

Concrete pump

➤ What are Concrete Pumps?

- Concrete pumps are powered by a motor or diesel engine and are used transport liquid concrete from the location where it is mixed to the location where it is needed on a construction site.
- They are presently the most used way of conveying liquid concrete and are a regular sight on construction sites.
- The main purpose of concrete pumps is to save time, money, and energy during a concrete project, large or small. Instead of hauling concrete to the desired location



What are the types of Concrete pumps?

Different types of concrete pumps have been developed depending on pumping pressure, ease of operation, and method advancement. Concrete pumps are classified mostly as follows:

Five types of concrete pumps are:

- I. Boom or Truck mounted pumps
- II. Trailer, line, or stationary pumps
- III. Spider concrete pump
- IV. Stationary concrete pump
- V. Concrete mixer with pump

1. Boom or Truck Mounted Pumps :

- Because of their larger size, these types of concrete pumps are best suited for lengthy highways and highway projects.
- These types of pumps are mounted on a truck and employ a remote-controlled articulating robotic arm, commonly known as a "boom", to precisely distribute concrete at the building site. A truck-mounted boom pump is another name for them.



1. Boom or Truck Mounted Pumps :



- > These pumps also include a hydraulic arm that can maneuver the pipeline containing the concrete, allowing it to reach along, up and down, and even around tight areas and obstructions.

- > These types of concrete pumps are thus highly recommended for concreting projects where there may be limited space at the premises or simply many impediments in the path that the concrete must be transported around, between or beyond. They also save a lot of work because of their multi-purpose robotic arm.

1. Boom or Truck Mounted Pumps :

Concrete pump boom is Not all sites are the same, which is why at Concrete Pumping Network, we have a variety of concrete pump sizes available for all requirements.

Whether it's a domestic or commercial project, our pumps save time, minimize mess and maximize the time you get to work with the material on site. The following are our concrete pump sizes available for any project:

- o 20 meters.
- o 24 meters.
- o 31 meters.
- o 36 meters.
- o 42 meters.
- o 52 meters.
- o 60 meters.



2.Line Concrete Pumps:

- Line concrete pumps are compact units that are mainly used for small construction projects
- The arrangement has a line pump attached to the back of the truck or the trailer. Hence the arrangement is also called as trailer mounted concrete pump or truck mounted concrete pump.



2.Line Concrete Pumps:

- it includes flexible rubber or steel hoses that connect to the machine's output. These hoses may be connected to other extension hoses to reach any location where concrete must be stored although they have less mobility than a boom pump.



What is different between boom concrete pump and line concrete pump ?

- line pumps pump concrete at a slower pace than boom pumps and are thus utilized in applications requiring lesser volume pumping, such as swimming pools, preparing ground slabs and sidewalks.



3. Spider concrete pump:

- Spider concrete placing boom is also named mobile concrete placing boom. It is easily installed on the jobsite and can be connected to any of concrete pumps.
- This helps pour large areas without needing to work with the traditional heavy line systems. There is a pipeline inlet under the concrete placing boom, just connect the pipeline of the pump to the pipeline under the concrete placing boom, then the concrete can be placed at different positions on the floor by the concrete placing boom.



4. Stationary concrete pump :

- A stationary concrete pump is also called a trailer concrete pump because it needs a trailer in front of it to drag it along when it is moving. Its main function is to pump concrete, often working in combination with a concrete mixer truck.
- The mixer truck first transports the concrete produced by the concrete mixing plant to the construction site. Then the concrete is unloaded into the hopper of the trailer pump and is transported to the construction site through the pipelines. So, every time before pumping, workers need to lay the pipes first. The trailer pump includes diesel engine type and electric motor for your selection.



5. Concrete mixer with pump :-

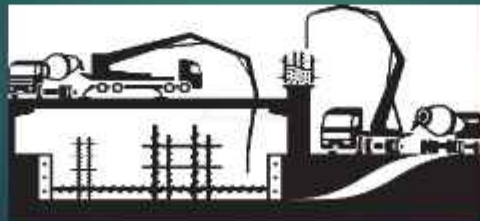
- The concrete mixer with pump is based on the trailer pump with the addition of drum mixer, which integrates the functions of mixing and pumping concrete into one. This makes the concrete mixer pump occupy a small area and save space.
- if you need to produce concrete on site, concrete mixing pump is a good choice for you. Like the trailer pump, the concrete mixer pump can also be divided into diesel engine type and electric motor type.



> How to choose a suitable concrete pump for your projects?

Different types of pumps are suitable for different kinds of projects. If you want to choose a suitable concrete pump, you need to consider these 8 factors together.

- > Max. aggregate size
- > Pumping capacity of concrete pump per hour
- > Theoretical maximum transmission distance
- > The strength of manufacturer
- > The concrete pump price and your budget
- > After-sale service provided by your manufacturer



> Common Use of Concrete Pumps

Among the many construction applications for concrete pumps are:

- > **Slab building foundations:** Buildings without basements have flat slabs for their foundations
- > **Building foundations with basements:** Constructing a foundation for a building with a basement is a little more complicated.
- > **High-rise buildings:** boom pumps are often required due to the high elevation and long reach they provide.
- > **Highway overpasses and turnets:** To support the daily traffic that passes over highway overpasses,
- > **Bridges and dams:** Dams and bridges must be large, strong, and steady to withstand the weight of heavy vehicles and the effects of high water pressure.
- > **Parking structures:** Parking garages usually include several levels, and without a concrete pump, concrete can't reach the upper levels
- > **Sidewalks and driveways:** When constructing a new home, many homeowners are most concerned with the house itself.

What are advantages and disadvantages of Concrete Pumps?

> Advantage of concrete Pumps:

- One of the main advantages of pumped concrete is that concrete can be moved both horizontally and vertically in one go. The pump output normally varies from 30m to 150m³ of concrete per hour.
- Pumped concrete normally good cohesion and high workability and thus, gives a better finish and strength to concrete structures. Concrete can be placed in inaccessible areas very easily. Mass concreting can be carried out in a limited time and at high speed, without cold joints.
- Using concrete pumps can help speedier completion of contracts and thereby, help in improved cash flow, reduction in site-overheads, and better utilization of resources.
- Pipeline for delivery of the concrete occupies very little space and can be easily extended or removed.

> Advantage of concrete Pumps:

- A concrete pump is one of the greatest aids to quality control. It is the most sensitive method in which any variation in mix consistency or workability can be easily detected at the pumping point by observing the pumping pressures. It acts as silent quality control equipment, refusing to handle any concrete which is unduly harsh, inadequately mixed, non-cohesive, and not correct n consistently.
- Delivery of concrete is in a continuous stream. If the mobile-boom pump is used, both vertical and horizontal movements for placing concrete are possible, thereby eliminating the need for drop chutes and elephant trunks. Concrete should be placed closer to its final position in form reducing shoveling/dragging of concrete thereby avoiding segregation of the concrete mix.

➤ Disadvantages of Concrete Pumped concrete

- The conveying capacity of concrete pumps is limited, so the conveying distance and height of concrete are limited. Pumped concrete is not suitable when the distance is too far and the vertical height is too large.
- Pumped concrete requires the pumpability of the concrete to be transported, which will increase the water-cement ratio of the concrete. Such concrete is prone to cracks and shrinkage.
- The concrete slump used by the concrete pump for pumping concrete construction is relatively large, and the pouring speed is very fast. Pumping concrete causes the concrete pressure measurement to become larger, so the utilization of pumped concrete has higher structural requirements for the *formwork*.

➤ What are the major problems in using pumping for concrete works?

The major problems associated with pumping are blockage of concrete pump pipeline and bleeding and segregation of concrete mix.



> How to avoid problems related to the use of pumps for concrete works?

Concrete pumping problems can be prevented by carefully:

- I. selecting concrete mix constituents
- II. proper mix design
- III. correct selection of pumping equipment
- IV. hiring skillful laborer
- V. performing regular maintenance of pumping equipment

> proper mix design of concrete :

- o **The concrete mix design** must be correctly proportioned so that the concrete will flow easily and uniformly through the pipe-line. The pipe diameter should be 3.5 to 4 times greater than the maximum aggregate size in the concrete. This helps ensure that the pipeline will not become blocked.
- o **Cement Content** Concretes without admixtures and of high cement content, (over about 400 kg/m³) are liable to prove difficult to pump, because of high friction between the concrete and the pipeline. Cement contents below 270 to 320 kg/m³ depending upon the proportion of the aggregate may also prove difficult to pump because of segregation within the pipeline.
- o **Workability of pumped concrete** The workability of pumped concrete, in general, has an average slump of between 50 mm and 100 mm. A concrete of less than 50 mm slump is impractical for pumping, and slump above 125 mm should be avoided. In mixtures with a high slump, the aggregate will segregate from the mortar and paste and cause choking.

- **The minimum slump** (wetness) that will pump is a 100 slump. Any concrete below that slump will not pump satisfactorily and will require water to be added which will dilute / weaken the strength of the concrete.
- **Adding water** can increase slump, decrease compressive strength, waste cement, and increase shrinkage by. But water isn't the only way to adjust slump. Consider adding a superplasticizer at the site to increase slump
- When there is too much water in the concrete, there is greater shrinkage with the possibility for more cracks and reduced compressive strength. As a general rule, every additional inch of slump decreases strength by approximately 500 psi

- A loss of slump during pumping is normal and should be taken into consideration when proportioning the concrete mixes. A slump loss of 25 mm per 300 meters of pipeline length is not unusual, the amount depending upon ambient temperature, length of the line, the pressure used to move the concrete, moisture content of aggregates at the time of mixing, truck-haulage distance, whether the mix is kept agitated during haulage etc. The loss is greater for hose than for pipe and is sometimes as high as 20 mm per 30 meter
- **pumpable concrete** is a type of concrete that can be pushed under pressure through a pipeline over a long horizontal distance or very high altitude to reach the pouring position. The pumpable concrete is commonly separated from the inside wall of the pipeline by a mortar paste.

➤ Common problems in concrete pumping works for super high-rise buildings :

- The high viscosity of high-strength concrete results in poor fluidity and cannot meet the pumping requirements of super high-rise buildings, so it is easy to cause pipe blockage.
- When the fluidity of concrete is too large, its anti-segregation and bleeding ability will decrease. Under the action of pump pressure, the segregation of concrete will cause the aggregate and mortar to separate, without the lubrication of the mortar, the coarse aggregate and the pump direct contact with the tube will increase friction and cause tube blockage.
- It takes a period of time for ready-mixed concrete to be transported from the mixing station to the construction site, which will reduce the working performance of the concrete and deteriorate the pumpability. The concrete manifestation is the reduction of the expansion value and the slump value, which will eventually lead to the blockage of the pump tube.
- Whether the strength grade of high-fluidity concrete meets the design strength.

➤ How do you clean concrete pump?

The first option (water) is the most recommended, because it is more effective and safe. Fill the hopper with water and put a foam ball in one end of the line, so that when pumping, it runs through the line and sweeps out the remaining material.



Reference :

- ✓ <https://www.brighthubengineering.com/concrete-technology/43337-three-common-types-of-concrete-pumps/>
- ✓ <https://www.hansochina.com/products/concrete-plant/epiler-concrete-placing-boom.html>
- ✓ <https://www.inquip.com/blog/types-of-concrete-pumps/?amp=1>
- ✓ <https://theconstructor.org/concrete/concrete-pumps-types-selection/26354/>
- ✓ <https://www.concrete.org.uk/finger-tips-suggests.asp?cmd=display&id=554&~.and=The%20concrete%20mix%20design%20must%20pipeline%20will%20not%20become%20blocked.>
- ✓ <https://accupdate.com/expert-speaks/principle-of-mix-design-for-pumpable-concrete/#~:text=The%20workability%20of%20pumped%20concrete,and%20paste%20ant%20cause%20choking.>
- ✓ <https://www.linkedin.com/pulse/concrete-pump-8-tips-you-need-know-kuke-new-1d>
- ✓ <https://www.engineeringcivil.com/what-are-the-major-problems-in-using-pumping-for-concreting-works.html>
- ✓ <https://www.equipmentandcontracting.com/advantages-of-concrete-pumping-in-a-construction-project/>
- ✓ <https://www.constrofacilitator.com/different-types-of-concrete-pump/>
- ✓ <https://theconstructor.org/concrete/concrete-pumps-types-selection/26354/>
- ✓ <https://www.ousheandparts.com/how-to-improve-the-concrete-pumping-performance-of-high-rise-buildings/>