

# SHIFT YOUR STRATEGY

GLASS PROCESSING AUTOMATION



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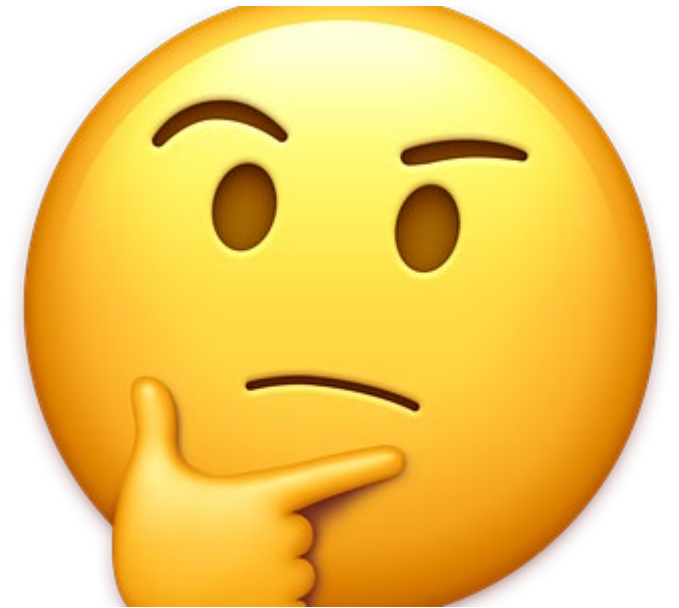
Avoiding the  
Automation Scaries

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Nashville  
[glass.org](http://glass.org)



# When does it make sense to automate a process?

- Is there a human available in the area to do the task?
- Is it a reasonable task to ask a human to do?
- Is it tedious?
- Is it dangerous?
- Is it difficult to do well without training?
- Does it take more than one person to do it?
- Is it complicated?



# Starting New or Adding To

- Sometimes it makes the most sense to install new equipment in an addition or new building.
- One advantage is that you can install and commission the new equipment without disrupting your current operation.
- Testing and calibrating new automation is best done with test pieces rather than customer product. Don't ruin your company's reputation over learning a new process.
- If you are not able to commission your new automated project offline, it can be advantageous if the equipment can also be run manually while automation is being tested and implemented.
- Remember- Automation is custom. Ask questions and use the integrator's expertise to get the end result that you want.

# Plant Layout

- Plan the flow of material throughout your plant when adding equipment. In general, you want raw material coming in one door and finished product going out the other door.
- Try not to backtrack through the shop for different fabrication operations. Think IKEA!
- Invest in a CAD layout of your plant early on and add to it each time you add equipment. Know where drain lines and other hidden-from-view items are under the floor and in the walls. Experiment with the layout and find what works best with the space.
- Sometimes it makes sense to “re-arrange” to gain efficiency. If making a hard commitment to your infrastructure, make sure it makes sense with the space that you have even if it means that something else has to move. Generally speaking, automation projects are not very portable.

# Building a solid foundation

- Several things need to be in place before automation can happen. The software system which manages all of the data throughout the shop is usually the first step.
- Partner with a software company that can accommodate growth and scale with your company.
- .dxf customization capabilities such as custom layers and custom notches will be needed for most automated systems.
- To-scale visualizations of each part with measurements and details.
- Routing and tracking of parts throughout the plant.
- Barcoding and labeling of each part with key information noted on the label.

# Dedicated Programmer

- Someone with *CAD and CAM* knowledge and experience
- Programmers should be intimately familiar with the equipment that they are programming for
- Let the programmer spend some time on the shop floor at the machine(s)
- The more the operators and the programmer work together, the better success you will have with your equipment
- The programmer should be very familiar with tooling- running each tool as well as it can be run is the goal

# Racks and Racking systems

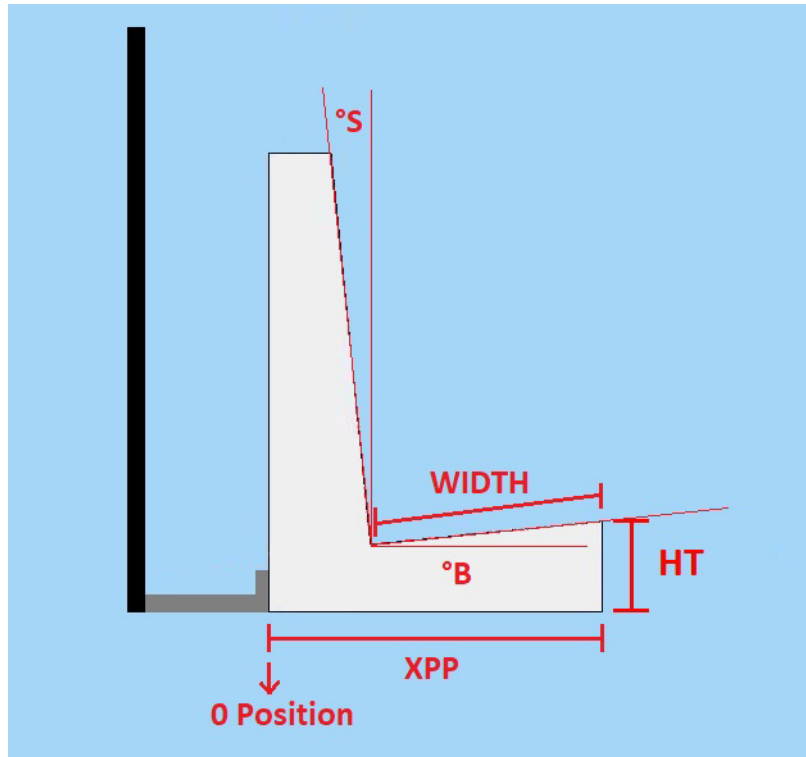
- When using automation such as automated loading and unloading, it is best to find a standard type of rack that is automation-friendly.
- Racks can be on wheels, forklift only, or in some cases both. It is important to think about how material will travel throughout your shop.
- The fewer different types of racks you have, the easier the automation will handle the product with less chance for human error.
- If you are using racks with wheels, they need to be able to be locked. Racks need to be completely immobilized when handling with automation. Stationary racks are preferred.
- Think of it as a small, medium, large scenario. All smalls are identical, all mediums identical, etc.
- The next step is to then assign identification to each rack. From there you can start to assign batches.

# Orientation of the Glass on the Rack

- For shaped and out of square parts, particular attention needs to be paid to the orientation of the glass. Find whatever works and stick with it.
- The more like- sized parts you can group together the better
- Same-sized holes and edgework grouped together will save you tool changes during the production run.
- When creating batches of differently sized glass, there needs to be some thought put into how the parts are stacked.



# Rack Definition

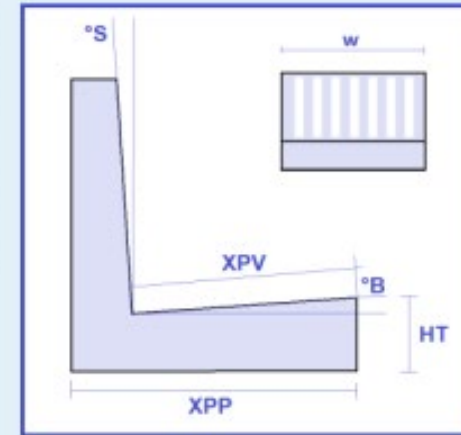


- **Id**: Identification Number of the Rack
- **HT**: Height of rack's base from the floor [in]
- **XPP**: Distance from the hard stops to the front of Rack [in]
- **B**: Angle of Rack's Base [ $^{\circ}$ ]
- **S**: Angle of Rack's Back [ $^{\circ}$ ]
- **Width**: Rack's Depth [in]



## RACKS DATA

| ID | B   | S   | XPP   | XPV  | HT   | W    |
|----|-----|-----|-------|------|------|------|
| 1  | 6.4 | 5.4 | 20.08 | 13.5 | 8.66 | 10.7 |
| 2  | 2.1 | 2.2 | 20.3  | 20.4 | 20.6 | 20.7 |
| 3  | 5.2 | 0.0 | 0.0   | 0.0  | 0.0  | 0.0  |
| 4  | 0.0 | 0.0 | 0.0   | 0.0  | 0.0  | 0.0  |
| 5  | 0.0 | 0.0 | 0.0   | 0.0  | 0.0  | 0.0  |
| 6  | 0.0 | 0.0 | 0.0   | 0.0  | 0.0  | 0.0  |
| 7  | 0.0 | 0.0 | 0.0   | 0.0  | 0.0  | 0.0  |
| 8  | 0.0 | 0.0 | 0.0   | 0.0  | 0.0  | 0.0  |
| 9  | 0.0 | 0.0 | 0.0   | 0.0  | 0.0  | 0.0  |
| 10 | 0.0 | 0.0 | 0.0   | 0.0  | 0.0  | 0.0  |



**ID** **1**

**B**  °

**S**  °

**XPP**  Inch

**XPV**  Inch

**HT**  Inch

**W**  Inch

LOAD

SAVE

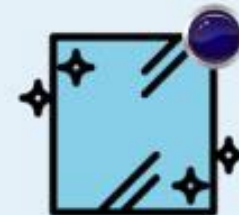
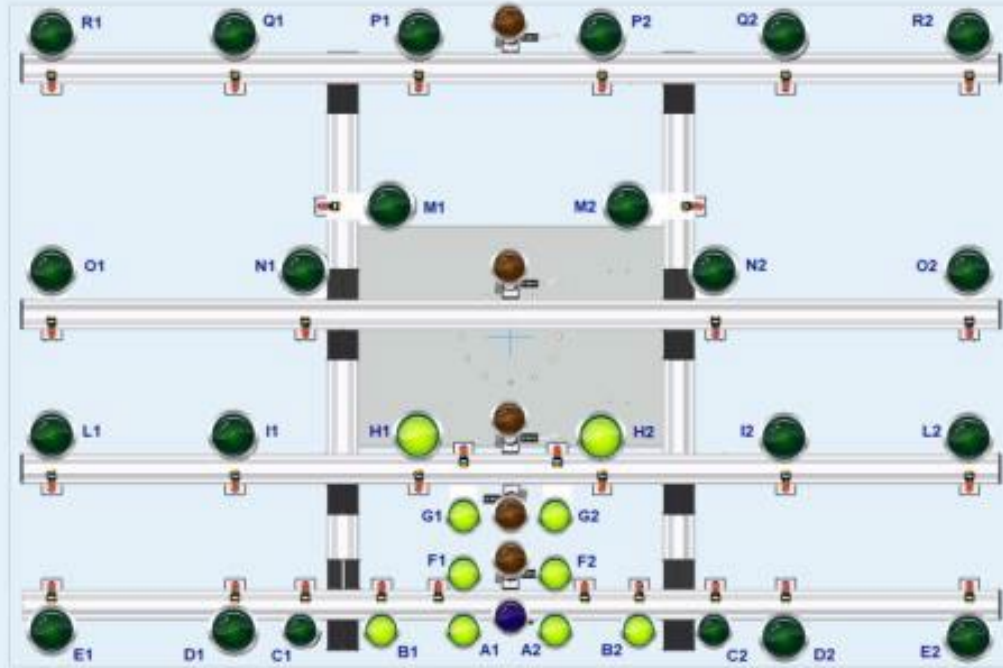
NEW RACK

# End of Arm Tool

- Handling glass is done with a vacuum end-of-arm tool
- End-of-arm tools should have a reserve vacuum accumulator for safety in case of power failure
- Vacuum for the EOAT can be through a dedicated closed-loop vacuum pump or a venturi system



## SUCTION CUPS ENABLED



# Batching Glass Example

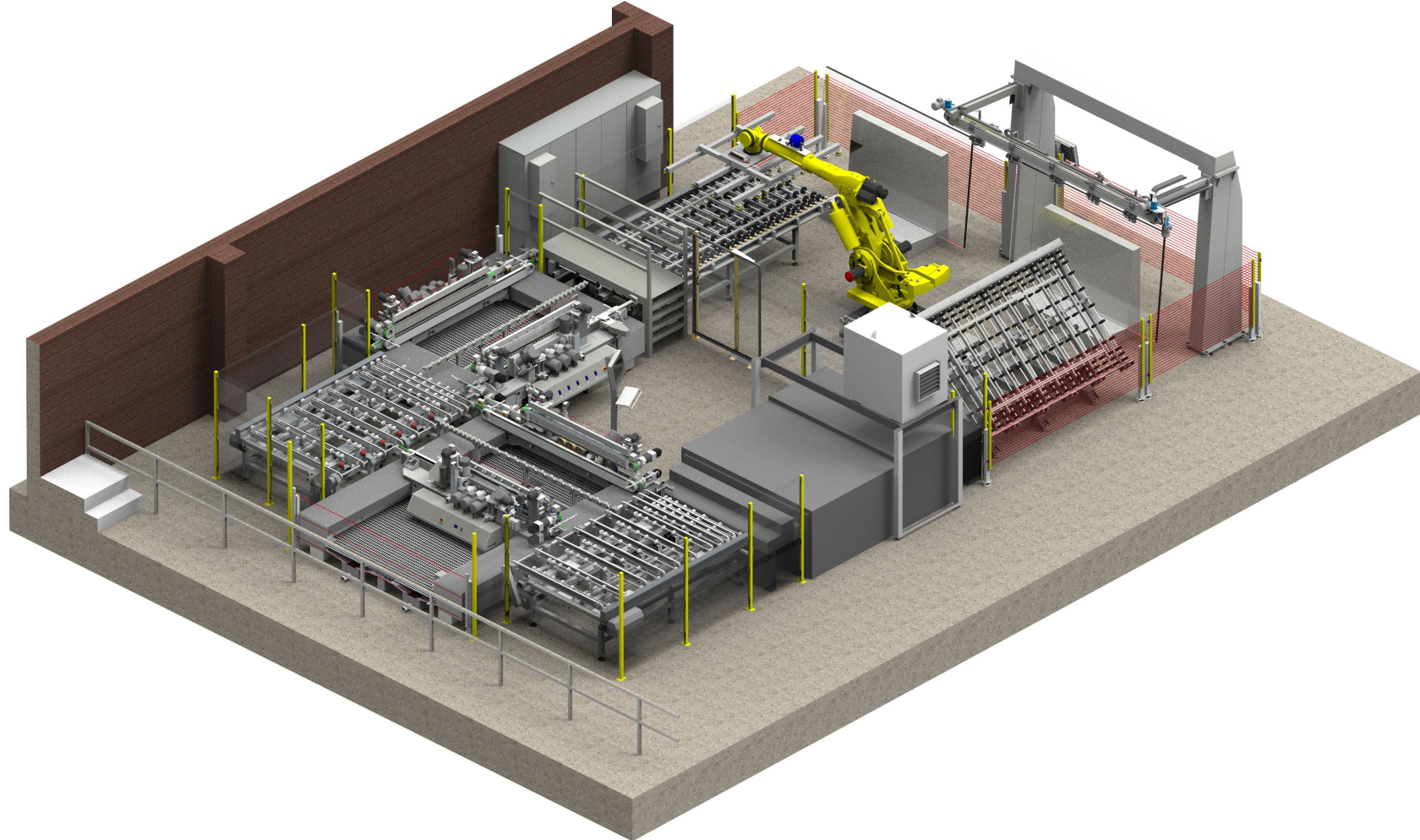
- Once you have automation in place, you will want to have runs of production. This is basically “feeding” the machinery the right stuff in the order that makes the best sense.
- Build racks of cut product ready to be processed by placing the product in the center of the rack and scanning the label, building the batch. Once the cart is full, the rack is considered one container both physically and digitally with all of the information about everything on the rack associated.
- Batches of identical parts can be scanned once and then assigned a quantity



# Machinery upkeep

- When you have an automated line, it is much more important to maintain your equipment. One piece of the line being down can stop production on the entire line.
- The more parts you run, the more glass grinding you are creating. With automation, keeping everything in perfect working order is a must.
- You have a chance to make a larger quantity of parts in a shorter period of time. If you are making bad parts, you will make a whole lot of them very quickly. This is why upkeep and maintenance is so important in an automated environment.

# Automated Edge Grinding Cell

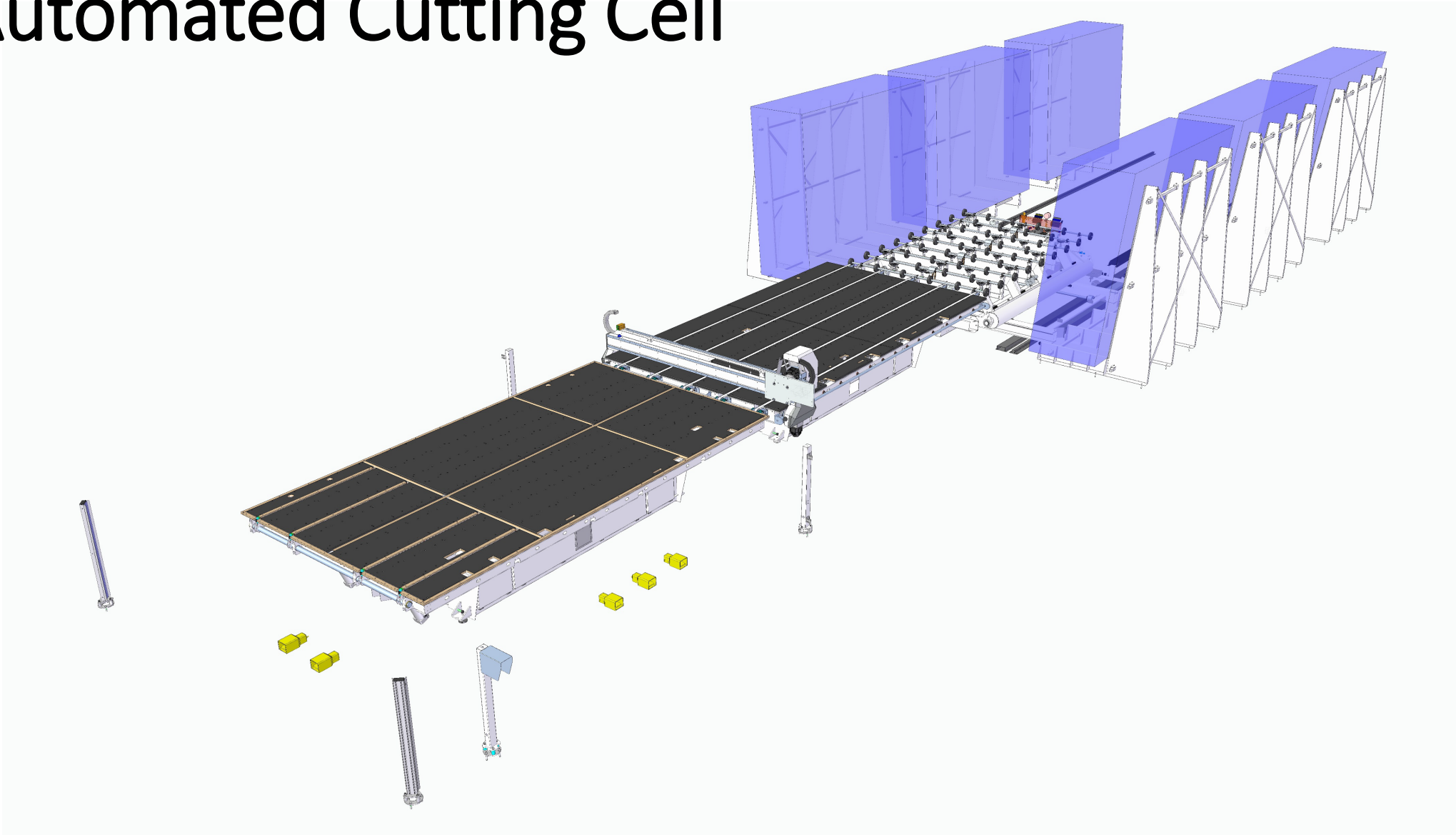


# Automated Cutting Cell

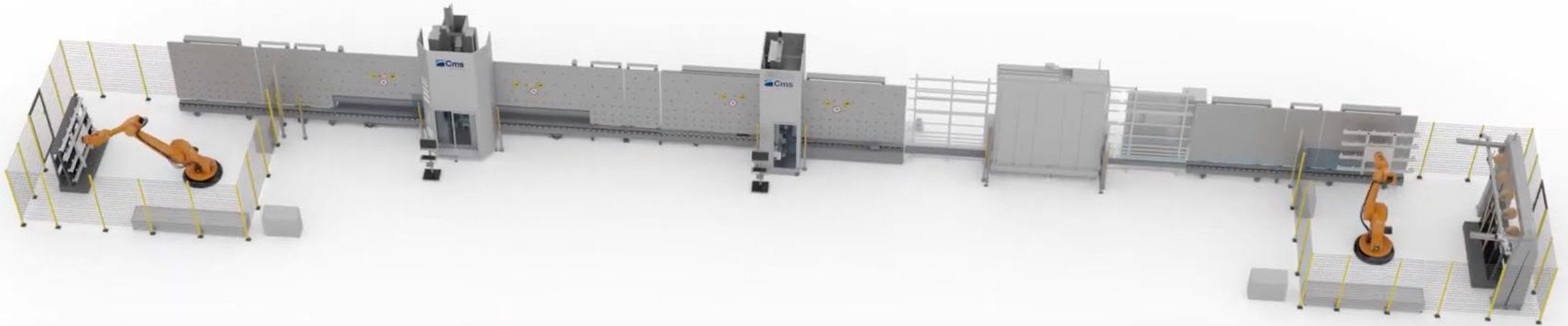




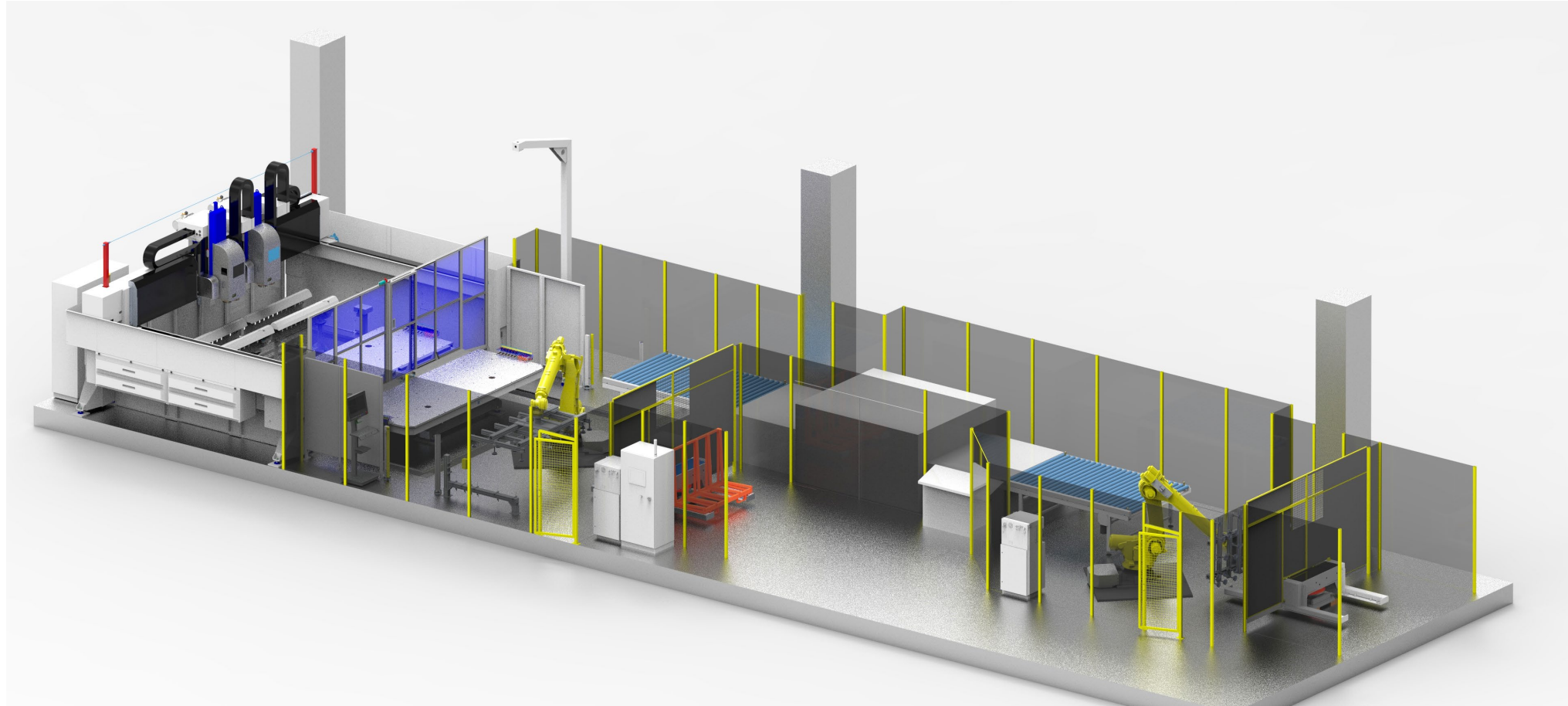
# Automated Cutting Cell



# Automated vertical CNC Line



# Automated Horizontal CNC Workcell



Thank You