

Hangar Bangers

Hangar rash and other airplane bashings can do substantial damage quickly. The good news is that prevention is fairly simple

by Pat Veillette

I recently listened to an aviation insurance official cite a collection of claims for aircraft damaged during ground operations. The cost of even the smallest “hangar rash” can be quite high to both the insurance company and the owner who has to pay the deductible. Given an expense for even a small dent, it can be tempting to ignore it rather than dig deep into your pocket to pay for the repair. Is this wise? You might be able to let the dent go, but then, maybe not.

The risk lies in the nature of aircraft design, where engineers demand maximum strength with minimal weight. A couple ounces of simple aluminum can support 200 pounds if the material is shaped into a stable structure. I use a simple demonstration to illustrate this point to engineering students.



Count the hazards: multiple vehicles close to the airplane at night with at least three people working.

If an average sized individual steps carefully on a soda can, the few ounces of material can support them. That is a remarkable strength-to-weight ratio, a property that is obviously very desirable in aircraft structures. However, once the student is standing on the can, I take a small pin and exert a touch of pressure to the side of the can. That slight pressure causes the side of the can to deflect slightly, which instantly collapses the can.

The same dynamics apply when it comes to dents in an airplane with a semi-monocoque design. Light materials can carry amazing structural loads as long as the integrity of the shape is maintained. However, a small dent in a critical spot can seriously compromise the load-carrying capability of the structure. In the case of an aircraft, it's certainly much cheaper and a lot less painful to prevent hangar rash in the first place than to pay for the damage afterwards.

Towing

The risk of damage to an aircraft during ground operations is the highest when the aircraft is towed. There are many precautions that should be followed to reduce this risk.

Prior to moving the aircraft, inspect all sides of the aircraft perimeter and the proposed path of movement, looking for obstructions anywhere close to the aircraft's wings and tails. Check the condition of the pavement and drains to make certain the aircraft isn't towed over a suspect surface.

If you are using a tug, it should be inspected and proper braking action assured. It would be quite a disaster if the brakes on the tug were to give out during the towing operation. If possible, it's wise to have two wing walkers while moving the aircraft with a tug. The towing operator should maintain continuous visual contact with the wing walkers in case a wing walker spots a possible collision.

If the tow operator loses sight of a wing walker, the tow operator should immediately stop. Needless to say, if there is any doubt that sufficient clearance exists, a wing walker should command an immediate stop. It should go without saying that the aircraft should be towed at a slow walking speed. If the aircraft is going to be pushed into a spot or a hangar, a spotter should be positioned at the back of the aircraft with visual eye contact with the tug driver to prevent the airplane from being backed into an obstacle.

Ramp Movements

The risk is second highest when an aircraft is moved under its own power on a ramp. The list of ramp hazards that have caused aircraft damage is long. Airplanes have hit hangars and trees and light poles and fuel trucks and parked airplanes. There are instances of aircraft taxiing over drain gates, only to have the drain gate collapse.

Sometimes the ramps have a distinct slope, which is made worse during icy or snow covered conditions. Prop and jet blast from other aircraft is always a hazard, especially when it blows loose items into nearby aircraft. Vehicles will always be hazard on a ramp.

Whenever taxiing into a ramp, you should slow down and visually scan the ramp for any of these hazards. If you're not familiar with the ramp, you can report your position and intentions on the Unicom frequency and an attendant may give you directions or dispatch a "follow me" cart.

Ground marshalls can be helpful to avoid ground collisions if ramp space is particularly tight, though nearly half of the business jets the database lists as being damaged were under the direction of ground marshalls at the time. If ground marshalls don't provide the correct hand signals at the start, you should probably be concerned that they haven't been trained properly.

One person, no matter how well trained, can't see your airplane from every angle, so in some circumstances it makes sense to ask the ground marshaller to have wing walkers. Only a wing walker standing in close proximity to your wing tips and tail can clearly observe the distance between your aircraft and a nearby obstacle.

If help from outside isn't available, there is one trick that can help if the sun is high in the sky: Compare the shadows on the ground. But when in doubt, enlist the help of someone outside or shut down the airplane and see for yourself. Don't set the parking brake and leave the airplane unoccupied with the engine running and don't ask a passenger to exit while the propeller is spinning.

If a parking spot is really that tight on a ramp, it won't hurt you to park farther out on the ramp and walk a little longer. And that would be infinitely cheaper than trying to squeeze into a tight parking spot and damaging your aircraft (and probably someone else's).

Another ramp action that invites trouble is cutting across a parking ramp at a skewed angle. Ramps often have chocks lying around, and sometimes other equipment or debris is present near parking spots. Few things will ruin your day faster than hitting a chock with a prop or even picking up a loose screw with your tire.

Those centerlines were drawn to keep your wingtips as far away as possible from parked aircraft. They also serve the additional purpose of keeping your airplane away from debris, since the chances of a stray chock laying in the middle of a taxi route are somewhat less.

A final caution on taxiing an aircraft in the ramp area: Keep your attention focused outside of the aircraft. Checklists and other concurrent duties can wait until you are out of the ramp area. Such concurrent duties should be delayed until you reach a long straight uncongested taxiway, or until you can stop.

This is especially important if your taxi route isn't clear. Stop the airplane to consult an airport diagram or take notes of a controller's instructions rather than trying to divide your attention.



A safe hangar is one that is fairly clear of clutter and has floor markings that will keep the wing tips clear of the doors and the empennage and wings clear of the back wall. A set of chocks just to be sure is also a good idea.

Vehicles on the Ramp

The risk is third highest when ground service equipment is moved around aircraft. Fuel service trucks moving between aircraft, external power units and personal vehicles hauling baggage out to an aircraft have damaged a lot of wingtips.

One large fuel provider now requires its personnel to place chocks on the back tires of its fuel trucks. The purpose is to prevent the vehicle from rolling into an aircraft, as you may presume, but it is also to get the driver out of the truck to visually inspect the area behind the truck. So far, the company's rate of ramp damage by service vehicles is reported to have shown a remarkable decline.

Operators of other vehicles should also take steps to avoid damaging airplanes. For instance, vehicles should always be positioned so that if it rolls for whatever reason it will not roll toward the airplane. If someone parks in such a way that the vehicle might roll into the airplane, bring it to their attention and have them reposition the vehicle.

If a car or other vehicles is left unattended on a ramp, make sure the engine is off. If there is a slope to the ramp, put a set of chocks under the tires.

Hangar Rash

The fourth riskiest event for ground damage occurs around the hangar. Sliding hangar doors that are not fully opened can snag wing tips. Bifold doors can crop vertical stabilizers. Swinging doors can get caught by a wind gust and damage propellers or wings.

The potential for damage is present regardless of whether it's your own T-hangar or the airplane is being moved into a larger hangar for maintenance or storage. Airplanes and doors, walls and structural frame members don't mix.

The damage can also come from unexpected places. Some tugs are not compatible with 3-blade propellers. When the driver turns the airplane, the tug's tow mechanism can take a chunk out of the prop. Some airplanes, Mooneys in particular, have a wide turning radius and tug operators who try to pivot the airplane sharply will damage the landing gear.

In one hangar incident, an aircraft's tires deflated. It would have been a non-event except that the wings overlapped other aircraft. As the tires failed, the wings were damaged when the aircraft settled onto another one.

Floor markings that guide the pilot when moving the aircraft and alert the crew to the best entry and exit positions are recommended. The limits should be clearly marked. You don't have to paint the lines on the floor, either. Colored duct tape sticks to concrete well and is easy to see.

Great care is particularly applicable when the aircraft is being pushed into a hangar, since it is difficult for the tow operator to maintain an accurate perception of the rear area of the aircraft.

Human Factors

It shouldn't surprise you that being in a hurry was the leading factor in many ground collision incidents. It's very clear that as pilots and ground personnel hurry the risk of ground damage rises substantially.

When I flew air ambulance missions, we kept our aircraft in a hangar to protect it from the elements. When the "red phone" rang, there was a perception of time pressure to get the aircraft out of the hangar in a hurry and have the aircraft's engines ready to crank as soon as the hospital crew arrived.

To guard against this mission-induced time pressure, I would have the aircraft fully preflighted at the beginning of the tour and have the tug already hooked up so that when the phone rang, I had already saved myself a number of precious minutes. The strategy worked because I was always waiting for the nurses to arrive.

Time pressure is the second leading overall factor that increases the chances of human error. This goes for departure, of course, but it also applies when you hustle to get an aircraft into a hangar because of incoming hail or windstorms. Waiting until the last minute to do something as important as getting an aircraft into the protection of a hangar is going to risk this “hurry up” syndrome.

It’s much wiser to do such important tasks when you have the time to do them conscientiously and with the proper precautions. Try to position your aircraft when you aren’t rushed for time – or simply refuse to let yourself be rushed into hurrying.

Failure to ensure adequate clearance is another leading item. Communication breakdowns between wing walkers and the person towing the aircraft are cited often, as well as a loss of situational awareness.

Adding to the problem are the factors common to many ramps. Aircraft are often spaced too closely together, the ramp may be slick, and the illumination may be poor at night. Visual obstructions are often present, and it can be difficult to hear someone shouting a warning on the average noisy ramp.

Most of the attention in aviation safety is usually paid to the in-flight phases, but clearly the ramp can be a hazardous location. Attention to ramp safety needs to be equal to attention to flight safety.

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