# Valley Design Corp.

*Since 1974, Industry Leaders in Precision Lapping and Polishing of Materials for Microelectronics, Electro-Optics, Optics and Semiconductors*

Westford, Massachusetts

Santa Cruz, California

www.valleydesign.com

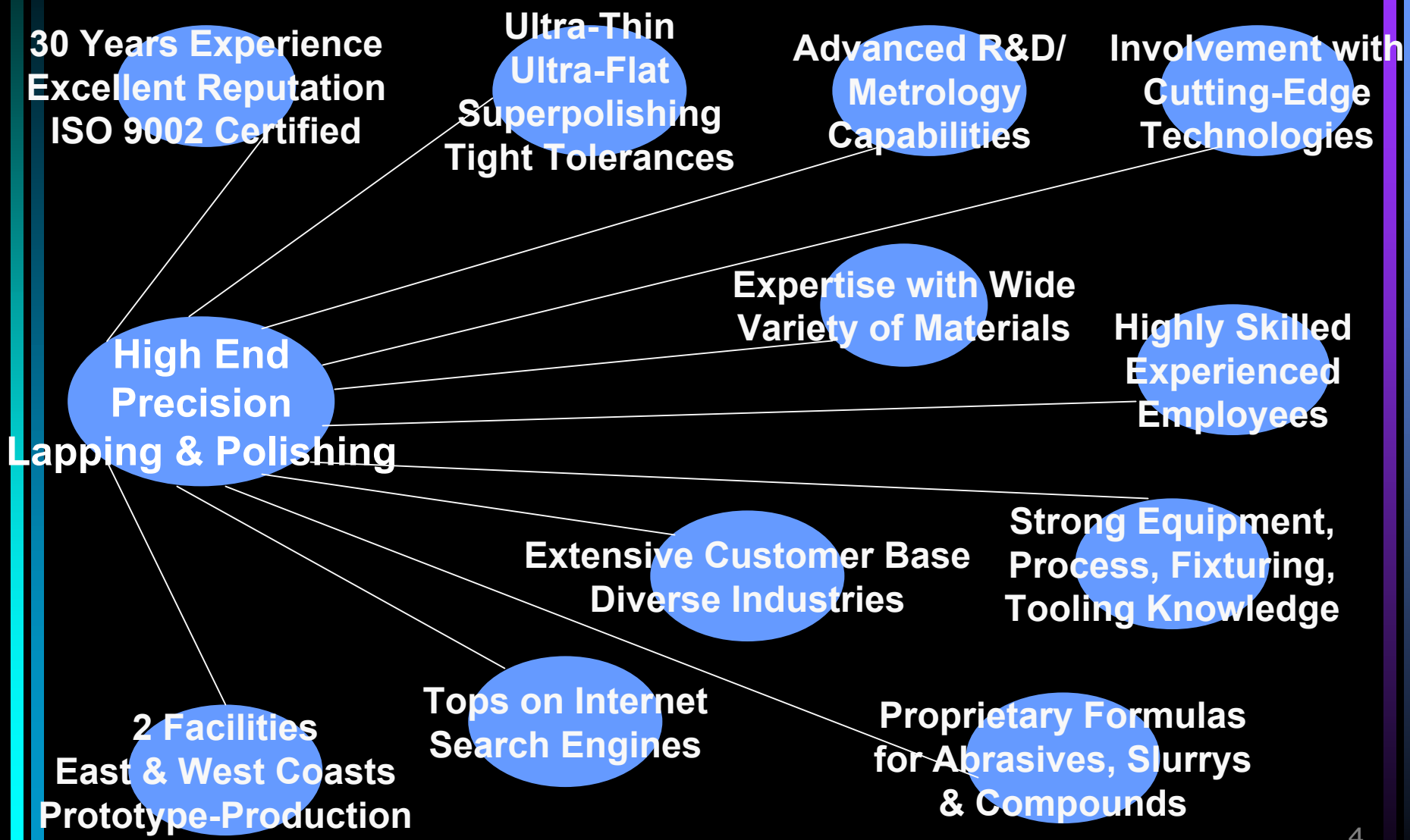
# Contents

- About Us
- Core Competencies/ Competitive Advantage
- History/Technology Landmarks
- Capabilities
- Equipment
- Metrology
- Abrasives/Compounds & Slurrys
- Valley Design Store
- 2001-2002 Year in Review

# About Us

- Since 1974 Industry Leaders in Advanced Materials Processing Serving the Semiconductor, Medical, Aerospace, Optics, Telecommunication and Research Industries
- ISO 9002 Certified With Over 25,000 sq.ft. of Facilities Space on East and West Coasts, employing approx. 25
- Services: Precision Lapping, Polishing, Dicing, Optical Edge/Angle Polishing, Fiber Array Polishing, Individual Die Thinning, O.D./I.D. Grinding and Polishing, Backgrinding, Wafering, Shaping, Bonding
- Products: Substrates, Windows, Wafers, Flat Optics, Glass Rods/ Blocks/Spacers, Waveguides, Beamsplitters, Polarizers, Lenses, Filters, Prisms, Wedges, Solar Cells, Witness Samples and other Components
- Materials: AlN, Aluminas, Ceramics, Fused Silica, Quartz, Glass, SiC Sapphire, Silicon, $LiNbO_3$, Crystals, GaAs, InP, ZnSe, PZT, PLZT, etc.
- Applications: Capacitors, High Power Semiconductor Products, Thin Film Circuits, SEMI Std. Dummy Wafers, Photonic and Optical Devices, DWDM Filters, MEMS and Nano-Optical Devices

# Core Competencies/Competitive Advantages



# History / Technology Landmarks

- 1974: Incorporated to develop and design unique manufacturing processes for the shaping of materials such as Ceramics, Silicon, Germanium, Quartz and Glass for the Semiconductor and Hybrid Circuit Industries.
- Opened facilities in Merrimack Valley, MA and were initially set up for I.D. cutting and wafering of non-Silicon materials. Projects included Fused Silica for Intel e-proms, 4" diameter Macor substrates for HP, Boron Plus wafers for doping Silicon for Owens of Illinois.
- 1975: Began providing backlapping and polishing of Germanium and Silicon using traditional techniques.
- 1978: Moved facilities to Nashoba Valley and began polishing Fused Silica using traditional optical processes, and conducted initial trials on Alumina and Sapphire substrates for thin film hybrid circuit industries.
- 1980: Purchased abrasive compound/slurry manufacturer leading to research and development campaign to become the world's most diversified lapping/ polishing company.
- Through 1985: Developed world-renowned Read-Rite memory head polishing process which is still being utilized to this day. Began production polishing of 99.6% substrates.  Added CNC dicing capabilities in-house.

# History cont.

- 1986-1989: Moved to current Westford, MA location. Began production on Ceramic automotive sensors. Production lapping / polishing on metal semiconductor chucks.
- 1990: Developed unique CMP scratch-free polishing process on numerous materials propelling the company into the optics/photonics industry.
- 1997: ISO 9002 Certification
- 1998: Began production lapping ultra-thin 96% Alumina
- 1999: Opened West Coast sales/manufacturing facility nearby to Silicon Valley
- 2000: Introduced Valley Design Store program – Revamped inventory system, marketed in-stock items on-line.
- 2001: Began production polishing of ultra-thin solar cells, and AlN substrate polishing. Expanded East Coast facility to include R&D Lab and advanced metrology capabilities.
- 2002: Perfected Optical Edge polishing, Fiber Array polishing, O.D. polishing and ultra-thin double side polishing. Focus on R&D and future products including nano-technology.

# Capabilities

- Ultra-Thin (12.5 um)
- Ultra-Flat (1/20 Wave)
- Tight Tolerances (+/- .25 um)
- Parallelism (.25 um)
- TTV (< 1 um)
- 99.6% $Al_2O_3$/AlN Polishing to .1 um Ra / to 25 um thick
- Superpolishing Optical Mat'ls (1 Angstrom / < 10/5 Scratch/Dig)
- Optical Edge Face Polishing (Chips < .1 Micron)
- Ultra-Thin/Ultra-Flat Wafers and Chucks to 300mm
- Lapping up to 48"
- Dicing as small as .005" sq.

# Equipment

- East Coast Facility (approx. 22,000 sq.ft.):
  - Production Lapping Machines (24-48″)
  - Production Polishing Machines (24-48″)
    - Capable of 24/7 operation
  - R&D Lapping/Polishing Single/Double Side Machines
  - CNC Dicing Machine and CNC Machining
  - Blanchard Grinder
  - Surface Grinders
  - O.D. Wafering Saws and O.D. Grinding Lathes
  - Internal Machine Shop geared toward equipment re-building, re- furbishing, customizing, fixturing, tooling and maintenance
- West Coast Facility (approx. 3,500 sq.ft.):
  - 28″ Production Polishers
  - Double Side Polishers
  - Lapping Machines (28-48″)
  - CNC Dicing Machine
  - Internal Machine Shop for fixturing, tooling, machine maintenance

# Metrology

- ISO 9002 Calibration & Maintenance
- Surface Finish Resolution to 1 Angstrom
- Flatness / Wavefront Distortion to 1/20 Wave (.0000012")
- Thickness / Length Measurements over 2" area: .1 um, over 3' area: .25 um
- Key Equipment:
  - Fizeau Optical Laser Interferometer
  - Mitutoyo Litematic Digital Height Msmt. Instrument
  - Pratt & Whitney Supermicrometer (3' capability)
  - Closed Circuit 400X Video
  - WYKO Optical Interferometer
  - Numerous Instruments including Profilometers, Electronic Indicators, Optical Comparators, Surface Plates/Flats, etc.

# Abrasives, Compounds & Slurrys

- Purchased abrasives business in 1980 from known abrasives expert
- Over 30 proprietary slurrys/compounds formulated exclusively for the polishing of:
  - Ceramic Substrates
  - Metallurgical Polishing
  - Eyelet Dies
  - Cubic Zirconia
  - Mold Polishing
  - Lappidary Applications
- Since then, the past 20 years of continued R&D has enabled Valley to further compound its foundation to formulate and modify additional chemical/mechanical polishing slurrys for the superpolishing of:
  - Alumina
  - Sapphire
  - Fused Silica
  - Beryllium
  - AlN
  - Crystals

# Valley Design Store

- Categorized, classified, itemized, labeled and automated all material inventory (over 250,000 items) including standard stock materials and overruns to market on the Internet.
- Full Q.C. conducted on stock for geometry, thickness, surface finish, flatness, tolerances.
- Standard stock sizes lapped and polished in Aluminas, AlN, Sapphire, Silicon, Fused Silica, Optical Glasses, Quartz.
- One day delivery available

# 2001-2002 Year In Review

- Opened West Coast Sales/Manufacturing Facility (full service lapping/polishing/dicing capabilities)
- Expanded East Coast facility to include R&D Lab and advanced metrology area bringing total sq.ft. to approx. 25,000.
- ESD Compliant (Class 10)
- Invested in new technology advances in MEMS, Nanotechnology, Waveguide, Fiber Array and Capacitor applications
- Acquired additional machinery: CNC machine, double side polishers, various lapping machines, additional dicing saw, 6” wafering saw, optical surface finish profilometer and laser interferometer
- Hired additional expert technicians on both Coasts adding to numerous existing employees with over 25 years experience in lapping/polishing industry
- Introduction of Valley Design On-Line Store and Material Stocking Program