

DEMOLINATION METHOD & TECHNIQUES

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Abstract: Demolition of any structure is a ground to earth technique which means destroying down or falling down of a building with the help of equipments, machineries, and explosives or with manual techniques without affecting the surrounding. Demolition is a simple process for small buildings or houses. The building is brought down either manually or mechanically using large hydraulic equipment: elevated work platforms, cranes, excavators or bulldozers. Demolition work is to be performed safely and with number of different steps involved before and during the execution of a demolition process. The various steps involved before the demolition process includes surveying the site of demolition, removal of hazardous materials if any, and preparation of demolition plan with techniques to be implanted, stability report and the precautionary safety measures to be taken for the workers and the surroundings. Equipments used for these demolition activities are like sledge hammer or rammers; excavators, bulldozers, tearing balls etc. and main explosives used are like dynamites and RDX. When explosive are used for the demolition, it is known as Implosion, which is generally.

Keywords: demolition, demolition techniques, RDX, Implosion, hazardous materials

I. INTRODUCTION

Demolition means dismantling, razing, destroying or wrecking any building or structure or any part thereof by pre-planned and controlled methods. Demolition methods can vary depending on the area where it will be held on, time available, the building material, the purpose of the demolition and the way that debris is going to be disposed. Time saving methods is more expensive than the slower ones. If noise dust and vibrations are to be restricted, it will add to the cost of demolition.

Demolition is one of the most dangerous activities in the construction sector. The demolition of a building can be total or partial. Total demolition is, in general, aimed at the recovery of the area for subsequent re-use, while partial demolition is aimed at the recovery of the building for refurbishing or rebuilding.

Total demolition generally regards old buildings and is performed using machines equipped with demolition hammers and pneumatic cutters or more simply with normal excavators.

In recent years the demolition of large buildings has also been conducted using explosives. This technique involves works by a specialised firm that can operate only after obtaining police authorisation.

II. CLASSIFICATION OF DEMOLITION METHOD

According to Kasai et al/1988/ are demolition methods classified into principles and mechanisms of breaking. In this presentation common or interesting methods are shortly described and classified according to type of impact on the concrete.

1. Simple demolition methods: The demolition tools are different types of buckets, demolition boom and elephant tusk. They are mainly used to demolish masonry buildings but can also be used for concrete. These types of equipments are mounted on a hydraulic excavator.

2. Hammering: Repeated hammering is often used to fracture and break concrete mainly due to occurring tensile and shear stress. There are three levels of hammering:

- Stone chisel. It is operated by manpower and is not in using any more for concrete demolition.

- Hand-held breaker. There are three types of breakers - pneumatic, hydraulic or electric driven. The first type is relatively light and small but noisy compared with the second type. Both need extra equipment but this is not needed for the third alternative. Electrical breakers are less efficient and heavy.

- Impact hammer on a carrier. This machine is manufactured in different sizes and strength from huge ones to small light ones, which can be operated on floor and travel through doors. The hydraulic type is most common, they can be remote controlled.

3. Hitting: This is a common method for total demolition. To demolish concrete elements a steel ball with a weight of 0,5-2,0 ton is either dropped on the element or swung into it. This method demand shows ever a great deal of skill from the crane Operator. The concrete element can after several hits be demolished in small pieces, although the reinforcement has to be cut afterwards. The method can of course be dangerous, especially when tall cranes have to be used. The process also causes considerable dust and Vibration, which is not acceptable in heavily built up areas.

4. Crushing: A C-shaped frame or a strong jaw is either suspended or mounted on top of the arm of an

Excavator. This type of demolition equipment was developed Japan. There are many different variations of demolition equipment, which can break or pulverize reinforced concrete elements of most sizes and degree of reinforcements. The jaws are quite efficient, silent; cause little dust and no Vibration. Accordingly the jaws are well suited for concrete demolition in residential areas.

5. Abrasion : There are different demolition machines based on abrasion e.g. diamond drilling, sawing, wire sawing and water jet.

- Diamond drilling. The drilling device is always mounted on a stand. The holes, 40-500 mm in diameter, is produced with considerable accuracy. The drills are driven by pneumatic, hydraulic or electrical power. Medium and heavy drilling Operations are carried out only with vehicle mounted drills. When the holes are drilled side by side, the method can be used for demolition, however, not very efficiently but the method is very useful when refurbishing buildings. It is a necessity to cool with water. The noise level is very high and of a high frequency.

- Diamond sawing. In principle see drilling. Sawing with a disc (maximum 1000 mm diameter) can also be interesting for total demolition when demounting elements of a concrete building or a structure. There are also special carriers for sawing, especially in

Japan. The elements can be used for a new building, hopefully for the same purpose as they were used for. The need for making good is very small.

- **Diamond wire.** A loop wire saw with diamond bits can cut around the circumference of a Concrete section. It is mostly used for cutting in rocks but can also be used for massive concrete structures.

- **Water jet.** This method is usually applicable for demolishing damaged surfaces. A high-pressure jet of water passes across the surface, penetrating into the weak concrete. When the water washes away, it takes the damaged concrete with it.

Instead of digging to the same depth throughout, it only removes concrete down to a preset quality depth. The method is very suitable for high quality repairs i.e. for bridges, airport runways etc. Mostly, the equipment is mounted on a carrier, but it can be hand-held for small surfaces. The noise level is very high; also the water jet has to be handled with great care, especially if hand-held.

6. Bursting: Concrete and rock can be split by a bursting force in a predrilled hole.

- **Hydraulic busters.** Two forms of such equipment are commonly used. The plunger buster Consists of a central cylinder down the side of which a series of pistons are forced out. The wedge busters consist of a steel wedge, which is retracted under hydraulic pressure. In either case the busters are often used in multiple arrangements fed from a common hydraulic power supply.

- **Chemical expansive agent.** Unslaked lime composite is mixed or absorbed with water and Injected or poured into a predrilled small hole. The bursting effect takes from some hours up to a day. There are no problems with dust, noise or Vibration when bursting except for the pre drilling procedure.

7. Blasting: The use of explosives on demolition sites should be looked upon as the application of a controlled High energy force. The Operation has to be carried out by fully experienced personnel, who are licensed. In most countries blasting on sites is covered by regulations. For the demolition of concrete structures it is usual to drill holes obliquely into concrete to be removed at predetermined positions. The holes are then charged with explosives which are electrically detonated in intervals.

Compared with other methods, the use of explosive on large and tall structures may show Considerable financial savings. The disadvantages are excessive ground Vibration which may Damage adjacent structures and air blast may cause superficial damage elsewhere. Precautions should taken to stop flying debris. Blasting can also be feasible for retrofitting reinforced concrete structures i.e. cutting piles, beams and making openings in slabs and thick walls.

8. Melting: Concrete and rebar are melted by the heat of combustion of metal or organic fuel, plasma and laser beam. Only the first mentioned type, the thoracic lance method, is commercially available Aluminium or iron alloy wires are enclosed in a metal pipe of rather small diameter. The combustion of oxygen and metal melts concrete and rebar. The method is noisy and special precautions have to be taken against fire and smoke. Laser beam could be a method for the future. Today complex and huge equipment are needed. A carbon dioxide laser beam of very high energy melt and cut concrete including the rebar.

9. Spalling: Concrete cover is spalled by heating rebar electrically with very high current, which means that the rebar expand and cause tensile stress in the concrete. The method has been studied for nuclear reactors in Japan.

III. DEMOLITION TECHNIQUES

- 1. Progressive Demolition:** Progressive demolition is a technique to demolish, wrecking or taking out of any load-supporting structural member part by part before the building completely fall. The heavy machinery or equipment includes large motorized vehicles such as bulldozers with rakes, backhoes, hydraulic excavators, and other similar machinery used for transporting, moving of materials at a demolition site. Cranes equipped with wrecking balls, clamshells, or buckets are also considered heavy machinery.
- 2. Mechanism of Control Demolition:** Equal to progressive demolition; it is commonly adapted to big catch area condition and usually practiced using explosion/implosion and wire rope pulling methods or any other suitable method.
- 3. Deconstruction or Top Down:** Deconstruction or Top down method is the technique that proceeds from the roof to ground in a general trend. There are particular sequences of demolition which may vary, depending on site conditions and structural elements to be demolished.
- 4. Wrecking Ball:** The wrecking ball application consists of a crane equipped with a steel ball. The destruction of the building is by the impact energy of the steel ball suspended from the crawler crane. The wrecking ball operates outside the building. This method is suitable for dilapidated buildings, silos and other industrial facilities. However, the operation requires substantial clear space. The application also demands high level skill operators and well-maintained equipment

IV. CONCLUSION

After reviewing above paper we can concluded that.

1. The real improvement of demolition techniques took place, when building market changed from almost only new constructions to more refurbishing ones. Specialized equipment was developed for the alteration of concrete structures. Diamond drilling and sawing replaced hand-held breaking.
2. The first tall buildings were taken by controlled blasting and miniblasting was introduced for partial Demolition. Somewhat later water jet was found feasible for preparing surfaces to be repaired.
3. The introduction some years ago of crushing and cutting attachments specifically designed for today's demolition have made the Standard hydraulic excavator one of the most useful pieces of equipment which a contractor can have.
4. The development can be characterised by mechanization, increased mobility and many measure taken for the working environment. But the next very important step is the consideration of the total environment. Therefore, the future demolition needs more planning, less transports, Selectivity, precrushing, sorting and crushing plants and quality assessment. All these requirements for the future will very much change the way the contractor works and also change the demolition techniques he will use.

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