

# Single Axis Adaptors

## For Moment Weight Scales



### Adaptor Theory

An accurate means must be provided to support the turbine blade at a precise distance relative to the measurement axis of the moment weight scale. This is generally accomplished using an "adaptor" which simulates the slot in the rotor hub. (The adaptor is sometimes called a "fixture" or "blade tooling").

The accuracy of moment weight measurement is dependent on the adaptor accuracy. For example, if an accuracy of 0.5 gm-inch is desired, and you budget 1/3 of this tolerance for the adaptor, then the adaptor must be machined to a tolerance of 300 millionths of an inch when measuring an 1.1 lb blade.

Most adaptor manufacturers are not capable of achieving this level of accuracy.

### Criteria for Blade Adaptors

1. The adaptor must contact the blade at the Z-plane. This means that the blade must be forced outward during measurement to

simulate the effect of centrifugal force.

2. For most root designs, there are two surfaces on each blade which must be contacted; it is not adequate to contact only one side of the root of the blade.

3. The contact surfaces must be rigid with respect to the axis of the moment weight scale.

4. Any clamping mechanism which moves in the fixture must not introduce a moment change.

5. The fixture must be easy to use and not require any special operator technique in order to obtain repeatable readings.

### Raptor Scientific Adaptors

Raptor Scientific "Gravity Wedge" Blade Adaptors are more repeatable and easier to use than any other style of adaptor.

Tare moment is not altered by insertion of blade. Repeatability is often better than 1 part in 100,000. There is no clamping knob to tighten, so operator effort is reduced and the disturbing force to the scale is minimized.

The unique slanted aperture guides the blade into position. A wedge at the bottom of the adaptor forces the blade forward, causing the lower surface of the blade to contact the adaptor at the Z-plane. The gravity moment

then rotates the blade downward, so that the upper surface of the Z-plane also contacts the precision interface surface.

Our adaptors are made of hardened tool steel. Wear is minuscule, and thermal expansion is 30% of the expansion of an aluminum adaptor.

### Critical Information

All adaptors are custom designed based on the exact dimensions of the turbine blade. We need the following information in order to design an adaptor:

- Drawing(s) of the outline of the root of the blade, including dimensions and tolerances.
- Nominal pan weight and nominal moment weight of the blade.
- Distance from the center of rotation of the engine to a reference on the blade
- A sample blade. This allows us to assure proper fit, clamping pressure, and ease of use, and it also permits verification of the dimensions on the drawings.

### Library of Adaptors

We have made many adaptors over the years and we may already have a design for your adaptor. Just give us your blade reference and we will be happy to check for you.

**Note:** These gravity wedge adaptors are not suitable for 3-axis blade measurement. We design specific adaptors for that purpose. Please contact us for more information.