

Application of the Advanced Yerzley Oscillograph (AYO-IV)
and
ASTM D945-06
to
Shapes other than the Standard Cylindrical Test Specimen

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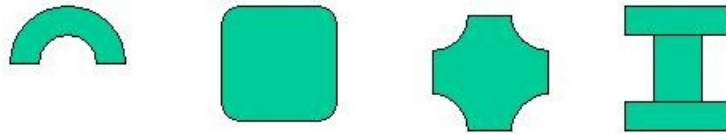
INTRODUCTION

ASTM D945-06 specifies the use of a circular cylinder test specimen. The dimensions of this test specimen are also specified. It is not always possible to obtain a properly dimensioned test specimen. Frequently it is desirable to test a coupon of the actual parts/components delivered by a vendor.

A close reading of the standard ASTM D945-06 as well as a study of prior publications by Dr. F.L.Yerzley shows the way for a scientifically valid method for using sections of actual components as test specimens.

Requirements:

1. The part geometry must be an “extruded shape”. The current specimen is an extruded shape.
2. The shape factor of the new specimen must be consistent with that of the standard specimen.



Examples of possible specimen cross sections

Method:

Calculate the cross sectional area and the perimeter of the specimen. The height is to be determined by the shape factor specified in ASTM D945, which is 0.375 for inch-pound units. The definition of the Shape Factor (Sf) is stressed area divided by unstressed area.

Thus for the standard specimen it is:

$$Sf = (\pi*d*d/4)/(\pi*d*h) \Rightarrow 0.375$$

where **d** is the diameter and **h** is the height.

Expressing the same equation in terms of height, perimeter and area, we have

$$Sf = Area/(P*h)$$

where **P** is the perimeter.

Using the same shape factor as the standard and solving for height, we have:

$$h = Area / (0.375*P)$$

Thus, knowing the area and the perimeter of the shape, we can determine the height of the specimens for a Yertzley Oscillograph test. Note that the equations in the ASTM D945 standard have been reduced. They do not include area or height as separate parameters. AYO-IV software on the other hand allows the user to enter both area and height as parameters. This feature allows the testing of non-standard shapes as long as the shape factor is consistent with D945.