

Effective system solutions for reliable assembly

Screwdriving and feeding technology from a single source

Standardised modular components build the perfect ensemble

Production downtime, assembly errors, product recalls – Who is not eager to avoid these horror scenarios for industrial series production. Contamination, defect parts or faulty screw joints are all examples of small issues creating major problems. Significant financial damages and loss of reputation lead to dramatic consequences which can be avoided if the utmost reliability is guaranteed.

Industrial screwdriving and feeding assembly systems are composed of a variety of complex components, the sound interplay of which, is of decisive relevance for the reliability and productivity of the unit as a whole. In order to avoid interfacing issues between screw feeding and the screwdriving tool, DEPRAG SCHULZ GmbH from Amberg, Germany, provides a wide spectrum of requisite system components from a single source. With over 40 years of experience, the standardised modular design of their components enables wide-ranging and versatile combination options with fast delivery times which ensure the perfect ensemble.

As well as ergonomic handheld screwdrivers for manual application, the DEPRAG portfolio also comprises stationary screwdriving tools for easy integration into automated PLC-driven systems. EC-servo technic tools can be used for maximum flexibility. Integrated sensor controlled torque and angle measurement enables precise control and regulation of the screw tightening procedure. The freely programmable applications allow a consistently high degree of flexibility. Furthermore, the comprehensive documentation and evaluation options for the processing parameters, guarantee the highest precision and security of processing sequences. The brushless EC-motors play an essential role in ensuring maintenance-free operation. Depending on the application area, EC-motors can be supplied with torque measurement based on power consumption as well as pneumatic screwdrivers. All screwdrivers are available in straight design, in angular design for restricted environments or pistol grip design for horizontal use. A torque range of between 0.008 Nm and 500 Nm can be achieved subject to tool and application requirement. Even difficult to reach positions can be accessed for screw assembly using the DEPRAG Feed Module DFM, which provides screwdriver vacuum hold for screws or nuts until processing begins.

The selection of the most suitable screwdriving technology is the first step on the way to optimised screw assembly. Smooth functioning feeding technology is vital for high system reliability, productivity and the efficiency of manual work stations.

DEPRAG has a range of feeding technologies available depending on the specifications set for technical cleanliness or noise level. High feed speed and high production quantities can be realised using vibratory spiral feeders (also called oscillating conveyers). In a vibratory bowl, the feed product is set into motion by targeted vibrations so that each fastener is propelled up the spiral and fed into the separator system. Incorrectly positioned elements fall back into the bowl. In their “eacy feed” vibratory feeder, DEPRAG have developed a modern generation, sustainable, innovative feeding system. Thanks to the 24 V oscillatory magnets, power consumption is significantly reduced, resulting in an energy saving of around 80 percent. Furthermore, “eacy feed” is Industry 4.0 capable and due to the 24-volt technology, can be operated smoothly and safely worldwide, even with a poor mains power supply. The vibratory bowls, available in fill sizes 0.15 l, 0.75 l, 1.2 l and 2.5 l, can be loaded with a variety of feed products, such as screws, nuts, O-rings and other fasteners.

Segment or sword feeders are used when feed parts need to be handled particularly gently, quietly and with low abrasion. The feed products are lifted out of a storage container by a pivoting segmented rail and slide into the separator by gravity. This feed system is particularly suitable for applications which must conform to high technical cleanliness specifications. The use of hardened wear-resistant materials as well as specific coating

procedures ensure the consistently high quality and efficiency of the DEPRAG sword feeders. The standard machines can be used to process screw sizes from M2 to M6. Sword feeders are ideal for screws up to 25 mm in length and balls of a diameter of 1 to 12 mm.

Linear conveyors are an optional link between the feeder and screwdriving tool. They function in the same way as vibratory spiral feeders with mini pulsing movements and can be used to span wide distances within assembly systems, supply part buffers or split the material stream. Because the linear conveyor supplies parts much more quickly than the feeder provides them, a gripper can for example, be used to safely and simply pick up the fastening elements. There is no chance of a backlog of parts in the feed bowl and there is no pressure accumulation when sorting parts in the feed bowl.

Fasteners are primarily fed to the screwdriving tool for processing via a feed hose from the feeding system. It is however, sometimes not possible to feed screws with a very short shaft, rivets with a large collar diameter or parts with particularly complex external geometry by feed hose. In this case the best option is the Pick-and-Place procedure in which the screws are “picked” using vacuum, gripper or magnet system. After each fastener is removed, the next part is automatically prepared.

Integrated refill and storage systems, such as the classic hopper, supply parts to the feeder securely and optimally throughout the entire process. A fill level sensor signals when the volume has fallen below the pre-set minimum fill capacity of the vibratory feeder or sword feeder and prompts the conveyor to supply a refill. A constant low fill level enables gentle handling of feed products with long refill intervals. Furthermore, the hopper can be simply integrated and flexibly utilised for the most varied of products without the need for modification.

Single or double-sided adhesive components such as seal rings can be supplied for processing on tape reel feeders. Components are fed on a tape and then removed from the tape by a blade. A combination of highly precise sensors and fast fixation ensures that the DEPRAG tape reel feeders attain exact positioning of parts with high repeatability.

In many branches technical cleanliness is increasing in relevance and becoming an important quality specification in the entire process chain. Equally, in the production of electronics, the reduction of dirt particles is particularly vital and consequently feeding must be particularly gentle. DEPRAG has met this challenge by designing a universal concept, also for use in cleanrooms: the CleanFeed concept. It is based on specifically designed CleanFeed components, developed and produced in-house by DEPRAG. They range from specially adapted feeding technology and expressly designed screwdriving function modules for underfloor screw assemblies, to particle suction by the “particle killer”. These fulfil the requirements for technical cleanliness: avoid, reduce and remove particles – throughout the entire screwdriving assembly process.

The extensive DEPRAG product and service portfolio can provide components for every requirement enabling flexible and reliable assembly. Beginning with the inquiry and project work, DEPRAG customers receive comprehensive technical support and guidance with outstanding engineering work throughout the entire system design process. A great variety of tried and tested standard modules can be called on for the layout of the assembly system. All screwdriving automation components such as screwdrivers, feeders, controller and process monitoring equipment have been developed to be perfectly coordinated with one another and have proven themselves over many years. One of DEPRAG’s core competencies is the realisation of customer-specific requirements. Top quality is assured by a continuous test before delivery. The customer receives comprehensive documentation relating to the commissioning and operation of the system. If servicing is required, all wear parts are available with very short delivery times.

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