PROJECT REQUIREMENTS

Customer Requirements:

1. Design within the cell
2. Easily Implemented
3. Minimize cost
4. Fast and efficient
5. Shipping capability
6. Can function with multiple part sizes
7. Durability and reliability
8. Modular to transfer different parts with minimal equipment changes

Engineering Requirements:

1. Achieve a 20 second cycle time
2. Tooling interface at transfer devices
3. Number of parts in the system
4. Reprogrammable time (+/- 5min)
5. Parts and material cost (<300,000 +/- 50,000)
6. Cycles (1,000,000 +/-1,000)
7. Weight of parts in packaged pallet
8. Components fit into the designed cell (5 x 6 m)

OPERATING PROCEDURE

1. Pallet enters the cell and travels to the depalletizing station
2. The R2000 robots decant the pallet by layer and drops it on the linear motor system presenting station
3. The part travels through the linear motor system and gets sorted by part number, design, color etc.
4. The part is presented to be removed from the next cell that will install the part.

Oregon State University

JUST-IN-TIME PARTS DELIVERY

Ryan Bertelsen , Stephen Erickson, Gavin Padgett, Rylee Valentine, Anthony West

An automated decanting process that depalletizes parts and delivers a single part to an assembly cell.
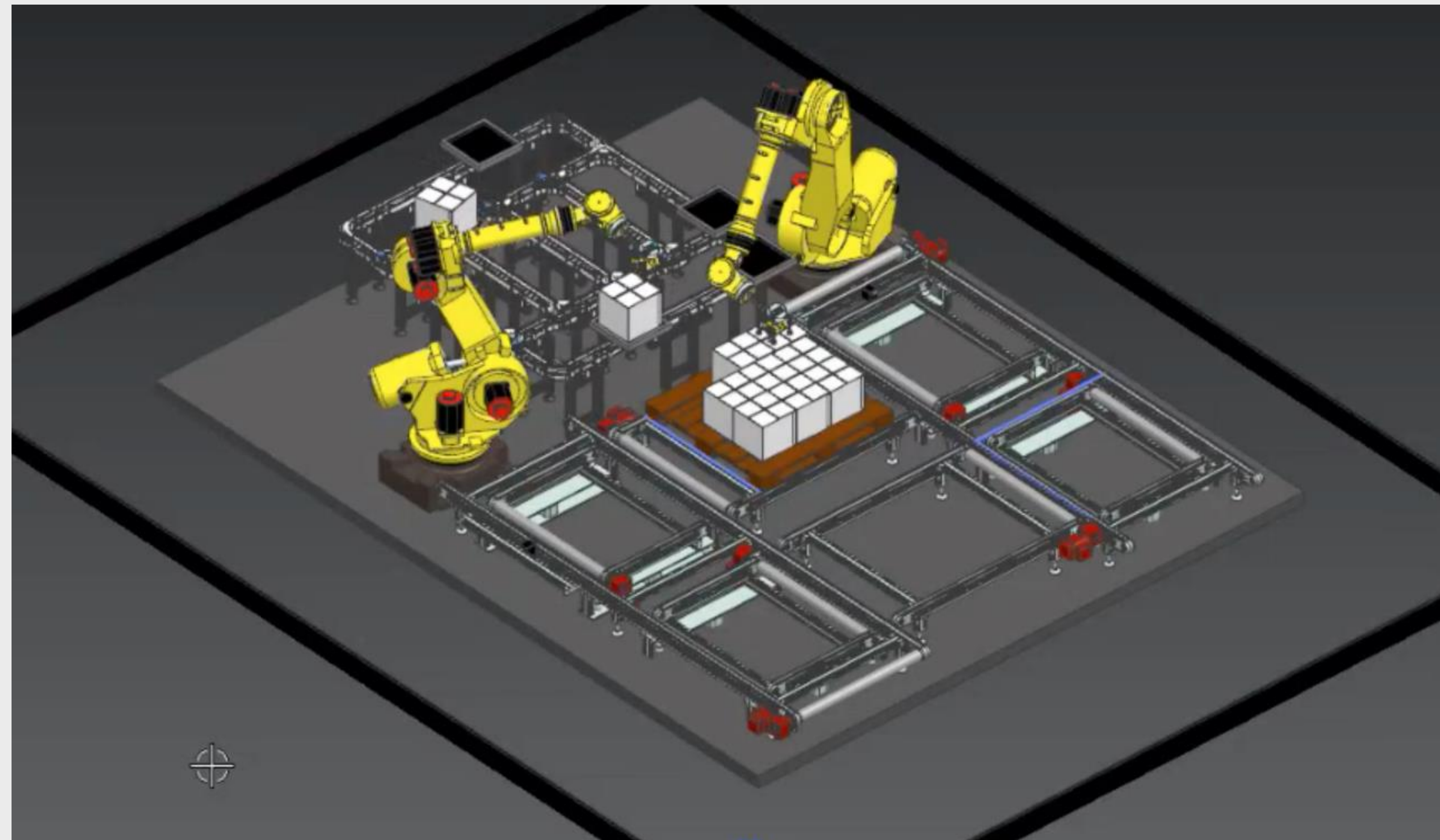

Figure 1: NX computer generated concept of automation cell design with all components.

WHAT MAKES THIS SOLUTION DIFFERENT?

Current Solutions:

- Humans using tuggers
- Humans with gravity conveyers
- Autonomous Guided Vehicle (AGV)
- Various depalletizing systems

What makes this solution better?

- Automated
- Lights out Manufacturing
- Efficient || 20 second cycle time

COMPONENTS

- R2000 robots
- Custom EOAT
- Pallet conveyers
- Linear motor system
- Vision system
- Position sensors
- Light curtain

SIMULATIONS

- Performed in Siemen NX Mechatronics Concept Designer
- Different Quantities Per Container (QPCs)
- Different part sizes
- Calculate cycle times
- Estimate Inventory Volume-Flow from sub-cycle times
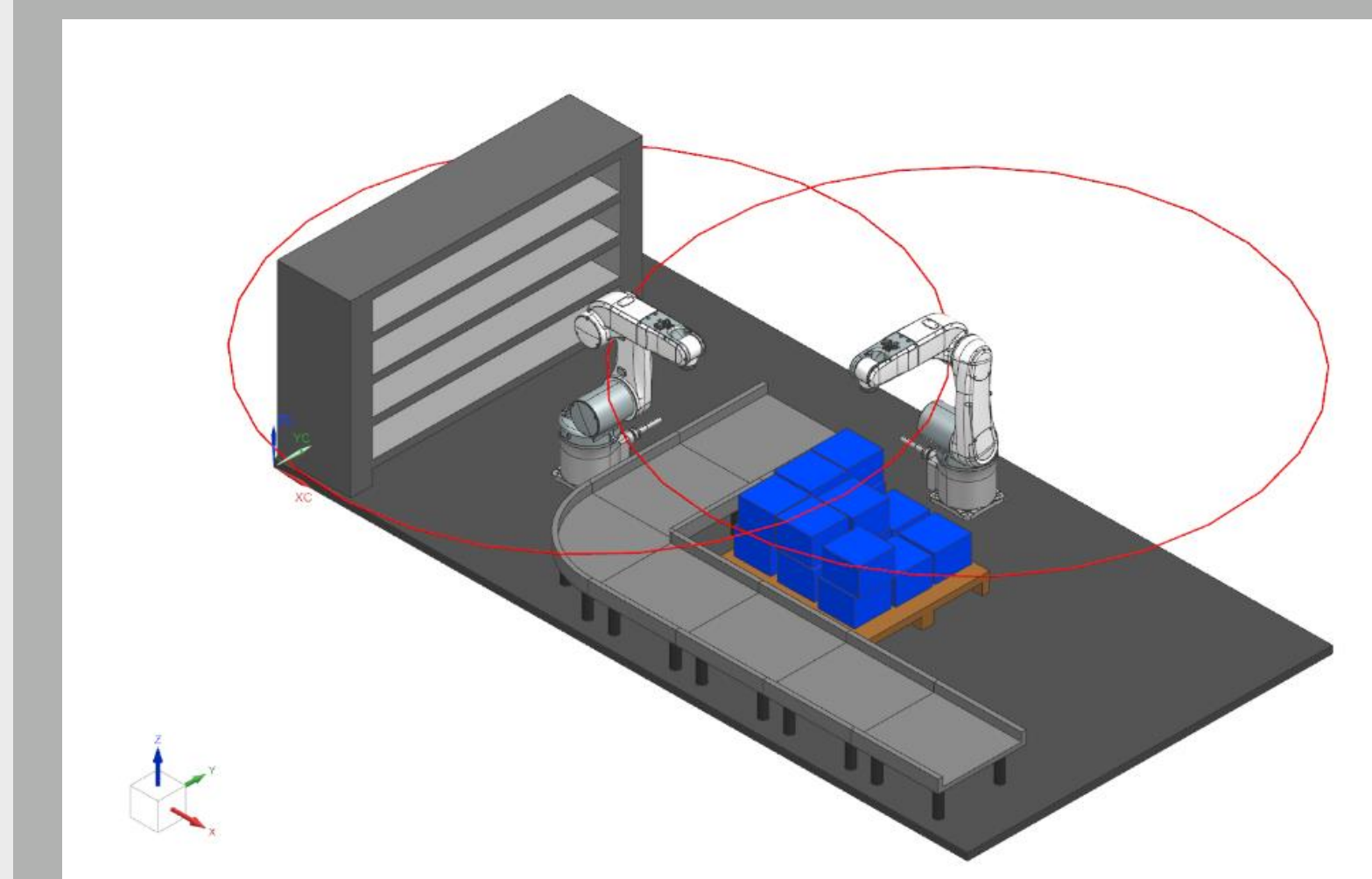
DESIGN ITERATIONS

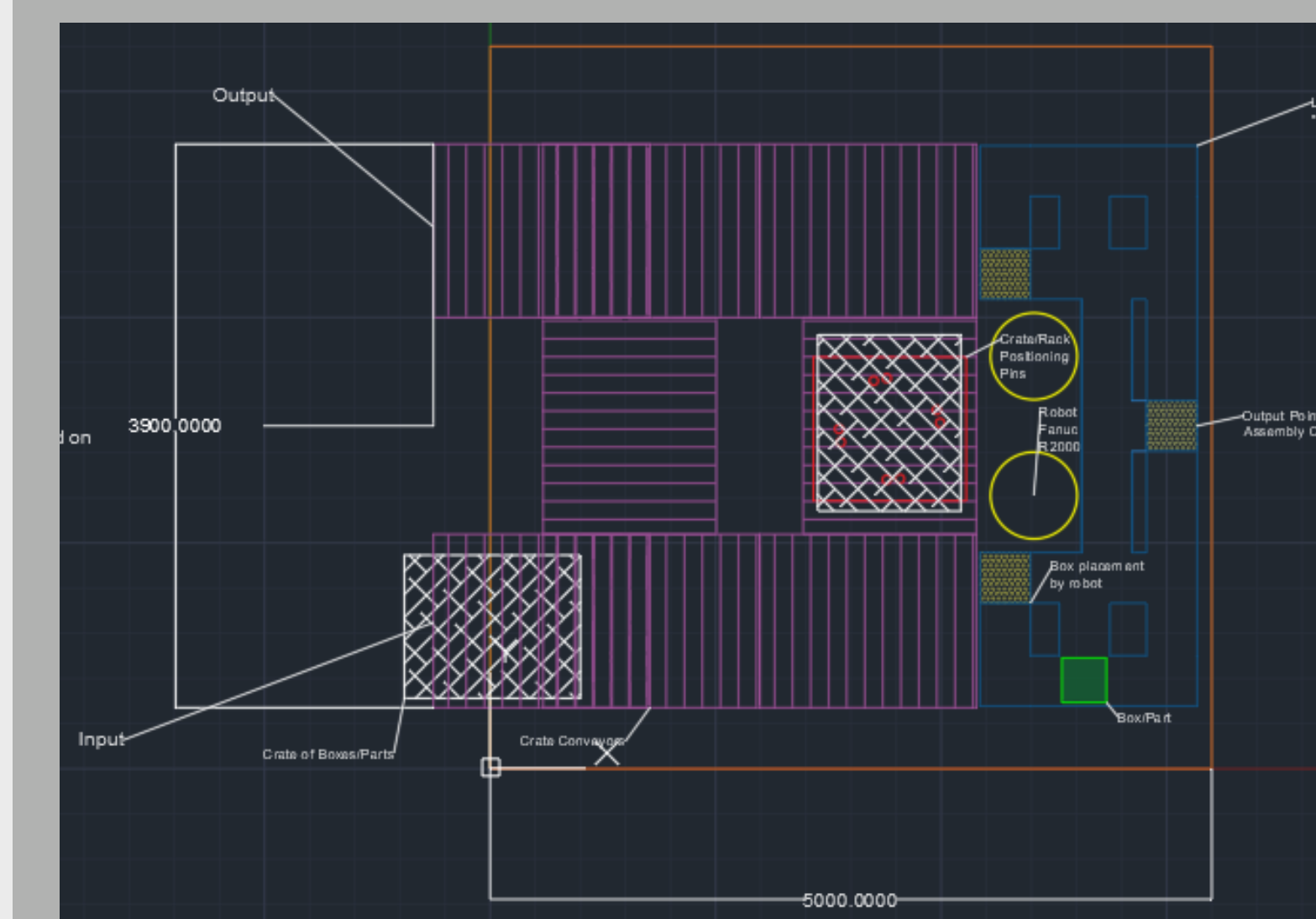Figure 2: Initial design that includes a shelving station

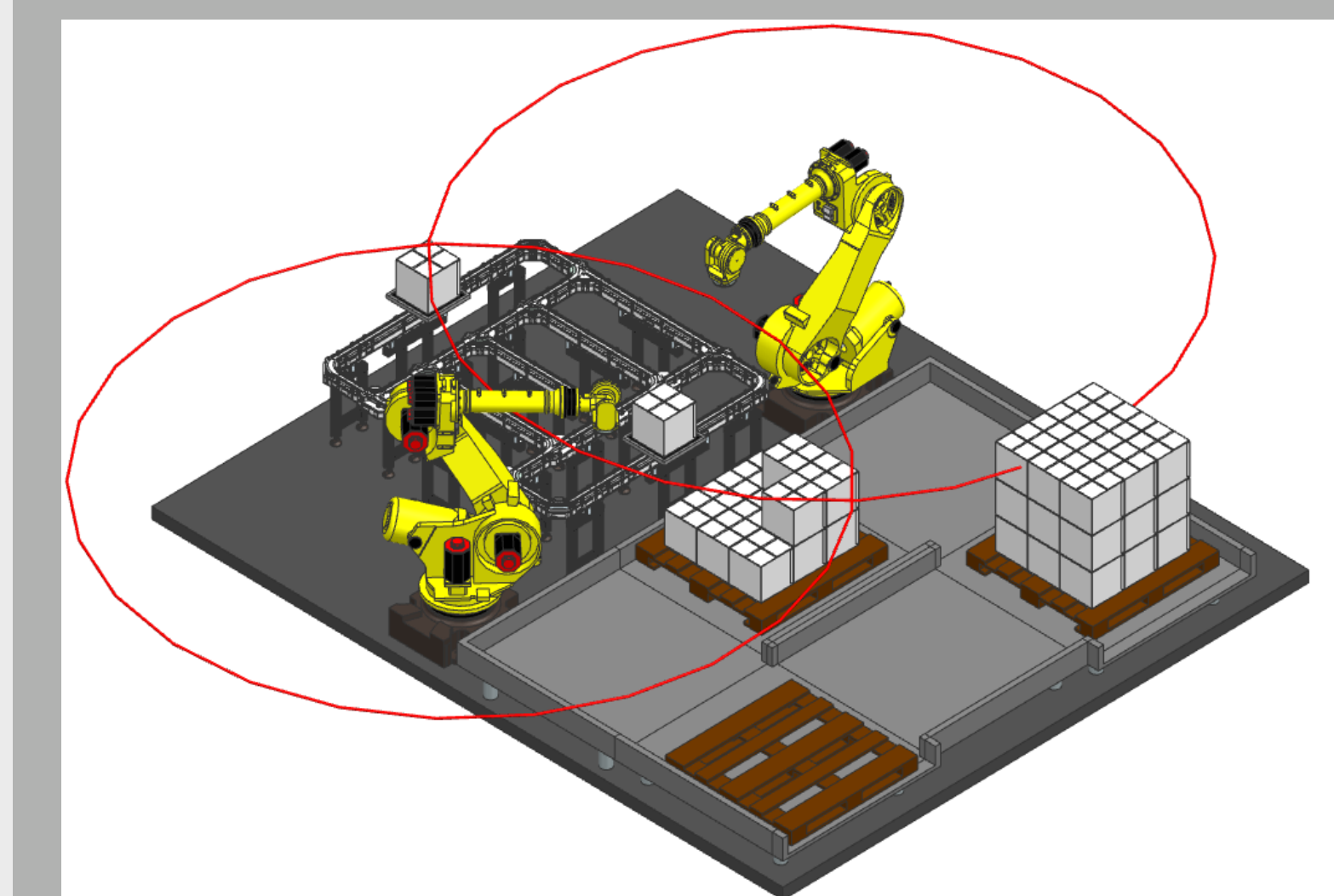Figure 3: 2D mock-up of new concept idea with circular conveyor and linear motor system.

Figure 4: Final Design idea built in Siemens NX.

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