Automation

Coupling device

Suitable for clean rooms due to the freedom of particles

Technology

A two-part coupling mechanism allows a rotating drive to be connected with a rotating receiver (e.g. a socket nut). The air between the two parts of the coupling is suctioned off during the coupling process. This prevents any particles produced during the coupling process from being released into the surroundings.

Innovation

The innovation consists in the design of the coupling's parts. The upper part of the coupling (turquoise) is directly attached to a rotary screwdriver. The particles produced during coupling are suctioned off in this shaft. The lower part of the coupling (green) encapsulates the coupling process while at the same time acting as a guide, so that the square shaft can be joined to the square socket nut. A continuous axial pressure of the rotary screwdriver is used to insert the shaft into the socket.

INNOVATION & TECHNOLOGIE TRANSFER

DESY.

Background and solutions

Procedures in which no external contaminants must be allowed to enter call for particularly high levels of cleanliness. Clean-room applications for accelerator technology, semiconductor technologies and for biological and chemical applications are particularly dependent upon particle-free procedures.

The coupling system described is a series of specimens to determine the abrasion resistance (number of particles produced per connection) of screw connections under clean-room conditions. For this purpose, the particles produced when screwing together a wide range of screws (having different surface properties) is examined. The results would be distorted by any contamination by foreign particles from the testing apparatus. A rotary magazine contains screws with socket wrenches in place (yellow guide and red socket nut) and integrated guide. The screwdriver with the integrated suction unit (blue spigot) is inserted axially into the socket wrenches. The guide pins in the socket wrenches align the square drive correctly and the screwing procedure can begin. The air in the space between the two parts of the coupling is sucked away through drill holes in the rotating mechanism. This construction allows an automated procedure to be carried out in a clean-room environment.

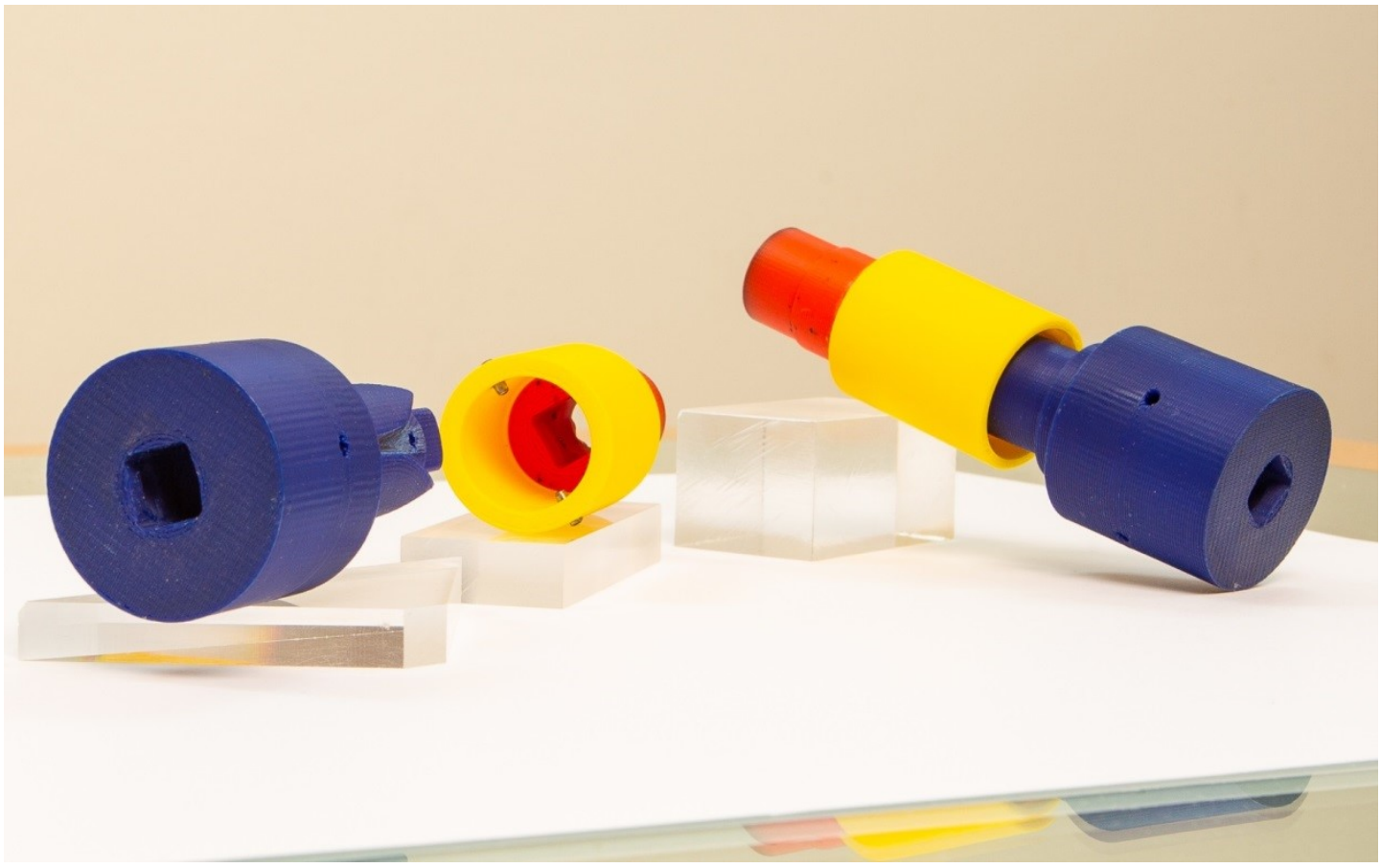


Photo: Marta Meyer DESY

Challenges

In temporary connections, mechanical abrasion releases particles that can distort the results of the abrasion measurement. The challenges are to avoid the release of particles into the clean room and at the same time realize a detachable and reproducible connection.

Possible applications

All assembly devices that require a clean working environment can profit from this possibility of the particle-free rotary motion. Whether in the semiconductor industry, accelerator research or in the chemical or biological industry. The food industry, also, depends on clean processes. .

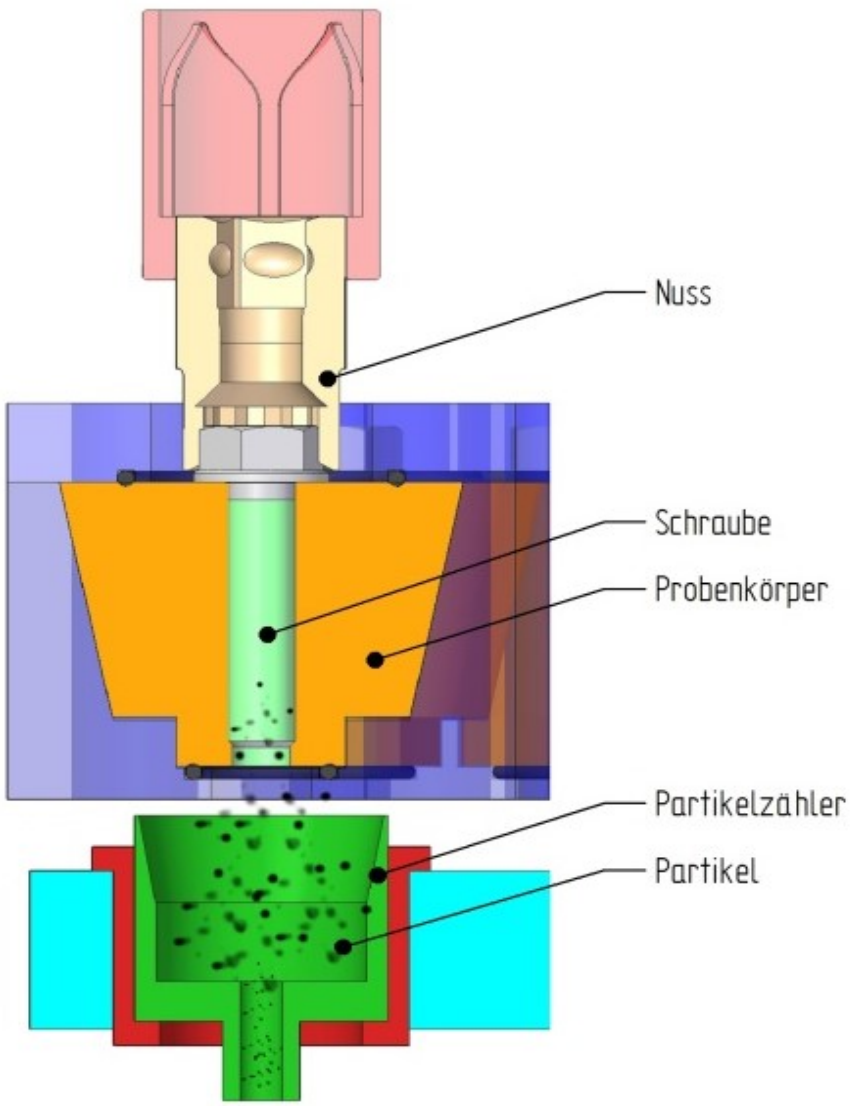
Applications

- Clean room technology
- Semiconductor industry
- Chemical industry
- Biological industry
- Food industry

Industrial sector

- Mixing equipment
- Screwing procedures
- Assembly procedures

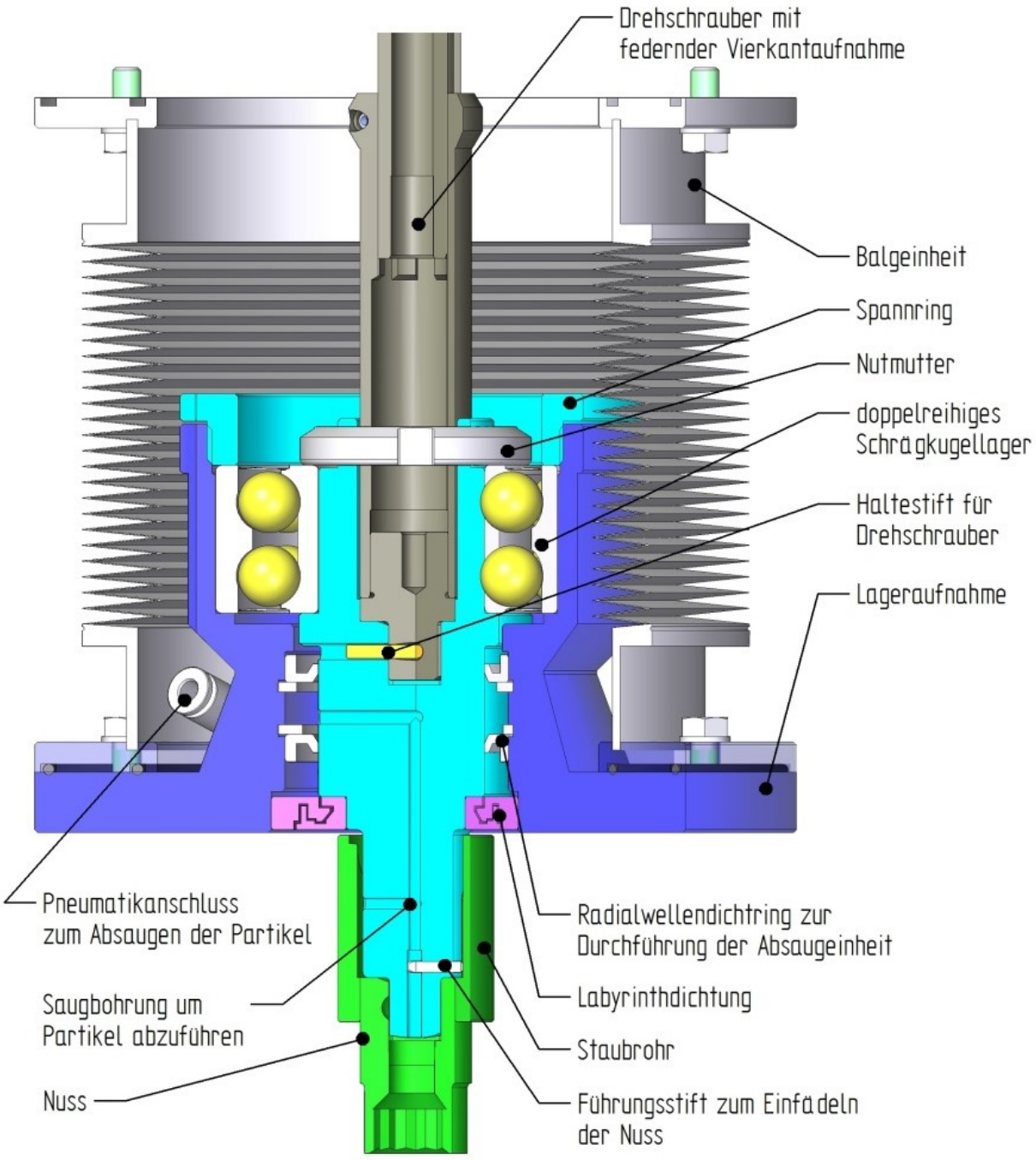
This arrangement has made it possible to measure the number of particles in the specimen under investigation directly. The set-up for the test is as follows:



A particle counter is situated below the body of the specimen (orange). This suctions off the particles produced when inserting the screw and measures them. As a result, the amount of abrasion of the samples can be determined.

Benefits

The encapsulated coupling procedure ensures a temporary connection that is suitable for clean rooms. This connection is force-fitting, form-fitting and frictional.
The widely usable temporary coupling can be used anywhere that rotational motion needs to be transmitted while maintaining particularly high levels of cleanliness.



Deutsches Elektronen-Synchrotron DESY
A Helmholtz Association Research Centre
Notkestraße 85 I 22607 Hamburg

DESY Innovation & Technology Transfer
Dr. Ilka Mahns, Technology Transfer Office
Email: ilka.mahns@desy.de
Tel: +49 40 8998-3647
www.desy.de