

1. It must give trustworthy results.
2. It must be easy to learn and apply.
3. There should be no necessity for costly or time-wasting mechanical treatment of the material previous to testing.
4. The testing medium for forcing into the material should be cheap, easy to obtain, incapable of altering its shape, and of sufficient hardness.
5. The method should admit of testing finished articles as, for example, armour plates, rails, etc.
6. The testing results should be indicative of the absolute hardness of the material tested, defining the term "hardness" as the resistance offered by a solid substance to the entrance of another substance into it.

He found that a decrease in the size of the sphere gave higher values of hardness factor with more pronounced differences between the specimens of different carbons.

Also, that the value of the hardness factor for a given specimen rose slightly with the loads applied.

These results agree with those herein described, with the hardness factor obtained by dividing the load by the area of projection of indent, and it would seem that the hardness factor obtained in this manner would be simple and satisfactory for the testing of steel rails, while its relation to other factors in their manufacture could be better established in the plant than in the College laboratory.

In conclusion, on summarizing the results of this investigation it would seem that:

1. The hardness factor as herein obtained would be a satisfactory expression of hardness.
2. The yield point in the tension test may be expressed in terms of the hardness factor H . of the indentation test, the value of this expression being about .150 H . for a sphere .75" diameter and .143 H . for a 90° cone or paraboloid $y = \pi x^2$.
3. The percent reduction in area of the tension test for steel up to about .65% carbon may be expressed in terms of the hardness factor, the value of the expression being $(59 - .000108 H)$ for a sphere .75" diameter and $(61 - .000111 H)$ for a 90° cone or paraboloid $y = \pi x^2$.
4. The value of the expressions in (2) and (3) will vary slightly with the type of indenter and the manner of applying the load.
5. For the testing of specimens having a wide range of hardness the paraboloid $y = \pi x^2$ would be found very satisfactory.