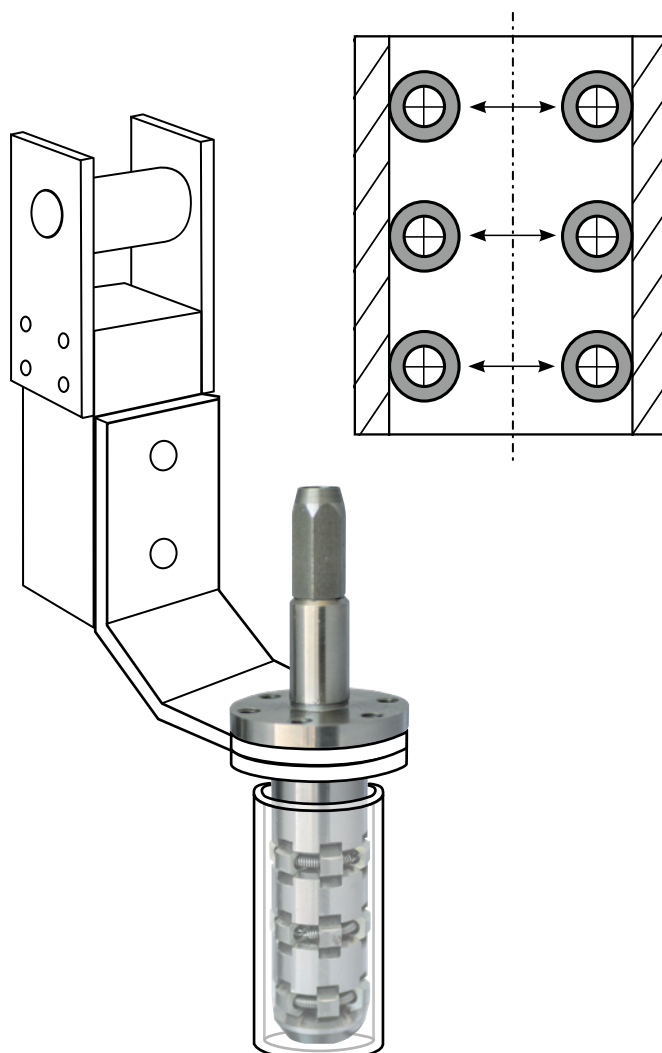


## Three-level clamp



### Applications:

This principle can also be applied to other transport situations, e.g. cardboard, glass, or plastic tubes, etc.].



### Task:

Securely hold bicycle frames on an assembly line (500 N holding force) and prevent them from rotating. The inside frame diameter ranges from 25 to 32 mm. Handling should be as simple as possible.

### Problem:

Since this first work step does not require specialized workers, the process must be simple to perform. The changing inside frame diameters are not relevant, and are all covered by the clamping range of the three-level centering clamp.

### Solution:

The special design of this three-level centering clamp consists of three clamping levels, which are used to ensure the required holding force. Each level consists of five six-sided clamping segments, with their outer diameters ground to the smallest inside frame diameter in order to avoid any damage to the inside diameter. The clamping levels are expanded by turning the inner pull rod using a special hexagonal nut.

### Procedure:

The three-level centering clamp, which is suspended vertically in the assembly line, is operated manually using the special hexagonal nut via a secured-torque pneumatic wrench. The respective inside frame diameter is pushed up to the block using the three-level centering clamp, then clamped using the pneumatic wrench with the defined torque.

### Summary:

This is a very simple clamping process that does not require specialized workers. No accidents have occurred due to loosening or rotation of the frames when used properly.