



Středoškolská technika 2017

Setkání a prezentace prací středoškolských studentů na ČVUT

GYMNÁZIUM ZIKMUNDA WINTERA RAKOVNÍK

Tým Ragtag Drifters:

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On 7th April 2017, our team attended the H2AC contest in Prague. Its purpose was to demonstrate the capabilities of hydrogen-fueled car models, in our case a Himoto Nascada 1:10 sized racer. The contest model comprised two kits - the basic electrical car model Himoto Nascada 1:10 complete with additional replaceable wheels and tires, and the 30 W hydrogen power unit utilizing pressurized hydrogen cells. The design of both systems allows them to operate together with minor adjustments.

The purpose of the hydrogen system is to supplement power input to the RC540 motor of the car. Our immediate concern was with the power connectors, as the RC battery pack had standard Tamiya connectors, while the hydrogen system control circuitry used T connectors. A logical first step was to assemble the RC model without the hydrogen bypass. That way, we could experience ourselves with the functioning RC model without deviating from the assembly manual.



Fig. 1: central axis (blue) next to the DC motor.

The rules of the contest required several rather drastic changes to the RC model. Namely, the shock absorbers had to be dismantled and replaced with static reinforcements (Fig. 2). The front gimbal was blocked (in fact, it was glued) and front axle was dismantled as well. Rear differential was blocked. All the changes proved significant for the model performance, although the car remained quite agile.

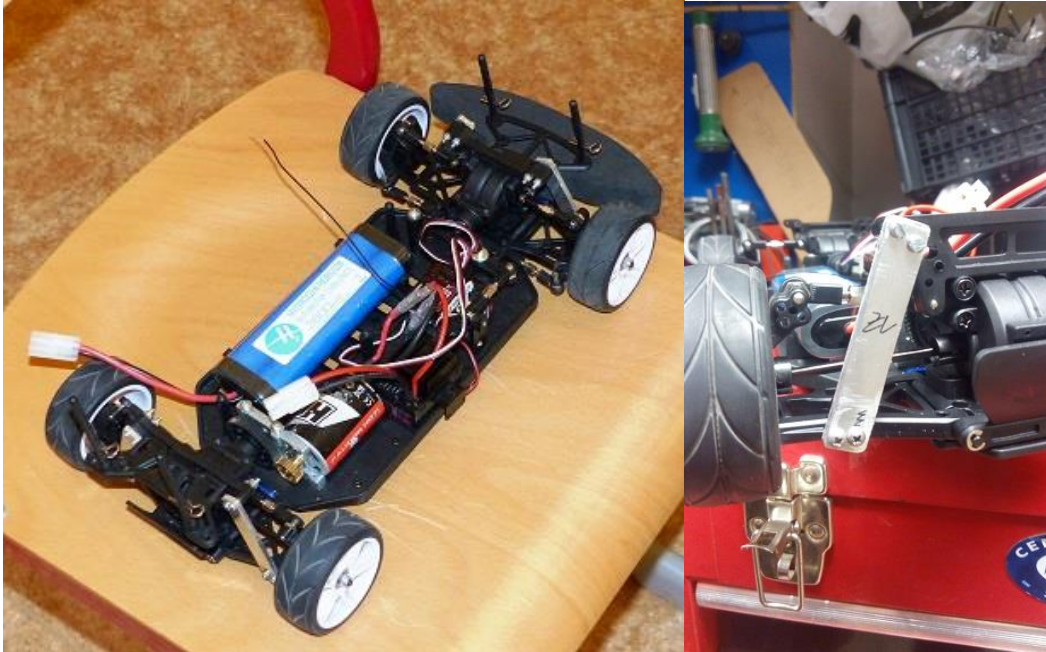


Fig. 2: left: basic assembly with the required changes; right: replacements for the shock absorbers can be clearly seen (aluminium reinforcements)

Next step was the attachment of the hydrogen system. Because the connectors were incompatible, the bypass power wires were adjusted. The conductivity in these connections was crucial as the current flowing to the DC motor was relatively high. The H-Cell is cooled with a large passive heat sink and the whole system had to fit inside the plastic car shell. Fortunately, the inside provided enough space to fit the cell together with two Hydrostiks on the single central support above the motor.

Because of the added metal, the center-of-mass of the model was elevated, which could be dangerous during hard turns. The RC model was fortunately stable enough and we did not experience any turn-overs. We were also concerned about vibrations propagating throughout the relatively elastic construction. Hard-point joints tend to transmit vibrations, so at certain points, as opposed to screwing parts together, we decided to use crude but effective fastening with cable ties.

After the final touches on the shell the model was ready for testing. We repeatedly performed a series of maneuvers so that any hidden irregularities would emerge. Luckily, apart from minor adjustments to the wheel geometry everything seemed ready to go and we could start training before the contest.



Fig. 3: left: finished assembly without the battery and Hydrostiks; right: decorated model shell

With the assembled model, we attended the H2AC 2017 contest in Prague.