

Holding Brakes: What They Are and What to Look For

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Brakes are not a foreign concept. Simply put, they are the mechanisms within our cars that enable us to slow down for yellow lights and stop at red ones. However, as a few of us have probably found, our cars need more than just brakes for the common, everyday functions of an intersection stoplight. We need parking brakes (also referred to as emergency brakes or e-brakes) when parking, especially on a steep hill, or in more extreme cases, when we happen to be sliding down a mountain due to brake failure.

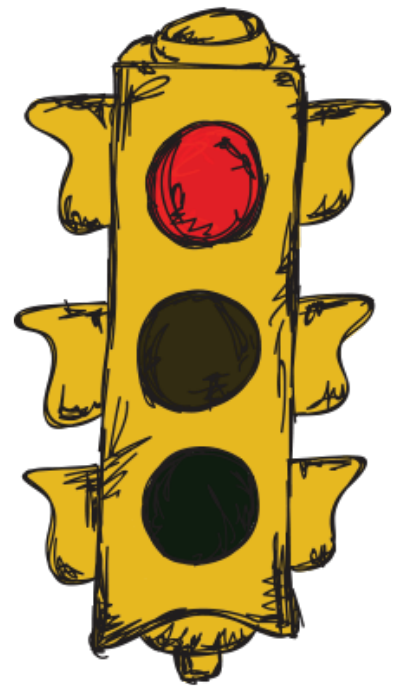
Essentially, holding brakes serve as both types—the “normal” and emergency—in various applications beyond just the automotive industry. Holding brakes work to either induce an abrupt stop or to keep their load from further movement. We can break this down further (no pun intended) into two subcategories: holding-only brakes (or “static” holding breaks) and stop-and-hold brakes.

HOLDING-ONLY BRAKES

Although rather self-explanatory, holding-only brakes are ones that serve the primary function of holding a load in place once power has been turned off. Movement has stopped; rotation is finished. The only remaining need is for the load to be maintained until operations begin again. It's like when someone waits for another person to open the car door because they have too many groceries in their hands. They are in holding mode, and their bananas and milk are just resting in their hands waiting to continue the action they had previously started. Think of various factory automation or medical equipment—some applications, such as inclined conveyor belts, just need help remaining at rest (like a car parked on a hill), particularly if they are at slanted angles or have asymmetrical orientations.

STOP-AND-HOLD BRAKES

Stop-and-hold brakes, on the other hand, not only act as the instantaneous, white-knuckled death grip in emergency stop situations, but they also are what help bring cranes, elevators, and various construction equipment to a stop and then hold the position. Picture yourself on a Ferris wheel with cotton candy in one hand, camera in the other. You ride for a couple loops, and then it's time for passengers to start exiting their baskets. Your ride suddenly switches from smooth to choppy while the baskets slow and wait for fair-goers to slowly make their way to other attractions. This is what stop-and-hold brakes do.



SPRING-APPLIED BRAKES (POWER-OFF BRAKES)

Most applications make use of spring-applied brakes in order to perform these functions. These are the most common type of brakes and host a variety of perks:

1. Comparatively low cost
2. No additional controls required
3. Less heat build-up

Spring-applied, or spring-set brakes, use water, air, or electromagnetic pressure to disengage brake springs, which in turn, apply pressure to internal plates within the brake. This acts as a form of clamp, thus maintaining the load. (Hydraulic and pneumatic are often used in higher torque applications, while electromagnetic is best used at lower torque levels.) In the case of an electrical outage, many brakes are equipped with manual overrides that allow for brake use even without power.

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For most applications this would (and does) work, but what about the instances where an abrupt stop isn't ideal? What if a conveyor is carrying fragile items or if someone is fast-tracking it through the airport on a moving walkway and the electricity goes out?

These situations would require a more gradual stop to occur, or rather, a “soft stop,” which is a characteristic of spring-applied brakes' more high-maintenance counterpart: the permanent magnet brake.

PERMANENT MAGNET BRAKES (POWER-ON BRAKES)

Permanent magnet (PM) brakes have a higher power density and higher torque function, but in order to achieve this, a controller must be set in place to adjust the voltage. This needs to happen because whereas spring-set brakes simply need power to disengage the springs, PM brakes work by using power to engage the magnetic coil with the magnetic field of the permanent magnet. To cancel out the attraction between magnetic fields (and resultant clamping of the brake), the controller terminates the flux of the permanent magnet, thus releasing the brake from its locked position.

Both types—Power-On and Power-Off—are offered by Groschopp and can be customized to fit the needs of a variety of applications. Various mounting practices can be undergone, temperature, corrosion, and humidity modifications can be made, and even different types of discs can be used—heavy friction discs, stationary discs—to help combat harsh conditions or special environment demands.

