

## Adjustable Counter-Weight for Full Turn Rotary Systems

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**Abstract :** It is necessary to test to see if optical devices such as camera, night vision devices are working properly. Therefore, a precision biaxial rotary system (gimbal) is required for mounting Unit Under Test, UUT. The Gimbal systems can be utilized for precise positioning of the UUT; hence, optical test can be performed with high accuracy. The weight of UUT, which is placed outside the axis of rotation, causes an off-axis moment to the mounting armature. The off-axis moment can act against the direction of movement for some orientation, thus the electrical motor, which rotates the gimbal axis, has to apply higher level of torque to guide and stabilize the system. Moreover, UUT and its mounting fixture to the gimbal can be changed, which causes change in applied resistance moment to the gimbals electrical motor. In this study, a preloaded spring is added to the gimbal system for minimizing applied off axis moment with the help of four bar mechanism. Two different possible methods for preloading spring are introduced and system optimization is performed to eliminate all moment which is created by off axis weight.

**Keywords :** adaptive, balancing, gimbal, mechanics, spring

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