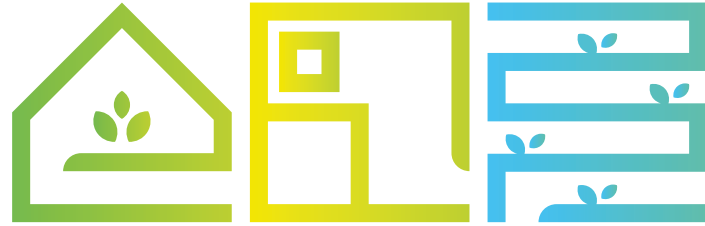


Logiqs



Benches with Vertical Airflow



Perfect climate near the plants



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VERTICAL AIRFLOW ADVANTAGES

Homogeneous climate:

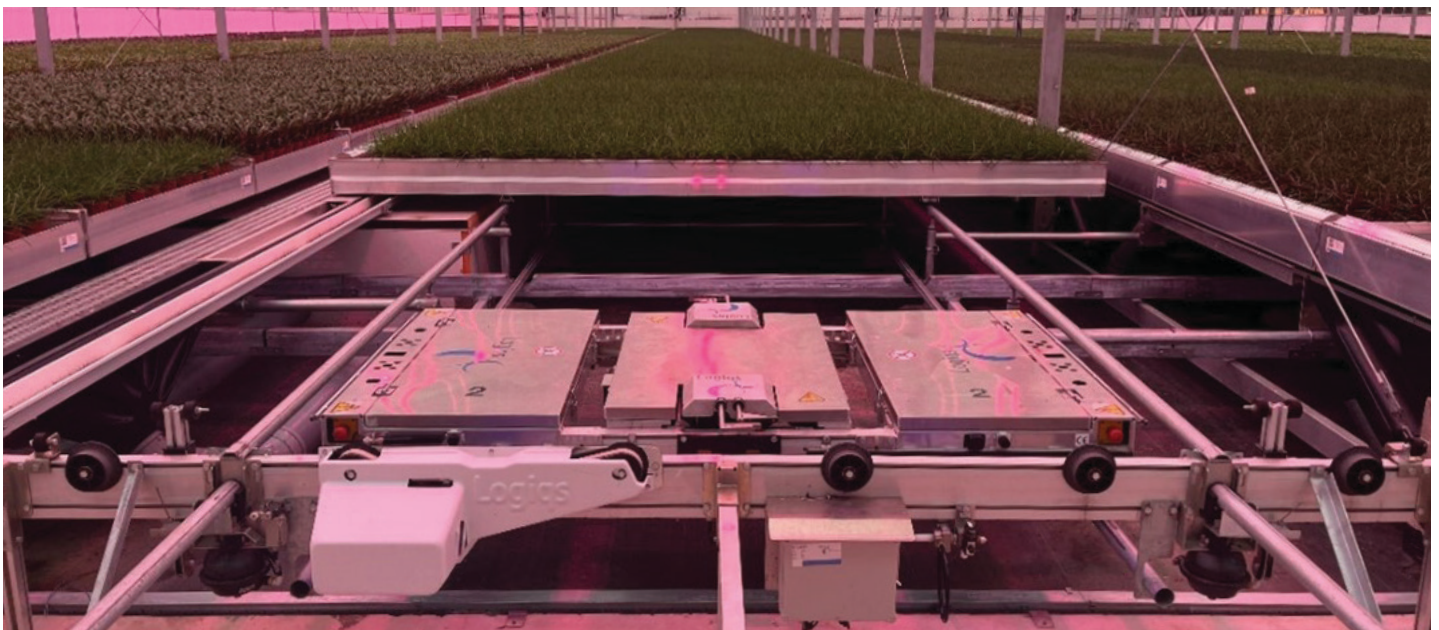
- The temperature difference between each point of the Greenhouse on the same height level is less than 0.5 °C.
- The relative humidity difference between each point of the Greenhouse on the same height level is less than 0.5%.

Strong climate control:

- Temperature and humidity are independent from outside conditions

Energy saving:

- In combination with a semi closed Greenhouse energy savings up to 50% can be realized.

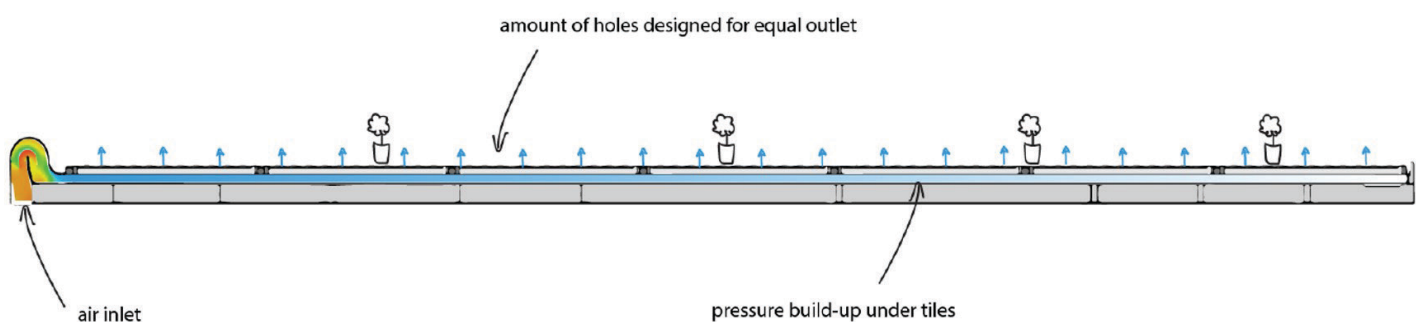


Stronger and faster growing plants:

- Due to optimal control in relative humidity, there is no risk of diseases caused by too much humidity.
- Because climate is controlled perfectly, plants can handle stronger light. Which leads to more photosynthesis.
- Plants dry quicker after irrigation, which also leads to more photosynthesis.
- Because the air constantly moves past the leaves the CO₂ level near the stomata is much higher. This means growing is possible with less added CO₂.

HOW VERTICAL AIRFLOW WORKS

- The plants stand on around 12 tiles in the bench.
- The tiles stand on an insert, which is air and waterproof.
- At one short side of the bench the air moves from an air supply channel below the bench into the bench, crossing a small gap.
- Inside the bench the air goes over a ridge and turns to go down to go below the tiles.
- The ridge blocks water from entering the air supply channel.
- The tiles have hollow spikes, through which the air moves up.
- The top of the tile is like the top of a Lego block. This keeps the air vents clear if a pot/tray is standing on top of the hole. This also avoids still water below the pot/tray.
- The side of the tiles connects seamlessly to the insert, which blocks the air from escaping at the sides.
- Vertical airflow lets conditioned air move upward passing the plants.



Flexibility:

- Can be used with different bench and greenhouse dimensions.
- Can be used in combination with any irrigation method, including ebb and flow.
- Benches can be moved automatically, or manually around the greenhouse and processing room.

WHY VERTICAL AIRFLOW

Vertical airflow has the following advantages for the plants:

- It allows for a higher humidity level, because the transpiration gets moved away:
 - This keeps the stomata open, causing higher CO₂ uptake and thus higher photosynthesis
 - Without the increased risk of diseases
- The lowest leaves of the plants are reached with fresh air:
 - The leaves stay active and can be sold
 - This avoids the build-up of ethylene
- The temperature and humidity level is static during the growth of the plant. Leaves that were built for a certain humidity level stay in this humidity level during growth.



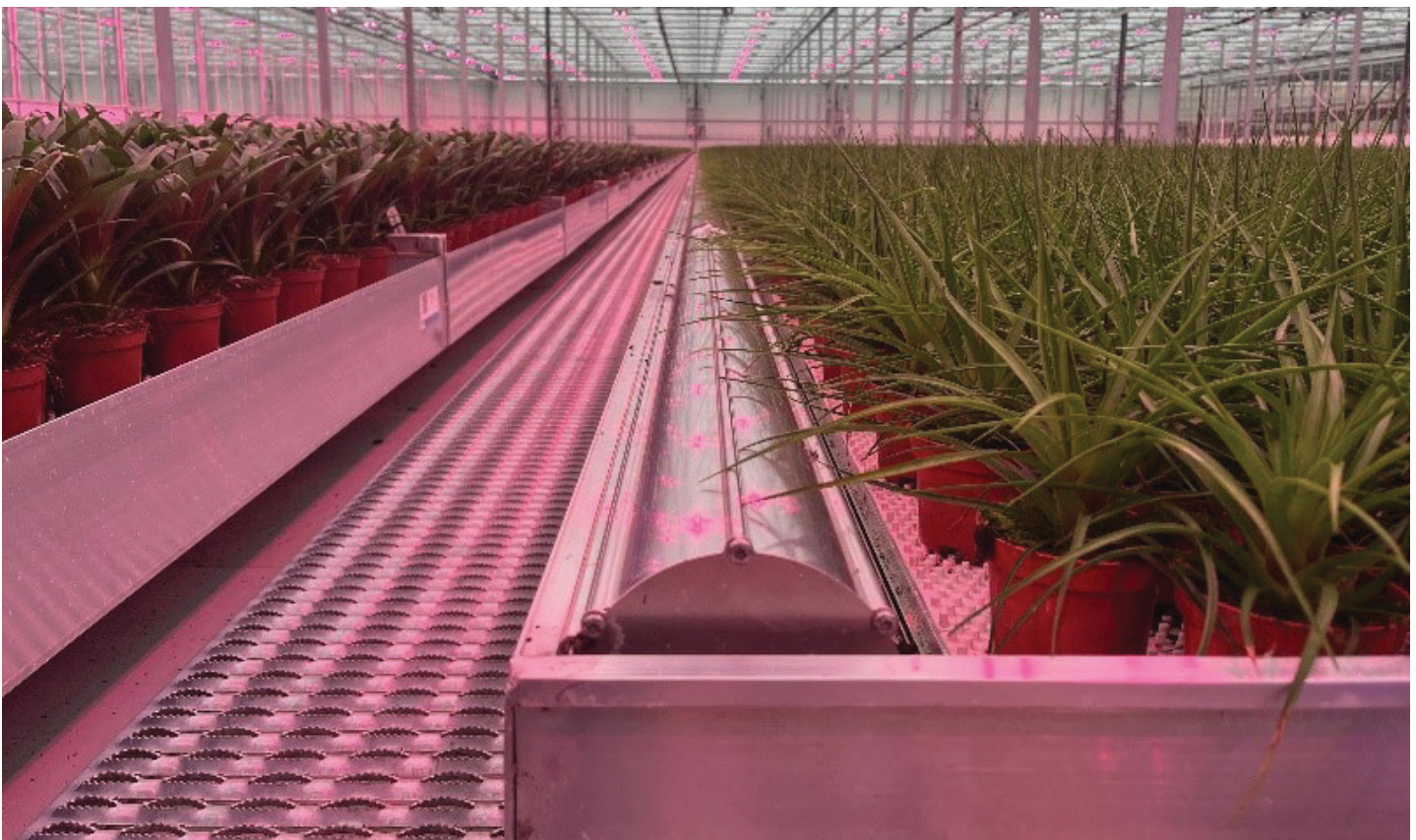
It has the following advantages for the growing system:

- As the air moves up the air gets warmed by the led lighting, so natural air movement of heated air works together with the forced air movement.
- The higher humidity helps reduce the energy cost.
- Climate control can be in a climate chamber (semi closed greenhouse).

VERTICAL AIRFLOW PROPERTIES

Dimensions:

- Benches can be between 2.500 mm and 8.000 mm long.
- Benches can be between 600 and 2.000 mm wide.
- Level of tiles can be between 10 and 40mm above the insert.
- Tile sizes can be between 300 mm and 800 mm wide and 250 and 620 mm long.
- The channel providing the air has an air supply that is a bit narrower than the bench and that is around 5cm wide.
- The distance between the air supply and the bench is around 10 mm.



Other properties:

- Water level above the tiles for ebb flow can be as high as 30 mm.
- Air speed going up past the plants can be between 5 and 50 mm/s.
- The system can be equipped with a special washing line, including a pick and place robot for the tiles , to wash the tiles and benches automatically.

REFERENCES



LKP Plants Bromelia Specialist Moerkapelle | The Netherlands

In the summer of 2018 Logiqs introduced the idea of vertical airflow in combination with benches.

The original idea at Logiqs was to use this in vertical farms, but the growers of LKP had visited a greenhouse using vertical airflow for lettuce and started talking about using benches with vertical airflow in a greenhouse in combination with a semi closed greenhouse.

To find out if vertical airflow works for Bromeliads like it does for lettuce, we did a test with 3 benches with bromeliads.

The outcome was very positive, so we worked together with greenhouse builder van der Hoeven and LKP for two years to make an optimal design and install this in their new 1.5-hectare greenhouse.

The greenhouse consists of 3 growing departments and 4 small test departments. The hard work paid off and right now there is a very homogeneous climate in all departments and requested changes in the climate are achieved within minutes.

The result is more growth and energy saving and a very even production.

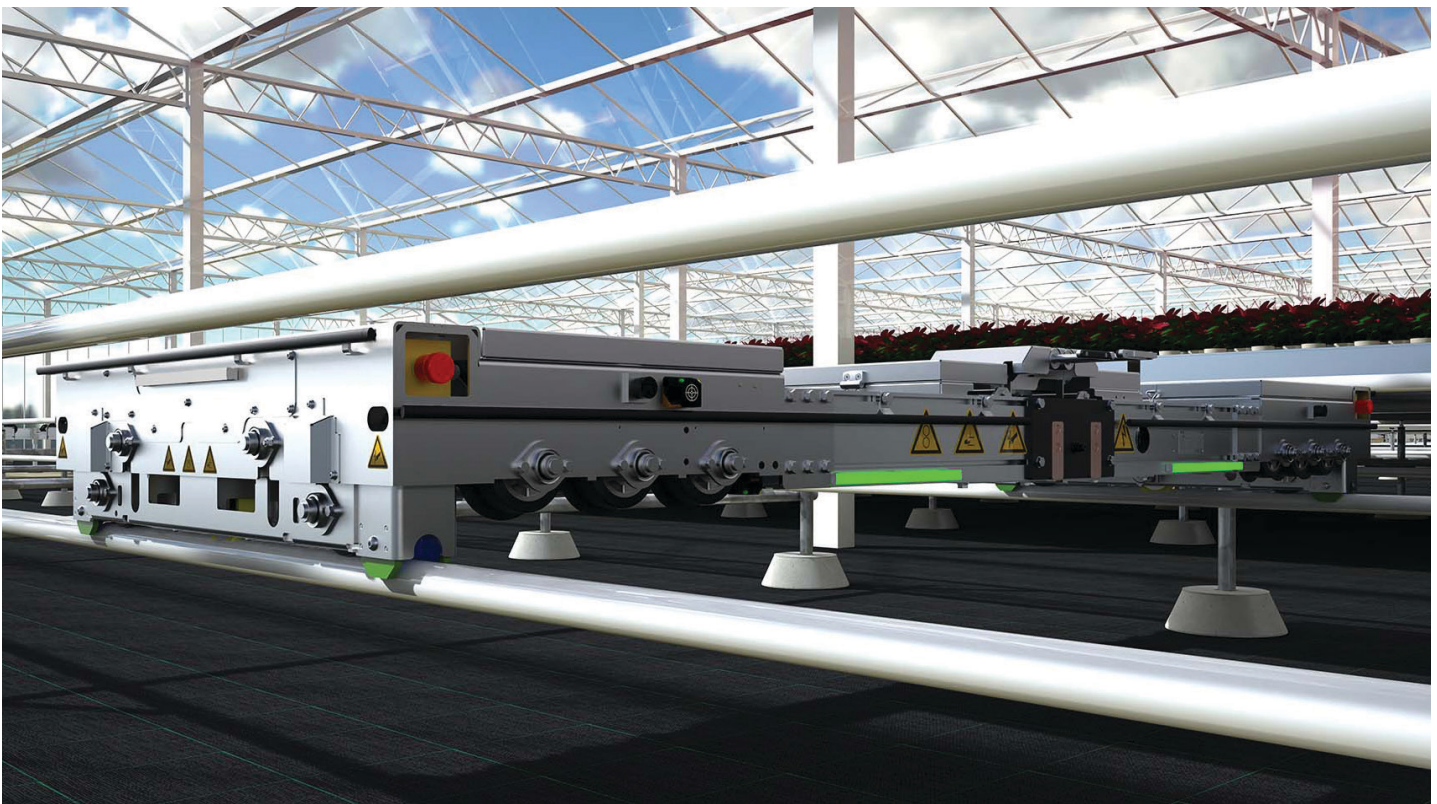


WHY CHOOSE LOGIQS

Logiqs has more than 45 years of experience and know-how, gained in the field of internal transport and logistics systems for greenhouses. Our industry leading solutions help our clients achieve a higher profitability and a stronger competitive position within the worldwide horticultural marketplace.

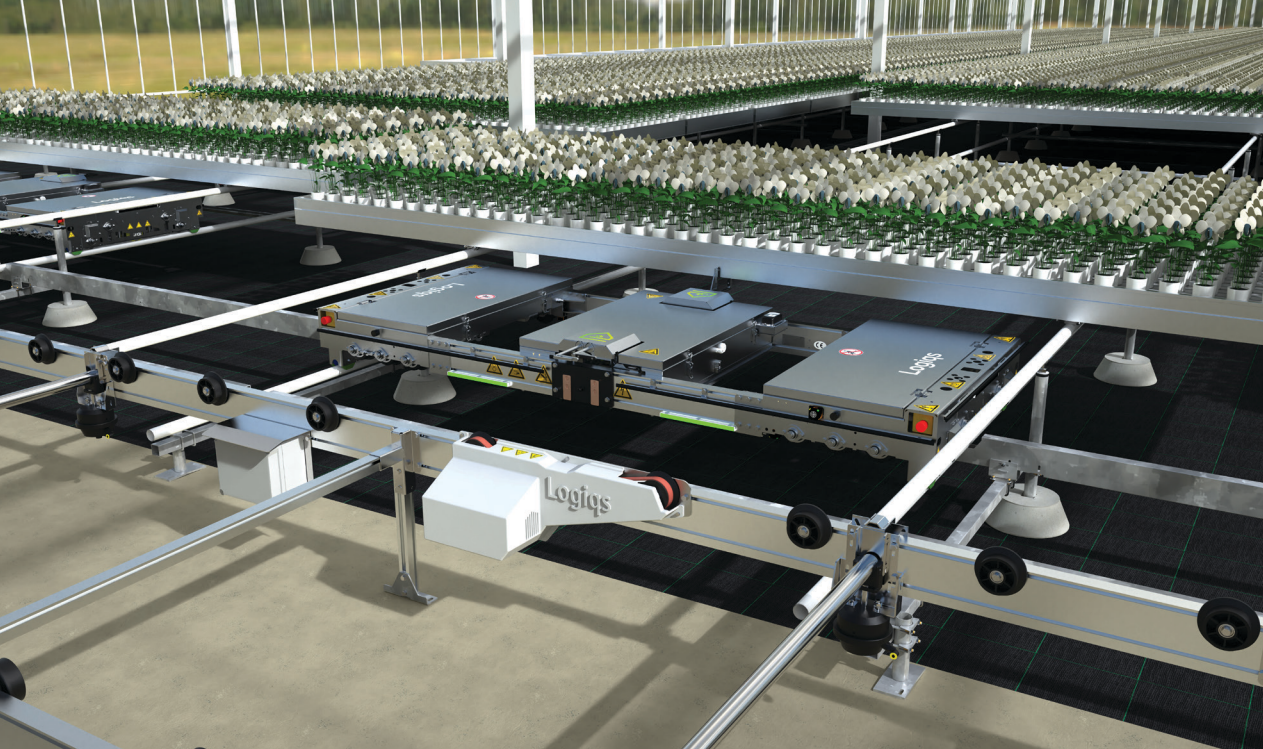
We advise, design, produce and install complete logistical systems, manual or completely automated, for growers specialized in: potted plants, young plants, cut flowers, tree nurseries, flower bulbs and vegetables.

By working closely together with our customers, we aim to always provide a highly reliable service as well as intelligent solutions for any logistics automation problems our customers might encounter.

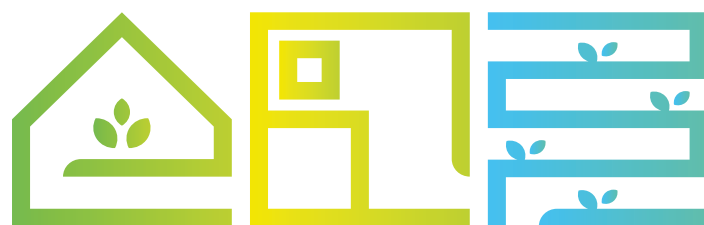


The quality of our cultivation systems, comes from the close collaboration we have with our customers, the growers. We always work together with the customer to fully understand both the short term and long term needs of the growers, so that we can design and build the best possible logistical solution for our customer.

Logiqs also has a great deal of international experience and has established partners in the United States of America, China, Great Britain, Australia, Finland, Brasil and South Korea.



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