

Guidelines for preparing IBMS BOQ

Lecture 6

Targets of Lecture

- Introduction to preparing Bill of Quantities and BMS, Access Control and Video Monitoring proposals
 - Knowing the required documents
 - Understanding required steps to prepare a BoQ and complete IBMS proposal
 - Introduction to calculation tool
- Duration: 2 hours

12 steps to prepare IBMS Bill of Quantity

1. Review all drawings to understand the project
2. Find connected systems and I/O points for connected systems
3. Place systems to different locations/automation panels
4. Add required modules to automation panels
5. Add automation panels and related accessories
6. Add required field devices (sensors and actuators)
7. Add FCU controllers and required field devices
8. Add Access Control components
9. Add Video Monitoring components
10. Add right control room software and equipment
11. Check summary (green cells)
 - layers should match with typical percentages
 - price per I/O point and FCU should match guideline price
12. Correct BoQ sheet

Required documents to prepare a BMS proposal

- BMS specification (if exists)
- Mechanical drawings
 - Equipment schedules
 - Control schematic drawings or I/O-point lists
 - BMS riser diagram (if exists)
- Electrical drawings
 - Amounts of systems shown in the control schematic drawings

From mechanical equipment schedule

- Amounts of:
 - Chillers/Heat Exchangers (HEX)
 - Chilled water pumps (primary, secondary, tertiary)
 - Pressurization Units
 - Fresh Air Handling Units (FAHU, AHU)
 - Fans (Make-up, Exhaust, Garage, Stairwell, Smoke)
 - Water Tanks (under ground, over head)
 - Pumps (Transfer, Booster, Sewage, other)
 - Amounts of Fan Coil Units (FCU)
 - Communicating (=BMS connected)
 - Stand alone
 - Other (lighting groups on/off and dimmed)

From control schematic drawings or I/O-point lists

- Add amounts of I/O-points per system and location to **Substations** worksheet:
 - Digital Inputs (DI)
 - Digital Outputs (DO)
 - Analog Inputs (AI)
 - Analog Outputs (AO)
 - Counters for pulses (DIC)
- Add required modules (L2242, L5400, L1000) to have enough I/O-points per location [**Substations**]
- Add time schedulers, routers and installation boxes [**Substations**]

From control schematic drawings or I/O-point lists

- Amounts of field devices per system to **Field Equipment** sheet:
 - Sensors (to Analog and Digital Inputs, AI and DI)
 - Temperature (room, duct, pipe, outdoor)
 - Humidity (room, duct, outdoor)
 - Pressure sensors and switches (duct, pipe)
 - Pressure difference sensors and switches (duct, pipe)
 - CO (room, duct)
 - CO₂ (room, duct)
 - Lux (room, outdoor)
 - Light switches, PIRs
 - Actuators (from Analog and Digital Outputs, AO and DO)
 - Valves and actuators
 - Damper motors (continuous, on/off, with or without spring)
 - Special relays and dimmers

From lighting control system

- Lighting Control (if included)
 - Calculate amount of controlled lighting groups (on/off, dimmed) for each automation panel and add required I/O-points and automation/electric panels [**Substations**]
 - Add required modules to automation panels [**Substations**]
 - Add required dimmers (600W, 1,3 kW or 2 kW) and special relays to automation panels [**Field Equipment**]
 - Calculate sensors (occupancy detectors and switches) [**Field Equipment**]

From equipment schedule and control schematic drawings or I/O-point lists

- Amounts of BMS connected Fan Coil Units (FCUs) and VAV controllers to **Rooms** worksheet
- Add required modules, boxes, sensors and actuators per FCU/VAV
- Add required routers (LON-router per 50 modules) and power supplies

From Low Current system design

- Amounts of Readers, lock, exit buttons, door contacts, power supplies to **Access Control** sheet
- Add required Access Control Panels to cover readers, indication and control points
- Add required Network controllers (V1000)

From Low Current system design

- Camera types from specification
- Amounts of Cameras to **Video Monitoring** sheet
- Add required Digital on Network Video Recorders (DVR/NVR) to cover cameras
- Add required DVR/NVR computer and display hardware

From BMS specification and riser diagram

- Control room equipment and COBA software license to **Monitoring** sheet:
 - Add needed computers/server
 - Add needed printers
 - Add needed network adapters (LNI)
 - Calculate the total amount of Information point (=I/O points) and right COBA software license
 - Estimate needed amount of graphical user interfaces

Check pricing summary sheet and correct BoQ sheet

- Check green cells which show the calculated cost share of each layer of system and compare to guideline (if large deviations check the calculation)
 - Monitoring ~10%
 - LON-network ~3%
 - Modules ~32%
 - Field equipment ~27%
 - Work cost ~20%
 - Panels and accessories ~8%
- Check calculated price per I/O-point and per FCU
 - Price should be close to guideline price
 - If big deviations check calculation
- Correct BoQ to include all included field devices

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