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Introduction to the Model Aircraft World
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Aeromodelling as a School Project

Having fun while promoting new talent

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A cooperation project run by the Rossendorf aeromodelling club and a nearby high school in Dresden is an example of how pupils can be introduced to our fascinating hobby while also covering aspects of the physics curriculum.

We have been offering the "Aeromodelling" project for a few years now. It involves weekly 2-hour sessions of building and flying in turn and has been very popular from the start. As an introduction, in the novice school year, we had pupils build chuck gliders from different materials such as polystyrene, Depron or balsa. Initially, we would then progress to building larger models. Various versions of lightweight motorised gliders proved to be quite successful, with two pupils working on one model. Due to their benign flight characteristics these models are quite suitable for RC training.

From Outdoor to Indoor

The construction of models in the Rossendorf workshop presented no problems. Flying them, however, was more problematic: either the weather was unsuitable on the designated day or pupils failed to find our flying site. The lack of public transport to the site was also criticised. Regular RC training proved to be impossible. This was overcome by using the sports hall once lessons were over for the day. We did not want to offer pupils state-of-the art aerobatics models but rather let them learn the art of steering with

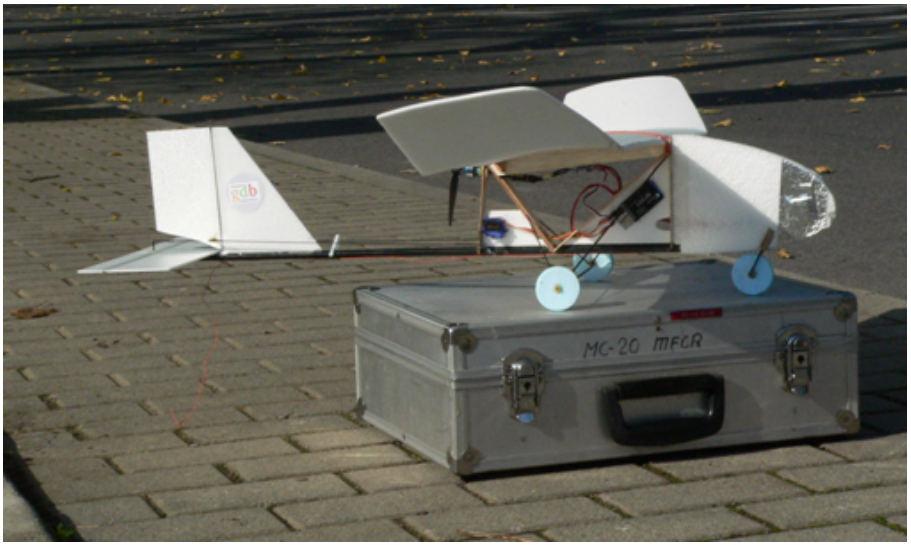
an easy to fly high wing model. We believed that the experience we had gained outdoors would transfer indoors, but the law of inertia proved us wrong on several counts: An object will remain in a state of linear (flying) motion until…. the instructor thinks: "Surely he'll turn now?" And before you know it, it's hit the wall. Or the instructor watches a pupil pull the model up at full revs when starting and suddenly change into idle. Before the instructor can react, the model pitches and the motor hits the floor. This rapidly became far too costly.

Looking for a suitable model aircraft

A new design was required that could provide the following characteristics: resistant against wall impacts and crashes, slow flying, benign handling. Slow flying had already been achieved in the model with forward propulsion through lightweight construction and a suitable wing profile (160 grammes, curved plate). Impact resistance, however, came at a price: The high wing pusher model with impact resistant rear propulsion – a design "borrowed" from the Czech motor glider OGAR – weighed 220 grammes (13.5 g/dm^2). This made it a bit faster but extremely robust. The 26 mm thick EPP nose was very good at absorbing impact energy and from then on, propeller and motor remained intact. The undercarriage was repaired only once. Further development finally resulted in the low wing pusher with a reduced wing load of 10 g/dm^2.

Flight School

We have now been using this model type for three years to train novices – mostly 5th grade pupils (10 to 11 year-olds) – and the result is fairly impressive. In the course of one school year, about 75% of pupils learn how to control these simple motorised flying models indoors. They not only learn to overcome the big hurdle of reversed steering when the model is flying towards them but are also able to place it into cruising attitude by pushing down and carefully reducing revs. They also know to pull up in a turn to keep the model horizontal but tend to take a bit longer to then steady it after flying through a turn. Despite being aware of the fact that a model will exit a turn with more speed than entering it and that this overspeed results in the nose rearing up, finding just the right moment to push down is tricky. Quite often, pushing down at the wrong time can actually amplify longitudinal oscillation. This simply requires a bit more patience from the instructor.

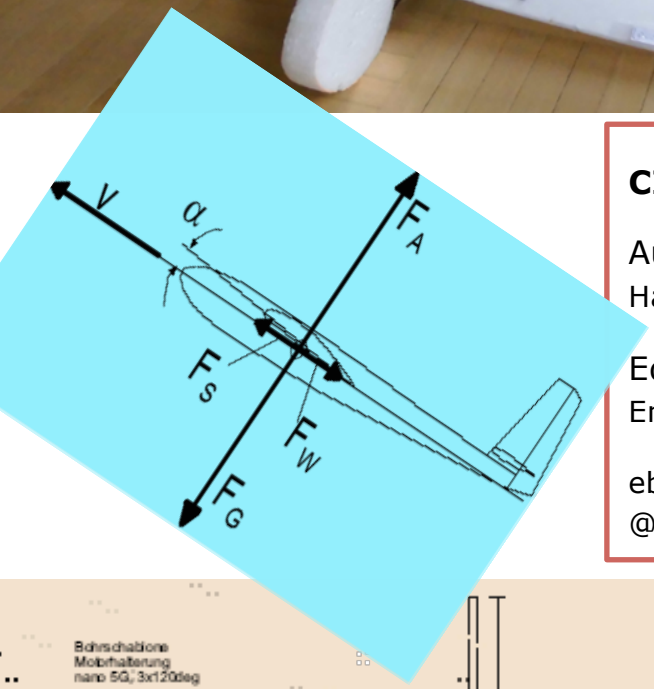


Good Results

We would not be writing about this training method if it had not led to the hoped-for time saving in subsequent outdoor training. In one aeromodelling holiday camp, for example, the young people only needed two training days of 2 hours each to master even the motorised gliders with 2 m span. At the end of the week-long camp, three out

of four pupils were able to take part in the concluding competitions in electric class E without assistance. Other pupils are now successfully representing our club in class F3K competitions (RC Hand Launch Gliders).

Three school years of experience have led to a substantially optimised ratio of mass to strength for the present low wing pusher. A large proportion of impact energy is absorbed by the EPP nose. A balsa plywood structure resists the shear forces transmitted to the fuselage. Even the wing of 3 mm curved Depron contributes to the model's robustness as it deforms elastically on impact. Construction details for the model can be requested from info@mfc-rossendorf.de and there is also information available on our website at www.mfc-rossendorf.de, but the experienced aeromodeller will no doubt quickly find a solution of there own.



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Aeromodelling and Physics

If the joy of flying is to be extended to integrate with material from the school's curriculum, there are plenty of opportunities, as demonstrated by the following examples. Model aircraft are "moving bodies" in the physical sense. Their flight is divided into motion with steady acceleration at take-off and cruising - here the desired slow flying - as motion with constant speed. Pupils tend to be enthusiastic when set tasks that involve measurements. If the project has enough participants, measuring via waypoints is appropriate. Even if time measurements show significant statistical variation, evaluation using linear interpolation (regression line) will be more accurate than "integral" speed measurement with only two waypoints.