Radar Array Window Insertion System

Background

Advent Design's client was using a semi-automated system developed in the early 80's to insert approximately 4,000 1" x 3" ceramic windows into a 12' x 12' aluminum base plate. The plate forms a protective front for a 12' x 12' array of phasers which are the heart of a computer controlled radar system. The assembly system required 8 people to run, and the quality of the finished product was poor. Advent Design proposed replacing the existing automation with a new robotic based system that could perform the window insertion process autonomously. The system also automated the insertion of nearly 2,000 metallic

buttons which were currently being installed manually.

Radar at Sea

System Description

Advent developed a "cart" which ran on the existing bridge assembly in the client's facility. This cart housed a Staubli 6-axis robot, 2 Cognex vision systems, an adhesive dispensing subsystem, and component feeders for 2 round "buttons" and the square "windows".

The process Advent developed worked as follows.

1. Cart moves to a rough position and locks into place.
2. The robot scans the array surface, and finds the first empty button or window pocket.
3. The robot picks the correct part, and checks for defects with the stationary camera.
4. The robot presents the part to the glue applicator, and moves the part around to apply a perimeter bead.
5. The robot presents the part again to the stationary camera for a glue bead quality check.
6. The robot moves to the rough pocket position, and uses the end effector camera to define the exact position of the pocket.
7. The robot places the part into the pocket.
8. The robot uses the end effector camera to check the part placement for rough errors.

Robot in Cart

Robot End-Effector

Impact

This system completes the array window placement process in about the same amount of time as the old method. However, it can run unmanned, and the quality of the adhesive dispensing has dramatically reduced the amount of time needed to prepare the array face

for the final coating

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