에너지 管理시스템 事業管理

PROJECT MANAGEMENT FOR ENERGY MANAGEMENT SYSTEMS

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Abstract

This paper explains about general considerations and project management for a modern electric utility EMS/SCADA system.

This paper also attempts to help engineers in the following situation :

They are given the task of specifying, buying and installing a EMS/SCADA system.
When do they start ?
What tools/texts/guidelines are available to help them out ?

If it is a large system, methodical project management is necessary.
What are the critical tasks to be undertaken?
When should they been done and how does their timing impact the whole project.

1. GENERAL CONSIDERATIONS[1]

1) Applicable Standards
ANSI/IEEE, ANSI, IEEE, EIA, ANSI/NEMA, IEC, MIL Std, and CCITT Recommendation.

2) System Design Characteristics
   (1) Reliability : MTBF
   (2) Maintainability : MTTR
   (3) Availability :
      (i) A=uptime/(uptime+downtime) =MTBF/(MTBF+MTTR).
      (ii) vital functions=0.9995,[2] non-vital functions : 0.995

3) On-Line Diagnostics
   (1) Analog function check
   (2) Contr ol/Indication functions check
   (3) Sequence or events functions check
   (4) RTU data processing functions check

4) Expandability
   (1) Points, spare
   (2) Points, wired
   (3) Points, space only

5) Installation Considerations
   (1) RTU Installation
   (2) Master station installation

6) Maintenance Considerations
   (1) Maintenance support : The user has a choice of
      (i) providing all maintenance with his own personnel,
      (ii) contracting for maintenance or
      (iii) a combination of the two
   (2) Preventive maintenance
   (3) Software/firmware maintenance

7) Documentation
   (1) Design documentation
   (2) Installation documentation
   (3) Operating instructions and records
   (4) Maintenance instructions and records
   (5) Test documentation
   (6) Documentation media :
   Paper, Microfilm, Magnetic Tape

2. PROJECT MANAGEMENT[3]

1) Objectives
   (1) On time project sechedule
   (2) Satisfying system
   (3) In-budget expenditure

2) Problem definition[4]
   (1) In-house study
   (2) Consultant help ?
   (3) The study team
   (4) Management approval

3) Project Definition
   (1) Feasibility study
      (i) 0.3% savings in operating costs
      (ii) 1% reduction in the required total generation capacity[5]
      (iii) 0.5% savings in operating costs by unit committment only[6]
   (2) Requirement study
   (3) Control Center facility require-ments.
   (4) Budgeting

4) Supplier Selection
   (1) Vender qualification
   (2) Procurement specifications prep-aration
      (i) terms and conditions
      (ii) technical specifications
      (iii) limitations guidelines for the fully expanded system[7]
      - CPU loading : 75% during normal operations
      - main memory : 90% for resident
        : 95% for overlay areas
      - data acquisition controller loading : 75-95%[8]
      - availability : redundant : 99.95%
        non redundant : 99.0%
   (3) Vendor propose/Bid evaluation
      (i) scorecard opproach
      (ii) low compliant bid approach
      (iii) low evaluated bid approach
      (iv) full life cycle analysis
      (v) assessing intangibles
   (4) Award
      (i) award outrignt or
      (ii) issue a letter of intent
      (iii) contract negotiation

5) Project implementation
   (1) The implementation plan[9][10][14]
      (i) PERT/CPM, GANT, PRL, PMS
      (ii) 4-5years
      (iii) 5-7years (advanced security control functions)
      (iv) cooperation between vendor and customer
      (v) customer's engineers particip~~ate~~ in system design, develo-pment and implementation
   (2) System documentation and design review[11]
      reviews are held :
      (i) at completion of prelimina-ry design
      (ii) at completion of each detail design
      (iii) at completion of unit test and perior to integration
   (3) Training[4][9][12][13]
      (i) formal training
      (ii) on the job training at vender site
      (iii) utility participation in design and construction during the implementation
      (iv) software engineers partici-pate in hardware training course
   (4) The factory acceptance test[4][9]
      (i) 3-4 months duration
      (ii) procedures must be approved and contributed by project team
      (iii) trained hardware engineer should porticipate and

approve the hardware portion of the factory test.

(5) Installation
  (i) site preparation
  (ii) RTU installation
  (iii) computer system errection

(6) Field checkout(4)
  (i) communication checkout
  (ii) data checkout
  (iii) AGC tunning

(7) Field startup

(8) System cutover

(9) System availability
  (i) A=U/(U+D)
  (ii) minimum: 1-3 month

(10) Warranty
  (i) vendor: often 18 months (after shipment)
  (ii) utility: extend 6~12months(after availability) test)

(11) Expansion and addition
  (i) adding RTUs, data base
  (ii) adding/enhancing functions
  (iii) major new functions.

(12) System maintenance and enhancement
  (i) hardware maintenance
  (ii) software maintenance
  (iii) design and development of new program
  (iv) configuration changes and expansion

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