

Machine of the Month

DEPRAG DCAM (Compact Assembly Module) for the Assembly of Components used in Cell-Phone Infrastructure

Requirement: Fully-automatic Screwdriving Cell for the assembly of components, including error-checking. Components are manually loaded by an Operator into a part fixture. This Screwdriving Cell is part of a complete conveyor-integrated assembly line. Total Cycle Time: 25 seconds for 4 complete parts with a total of 8 fasteners.



View of the DEPRAG DCAM incl. stationary Screwfeeder

Solution: One DEPRAG [DCAM](#), which is equipped as follows:

- Base Frame with automatic slide-table and light-curtain at the load-station
- Part-fixtures with part-sensors for 1 to 4 parts
- XY - Axis-System - freely programmable
- [Stationary Screwfeeder](#) Model 0511-EP/0,75V-1
- DEPRAG [MICROMAT - ULTRA](#) Screwdriver Spindle Model 345-700-31-1
- Pneumatic Unload-Station with Z-axis
- [Motion Controller](#) Model MC282
- [Remote Access System](#) with modem
- Safety Enclosure (antistatic)
- Unload conveyor with light curtain
- Machine Status Indication-Light
- Workstation Lighting
- Maintenance Door with safety switch



Load Station in the front; Screwdriving Station in the rear

Screwdriving Station from the rear; separate openings for the auto-unloading of correct parts onto the conveyor and of incorrect parts into a reject area with drawer for easy removal.

Cycle Description: Each load-station is equipped with a slide table, which transports the components to be assembled in form-fitted part fixtures, to the Screwdriving location. An Operator is required to manually load the pre-assembled and tightly fitted components into the part-fixture(s).

Light sensors indicate to the controller that all components are loaded correctly and verify that the number of components agrees with the previously selected quantity. It is possible to load components into any of the available 4 fixture cavities since only occupied cavities will be recognized and processed. The part fixture allows the Operator to preload up to 4 components.

The light-curtain assures the safe operation of the equipment. It recognizes if an Operator reaches into the machine and immediately stops the movement of the slide-table. Only if the load-station is free from any interference will the machine allow the slide-table to move.

Once the Operator has removed his hands from the load-station and the amount of loaded parts per fixture is compared to the pre-adjusted part volume, the light-sensors and the light-curtain report "ready" to the controller and the slide-table moves automatically into the Screwdriving position.

The DEPRAG MICROMAT - ULTRA Screwdriver Spindle moves to each screw-location and the Screwfeeder automatically supplies the Screwdriver with fasteners. Each part requires two screws.

To avoid any error-assemblies, the system verifies and controls the correct feeding (screw presence control), torque and depth of each Screwdriving cycle.

Once the part is completely assembled and no errors were reported, the vacuum grippers remove the completed parts and place them through an unload-chute onto the conveyor. Only perfectly assembled parts will be placed onto the conveyor.

Parts that have an assembly error will also be removed by vacuum-gripper into a separate container that holds erroneous parts only. Also, any faulty screws are

unloaded into the reject container to avoid that such a defective screw may be reused.

The machine status light indicates the current machine status during the Screwdriving process and shows the fill-level of the reject-container. To correctly assign any occurring errors, only 1 incorrect part will be unloaded at a time.



This conveyor connects this Screwdriving Cell with the next Station in the assembly line