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Autor: Abeles, P.W.

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The Importance of Supervision of Workmanship in Building Construction

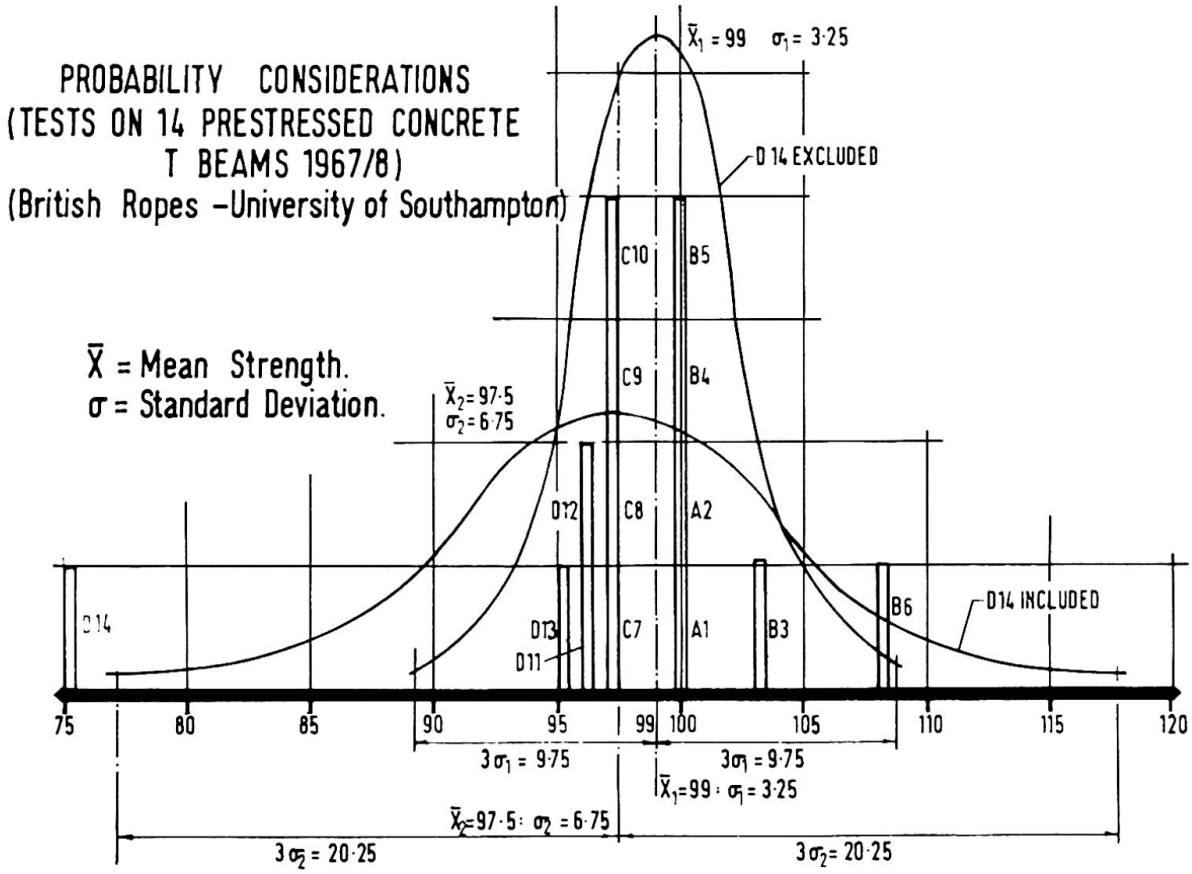
L'importance de surveiller la main d'oeuvre dans la construction

Über die Notwendigkeit der Überwachung der Arbeiten im Bauwesen

P. W. ABELES

Prof. Freudenthal has been one of the pioneers of the introduction of new safety criteria based on a new philosophy of design and his present paper represents a critical appraisal.

With structural members the workmanship is of utmost importance and in this respect the degree of supervision is of great influence which is, however, most difficult to assess at the time when the design is made. In IVb5 (Fig. 12), an example is shown, taken from the contribution in which thirteen of fourteen prestressed concrete beams agreed very well with the expected failure loads, whereas one beam failed at 75% of this load. This relates to partially prestressed T-shaped beams of 24' 6" span, the types A to D having different reinforcements comprising tensioned and non-tensioned strands. All beams are under-reinforced and were designed to fail by yielding. Casting as well as prestressing were specially supervised by one of the authors of paper IVb5. However, at the last beam D14 the supervising engineer had to leave shortly before the flange of 2' widths and 2" depth was concreted. At the test it turned out that a portion in the compression flange of this beam was not properly compacted and consequently early compression failure took place at 75% of the expected failure load.



This Figure shows the distribution curves if in one case all fourteen results are duly taken into account comparing calculated failure moments taken as 100 with actual failure moments. In this case the mean value is 97.5 instead of 100 with a standard deviation of 6.75, whereas these values are greatly improved to a mean of 99 with a standard deviation of 3.25 if beam D.14 is excluded. The corresponding Gauss distributions clearly indicate that it would be most disastrous if such faults in manufacture were expected to occur in practice due to lack of supervision. This example illustrates the difficulty of assessing the magnitude of standard deviation at the design and finding a satisfactory distribution.

This contribution is not intended to query the approach based on probabilistic methods, but rather to give an example of the difficulties which are encountered in ordinary building constructions.