

# City Talk

A bulldozer plunges down a shaft after coming loose from a crane in Ho Man Tin in October.



## WEIGHING THE PROS AND CONS OF CRANES

Of all modern equipment for construction, the crane must be the most important.

Without it, construction of buildings and bridges cannot be performed on a large scale. The new modular integrated construction process cannot work without extensive use of cranes.

The most common and versatile type is the mobile crane. It runs on wheels or on belts to cover rough terrain.

To increase reach, modern mobile cranes are equipped with telescopic sections, and the most modern type can be of the luffing-jib type for better reach and carrying capacity.

But even with the versatility of mobile cranes that can be called upon at short notice for all sorts of lifting activities on a construction site, they can only work safely when precautions are taken.

The ground where the crane sits must be sufficiently robust to bear the crane and its load, as when the load is lifted off the ground and placed in the desired position, the weight transfer will cause a change of loading to the wheels or track, and in extreme cases may cause it to topple.

This is unfortunately a common cause of construction site accidents. Stationary cranes are much safer for continuous lifting operations.

The gantry crane is the common equipment used in factories.

It can cover the whole floor area and has a large lifting capacity, but is applicable only to rectangular-shaped factory-type buildings and is not flexible enough for construction sites.

The common tower crane, used widely in building construction, is efficient.

The light structure can lift heavy weights as the jib is balanced by the application of counterweights at the back.

Tension steel wires, hung from the crane tower top to the jib, enhance the lifting capacity of the crane and allow the slender structure to carry heavy weight,



### Nuts and bolts

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which is similar in principle to suspension bridges.

The laws of physics dictate that the longer the reach, the less weight the crane can carry.

For the construction of most buildings, this is usually not a problem, as the sweeping circle or arc of the crane can be accurately determined.

However, for a congested site, the sweeping arc must be restrained to ensure it does not encroach on adjacent buildings or roads to which the public have access.

Many crane accidents occur when the sweeping arc is exceeded or when the crane driver neglects the reduction of weight that can be lifted with increasing reach.

For a congested site, the effectiveness of the tower crane will be limited by the sweeping arc, and it may not be able to lift building components or parts at some extremities of the site.

A modified tower crane, of the luffing-jib type, will offer more flexibility.

In principle, the fixed structure of the tower crane jib is replaced by an articulated section, which is controlled by coils of moving tension wires.

It increases the lifting capacity while allowing the sweeping arc of the crane jib to vary without loss of lifting capacity.

However, the operator of a luffing-jib crane must have superior skills and the ever-changing sweeping arc with varying lifting capacity will need a lot of attention.

Like all tools of the trade, knowledge and appropriate selection of suitable cranes ensures efficient and safe lifting operations for factories and construction sites.

**Veteran engineer Edmund Leung Kwong-ho casts an expert eye over Hong Kong's iconic infrastructure**