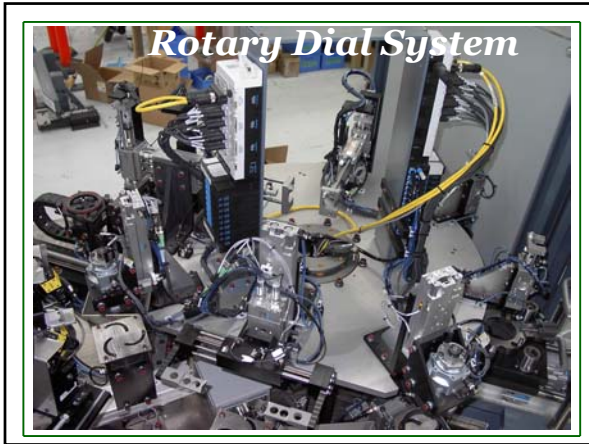


Rotary Dial System



Rotary Dial Solution

Benefits of this type of system:

- A rotary dial is effective when multiple stations (4 to 10) are required to assemble and/or test parts
- This system will typically take up less floor space than other systems. Access to the stations may be limited
- Systems can operate automatically with little operator attention



Equipment Specification

Customer Requirements for the system

- Automatically test and assemble a set of four parts every 30 seconds
- 1/2 the number of operators are required to run the line (as a support to fill the feeders and correct faults).
- Run 24 different part types with a change over time of 10 minutes



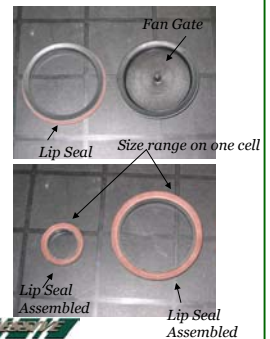
Part types/production rates

- Station part to part cycle time of 7.0 seconds
- Operating efficiency of 90%



Part Assembly Process

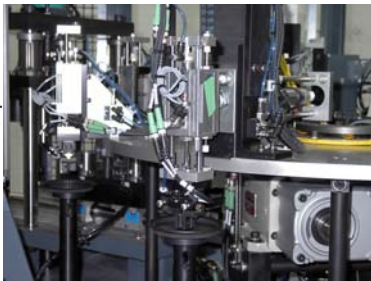
- Accept 4 parts from an Engel unload robot
- Cool the parts for 1 cycle
- De-gate the fan gate
- Vision inspect the black lip seal
- Place the red load ring onto the lip seal
- Vision inspect the load ring
- Stack 2 parts for the robot to re-pick and load to a rack



Station # 1

Receive parts from unload robot

- X/Y nest for pick up
- Pneumatic pick and place unit for part transfer
- Next 2 stations are used for part cooling



Station # 2

De-gate inside fan gate

- An Air/Oil cylinder is used to power the de-gate dies
- Quick change plates are used for quick part type change over



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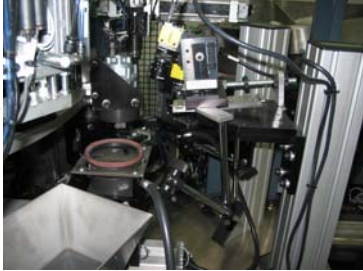
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Rotary Dial System

Station # 3

Vision inspect lip seal

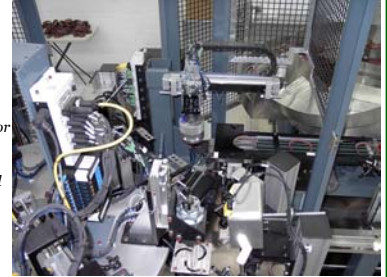
- A camera is used to inspect the lip seal for defects
- The part is rotated as the camera inspects the surface of the seal
- The vision system detects waves, pits, chips, knit lines, flash, and short shots



Station # 4

Assemble load ring to lip seal

- Vibratory bowl feeder for part feeding
- Pneumatic pick and place unit for pick center and press onto lip seal



Station # 5

Unload finished good parts

- Only good parts are stacked onto the pick nest
- The unload robot will pick the finished parts and place onto the rack
- Reject parts are ejected prior to this station



Controls System

- Allen Bradley SLC 5/05 PLC
- Pro1 HMI Operator Interface
- Station Device Net with Flex I/O modules
- Station fault beacon
- Manual Step PB's
- Pro 1 Data Pro data collection system
- All programs allow full automatic and manual operation of the system
- Operator interface is programmed to display system status through color and graphical representation
- System faults are detailed with station/device description and PLC I/O address



Mechanical Quality Standards

- Welded structural steel machine frame
- Blanchard ground, nickel flashed table tops
- All machined surfaces are plated or painted to inhibit rusting
- All machined areas subject to wear will be hardened
- Main airline filter/regulator c/w quick dump and soft start
- Flow control fittings on cylinder ports
- Part present sensors at all critical locations



Machine Safety

- Third-party engineering safety inspection completed
- Perimeter guarding with access doors and safety switches
- American National Standards Institute (ANSI)
- CSA Z432-1999 - Safeguarding of Machinery Standard
- Ontario Electrical Authority Code
- CSA Z434-2003 - Industrial Robot Safety Standard
- Risk assessment completed during design (FMEA)



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