

PROCESSES AND TECHNIQUE

The fundamental principles of forging are much the same regardless of the method employed. The steel is heated to a temperature at which its elastic properties entirely disappear and it obeys the laws of plastic flow, following the direction of least resistance, when deformed by pressure.

Theoretically a length of round bar pressed from both ends would bulge equally in all directions and along its whole length. In actual practice there is friction between the ends and the surfaces applying the pressure, and a chilling effect by contact with them, so that the increase in diameter is not uniform but is a maximum at the centre and practically nothing on the end faces.

Forging can be performed by either steady pressure or impact pressure, and although the frictional effect is present in both cases, it is more marked in the former, due to the longer period of contact. Its influence is taken into account when designing forging tools for the purpose of controlling the direction of flow of the metal. With impact pressure the energy of the blow is transmitted throughout the material more rapidly and completely and will manifest itself even in a reverse direction. Thus a downward blow can be used to force the plastic metal upwards into a die cavity more readily than by steady pressure.

Methods of Forging. The methods of forging steel can be divided into two main groups:

1. Forging with simple tools of more or less standard forms in which only a portion of the material is worked at a time. The tools are used in conjunction with a press, in which case the action is one of steady squeezing, or a hammer which imparts a blow or impact pressure.

2. Die-forging, in which the material is formed between two dies having impressions corresponding to the finished shape of the article. In this case the whole surface is under pressure at once during the final stages of forming.

The commonest method of die-forging is drop-stamping, which, like hammer-forging, gives an impact pressure.