MINOS 2015

MORE THIS AND THAT

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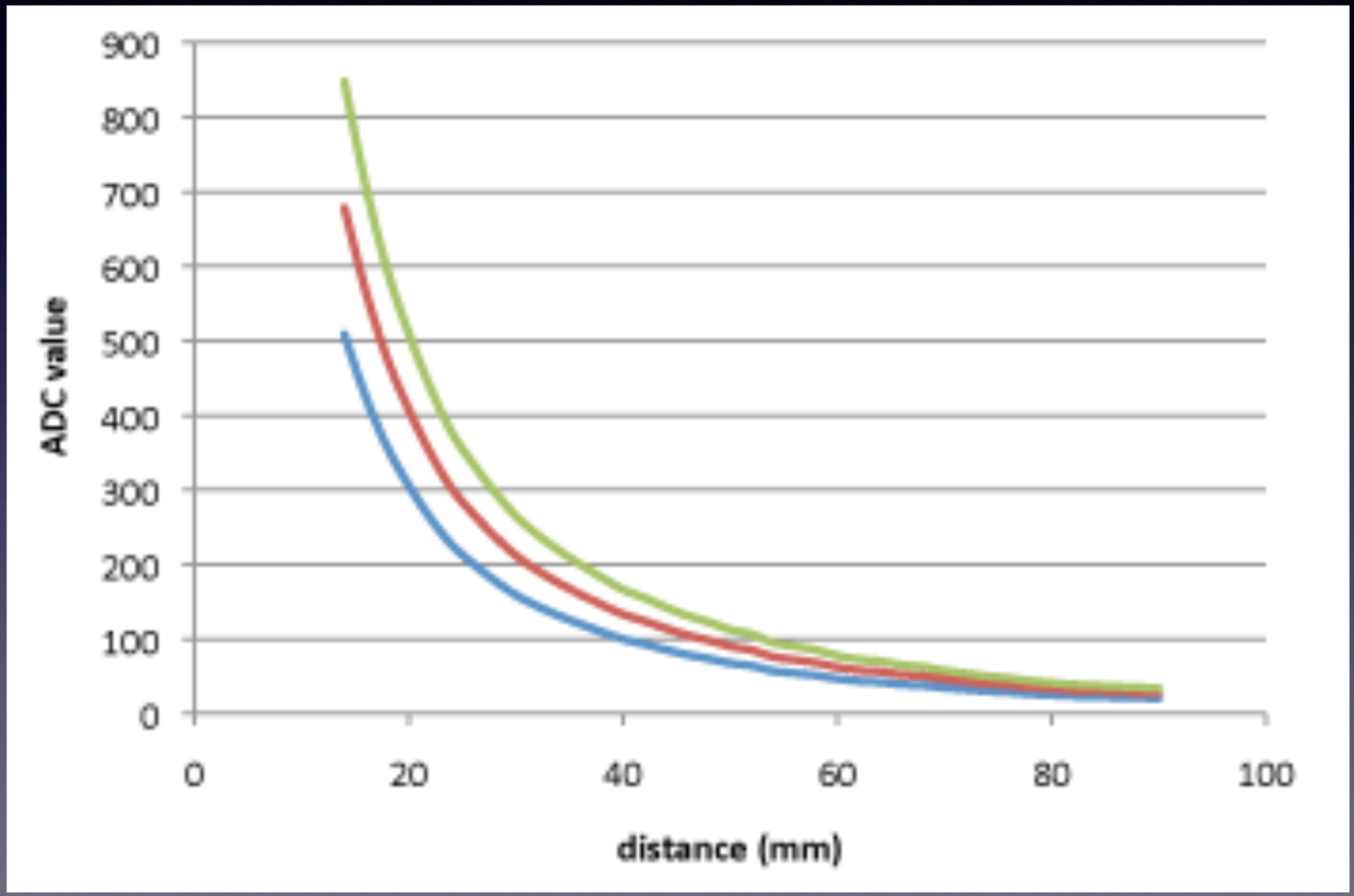
WHAT THIS YEAR ?

- UPDATE ON LASER PSD SENSOR FROM LAST MINOS
- LAST JUNES DEE PROBLEM ?

LASER PSD SENSOR

Normal Reflective Sensor Output
As Distance increases light level falls



With PSD sensors the output gives the position of the light spot relevant to each end point, equal output when in the middle of the sensor

$$D = \frac{Ix1 - Ix2}{Ix1 + Ix2}$$

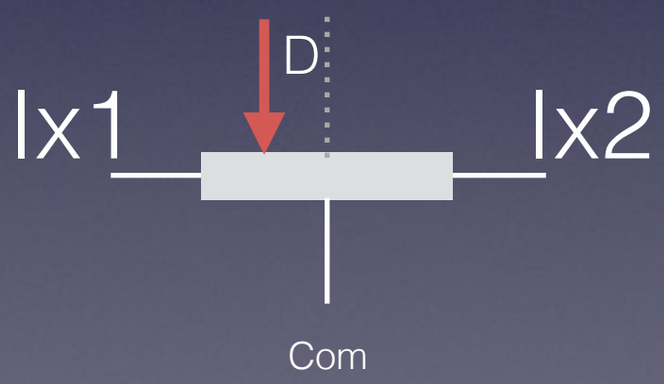
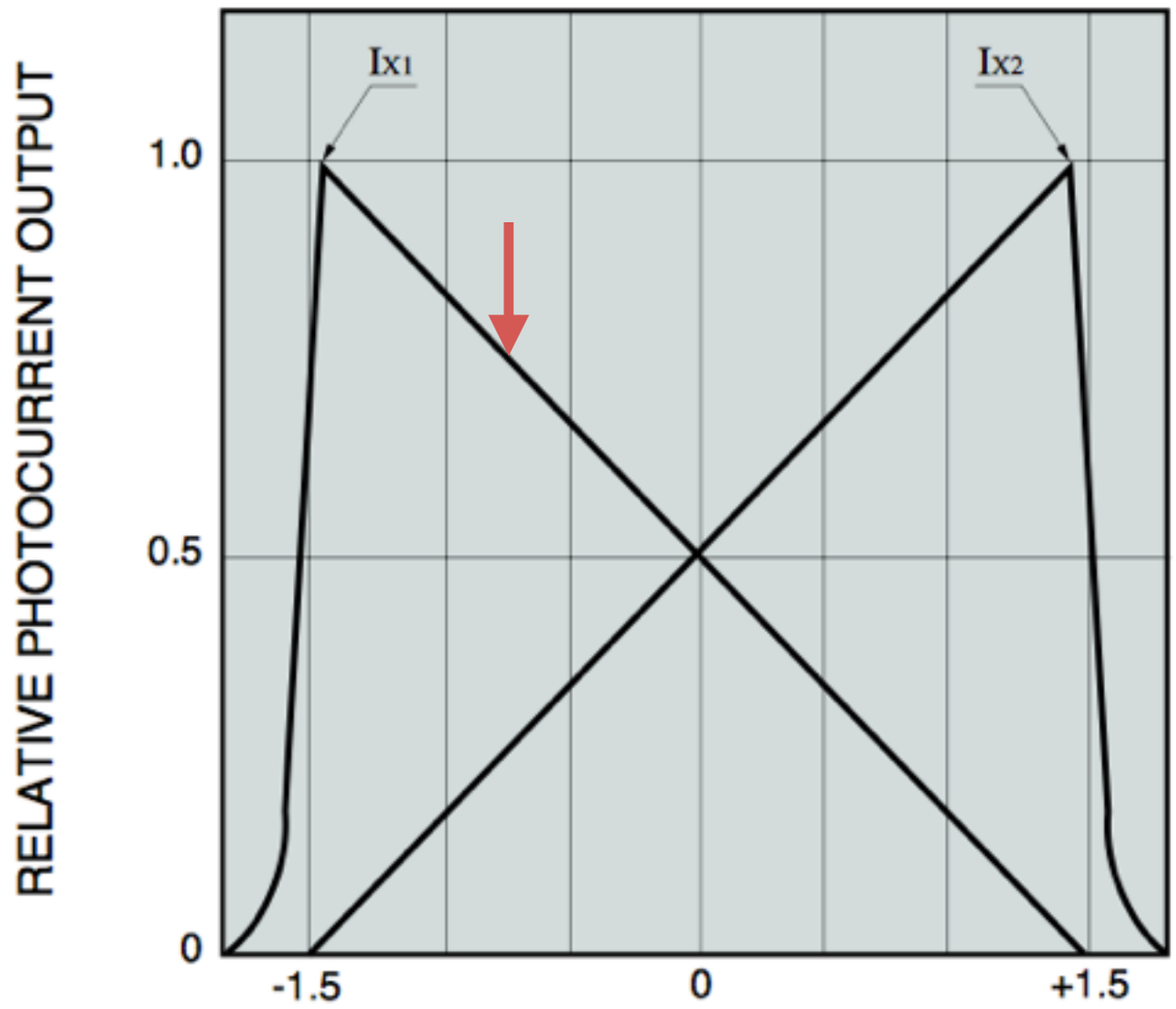
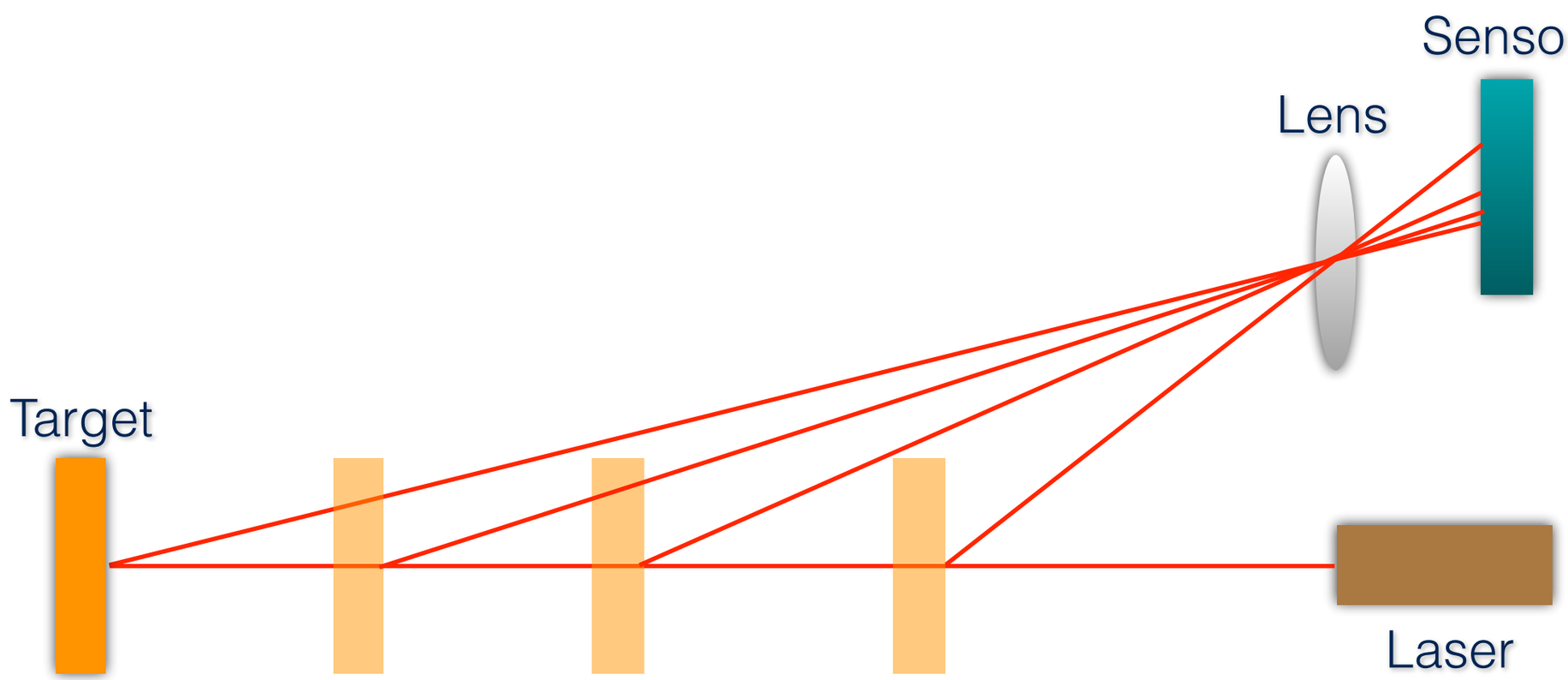


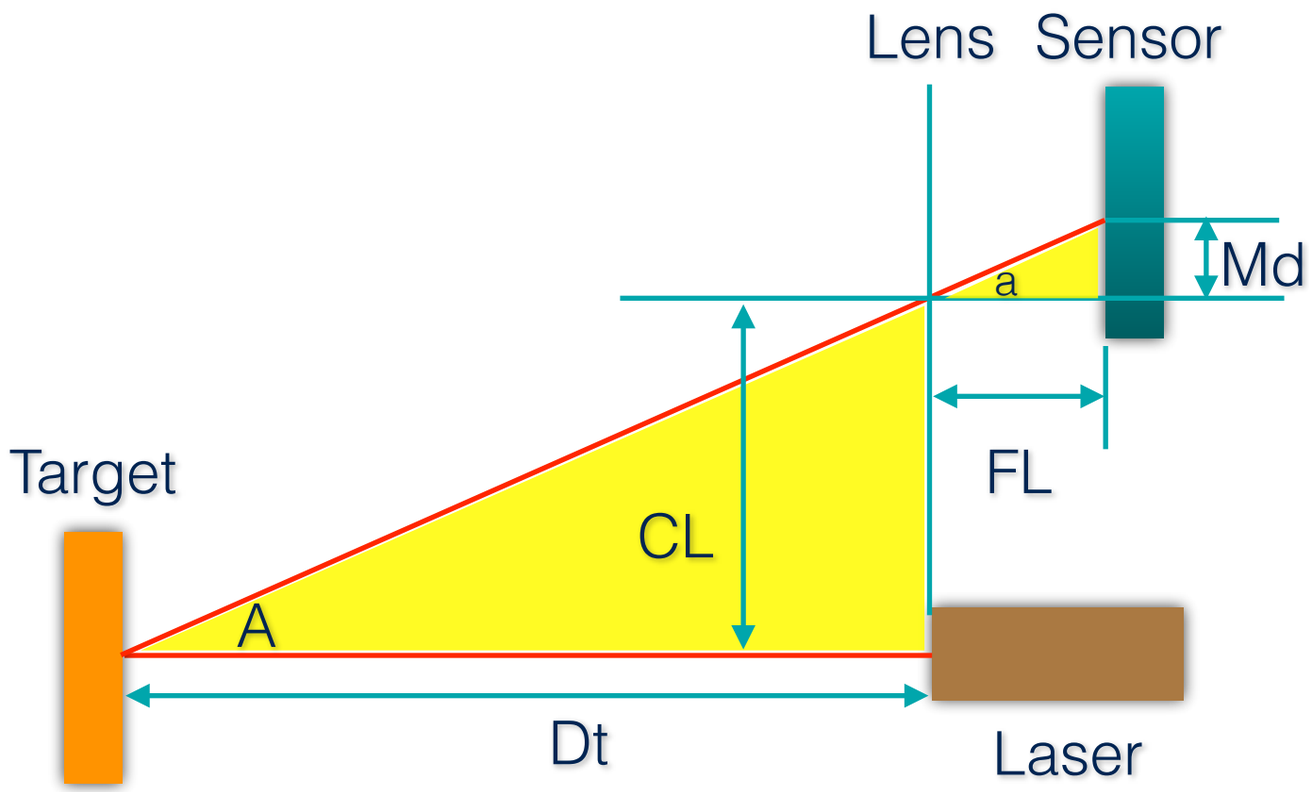
Figure 4-2 Photocurrent output example of one-dimensional PSD (S4583-04, etc.)



PSD SENSOR



Geometry of Sensor



FL = Lens focal length

CL = Laser to Lens centre line

Dt = Distance to target

Angles A and a are the same

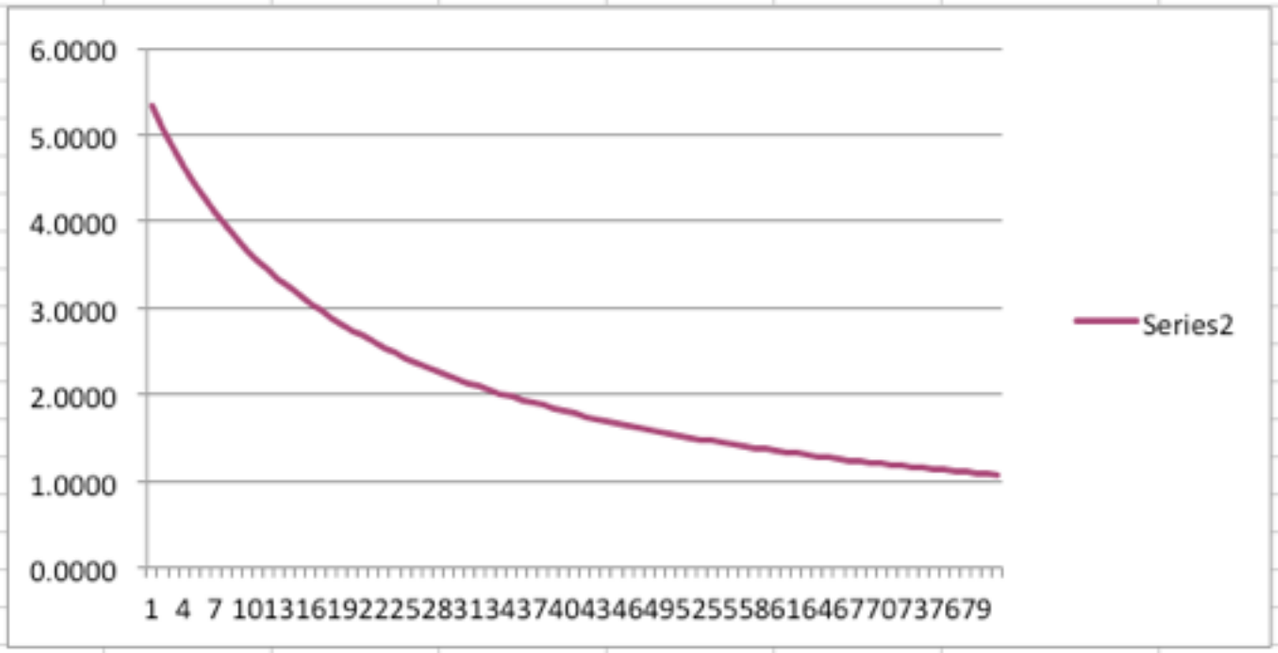
Md = Measured distance

Dt = (FL/Md)*CL

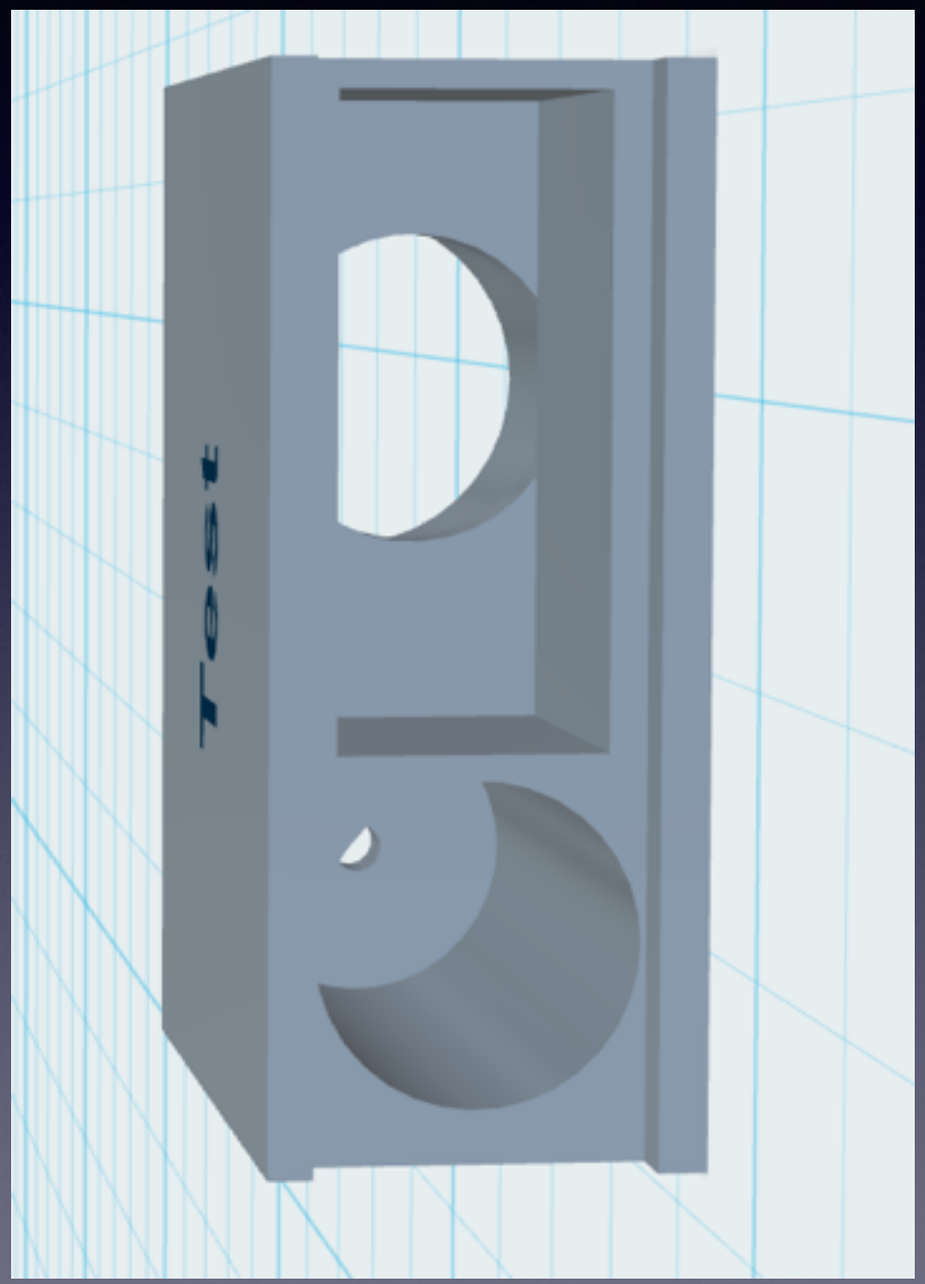
Spreadsheet of PSD sensor

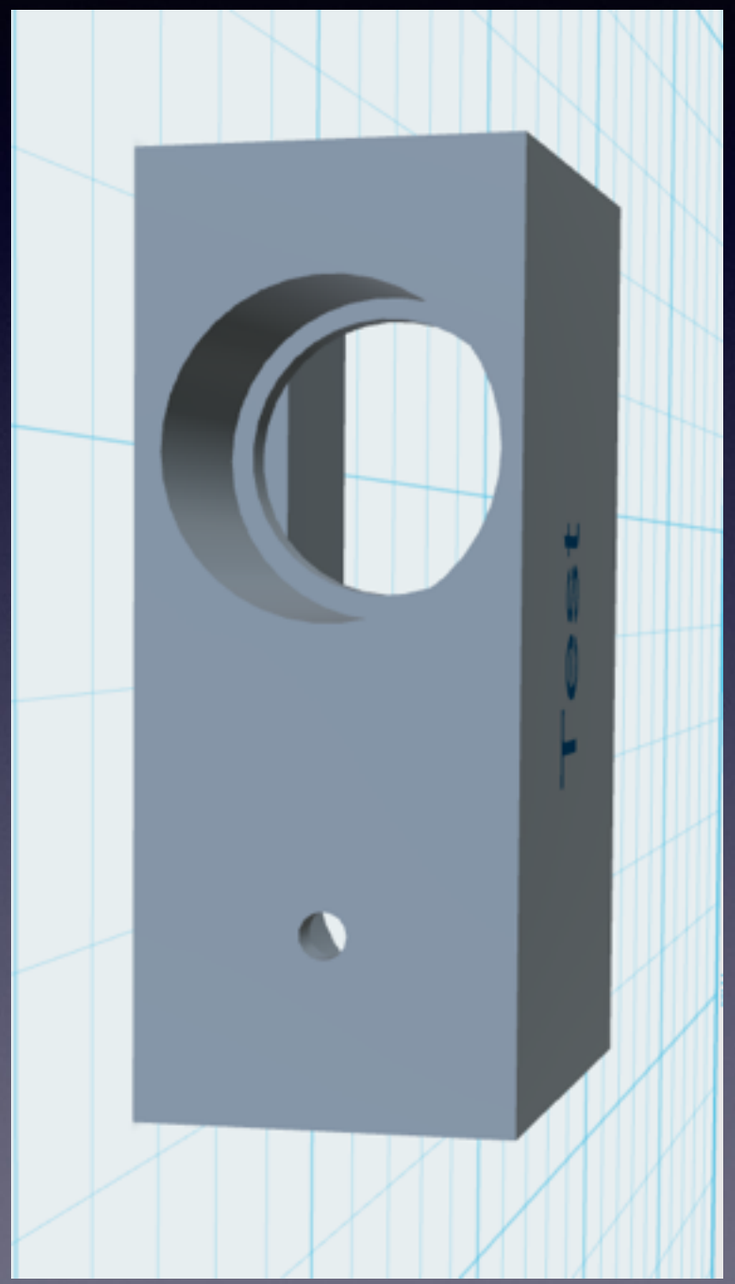
	Source to Sensor CL	18.4	Lens to Sensor FL	5.8						
Min				Mid point				Max		
20	30	40	50	60	70	80	90	100	Range mm	
5.336	3.557333	2.668	2.1344	1.778667	1.524571	1.334	1.185778	1.0672		
Sensor L	4.2688									
Sensor +	3.557333	83.33333	%							
Snsor -	-0.71147	16.66667	%							

Dw	Ds	Delta	(FL/Ds)*CL
20	5.3360		20
21	5.0819	0.2541	21
22	4.8509	0.2310	22
23	4.6400	0.2109	23
24	4.4467	0.1933	24
25	4.2688	0.1779	25
26	4.1046	0.1642	26
27	3.9526	0.1520	27
28	3.8114	0.1412	28
29	3.6800	0.1314	29
30	3.5573	0.1227	30
31	3.4426	0.1148	31
32	3.3350	0.1076	32
33	3.2339	0.1011	33
34	3.1388	0.0951	34
35	3.0491	0.0897	35
36	2.9644	0.0847	36
37	2.8843	0.0801	37
38	2.8084	0.0759	38
39	2.7364	0.0720	39
40	2.6680	0.0684	40
41	2.6029	0.0651	41
42	2.5410	0.0620	42
43	2.4819	0.0591	43
44	2.4255	0.0564	44

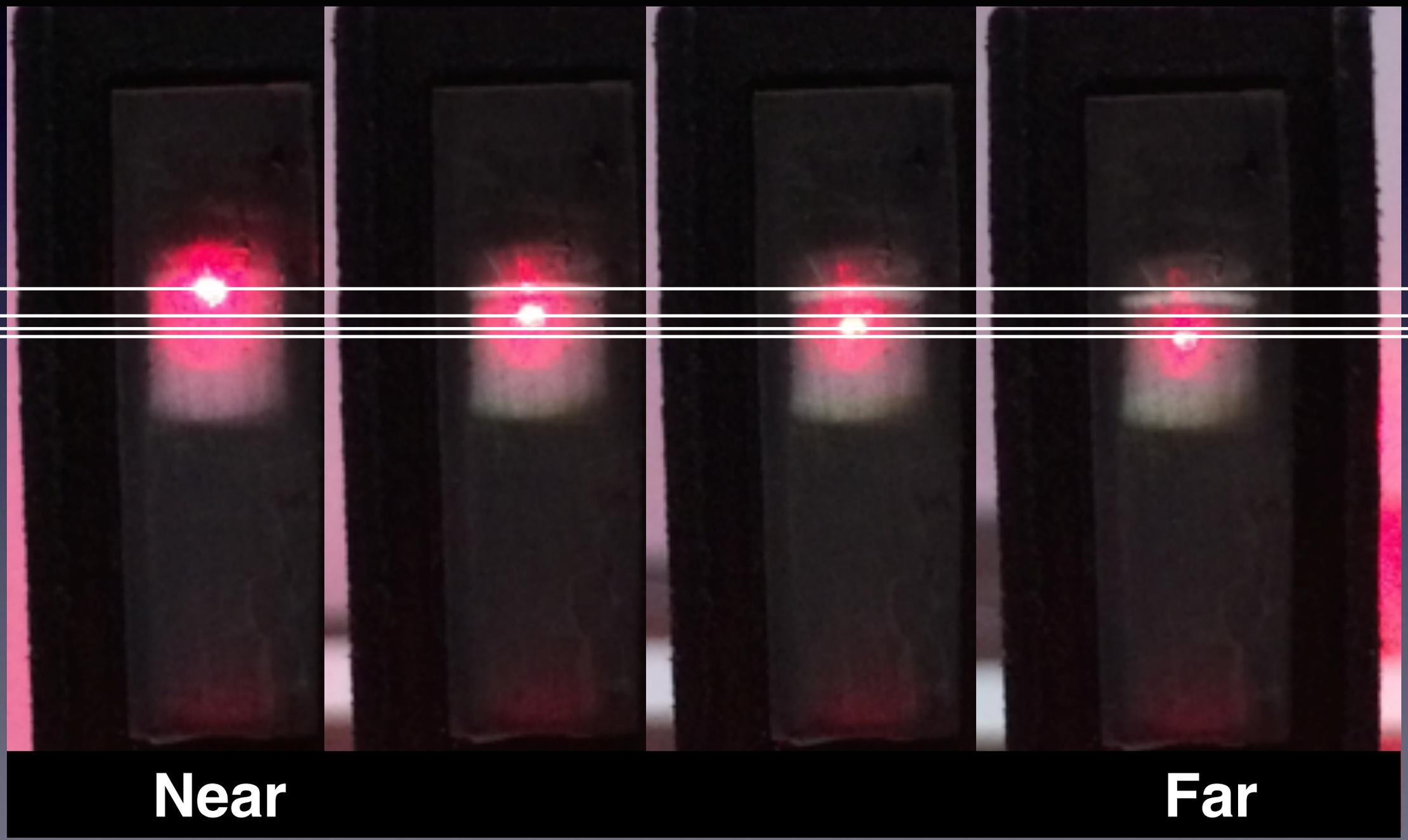


3D Printed Housing

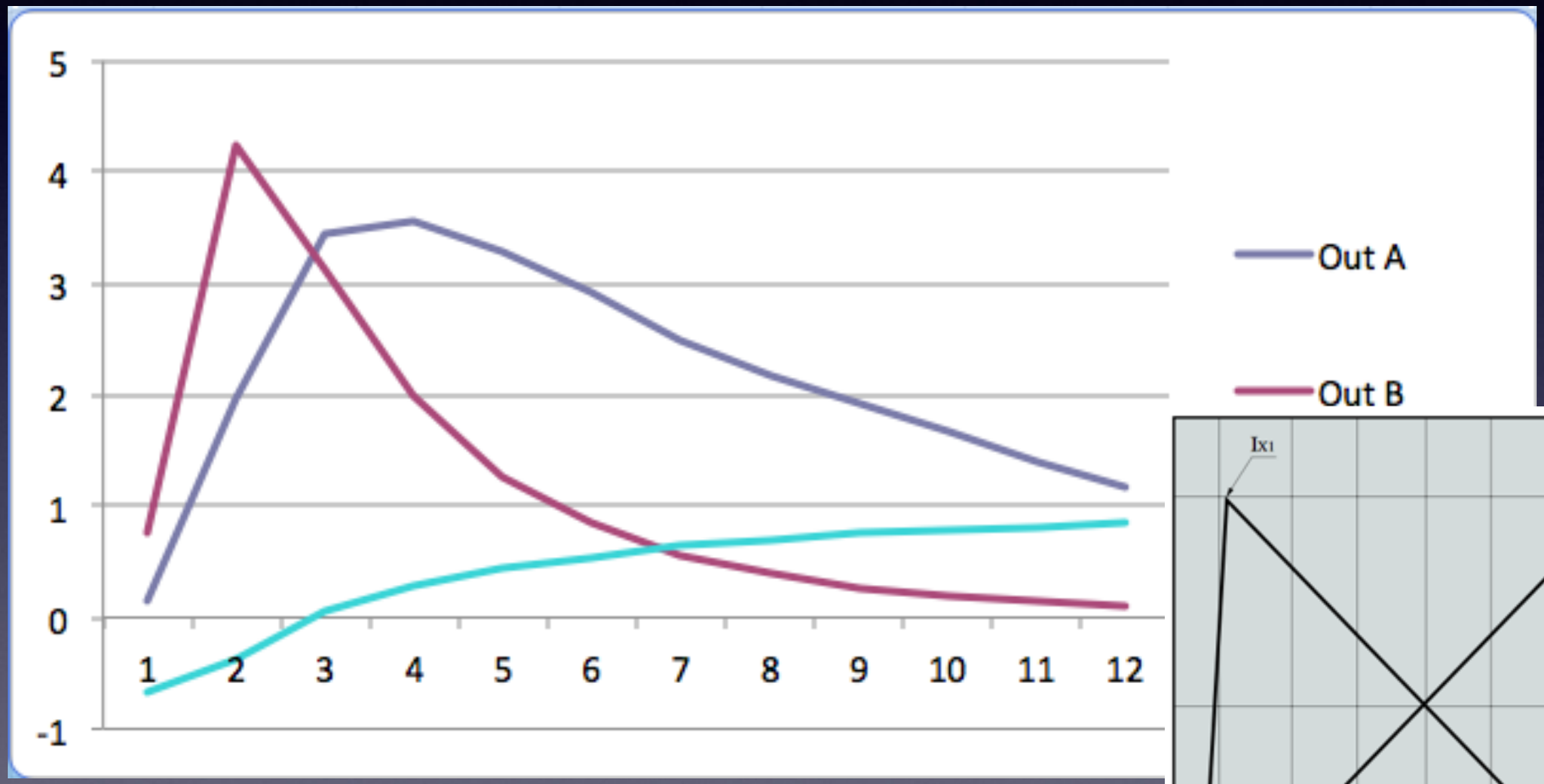




Laser Spot as Seen by Sensor

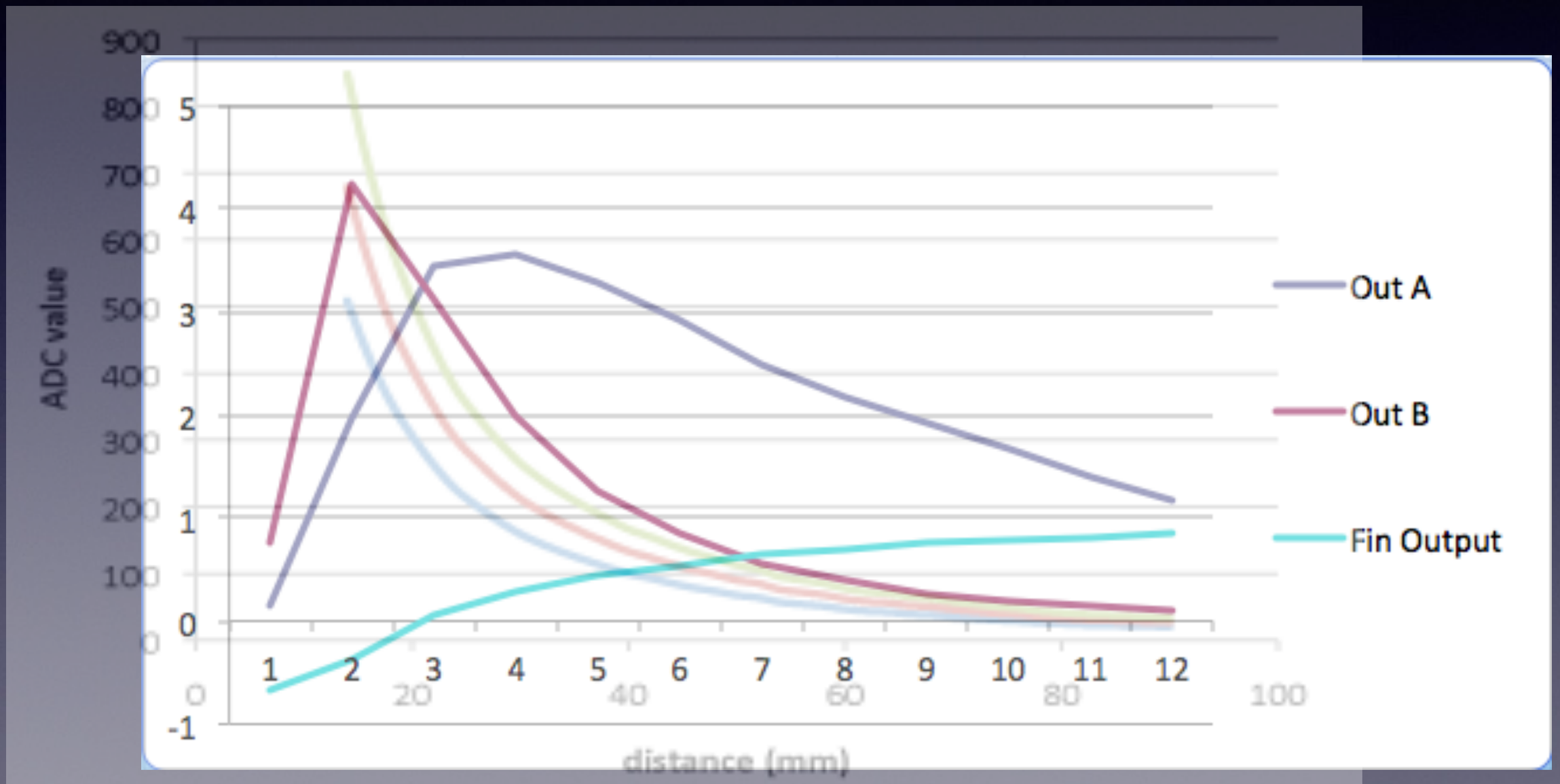


This is what we get, Why



Laser Spot as Seen by Sensor

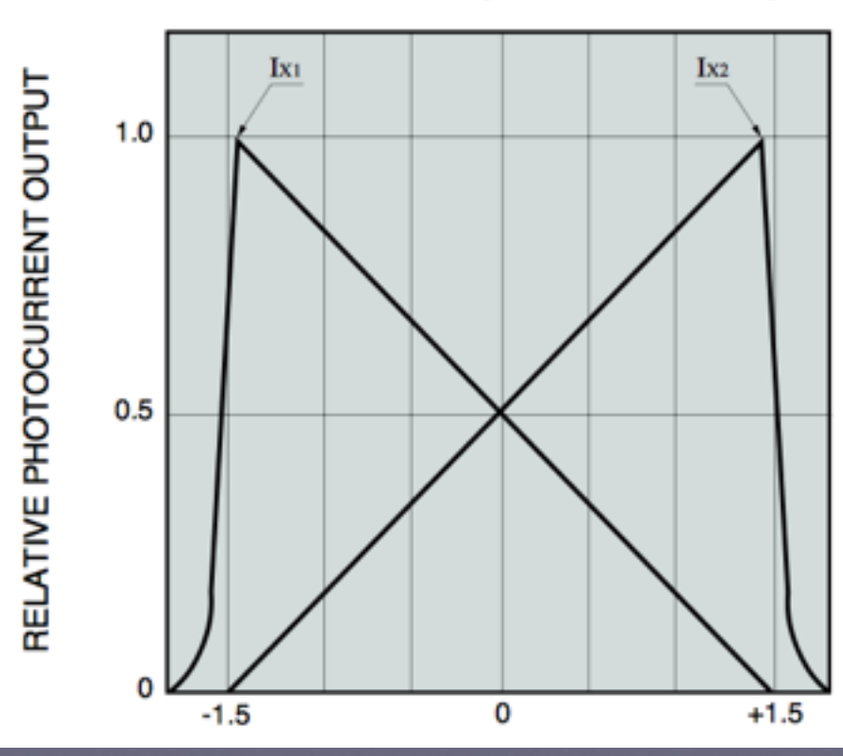
It is behaving as a reflective sensor as well



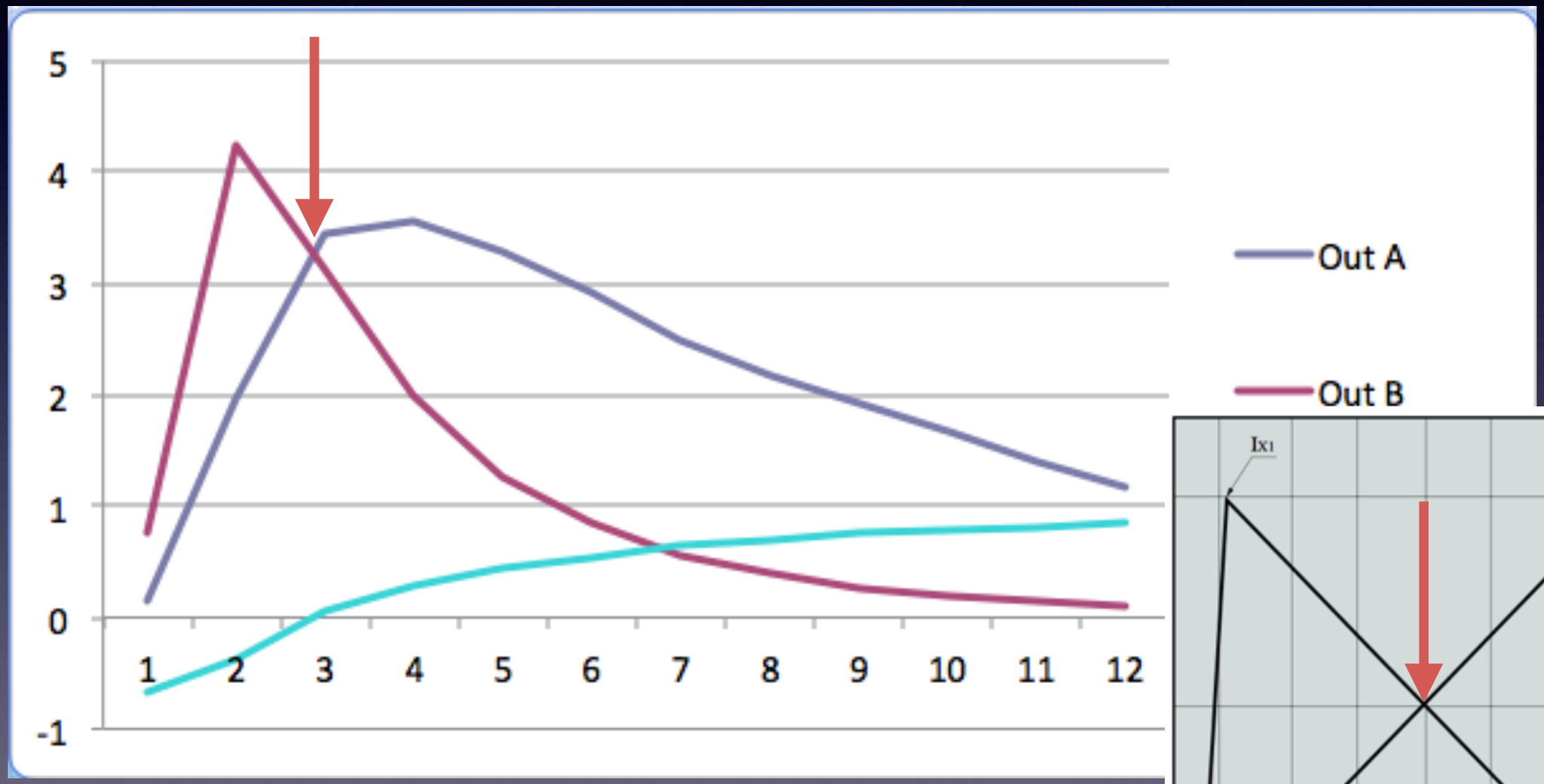
This is true only when the light falling onto the sensor is kept at a constant distance and hence constant brightness from the sensor element.

Figure 4-2 shows the photocurrent output example from electrodes of a one-dimensional PSD with a resistance length of 3 mm (S4583-04, etc.), measured when a light beam is scanned over the active surface. The position detection error estimated from the obtained data is also shown in the lower graph.

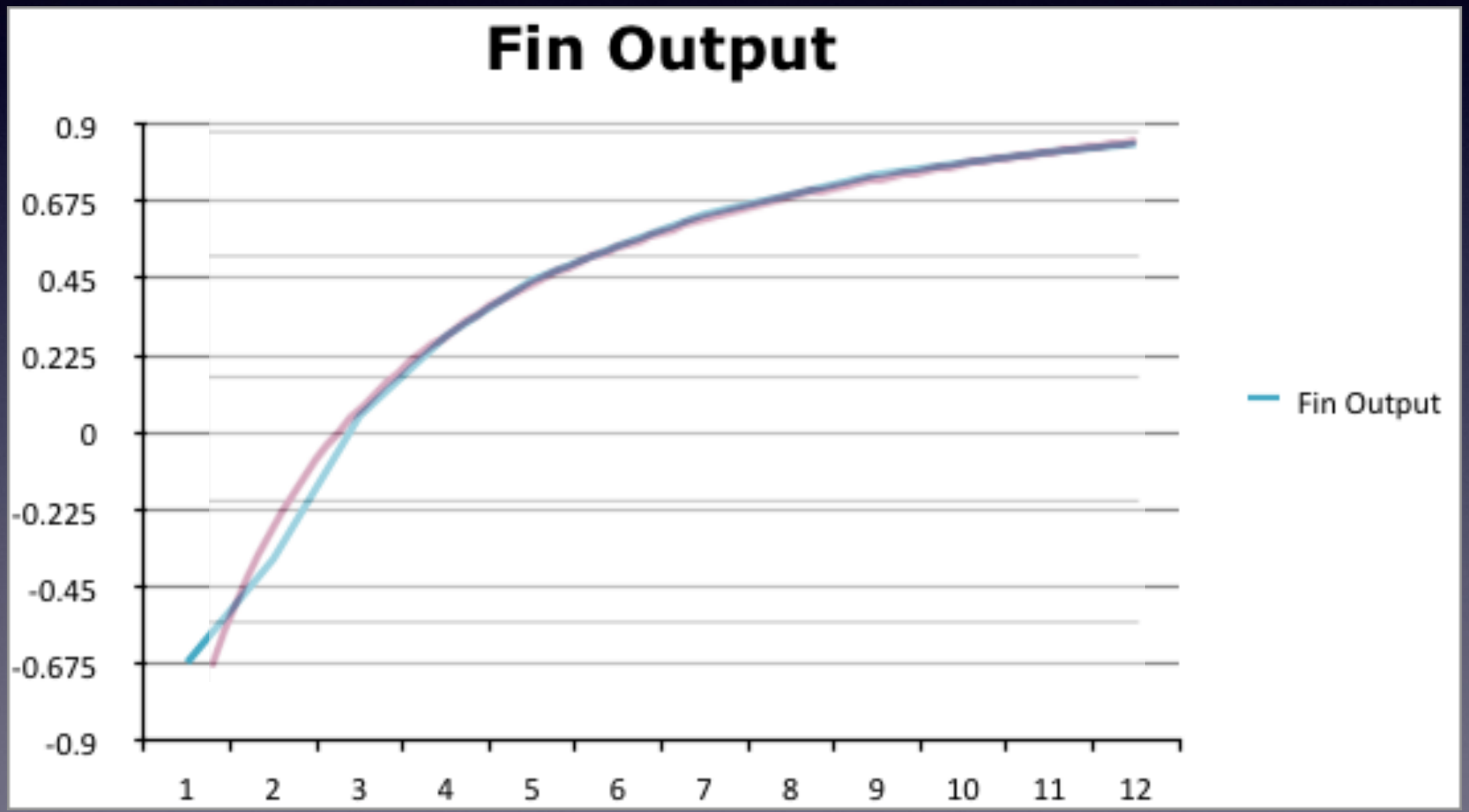
Figure 4-2 Photocurrent output example of one-dimensional PSD (S4583-04, etc.)



So this is it

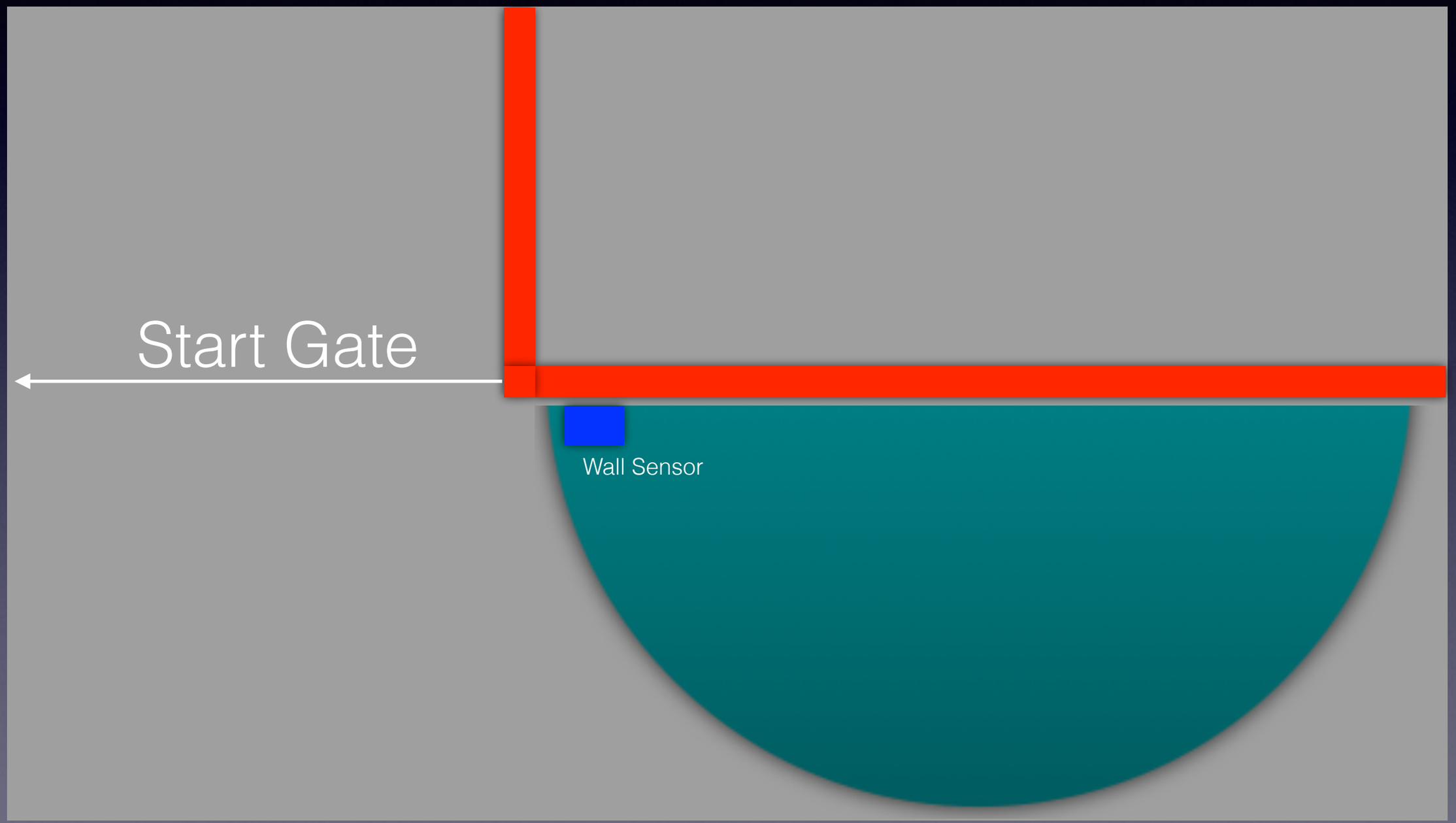


$$\frac{\text{OutA - OutB}}{\text{OutA + OutB}}$$



LAST JUNES DEE PROBLEM ?

DEE 2

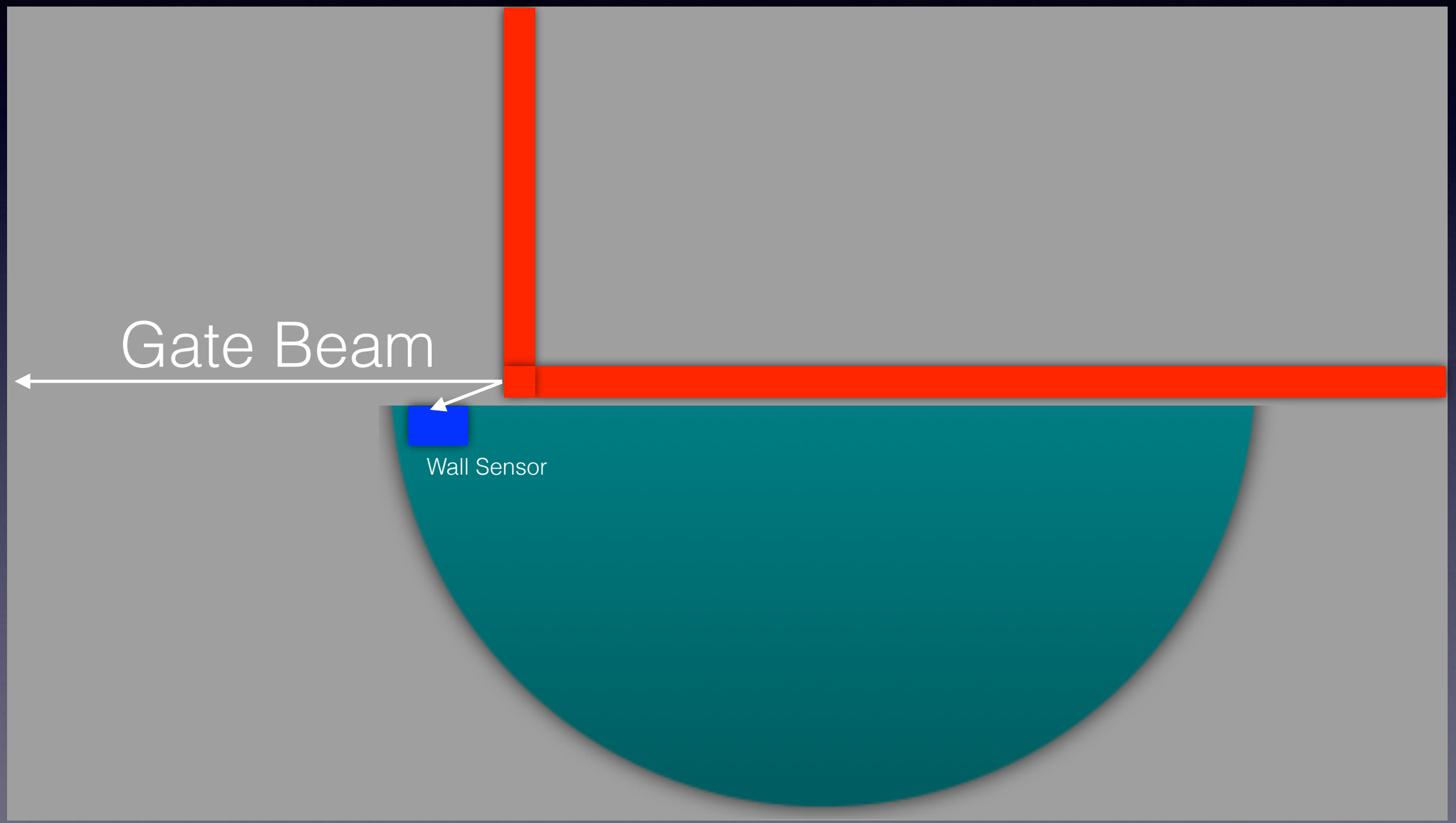


START / FINISH GATE PROBLEM

Last year at the June competition DEE had a problem (as usual), it moved forward to start it's first lap and then stopped indicating it had completed all of the laps it was meant to have done.

WHY WAS THIS ?

DEE 2



WHY WAS THIS ?

My wall sensor was just looking for a change in wall level signal, it was not pulsing like most wall sensors. As the sensor moved passed the start gate emitter post it started to see the pulses for the timing gate (1mS) DEE then counted these pulse as lap corners and hence completed its 6 laps in 24mS.

Easy fix just use an RC filter to remove the pulses and restore the DC signal I was looking for.

HAS THIS HAPPENED BEFORE ?

In past competition we have observed some strange mouse behaviour when approaching the centre and getting near the finish gate. At the time it was suggested that the finish gate may have caused a problem to the mouse. We never really proved it one way or another.

So what to do about it ?

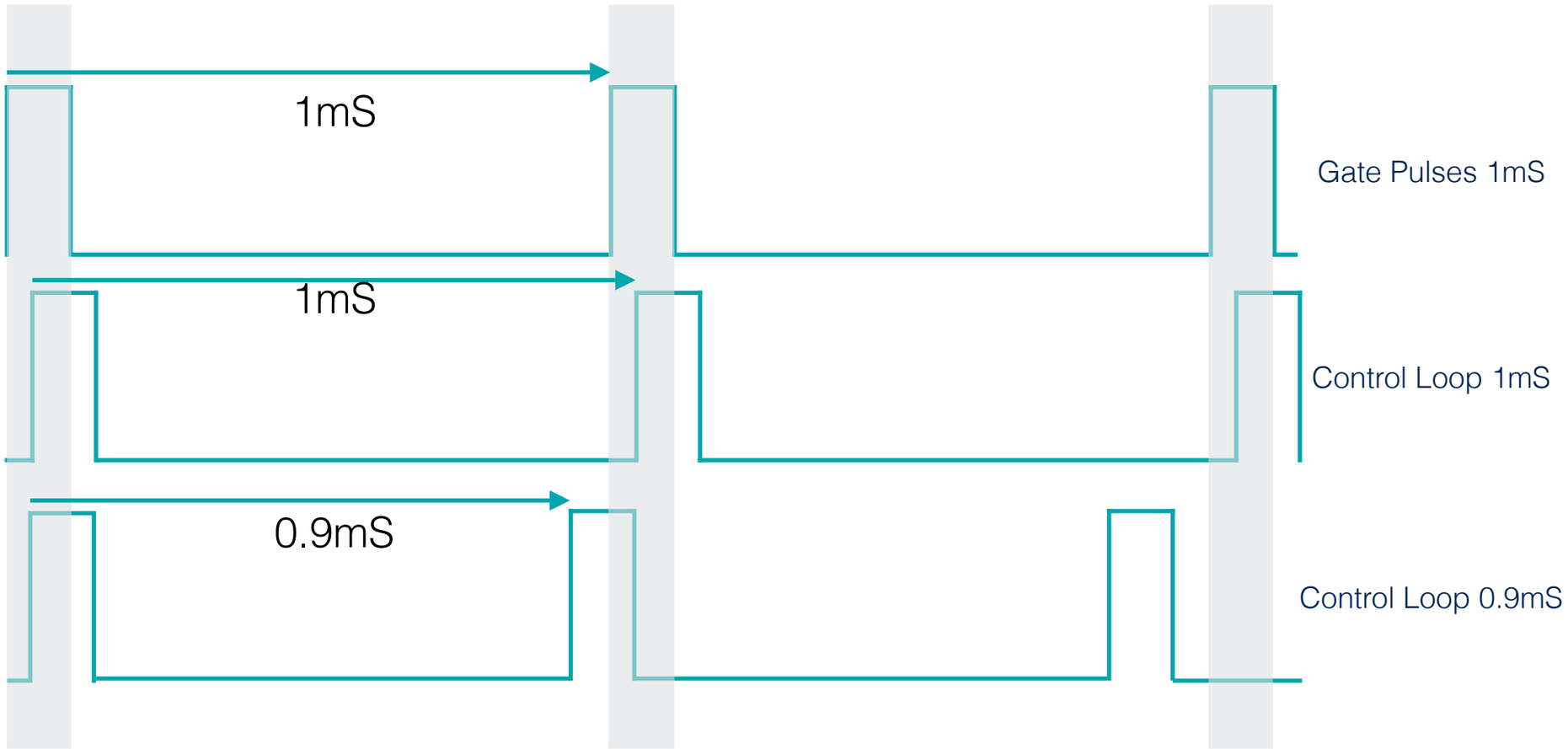
So what to do about it ?

My first idea was to just say, I needed to see a wall for 3 consecutive readings before setting a wall detected bit.

But then it dawned on me, the timing gate will be running at 1mS and most people also run their main control loops at 1ms, so if you collide with it once you will keep colliding until you get out of sync.

So run you main control loop at something like 0.9 or 1.1mS to get out of sync ASAP.

Timing Loops



And That’s All For This Year

Any Questions