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Editorial comment

ABOUT 120 years ago, when concrete was beginning to rival natural stone as a building material, manufacturers of cements engaged in competitive demonstrations of the quality of their products by subjecting them to what must have been about the earliest reported quantitative concrete strength tests. Even in those days, forces of tens of tons were required to crush small rectangular blocks and the new hydraulic ram developed by Mr Bramah was pressed into service. Ever since these early tests, very much the same apparatus has traditionally been used to test concrete. As the art of hydraulic engineering progressed, better hydraulic presses were made but the quality of the engineering seems to have advanced more rapidly than the quality of the thought behind the testing procedure, with the result that fine hydraulic presses have been produced which nevertheless have serious shortcomings as testing machines for brittle materials. To be fair to the manufacturers of testing machines, they have never been given a proper specification of what is required for testing brittle materials[1], with the result that they have devised machines which are capable of applying a measured load with considerable accuracy but not necessarily in the manner required for testing concrete.

Two recent and quite unrelated developments in concrete technology have suddenly focussed attention on the precision of concrete compressive strength tests. These are the rapid rise in the proportion of concrete which is purchased ready made, for which precise measurement of the compressive strength becomes of great contractual importance, and the acceptance of the statistical concepts embodied in the philosophy of limit state design, for which a reliable estimate of the mean strength and likely variability of concrete is needed.

These changes have stimulated interest in the factors involved in the testing of brittle materials to failure, and it has become clear that the behaviour of the testing machine during a test has a marked influence upon the apparent load which a test piece will sustain before failing. Already sufficient information has become available[2] about concrete cube testing for some important sources of error arising from the behaviour of the testing machine to be pinpointed, and the more progressive machine makers are improving the designs of their machines to overcome these known failings.

It is clear that a standard for testing machines is long overdue and recently several important moves have been made towards generating one. A conference under the auspices of RILEM is being held this month in Stuttgart (see reference 3) to consider the design of testing machines, a preliminary meeting is being convened by the Materials Technology Division of the Concrete Society to make proposals for a British Standard, and informal talks are in progress with the Metrology Division of the National Physical Laboratory and the British Calibration Service to define what is required of a device for making compressive strength tests on brittle materials.

Once the basic specification for machine performance has been settled, the next step must be to encourage manufacturers of testing machines to automate the test procedures. Already there are a few machines in use, unhappily not in Britain, for which the minimum operator intervention is required and which carry out compressive strength tests on concrete cubes completely automatically, recording the results and other information on punched tape for further processing. In an era in which quality control and labour saving are increasingly being recognized as playing an essential part in raising productivity, the building industry will find itself penalized if soundly designed, fully automatic testing machines are not made available to it.

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