

Decreasing Cost of DVD Pickup

P2002-0046560 USPTO etc.

Hyo June Kim

(triz@samsung.com)

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Japan Invention Machine User Meeting

- Contents -

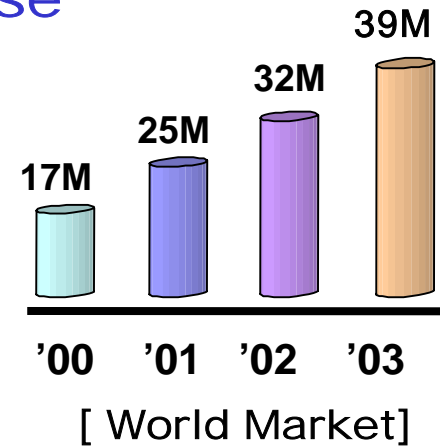
1. Need of Invention
2. TRIZ Application
3. Analysis of Success Point
Question : Why Sergei?

1. Need of Invention at 2001 year

DVD Player (DVDP) Market Size Increase

- USA : 9M ('00) → 12M ('01)
- Europe : 3M ('00) → 6.5M ('01)

Annual Increase based on '00 is 40%



Major Manufacture Market Share Expand → Severe Competence

- The number of Manufacture in the world: 44
- Emerging China DVDP, Cost decrease, Profit Decrease

Extreme Trial for Decreasing Cost by New Design

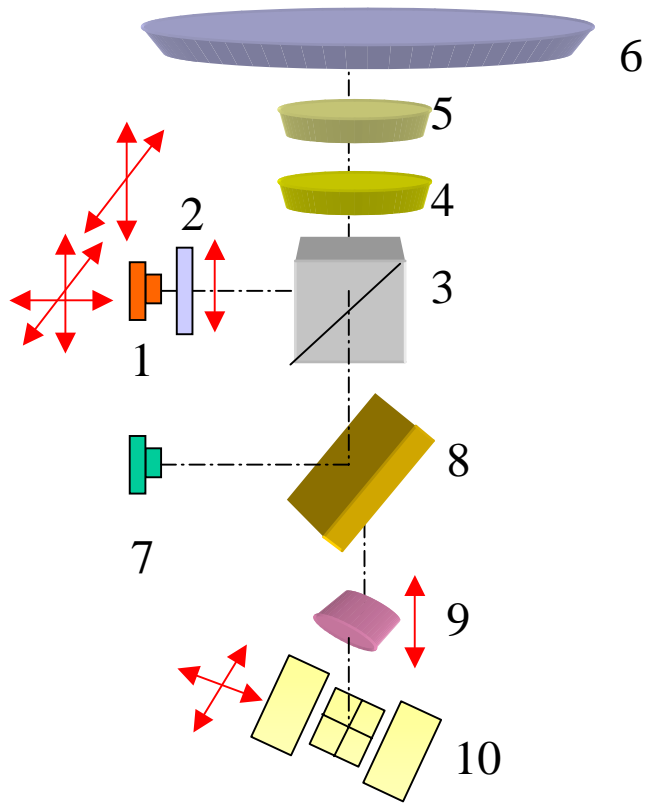
VALINO
Project
('00.4)

MILLENO
Project
('01.4)

PESRONAL
Project
('01.10)

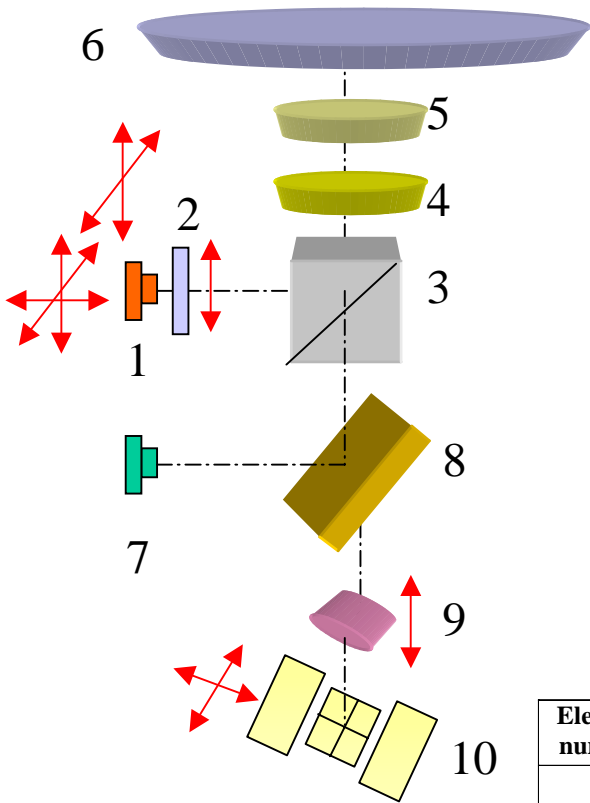
SELLINO
Project
('01.11)

2. TRIZ Application



1. CD Laser Diode (CD LD)
2. Grating structure (GT)
3. Cubic Beam Splitter (CBS)
4. Collimate Lens (CL)
5. Objective Lens (OL)
6. Disk
7. DVD Laser Diode (DVD LD)
8. DVD Beam Splitter Plate (DVD BSP)
9. AStigmatic Lens (ASL)
10. PhotoDetectors (PD)

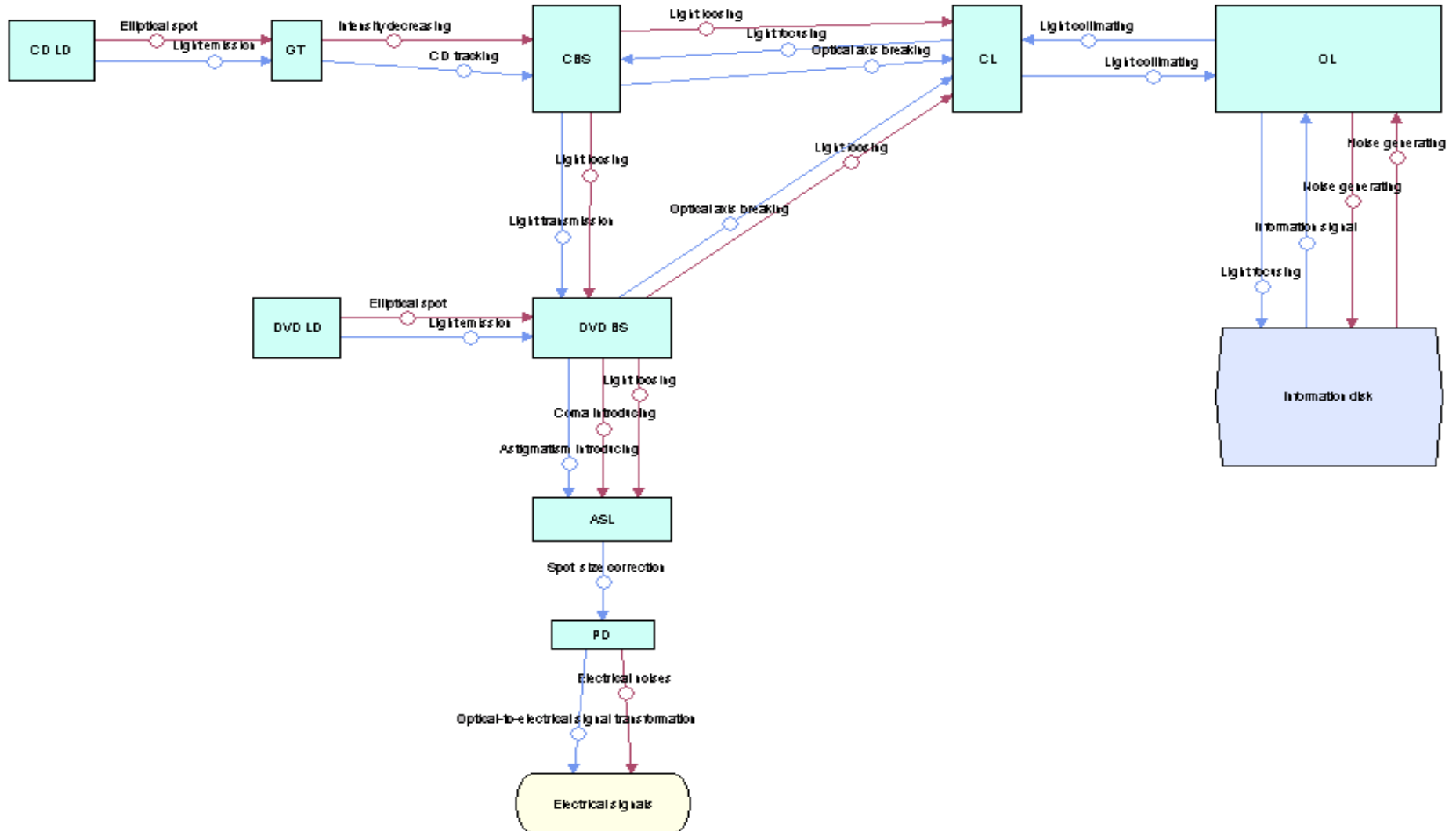
Function Deployment



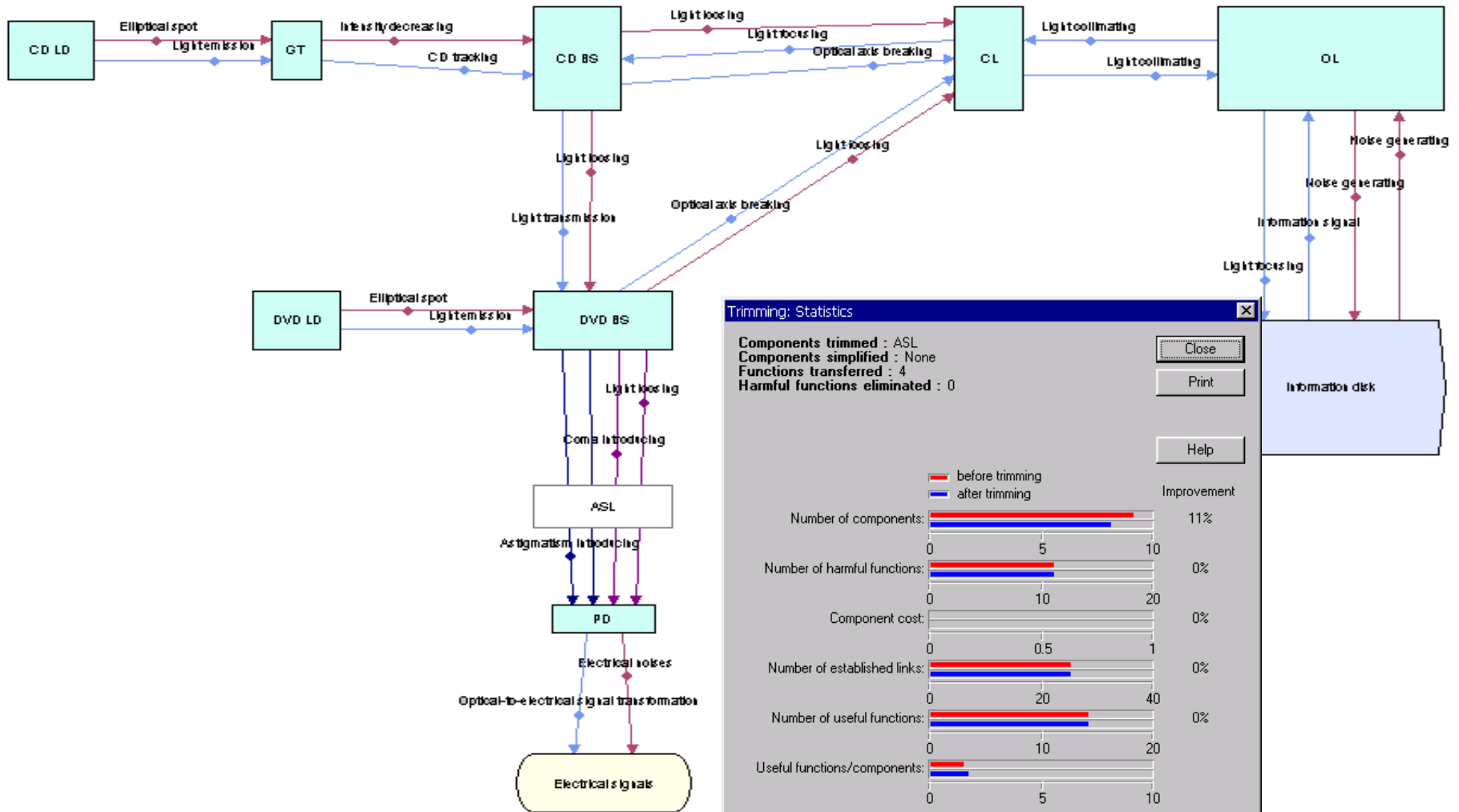
Element number	Useful	Harmful	Notes
1	Light source	Different radiation angles in parallel and perpendicular directions	
2	Satellite spots for CD-tracking producing	Reading spot energy decreasing	
3	Optical axis rotation (→) Beam splitter (←)	Light losses (both directions → and ←) Spherical aberration	
4	Transformate divergent beam to parallel (→) Transformate parallel beam to convergent (←)		
5	Light focusing (→) Light collimating (←)	Enter optical noise in system (in both directions → and ←)	
6	Coded information carrier	Enter noises by means of defects	

Element number	Useful	Harmful	Notes
7	Light source	Different radiation angles in parallel and perpendicular directions	
8	Optical axis rotation Beam splitter Enter astigmatic difference in system	Light losses (in both directions → and ←) Enters coma	
9	Beam gabarite correction BSP coma correction		
10	Transformation of optical radiance into electrical signals	Transformation of optical noises into electrical noises	

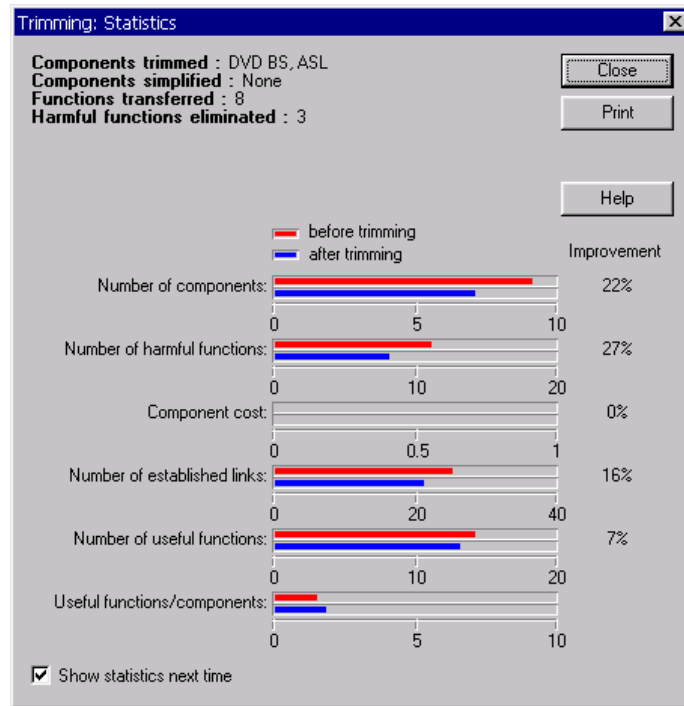
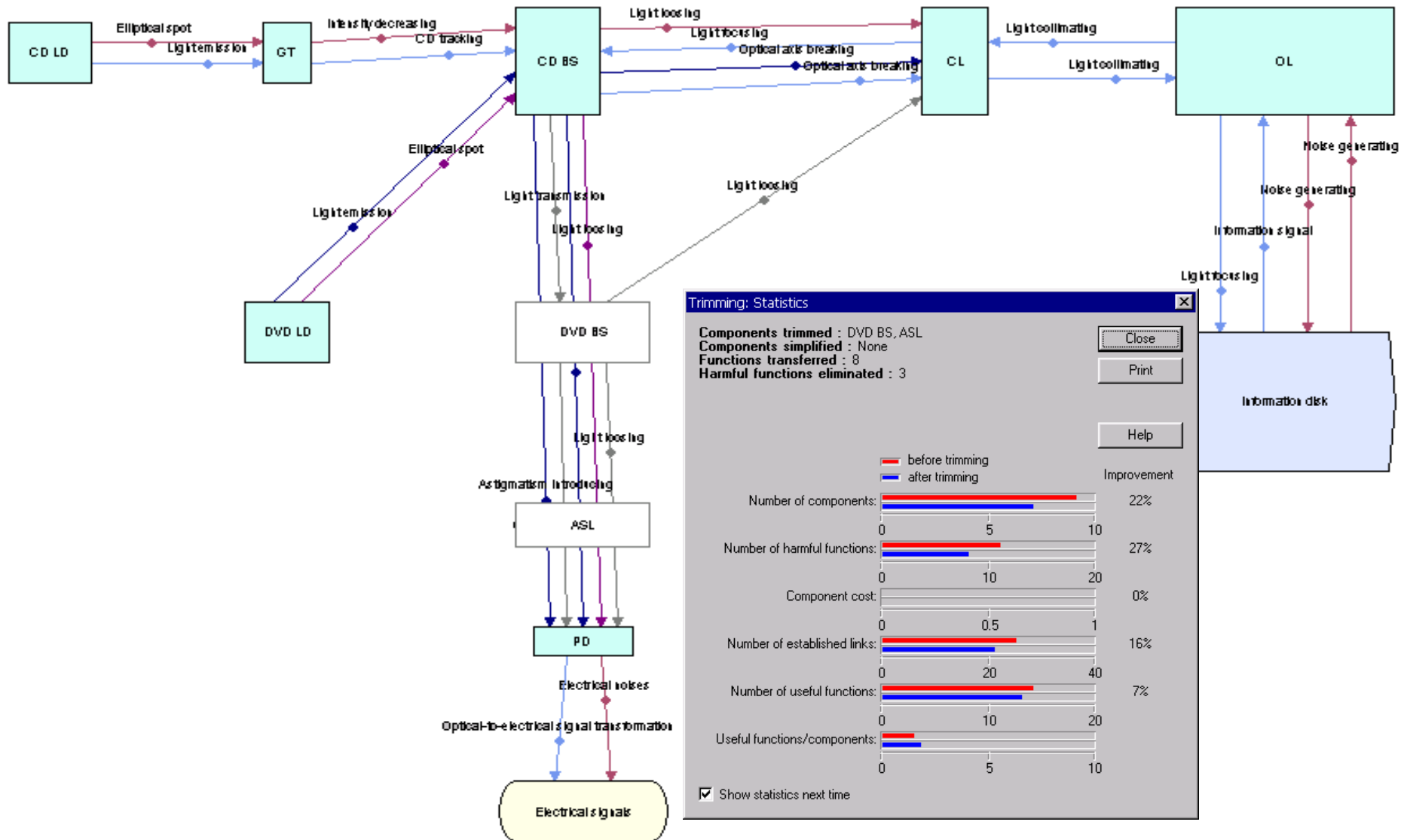
Techoptimizer, Using Product Analysis Module



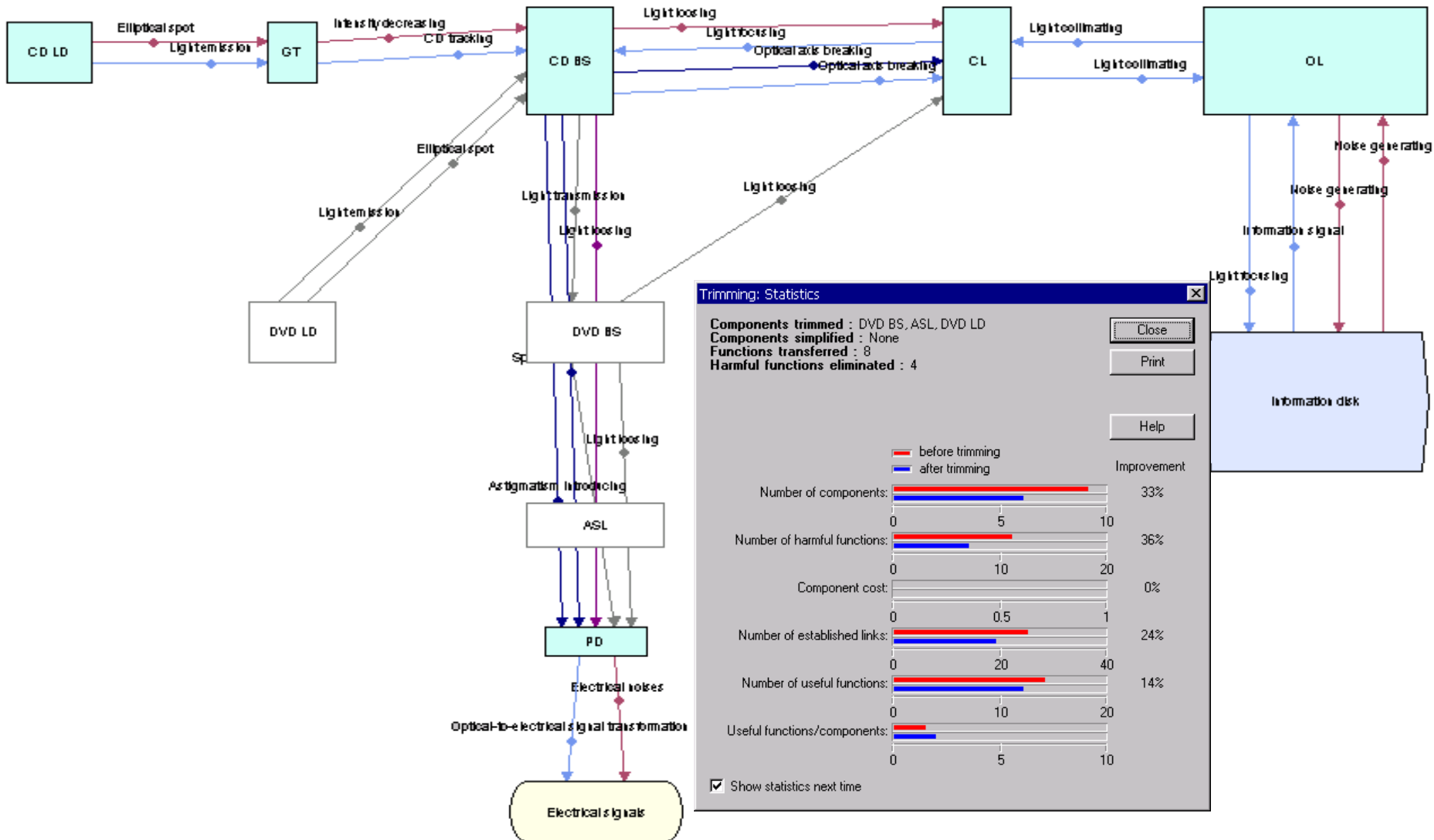
ASL Trimming



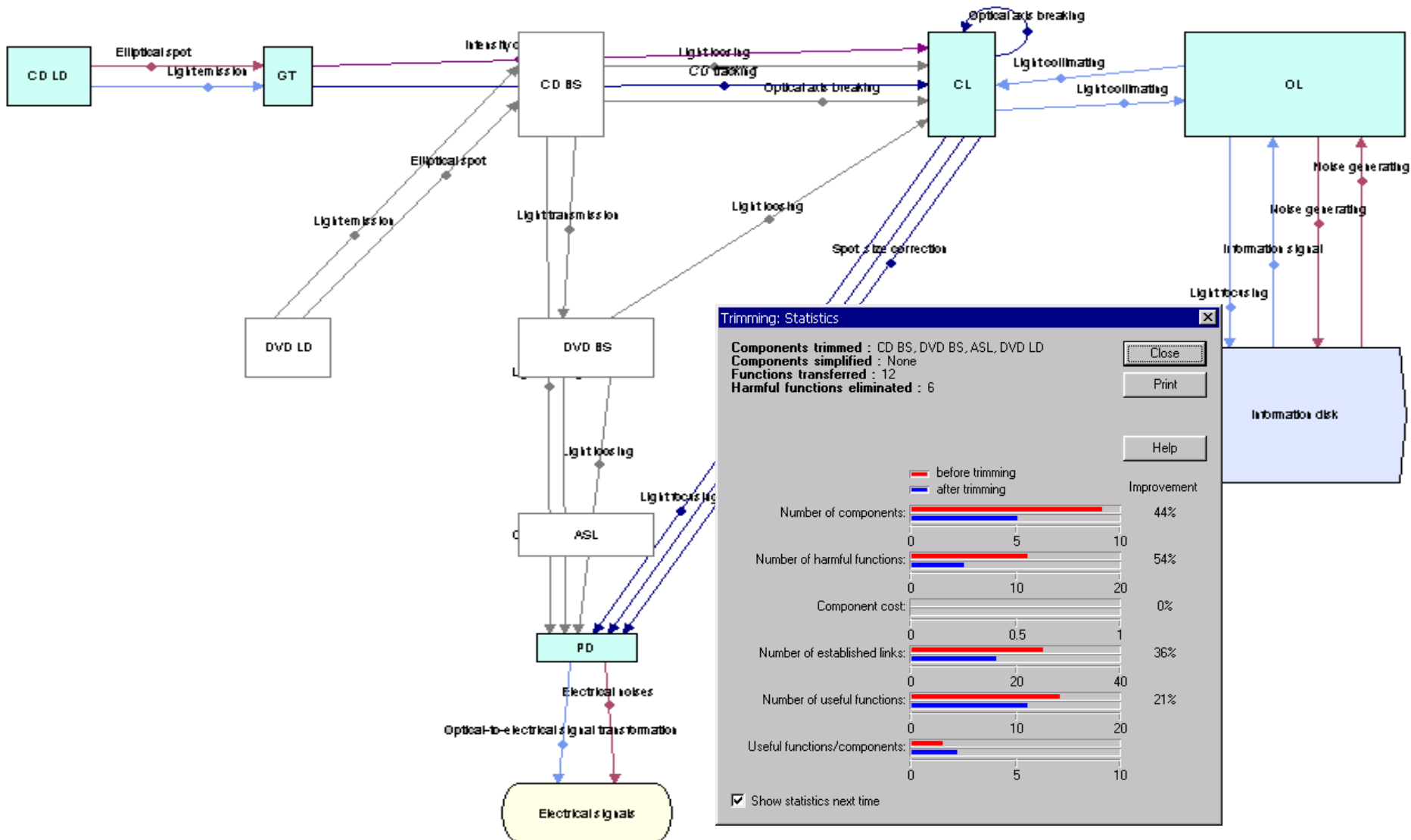
DVD BS Trimming

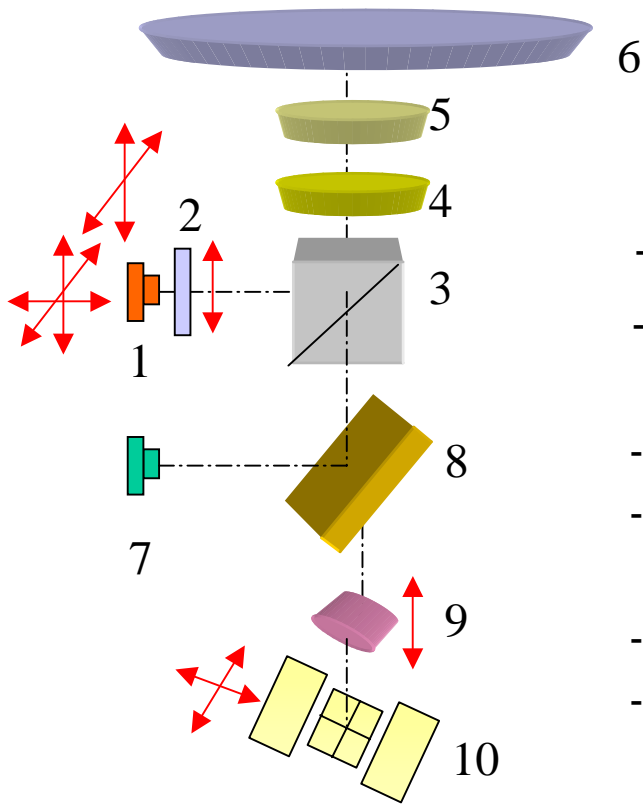


DVD LD Trimming



CD BS Trimming



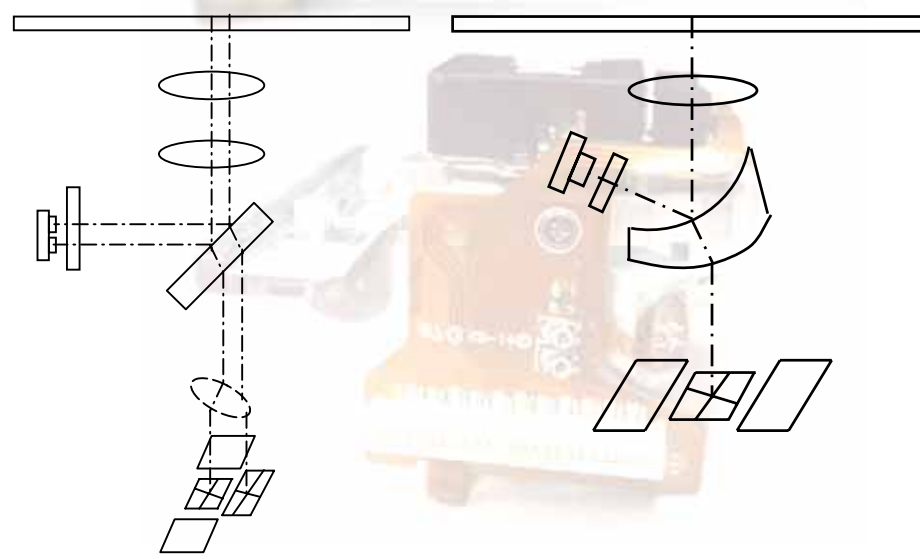
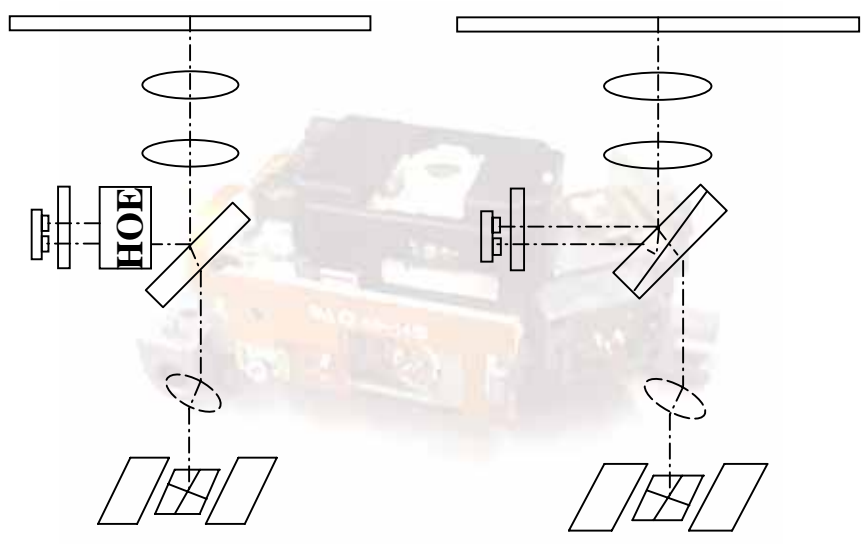
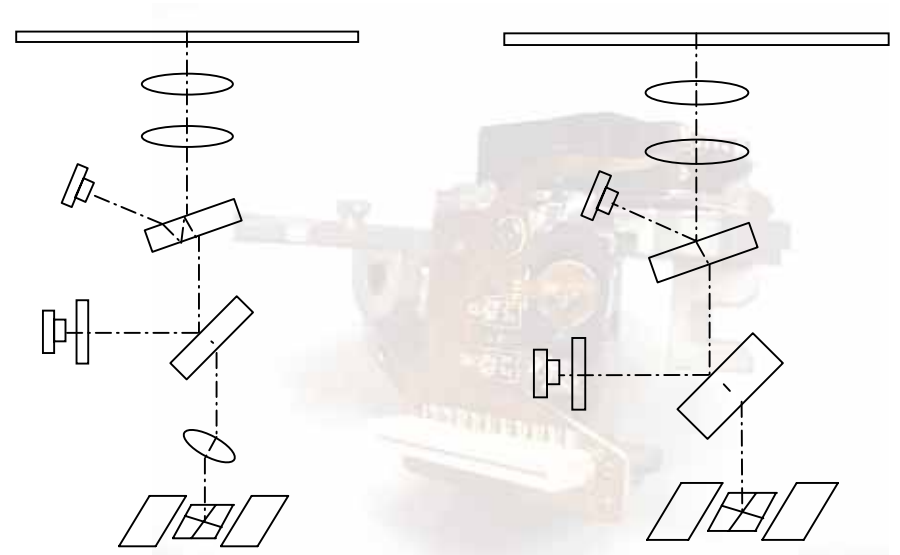
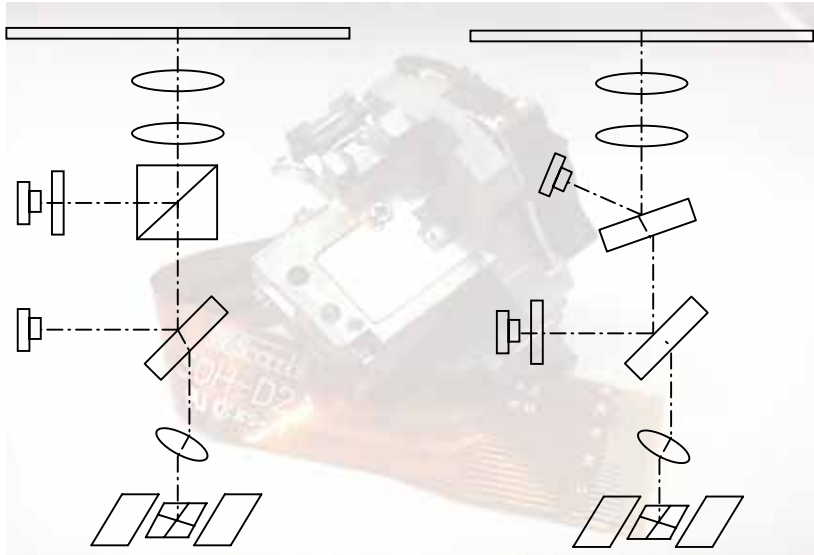


Real Process of Idea Generation

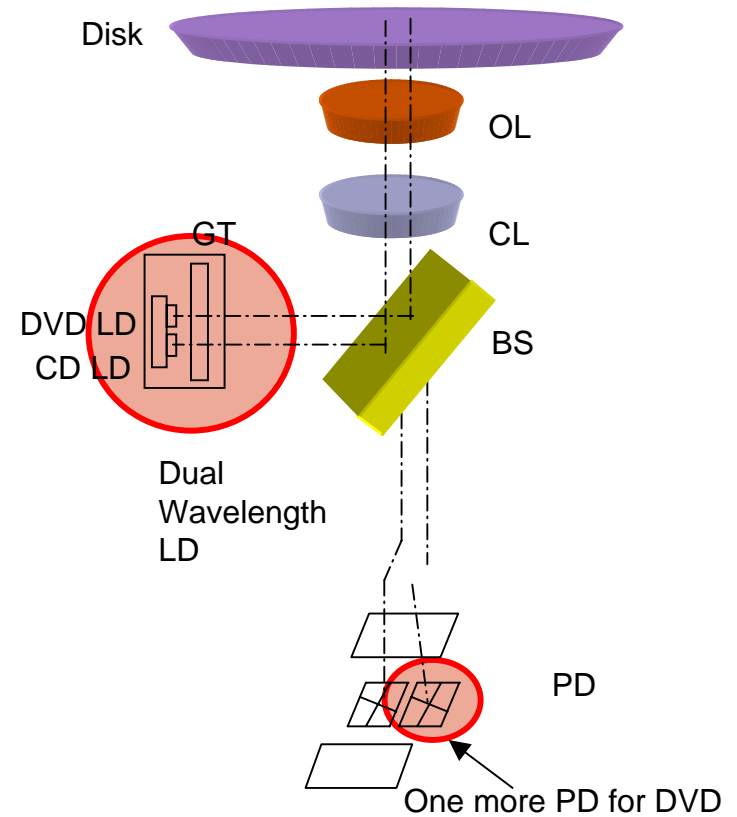
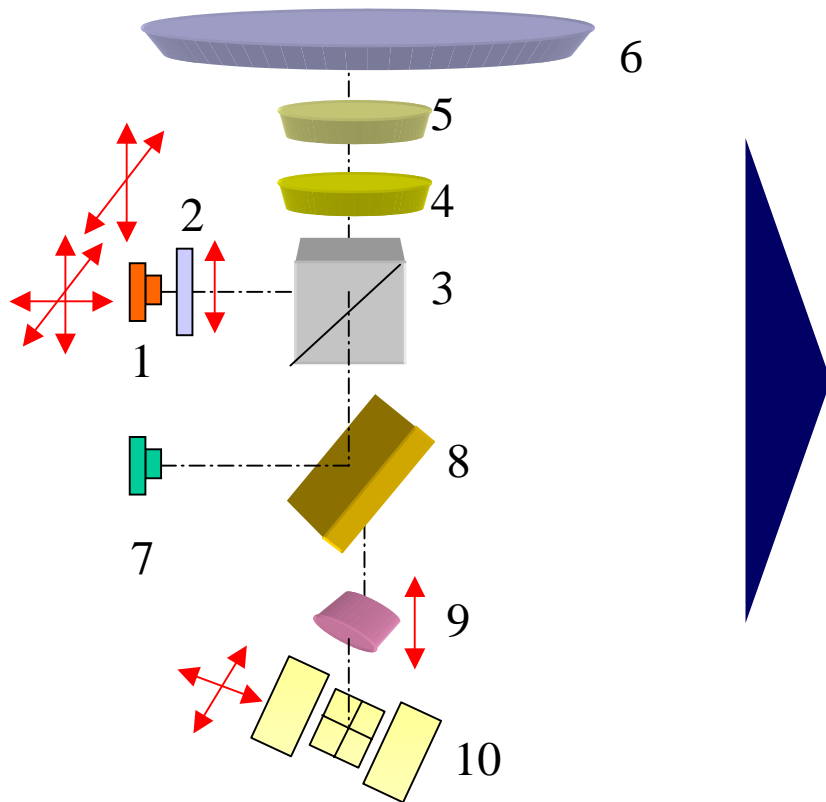
- Analysis of Useful and Harmful function for each part
 - Substitution CBS(3) with common BS by changing place of CD LD and DVD LD positions
 - Trial of partial Trimming of ASL(9) by changing place of CD
 - Trial of partial Trimming of ASL(9) by increasing the thickness of CD BS
 - Complete Trimming of ASL(9) by New shape of BS
 - Trial of partial Trimming of ASL(9) by adjusting Focus length of CL(4)
 - Union of DVD BS with CD BS, Union of DVD LD and CD LD
 - Additive PD instead of unifying two wavelength optical path
Different way from SONY(HOE) and SANYO(Multi Layer BS).
They were captured by Big Mental Inertia.
-
- Using only one wavelength LD by changing OL(5)
 - What will be the next system ? X element

SELLINO ↑
NEXT... ↓

CD BS Trimming

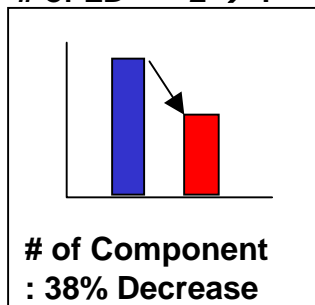


Keyword : Useful, Harmful Function, X element, Trimming



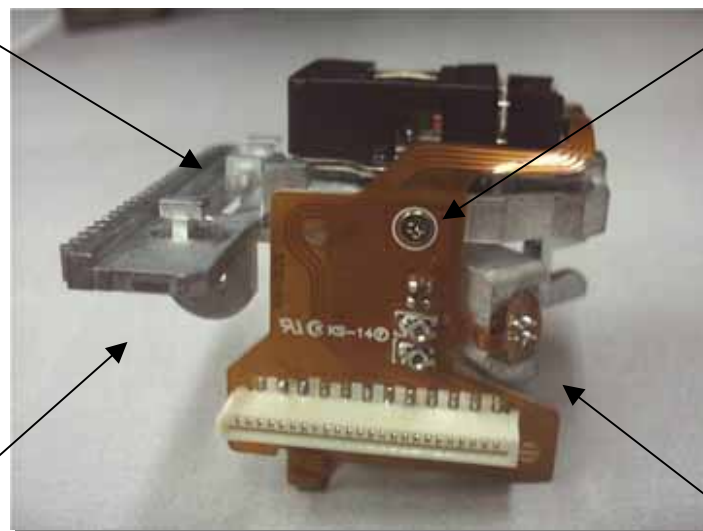
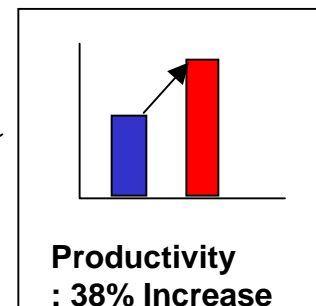
Final Result

of Lenses 6 → 4
of LD 2 → 1

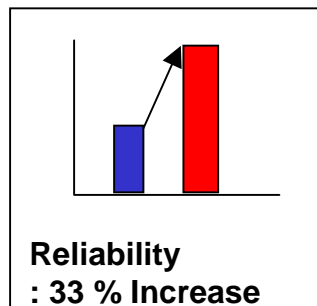


Increase of System Ideality
of Component
Reliability Cost

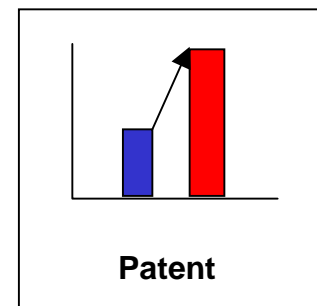
of Adjusting Point
: 13 points → 8 points



of Bonding Point
: 38 points 26 points



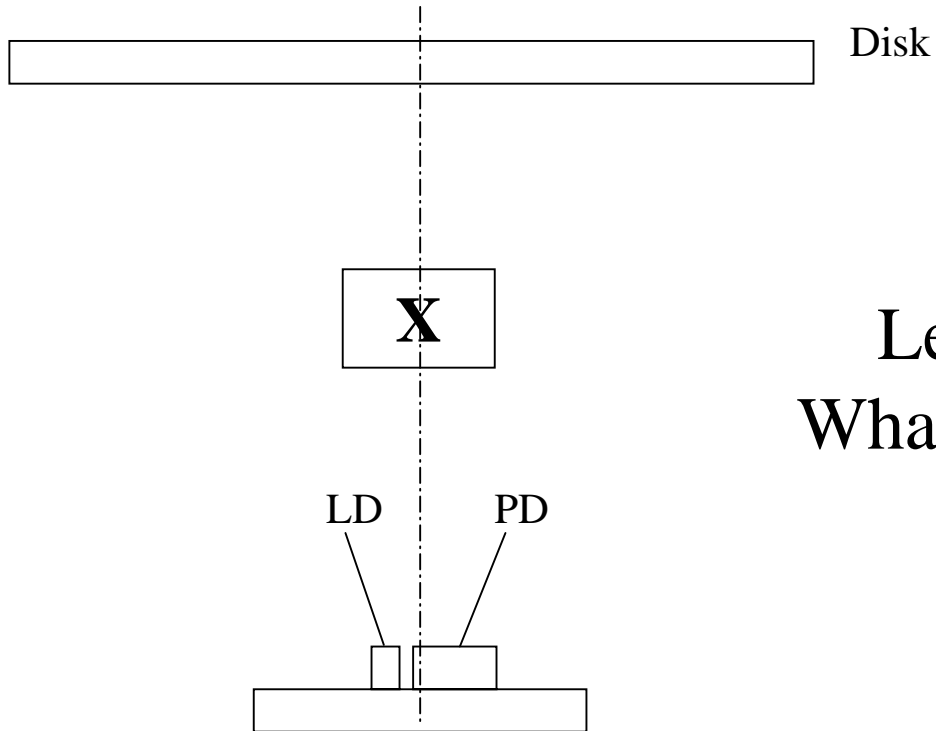
Patent 13ea
(USA 4ea)



Total Saved Cost
=\$3.7/ea x 7M/year x 3year
=\$0.1B

Ideal Final Result

- What will be the next system?



Lets Think Together
What X-element will be...

III. Analysis of Success Point

Why "Sergei" ? (He was employed by Samsung Electronics)

- He knew Russian language. So he could communicate with Vassili, TRIZ expert.
- 20 kinds of TRIZ book in English, But poor quality compared to Russian Book.
- Just lecture and Seminar is enough for applying TRIZ ?
- Just knowing the S/W usage is enough ?

So SAMSUNG developed online TRIZ Education Program

