# The Largest Inclusions Within a Piece of Steel

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**Abstract**

Imagine a solid object, homogeneous except for the presence within it of small particles of foreign material of different sizes. Interest resides in the size of the largest of these particles, and how that size relates to the volume of the solid. Direct measurement inside the solid is impossible, but particles intersecting the surface can be seen in section.

This is a problem with particular relevance to new high quality steels. All steels contain inclusions — small particles of impurity — which affect fatigue behaviour and other mechanical properties. In the new high quality steels intended for critical applications (so-called clean steels) the number and size of inclusions are much reduced, and it becomes crucial for safety and commercial reasons to know the likely size of the largest. Measurement of the cross-sections of inclusions exposed in sampled polished surfaces of the steel can be made reasonably routinely.

Without the emphasis on the largest particles, inference about particle sizes on the basis of two-dimensional sections is a standard problem in stereology (see e.g. Kendall & Moran 1963). The talk will present a development which concentrates specifically on inferences about large particle sizes, combining modern extreme value odelling with stereological ideas. The results will be illustrated with data on clean steels.

## References

Kendall, M. G. & Moran, P. A. P. (1963) *Geometrical Probability.* Griffin, London.