

Use of PAPER TEMPLATES

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On one-off jobs, hole alignment in mating parts is best achieved using one as the drilling template for the other, for this is the most certain way to prevent errors that are of no consequence from becoming "functional." It can happen all too easily, of course, if parts are marked-off and drilled separately - and the only remedy is to slot some of the holes (in the "cover" part), or drill them oversize.

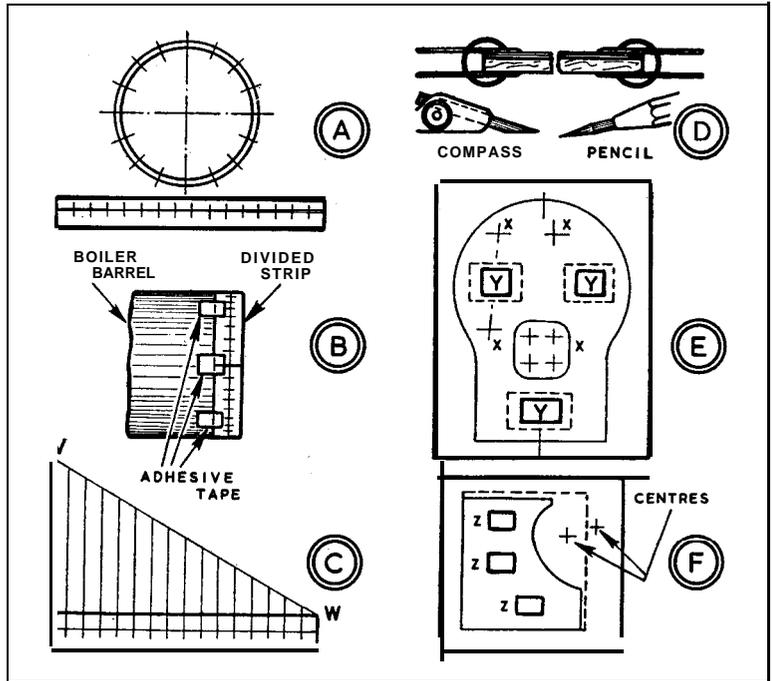
On other occasions, an actual template in thin steel plate serves the same purpose in ensuring fitting accuracy. Drills can be entered from one side for drilling one part, and from the opposite side for drilling the other part, to preserve overall alignment where there may be minor errors.

With some one-off jobs it is hardly worth while to make a metal template, and the drilling-through principle has still to be applied; yet some method other than ordinary marking-off is desirable. There are also times when marking-off may be awkward, or even likely to lead to errors, because of the shape of parts or the size of material. There are times, too, when with such drawbacks present a good standard of "eye-accuracy" is important, as for example, in the pitch and alignment of rows of rivets.

Advantages on models

In such instances, the solution to the problem of reasonably accurate marking-off can often be a paper template, carefully drawn and used once. When it has been aligned to the work and suitably stuck, its intersecting lines indicate where a sharp centre punch must be used to make indentations for later drilling. With the template drawn flat it is a particularly quick method for curved surfaces; and under controlled conditions, it gives good results on many of the more "structural" features of models - though it is also applicable to some mechanical items.

A particular application of a paper template is as at A and B, where the operation is marking-off hole centres for rivets round the end of a boiler barrel. This is a job where ordinary marking-off can lead to



noticeable errors in spacing, yet for which the ultimate accuracy of a lathe dividing set-up may hardly be required. The circumference of the barrel is obtained by wrapping a strip of paper round and marking or cutting exactly to length. It is then taken as the base for uniform division, and a strip is made to wrap round the barrel, to which it is fixed with tabs of adhesive tape. Using a spring dotting punch or automatic centre punch, the hole centres can be accurately marked; and in the drilling operation the holes are, of course, continued through the flange of the endplate, the barrel then serving as a template.

Spacing for any number of holes is done as at C, preferably on a drawing board. The horizontal length is the circumference of the barrel, and slope V-W is any length which will easily divide from the graduations of a steel rule. Vertical lines give the spacing on the strip which, finally, can be cut out using the steel rule and a sharp penknife - the paper being laid on a piece of cardboard.

Good results follow with reason-

able care; but to achieve a standard consistently close to normal marking off, conditions must be observed. The paper (thin note paper or tracing paper) should be stored flat in a normal room atmosphere. It should not be heated, and can be held flat and free from rucking using adhesive tape. The template should be used immediately it is finished. Pencils and compass lead should be 4H, maintained sharp as at D, which can be done rubbing on a piece of fine sandpaper, held to a strip of wood with paperclips. All measurements should be taken from a steel, (not wood) rule, and thin clear lines made.

Only care is required for accuracy to equal that of average marking-off on small parts. Using tracing paper and with the outlines of parts drawn, as at E and F, they can be matched to parts, or positioned on material to be marked for centres, as X, to be indented. Curves from centres off the material can be punched for cutting. Holes in such templates, as Y and Z, admit of securing with tabs of adhesive tape.8