ELEVATOR

TOPICS

Elevator Assembly

The elevator elevates material from the bottom of the elevator as the main broom bristles flick material onto the bottom liner (floor). As the squeegees come against the bottom liner of the elevator they capture the material and elevate it to the top of the top liner by dragging the material in front of the squeegees and against the floor. When the material is at the top, the squeegees flick the material into the hopper. All StarFire elevators are designed the same which gives the smallest sweeper the same capability as the large sweepers.

Speed

Elevator speed determines how much material is being elevated and how far into the hopper the material is being placed. Elevator speed can be changed by throttle position of the auxiliary engine or for a more long term speed change the sprockets and chain can be changed to give a higher or lower speed for the elevator. Note: the faster the elevator runs the faster it will need repaired or replaced.

The elevator and all its components are considered wear parts

Material

The squeegees are made from a material similar to conveyor belting. Both the top and bottom liners are made from AR 400 plate. The combination of the squeegee material and the liner material gives these components an excellent wear characteristic and will last a long time if the machine is cleaned daily.

Liners

The top and bottom liners are in 2 pieces. The bottom liner is the same part used on all StarFire sweepers. The bottom liner is curved at the bottom to give a gradual contact of the squeegees and act similar to a broom and dust pan used in your home. The top liner changes in length which is determined by the size of the sweeper. The wear characteristics of the top and bottom liner are such that the bottom liner will wear at an approximate rate of 3:1 of the top liner. The bottom liner only has 4 bolts holding it in place, for easy replacement when needed.

Shafts and bearings

The StarFire elevator uses 3 shafts. The third shaft helps support the chain on the return side reducing chain stretching and chain slap when switching from sweep forward to sweep reverse and back again. When the chain is carrying material up to the hopper it drags on the floor causing a drag on the chain. This drag keeps the chain tight on the floor side which puts all the slack of the chain on the return side. By putting the third shaft in it helps support the slack side which significantly reduces wear on the chain.

The elevator shafts are large diameter to prevent damage from shock loading of the chain. On the shafts are the sprockets that transfer the rotational force to the chain. These sprockets are made from a polyethylene material. They cushion the shock loading as well and have an excellent wear characteristic which extends life of the chain and sprockets.

The elevator bearings are a 2" diameter four bolt and self-aligning. These bearings are extremely durable if properly maintained. Since the bearings are running in a very dirty and wet environment they must be greased daily, or every 8 working hours. The bottom bearings have remote grease lines to them for ease of maintenance but the line must be kept clear and make sure it does not get broken or grease will not get to the bearing and cause premature failure.

The elevator and all its components are considered wear parts

Chain tension

When the chain is installed at the factory the chain tension is set to have approximately 3" deflection between the bottom shaft and the center shaft **"this is a setting that is done with new chain ONLY"**. Once the elevator is put into service the chain is to be run as loose as possible. By running the chain loose it will significantly extend chain life. Do not adjust the chain tension unless the slack side of the chain is rubbing on the tight side of chain or other components inside the elevator and then only adjust the tension enough to clear what it was rubbing on.

When the chain is to lose it usually rubs on the separator tubes, these tubs are installed to hold the side walls of the elevator in alignment. The chain will rub on the tubes and will eventually rub through the tubes causing the sides to be misaligned. Adjust the chains before this happens.

The elevator and all its components are considered wear parts

The chain can be adjusted in 2 places. The top shaft can be adjusted, as needed, equally on both sides until there is no more adjustment left. Then the center shaft can be adjusted, as needed, equally on both sides. When neither the top or center shaft have no adjustment left, the adjusters need to be loosened and returned to the loosest setting. Once the shafts have been loosened then one link can be taken out of both chains at the same spot. Care must be taken to keep the chains in time with each other so the squeegees will run straight and perpendicular to the walls. Then readjust the top shaft just enough to clear all internal components of the elevator.

The life of a set of chains is determined by many factors. The most prevalent factors are: the material being swept (leaves, millings (grindings), road salt or silica sand), how tight or loose the chain have been kept and most importantly is how clean the elevator has been kept. Not cleaning the elevator daily is the biggest factor that causes excessive wear.

Drive system

The elevator is driven by a hydraulic motor mounted at the top of the elevator. The motor is offset from the top shaft which further protects the motor from shock loading. It drives a sprocket inside a housing that is connected to another sprocket by a drive chain. The drive chain is kept tight by use of an idler sprocket. This system is very durable and requires very little maintenance.

The sizing of the sprockets can change the speed of the elevator. By putting a larger sprocket on the hydraulic motor versus the sprocket on the elevator shaft will increase the speed of the elevator but reduce the power of the elevator. Care and consideration must be given to balancing the speed and power requirements to perform the job at hand.

Mounting

The elevator is mounted to a swivel shaft. The swivel shaft is supported by the elevator lift arms that connect the elevator to the sweeper frame. This is the only place that the elevator is physically connected to the sweeper frame. The tube that runs across the frame near the bottom of the elevator is not connected to the elevator. The elevator rest against this tube only, thus it's called the rest tube. The rest tube positions the bottom of the elevator in the correct position to receive the material that the main broom is flicking to the elevator. The reason it's not connected at this point is because if the elevator was to strike a solid obstacle like a manhole the bottom of the elevator can move back towards the main broom to clear the obstacle and then return to the correct position. The elevator can move back to give 10 to 12 inches ground clearance, depending on the sweeper model, to clear the obstacle.

Cleaning the elevator

Cleaning the elevator is one of the most important things that can be done to extend the life of the elevator. The bearings operate in the most severe conditions. Washing the inside of the elevator washes the dirt from around the bearings so it doesn't work its way past the bearing seals and destroying the bearings. The lower bearings are the most susceptible to damage from dirt contamination. The rotating shafts also get wrapped with material such as tape ribbon, twine, fishing line and tire trash which wrap into the bearings as well causing premature failures.

All StarFire's are set up with auto flushing of the elevator. If possible, the flushing system should be used every time the sweeper is filled with water. When filling with water, the water valve lever is pulled to fill the tank. When the tank is full the lever can be pushed to close the tank and open the flushing lines. These lines attach to the top of the elevator and are directly over the elevator chains. If the sweeper is left in sweep forward at low idle, the elevator will do a wash down. If this is done at every fill up, then

the end of the day cleaning will be much easier. Be careful not to get near any moving parts on the sweeper. Safety is always job one.

Combining a good cleaning and maintenance program will extend the life of the elevator for many hours.