

SCOPE



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Flat Panel Monitors (FPMs), which employ the TFT LCD technology common in laptop computers, are now gaining in popularity for desktop PCs. The FPM differs substantially from the more common Cathode Ray Tube (CRT) monitor. With a CRT, the ray “burns” an image into the phosphorous coating on the inside surface of the vacuum tube. Conversely, the FPM employs three transistors per pixel embedded in the display screen. Flat panel technology is more expensive because it has not yet reached the same efficiency of production as CRT monitors. While

FPMs may cost up to three times as much as comparable CRT monitors, they more than make up that difference by enabling significant facility cost savings.

FLAT-PANEL MONITORS: “EXPENSIVE” TECHNOLOGY THAT SAVES MONEY

IBM commissioned KSBA Architects to research savings that may offset the additional cost of the IBM FPMs. KSBA’s completed study, which produced some interesting results, is titled “Analysis of Facility Cost Savings Associated with Flat Panel Monitors,” and was completed in association with Flack+Kurtz engineers of New York City.

The study’s hypothesis asserted that even though the FPMs are more expensive than CRT monitors, it’s possible their use could result in facility savings, making them economically justifiable when approached on a holistic basis. KSBA’s study addressed four different quantitative savings opportunities: energy, construction, furniture and rent. The methodology included:

- ① Measuring the energy consumption of the IBM FPM and a variety of comparable CRTs.
- ① Researching ergonomic parameters to determine how workstations can be modified when FPMs are used.
- ① Developing seven different “Benchmark Workstations” commonly used in high density, computer intensive environments and redesigning those workstations around the FPM.
- ① Quantifying the savings associated with each of the four opportunity categories mentioned above.
- ① Developing return-on-investment spreadsheets showing savings under three different development scenarios at various rental rates.

What KSBA Discovered

- ① FPMs use approximately 60% less energy than the average CRT.
- ① Workstations designed for the smaller FPM, while keeping the same “Functional Worksurface Area,” are between 10 and 20 % smaller.
- ① With workstations employing a single monitor, larger workstations offer greater savings potential.

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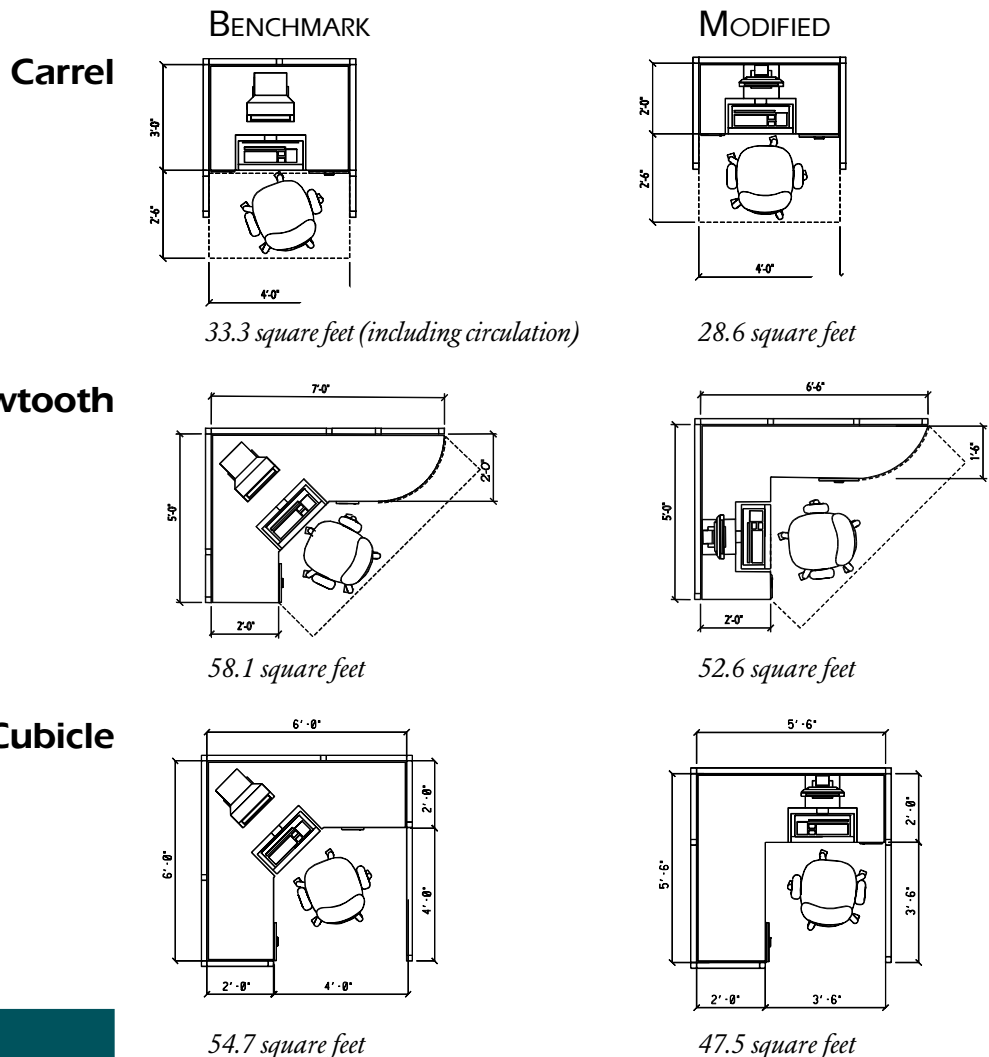
- ① The use of FPMs is not justifiable in purely objective economic terms without the consideration of other factors. However, when new furniture is employed, the energy savings, combined with savings in furniture costs, rent, and in some cases, construction costs, can often result in a positive return on investment.

Some Examples

The seven workstations studied ranged from a small training room workstation, occupying 31 square feet (including circulation), to a medium-sized cubicle occupying 69 square feet. A review of specific results from three of those workstations follows. These workstations included:

- ① *Carrel* - A very small workstation (similar to a library study carrel) often found in the highest density telephone call centers.
- ① *Sawtooth* - An L-shaped workstation arranged in a serpentine or “sawtooth” configuration. The sawtooth works well in situations where a sense of openness and shared communal space is desirable.
- ① *Small Cubicle* - A six-foot square cubicle with an L-shaped worksurface, ideal where private work is necessary but abundant storage space is not.

The plan drawings below show each of the example workstations in the “Benchmark” and “Modified” configuration.



In order to compare savings at various rental rates, KSBA converted capital costs to costs over time by assuming the capital is borrowed at 8.5% over five years for furniture and tenant construction and over 20 years for building construction. The cost savings include the following:

- ① *Rent* - The reduced workstation area, including circulation, incorporating a 15% markup factor which converts from usable square footage to rentable square footage in an office building.
- ① *Electrical Energy* - Including reduced cost to power both the air conditioning system (that can be smaller because of the reduced heat output of the monitor) and the monitor.
- ① *Furniture* - Savings in furniture resulting from smaller size and reduced complexity.
- ① *Tenant Fit-out* - The reduced cost of completing interior tenant construction that is not normally amortized in the rent but is otherwise economically justifiable in high-density offices.
- ① *Base Building Mechanical/Electrical* - Savings associated with downsizing major mechanical and electrical equipment because of reduced energy requirements.

KSBA calculated the savings associated with each of the following examples:

	CARREL		SAWTOOTH		SMALL CUBICLE	
	Total Savings	Savings/Year	Total Savings	Savings/Year	Total Savings	Savings/Year
Electrical Energy	—	\$ 26.74	—	\$ 26.74	—	\$ 26.74
Furniture	\$ 168.00	\$ 42.63	\$ 397.00	\$ 100.75	\$ 836.00	\$ 212.15
Tenant Fit-out	\$ 49.02	\$ 12.44	\$ 56.95	\$ 14.45	\$ 74.58	\$ 18.93
Base Building M/E	\$ 322.22	\$ 34.05	\$ 545.27	\$ 57.62	\$ 525.72	\$ 55.55

**Savings Table
(per workstation)**

KSBA also calculated the savings at various rental rates under various assumed development scenarios:

- ① Scenario A incorporates savings in rent, energy and furniture.
- ① Scenario B includes Scenario A savings plus savings in tenant fitout construction.
- ① Scenario C assumes the project includes construction of a new building and includes Scenario B savings plus base building mechanical/electrical savings.

The following tables show the savings per workstation per year and return-on-investment for the three examples at various assumed rental rates under each scenario. The rental rates are gross rents which include taxes, utilities, maintenance and janitorial.



<i>Assumed Gross Rent (RSF)</i>	CARREL		SAWTOOTH		SMALL CUBICLE	
	<i>Savings/ Wrkstn./ Year</i>	<i>Return on Investment</i>	<i>Savings/ Wrkstn./ Year</i>	<i>Return on Investment</i>	<i>Savings/ Wrkstn./ Year</i>	<i>Return on Investment</i>
\$10.00	(\$ 36.58)	- 22.9%	\$ 30.28	18.9%	\$ 161.11	100.7%
\$15.00	(\$ 9.55)	- 6.0%	\$ 61.67	38.5%	\$ 202.23	126.4%
\$20.00	\$ 17.47	10.9%	\$ 93.07	58.2%	\$ 243.34	152.1%
\$25.00	\$ 44.50	27.8%	\$ 124.46	77.8%	\$ 284.45	177.8%
\$30.00	\$ 71.52	44.7%	\$ 155.86	97.4%	\$ 325.56	203.5%

<i>Assumed Gross Rent (RSF)</i>	CARREL		SAWTOOTH		SMALL CUBICLE	
	<i>Savings/ Wrkstn./ Year</i>	<i>Return on Investment</i>	<i>Savings/ Wrkstn./ Year</i>	<i>Return on Investment</i>	<i>Savings/ Wrkstn./ Year</i>	<i>Return on Investment</i>
\$10.00	(\$ 24.14)	-15.1%	\$ 44.73	28.0%	\$ 180.04	112.5%
\$15.00	\$ 2.89	1.8%	\$ 76.12	47.6%	\$ 221.15	138.2%
\$20.00	\$ 29.91	18.7%	\$ 107.52	67.2%	\$ 262.26	163.9%
\$25.00	\$ 56.94	35.6%	\$ 138.91	86.8%	\$ 303.38	189.6%
\$30.00	\$ 83.96	52.5%	\$ 170.31	106.4%	\$ 344.49	215.3%

<i>Assumed Gross Rent (RSF)</i>	CARREL		SAWTOOTH		SMALL CUBICLE	
	<i>Savings/ Wrkstn./ Year</i>	<i>Return on Investment</i>	<i>Savings/ Wrkstn./ Year</i>	<i>Return on Investment</i>	<i>Savings/ Wrkstn./ Year</i>	<i>Return on Investment</i>
\$10.00	\$ 9.91	6.2%	\$ 102.35	58.5%	\$ 235.59	147.2%
\$15.00	\$ 36.94	23.1%	\$ 133.74	75.4%	\$ 276.70	172.9%
\$20.00	\$ 63.96	40.0%	\$ 165.14	92.3%	\$ 317.82	198.6%
\$25.00	\$ 90.99	56.9%	\$ 196.53	109.2%	\$ 358.93	224.3%
\$30.00	\$ 118.01	73.8%	\$ 227.93	126.1%	\$ 400.04	250.0%

Conclusions

The tables above demonstrate that, when approached holistically, the use of FPMs in high-density office space can, in fact, save money. This is particularly true with larger workstations in new buildings where the full savings potential can be realized. Of course, actual savings will vary depending on specific circumstances. For example, a company may need additional staff but not want to undergo the time and expense associated with relocating company facilities. In that case, converting to FPMs with new furniture can increase density.

There are also qualitative savings opportunities with the use of FPMs. LCD technology eliminates screen flicker or movement of the pixels that is typical with Cathode Ray Tubes. In addition, due to the flat surface and matte finish of the screen, the FPM appears to be more tolerant of the wider variety of natural and electrical lighting conditions found in office environments. Therefore, there appear to be substantial opportunities to increase occupancy comfort and productivity through reduced operator eyestrain.

One of the problems with taking a holistic approach to costs is the financial compartmentalization of most corporations. KSBA has been involved in projects where the client's Information Technology (IT) department has rejected FPMs because, although they feel the FPMs are of higher quality, they are still viewed as cost prohibitive. Even though the data demonstrate the potential for reduced — not increased — expense, the company's budgeting procedures did not allow offsetting the increased IT expense with reduced facilities expense. The obvious conclusion is that companies better able to analyze costs holistically will be able to take advantage of these new technologies and realize savings their competitors will not. ①

Scenario A —

(Rent, Energy & Furniture)

Scenario B

(Rent, Energy, Furniture & Tenant Fit-Out)

Scenario C

(Rent, Energy, Furniture, Tenant Fit-Out & Base Building M/E)



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