

Furniture industry: automatic assembly of office chair armrests



► Customer's need

Automatic assembly of office chair armrest components using 4 self-threading screws, taking into account that self-threading screws require adequate axial thrust during tightening to form the thread inside the component.

► Solution

A two-spindle auto-fed tightening unit with manual work piece loading.

The unit, made with a load-bearing framework complete with supporting plate and safety guard systems, is composed as follows:

► **work piece jig** designed following work piece dimensions; the jig fixture is positioned in a working area so that the operator is given enough room to comfortably position and turn the part;

► **screw feeding** system comprising a circular feeder, a high-speed two-way screw selector, and selector support plate.

The two-way screw selector, which is separating the screws so that they are sent down two individual

channels, is designed to simultaneously feed the two selected screws, which will be shot to the tightening heads.

► two **dual-movement slides** complete with 2 MCSE8A **air nutrunner motors** with Jointech Plus tightening torque control featuring instant automatic air shutoff. The tightening slides, equipped with magnetic cylinders complete with sensors for checking end-of-stroke depth, are also equipped with pneumatic decelerators. The slides are equipped with two **screw-retaining heads**.

► pneumatic installation with Festo components;

► the control board, which includes the pneumatic/electric transducers for checking torque, is fitted with a SIEMENS LOGO PLC, which provides numerous diagnostic options, including the most common ones below:

- green indicator light (part OK)
- red indicator light (part NOT OK)
- yellow light (no screw)
- emergency pushbutton, head cleaning and screw loading buttons.

► Working cycle

1. The operator positions the preassembled work piece manually on the relevant jig.
2. As soon as the unit detects the part, the automatic working cycle starts.
3. The slides descend and automatic tightening of the first two self-threading screws takes place simultaneously.
4. The machine reports possible anomalies through PLC and alarm lights.
5. The operator removes the part, turns it 180° and repositions it on the jig so that the machine can start tightening the last 2 screws.
6. Tightening cycle is repeated.
7. The work piece is discharged.

► Advantages

- **High production rate.** The tightening cycle totally takes **3 seconds, whilst total cycle time comes to 6 seconds**, providing an immediate return on the investment made.
- **Full automation of the tightening process.** The machine takes over all operator work and fatigue. Moreover, the machine is fitted with Plexiglas safety 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**.



Manual positioning



Alarm lights



2-way screw selection unit



Screw feeding system

October 2007 | Copyright Fiam Spa. The unauthorised distribution and/or reproduction of all or part of this publication is strictly forbidden.