

Objectives

The objectives of this study are to understand the general practice and procedures in the execution of Electrical and Mechanical (E&M) works, to determine the causes of E&M works related accidents and to provide recommendations to improve the safety and health of E&M practitioners.

Background

E&M works are one of the most hazardous trades in the construction industry. The Hong Kong Federation of Electrical and Mechanical Contractors Limited has expressed concerns about the safety of E&M practitioners in different occasions. It is important to identify the major factors leading to the E&M works related accidents and formulate safety measures to improve the safety performance of the E&M industry.

Methodology

The research comprises seven key stages: (a) literature review, (b) focus group meetings, (c) case studies, (d) structured interviews, (e) questionnaire survey, (f) data analysis, and (g) validation and dissemination.

Findings

1. Characteristics of E&M Works
 - (a) E&M sub-contractors are appointed by the client in new construction projects, whereas non-E&M subcontractors are appointed by the main contractor. Main contractors normally pay little attention to the E&M workers. Planning of the E&M works and safety of the E&M workers are generally ignored.
 - (b) E&M works follow building and construction activities. A delay in the building and construction activities will have a knock-on effect on the commencement of the E&M works, and the programme. With a tight working schedule and long working hours, E&M workers may neglect safety procedures and overlook the hazards on site.
2. Safety Culture of the E&M Industry
 - (a) Safety culture of the E&M industry is poor and safety awareness of E&M workers is low. E&M works are normally sub-contracted. Communication between the main contractor workers and the E&M workers is poor, and this greatly increases the likelihood of E&M works related accidents.
3. Major Types of E&M Works Related Accidents
 - (a) The major types of E&M works related accidents are fall of person from height and electrocution.
 - (b) The major types of accident related to air-conditioning works in both new construction works and Repair, Maintenance, Alteration and Addition (RMAA) works is fall of person from height.
4. Major Causes of E&M Works Related Accidents
 - (a) For new construction works, the major causes are compressed work schedule, long working hours, complex work environment, manpower shortage, and lack of risk assessment and safety plan.
 - (b) For RMAA Works, the major causes are lack of safety facilities/access for air-conditioning works, and lift repair and fire services maintenance works, inadequate safety supervision, reduced construction period, and pressures on frontline workers (e.g. to keep the electricity supply live during maintenance works).

5. Other Observations

- (a) Electrical wiring and air-conditioning installation works are the top two hazardous trades.
- (b) “Slip, trip or fall on same level” and “fall of person from height” are the most common types of E&M works related accidents.
- (c) The majority of the injured workers had less than 5 years of working experience in construction, and most of the workers had been engaged in that field for not more than one month.
- (d) Other factors causing E&M works related accidents are improper working procedures, poor housekeeping, carelessness or lack of concentration of E&M workers and, failure of E&M workers to operate in accordance with safety specifications and construction guidelines.

Recommendations

1. Gaining of stronger support from the developers and main contractors to enhance safety awareness, safety culture and safety attitudes of workers.
2. Consideration and inclusion of the following items in the design:
 - (a) Safety facilities for air-conditioning works, such as anchor bolts, working platforms, safe access and space, service platform or maintenance corridor, and internal access opening;
 - (b) Safety facilities for lift works, such as access to the lift pit at the basement level, inclined ladders with railing for access to the lift machine rooms, fall protection anchor points for arrest device at the lift lobby (i.e. near the lift door), switch lock on the operation switch, and guard-rails and toe-boards on top of a lift car;
 - (c) Implementation of Construction Design and Management (CDM); and
 - (d) Maintenance plans (submitted to the Buildings Department with input from the Labour Department), which are then uploaded to the Sales of First-hand Residential Properties Electronic Platform (SRPE).
3. Planning of a reasonable works programme, with input from various parties, such as E&M subcontractors.
4. Promotion of the image of the industry and enhancement of site facilities, and income and welfare of the E&M workers, to attract new blood.
5. Implementation of risk assessment at tender stage with mitigation measures considered and included.
6. Extension of the Pay for Safety Scheme to E&M subcontractors and the frontline workers, when they have complied with the stipulated safety requirements.
7. Adoption of new technologies, such as push-fit pipes, BIM, guided suspended working platform, rechargeable and wireless hand held tools, etc.
8. Provision of training to new workers on site, and closer supervision of the workers involved in high-risk activities, such as electrical wiring works, work at height, etc.
9. Adoption of other safety measures, such as use of “Lock out tag out device” and "Permit-to-Work" system.

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