According to the current embodiment shown in Figure 2, in order to control the relative position of the roller die and linear die so as to achieve high dimensional stability for complex shapes, a rack and gear arrangement may also be incorporated.

To this end the roller die 25 includes a peripheral gear 65 mounted circumferentially about the roller which is in meshed engagement 75 with a peripheral gear 70 of the press roller 45. Thus the relative position of the press roller and roller die is maintained through the meshing 75 of the gears 65, 70. Further the press roller gear 70 is in meshed engagement with a rack 80 which is mounted to the platen 22.The press roller gear to meshes 85 with the rack 80 and so movement of the rollers 25, 45 is accurately controlled and tracked through the rack gear arrangement.

Figures 3A and 3B show two work pieces fabricated according to the present invention. In particular Figure 3A shows an aerofoil 90 formed according to the cold forming process of the present invention. In this case, the upper face 92 of the work piece 90 is applied by a roller die, projecting into the surface of the figure. Similarly, the profile of the lower face 100 is formed by a linear die onto which the work piece is placed. By designing the roller die and linear die accordingly, the end effects applied to the work piece 90 form the rounded ends 110, 105. Further the selective thickness variation along the orthogonal axis 115 yields a substantially different effect on the right side 95 compared to the opposed side, resulting on a substantially variable thickness along the orthogonal axis.

For Figure 3B, the work piece 120 demonstrates substantially varying thickness between a central portion 125, 130 and the end portions 140. The transition fillet 135 between the portions is also accurately formed so as to limit stress concentration between the portions.

In a still further alternative, Figures 3A and 3B may also be different views of the same work piece. The device and method according to the present invention is capable of forming a work piece whereby Figure 3A is a cross-sectional view of the central portion 125, 130 of Figure 3B with the upper face 92 of Figure 3A corresponding to upper face 125 of Figure 3B. Thus, in this alternative form, the work piece has been formed according to the present invention varying in profile along both respective axes 115, 145 of Figures 3A and 3B.

Claims:

1. A device for cold forming a metal work piece comprising
a roller die having a first die formed in a circumferential face;
a linear die having a second die formed on a receiving surface for receiving the work piece;
a press for applying a load to the roller die;
wherein the roller die, whilst under load from the press, is arranged to roll across the linear die so as to have the first and second dies applied to opposed faces of the work piece, and so progressively cold form the work piece;
wherein the first die varies in shape along a circumferential path around said roller die, and along an orthogonal axis of said work piece.

2. The device according to claim 1 wherein the second die varies in shape along a longitudinal path along of said linear die, and along an orthogonal axis of said work piece.

3. The device according to any one of the preceding claims further including a horizontal press arranged to bias the roller die to roll across the linear die.

4. The device according to any one of the preceding claims further including a press roller intermediate the press and the roller die through which the load is applied to the roller die.

5. The device according to any one of the preceding claims wherein the roller die includes a gear mounted circumferentially around said roller die and the linear die includes a rack such that said gear and rack are in mesh engagement to facilitate rolling of said roller die across said linear die.

6. The device according to claim 4 or 5 wherein said press roller includes a gear mounted circumferentially around said press roller such that the press roller gear is in mesh engagement with the roller die gear.

7. The device according to claim 6 further including a rack mounted parallel to the linear die rack and in mesh engagement with the press roller gear.

8. A method for cold forming a metal work piece, the method comprising the steps of:
providing a roller die having a first die formed in a circumferential face, such that the first die varies in shape along a circumferential path around said roller die and along an orthogonal axis of said work piece.;
providing a linear die having a second die formed on a receiving surface
said receiving surface receiving the work piece;
applying a load to the roller die;
and simultaneously rolling the roller die across the linear die so as to have the first and second dies applied to opposed faces of the work piece;
and consequently progressively cold forming the work piece.