Correspondence

Manufacturing Tolerance Allocation

Sir—I was pleased to read the paper by Mr. G. W. Hindmarsh, entitled ‘Manufacturing Tolerance Allocation’. This paper impacts upon the day to day work of Production Planning Engineer/Design Engineer members. Colleagues of mine from earlier years will not be surprised to see me in print on this subject, which was very near to my heart when planning on aircraft components.

May I congratulate Mr. Hindmarsh on an excellent paper which laid out in such a precise way the problem of dimensioning for interchangeability. I also appreciate that the limitations of a paper (and this letter) preclude the possibility of discussing any one example to finality.

I would like to comment as follows:

In example Figure 1 (b) the overall dimension would always have to be 75.0/75.5 the collar would vary from 2.0 to 3.5, otherwise the prints are well made. If the collar was important, the design office would have to re-dimension. In example Figure 2 (a) we can take note of what the author says, ‘a study of the method of manufacture of a detail can often lead to a simplification of a design and may be necessary in order that the detail may be tolerated realistically’. If this component was a one off (or a few off) it would present no difficulty to the workshop as our final working limits by traditional metal removing means.

If the part was to be economically batch produced, and the hole had to be the three millimetres off centre, a prudent 0.0 would add an identification mark, say a turned groove on one face. If it was to be a turret lathe and drill jig job, a small drilling on one end may be permissible to ‘hand’ the part to the drill jig and prevent mis-loading the jig. The part may then be dimensioned as Figure 2 (b) or Figure 2 (c) and whilst I fully take the author’s point in this example I think the manufacturing tolerance of 47.2/47.1 could be more generous, based on the original functional dimensions.

Remembering our battles with functional design, when the design office were loath to approach R.T.O. for dimension changes on sealed drawings (for many years now I have been on the other side of this battle) we became expert at achieving a desired design result. Sometimes we tightened up an otherwise open dimension to a limited one for tooling purposes, but our energies were directed to taking full advantage of anything the design office gave away.

Taking Figure 5 (a) on its face value, a special cutter would look after the 25.15/25.00 dimension, and most likely the 30.00/30.26. At the worst a second facing operation would correct any deeper boring. The point made with respect to the details being ‘out of context’ is a valid one, but again only certain dimensions have been used to illustrate the proposed method. The example in Figure 2 shows the difference in tolerance available, dependent upon which end is used as a datum. This again is an incomplete detail, as I would suggest that for identification purposes, one end would be chamfered and one end would just have the sharp edge removed. If the detail was to be parted off to a tolerance of 0.5, then this could lead to a dimensional error.

One of the objects of the proposed method is to prevent second facing operations after finishing certain functional dimensions, ie. to obviate the ‘leave a bit on lad’ policy. On a long run, one would not want the details to undergo the extra facing operation.

G. W. Hindmarsh
UWIST
King Edward VII Avenue
Cardiff CF1 3NU

The Author Replies . . .

Sir—Before giving an answer to the points raised by Mr. L. Bateman, I would like to say thank you for the very nice comments on the paper. The object of the paper was to present a systemised method for calculating tolerances, rather than using a ‘hit and miss’ approach. This is a subject on which there appears to have been very little concentration and is one which I feel is very important. Unfortunately Mr. Bateman has made no comment on the proposed method—however, I agree that if every detail is taken to finality ‘in its context’ the paper would be rather long. It would be interesting to know what method Mr. Bateman is familiar with, in achieving manufacturing tolerances from given functional tolerances, as I have seen no literature on the subject.

The point made with respect to the details being ‘out of context’ is a valid one, but again only certain dimensions have been used to illustrate the proposed method. The example in Figure 2 shows the difference in tolerance available, dependent upon which end is used as a datum. This again is an incomplete detail, as I would suggest that for identification purposes, one end would be chamfered and one end would just have the sharp edge removed. If the detail was to be parted off to a tolerance of 0.5, then this could lead to a dimensional error.

One of the objects of the proposed method is to prevent second facing operations after finishing certain functional dimensions, ie. to obviate the ‘leave a bit on lad’ policy. On a long run, one would not want the details to undergo the extra facing operation.

G. W. Hindmarsh
UWIST
King Edward VII Avenue
Cardiff CF1 3NU

COMPLETE SETS OF BACK NUMBERS OF THE INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH are now available from publishers William Dawson & Sons. Each volume is comprised of four issues of the Journal. Volumes 1—10 inclusive, are priced at £70.00; single volumes of vols 1—8 are £6.00 or £1.50 per issue; vols 9 and 10 are £11.00 each or £3.00 per issue.

Wm. Dawson & Sons Ltd.
Back Issues Department
Cannon House, Folkestone, Kent