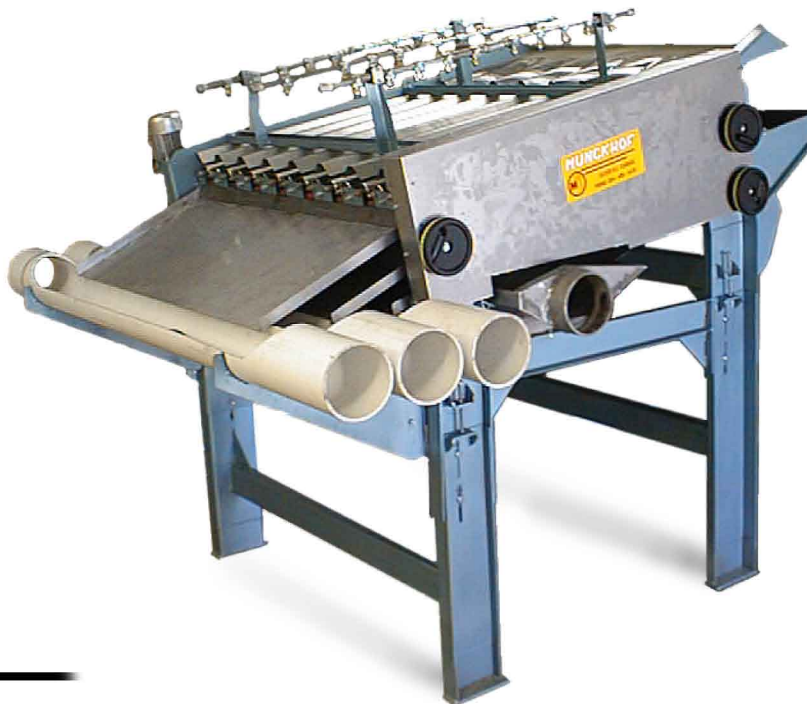


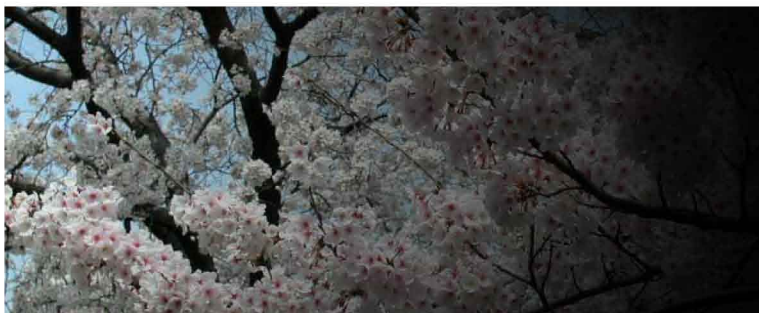
MUNCKHOF

Cherry Packing Lines

*Munckhof
Manufacturing
offers a wide
variety of
products to
suit your fruit
packing needs*



PARALLEL SIZERS
RECEIVING STATIONS
SORTING LINES
HYDRO COOLERS



Munckhof Manufacturing

P.O. Box 308
Oliver British Columbia
V0H 1T0

tel.: 250 498 4426
fax: 250 498 4460
www.Munckhof.com



Summary

For Decades Munckhof Manufacturing has been a leader in the construction and design of farm equipment, and since 1999 has been working on and perfecting the many different machines which make up a modern packing line. The newly developed cherry lines are mainly comprised of:

- Receiving Stations
- Sorting Lines
- Parallel Sizers
- Hydro Coolers
- Cull Collection



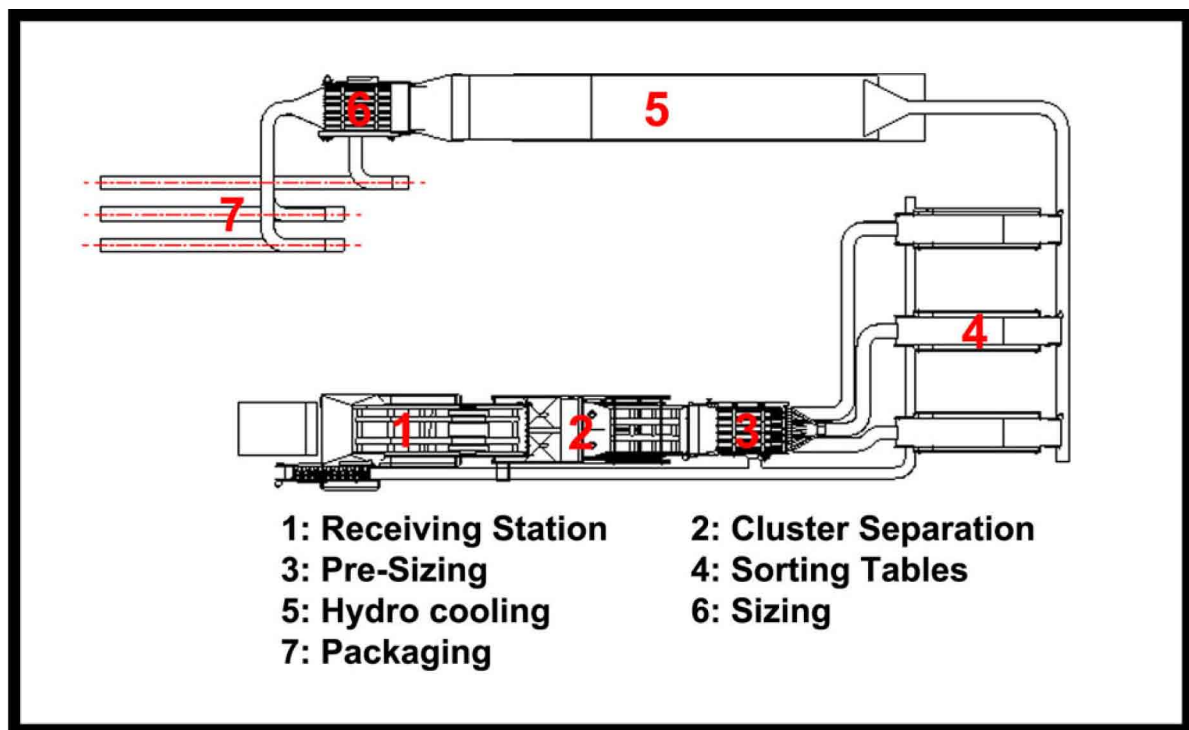
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1. Typical Layout

Below is an example of a typical cherry line layout. The cherries first are placed in the **Receiving Station** that delivers the cherries to the **Cluster Separator**, which singulates the cherries for the **Pre-sizer** to remove undersized fruit. From here they move on to the **Sorting Lines** for hand sorting. After sorting is completed the cherries make there way onto another **Receiving Station** and into **Hydro Cooler** for chilling, where the cherries core temperature is cooled dramatically. A **Water Transition** is used to insure that all the cherries come onto the **Parallel Sizer** evenly. From the **Parallel Sizer** the cherries are packaged and conveyed immediately into cold storage.



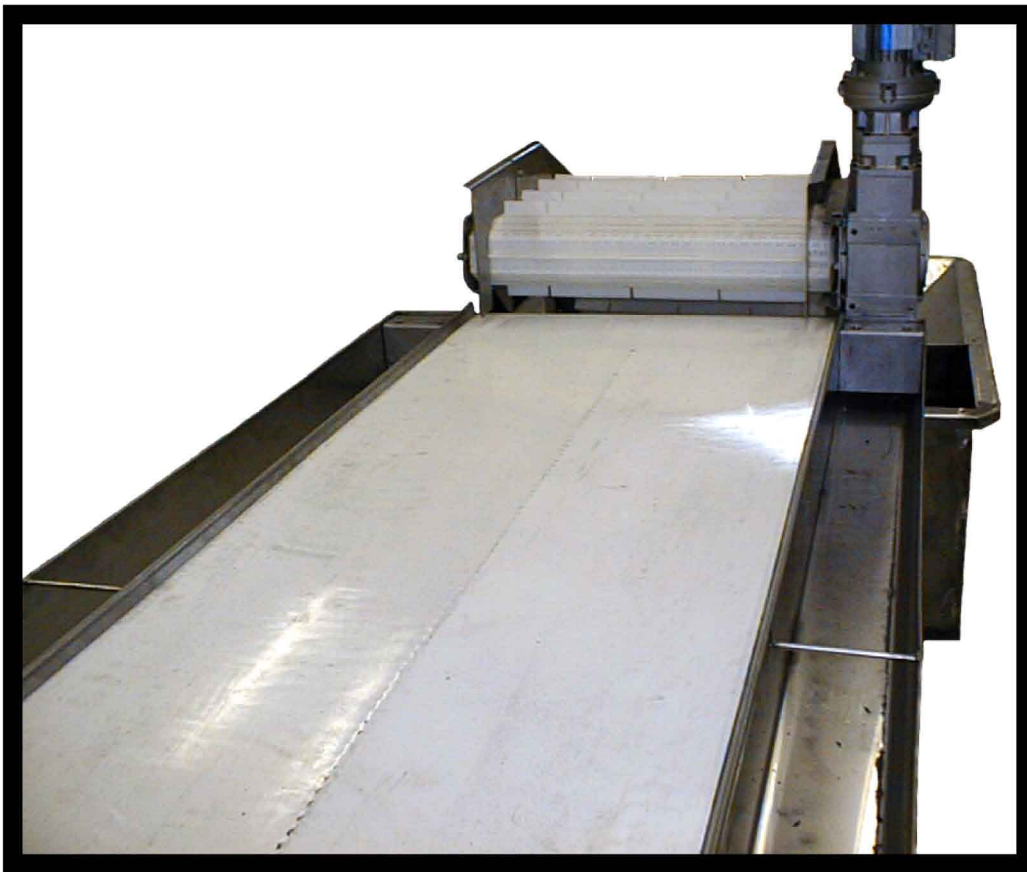
2. Receiving Station

Receiving Stations are the entering point for the cherries. They are comprised of a stainless steel tank and elevator to move the cherries onto the sorting lines. The advantage of using this system to load the sorting lines is that it provides an equal variable distribution of cherries over the sorting line, while the tank serves as a reservoir to feed the elevator. This is accomplished by controlling the module belt speed.



3. Sorting Line

After coming off the elevator the cherries roll onto the sorting line. The sorting lines are comprised of FDA approved seamless flat belting with V-line tracking and stainless steel troughs on each side. There is a choice between green and white belts for the sorting lines, though green is recommended because it is easier on the eyes and makes it easier to detect the blemished cherries. These belts have inverters for speed control making it possible to adjust the rate of forward travel as required. When the culls are taken off the belts they are put into the troughs which deliver them via water to the cull collector. There is also the option of having an extra trough in the center for multiple grading purposes. After sorting is complete the cherries then go into another receiving station for delivery to the sizer. This also facilitates the sump separation keeping the final hydro cooler water as clean as possible minimizing tank water exchange those creating large energy savings.



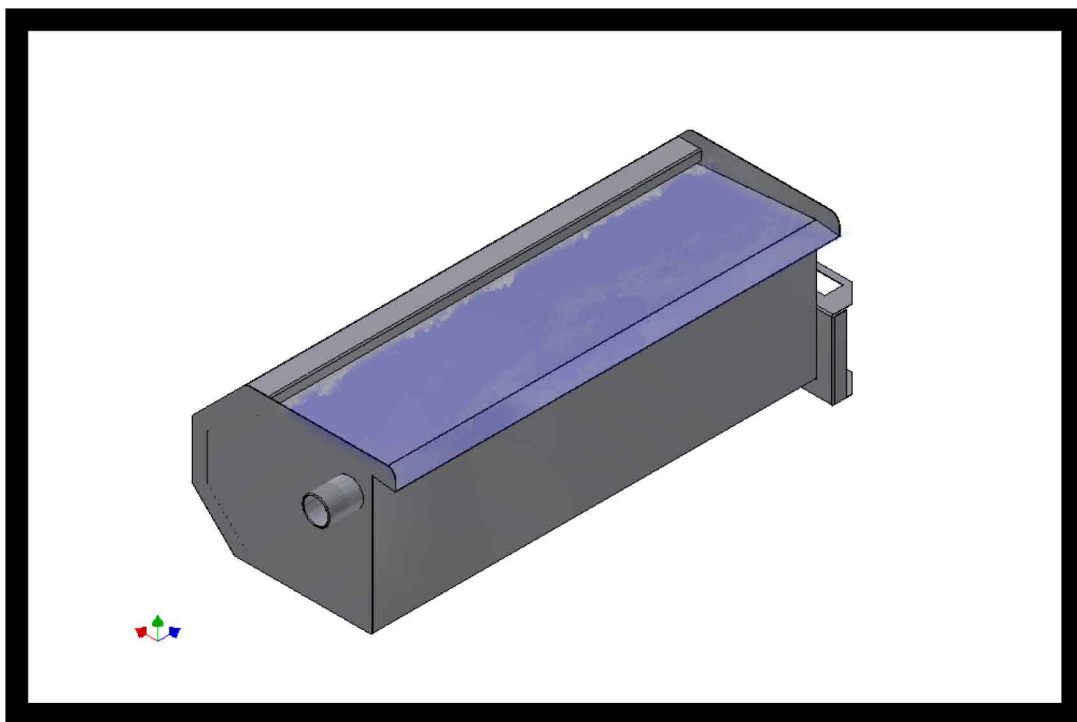
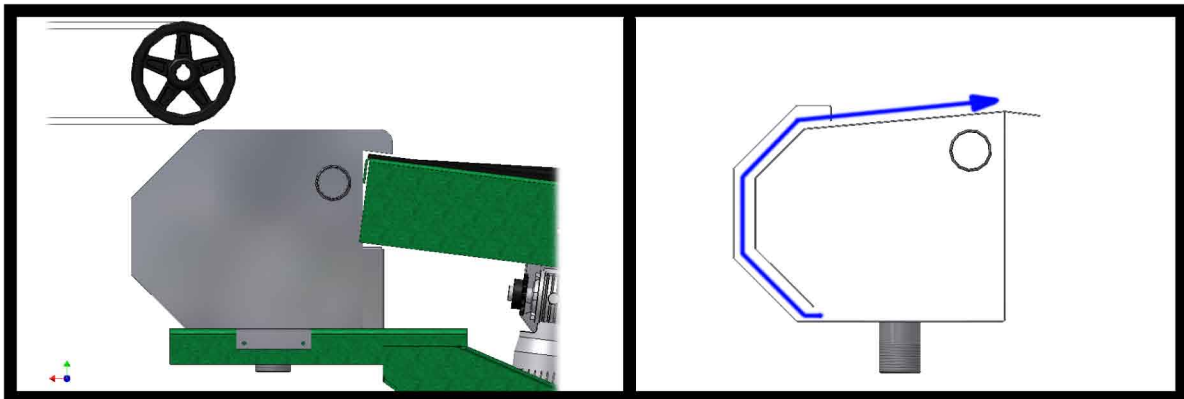
4. Hydro Cooler

The next piece of machinery in the cherry line is the Hydro Cooler. The hydro cooler continually showers the cherries in almost 0° C water for 5 to 7 minutes bringing the core temperature of the cherry dramatically down. This is accomplished by flowing cold down through the cherries preventing them from insulating themselves and by placing the cooling coils in a tank at the top of the machine for maximum chilling effect. The belt chosen for the hydro cooler is FDA approved and open for drainage and is speed adjustable to get the cherries to the optimal temperature. Once the cherries have been transported out of the Hydro Cooler, they are moved over the waterfall transition and into the sizer.



5. Water Transition

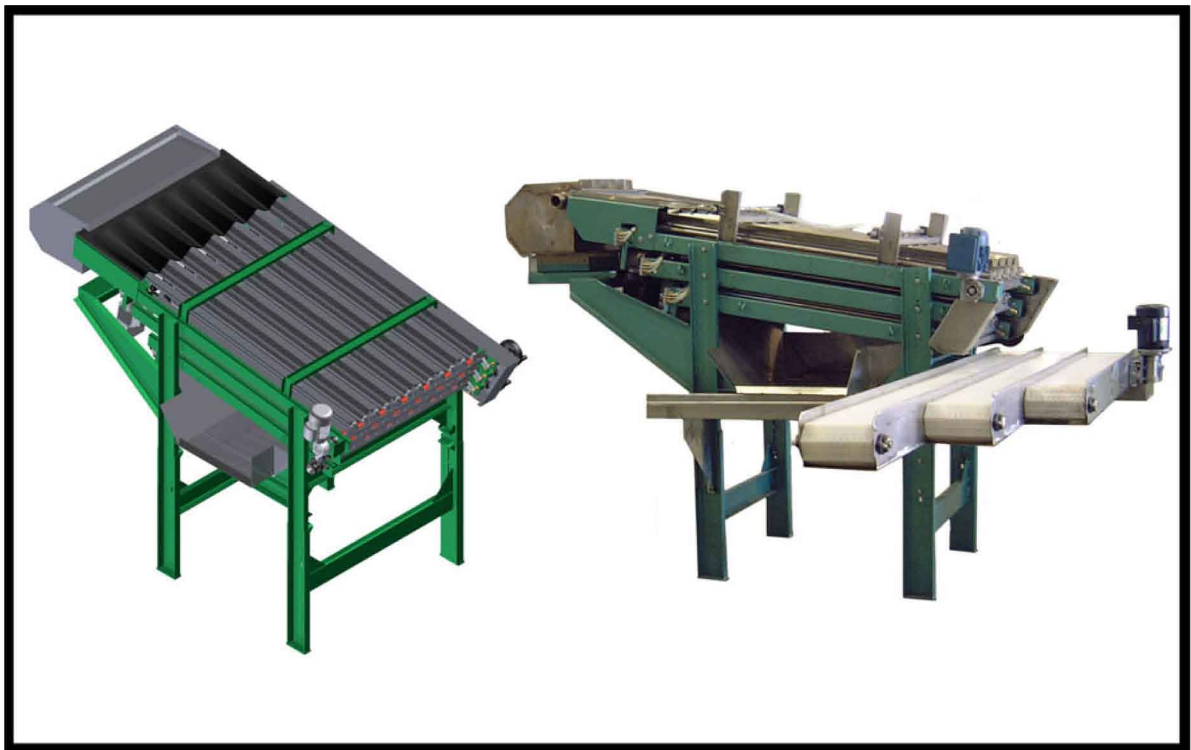
The water transition is a unique delivery system that insures not only even uniform feed into the sizer but more importantly provides a very gentle drop for the cherries. With this feature cherry pitting is greatly reduced.



6. Parallel Sizer

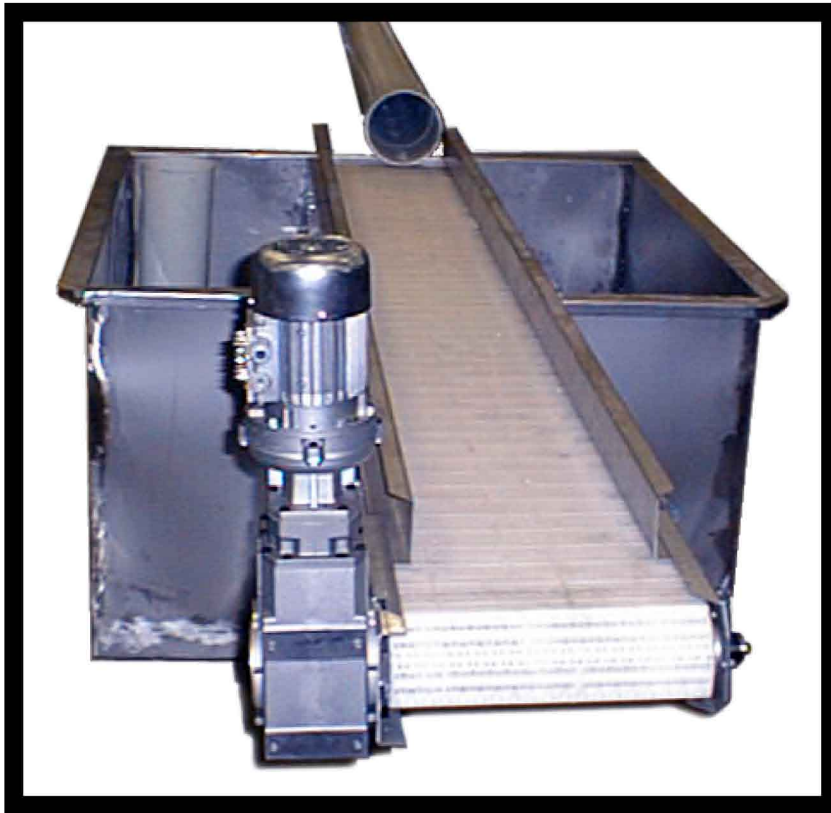
After being fed by the water transition the cherries reach the parallel sizer. The parallel sizer consists of typically 3 tiers of highly polished stainless steel rollers, machined with precision to size accurately. All rollers on each tier are adjustable but maintain even spacing allowing larger fruit to proceed off the end and allowing smaller fruit to fall to the next level. Typically after three tiers the undersized cherries drop through and a cull collection system transports them away.

The parallel sizer improves the quality of the product in particular the larger more valuable cherries by reducing the amount of time spent on the rollers. Set-up time for the parallel sizer is also decreased as the entire roller is moved with one handle. The rollers are set at a single size rather than the taper system in which both sides of the roller must be adjusted to allow the cherries to fall into there appropriate water trough. With this system the cherries no longer have that drop because once they are finished being sized they roll off a stainless steel plate into a stream of water where it is then transported for packaging



7. Cull Collector

All undersized and defective cherries which were collected over the cherry line converge to the cull collector to be placed into bins. When designing the layout of a cherry line, Munckhof tries to arrange the flow so that the cull collection occurs at a point where it is easily accessible, usually close to the receiving stations.





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