

MAINTENANCE OF GLASS CURTAIN WALLS

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ABSTRACT

During the last decade Indian buildings have undergone dramatic changes. There has a large influence of commercial growth and advances of building technology on the façade treatment of buildings. The tremendous use of glass curtain walls has now made buildings more visually attractive, aesthetic and transparent. But it has also made the building envelope more vulnerable and more exposed to the exterior environment. Though glass is a very tough material but it is very brittle. Also the supporting systems of the glass facades are of anodized aluminum sections. Hence these facades need more frequent maintenance vigil. This paper brings forward solutions to façade maintenance as followed globally.

INTRODUCTION

The condensation and dirt deposition on the curtain walls damage the optical films attached to the glass, cause deterioration of supporting aluminum sections and corrode the fittings. They become a potential danger to the life of users of the building. Other than this they also lead to visual obstruction and also become aesthetically unpleasing. All this leads to emergence of leakages in the joints. This is detrimental to thermal insulation, ventilation and acoustical insulation required for comfortable working environment inside the buildings.

REPAIR AND RECOATING

The glass facades usually consist of glass panes of uniform sizes attached together by silicone sealants and to the structure with the point supported fittings or patch fittings. These glass panes and sealants require maintenance to maximize service life which typically is 10 to 15 years. Since the sealant combines the edges of adjacent glass panes through chemical bonding the replacement or removal of these sealants require extreme care and detailed surface preparation. Aluminum frames are generally painted or anodized. Hence they cannot be re-anodized in place, but can be cleaned and protected by applying clear coatings to improve appearance and durability.

MOISTURE PROTECTION

Exposed glazing, sealants and fittings require regular inspection and maintenance to minimize water penetration and condensation resistance. Water penetration resistance can be achieved by proper glazing details, frame construction and well planned drainage details, weather stripping and frame gaskets, interior sealants, and perimeter flashings and seals. Water can enter the exterior wall system by means of five different forces: gravity, kinetic energy, air pressure difference, surface tension, and capillary action. To mitigate water infiltration, all of these forces must be accounted for in the system design. Watertight frame corner construction and good glazing pocket drainage are critical for reliable water penetration resistance.

MAINTENANCE ACCESS

For regular inspection and maintenance of curtain wall of high rise buildings, the accessibility to vertical and angular surfaces has to be planned well in advance at the planning stage of the building. The loads of the equipment to be installed at the terrace and load to be suspended from the cantilevering arm or trolleys running along the guide rails, etc should be well designed by the structure engineer and shall comply by the IS codes. The Low-rise buildings can though be accessed from the ground using equipment with hydraulic jacks, cross braced lifters, etc.

INSPECTION AND FIELD WORK

Many companies have come up in the area of façade maintenance and repair. They provide the equipment and skilled labor to carry out the regular maintenance of the glass curtain wall. The commonly used are of two types – permanent installation systems and temporary installation systems.

1. The permanent systems comprise of building mounted units. They are listed as follows:

- **Powered Cradles** - A powered cradle (Fig.1) is deployed for low height buildings. It is suspended either on a monorail or on a mobile cantilever, while the hoisting gear is mounted in the cradle. It is appropriate for different usage sites, because the cradle can be demounted separately, or as an alternative to a mast access equipment.



Fig.1



Fig .2

- **Facade Elevators** -Facade Elevator with Fix Cantilever, Facade Elevator with Telescoping Cantilever, Facade Elevator with Two-Arm Cantilever, Facade Elevator with 1-Arm Active Suspension, Facade Elevator with V-Suspension.

The Facade Elevator with Fix Cantilever (Fig. 2) is used for medium to large throat depths. The Facade Elevator with Telescoping Cantilever (Fig. 3) is used for very large throat depths and the requirement of compactness during no-use of the system a facade elevator with a telescopic cantilever is suitable.



Fig.3



Fig. 4

Other than the façade elevators horizontally swiveling cradle for overhanging facades and roof porches for handling the material and labor are also an important part of the façade maintenance systems. The facade Elevator with Two-Arm Cantilever is used for simple facades and roof geometries without complex porches (Fig. 4). Facade Elevator with 1-Arm Active Suspension gives the additional

freedom degree to the cradle parts which makes complex roof form and corners of the building more accessible.

- **Tracks** -Free Laid Double Rail System (Fig. 5), Concrete Track (Fig. 6) ,Anchored Double Rail System (Fig. 7), Anchored Equipment (Fig. 8)



(Fig.5)

(Fig. 6)



(Fig. 7)



(Fig. 8)

- **Masts, Ladders** -Suspended Ladder With Movable Platform, Mast Unit

Masts are used mostly for low rise buildings. For small facade areas, inner courtyards, a manually operated suspended ladder with a movable platform (Fig. 9), is a suitable solution. For higher buildings having large facade areas, mast access equipment (Fig. 10), is used. The platform moves along the mast vertically, while the whole mast can be translated horizontally. This covers the whole facade area in a well planned manner.



(Fig. 9)



(Fig. 10)

Maintenance Bridges -The Maintenance Bridges are provided in exterior on the terrace level or inside the building at the roof level so that the trusses and the glass on them can be easily cleaned or repaired.



(Fig. 11)



(Fig. 12)

2. The temporary installations include the curtain wall mounting systems like the monorail crane and the mobile cranes.

- The Monorail-Crane (Fig. 12) consists of winch housing and a power set. The cradle moves laterally on the monorail and when the area at a particular height is finished the whole rail system is transferred to a higher level. It moves up vertically to the next section of the building as the construction progresses vertically.

- The Mobile Crane (Fig. 13) consists of a roof top unit, a load arm and the suspension system. The crane lifts the curtain wall units and places them in the area marked on the vertical face of the building. Once one wall is done the crane is demounted and re-assembled in the next zone or on the next construction site.



(Fig. 13)



(Fig. 14)

- In India there is also a practice of manual cleaning of glass curtain walls. These are called 'spider cleaning systems. But they are very dangerous, skilled labor is difficult to find and lacks uniformity of work.

CONCLUSION

As Indian buildings progress in their aesthetic appearance due consideration should be given to the regular maintenance and repairing of the vast glass facades provided. Though there has been improvement in the quality of glass, as use of laminated and self cleaning glass has made the glass façade safer but new techniques of installation and regular maintenance should be adopted to increase the durability and life expectancy of the glass curtain walls.

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