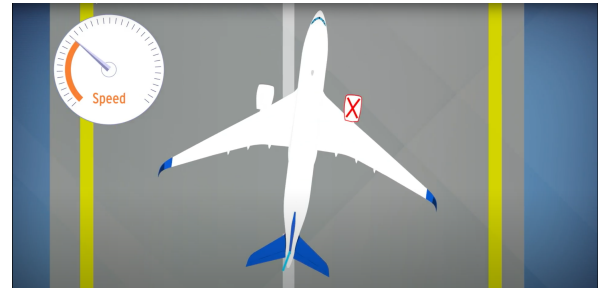


VMCG TESTS



Definitions

When an engine fails during a take-off roll, there is a speed below which the take-off cannot be continued safely because of a lack of lateral controllability. This speed is known as the VMCG.

The VMCG is defined as the minimum speed, during a TOGA take off roll, at which, if an engine fails maintaining maximum thrust on the live engine(s) with full rudder pedal application, the lateral deviation does not exceed 30 ft before lateral control is recovered.

Purpose of the Flight Tests

The method used to determine the VMCG is to shut down the engine during TOGA take-off roll by selecting the master lever to off with the nose wheel steering already cut off to simulate wet runway conditions. This is done progressively over several runs where the engine is shut down at different speeds. It starts at a speed above the predicted VMCG, and then progressively reducing the speed at which the engine is cut-off, until the 30 ft lateral deviation is exceeded. When approaching the actual VMCG, the lateral deviation becomes very sensitive to the cut-off speed decrement and the pilot's reaction time. The safety of this test requires special care to be repetitive in the way the flight test is performed considering cut-off and reaction times (e.g rudder input).

Application to Line Operations

By regulation V_1 is limited by VMCG ($V_1 \geq VMCG$). When V_1 is close to VMCG (low weight), if an engine failure occurs just above V_1 , the lateral control may require immediate and full rudder application. Any cross wind from the failed engine side increases this need of immediate pilot reaction. VMCG tests are done without cross wind.

Since the lateral deviation at engine failure around VMCG increases dramatically with a small reduction of the failure speed and is very sensitive to the pilot reaction time, an engine failure before V_1 requires an immediate thrust reduction and an immediate rudder application. At very low speed, differential braking action may be required in addition.

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