



# XRAY RX8'16

## Making of

Exclusive story by Martin Hudy

I have a lot of respect and passion for the 1/8 on-road class. My passion comes from my early days when I got involved in RC, as this was the class I started with and grew up with. My respect comes from the fact that this class is considered the “ultimate F1 class” and as such many manufacturers put a high priority and investment into the class that pushes performance and limits all the time. It is kind of strange that despite this class being considered to be pinnacle of all RC car classes, the number of race entries is still low. This is understandable considering the big investment for a 1/8 on-road season and the complexity of the cars, but the very high speeds make the races very exciting and also challenging!

For non-involved persons it may seem that the cars remain nearly the same, but the opposite is true. Since many manufacturers make this class their primary focus, there are large resources invested into R&D and as such new changes & refinements appear every year. Every brand and every team that takes this class seriously must stay constantly involved, participate at races, and have frequent interaction with the community. Quite literally, there is no time for a break.

My father Juraj Hudy was designing & producing his own 1/8 on-road cars by himself in the late 70's, but XRAY's first commercially-available, mass produced 1/8 on-road platform was the RX8 which was introduced back in 2010. Since its introduction, we have made huge progress on the car and worked hard with the team during the seasons to bring improvements for the next car... cars which were again faster, better, and more reliable than the last. This is pretty much what we do with all XRAY cars and platforms, in all classes.

Even with our best efforts, 2015 was the first year that we did not release a new version of the RX8. It was an extremely difficult decision to make, but we had to face reality though it was not to my liking. Why? New tire rules brought numerous new challenges which we had to solve; though I started with some small changes and ideas, we ended up designing an all-new car. How? Keep reading! 😊

Back in 2014 we were probably the last manufacturer that continued to use composite bulkheads. These were great for soft tires, but now that hard tires had to be used we were forced to completely redesign the entire platform. I thought I could make all the changes fairly quickly, but I ended up in an endless loop of design-prototype-test and back to design again. During the over 1.5 years of development (and seemingly never-ending testing), I ended up with 12 different concepts. Yes, that's right... 12. Twelve different designs, from which 4 different designs were realized into real prototypes that were tested and analyzed. Does this sound crazy to you? Yes, it is crazy for sure, but once I got fully involved and had a clear goal of no-compromise strategy, there was no turning back.

Most of the work and development was in the following critical areas:

- **FLEX:** Flex is the most important feature that influences the overall characteristics and handling of the car. All changes to the car were made with the intention to achieve the proper flex, and of course to design the key parts to allow flex adjustment as needed.
- **BULKHEADS:** The aluminum backbone of the car was a major update to the entire concept of the car, a "must have" when using hard, large tires without additive. With experience from the recent NT1 platform redesign changing to aluminum bulkheads, I already knew the critical things to focus on, and how to incorporate new parts to allow the car to flex properly. I also knew how to re-design the car to make it easier to work on, as well as keeping production efficiency in mind.
- **CHASSIS:** The chassis was re-designed to work with the new aluminum backbone, and it was modified to accommodate the newly-improved geometry.
- **SUSPENSION FLEX:** Flex of the suspension is very important to the car's overall performance and handling characteristics. Besides getting the correct stiffness of the composite suspension arms, the way that the suspension is mounted is also very important. Therefore I focused on this area and tested many different alternatives that helped me to make good progress.

The car's flex and suspension are things that you cannot analyze in a computer environment, but rather they have to be experienced on the track. As such, whatever I designed in the computer was soon tested on the track. To be sure that I had feedback from all different track conditions, we decided to make more prototypes than usual. We tested the prototypes at low-traction tracks in Portugal and Slovenia, at large open tracks in Germany, and at tight tracks (with boards) in the USA. With different tire additive rules from country to country, we needed to test at races which allowed tire additives (e.g., Italy, USA) as well as at EFRA races which did not allow tire additives.

The test team included Bruno Coelho (Portugal), Nicola Marrone (Italy), Fabio Domanin (Italy), Mattia Passenti (Switzerland), Tom Kraegefski (Germany), Mike Swauger (USA), Ralph Burch (USA), Jernej Vuga (Slovenia), and of course myself and my father Juraj. To get feedback from regular drivers as well, I included Tomas & Igor Lipták – they are living in my city, and are both RC fanatics that spend almost every day at our track. Both of them

together put in several hundreds of track time hours, so I could be confident in the car's long-term reliability.

### **Prototype #1:**

After the 2014 season, I started working from scratch using concepts from the new NT1. I started with the design of the alu bulkheads, which were assembled to the RX8 chassis. I tried to use as many existing RX8 parts as possible, but of course there were many complications and thousands of small problems. In the computer, I created several different concepts which had the same results, but every one of them used different parts to achieve that. From these first concepts I chose the one that used the most existing RX8 parts so we could quickly create prototypes for the team to test. It took several weeks to produce the new parts, but after I assembled the first car and checked the flex on the workbench I was very positive and optimistic.

The first feedback was positive (as expected) and everyone reported that the first prototype performed better than the current RX8 car, and in particular it had increased traction and steering. I was happy that we started to move forward right away from the beginning, but I wanted to wait for a few more weeks to get more feedback from the rest of the team. From all the data we collected along with my own test experiences, I knew what I needed to work on next.

### **Prototype #2:**

Based on Prototype #1, I started to work on further modifications and improvements. The basis of Prototype #1 was very good, so I only needed to work on small details to make the car easy to handle but also easier to work on. There were several parts that required design changes to eliminate weaknesses. For example, I received reports from two different drivers who both broke aluminum bulkheads in exactly same place. As such, I had to completely redesign the front bulkheads to make them stronger and more reliable, while still keeping the same flex. Progress with Prototype #2 was going very well, but time was flying by faster than I realized.

While I was hard at work, I was suddenly confronted by the most difficult thing that any designer and engineer faces: The Deadline. By then it was the beginning of 2015, and we had only a few months left before the new season started. I had a major decision to make: either we were all done and ready for mass production, or we continue to work on the design which would put us in jeopardy of missing the start of the season... which also meant the potential of a drastic drop in sales.

I spent many sleepless nights thinking about all the details and aspects of the project, but to move forward there was no other option than to analyze all the feedback and consider all the options in front of me (again). There were so many different ideas for improvement which I was convinced would give even better performance, and I really did not want to miss out on them. I badly wanted to bring the RX8 to the top of the class, which was probably the reason I lost track of time. I kept trying to convince myself that we could still do everything on time.

After very tough considerations, I decided to take a risk and continue to incorporate new ideas. I really did not want to make any compromises, and wanted to make the RX8 the absolute best possible. I was convinced that I could quickly incorporate all the necessary design changes, produce the prototypes quickly, have them tested quickly, and then still be

on time to incorporate any changes before mass production (which, of course, could still be on time). Oh man, how wrong I was!

The first delay happened right away in the design process, as I had some very different requirements and ideas from the team which I could not incorporate into a single design. As such, I ended up with another 3 different designs and platforms. So what I thought would only take me a few hours behind the computer actually took me many, many days... more than I expected. Then to produce all those different prototypes for 3 different designs also took much more time... so again, we spent much more time in production than expected. Once the prototypes were finished, I sent them to the drivers for testing and anxiously waited for feedback while Juraj and I continued to test.

Time was flying by very fast, and I was getting very close to The Deadline. To say I was seriously nervous and stressed is a gross understatement. I had a really good feeling about the progress we made from my own testing as well as from others' feedback, but the more feedback I got the more I realized I was in real trouble. After all the information was analyzed, I simply did not know which way to go since each of the 3 different concepts had different strengths but also some weaknesses. Of course, some of the weaknesses could be quickly changed & incorporated, but the tricky part was that it started to seem that the only solution would be to "mix" and incorporate all the 3 different concepts into 1 design. This would be the ideal solution, but would mean a very high chance of missing The Deadline and the beginning of the season.

The pressure was tremendous.

I had to decide whether to:

- a) select one of the 3 concepts and put one of them into production, or
- b) get back to work and make new changes.

If I selected the first option, it would not be a disaster as any of the 3 different cars were still a big improvement over the previous RX8. But still, all of them had room for improvement which I knew about and could not get out of my head.

Should I play it safe and compromise... releasing a car on time for the season? Or should I stand by our "no compromise" commitment to ensure that I put the best-of-the-best into the final design?

After extensive analysis of how quickly we could run the production line, I decided on the riskier of my two options. It was obvious that if I still wanted to make changes, there was no chance to produce a prototype, test it, and then run mass production... all while still being on time. I decided to make all the required changes I had in mind, and produce a small quantity of cars in the final design for the team. With this strategy I wanted to at least have the team running with the new car, meanwhile running the mass production as quickly as possible. This would essentially mean that despite missing the start of the season, we still could have the car available a short time afterwards. Whether or not this was the right decision I will never know, but the fact is that in the end we missed the season.

### **Prototype #3:**

After making the decision to incorporate the changes, I was almost a permanent fixture behind the computer... trying to put all the changes from the 3 different concepts into one car. This was very tricky & demanding, as I had to throw away a significant amount of the

work done beforehand, and even still I was constantly running into conflicts and problems. After a huge amount of time & effort spent on this, I finally finished and was very pleased with the outcome. I uploaded all the manufacturing programs to the production server, and Production started to work on the 20 pieces of the cars for the team.

While working on the team cars, we sadly informed distributors that the RX8 would be delayed for the 2015 season. This was not very welcome news.

By some kind of miracle we were able to produce the team cars fairly quickly before the first races of the 2015 season, so the team got their cars which they could use to test & approve the new final design. As usual, I was very anxious and could not wait for the feedback to roll in. I was contact with the team drivers very frequently, to poke them if they had any new feedback for me.

The first bits of feedback did not please me. There were several issues reported which were not good news: the front bulkheads were breaking again (but in a different area), the rear lower suspension mount was bending, and at some particular tracks with angled curves the engine would still choke despite the changes I had already made to the fuel tank. All of this feedback sent a clear message to me: there was no chance we could start mass production of this car, and there was no chance I could make all the necessary changes and still be on time for the 2015 season. For the second time, we had to face a tough reality and send the bad news to distributors – for the first time there would not be an updated version of the RX8 ready for the 2015 season.

Was I broken? Yes!

Was I frustrated? Like never before!

Did I give up? Absolutely not!

All the issues & problems I had not expected served to jumpstart my motivation to a whole new level.

Since I had nothing left to lose, I needed to first solve the existing issues:

- The front bulkheads got a design change, with reinforcement in the area that saw breakage;
- To eliminate the rear suspension holder bending issue, I changed the mounting from 2 screws to 4 screws which made the assembly very solid and impossible to bend anymore;
- To solve the problem with the fuel tank, I have decided to use a completely different fuel tank;
- To get more steering from the front suspension I incorporated the same design I recently (successfully) used on the new NT1. Instead of the front upper arm mounting from the side to the bulkhead, I changed the design so the upper arm holder was mounted in two different points – in front at the bulkhead, and in rear at the radio plate. This design resulted in changes to the flex characteristics which improved steering (especially at high-traction tracks). This new design concept required completely changing the front part of the car – making it more difficult to implement – but the benefits & performance improvements were significant.

All these new changes were put into production and we managed to get the parts to the team for further testing. Finally, the feedback that arrived was positive and no more issues were reported. Unfortunately, we were too late.

The team continued to use prototypes for the rest of the season, in many cases very successfully. The team used the newest prototype at the European Championship, where Bruno Coelho qualified 5<sup>th</sup> and Nicola Marrone finished 5<sup>th</sup> overall. The performance of the car was finally where we wanted it to be, and the team was satisfied and happy.

After summer 2015 had passed, I considered putting this latest version of the RX8 into mass production. However, since I was busy with the new T4, X10, X1, and NT1 projects and still had enough time, I decided rather to wait. Finally I had made a good decision! ☺

#### **Prototype #4:**

Despite being convinced that we had the final design, a coincidence changed this. This time the idea came from a completely different source: the new T4'16 that I was working on at the time. While racing on asphalt, to make the car roll better we added a 1mm shim under the top deck. This small change gave the car much less roll resistance through the corners, increased traction, and made the car much easier to drive. With this positive experience on the T4, I really wanted to try this on the RX8 as well.

Despite this sounding like a small change, the opposite was true. I ended up completely changing the front bulkheads, radio plate mounts, and servo saver. To incorporate this idea I had to change the steering servo mounting... by raising the radio plate I had to lower the servo mounting to keep the heavy electronics as low as possible. So this "small" change resulted in many long hours at the computer (again) to produce plenty of new parts to try out.

After the production run, I received the parts early in December 2015. Since the season was finished almost everywhere, I was lucky to find one last race in southern Italy where we could test this new part. I prepared my own Prototype #3 (which we used the entire season) along with the new Prototype #4, and sent both to Italy for testing. Luckily, as I had hoped & expected, the feedback on this new radio plate mounting system was positive, the car was easier to drive, had more traction, and had increased cornering speed. To make sure that we were not hanging our hopes on the feedback from a lone driver's feedback, I sent the same parts to Mike Swauger for the Winternats. Mike tested both prototypes back-to-back, and confirmed the same good feeling with the new radio plate. I was so relieved!

By this time, I was convinced that this was "it" and I could finalize all the drawings, update all production programs, and release the car to Production. Despite our disappointment in missing the 2015 season, we know the final car was worth the wait. We have completed all of our long-time tests, and fine-tuned all the details. I am certain that you will be impressed by the new RX8, and enjoy it as much as I do.

I hope you have enjoyed this short story that hopefully gives you some insight into my daily life and the challenges I face, but also tells of the joy I get once we successfully finish an important project. Please know that I will be with Team XRAY at all races during the 2016 season, so I welcome you to come see me at any time if you need any help with anything.

'Till next time!