

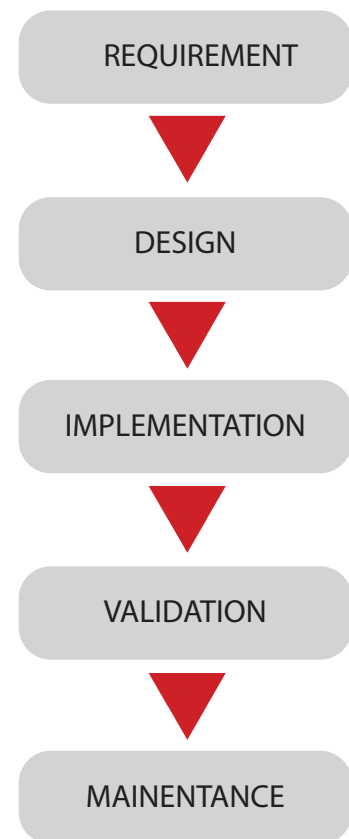
## Control Room Design : Approach

System requirement study is done to evolve technical and ergonomic specification of the control room. Location, layout, choice of control room furniture, display technology, HMI (Human Machine Interface) etc will be based on both operational requirements as well on environmental requirements. Understanding these aspects are vital to any design solution. The design specifications must include ergonomic considerations in order to provide comfort and reduce the physical stress of the operators.

Once the system requirements are clear, the next task is to design/ define the most optimum system to meet the requirements. Top down approach provides a framework for ensuring that decision on each of the above parameters are made based on operational demands considering user in the center. The international standard known as ISO 11064 is the

Operational and Environmental requirements that have to be considered are :

1. Sensitivity of Operation
2. Sensitivity of information handled
3. Monitoring information, people, facilities, material
4. Monitoring time (24/7 or intermittent)
5. Operator population
6. Operator qualification / communication skills
7. Real-time and online requirements
8. Emergency procedures
9. Equipments and system requirements
10. Maintenance requirements
11. Power and redundancy of critical equipment
12. Job aids and working documents
13. Training of operators
14. Environmental temp, lighting, air flow and comfort
15. Human factors/ operator posture
16. Environmental acoustics
17. Wire access, raised flooring for easy installation
18. Exit, entrance, egress, walkway
19. Horizontal and vertical space
20. Flexibility and upgradation of equipment
21. Room layout, modularity of control room furniture for future expansion
22. Maintenance access
23. Identity and image of the corporate values
24. Security and protection requirements
25. International/ national building codes



backbone of ergonomic design of control rooms. The essence of this approach can be defined within a single term: user-centered design. The top-down approach requires that you first spell out the goals of the control center in various situations, including normal, off-normal, emergency, outage, and startup conditions.

Once solutions are identified, they have to be effectively implemented and integrated. Implemented solutions are further Verified and validated. Further, a robust maintenance plan is made for effective functioning of the control room.

TEQZO Environments are a company engaging in research, design, manufacturing, supply and commissioning of technical furniture. Our key focus is on environments like control rooms, control centres, shop floors other technical work environments.

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## Tips for better operator performance :



1. Lower the monitor height, keep items and screens to be viewed at similar distances, increase task lighting on printed material, increase text size, and change tasks periodically. The average resting point of convergence is 35" at 30 degrees down angle, 45" at horizontal, and 53" at 30 degrees up angle, hence lower monitor heights means lesser strain.

2. The vertical and horizontal eye and head movement diagram demonstrate best viewing angles for an operator. Ideally, there is no head movement and minimal eye movement for the most important and most common tasks.

## Tips for deciding Displays & Monitors:



1. Displays that are used for close image inspection should be positioned directly in front of the operator, with sizes typically ranging from 15" to 19".

2. Displays outside the workstation and positioned at a greater distance or behind the console should range in sizes from 19" to 42" or larger.

3. Touch operated consoles to be placed at a minimum of 28", so that the screen can comfortably be touched from a relaxed sitting position.

4. To minimize head and extreme eye movement, the primary images to be viewed, whether displayed locally or on a distant video wall, should be centered within a 30 degree cone.

5. To calculate the minimum distance, multiply the width of the display times 1.87 and maximum distance will be 8 times height of the display. Thus, a 20" diagonal display will have a width of 16" and height of 12", meaning that the minimum distance from the display should be 30" and maximum distance will be 96".

## Tips for good Environmental design:



1. Ceiling acoustics should strive to achieve an NRC (noise reduction coefficient, a measurement of sound absorption characteristics) of 0.65 to 0.75 or better and an AC (articulation class, a measurement of sound attenuation) of 40 to 44 or better.

2. Room temperature should range from 70 degrees to 72 degrees F, with relative humidity from 40 percent to 65 percent and minimal air movement not exceeding 4" to 6" per second.

3. Ceiling materials should offer moderate to high reflectance of 0.8 or more to improve light distribution throughout the room and reduce energy costs for lighting.

4. Walls should be an off-white matte or flat finish with a reflectance range of 0.5 to 0.6.

5. Floor materials should have a lower reflectance of 0.2 to 0.3 for carpet or 0.25 to 0.45 for floor tiles.