

DESIGNING & IMPROVISING THE ASSEMBLY LINE OF FOUR WHEELERS

WORK SYSTEM AND DESIGN LABORATORY

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OBJECTIVE

TO FACILITATE ASSEMBLING OF INTERMEDIATE
PARTS VIA ASSEMBLY LINE THROUGH THE
APPLICATION OF VIRTUAL REALITY MODEL
OBJECTIVE

ASSEMBLY LINE

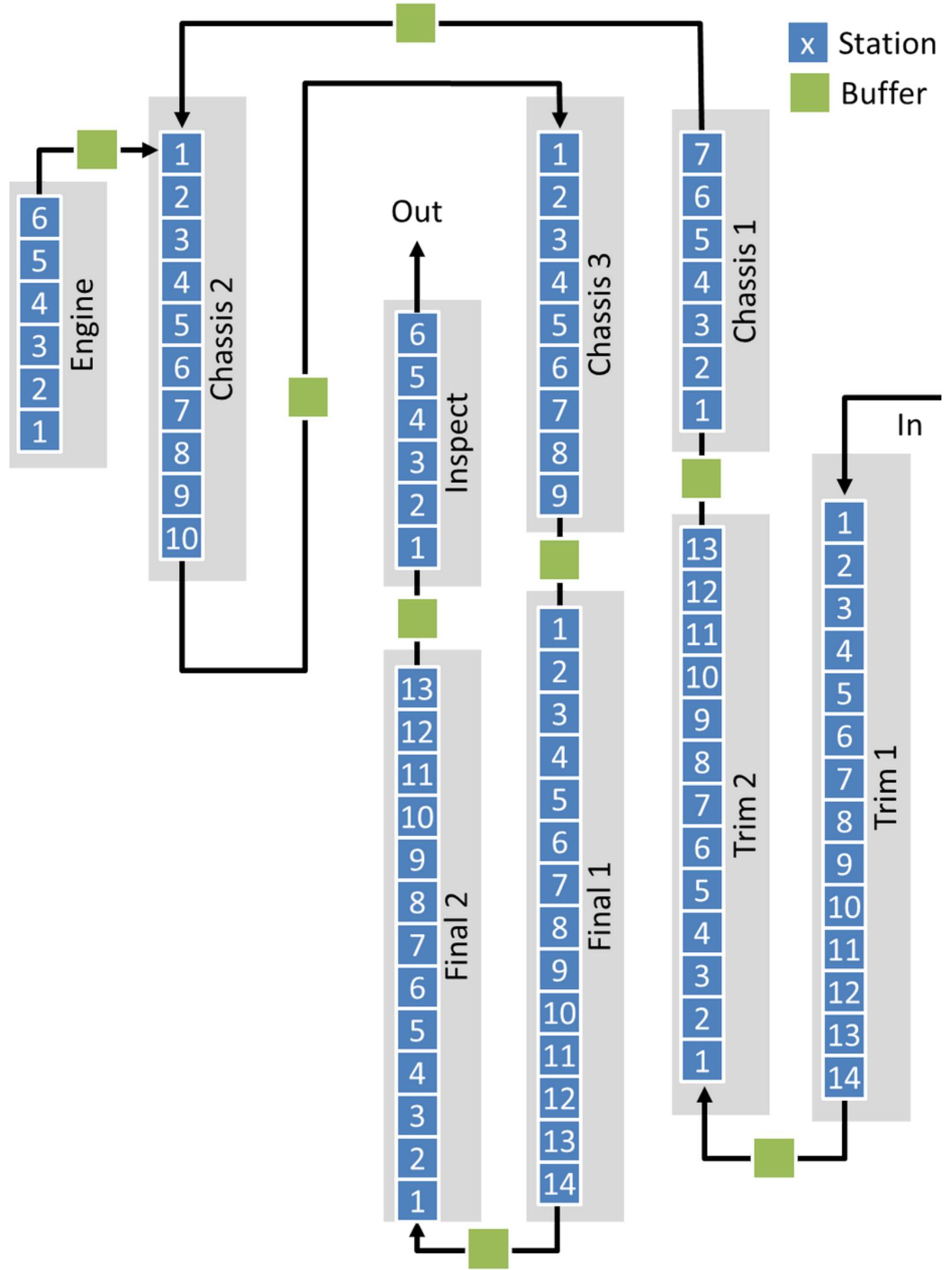
Assembly lines are manufacturing systems in which work-in-process moves from station to station in a sequential fashion. At each workstation, new parts are added or new assemblies take place, resulting in a finished product at the end.



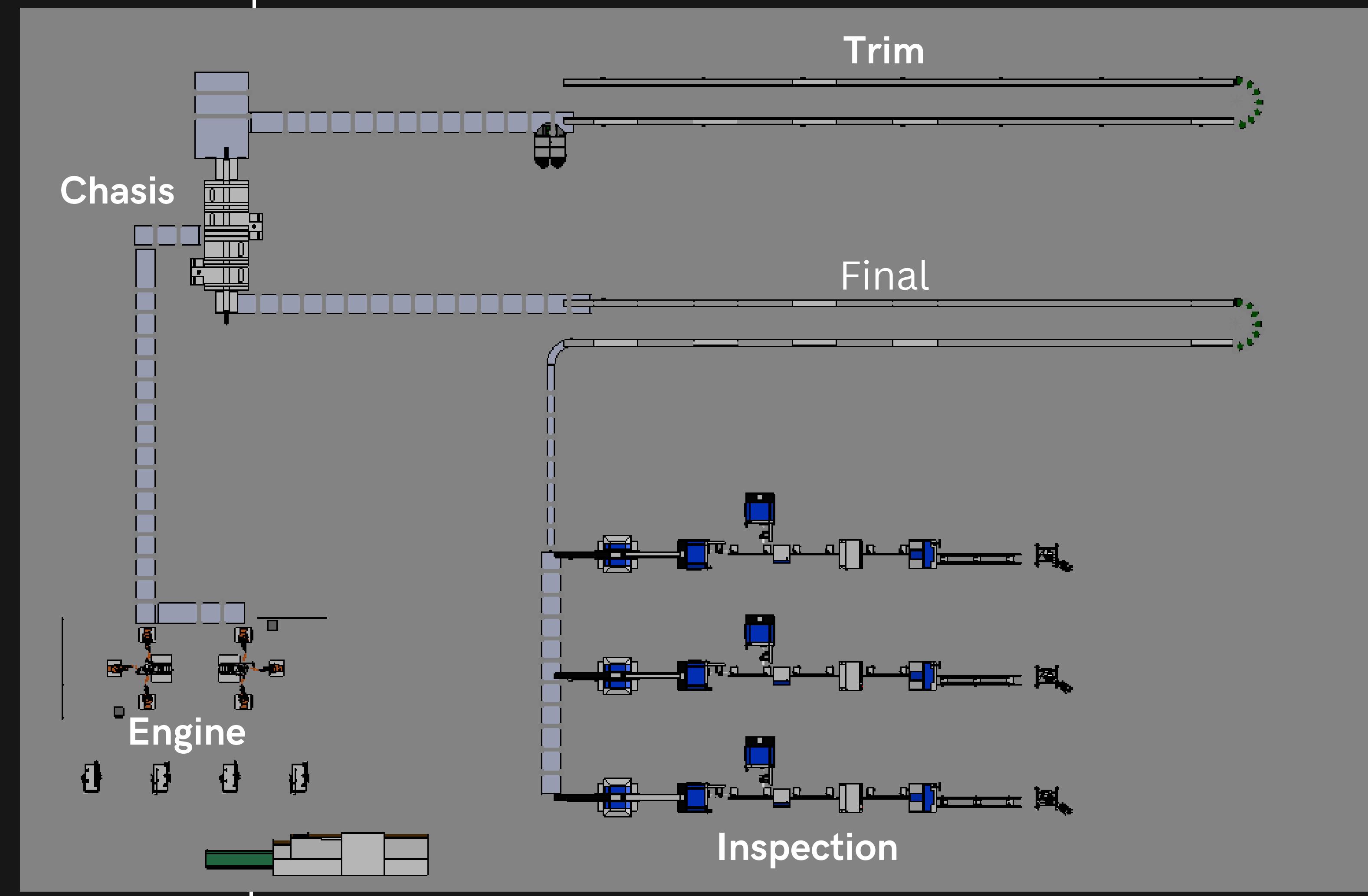
CASE STUDY

The Toyota Assembly Line: A Masterpiece of Efficiency.

Toyota's assembly line is a revolutionary production system that has transformed the manufacturing industry. It was developed in the late 1940s by Taiichi Ohno, who was inspired by the efficiency of American supermarkets.



- **Trim Assembly:** The interior and exterior components are installed on the body.
- **Chassis Assembly:** The wheels, suspension, and brakes are installed on the vehicle.
- **Final Inspection:** A final inspection is conducted before the vehicle is shipped to dealerships.



KEY POINTS

JUST IN TIME PRODUCTION

It is a core component of Toyota's assembly line. It involves delivering parts and materials to the production line just as they are needed, rather than stockpiling them in a warehouse.

This approach reduces waste and improves efficiency, as it eliminates the need for excess inventory and frees up space on the production line.

JIDOKA

It is a quality control system that allows workers to stop the production line if a defect is detected, rather than allowing defective products to continue down the line. This approach helps to ensure that only high-quality products are produced.

KAIZAN

It involves everyone in the organization, from management to front-line workers, in a continuous effort to improve productivity, reduce waste, and enhance quality. The process typically involves identifying and eliminating small inefficiencies and problems on a daily basis, with the aim of achieving a culture of continuous improvement.

QUALITY CHECK

PROBLEM

- In Toyota's assembly line, quality checking occurs after the vehicle has been assembled and is ready for shipment to the customer.
- Due to this, it can be more costly to fix them since the entire product may need to be disassembled and reworked, it can lower the morale of employees, who may feel that their efforts are wasted and defective products may have consumed valuable time and resources, which could have been used on products that would pass inspection.

SOLUTION

- Quality checks at each stage of assembly line can save time and money by reducing the need for rework and preventing costly recalls. The final product is more likely to meet customer expectations for quality and performance.
- It can help manufacturers to ensure that their products meet industry regulations and safety standards. and reduce the risk of legal or regulatory action and can protect the brand reputation.

Unbalanced Station Workload

PROBLEM

- Unbalanced station workload is a common problem in car assembly lines, where some stations or work cells have a higher workload than others. This can lead to bottlenecks, delays, and reduced efficiency in the production process

SOLUTION

- Line balancing involves distributing work evenly among stations or work cells to eliminate bottlenecks and improve overall efficiency.
- This can be done by adjusting the number of workers or machines assigned to each station or by redesigning the production process to eliminate unnecessary steps or processes.
- Load leveling involves smoothing out fluctuations in the production process to ensure a consistent workload across all stations or work cells.

BUFFER ISSUES

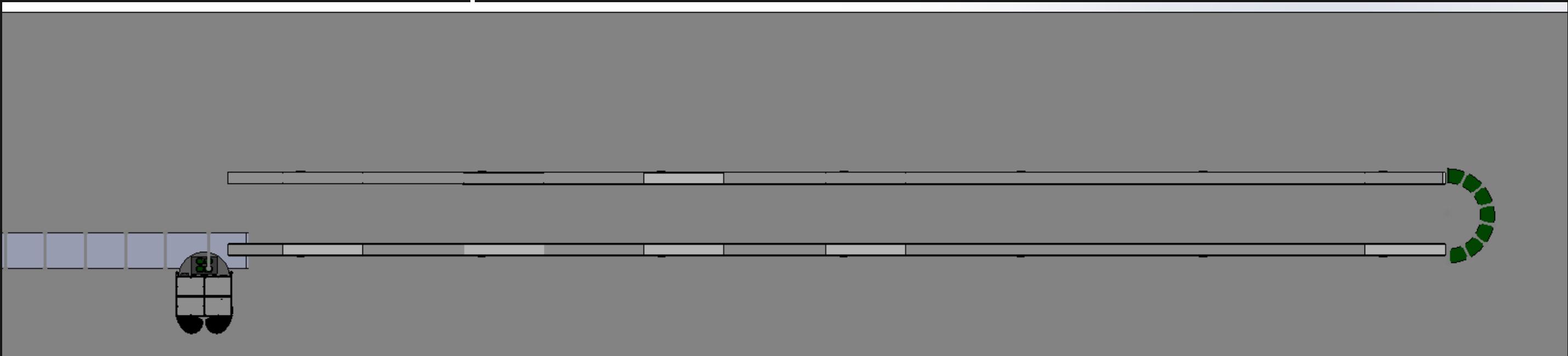
PROBLEM

- A buffer in an assembly line can create delays or bottlenecks in the production process. If the buffer becomes full, it can cause a backup in production, leading to increased lead times and potentially affecting customer satisfaction. Moreover, buffers can reduce visibility into the production process, making it difficult to identify bottlenecks or other issues that may be impacting production efficiency.

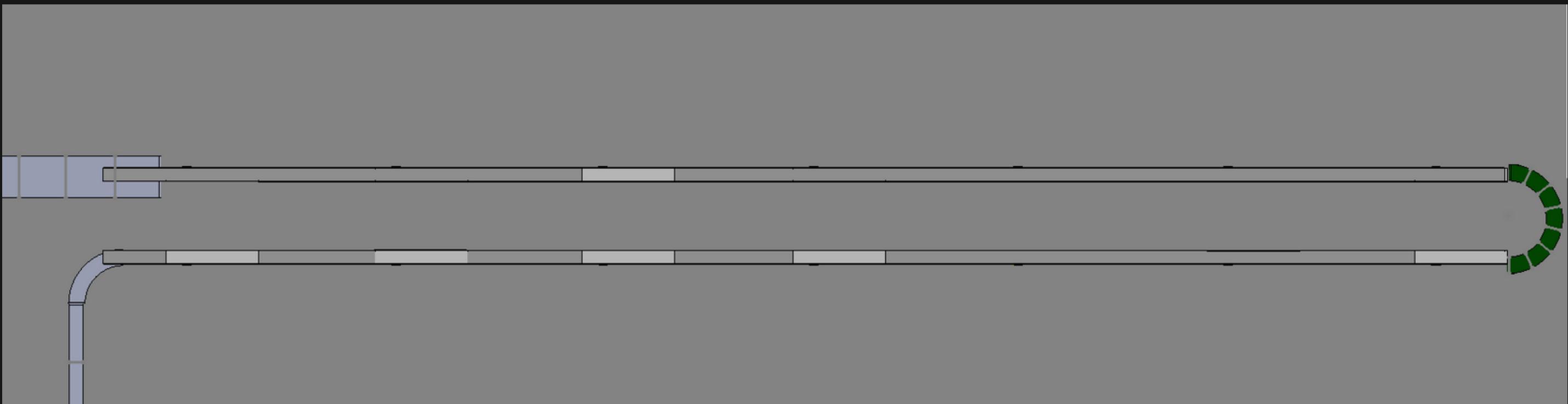
SOLUTION

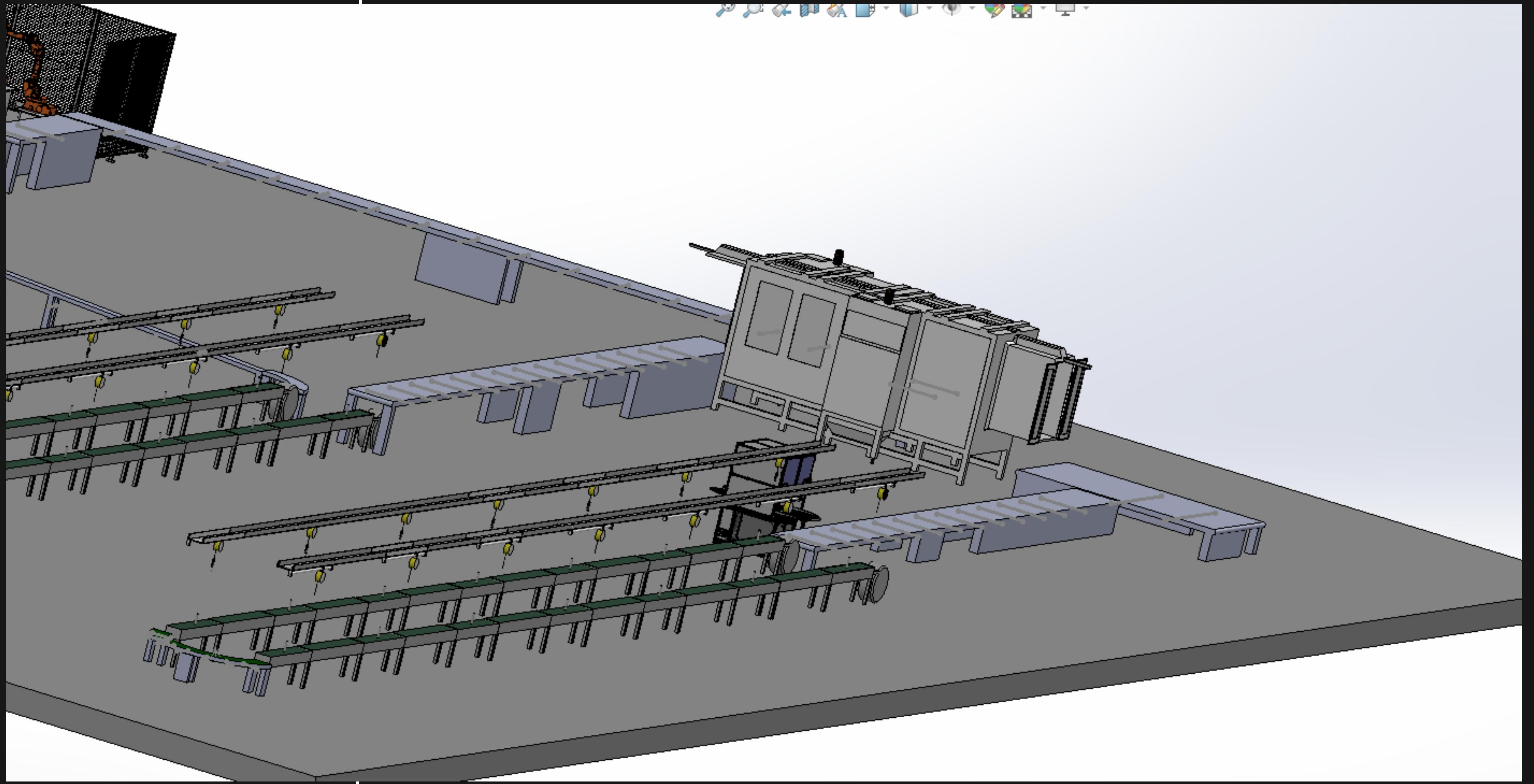
- A parallel assembly line can be used to solve the problem associated with buffer in an assembly line by reducing the amount of work-in-progress (WIP) inventory that needs to be stored in buffers.
- In a parallel assembly line, the production process is split into multiple lines that operate simultaneously, with each line specializing in a particular production stage.
- Parallel assembly lines can help reduce lead times by enabling multiple stages of the production process to be performed simultaneously.

Trim

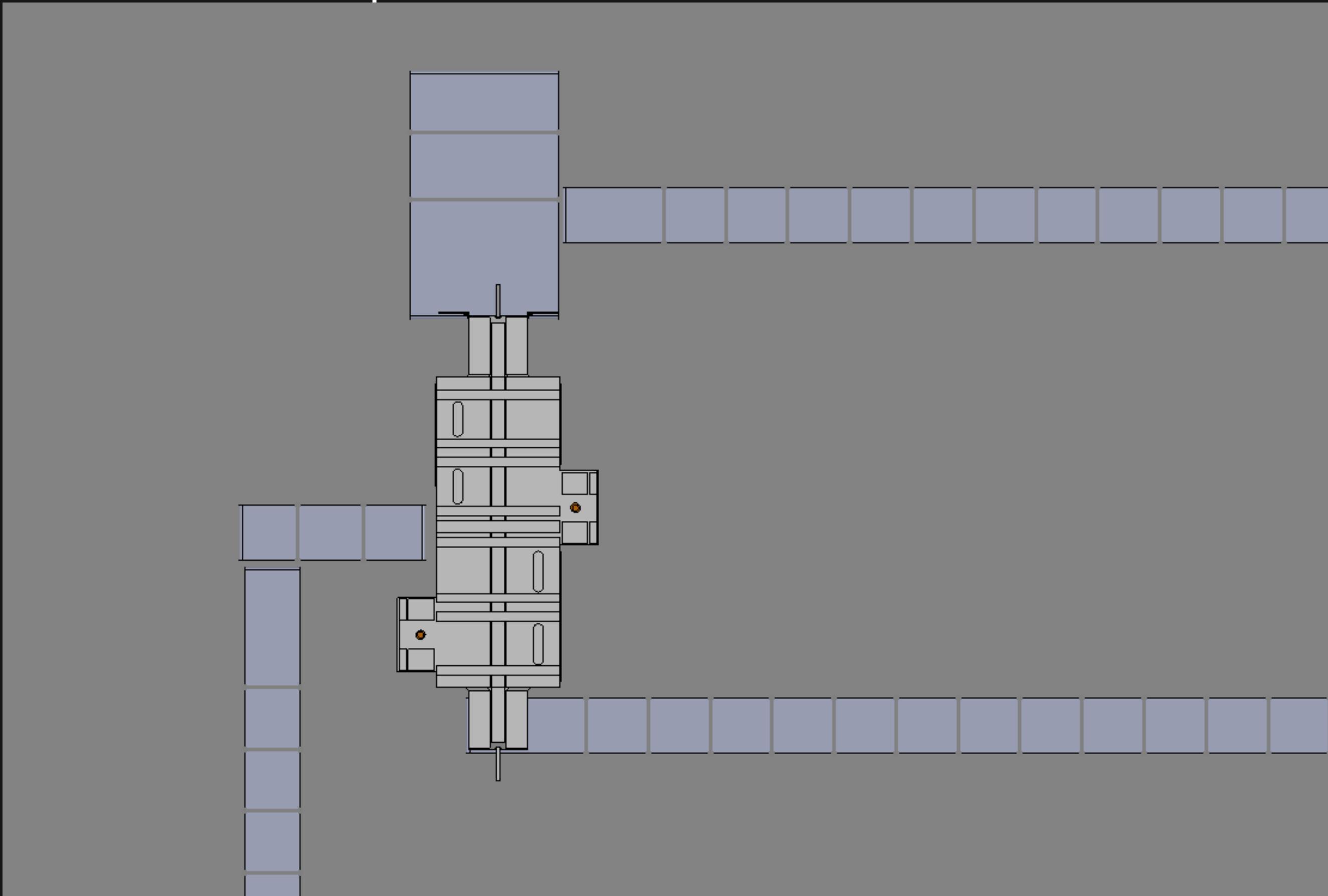


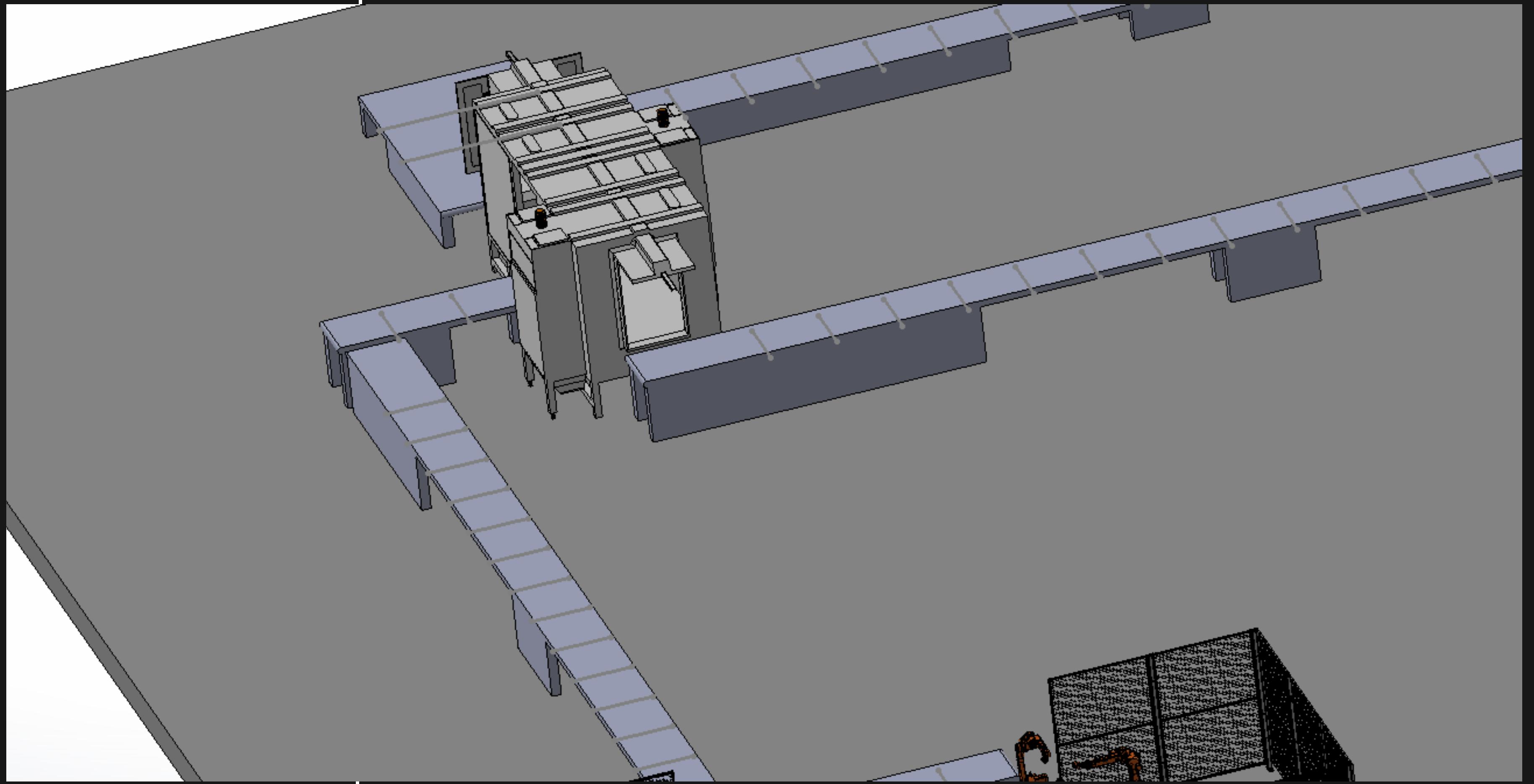
Final



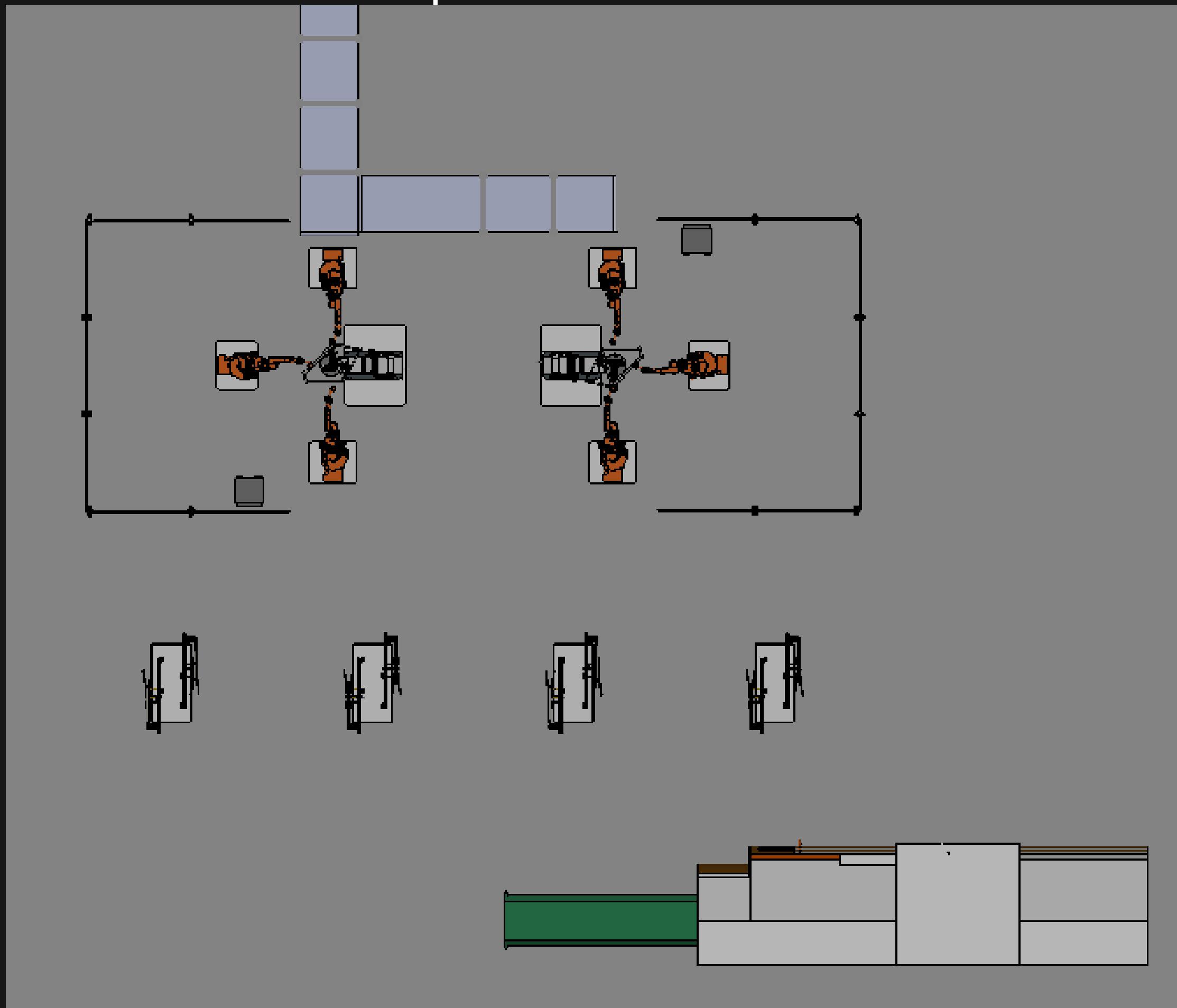


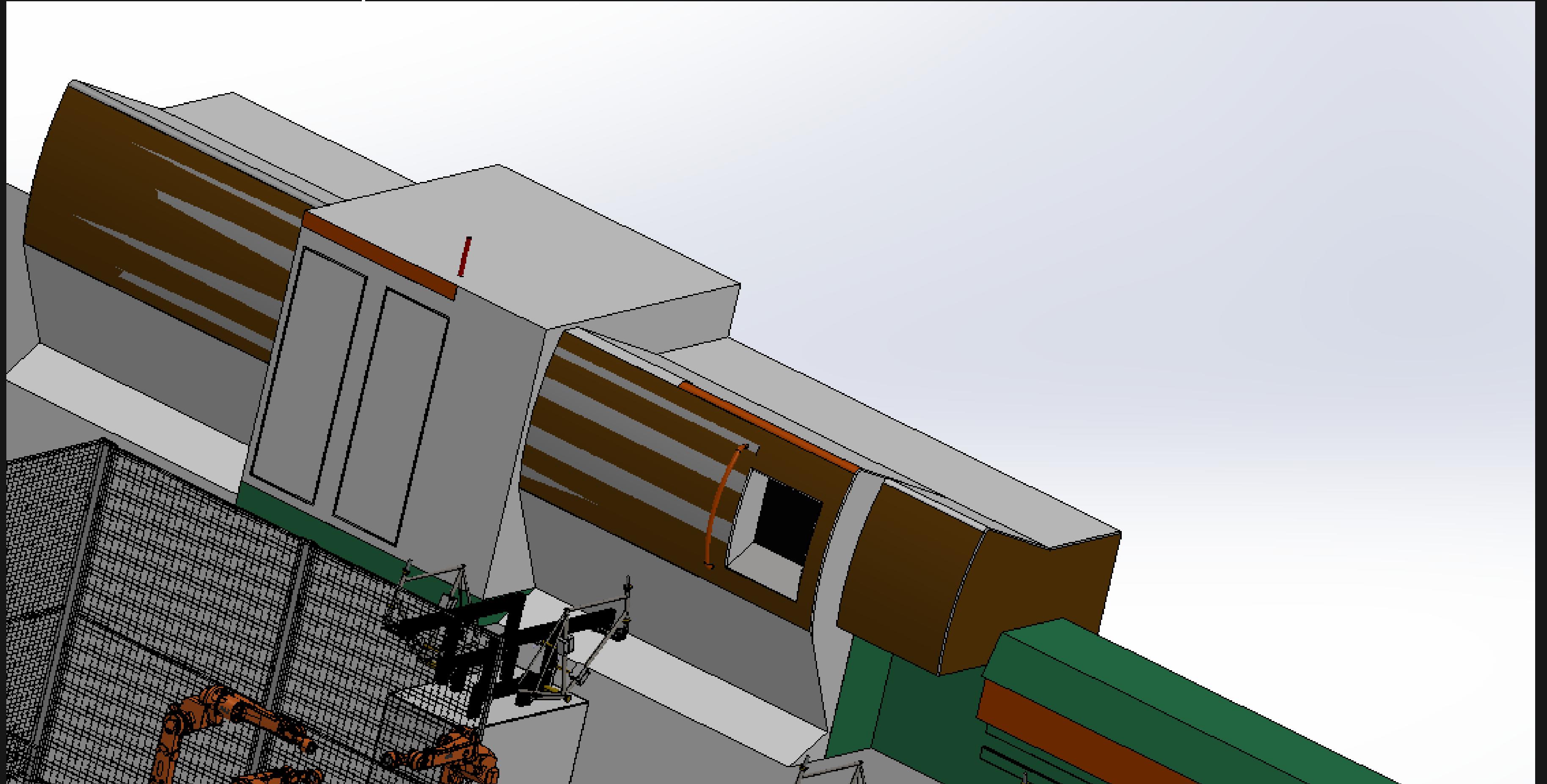
Chasis

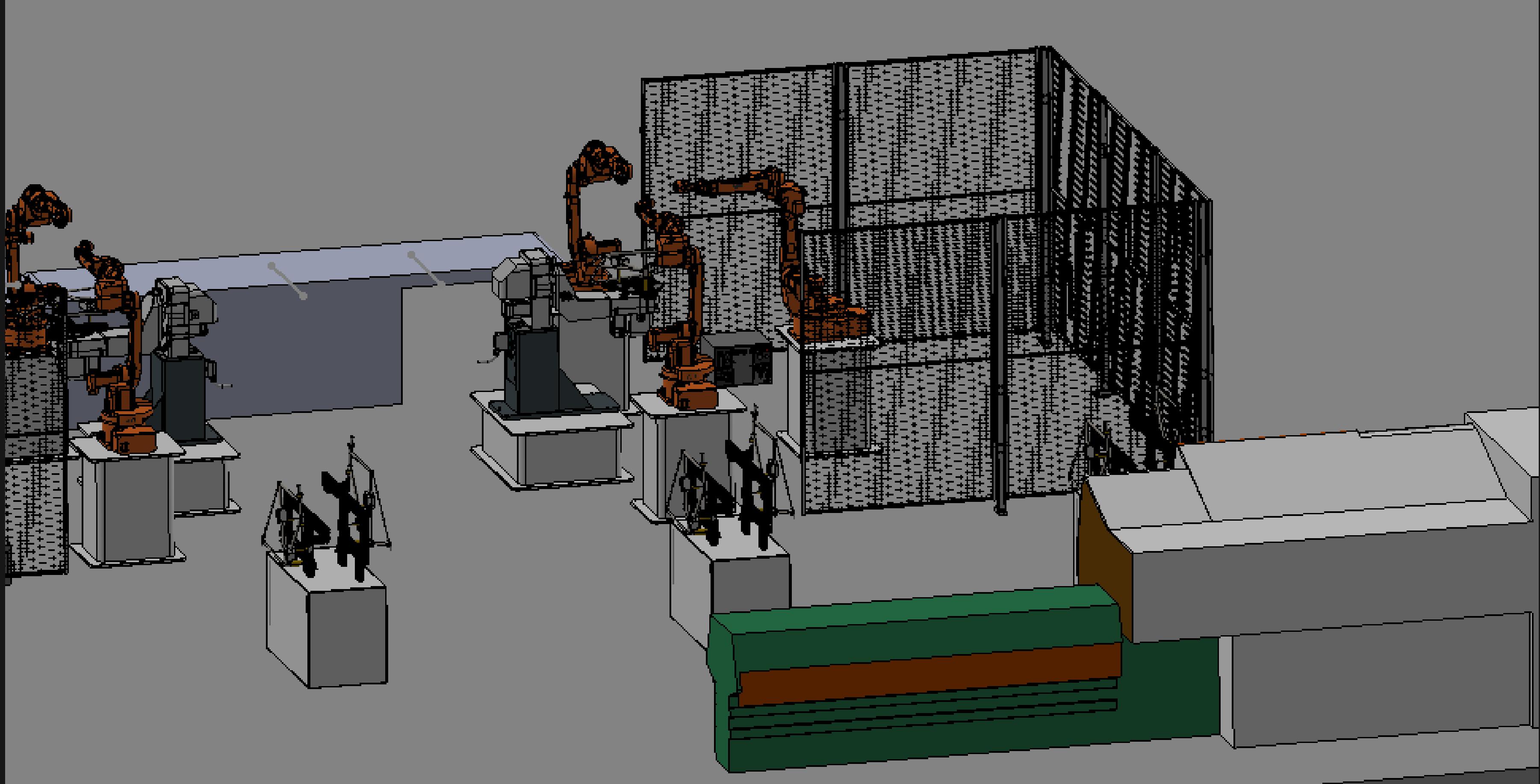




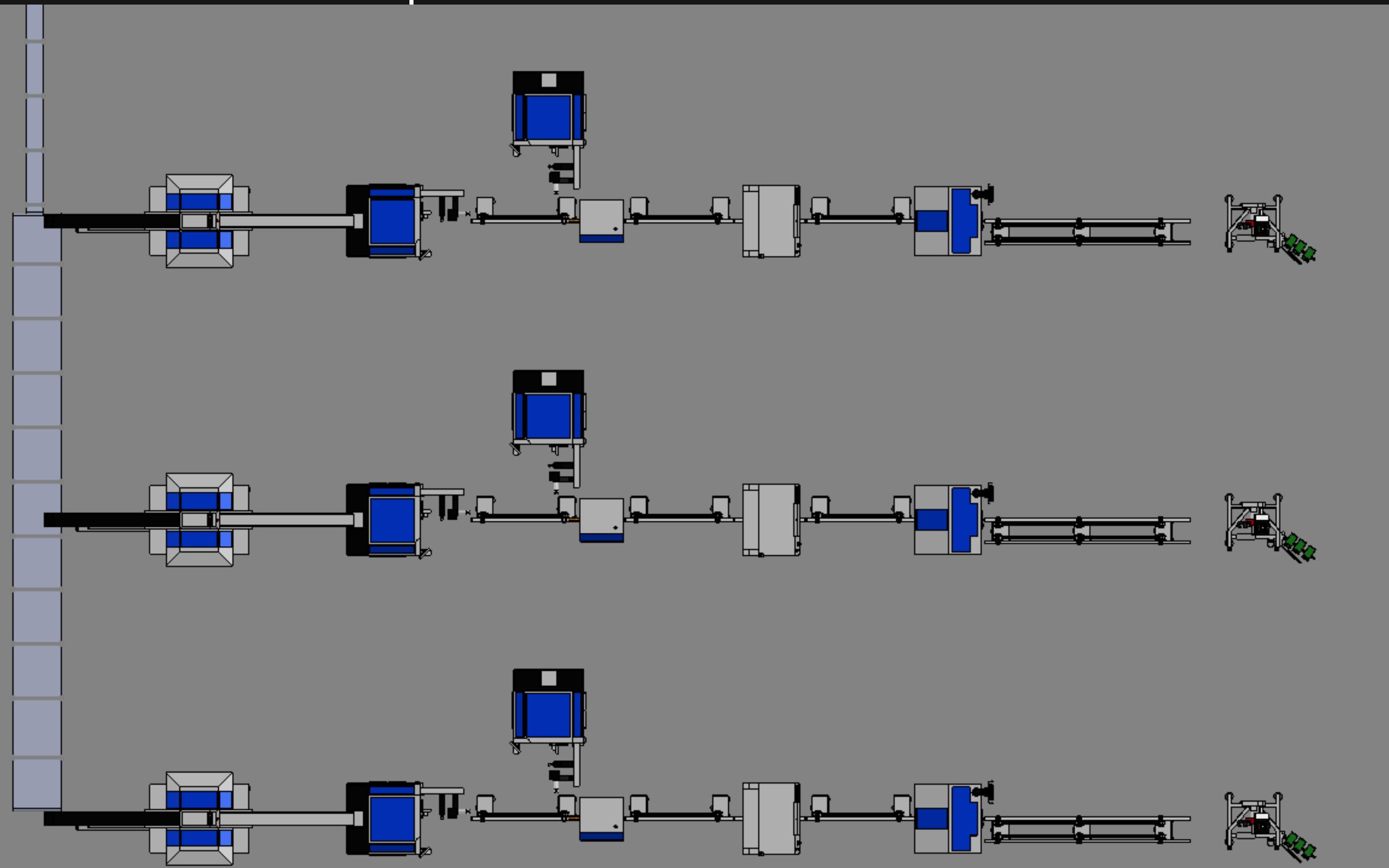
Engine

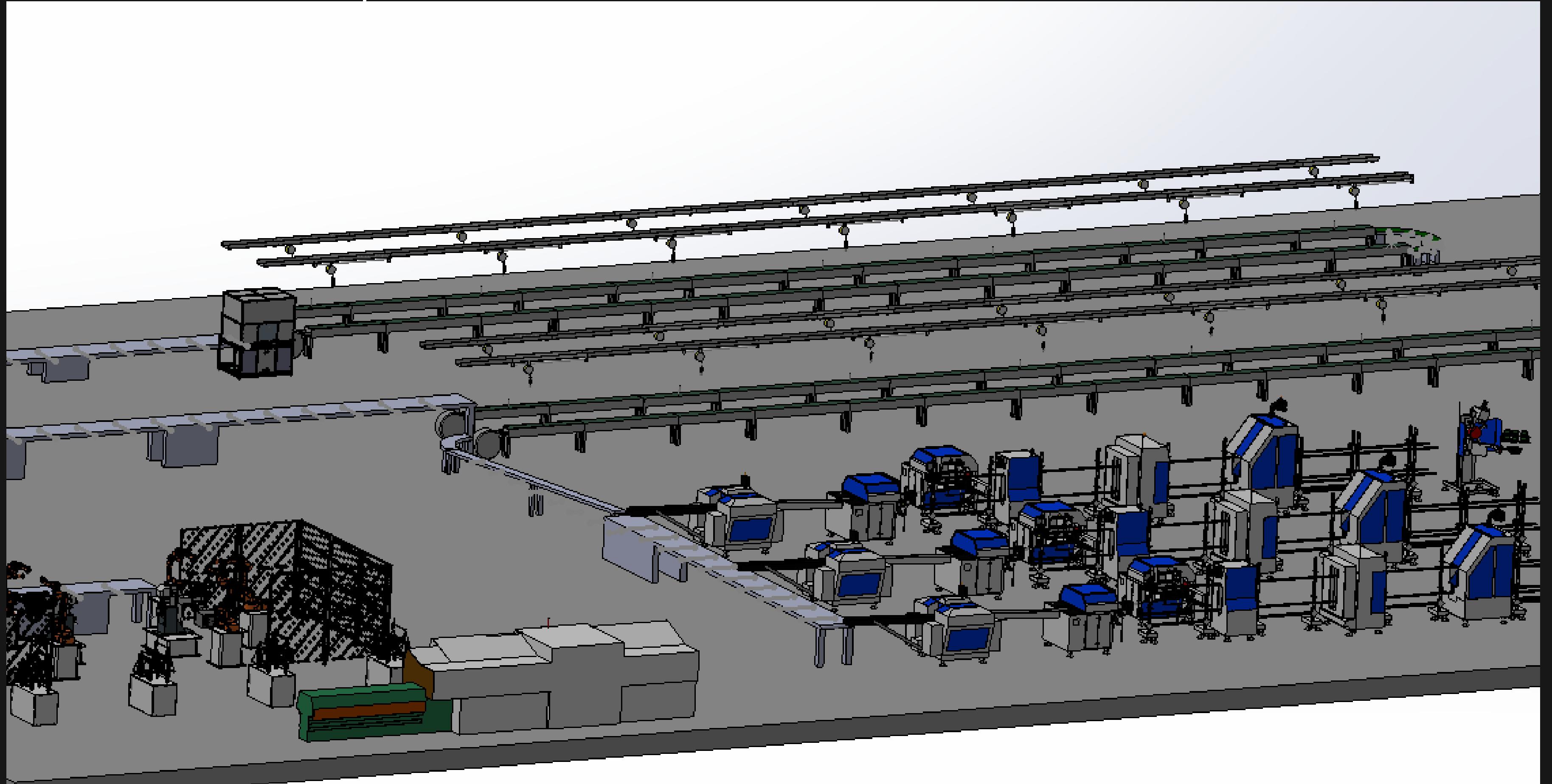


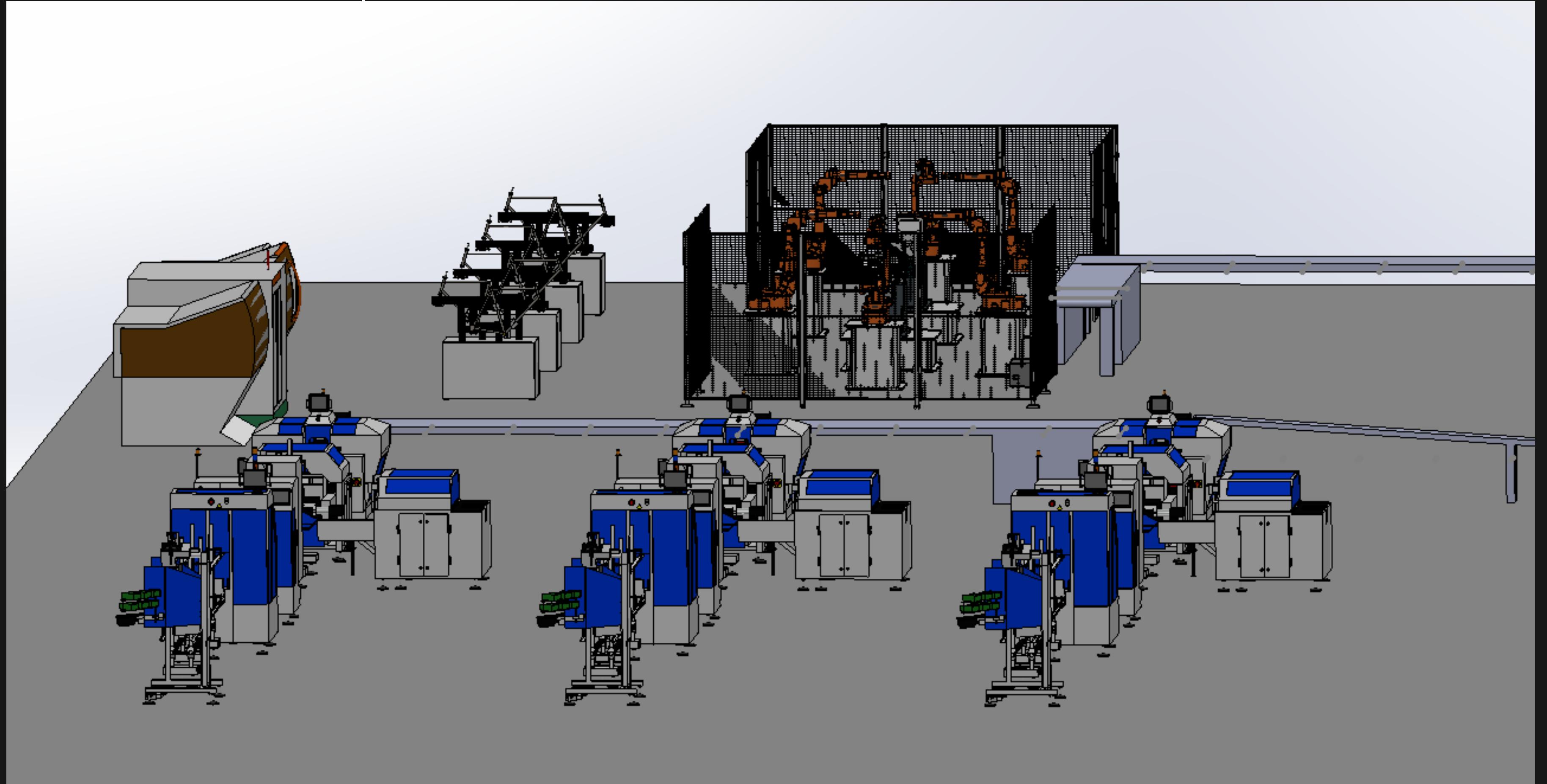




Inspect



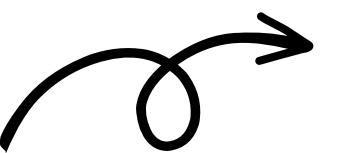




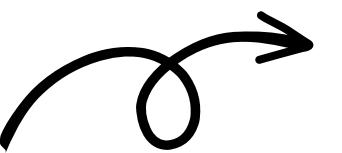
Conclusion

- The future of assembly lines is highly inventive with exciting developments in automation, customization, sustainability, and collaboration.
- However, it's important to remember that assembly lines are not just about machines and technology. Human input and collaboration will remain essential for ensuring that products are produced to the highest standards, while also promoting safety, efficiency, and its economic performance.
- Finally, it is important to adopt a culture of continuous improvement to ensure long-term success. The work in this area is still going on.

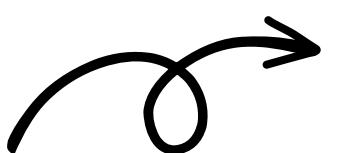
REFERENCES



[https://www.allaboutlean.com
/toyota-line-layout/](https://www.allaboutlean.com/toyota-line-layout/)



[https://www.researchgate.net
/figure/An-assembly-line](https://www.researchgate.net/figure/An-assembly-line)



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Thank You

WSD LABORATORY PROJECT
GROUP 2

