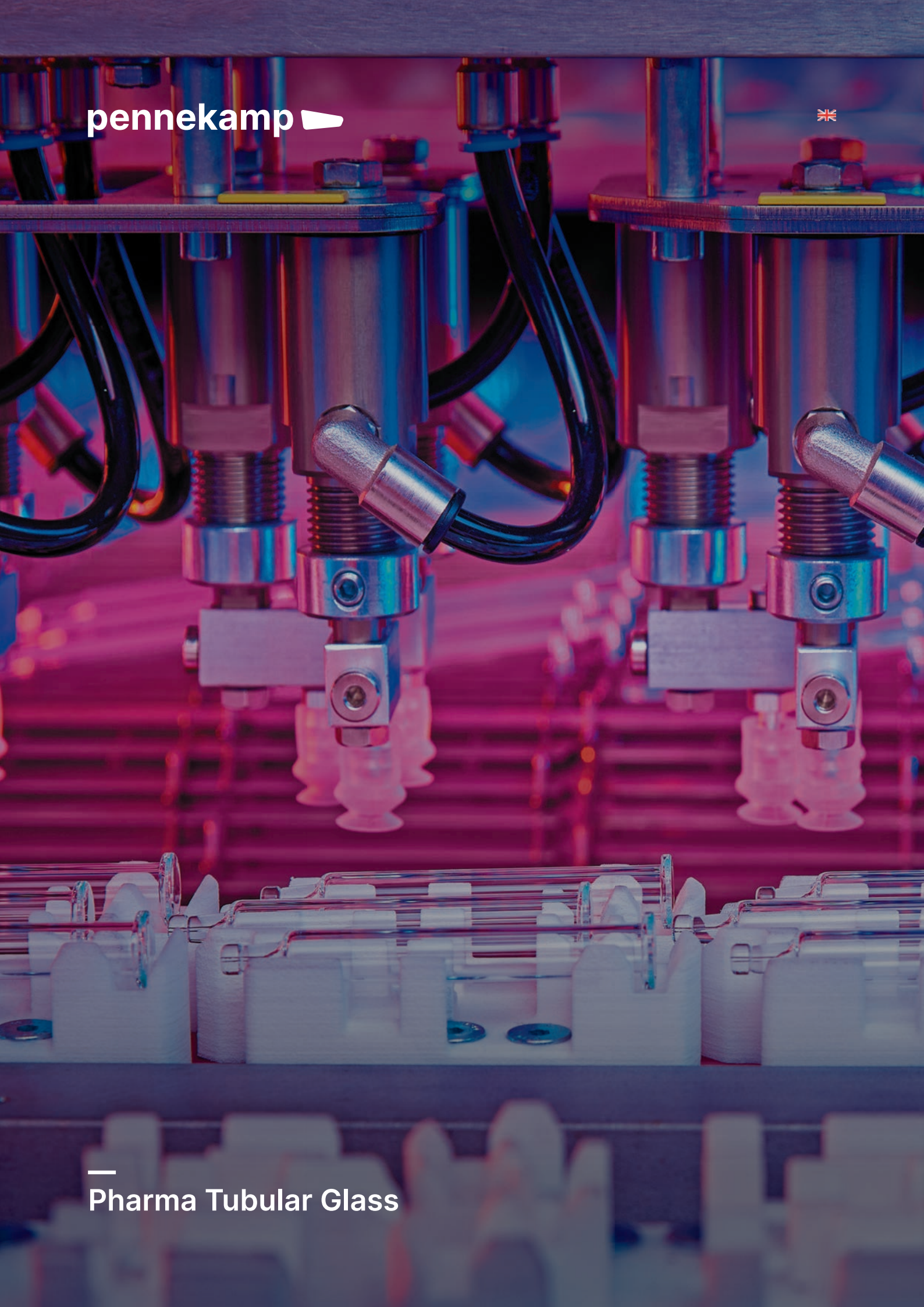


pennekamp

Pharma Tubular Glass

Pharma

Pharma Tubular Glass

Pennekamp special Annealing Ovens and its Robotic Handling Systems (Pick & Place) are designed and developed for thermal processing of tubular glass products, and they are applicable for a vast range of Vials, Ampoules, Cartridges and Syringes in Pharmaceutical industry.

By using this technology, the producers of Pharma Tube Glass articles are able to meet with their customers' highest expectation on the final products quality such as:

- Perfect articles surface
- Tensionless annealed products
- Well cured colors on the decorated items

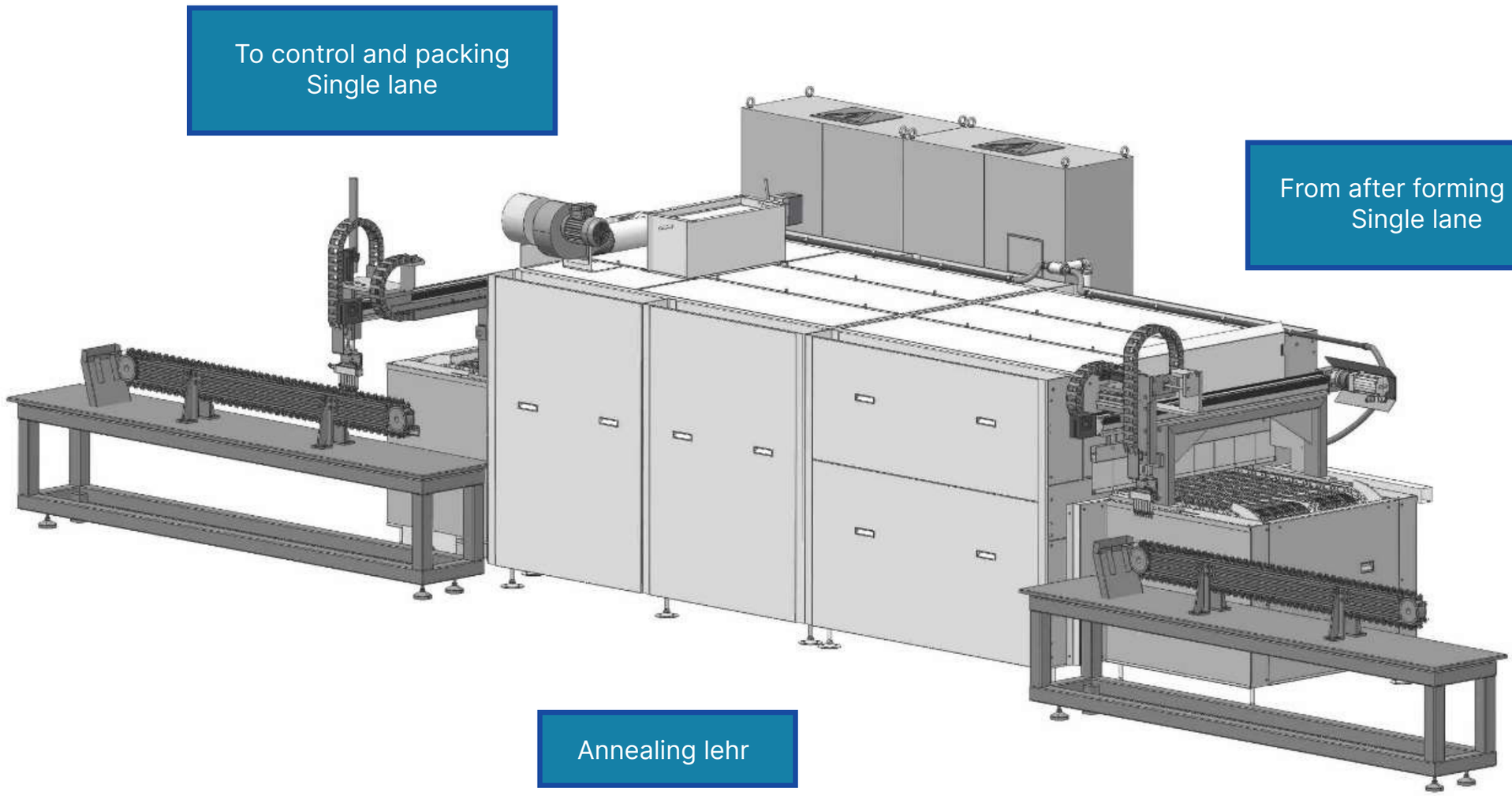
The new concept of these ovens and handling systems are designed to be placed in the dedicated production lines that have continuous increment in the capacity and speed. This allows them to double the capacity of their production with a smooth robotic article transport system to pick the products from feeding line and to place them in the most compact pattern, on the oven's belt.
The high temperature resistance belt is been made of stainless steel, hence we should appreciate the high quality of insulating materials and our in hood design for creating the best energy efficient technology.
The right positioned thermocouples are controlling the thermal cycle, while the PLC system allows the customers' operators to adjust their required tolerances.

Pennekamp Ovens are categorized in 2 versions:
- Gas Heating
- Electric Heating

Unique advantages of Pennekamp systems:
- This is just 1-stop technology:

Synchronous placement and removal of the glass articles on or from the oven conveyor belts.
- **Article positioning in Rows** instead of columns: The robotic pick and place system always handle whole article line. Any vacancy or displacement error can be easily traced.
- **Extremely high loading density:** Double quantity of articles can be compactly placed on the belt and passed through the Annealing tunnel, with minimum speed for reaching to 50% less energy consumption.
- **The most cost effective and operative Ovens.**

Technological Features:
- There is No Glass-to-Glass contact in the entire process.
- Optional positioning of the Oven in length and/or crosswise to the infeed and outfeed conveyor. (as per customer desire)
- Homogeneous heat distribution inside the oven, ensuring the best annealing result.
- Using variable drive by servomotors.
- Automatic control of the thermal program and Belt speed.
- PLC monitoring and controlling all aspects of the machinery.
- User friendly central touch screen for operation.



Classic Line 4000

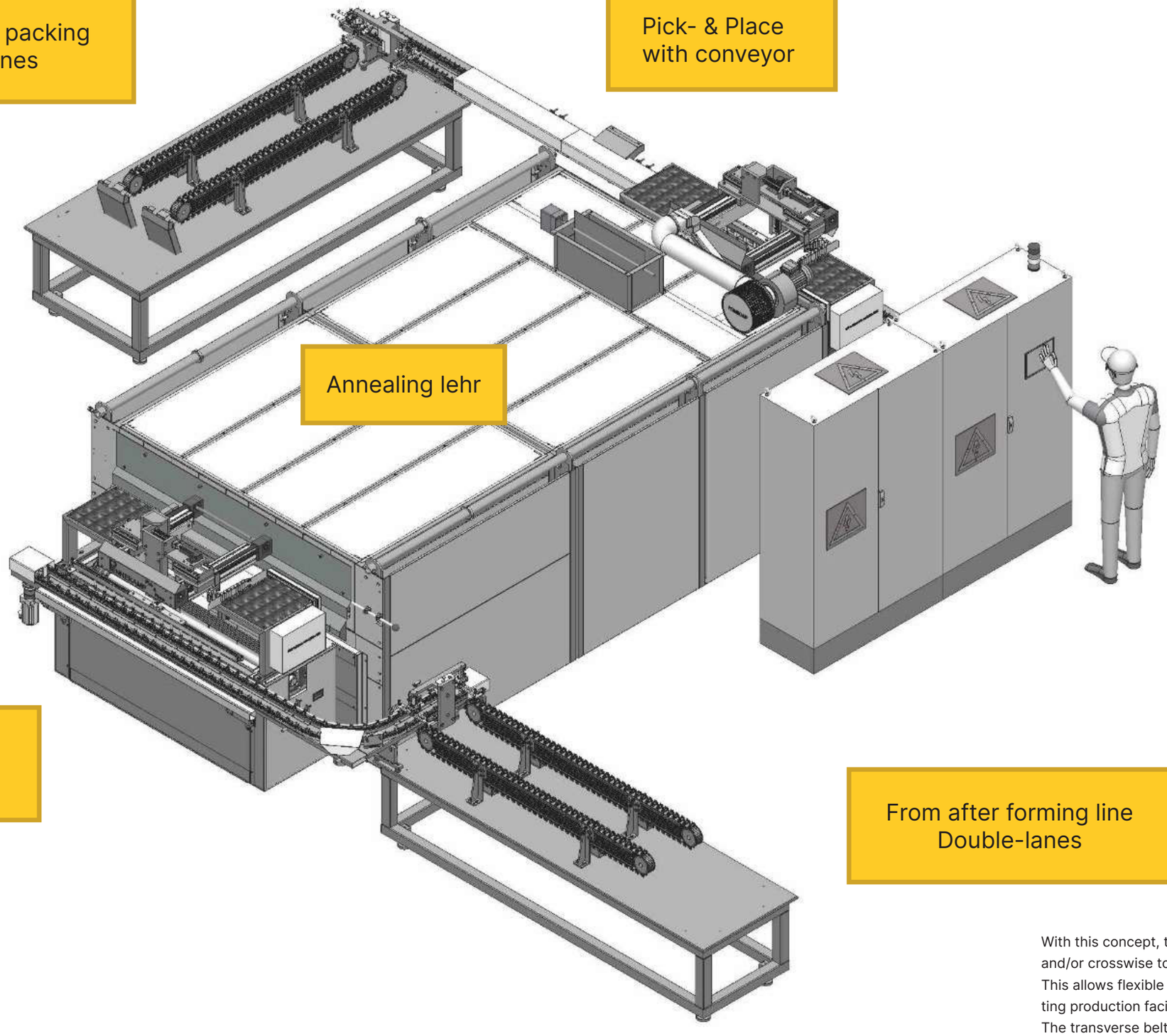
- Glass Annealing / Color curing
- 1 - lane infeed and outfeed of glass articles
- 4000 articles/h (depending on article diameter and length)
- Oven temperature up to 650°C

In this oven type, both infeed and outfeed conveyors are in one line direction.

To control and packing
Double-lanes

Pick- & Place
with conveyor

Annealing lehr



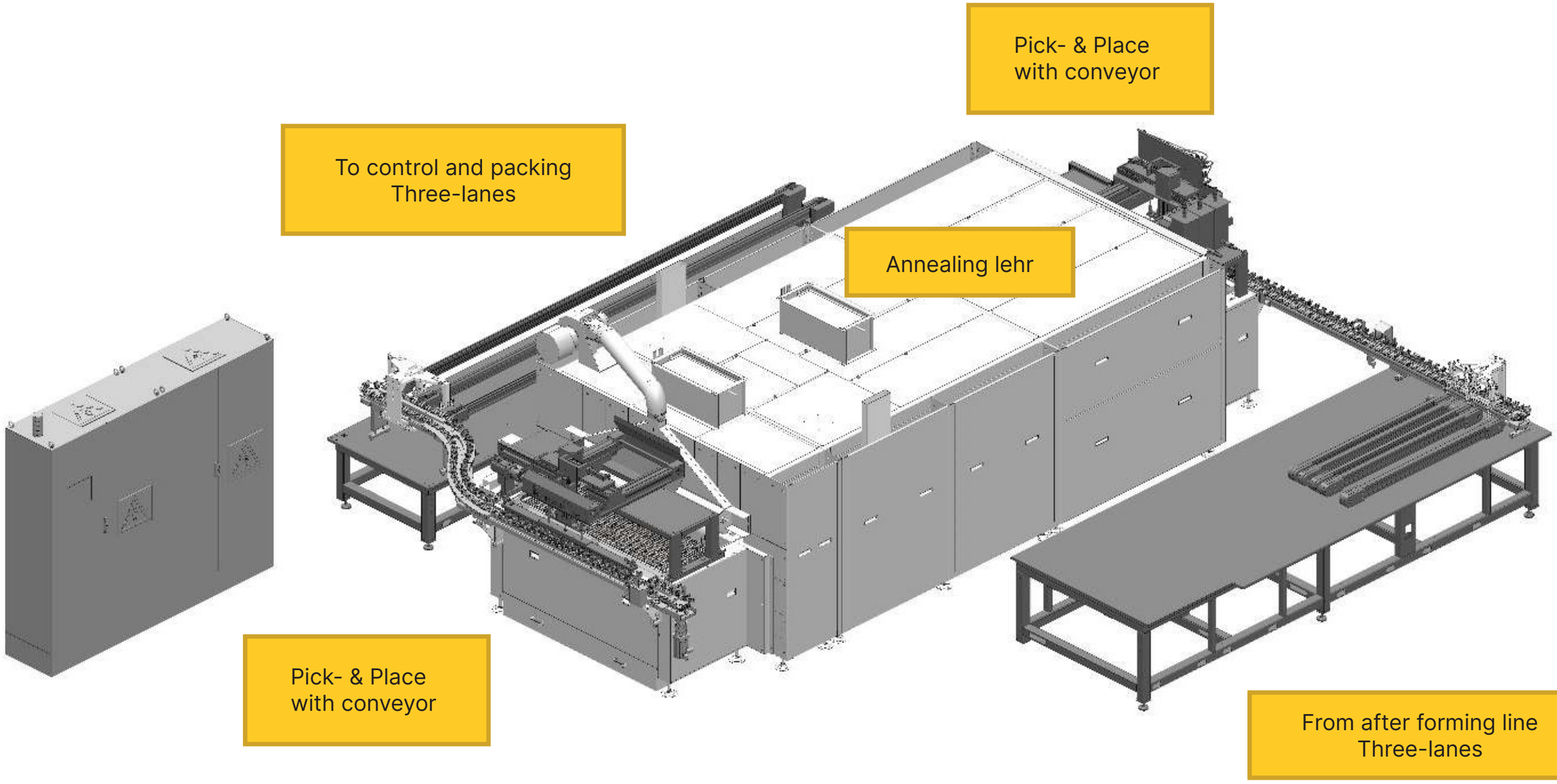
Pick- & Place
with conveyor

From after forming line
Double-lanes

Innovation Line 8

- Glass Annealing / Color curing
- 2 - lanes infeed and outfeed of glas
- 8000 articles/h (depending on article diameter and length)
- Oven temperature up to 650°C
- Oven can be in line and/or crosswise with the production transport direction

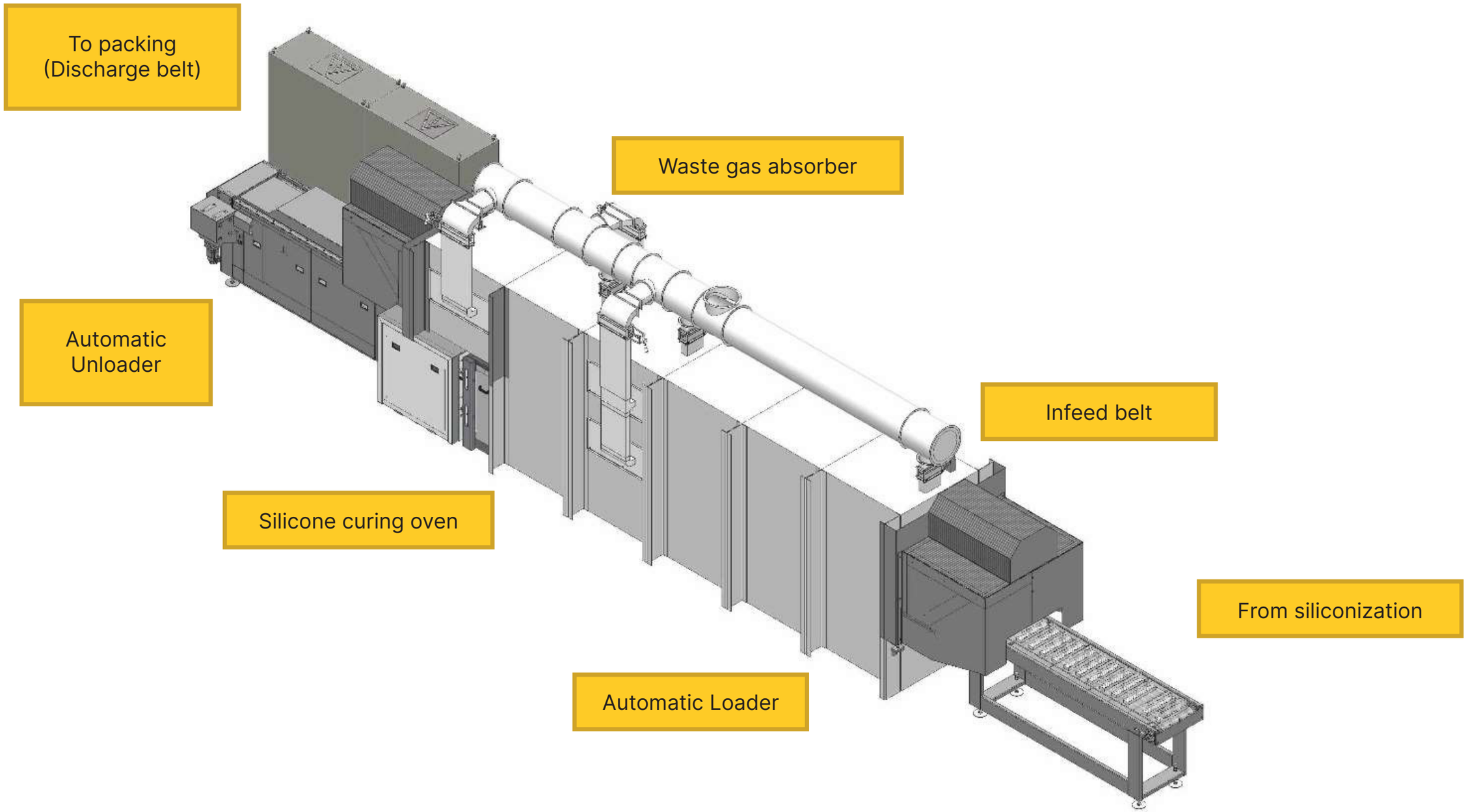
With this concept, the oven is positioned lengthwise and/or crosswise to the infeed and outfeed conveyors. This allows flexible alignment even in the clients existing production facilities.
The transverse belts allow the glass products to be placed on, and to be removed from the oven belt, line by line. The glass products are thus handled slowly and particularly gently.



Innovation Line 12000

- Glass Annealing / Color curing
- 3 - lanes infeed and outfeed of glass articles
- 12000 articles/h (depending on article diameter and length)
- Oven temperature up to 650°C
- Oven can be in line and/or crosswise with the production transport direction

With this concept, the oven is positioned lengthwise and/or crosswise to the infeed and outfeed conveyors. This allows flexible alignment even in the clients existing production facilities.
The transverse belts allow the glass products to be placed on, and to be removed from the oven belt, line by line. The glass products are thus handled slowly and particularly gently.



Siliconization Line

- Silicone coating curing line
- 1 - lane feeding and discharging of the glass articles
- Oven temperature up to 420°C
- Discharge of the process gases

Our Siliconization line is designed to:

• Improve the flow of liquid inside the container and reducing “dead volume” effects.
• Reduction of the interactions between the pharmaceutical product and glass container
• Process the most common sprayed materials: silicon emulsion or silicon oil

This fully automatic oven is used to cure the silicone coating of glass products. This oven has an optional infeed and outfeed conveyors. The glass articles are being transported to the oven via the infeed belt. Then an automatic "pusher" automatically moves the containers into the oven at the correct distance from each other. At the end of the oven, another "pusher" transfers the containers to the discharge conveyor.

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