

Workholding Options

Email your question—along with your name, job title and company name (if you wish to remain anonymous, no problem) to: jmcguinn@geartechnology.com; or submit your question by visiting geartechnology.com.

QUESTION

We manufacture some gears that require an axial face as a datum, as well as locating on the bore for centering. Other gears use only the bore for both axial and radial locating. What type of workholding is appropriate for each type of part? Is there workholding that will work for both types?

Response from Hank Kohl, president, Hainbuch America Corporation

For the parts with a bore that is the radial datum and an axial face, a “pull-down”-type mandrel is most effective. As the part is centered on the bore, the collet pulls the parts down against an end-stop for the axial reference. These can be with or without a draw bolt, thus allowing a blind-hole application.



Pull-down mandrel (illustrations courtesy Hainbuch).

When parts that have only a bore for datum, a “dead-length” mandrel is appropriate. These expand only on the bore and do not pull against the face. This prevents a non-

datum-surface from affecting the alignment of the part during clamping.

For the flexibility to use both types, a quick-change system — consisting of a flange and actuating unit — will enable a fast changeover from “pull-down” to “dead-length.” These are generally off-the-shelf, standard components.



Dead-length mandrel.

Hank Kohl



Second response from Chris Brown, business manager for Forkardt, an ITW Workholding Company.

For gripping on only an ID bore, a collet or expanding mandrel are usually the preferred method; this is when there are no other datums to locate from. Typically, the manufacturing process will use centers for putting the gear on a common centerline, and the collet/mandrel is used for securing the gear while under rotation and against any torque applied during the process. This is very common in gear hobbing. Where centers are not used, accuracy will be dependent on a collet fixture, as centerline will be established by the accuracy of the fixture, as opposed to the accuracy of the centers.

When centering on the ID is required — along with an axial face as a locating datum — a pull-down chuck is recommended. This most likely would be a collet chuck that pulls the gear

down against a positive stop or locating face. These are typically not something that the buyer can purchase off the shelf, but more likely requires some design work that can be accomplished — in some instances — rather easily. But for more complex or demanding applications, contacting a workholding company is advised. Designs of this type can accommodate diameters as small as .5" (12 microns) and up to 40" (1 meter) or larger. Regarding larger instances, if a collet is not used, some form of either manual or power chucks are used. The key will be to pull the gear back against a qualified surface in order to hold any GD&T requirements.

Collets would be most commonly used, however, due to the need to locate on an axial datum; a special fixture would be needed to accommodate both examples. It can be accomplished relatively easily by eliminating the locating detail on the fixture.

Chris Brown

