

# Introduction to the centralsug system essay



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The Centralsug System is an efficient, modern and exceptionally hygienic method of managing waste. It is based on the rule of transporting waste to the truck. The system utilizes air to transport the waste via a web of belowground pipes from edifices to a cardinal aggregation station. The applications are far ranging. About any urban development with a high concentration of waste being generated can profit from this system. The system consists of: a garbage chute with recess doors for flinging garbage on each degree of the edifice, a web of pipes which connect each edifice to a cardinal aggregation station and an aggregation station where garbage is compacted and stored in containers. The Centralsug system besides makes recycling more efficient. Different types of waste can be easily collected and stored in separate containers to be transported to recycling installations.

Fig. 1: System Concept  
The Hong Kong Science & Technology Parks (HKSTP) was the first commercial edifice which has installed the Automated Refuse Collection System.

The constituents of the Automated Refuse Collection System

The Automatic Refuse Collection System (ARCS) consists of the undermentioned parts:

1. Cardinal Collection Station  
This is where all garbage is collected after pneumatic conveyance. All equipment, which performs and supports the aggregation procedure, are installed here.

Fig. 2: Diagram of chief constituents of ARCS

2. Refuse Transport Pipes A Network of belowground conveyance pipes connects the aggregation station with the edifice and sites where the garbage originates.

3. Vertical Gravity Refuse Chutes with Loading Doors The perpendicular chute run down the length of the edifice and connects to the garbage conveyance electronically locked. There is no vacuity in the chute. the garbage bags autumn by gravitation down to the discharge valves.

4. Refuse Discharge Valves These valves are located at the underside garbage chutes and serve as a barrier between conveyance pipes and the perpendicular garbage chutes. Waste is stored on top of the valve ready for aggregation.

5. Air recess Valves These valves. located at the terminal of each subdivision of the pipes system. supply the conveyance air to come in the system.

6. Out Door Loading Stations These recess points provide out-of-door disposal entree to the pipe net work.

## Operation

The pneumatic garbage aggregation systems map automatically. Human aid or supervising is non required during the aggregation procedure. A computing machine. located in the cardinal control panel controls the aggregation procedure. During the aggregation procedure. the garbage that has been stored on the garbage discharge valves is collected. The aggregation procedure is by and large repeated two to five times a twenty-four hours. The continuance of each procedure varies between 2 - 15

proceedings. depending on the size of the system. Between the aggregation times. all machinery of the pneumatic conveyance system is turned off. The garbage can nevertheless be loaded into the chutes at any clip when the system rests.

### Collection Cycle

1. The exhausters start and create air flow in the garbage conveyance pipe system.
2. The cardinal control panel orders the first air recess valve to open. When the valve is unfastened. a verification signal is sent back to the cardinal control panel.
3. A powerful air-steam is created in the garbage conveyance pipe system from the first air recess valve to the garbage aggregation station. The air steam must be powerful plenty to transport even the heaviest garbage constituents.
4. After verifying that a minimal air velocity has been established in the conveyance pipe. the cardinal control issues an order to the first garbage discharge valve on the corresponding pipe subdivision to open. When the valve opens. the garbage which was stored above the valve falls by gravity/suction into the garbage conveyance pipe and is transported by the air watercourse to the aggregation station.
5. After a period of about 7 seconds. all garbage stored on the first valve is discharged. and the valve is closed.

6. After a short interval. the 2nd garbage discharge valve on the same pipe subdivision receives an order to open. The same operation described in measure 4 is repeated.
7. When all refuse discharge valves connected to the first pipe subdivision have been discharged. the air recess valve is closed.
8. After a short interval. an order to open is transmitted to the 2nd air recess

valve in the following pipe subdivision. The same process described antecedently in measure 4 is repeated.

9. The operation is repeated. until the garbage from all discharge valves of all conveyance pipe subdivisions of the system has been collected.

Throughout the aggregation rhythm merely one valve is opened at a clip and therefore each garbage chute is emptied in sequence. 10. When the garbage reached the aggregation station. the garbage is separated from the conveyance air stream in the garbage centrifuge. The garbage so falls into the compactor and is compacted into the affiliated containers. 11. The full containers are so picked up by a standard arm lift truck and transported to suitable sites for emptying. Equipment used in Hong Kong Science and Technology Parks

## 1. Collection Station

The garbage aggregation station can be located in a separate edifice or organize portion of a another edifice. e. g. a auto Parks. Principle equipment in the aggregation station consists of:

Fig. 3: Collection system in HKSPTI. Air ExhaustersThe exhausters are used to make an appropriate air watercourse and negative force per unit area in the belowground pipes. In Hong Kong Science and Technology Parks. three exhausters connected in series are installed. Merely two will be used. and the other 1 is used as a stand-by manner.

Fig. 4: The Exhauster used by HKSPTtwo. Refuse Containers and CompactorThe size of figure of the garbage containers depend on the

measure of garbage collected. Normally, one to five containers are used. In Hong Kong Science & A ; Technology Parks, two garbage containers are used. Each container has the capacity to hive away 10 metric tons to the garbage compactor.

Fig. 5: A typical compactor ( above ) ; Compactor used in HKSTP ( left ) three.

Control SystemThe cardinal control panel controls the automatic garbage aggregation procedure. The cardinal control panel consist of the undermentioned constituents: desk top computing machine with modem for distant control. command board for the general operation. motor control panel. and a panel for the container managing system.

four. Dust FiltersThe conveyance air requires filtrating anterior intervention for odour control. The filter installing usually consists of cassette bag type filter for dry filtration installed downstream of the air exhausters.

v. Odour FiltersThe fumes gas passes through an activated C filter and a H2O scrubber to take odorous gases.

Fig. 6: Activated C filter

six. Container TransportThe container conveyance vehicle does non refer to the ARCS itself. However, when put ining an ARCS, the container conveyance vehicle ever be taken into consideration. The vehicle bounds, to a certain grade, the location of the aggregation station. It is frequently desirable to turn up the aggregation station at the outer boundary of the installing to minimise local traffic of heavy vehicles.

Fig. 7: Container Conveyance

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seven. Diverter Valve A diverter valve is installed if we are roll uping more than one class of waste ( i. e. recycling ) . In Hong Kong Science & A ; Technology Parks. there are two containers. one for non-recycling waste. another one is for recycling waste. So it is used to direct the waste into the right container.

## 2. Pipe Network

Fig. 8: Pipe Network in HKSTP

Refuse Transport Pipes The garbage conveyance pipes are usually manufactured of mild C steel. But in the Hong Kong Science & A ; Technology Parks. the pipes are made of unstained steel. In subdivisions where big measures of garbage are transported or high impact parts ( decompression sicknesss and Y-pipes ) pipes must be manufactured of stuff with greater hardness. The wall thickness of the pipe besides varies in different parts of the system to provide for different eroding factors. All parts of the conveyance pipe system are welded together. The conveyance pipes are normally installed resistance. In Hong Kong Science and Technology Parks. nevertheless. has use two service tunnel. All the public-service corporations. including the conveyance pipe. were installed in the service tunnel. Fig. 9: The ARCS conveyance pipe in the service tunnel in HKSTP 3. Refuse Discharge Valves

The garbage discharge valves ( DV ) separates the perpendicular garbage chutes form horizontal conveyance pipe system. The valves are usually installed on the cellar degree in the edifices. The garbage is stored above the closed valve between emptying rhythms. When the valve opens. the garbage

falls by gravity/suction into the air watercourse in the conveyance pipe.

Merely one valve can be unfastened at one valve. The operation of the valve is controlled by the computing machine in the cardinal control panel in the aggregation panel. Control boxes in the garbage valve suites verify and execute the orders transmitted from the cardinal control panel. A storage subdivision was installed above the valve, where garbage collects, in HKSTP. A degree detector besides has installed which will alarm the control Centre to get down the aggregation procedure when full.

4. Air Inlet valves The air recess valves are located at the terminal of each subdivision of the garbage pipes. The Valves are normally installed on cellar degree in the edifices near the last garbage discharge emptying rhythms.

Fig. 10: Air inlet valve

5. Refuse Chute and Refuse Inlet Doors The perpendicular garbage chutes form portion of the edifice and supply recess doors for garbage disposal at each degree of the edifice. The garbage chutes are merely subjected to a little negative force per unit area. The chutes are usually constructed of concrete or steel.

Fig. 11: Refuse Inlet Door In order to forestall obstruction of the garbage in the chutes and in the conveyance pipes, the recess doors are volume controlled, where the dimensions of the garbage disposed should not transcend the inside diameter of the conveyance pipes. At the top of the chute, a airing fan is provided for exhaust extraction.

Collection Equipment: Different Configurations for Recycling Purpose For the first 1, there is one chief chute, which runs down the edifice serving all

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degrees. This chief chute will chiefly be used to roll up non-recyclable waste on a day-to-day footing. The land degree outdoor disposal recesss are provided for the disposal of reclaimable stuffs such as paper or organic garbage. In this constellation, it is necessary to manually transport the reclaimable waste from the edifices and out to the specified recess for aggregation.

Fig. 12: one chute disposal recess For the 2nd 1. this type of set-up provides the full service of reclaimable waste disposal to each degree of the edifice. The aggregation rule is the same as for the first constellation. However, this agreement allows disposal of reclaimable wastes at the doorsill of each flat.

Fig. 13: Three different garbage chutes are used to transport different classes of wastes Conclusion At the clip being. Since the Hong Kong Science and Technology Parks is still under building and non yet to the full complete. ( Phase 1 is 70 % coating. Phase 2 & A ; 3 has non start. ) Therefore, the ARCS is non to the full utilised, and merely a few waste was generate per twenty-four hours. However, harmonizing to the ordinance in Hong Kong, it is non allow to hive away waste within a long period. It may be non efficiency if conveyance the waste to landfill with merely a few wastes was generated. Therefore, under particular arrange, it is allow for HKSTP to hive away up to 80 % of the capacity before a conveyance the container. It is because merely dry waste is allowed to set in this system. Therefore, smell is non job.

Furthermore, the ARCS is possible to roll up waste about 1 kilometers far off. it have a large potency to replace the Manual waste handling. Since manual waste handling may convey a batch of hygiene job.