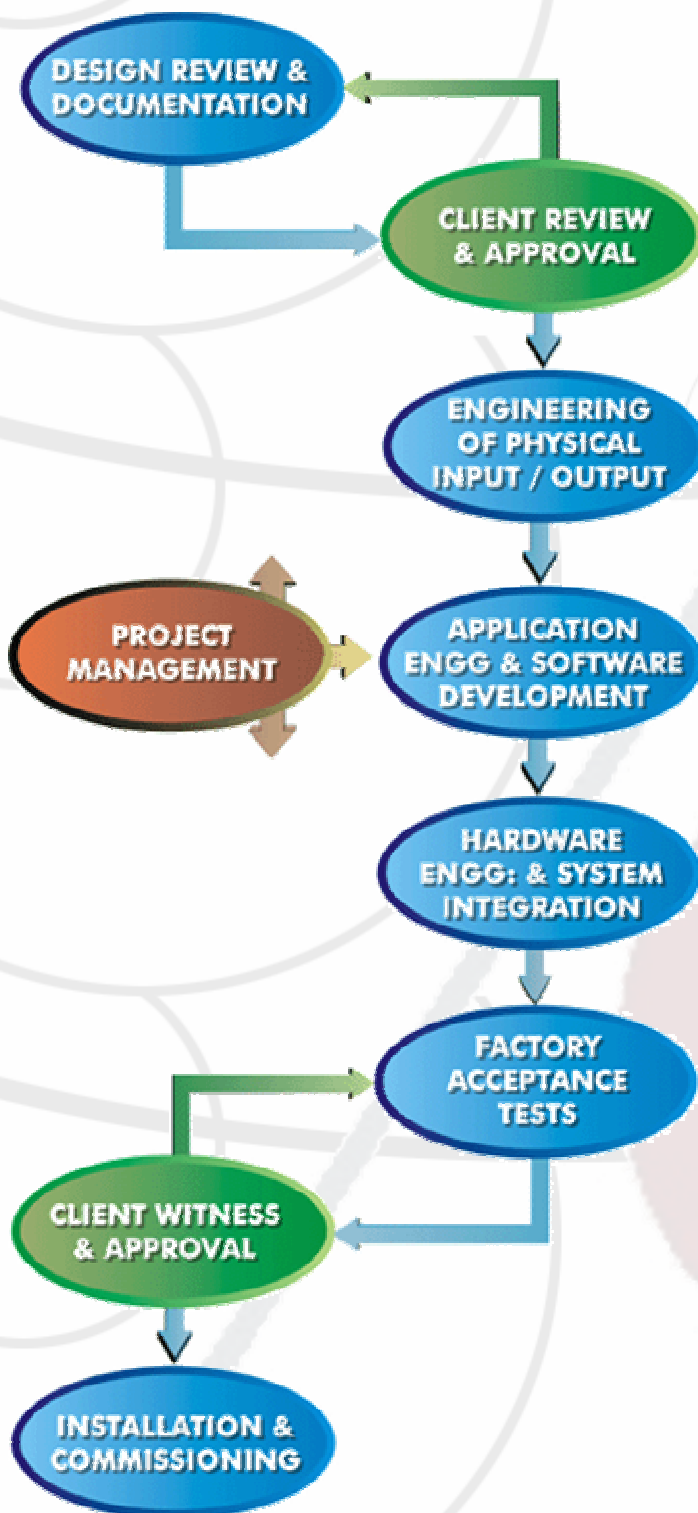




## TYPICAL CONTROL SYSTEM PROJECT EXECUTION CYCLE



### Engineering Activities (excluding Project Management)

#### Design review and documentation: (Client approval critical)

1. Control System Architecture and Design
2. System Loading calculations such as Controller (CPU) loading and communication network loading as applicable
3. System Power Consumption and Heat Dissipation calculations (subsequently useful for power supply design on site and also for site-planning of air-conditioning where required)
4. Cabinet sizing and design
5. Generation of typical cabinet layout drawings
6. Generation of I/O Termination and typical Wiring diagrams, loop drawings
7. Graphics design for plant operations and maintenance – develop color and symbol philosophy, navigation philosophy, animation and alarming philosophy

#### Engineering of physical Inputs and outputs

8. Input/Output, Tag database generation
9. Design of System I/O Cards and channel allocation
10. Design of system address allocation for tags

#### Programming and Software development (off-line)

11. System Software development: Define system modules and assign racks/slots, communication cables etc
12. Control software development: Programming controllers and developing ladder logic, Batch recipes etc as applicable to application

13. SCADA/HMI Software development and configuration
14. Alarm configuration
15. Historical Trends and Reports configuration
16. Configuration of data transfer to/from third-party systems if applicable



### **Hardware Engineering and System Integration (Optional)**

17. Fabrication and wiring of panels and cabinets
18. System rack and Module assembly, integration and power-up
19. Load System software and upgrade to latest revisions required
20. Load application software developed offline
21. Establish system network and communication (I/O Cards – CPU – Communication modules/cables – Operator screens/SCADA)

### **System and software Testing**

22. If applicable, check integrity of wiring in panels by simulation of field signals and corresponding updates to the system health displays
23. Check control software and displays by simulation of field inputs/outputs
24. Check program and application software for correct operation of control schemes, interlocks and logics by simulating normalized conditions (by applying “forces” on I/O)
25. Check displays for proper representation of plant equipment, pipelines etc and for corresponding dynamic links and data updates with the simulated inputs
26. Verify operator alarm notification to be in accordance with the plant requirement

27. Verify proper data collection and retention on the historical database and for proper data displayed on trends
28. Generate sample reports such as Shift Logs, Daily Logs, Production reports etc as applicable by the requirement specifications
29. Document test results and rectify errors found while testing

### **Factory Acceptance Testing (FAT) with Client representatives**

30. Repeat 20-27 and obtain System Acceptance by client for a DEFECTLESS system.
31. Documentation of Modifications that need to be made to the control system after the FAT prior to testing at Site
32. Prepare System for shipment with necessary documentation to identify different cabinets, packages etc

### **Installation, Testing On-Site and Plant Start-up / Commissioning (Optional)**

33. Installation of System cabinets and cables as per recommended procedures and project documentation
34. Power-up of system on site
35. Repeat tests conducted on system during FAT on site with actual signals
36. Engineers’ stand-by support during pre-commissioning, commissioning and startup of plant