

The “Quiet” Success Story Enidine Rotary Damper Application

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Situation Overview/Application Opportunity

Aircraft lavatory manufacturers have historically built their toilets without a damping feature for the toilet seat or toilet cover. The cover and seat could often be dropped or slammed by a passenger, causing a loud noise, which was disturbing to nearby passengers, or caused structural damage to the seat and cover. A lavatory OEM supplier for commercial aircraft wished to gain a competitive advantage in producing a quiet and safe product. The customer asked ITT Enidine Inc. to design separate rotary dampers for the seat and cover of their toilet. The dampers would replace existing hinge mount assemblies.

Application Data

The lavatory OEM required dampers which would slow the descent of the seat and cover separately. The rate of descent was to be very tightly controlled. The seat and cover, when in their upright positions, were at 105° from horizontal. ITT Enidine Inc. developed rotary progressive damping units which offer increased resistance as the seat and cover approach the horizontal (down) position.

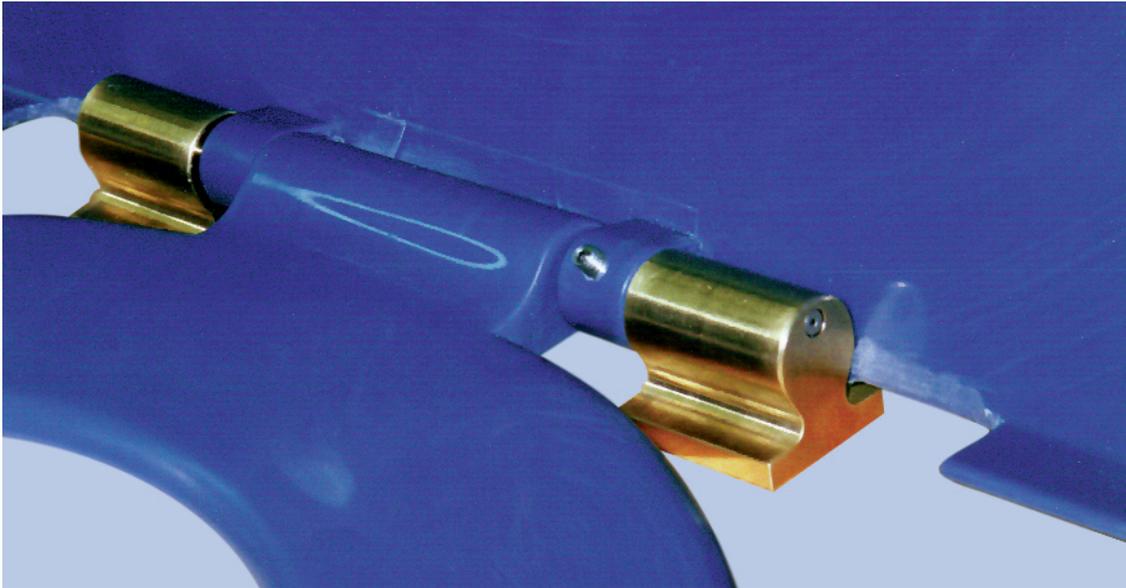
They also needed the dampers to have mounting interfaces which could be molded into their current design. Finally, the damper would need to be corrosion resistant to avoid tarnishing when standard lavatory cleaners were applied to it. Using its aircraft interior expertise, ITT Enidine Inc. assured that the dampers met stringent FAA FAR 25.4 regulation for fire and toxicity.

Other design considerations included:

- Lightweight seat and cover
- Operating temperatures (32°F to 104°F)
- Non-operating temperatures (-67°F to 176°F)
- 500,000 cycle life requirement



Aircraft lavatory manufacturers have historically built their toilets without a damping feature for the seat or cover. A lavatory OEM wanted to gain a competitive advantage and came to ITT Enidine Inc. for the solution.



The two dampers allow the cover and seat to be dropped from a vertical position and provide damping during the last 20° of motion.

Product Solution

ITT Enidine Inc. designed two rotary dampers for the application: One was used to dampen the toilet seat and the other for the toilet cover. The units were originally designed in brass, but in volume could be molded in plastic. The two dampers allow the cover and seat to be dropped from a vertical position and provide damping during the last 20 degrees of motion. The dampers work individually and also function if both seat and cover are dropped simultaneously. The two dampers will even dampen the descent of the lid and cover if they are forcibly slammed downward.

Installation

ITT Enidine Inc. designed dampers were screwed into the hinge mount area. After attaching the dampers to the seat and cover, the total assembly was mounted to the toilet through the original mounting holes.

The optimum mounting solution is to have the toilet manufacturer incorporate flats in the hinge holes. These flats would lock to the mating flats on the damper's shafts.

Project Results/Evaluation

The rotary dampers worked very well in the application and provided the correct damping rates. Production units can be machined or molded, depending upon customer quantities required.

Miscellaneous Considerations

The ITT Enidine Inc. solution provides a lavatory with a competitive advantage over other toilet seat manufacturers. The seat's quality advantage will create new market opportunities and advantageous pricing for the customer. Other potential applications for rotary dampers include doors, seats or compartment door damping.