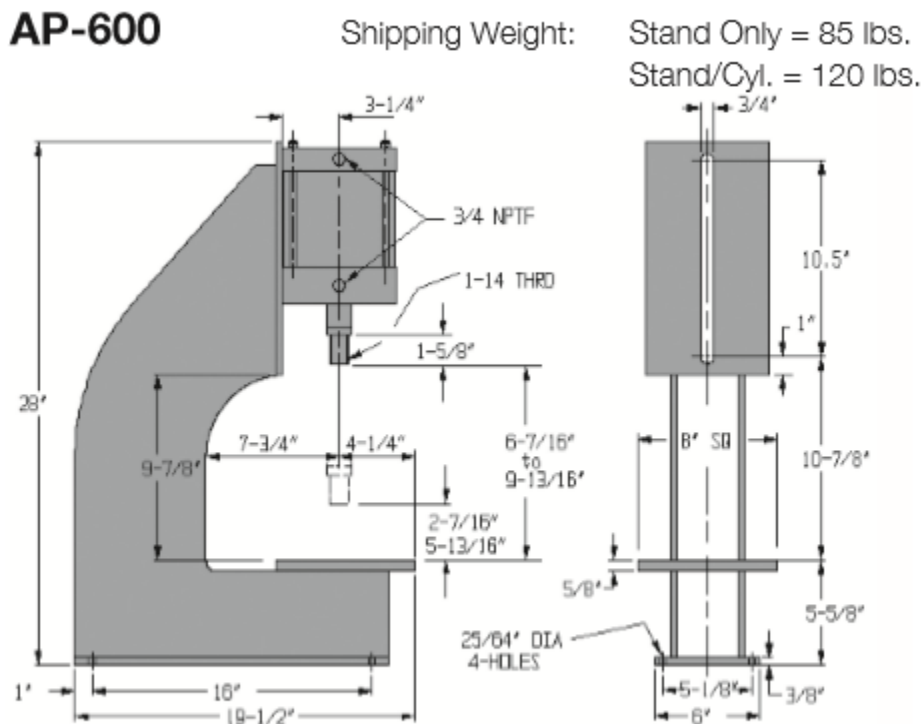


## Concept Generation

The project for assembling a high-speed shaft includes pressing a bearing sleeve and radial sensor onto a shaft. To have a full contact fit the alignment of the press, shaft and subassemblies must be precise. Design concepts for an alignment fixture that will hold the shaft and subassemblies in place to be pressed were generated through brainstorming. The alignment fixture must have an alignment tolerance of  $\pm 0.001$  mm and fit within the throat of the press. The dimensions of the press can be seen in Figure 1.



For non-standard double-acting service with strokes up to 6", use pages 30-31 to design a 6" bore cylinder for use with this stand.

Figure 1: Air Press Dimensions

During brainstorming team members generated design concepts and then discussed the pros and cons of each concept. Below are design concepts that were recorded.

**Semi-Cylindrical Shells** - Two semi-cylindrical shells with interior curvature matching the exterior curvature of the shaft assembly could be used to align the parts vertically inside the throat of the shaft. One end of the two semi-cylindrical housings are fixed together and the other end is movable. The overall motion is similar to the clip and the shaft is fixed by the middle of the clip.

**Automated Arms** - Robotic arms with carefully controlled motors could be used to position the parts in place and hold them for the duration of the press.

**Guiding Rods** - The plate on the press could have an inset drilled in which the shaft will rest. Guide rods could extend around the shaft (coming out of the plate) to align the parts vertically as the sub-assemblies rest above the shaft. The rods can then be retracted after the press is completed so the assembly may be removed.

**Opening and Closing Gate**- An opening in the plate of the press has an attached gate. The gate is opened to allow the shaft and subassemblies to be placed under the press and closes to lock in the parts in proper alignment to be pressed and then re-opened to allow the assembled shaft to be taken out.

Many of the design concepts that were generated during brainstorming were rejected after more consideration. The rejected concepts either did not fit within the dimensions of the air-press, were unable to achieve precise alignment repeatedly, were too expensive, or caused unsafe conditions for Danfoss employees.