Welding system for joining automotive door panels and interior parts

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Customer

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Project

Development of a welding system for joining several individual components into four complete car doors within 30 seconds.

Requirements

- Low cycle times and maximum precision
- Maximum flexibility: the welding system must be convertible fully automatically within ten minutes, depending on the car type.
- Total process reliability: each door must be welded precisely down to the last millimetre.
- Processing of a total of 148 welding points in 30 seconds

Solution

- ADNGF guided drive with SDAT position sensors ensure the exact feeding of ultrasonic welding sonotrodes
- The cylinders in the welding tool are controlled by piezoelectric pressure regulators of the type VEAB – first for position and later, during the welding process, for pressure
- D2F flat cylinders clamp the retainer frame to fix the doors in the system during transport
- During the welding process, the process valves of the type MN1H supply cooling air
- A service unit MSB6 ensures optimal process air in the machine

Highlights

- Use of innovative piezo valves
- Low energy consumption and long service life
- Permanent process data monitoring
- Full flexibility in adjusting the welding pressure
- Fast switching times in the sub-microsecond range

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- Piezoelectric pressure regulators VEAB control the cylinders in welding tool
- ADNGF guided drive with SDAT position sensors ensure exact feeding of the ultrasonic welding sonotrodes
- DZF flat cylinders clamp the retainer frame while the doors are being transported
- Process valves MN1H supply cooling air in the welding units
- Service unit MSB6 ensures optimal process air in the machine

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Optimising welding systems: products and solutions

**Piezoelectric pressure regulator VEAB**
- Short response times of < 10 ms
- Voltage setpoint value: 0 ... 5 V or 0 ... 10 V
- Current setpoint value: 4 ... 20 mA
- Very long service life
- Low power consumption
- Piezoelectric valve system
- Noiseless operation
- High control precision and dynamic control behaviour

**Compact cylinder ADNGF**
- Diameter: 12-100 mm
- Stroke length: 1 ... 400 mm
- Force: 68 ... 4712 N
- Position sensing
- Fixed/self-adjusting cushioning
- Mounting hole pattern to ISO 21287
- Piston rod secured against rotation by means of guide rod and yoke plate
- Plain-bearing guide
- For position sensing
- Available with through piston rod

**Position transmitter SDAT**
- Analogue output: 4-20mA
- IO-Link
- Switching output: NO or NC
- Position measuring range: 50, 80, 100, 125, 160 mm
- Cable length: 0.3 m
- Electrical connection, 4-pin, M8x1 plug
- Design for T-slot
- Reliably and accurately senses positions for standard strokes
- High repetition accuracy
- Coordinated with and tested for Festo's cylinders
- Plain bearing

**Process valve MN1H-MS**
- Connection: G1/4 ... G1 ½
- Flow rate: 2000 ... 30500 l/min
- Voltage: 24 V DC, 110 ... 230 V AC
- Pilot operated diaphragm valve
- Adjustable closing cushioning, in-line mounting or through-hole
- Electrically actuated, piloted, pneumatic spring return
- Connection via plug/socket
- Brass design
- Adjustable closing cushioning, in-line mounting or through-hole
- Can only be used for gaseous media

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