab

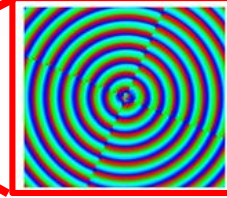
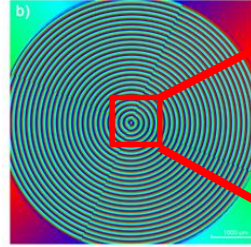


How We Do It? Step #1 – Laser Processing

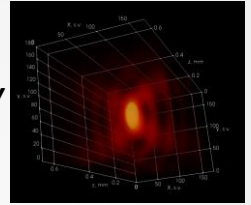


Optical Engine

+

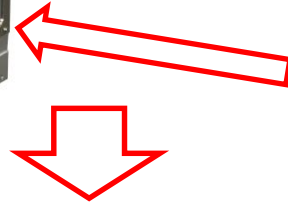


Y

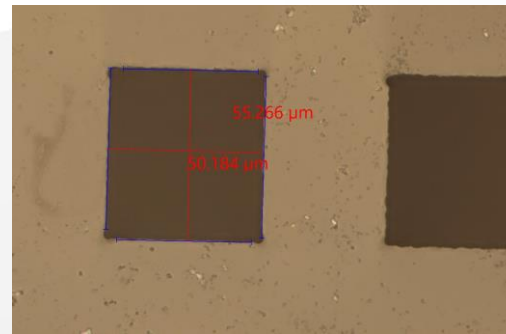
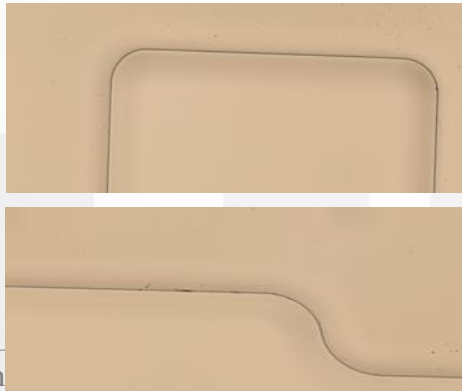


X

Special Optical Elements



Free Form Cut



Non-round
Corners of Holes

How We Do It? Step #2 – Chemical Wet Etching



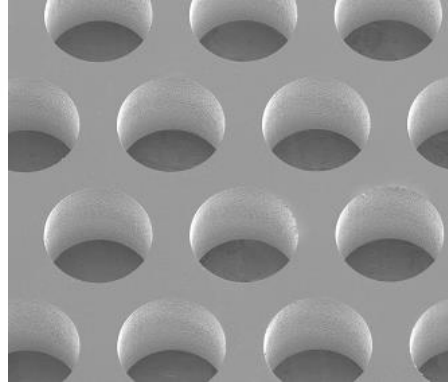
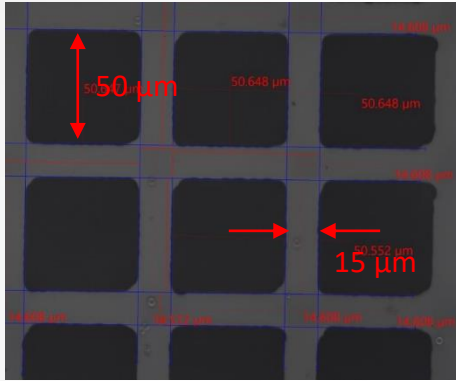
Mixed etchant specific for particular glass



Rinsing and cleaning

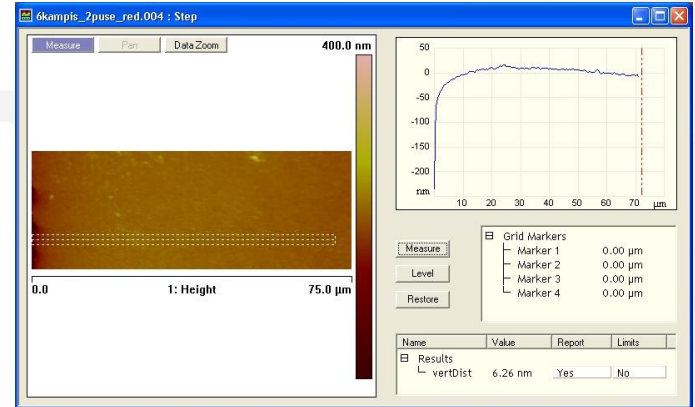
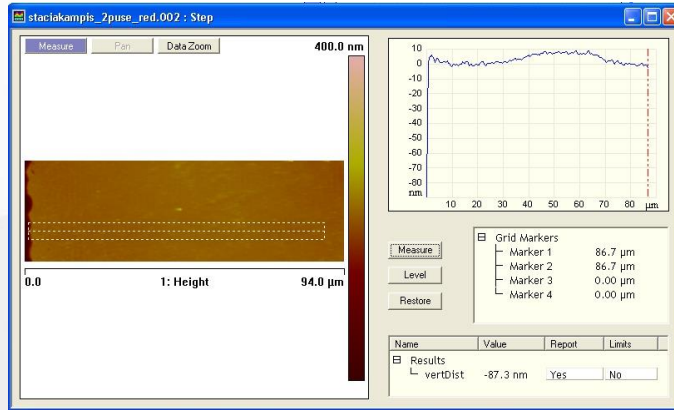


What We Get? (And You May Have It)



- Position accuracy $< 1\ \mu\text{m}$
- Shape precision $< 1\ \mu\text{m}$
- Grid thickness $\geq 15\ \mu\text{m}$
- Glass thickness $\leq 15\ \text{mm}$
- Wafer $\varnothing \leq 200\ \text{mm}$

Sharp edge!
Flatness ready
for bonding





Thank you!

Any questions?

This presentation was presented at EPIC Meeting on Wafer Level Optics 2019

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