

## The Permanent Solution Gas Spring Replacement Actuator Application

By: William Wilk

### Situation Overview

Recently, an air frame manufacturer needed to improve the performance of its stowage bin door operation. The commercial aircraft market is a fiercely competitive industry. Each air frame manufacturer is always looking for a competitive edge over the other. Typically, these manufacturers like to feature their product applications within the aircraft's interior. The air frame manufacturer came to ITT Enidine Inc. for assistance.

### Application Opportunity

ITT Enidine Inc. was given the opportunity of providing an actuator that would raise the stowage bin doors. This new actuator application would be competing with a gas spring solution. The challenge also included optimizing the service life of the unit to 200,000 cycles, reducing the weight to 2.2 ounces, providing controlled damping, and consistent performance over a wide temperature range (-40°F to +195°F). Finally, the solution needed to eliminate any safety concerns associated with an actuator.

### Product Solution

ITT Enidine Inc. developed a GSR (Gas Spring Replacement) actuator to meet the challenge of the air frame manufacturer. The GSR uses a mechanical spring for its actuation force. It is not pressurized, like the gas spring, so sealing the fluid damping medium is much easier.

A gas spring typically leaks nitrogen gas over time. Then the gas spring loses its extension actuating force and does not open the door properly. Gas springs also operate with less fluid, creating a tendency for the seals to run dry and leak.

The GSR seal remains in contact with their internal fluid and does not dry as a gas spring's would, yielding a service life of over 200,000 cycles. It is constructed of lightweight materials such as aluminum and reinforced plastic, leading to a weight savings of over 50 percent compared to the gas spring. This alone results in significant fuel savings for the aircraft operator over the life of the plane. In addition, large temperature ranges do not effect the GSR because its mechanical spring provides a more consistent output force than a gas spring, which experiences extensive internal pressure changes over the same temperature range. At high temperatures, pressure builds up in the gas spring which encourages leakage. At low temperatures, the pressure drops such that the gas spring does not have adequate force to open the bin door properly.



### Project Results

The ITT Enidine Inc. GSR actuator was the optimum solution for the air frame manufacturer. When designing new applications or refurbishing new products that have previously used gas springs, GSR actuators are the permanent solution to provide smooth, consistent lifetime operation. Normally used in the aerospace industry, the GSR product line could be the solution in any application where consistent actuation force is required.