

Automatic assembly of foot on children's rocking chairs

Customer's need

To automatically assemble the foot on children's rocking chairs using 3 self-threading screws and to perform tolerance tests on the holes to accommodate the two wheels.

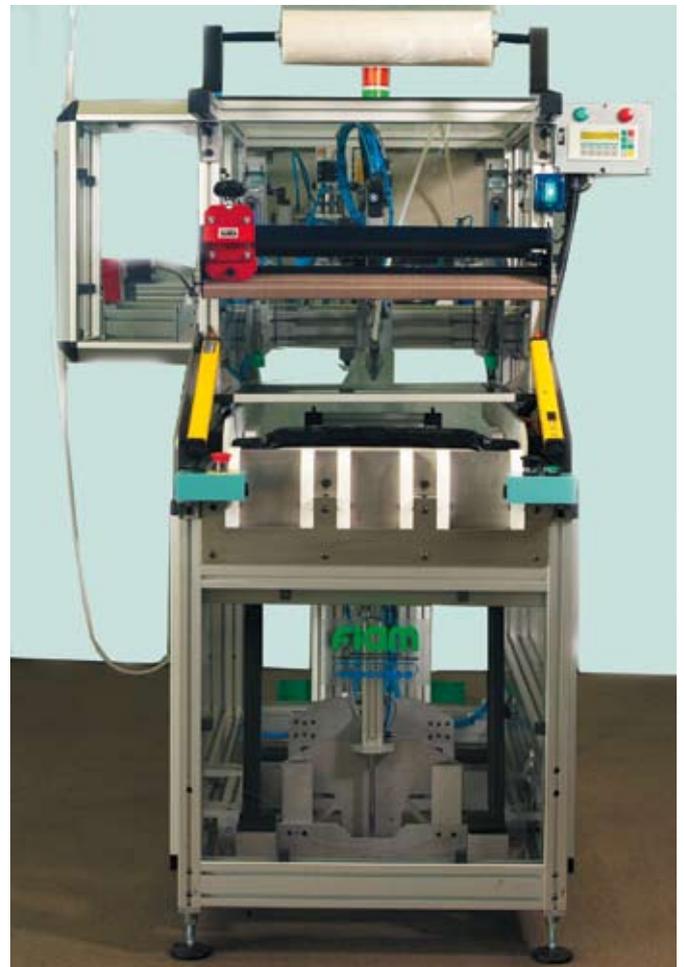
Solution

An automatic stand-alone assembly unit was designed and built to tighten screws in 3 different positions and to automatically discharge the work piece onto a chute. In the automatic working cycle a test of tolerance of the holes made to accommodate the wheels is being performed. The machine, equipped with safety guards, has been manufactured foreseeing work piece pre-assembly by the operator, who also sticks a transparent protection film on the work piece.

The unit comprises:

- single-spindle tightening unit made up of an MCZE3A air nutrunner motor with Jointech Plus tightening torque control featuring instant automatic air shutoff. The motor is installed on a **LIGHT tightening slide** featuring magnetic cylinders complete with sensors for checking end-of-stroke depth, fitted with pneumatic decelerators and complete with **screw-retaining head**. The slide runs horizontally on an electric axis set up to stop at 3 points corresponding to the centre-to-centre distances for tightening;

- the **screw feeding** system comprises a circular feeder and a high-speed 1-way screw selector, and selector support plate.



- Checking of the amount of screws** on the circular feeder tracks is performed via an **optical fibre**, which is employed on the feeder to stop screws jamming in the selection channel: when the optical fibre detects the presence of screws, after a time preset by the PLC, it activates a solenoid valve, which produces a jet of air to eliminate excess screws;
- a manipulator, which carries across and positions the work piece from the first station to the second-where tightening and testing are carried out and then onto the work piece discharge;
- pneumatic installation with Festo components;
- the control board, which includes the pneumatic/electric transducer for checking tightening torque, is fitted with a PLC, which provides numerous diagnostic options for the tightening cycle and hole testing;
- operator panel for work stage settings/results/alarm diagnostics;

► Working cycle

Stage 1:

The operator assembles the part manually, places it inside the machine, applies the protection film and starts the machine by pressing the start button.

Stage 2:

The manipulator carries the part across to the second station where the two holes are tested by means of plugs/sensors. If the part passes the test, the automatic tightening cycle starts tightening the three screws. Otherwise, the control panel reports the part's rejection.

Stage 3:

► At this point, the manipulator automatically carries the assembled and tested part across to the discharge, placing it on the relevant chute. At the same time, the manipulator carries a new part into position ready for tightening;



Details of machine

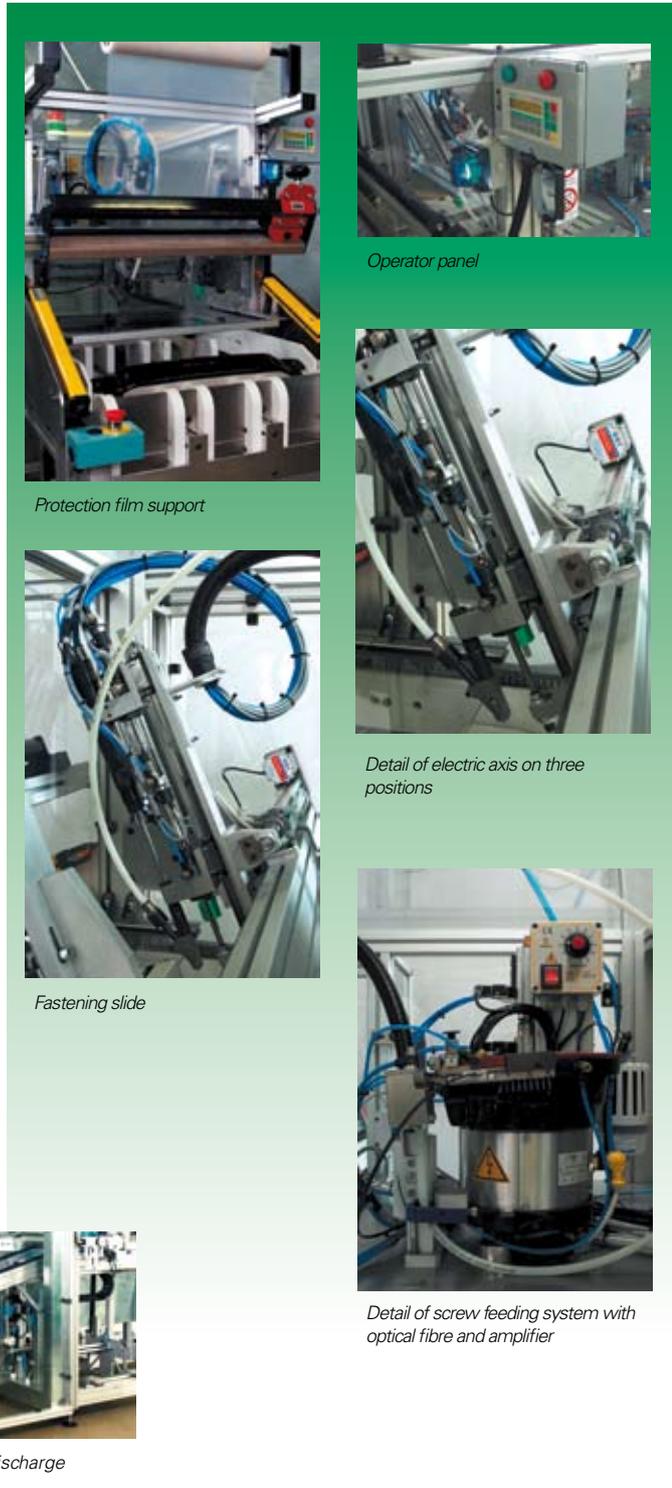
► The machine reports part rejection at the discharge stage, at which point the operator is required to reset the cycle and is allowed to retrieve the defective part

► Advantages

- **High production rate.** The machine can assemble 6 products/min, providing an immediate return on the investment made
- **Full automation of the tightening process.** The machine takes over all operators' works as well as fatigue associated with tightening jobs. Moreover, the machine is fitted with Plexiglas guards to protect the operator throughout the work cycle.
- **Extremely high tightening precision and repeatability:** the system provides **continuous, constant control of all assembly operations as demanded by the customer**, meaning the resulting product is reliable and correctly fastened, in other words a **product of certified quality.**



Chute with parts discharge



Protection film support



Operator panel



Detail of electric axis on three positions



Fastening slide



Detail of screw feeding system with optical fibre and amplifier

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