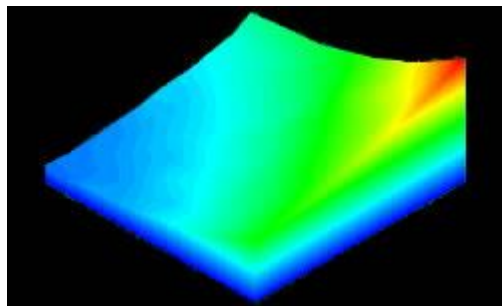
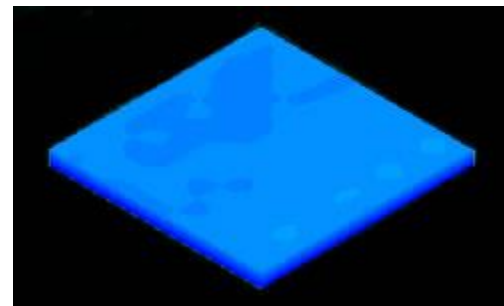


# Fluid Jet Polishing

- LightMachinery has developed a patented computer controlled polishing technology: Fluid Jet Polishing (FJP)
- FJP allows to produce consistent surface flatness or thickness uniformity of 3 nanometers.
- LightMachinery utilizes FJP on a daily basis to produce high value optical components, also used for its high-end spectrometers



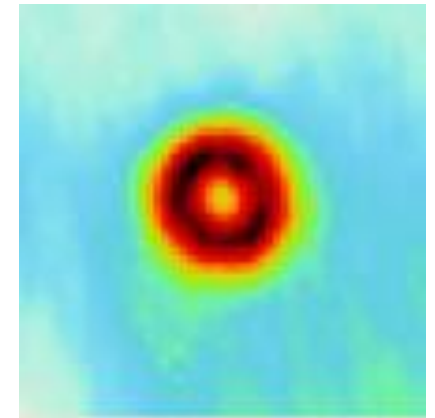
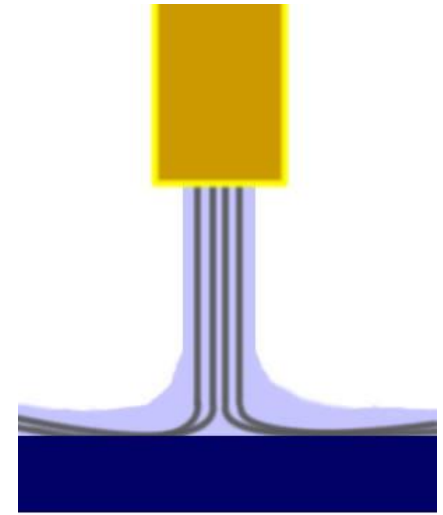
Before (115 nm variation in thickness)



After (3 nm)

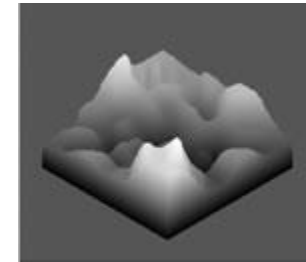
# Fluid Jet Polishing: Using a Stream of Fluid

- A flow of abrasive nano-particles from a jet nozzle hits the optical surface
- Dwell time of the nozzle equates to removal volume
- As the flow hits the surface of the optic the direction of flow changes by 90 degrees (from downward to outward)
- The work done on the surface (tool shape) is in the shape of a second order gaussian (donut)



# Dwell Map Computation

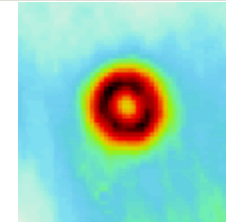
- Measure the current surface
- Create a target surface
- Load the fluid jet tool profile
- Software calculates the optimal tool dwell map to achieve the desired change
- Software determines the predicted surface after fluid jet processing



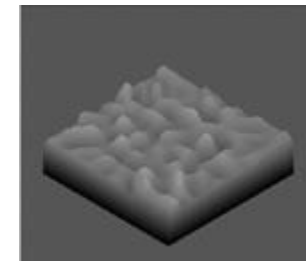
Starting Surface



Target Surface

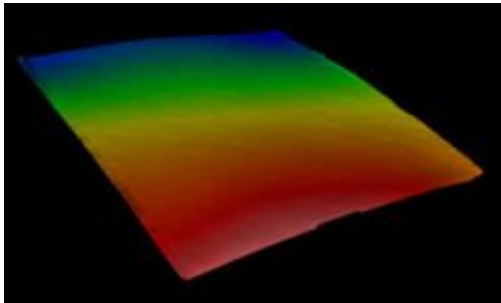


Tool Profile

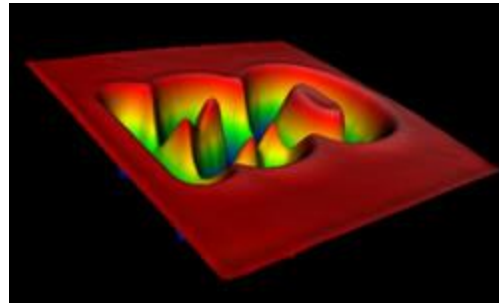


Predicted Surface

# FJP Examples



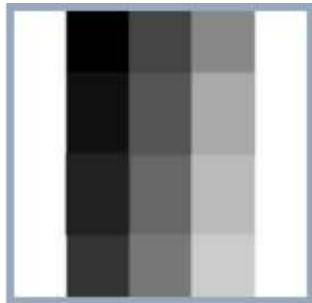
Starting Surface



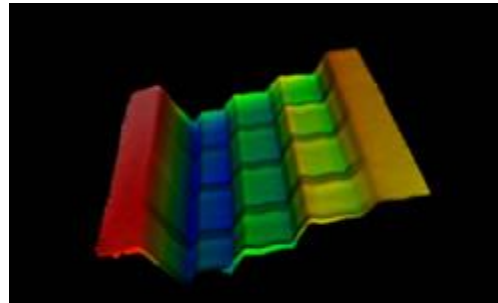
Processed



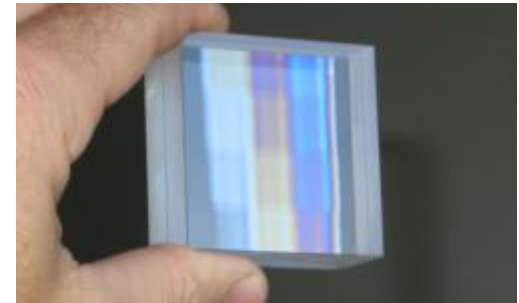
Optically Contacted



Target Profile

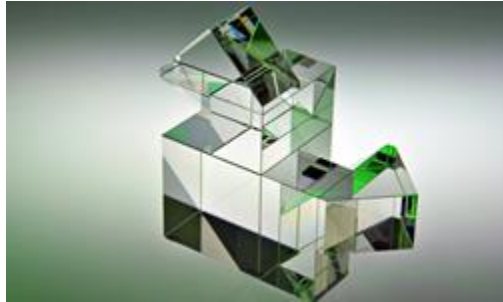


After Processing

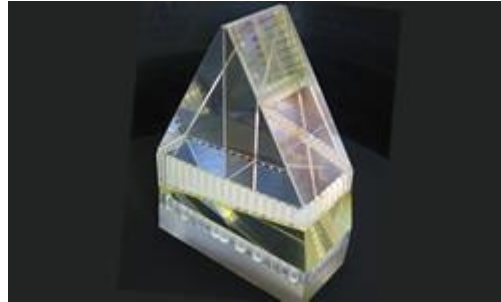


Optically Contacted

# More Fluid Jet Polishing Examples



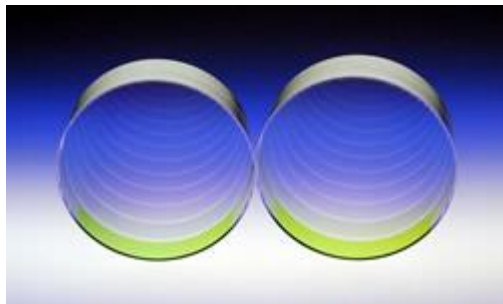
MANIC



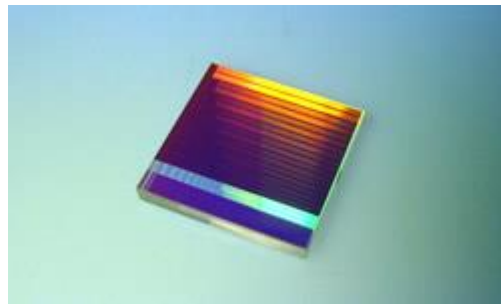
DASH



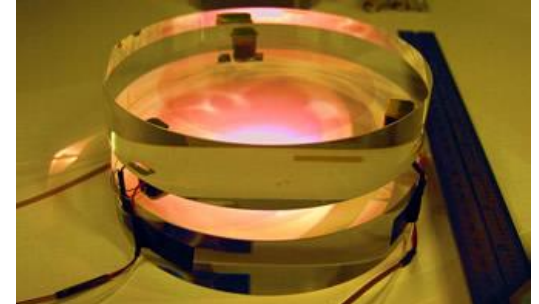
HMI



Etalons



VIPA Etalons



Large Etalons