Hydroplaning

There are three types of hydroplaning: dynamic, viscous, and reverted rubber.

Dynamic hydroplaning requires 1/10th inch or more of standing water on the runway. Excessive tire tread wear, insufficient groove depth, and overinflation exacerbate the problem as the tire alternately rolls on the dry surface and skis on the wet. Pilots who have taken off or landed during heavy rain have probably experienced this phenomena, though they may not have realized they were hydroplaning. In the airplane, it feels as if the airplane is alternately sliding and jerking, typically from side to side.

Viscous hydroplaning is probably the most common of the three types. It occurs on a smooth runway or one on which there are rubber deposits present, such as in the touchdown area. It requires only a thin film of water that the tires are unable to penetrate, causing a partial loss of contact with the runway. It can happen at a speed significantly below that which you normally would anticipate hydroplaning to occur—even at a fast taxi!

Reverted rubber hydroplaning is a bit more complicated. The necessary conditions are a wet runway surface and a skid in progress. When the tire locks up because of hard braking on a slick surface, the resultant friction generates heat and the tire begins to smoke. Rubber debris collects under the tire, causing water to build up in front of, and underneath, the tire. The heat turns the water into steam and the tire actually rises up and floats on the steam. There is no runway contact, a severe loss of control, and, yes, it really can happen in light aircraft as well as heavies.

There is a simple formula to determine at what speed an airplane will hydroplane. It is 8.6 times the square root of the tire pressure measured in pounds per square inch. That will give you the lowest entry speed; however, once hydroplaning has begun it can continue at lower speeds! For instance, the Cessna 172Q nosewheel holds 45 psi, and the main gears hold 38 psi. That means that the nosewheel will begin hydroplaning (if the conditions exist) at 50 knots and the main gear at 46 knots.

A Beech 58A Baron nosewheel has 55 psi; the main gear has 52 psi. Hydroplaning is at 56 and 54 knots, respectively. Obviously, the best plan of attack is to try to touch down below those speeds if there is standing water or other conditions conducive to hydroplaning. Further, it is advisable to not use brakes until the aircraft has decelerated below the calculated hydroplaning speed. Instead, use aerodynamic braking until reaching that speed.

Remember that hydroplaning can happen anytime you are at or above the speed, whether you are landing or taking off. Because the grooves between tire treads play an important role in getting water out from under the tire, it is important that they be checked on each preflight. The best method is to use a manufacturer approved depth gauge, but at least check them visually.

Preflight

There is not a lot of preflight associated with tires. Probably the most important thing is to look at their overall appearance and condition. Look carefully for cuts and nicks. Check cold tire inflation against the POH's recommendation for tire pressure. Finally,