CONTROL ROOM DESIGN

Introduction

This article is part of the "Understanding CCTV Series" and is an abstract from STAM InSight - The Complete CCTV Program on CD-ROM for Staff Training and Productivity Enhancement.

The control room is the heart of any operations and is the final link in a CCTV system. Unfortunately, control room design is often an afterthought and receives little attention as to location, size and comfort.

The Control room is the place where the man machine interface takes place and therefore adequate care should be taken for an ergonomic design. The operators spend long hours in this place and their comfort should be taken care of. Often the investment in the manpower in the control room may be more than the investment in the CCTV system. All this calls for better planning of the control room design. In this article we will discuss the following aspects of the control room.

- Control room design
- Rack design

Control room design

The following factors should be considered when designing a control room:

Temperature
High temperature in a room produces fatigue, which can reduce the concentration of the operators. The right temperature should be maintained in the control room.

Room size
The room size should be comfortable so that the operators do not feel cramped. Future expansion should be taken into account while determining the room size.

Outdoor view
Looking at greenery definitely reduces stress and improves concentration. It is better if the control room has a window and one can see the outside world. This may not be possible in high security control rooms. In such cases adding greenery, plants and other interior design elements in the room will help performance.

Noise
Make sure the background noise is maintained to the minimum. Total silence is also not very good, because it may lead to sleepiness. Soothing music is a good idea.

Lighting
In any office, the expected lighting is around 400 lux. However in the control room the lighting levels should be much lower. The maximum recommended is around 300 lux. Make sure all

the lighting is indirect in nature. Direct lighting behind the operator can cause glare and reflection, causing difficulty for the operator to see the image on the monitor.

Rack design

It is very important to have an ergonomically designed rack so that the operator can use it effectively and efficiently. Some design aspects to be considered are:
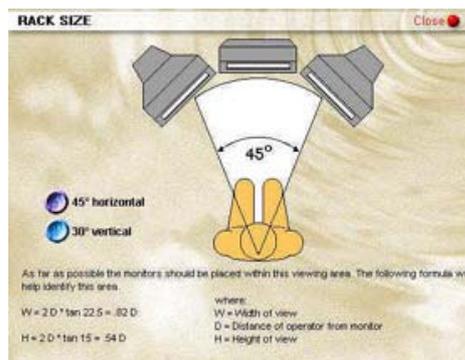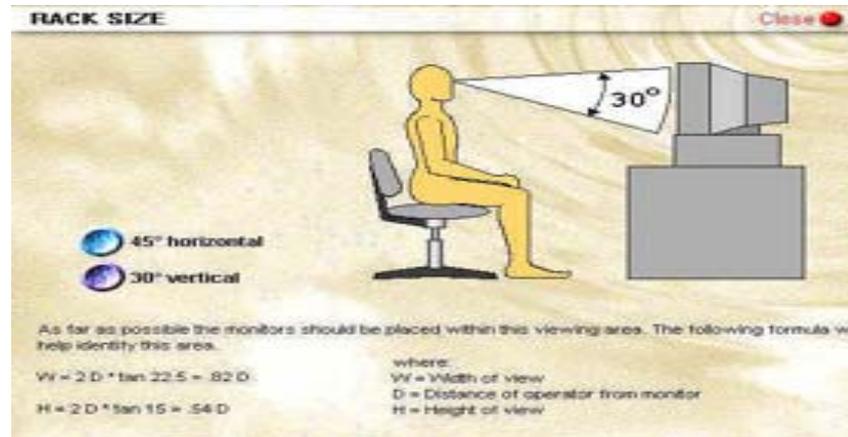
Rack size

The most comfortable angles for human vision are 45 deg horizontal and 30 deg vertical. Greater angles can be seen but that would involve moving the eyeball or moving the neck. This additional movement can cause fatigue and stress. All efforts should therefore be made to place all the monitors within this vision. The following formula can help in identifying this area.

$W = 2 D * \tan 22.5 = .82 D$
$H = 2 D * \tan 15 = .54 D$
W= Width of view
D= Distance of operator from monitor
H = Height of view

Let us see what happens if the operator sits 5 feet (D) from the monitor
W = 4.1 ft
H = 2.7 ft
Now let us see how many monitors can fit this rectangle of 4.1 ft X 2.7 ft
The typical size of a 9in monitor is 8.7 in X 9.4 in. Typically 12 monitors will fit in this square.

Monitor arrangement

The lesser the number of monitors to view, the better it is for an operator. For ease of observation, it is always best to place the monitor in a array of 3 X3 or 4 X 4. It is more convenient for the operator if the upper rows of monitors are slanted downwards and the lower row is slanted upwards. For a big rack a semi circular design is more convenient.

Ventilation in the rack
One of the causes for monitor failure is the heat generated by the monitors when placed in a closed rack. Adequate ventilation should be provided in the rack design.

Wires into the rack
After all the equipment is put into a rack, there is a tendency to push the co-axial cable into the rack. This can be a source of problems. Bending the co-axial cable can change the impedance. This can cause picture reflections leading to double images. Too much bending at the equipment end can also damage the BNC connection over time. This will lead to a gradual drop of picture quality.

Avoid cluttering of rack
The control rack usually has equipment other than CCTV. Prior to designing a complete listing of equipment should be made. These should be placed in such a manner that it reduces clutter and is easy to use. Do not have many keyboards controlling different sub-systems. There is a trend towards system integration whereby most of the security sub systems are interfaced and controlled by a single keyboard.
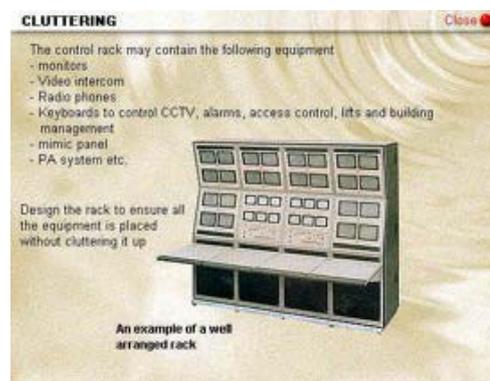
Operator resolution
The distance the operator should sit from the rack will depend upon the resolving power. If you sit very far you will not be able to identify small movements or objects on the screen. In fact, according to one study, the resolving power on a 12 in monitor reduces from 600 lines at 1 foot to only 125 lines at 6 feet. Choosing the correct viewing distance is important.

About the author
Jayant Kapatker is an international authority on CCTV and is the brain behind STAM InSight The Award Winning CCTV Program. This interactive multimedia contains over 14 hours of CCTV content. This series of articles have been based upon the subjects covered in the STAM CCTV – A complete review web based training course. For more information visit: www.stamweb.com or email: sales@stamweb.com