CELULĂ ROBOTIZATĂ PENTRU PALETIZAT BIDOANE DE APĂ DE 20 LITRI
ROBOTIC CELL FOR PALLETIZING 20 LITER BOTTLES OF WATER

MINCĂ Laurenţiu

Faculty: FIIR, Robotics Year of study: 1 Master, e-mail: laurentiu_minca14@yahoo.com

Scientific leader:
prof. dr. ing. Tiberiu DOBRESCU

1. Introduction

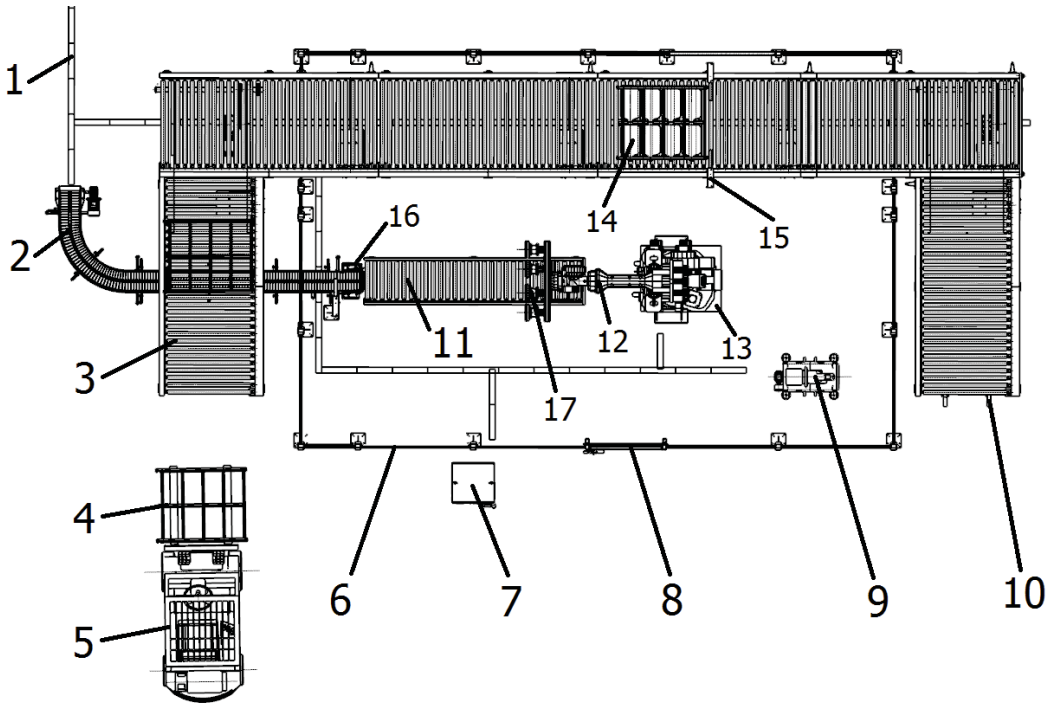

Fig. 1. Top view

Way of operation:

The human operator in the forklift (5) places an empty rack (4) on the roller conveyor (3).

The water bottles (14) enter the robotic cell using the belt conveyor (2) and are directed to the direction diverter (16). The bottles are grouped in two rows on the roller conveyor (11).

The Kawasaki MX500N industrial robot (12) which is on an elevation support (13) approaches the conveyor (11) and takes over with the help of the effector (17) and will take 8 bottles (14) which it will deposit in the rack.

The compressor (9) ensures the required compressed air flow in the cell.

Once all 32 bottles are placed in the rack, the two stops (15) will retract and the rack will move towards the end of the conveyor. The end of the stroke (10) will stop the loaded rack until the human operator lowers the rack on the conveyor with the forklift (5).

The robotic cell is provided with a protective fence (6) to ensure the protection of those working near it. The gate (8) provides access inside the cell. The Kawasaki controller model E04 (7) ensures the control of the process and is provided with an emergency button.

2. The current stage

Fig. 2. Front view

The virtual prototype of the cell was made in NX 12:

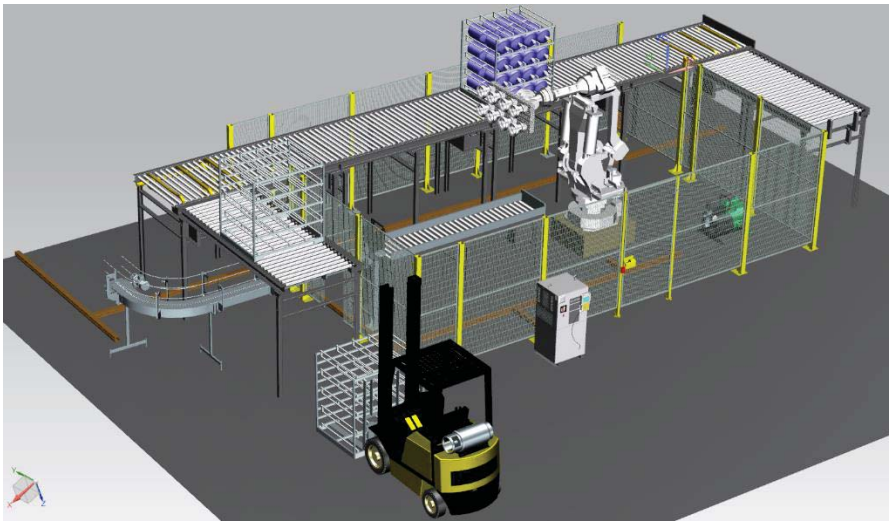

Fig. 3. Virtual prototype

Presentation of the effector.

Effector components:

- 6 profiles at the size of 80x80x1100;

- flange mounting plate model ZX200S;

- 8 spacers to the size 80x80x80;

- 8 suction cups with high rigidity (Ø = 160mm);

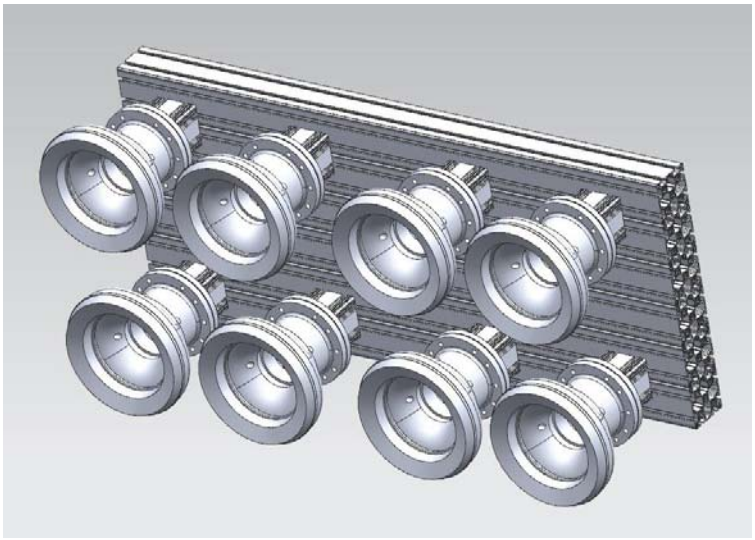

Fig. 4. Effector view

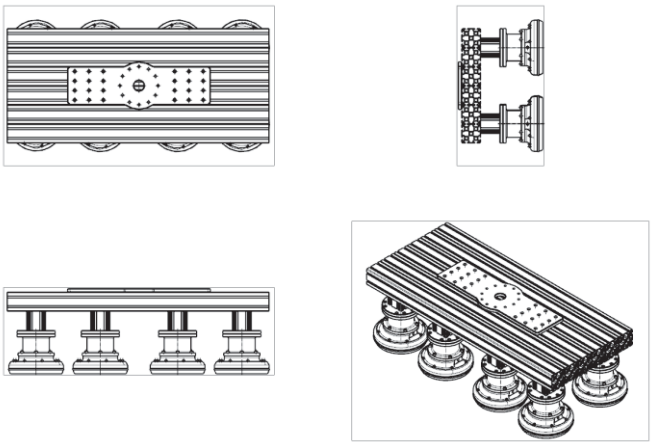

Fig. 5. Effector orthogonal views

3. Assisted simulation of the overall operation of the application / technical system designed in a CAD work environment (SIEMENS NX 12)

After downloading the 3D model of the robot, I opened it with SIEMENS NX 12 to export it in the format with the extension .JT required for PROCESS SIMULATE 13. For this robot model, we made only rotation torques with the help of the SIEMENS PROCESS SIMULATE working environment 13.

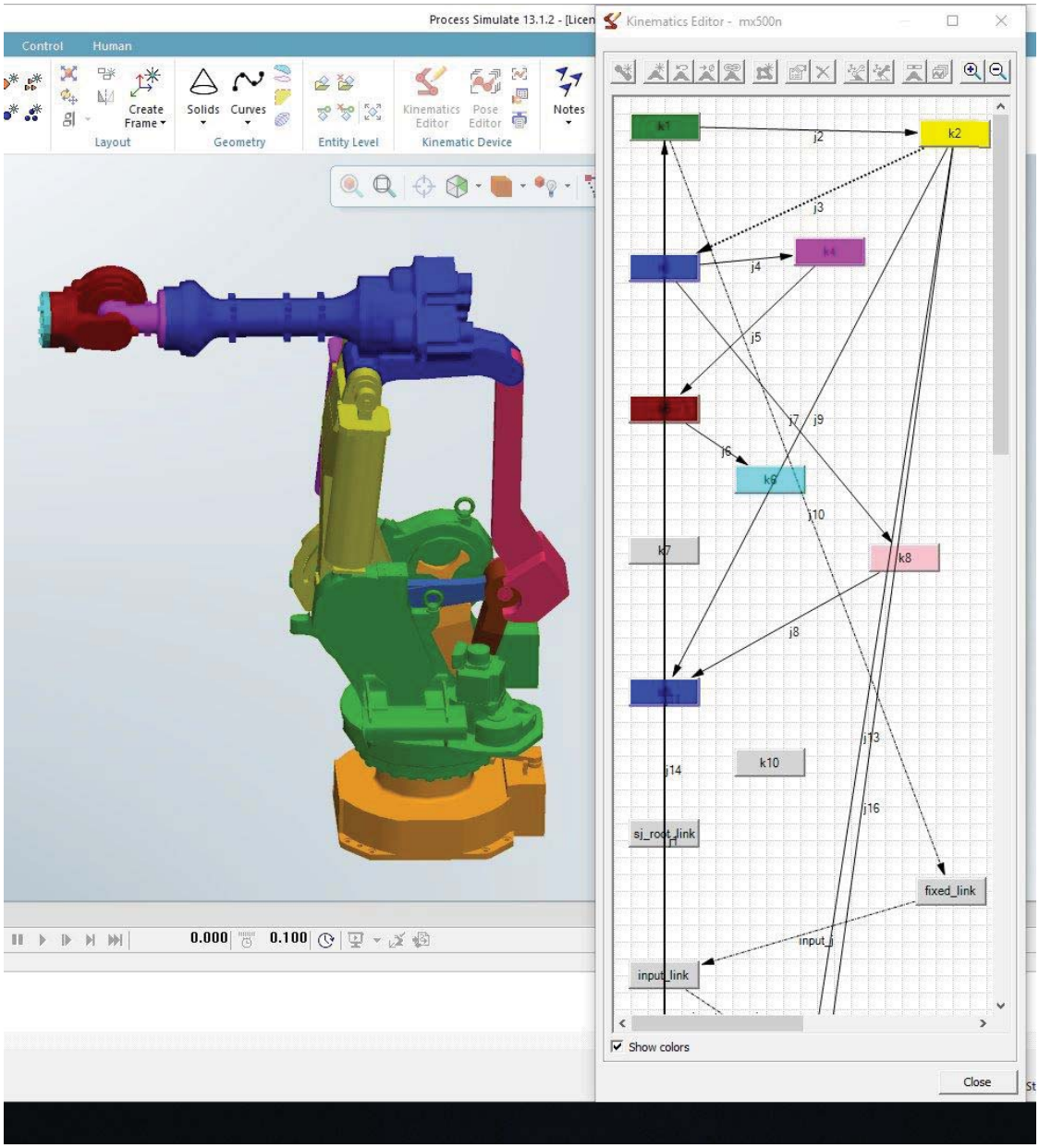

Fig. 6. Defining rotation torques

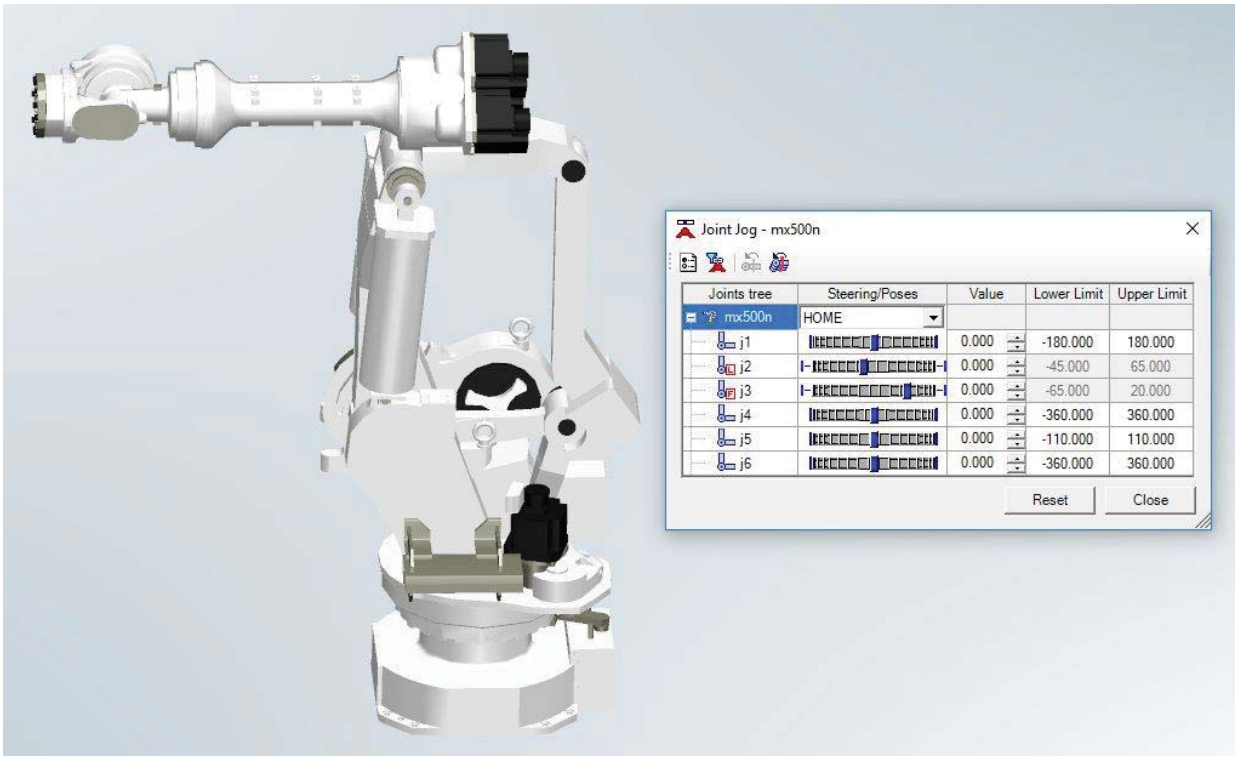

Fig 7. The possibilities of movement of the robot on each axis

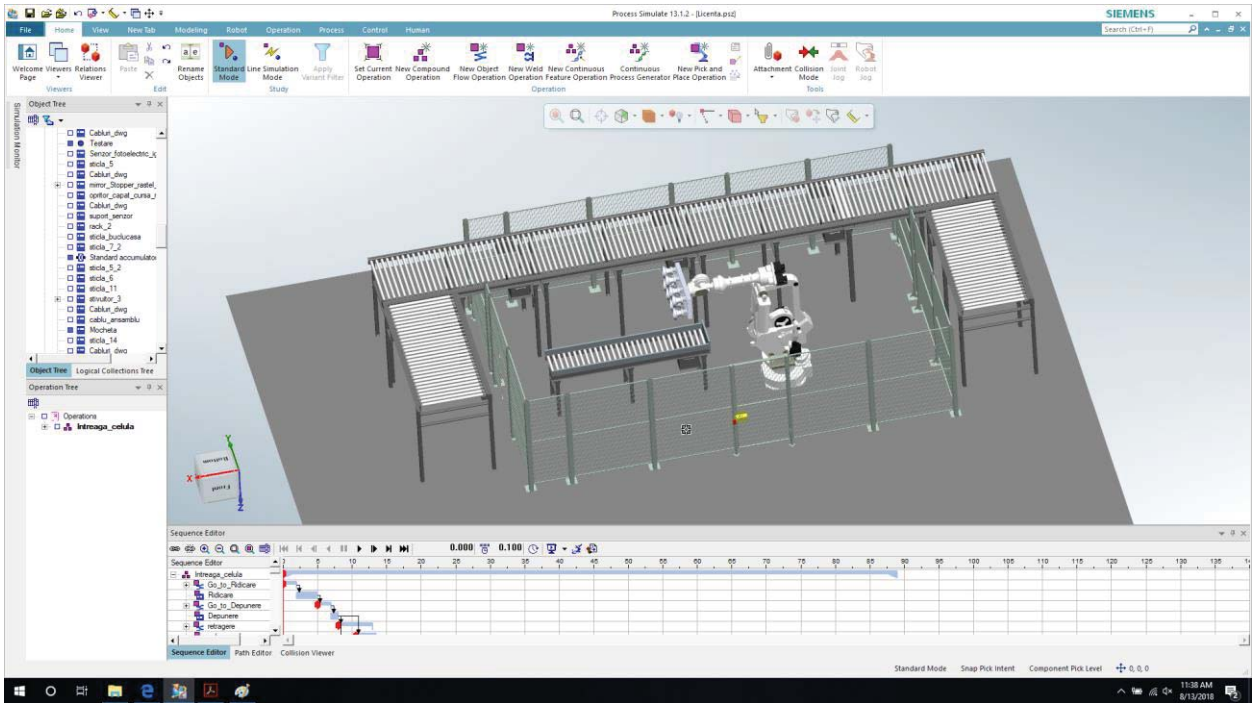

Fig 8. Defining the operations required to simulate the cell in Process Simulate 13

4. Flowchart of the chosen application

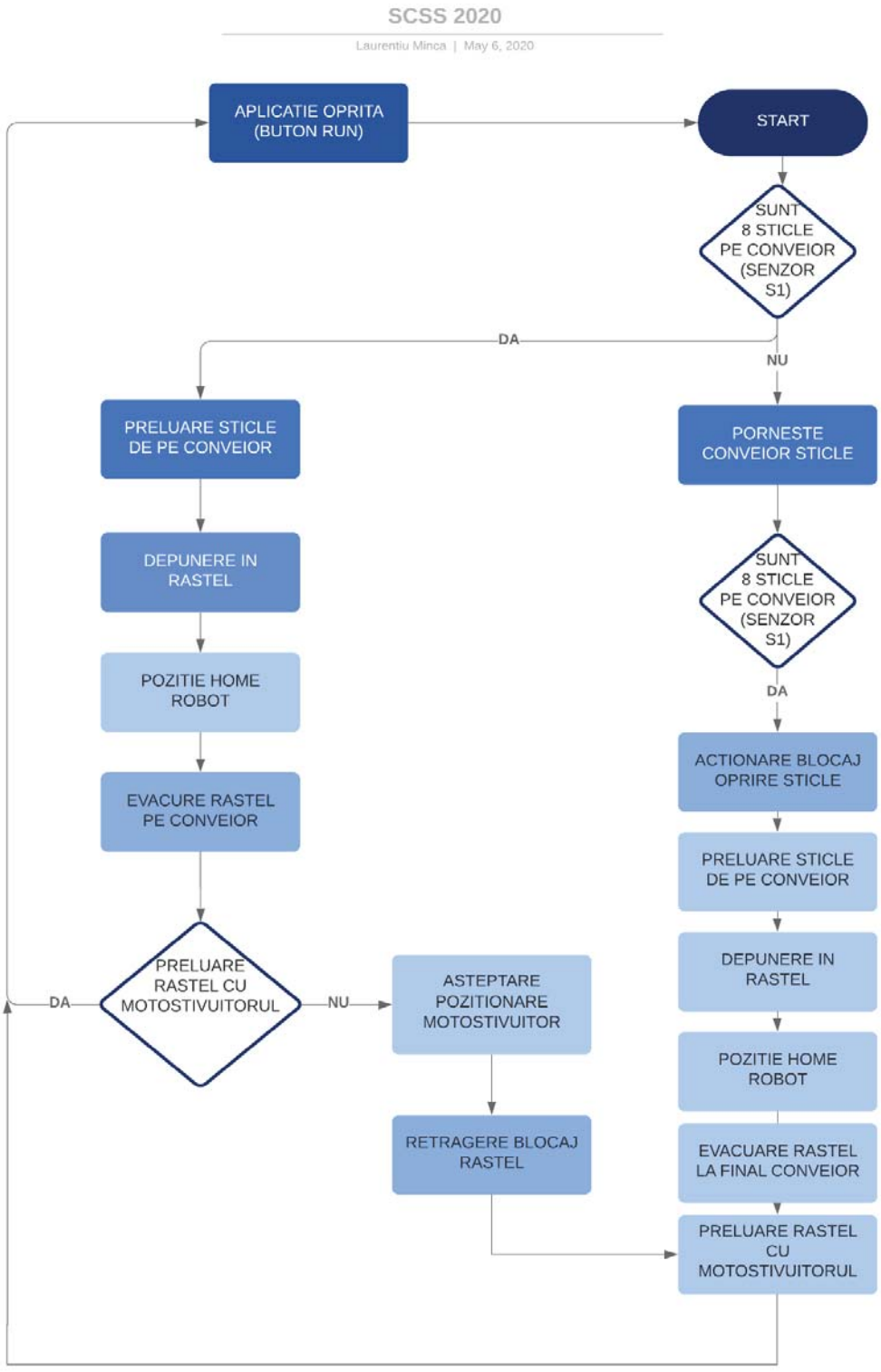

Fig. 9: Flowchart organization chart

5. Location of industrial sensors in the robotic application

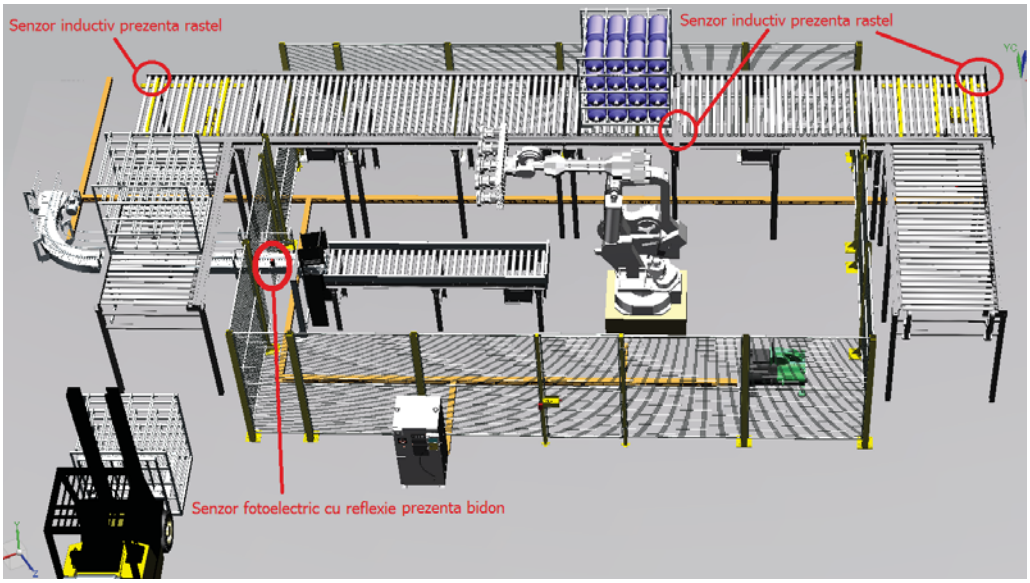

Fig 10: Location of industrial sensors

6. Personal contributions:

• Integrated cell design and modeling, activity automation solutions, using NX 12 viral environments.
• Off-line programming and simulation and robotic integration, using SIEMENS PROCESS SIMULATE off-line simulation programming environments 13.
• Earthquake behavior analysis in the water storage rack, using the CAE environment, ANSYS Workbench 19.
• The graphic part was made using the 2D AUTOCAD 2019 working environment.
• Kinematic calculations, are calculated in the robot carcasses and cinematographic and organic works are designed for a rotational torque and can be joined to the robot.

7. Bibliography

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