



- f) M and E Subcontractors - are responsible for installing work and supplying equipment as stated in contracts. Specific commissioning responsibilities could include performing performance tests and provide / assist in training and documentation for O&M staff.
- g) Suppliers and Manufacturers - provide specified systems, equipment and components to owner, main contractor and subcontractors. These could include conducting factory and site performance tests, if specified and providing O&M information for specific equipment.
- h) Operation and Maintenance Staff - should provide continual feedback to the owner about the system performance hence the deficiency in design, installation, or commissioning phases could be upgraded or fine-tuned in the development. They should give early O&M requirements in the design intent; training requirements and attendance on performance testing.

#### 4. Who should appoint and how to budget for Commissioning

Commissioning specialist can be appointed and paid in the following ways.

a) **Appointment** - the role of commissioning specialist and its relationship with employer and other project team members can be many and varied which depends on the contract nature. Its contractual position is very important as this defines its authority and responsibility thus its ability and effect in the project team.

In US, the Cx specialist is usually an independent party so it is usually appointed directly under the owner and has right to vet and approve the design documents. In Britain, research indicated that Cx specialist should be appointed as part of the project management team (e.g. under the main contractor). In Hong Kong, such definition has not been specified mainly due to the lack of contractual position in the adapted Conditions of Contract and the General Specifications. Therefore, commissioning is usually conducted by M and E contractors at the end of the project before handing over the building to owner. As a result, the Cx process in design and construction is always undermined.

b) **Budget cost** - this should be related to the nature of appointment. Four ways can be

defined.

- i) In-house budget - the owner set aside specific budget for commissioning each project.
- ii) Independent budget - an independent budget for commissioning that is separate from the project budget which can be part of the owner's operational expenditure.
- iii) Inclusion in design fee - the cost is being quoted or absorbed in the designer's fee.
- iv) Inclusion in contract sum - the cost is included in the construction tender bid which can be a separate item.

In US, the commissioning budget is as follows:

- Total Building - 1.5 to 3%
- HVAC - 2.5 to 5%
- Electrical - 1 to 2%

#### 5. Conclusion

It is no doubt that HVAC commissioning process could lead to a better building quality thus benefits the owner and occupants in long run. Unlike electrical and fire services systems that shall be properly tested to meet the statutory requirements, HVAC system is not being governed under regulations. Therefore, for the sake of safety and health, energy utilization etc., appropriate HVAC commissioning process should be executed so as to reveal the issues in a systemic documentation process. ◦

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