

## Hardness Tests as a Tool for Determining the Fatigue Limits of Steel and Aluminum Alloys<sup>1</sup>

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### Abstract

The fatigue limit, which is an indication of fatigue resistance for ferrous and non-ferrous alloys, can be determined by establishing (S – N) curve. Large numbers of specimens are used to establish (S – N) curve. Long time and high cost needed to reach a final result. The fatigue limit of any type of steel and aluminum alloys can be determined quickly from the hardness values (HB) without establishing the (S- N) curve of the material. Two simple proposed empirical models are formulated at zero mean stress without considering the method of fatigue testing. These models are:

Fatigue limit ( N/mm<sup>2</sup> )= 1.25 x (Brinell hardness)

For steel alloys.

Fatigue limit ( N/mm<sup>2</sup> )= 1.9 x (Brinell hardness) + 7.5 for aluminum alloys

The results of these models are compared with fatigue limit values obtained from (S – N) curve. The comparison showed that good estimation of the fatigue limit of Al – alloy (2014) and (St 37C) subjected to rotating bending fatigue test. Also these models when compared with previous models give results in good agreement with the one 's obtained from (S – N) curve, while the other models over – estimated the fatigue limit values.

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<sup>1</sup> For the paper in Arabic see pages (109-114).

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