

## Accidents in aerotow

On June 25, 2023, at about 2:30 p.m., a Robin DR400 powered aircraft crashed into a cornfield during a tow shortly after takeoff from Nikolsdorf airfield. In the process, the 43-year-old tow pilot lost his life. He was an experienced pilot from Oberkärnten and was towing a glider with a 56-year-old Austrian and a 65-year-old Italian pilot.

AUTHOR ROLAND BIERI

ccording to initial investigations, the glider began to oscillate at a very low altitude shortly after takeoff. At the same time, the

canopy opened, causing the glider to rocket upward and the tow plane to tilt forward and crash. It hit the field vertically, caught fire and burned out completely.

Members of the Federal Safety Investigation Agency were already conducting initial surveys at the crash site. The accident wreckage and the towed glider were seized, the autopsy of the deceased was ordered by the court and an aviation expert was appointed to clarify the question of how the accident occurred. The Innsbruck Public Prosecutor's Office initiated a preliminary investigation against the occupants of the glider.

This sad newsflash appeared in the

"Dolomitenstadt" at the end of June. What exactly led to this accident is still under investigation.

Based on the newspaper report, two topics stand out: Pilot Induced Oscillation (*"the glider began to oscillate at a very low altitude shortly after takeoff*") and a tow plane being pulled into an uncontrollable position by the glider (*"causing the glider to rocket upward and the tow plane to tilt forward and crash*").

This article discusses the second issue, then oscillation in the next issue.

While towing the two planes fly in formation on the rope, the glider pilot "puts the wheels of the tug on the horizon" (*picture below*) and always maintains the same lateral attitude as the tug. The rope forces are small in a steady tow position: e.g. 1/40 of the aircraft weight at a glide ratio of 40 (10 kg for a 400 kg glider).

## Slow divergence of flight paths

If the glider slowly drifts away from the correct position due to distraction or lack of concentration, the rope force increases and the tow pilot must control the attitude and direction of flight with greater rudder deflections. This works only until he is at the stop with the corresponding rudders. With even larger deviations the further flight path is no longer controllable – every glider can bring a tow train into an uncontrollable position this way! Mostly we have enough time with small trajectory deviations to steer the glider back into normal position. If everything escalates too much, only one thing helps: release the tow rope.

In any case, the rope must be released immediately when the tow plane is no longer in view. If there is a lot of slack in the rope, you must act quickly but carefully. A adequate use of airbrakes is not



The correct position in the F-tow is not easy to recognize in the mountains

easy. Because of the increased speed in aerotow, the airbrakes are sucked out by the vacuum after unlocking, so that they extend further than planned. Excessive airbrake deployment can provoke a violent jerk with subsequent rope breakage. A sagging tow rope can – if you act immediately – also be corrected by some slipping. If it is necessary to descend for a longer time during a tow (e. g. during a crosscountry tow with a descending cloud base), the tow can be stabilized by moving the glider into low tow position (under the propeller gusts).

In basic training, the advanced student learns how to correct abnormal towing positions. A good exercise for this is the so-called box tow (*picture below*): first the instructor flies the exercise, then the student. I know several cases that have led to a critical attitude because (especially lateral) there was a too extreme deviation from the normal attitude. Problems are strong rope sags. In one case, this led to rope breakage/loss when trying to stabilize the situation. In another case, the rope sag was so severe that the rope wrapped around the left wing and got caught on the extended airbrakes - the glider landed just short of the runway with luck. It pays to perform such exercises with a healthy margin of safety.

Before a formation flight, it is a matter of course for the pilots involved that a detailed briefing about the flight sequence is made. In daily glider operations, communication between the tow pilot and the glider pilot is usually limited to indicating the desired release location.

For the tow pilot it can be interesting to know whether the towed glider is filled with water and weighs 800 kg, whether it has only a belly hook or that the maximum speed in aerotow is 100 km/h (e. g. with the Grunau Baby) – a Robin pilot would have to start thinking a bit. Before special exercises, it is always worthwhile to clarify the procedure in a briefing and to define possible abort criteria, so that everyone involved has the same mental model in mind. If you



Left The box tow: First the glider sinks below the propeller gusts, then shifts half a span to the side, then slowly upwards. Very important: the tug must always be visible! As sketched the figure is completed **Below** This is the correct altitude of the glider after takeoff



simply call out quickly before takeoff: "Fly an eight in tow," you as a flight instructor will then be amazed at how many versions of eights there are. Conclusion: Do not tolerate small deviations. If the situation gets out of control or the towplane is no longer in sight, there is only one thing to do: RELEASE IMMEDIATELY!

## Dynamic attitude errors

Situations such as the accident mentioned at the beginning of this article arise within seconds, and if there is not an immediate release, the rope is cut or the rope breaks, a crash cannot be prevented. The glider should remain at an altitude of one to two meters after take-off until the tow plane has also taken off (picture below left). Defending this low altitude with increasing speed is not easy for student pilots and even the experienced pilot has to concentrate. A disturbance by a gust, contact with the ground (e.g. due to a bump) or any other surprise usually leads to "fleeing upwards". Just a quick pull on the stick and you're at ten meters. But now comes the shock "I'm too high" - push. The disaster takes its course.

The tow pilot has very little time to save himself by immediately cutting the rope. I claim here that most of them hesitate a few seconds, after all the rope has to be repaired afterwards and there is also the hope that the glider will release. After these few seconds, it is then too late. As mentioned at the beginning, I will discuss oscillations and what can be done against them in the next article.

## Factors influencing the risk

For aerotow, the nose release hook of the glider must always be used. If this is missing and the cg release must be used, the glider pilot must be aware that a rearing moment occurs due to the release position and that he must actively steer against it in the takeoff phase. This moment also exists with jerky loads In aerotow, concentration on flying is the nuts and bolts, everything else is incidental.

in flight. A tow rope engaged in the nose causes stabilization of the sailplane in the towing direction; this is absent with the cg release.

The trim must be adjusted before takeoff according to the flight manual. A rearward CG position and/or pendulum rudder make steering challenging. A short tow rope logically also makes the tow more unsteady, a rope length of 50 to 60 m is recommended.

A dynamic escalation of the tow attitude always comes as a surprise to those involved. For this reason, it is very difficult to react quickly enough in the right way. There is almost only one solution: release immediately! This is easier said than done, because instinctively we want to try to save the situation.

With mental preparation in the takeoff briefing (if the wing goes down during takeoff, if I get too high, if there is ground contact after takeoff, then I immediately release twice) the inhibition to act can be reduced. Such a rejected takeoff can be life-saving and there is no need to discuss. ◆



VERSICHERUNGSVERMITTLUNG

Tel: +49 (0) 89 744 812-0 www.peschke-muc.de