

Total Cost of Ownership comparison between AV systems using:

1. A lamp-based projector, 2. A laser projector, 3. Two large flat panel video displays, and 4. A single extra-large flat panel video display

1. LAMP-BASED PROJECTOR

Item	Unit price	Quantity	Ext. price
Panasonic PT-EZ770 projector	\$4,650.00	1	\$4,650.00
Chief RPA-U projector mount	\$175.00	1	\$175.00
Pana ET-LARF100 projector lamp	\$680.00	10	\$6,800.00
Da-lite Contour 88499LS screen	\$2,600.00	1	\$2,600.00
Screen control switch	\$50.00	1	\$50.00
Lost instruction time when lamps fail	???	10	???
Staff time to replace lamps	\$30.00	10	\$300.00
Total Cost of Ownership over 11 years			\$14,575.00
TCO per year			\$1,325.00

This TCO estimate doesn't include taxes, shipping, installation, energy, or disposal costs. It also does not account for lost instruction time due to lamp failures

2. LASER PROJECTOR

Item	Unit price	Quantity	Ext. price
Panasonic PT-MZ570	\$5,200.00	1	\$5,200.00
Chief RPA-U projector mount	\$175.00	1	\$175.00
Da-lite Contour 88499LS screen	\$2,600.00	1	\$2,600.00
Screen control switch	\$50.00	1	\$50.00
Total Cost of Ownership over 11 years			\$8,025.00
TCO per year			\$730.00

This TCO estimate doesn't include taxes, shipping, installation, energy, or disposal costs.

3. TWO LARGE FLAT PANEL VIDEO DISPLAYS

Item	Unit price	Quantity	Ext. price
Sharp PN-UH 701 70" commercial display	\$1,525.00	2	\$3,050.00
Chief LSM1U display mount	\$180.00	2	\$360.00
Cables and signal distribution gear required for second display	\$1,100.00	1	\$1,100.00
Total Cost of Ownership over 11 years			\$4,510.00
TCO per year			\$410.00

This TCO estimate doesn't include taxes, shipping, installation, energy, or disposal costs.

3. ONE EXTRA-LARGE FLAT PANEL VIDEO DISPLAY

Item	Unit price	Quantity	Ext. price
Sharp PN-LE901 90" commercial display	\$5,200.00	1	\$5,200.00
Chief LSM1U display mount	\$180.00	1	\$180.00
Total Cost of Ownership over 11 years			\$5,380.00
TCO per year			\$490.00

This TCO estimate doesn't include taxes, shipping, installation, energy, or disposal costs.

NOTES:

1. Are the figures above the *total* cost of equipping a classroom?

- **NO!** The figures in the above TCO estimates should not be mistaken for the total cost of equipping a classroom. These figures do not include the many other AV/IT devices in a classroom, such as computers, document cameras, sound systems, control systems, etc. The figures can be used only for comparing the relative costs of 4 different video display types. Only those costs associated with a particular type or number of display(s) are shown.

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NOTES cont'd

2. Were all the prices used in the above TCO estimates from the same vendor?

- **YES** In order to provide a genuine "apples to apples" comparison, all prices shown were obtained 12/5 & 12/6/19, from the B & H Photo Video website <https://www.bhphotovideo.com/>
 - CMAS pricing is often somewhat lower.

3. Why did you estimate TCO over 11 years?

- Laser projectors (rather than conventional lamp-based projectors) have a rated life of 20,000 hours, or approximately 11 years at 1830 hours per year
 - We don't yet have enough experience with laser projectors to be able to say if they genuinely achieve their 20,000-hour expected life.
 - Laser projectors cannot be "re-lamped" like lamp-based projectors. They are essentially consumables, to be disposed of and replaced rather than repaired.

4. Where did you come up with the estimate of 1830 hours per use per year?

- The 2020-21 YCCD Academic Calendar includes 183 Monday - Thursday Instructional Days.
 - Although the Academic Calendar includes Fridays and Saturdays as Instructional Days, I chose not to count them because EMS shows room usage (and therefore, presumably, projector usage) is minimal on those days.
- I estimated that a projector in a typical classroom is used 10 hours per Instructional Day.
 - This may, in fact, be on the low side. On most days, instruction begins at or before 8:00am, and may extend past 10:00pm. Walking through our largest instructional facilities - Founders Hall, Sierra Hall, and the Science Community Center - one sees that the projectors are on (even if they're not actually in use) for virtually every class session.
 - If the usage of a particular projector is higher than 10 hours per day, the Total Cost of Ownership of that projector will be higher than indicated above.
- $(183 \text{ Instructional Days per year}) \times (10 \text{ hours projector usage per Instructional Day}) = 1830 \text{ hours of projector usage per academic year.}$

5. How long do conventional (non-laser) projector lamps last?

- Most OEM projector lamps have a rated life of 2000 hours. In our experience, this is reasonably accurate - some (though few) lamps fail prematurely, while others achieve slightly longer life.
 - $1830 = 91.5\%$ of 2000
 - This means 91.5% of a conventional projector lamp's life is used in a typical academic year.

6. Why did you include screens in the TCO estimates for projectors?

- To provide a genuine comparison. Screens are needed in rooms equipped with projectors, but not in rooms equipped with flat panel displays, so the cost of the screen is relevant to this comparison.
 - It is reasonable to expect a screen to need to be replaced after 11 years in a high-traffic environment.
 - The screens in Founders Hall began failing within a few years of the building's renovation. This may have been due in part to a poor design - the one screen that was replaced by the Lit & Lang Division appears to be of much higher quality.
 - When considering replacing screens with whiteboard paint, as some have advocated, the TCO of screens and screen controls should be replaced with the TCO of using whiteboard paint.

7. What is a "screen control" and why are they included in the TCO estimates for projectors?

- Screen controls are the switches (usually buttons or rocker switches) on the wall that raise and lower screens. They were included in the TCO estimates, as with the screens themselves, to provide a genuine comparison. Many of the screen controls in Founders Hall have broken due to a poor design, and have been replaced - some twice. Similarly, some of the screen controls in the Science Community Center have failed.