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SOME NEEDS OF ENGINEERING[1]

LET me remind you that the practise of our art is still empirical in that most fundamental matter, the strength of the materials which we use, their ability to resist the stresses to which we expose them. It will suffice to touch on two phases of this matter, that our reception tests are quiescent, though in many cases they should be kinetic, and that they do not determine the true resistance of the material even to relatively quiescent stress, as it is applied in many important services. Let us consider these two in series.

It should be an axiom that reception tests should represent the most trying service stresses, which in many important cases are kinetic, arising from impact, shock or very rapid application of stress. This is true of gun hoops, shells, rails, tires, axles, and many parts of motor cars, and of agricultural and other important classes of machinery. The fitness of such materials for enduring these kinetic stresses should be determined primarily by means of impact tests. For each service the severity of this impact should represent the greatest and most rapidly applied stress which is to be expected.

What would you say to using a hydraulic press to determine the ballistic resistance of armor plate or the resistance of a safe to a burglar's sledge? Yet it is only in degree that our present practise is less rational than this, and it is only because fa-

[1] Address of the Vice-president and Chairman of Section G, of the American Association for the Advancement of Science, Pittsburgh, December 28, 1917.