

BAYONET STEMS

Notes on the function and maintenance of the stem in an extrusion press

General

The stem acts as a column, transmitting the force of the main cylinder to the billet. It must operate under high loads without bending, cracking, or upsetting. It is important to notify the manufacturer of the size of the press and its application, so that it can be properly designed to carry the high compressive loads.

Material

The material most commonly used for extrusion stems is AISI H13 (1.2344) hot worked tool steel. This is heated, quenched and tempered to a hardness in the range of 430-475 Brinell (Rockwell C45-50). Its strength depends on its continued hardness at operating temperatures, and also on the absence of internal stress.

Alignment

The stem must operate repeatedly and consistently under very high compressive loads. It is essential therefore that it remain in complete alignment throughout the length of its stroke. The alignment should be checked weekly.

Loading

Because of the high pressures carried by the stem, it is essential that the load be uniformly applied. Uneven loading will eventually cause bending or breaking. This can result from a variety of reasons such as improper installation, distorted pressure plate, misaligned press, jammed butts (causing the container to shift), or improperly cut billets.

Care must be taken to avoid these situations as the stem can break catastrophically, resulting in damage to the press, lost production time and possible injury.



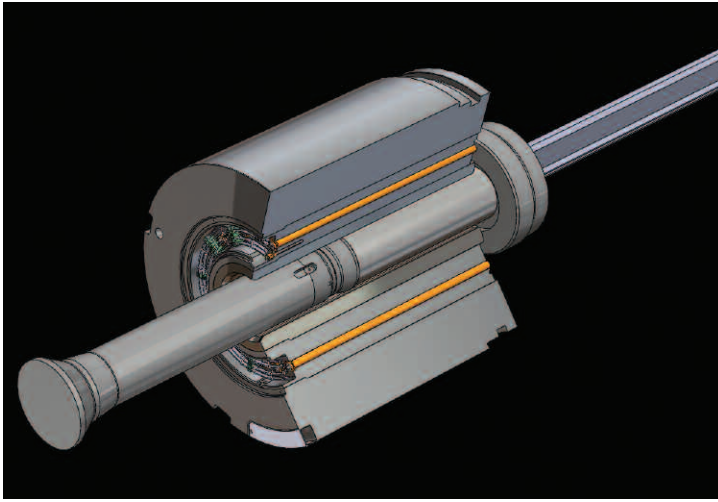
Cracking

Eventually the face of the stem will compress and begin to expand laterally. Also, repeated intense pressure against the dummy block will in time continue to harden the face of the stem, and hairline cracks may form. If not checked, these can extend into the body of the stem. The stem should be returned to Castool for ultrasonic testing to quantify the amount and depth of the cracks. If necessary, the stem will then be shortened and a spacer installed.

Stress Relieving

Stems should be stress relieved on a regular basis, and in accordance with the size of the press and the number of pushes. (See suggested frequency below)

The stem should be positioned vertically in the oven, and heated at no more than 100°F (55°C) per hour to 1000°F (540°C), then held at this temperature for one hour per inch (25mm) of stem diameter. Remove from furnace and allow the stem to cool in still air at room temperature.



Preventative Maintenance

- Keep the stem dressed at all times. Correct any visible damage as soon as possible by machining to clean metal. Watch for small cracks, upsetting, impact scars or cuts. Stress relieve stem after each machining. Never weld the stem.
- Check press alignment over complete stroke at least weekly.
- Check press end of stem weekly for squareness, and for any indication of upsetting or cracks. Check also each time a fixed dummy block is replaced.
- Check the pressure plate monthly for coining or other apparent damage.
- Stress relieve regularly, and also after each machining.

Frequency of Stress Relieving

Pressure	Pushes
180,000-200,000 psi	20,000-30,000
160,000-180,000	30,000-40,000
130,000-160,000	40,000-50,000
100,000-130,000	50,000-60,000
<100,000	100,000 cycles

Drawings

Detailed drawings and specifications of all press tooling should be kept permanently on file, and regularly updated. Drawings are required for spares and replacements. They should incorporate any details of design which may be unique to each press and also complete and detailed material specs.

Spares

Spare stems should be carefully inspected immediately on receipt. Don't wait until they are needed for use. Stems should be stored in a warm dry place whenever possible.

