The Challenge

As the demand for our customer’s valves continues to soar, due in part to increased global industrialization, they needed a way to increase production. Already very familiar with automation and robotics, they turned to RND Automation and Engineering® of Sarasota, FL to help design and build their latest automated assembly machine. With over 15 years experience in the engineering, design, retrofit and manufacture of custom automation & material handling machinery, RND was a perfect fit for our customers’ needs.

The Plan

RND worked closely with the customer to determine the sequence of operation of the machine. The machine testing and uptime criteria were considered in the selection of components, selecting only those motors, actuators, and robots that had best-in-class reputations. Using Autodesk Inventor®, a 3D modeling CAD package, RND was able to illustrate to the client how the machine would operate at each design review. Using Inventor, the paths and envelopes of the robots could be animated showing the operation of each station before any materials were purchased.

The Solution

After approval of each station, RND worked closely with a stable of machine shops, fabricators and other vendors to procure manufactured and purchased parts. Assembly was done at RND’s 5000 square foot facility. Simultaneously, RND’s electrical control’s group was designing the electrical enclosure as well as programming the PLC, robots and machine touchscreens.
A 4-axis SCARA robot unloads an unprocessed body from a pallet and inserts into the Bosch conveyor puck system.

The body is dosed internally with light oil.

A SCARA robot loads one of three inserts into the body. One particular insert needs to be aligned with a square recess in the body.

Two backup rings and two o-rings are loaded onto the outside of the body.

One of four possible springs is inserted into the body.

A servo-driven load cell determines the spring rate of the spring checking if the correct spring has been inserted.

A six-axis robot picks a sleeve from a feeder bowl, inserts a locking ring onto the sleeve and inserts it into the body.

A backup ring and o-ring are inserted onto the sleeve.

If required a SCARA robot loads a hex nut into a servo fixture then holds the body over the nut. The servo spins the nut onto the body torquing it to the specified value.

The first SCARA robot unloads the completed body and places it into a 360° vision inspection station to check for the location and presence of all of the backup and o-rings.

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The Results

After an extensive debug period, the customer began to run production at RND’s facility to put the machine through a rigorous testing phase. Only after the machine had proven to be reliable was it disassembled and moved to the customer’s facility. Its modular design attributed to the astonishing fact that the period of down time, from the day of disassembly to the day it was producing parts on their factory floor was only 4 days.
Machine Specs

FROM CONCEPT TO PRODUCTION IN APPROXIMATELY 1 YEAR

- 16 stations fed by pallet conveyor
- 4 Epson® robots (3 SCARA, 1 six axis)
- 8 vibratory feeder bowls
- 6 o-ring feeders
- 2 vision inspection cameras
- 2 Human-Machine Interfaces (HMIs)