

Basket Drop Test

By Sidney Conn

Our neighbors love us! Where else would they get such entertainment? We've had the whole fire department come out with sirens screaming in the middle of the night when we were testing the Halon fire suppression system and we lit up the whole sky. We've had the State Police and EMS ambulances attend our "crashes" when we landed and laid our transport truck shape on its side. We've towed polyethylene sheets with sandbag weights around the block when we were testing our new runner protective material. We've had phoned-in threats when we test flew the Condom balloon around the county. We've had people stop on the Interstate and get down on their knees when we took off and flew the Jesus balloon right over them . . . and we always have a good turn out when we do our carriage drop tests in the front parking lot.

What are drop tests and why do we do them? Well, FAR 31 is very specific about what American manufacturers must do to comply. It requires an understanding of the three types that we have to address. The first is the Limit Load. It's the maximum load to be expected in service. We have to multiply that by a "factor of safety" of 1.4 to get the Flight Limit Load and then by 5 to get the Ultimate Load. FAR 31 states that the carriage must withstand this Ultimate Load for three seconds. Given that a carriage may be required to carry 2,000 pounds of passengers, this is no small feat!

Now for the fun part: FAR 31 states that the carriage must be dropped at "design maximum weight" at angles of 0, 15 and then 30 degrees. Some structural failures may occur but nothing that would endanger passengers and in our case (self-imposed) the fuel system must remain intact.

We recently certificated our new rattan-framed 54" x 68" divided-compartment carriage. The empty weight of the carriage is 269 lb. The carriage can carry six passengers (170 lb each as per FAR 31.25) plus the pilot and six fuel tanks. That's right at 1,950 pounds. In order to do the test at "worst case", we topped the tanks with water to give twice the weight of a tank of propane tank at 80 percent to see if we could cause structural floor damage. We made up the rest of the 4,208 pounds with sand bags. The carriage was suspended by a steel I-beam and quick-release that's designed to drop lifeboats from ships. Since this whole assembly also drops on to the carriage, we put an old envelope on the top to cushion the blow. The envelope and I-beam weighed just over 400 lbs.

The crane arrived and so did the official observers and the "Peanut Gallery". Altogether we had the makings of a fair sized dinner party, this was serious business.

During the first drop, we delighted everyone but scared the bejeebers out of the crane operator. At the instant of release, the crane bounced upward and two of the outriggers cleared the ground! The I-beam came crashing down, the carriage flexed as

designed and the loud thump and rattling chains made an unearthly sound. Inspection showed almost no damage, except for a minor delamination of one of the rattan rails, right at the bend.

Drop two, at a 15 percent angle of attack, was more interesting. There was a two-part thump since the leading edge of the carriage hit first and the trailing edge continued to accelerate until it struck the ground. Again, there was little damage but some cracks appeared on the bottom of the floor at an unsupported area right beneath the tanks.

Drop three was violent. The beam came crashing down, impacting the top of the carriage before it actually hit the ground. The carriage flex was very severe! We managed to crack the attachment points of two of the horizontal rattan members but they didn't disengage from their mounts.

The test was deemed successful, by the FAA, by us and by the spectators.



This shows the 15-degree drop from the narrow side. Note distortion on the near side and right side.

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