important to consider all of the things that might have affected the data. The deflection of peened Almen strips depends, for example, upon the elastic modulus of the strips. Equation (1) is a simplified form of the equation (5) that appears in *The Shot Peener* Fall 2009 edition.

$$\mathbf{h = K/E} \quad (1)$$

where **h** is Almen arc height, **K** is a constant and **E** is the strip's elastic modulus. Hence the lower the strip's elastic modulus the greater will be the arc height induced by a given shot peening treatment. Elastic modulus can be affected in several ways mainly by preferred orientation of the steel's grains. A factor commonly overlooked is the testing temperature because it has only a small effect on measured arc height of a given peened strip. Fig.7 shows how the elastic modulus of an Almen strip is affected by room temperature.

Reading from fig.7, the elastic modulus at 28˚C is 2GPa lower than it is at 16˚C. 2GPa is about 1% of the elastic modulus. Hence, the measured arc height on a given peened strip will be some 1% greater at 28˚C than if measured at 16˚C.

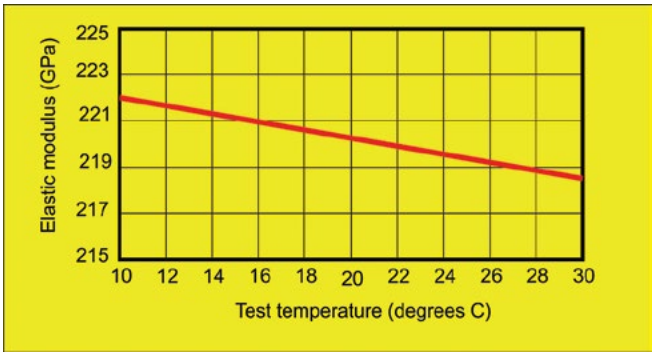

Fig.7. Effect of temperature on the elastic modulus, E, of Almen strips.

DISCUSSION

This article has attempted to highlight the problems associated with achieving accuracy of shot peening measurements. Most of the problems are familiar to shot peeners. Navigating through the various problems is, however, like crossing a minefield. Constant vigilance is required.

Storing data is of vital importance and is not difficult to achieve. Trends can be detected to show what changes are taking place over time. Correction can then be applied where necessary. Measuring equipment must be maintained and routinely calibrated.

Not all the problems affecting accuracy are governed by specifications. A prime example is that of the elastic modulus of Almen strips which can vary significantly.

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Cavitating Jet: A Review

The following paper can be downloaded in its entirety at www.shotpeener.com

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Featured Application: Cavitation peening, Cleaning, Drilling

Abstract: When a high-speed water jet is injected into water through a nozzle, cavitation is generated in the nozzle and/or shear layer around the jet. A jet with cavitation is called a "cavitating jet". When the cavitating jet is injected into a surface, cavitation is collapsed, producing impacts. Although cavitation impacts are harmful to hydraulic machinery, impacts produced by cavitating jets are utilized for cleaning, drilling and cavitation peening, which is a mechanical surface treatment to improve the fatigue strength of metallic materials in the same way as shot peening. When a cavitating jet is optimized, the peening intensity of the cavitating jet is larger than that of water jet peening, in which water column impacts are used. In order to optimize the cavitating jet, an understanding of the instabilities of the cavitating jet is required. In the present review, the unsteady behavior of vortex cavitation is visualized, and key parameters such as injection pressure, cavitation number and sound velocity in cavitating flow field are discussed, then the estimation methods of the aggressive intensity of the jet are summarized.

1. Introduction

Cavitation is a harmful phenomenon for hydraulic machineries such as pumps, as severe impacts are produced at bubble collapse [1,2]. However, cavitation impacts are utilized for mechanical surface treatment in the same way as shot peening, and this is named "cavitation peening" [3,4]. The great advantage of cavitation peening is that shots are not used in the peening process, as cavitation impacts are used in cavitation peening [5]. Thus, the cavitation-peened surface is less rough compared with the shot-peened surface, and the fatigue strength of cavitation peening is better than that of shot-peening [6]. In conventional cavitation peening, cavitation is generated by injecting high-speed water jet into water [3,4], and a submerged water jet with cavitation is called a "cavitating jet". The cavitation peening is utilized for the impacts of cavitation collapses, and it is different from water jet peening, in which water column impacts are used. To use the cavitating jet for peening, it is worth understanding the mechanism of the cavitating jet.