



Holographic technology and product development update

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80305-5602**

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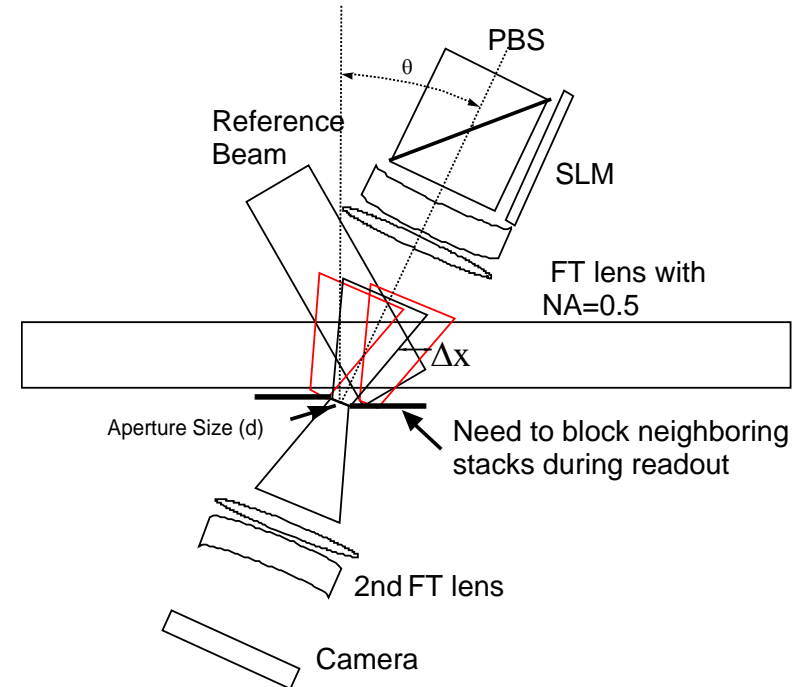
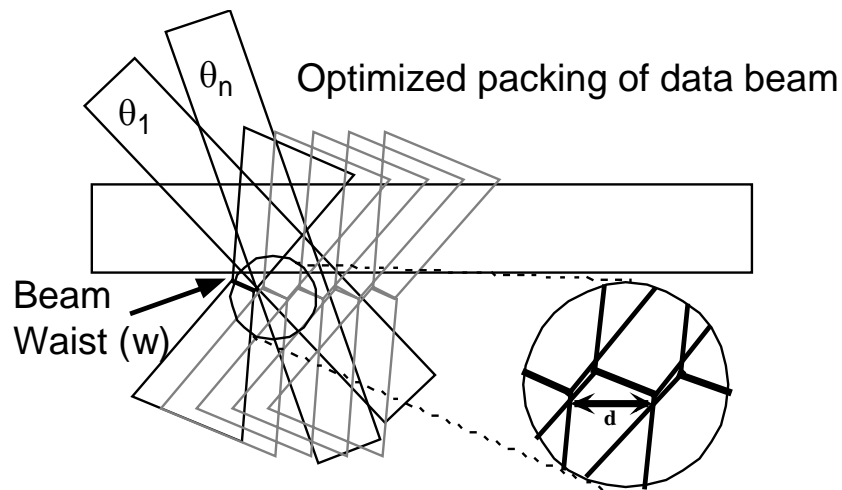
Agenda

- Technology Overview
 - Opto-Mechanical Assembly (OMA) architecture
 - Polytopic filter and Phase Conjugation
 - Technology roadmap
- Prorotype and Product development update
 - Drive development status update
 - Product road map
 - First generation product specifications
 - Partners and potential users

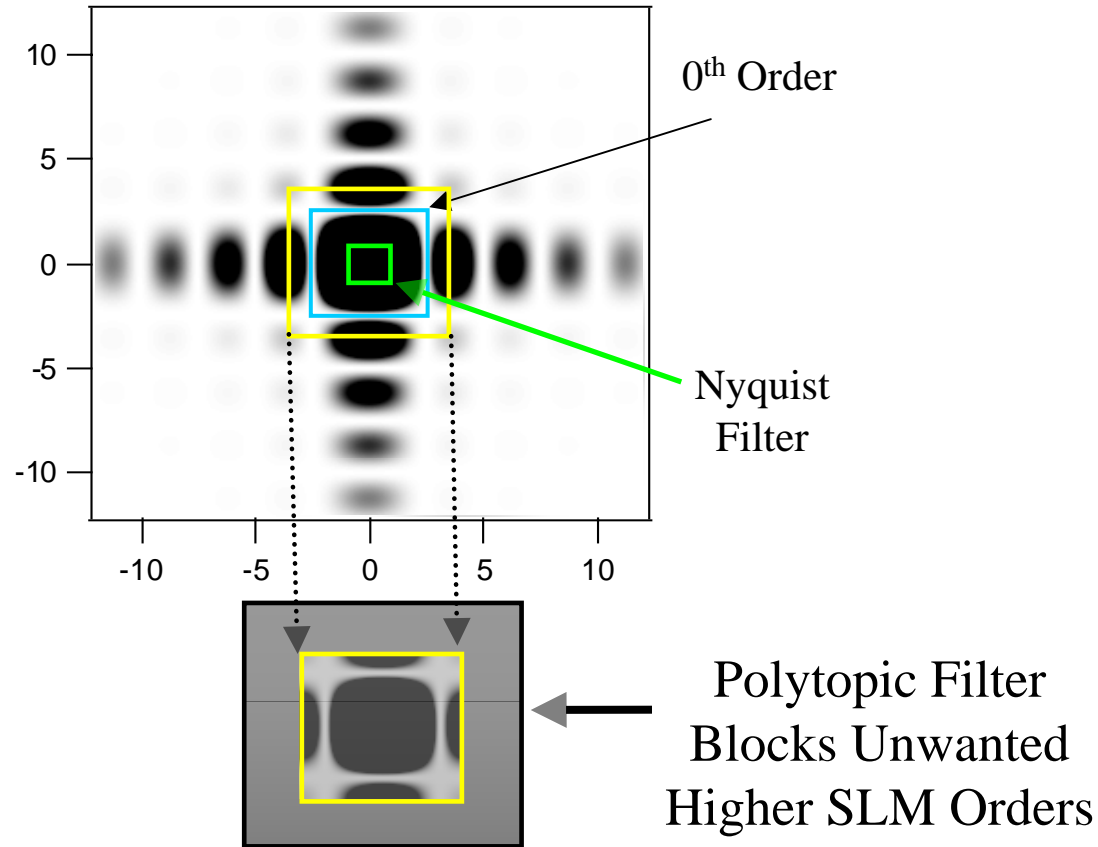
Technology overview

Technology enhancements for our product development:

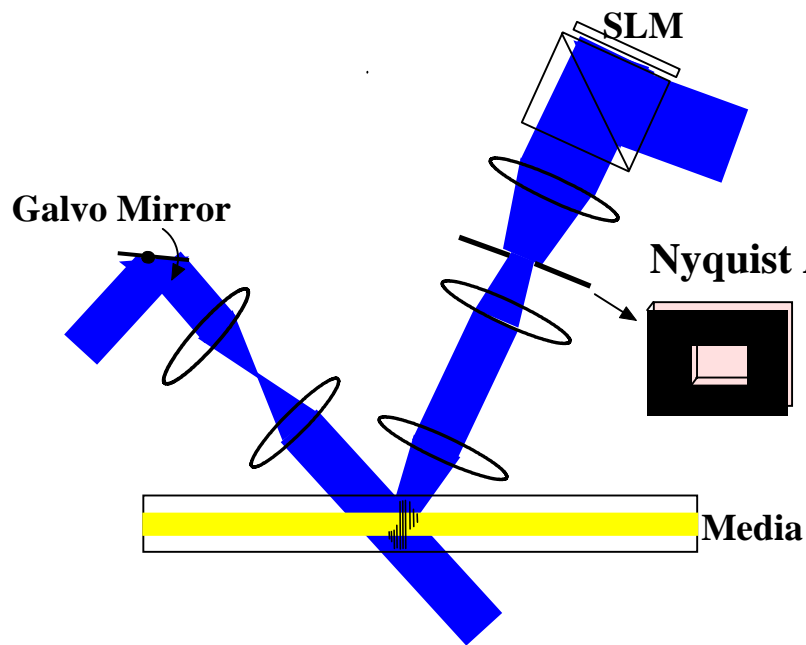
- Continuing with the use of the Polytopic filter and Phase and Conjugation architecture for our drive development.
- Developing new custom components:
 - New 1200 x 1200 pixel SLM development
 - New 1600 x 1600 pixel camera development (with higher sensitivity)
 - New fast shutter (new development for long life and reliability)
 - New Opto-Mechanical Assembly (OMA) design
 - Blue tunable laser (with Sony's help)
 - Phase Mask development
- Invented oversampling technique to avoid moving the camera to achieve pixel matching.
- New channel development to support oversampling and a high transfer rate with robust data reliability (10 x E-15 error rate).



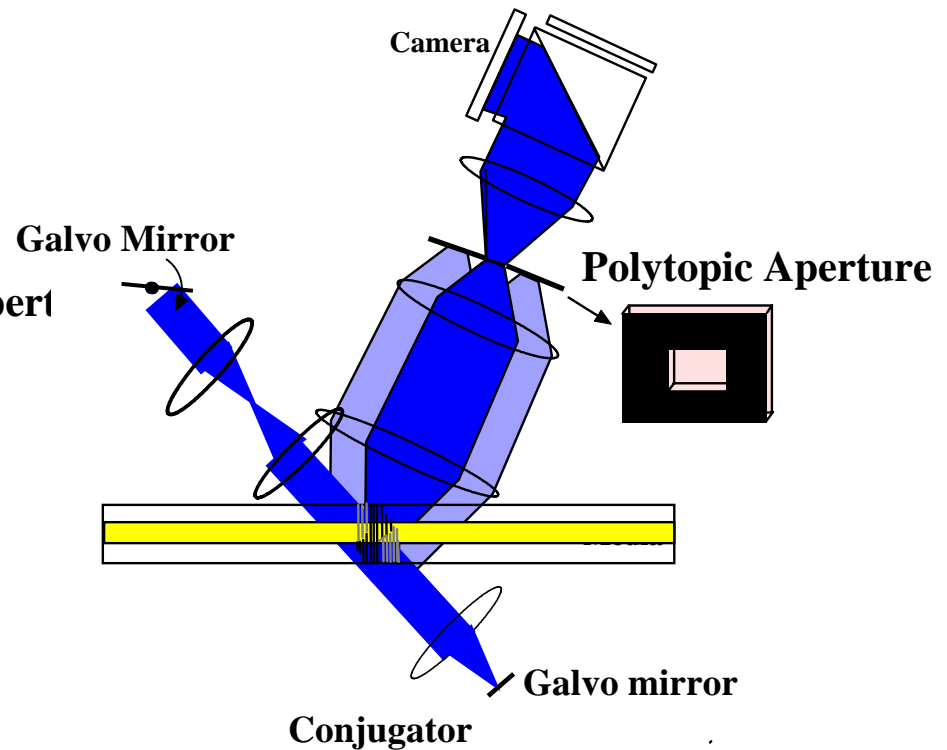
**At the Fourier/Focus
plane of SLM**

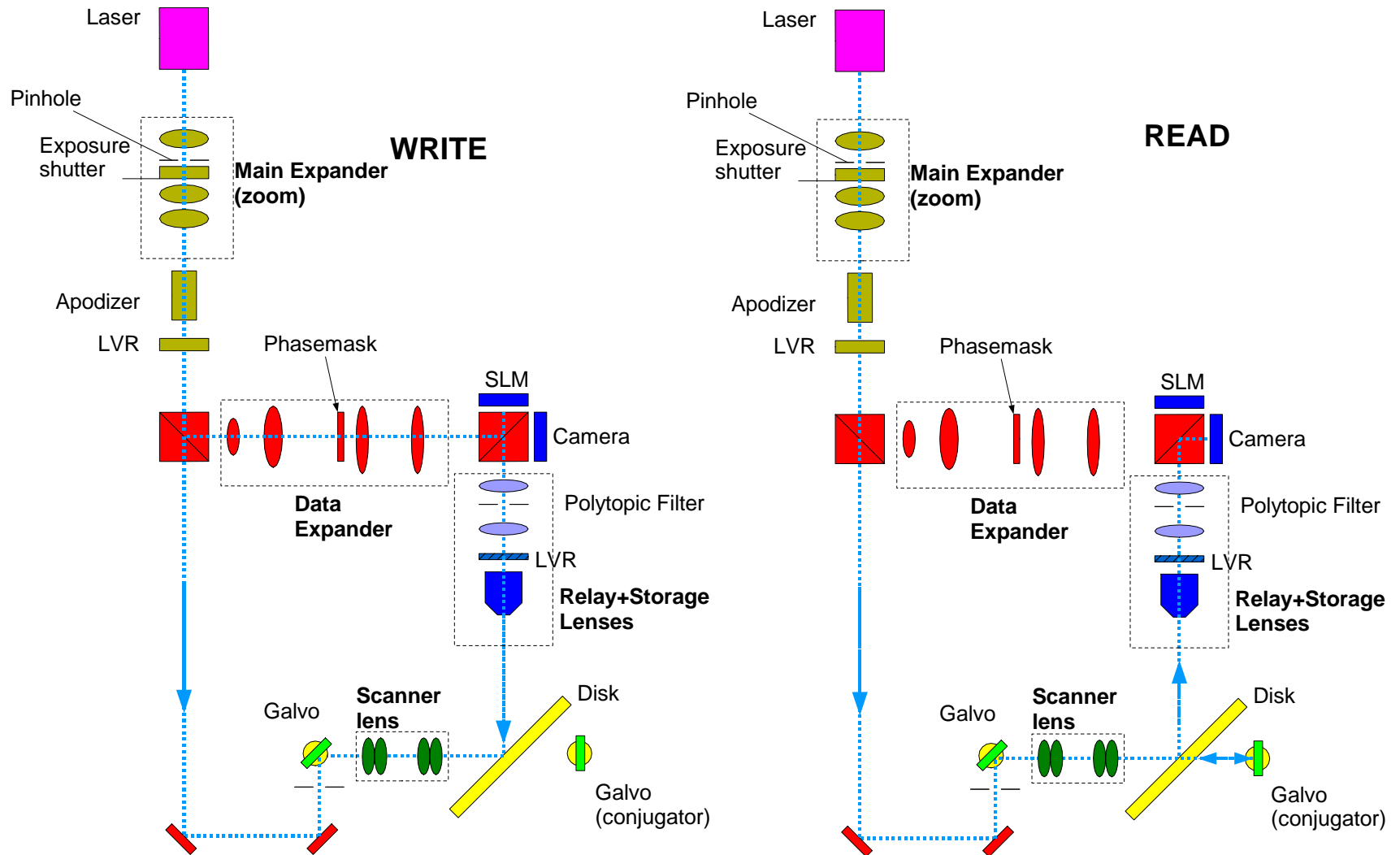


Write



Read







	P1	P2	P3
Areal density	300 Gb / in ²	800 Gb / in ²	1600 Gb / in ²
Transfer rate	20 MB/s	80 MB/s	120 MB/s
# of pages per book	144	325	662
Reference Beam Sweep (degrees)	10	24.5	25
Hologram pitch (θ, r) (mm)	0.82, 0.48	0.82, 0.48	0.82, 0.48
Nyquist filter / Beam Waist area	1.2x	1.2x	1.2x
NA of object beam	0.6	0.6	0.6
Bragg Null	2nd	2nd	1st
SLM/Camera Pixels	1200x1200/1600x1600	1200x1200/1600x1600	1200x1200/1600x1600
Wavelength (nm)	407	407	407
Material Thickness (mm)	1.5	1.5	1.5
M# of media @1.5mm	33.3	90	135

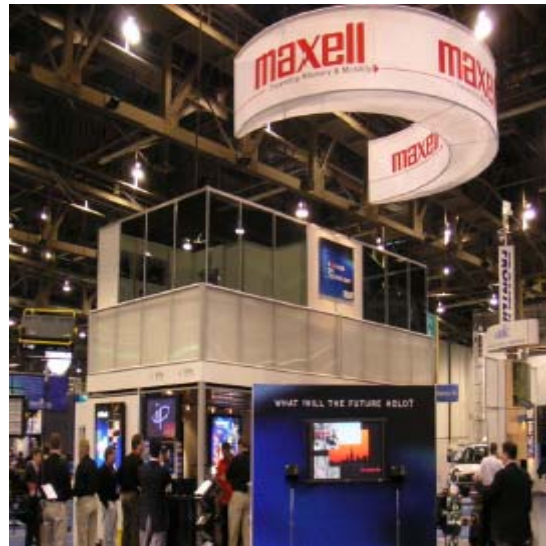
Angle and Polytopic Multiplexing

Compatible with RW media

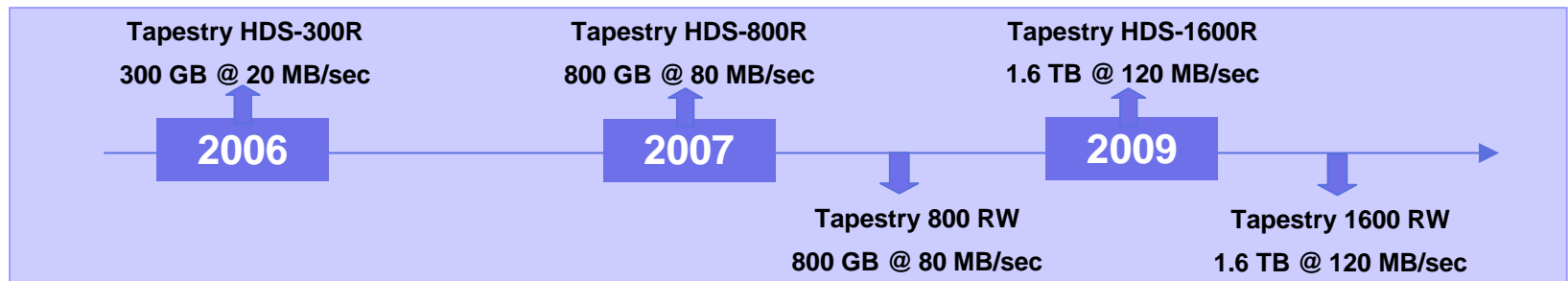
Product development update

Drive development status

- We completed the development of six prototype drives:
 - Demonstrated read/write and seek functionality
 - Demonstrated cartridge interchange
 - Demonstrated the prototype at the NAB show last April and many other shows and conferences after NAB.
- We are now well into the drive development stage of the program.
 - Developing new components and subassemblies.
 - We are detailing the OMA opto-mechanics. Optics are being fabricated.
 - Very close to signing a drive manufacturing partner.
 - All electronics hardware/firmware development is currently on schedule.
- We see no “show-stoppers” for completing the drive development on time and no new inventions are required.
- Goal: to begin revenue shipments in late 2006.



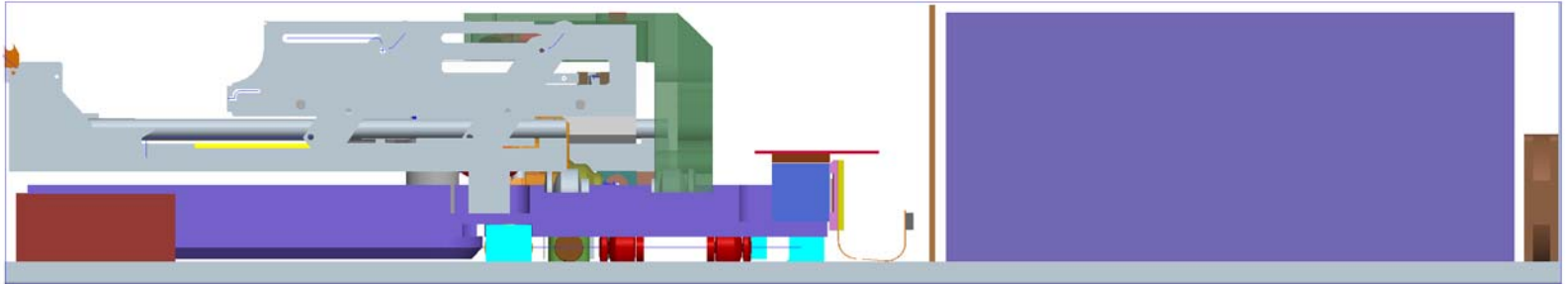
Roadmap for Recordable Products



Two product families planned:

-Recordable (starting in 2006)

-Re-writable (starting in 2008)

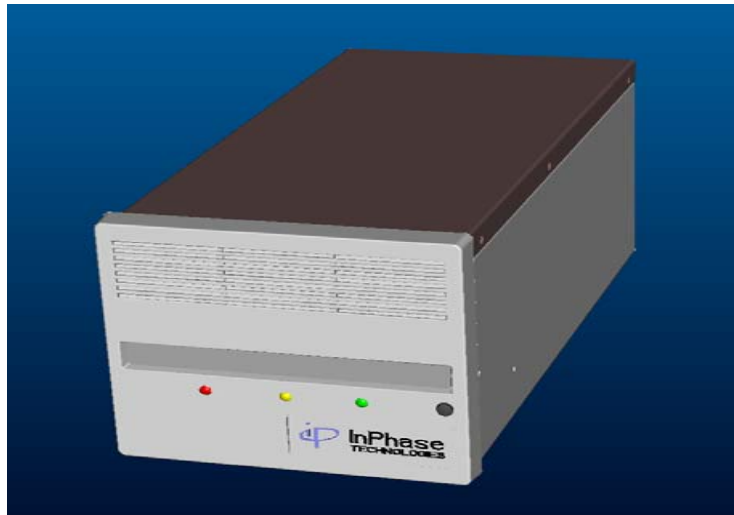


Preliminary drive dimensions:

Height: 3 x HH (5.24")

Width: Standard 5.75"

Length: 27"



DRIVE

- 300 GB Capacity
- 20 MB/s Transfer Rate
- 250 ms avg. access time
- 407 nm Laser
- 1.4 megabits/page
- 5.5 sec. Cartridge load time
- 3.5 sec. Cartridge unload time
- BER $<10^{-15}$
- 100K power on hours MTBF

MEDIA

- 130 mm disc
- 5.25" X 6" X .25" cartridge FF
- 3 year shelf life (prior to recording)
- >50 year archive life

- **Technology and product introduction activities:**
 - Working with several robotics library manufacturers.
 - Also talking with several major potential HDS drive users in the archival and professional video industries.
- **Media partnerships:**
 - Maxell (planning a second media volume production source)
 - Bayer (for chemicals)
- **Drive development relationships and partnerships:**
 - Sanyo- Opto-Mechanical Assembly
 - Sony - Blue Lasers
 - Alps - Loader and drive mechanics
 - DisplayTech – SLM
 - FillFactory - Camera
- **Media and Test Equipment Sales**
 - 23 companies are InPhase media customers
 - We have also sold several “plane wave” and “digital” test equipment to several companies.