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Part Mirage, part Evo: the new Mitsubishi R5+ rally car developed in Sweden

Not just a Mirage

The latest entrant to rallying's up-and-coming R5 class has been developed in Sweden, based on a Japanese car made in Thailand. True to its international origins, it will be sold around the world

WORDS BY GRAHAM HEEPS



➤ The Group N class for production-based vehicles was a rallying success story in its 30 years of existence. Even now, hundreds of Mitsubishi Evos and Subaru Imprezas – which became the class’s mainstays – compete in national and local championships on every continent. But the FIA phased out Group N at the end of 2012, and it was removed as a class from international competition.

In Sweden, Tomas Weng’s Mpart company had built a business supporting Evo rally cars. Together, the abolition of Group N (latterly known as R4) and Mitsubishi’s 2010 decision to scale down its Ralliart motorsport operation – and not build further Evo models – put the future of his business in doubt. Many of his customers, too, weren’t sure which rally car would be their next. Working with SBF, the Swedish motorsport federation, he put together a set of regulations for 4WD cars.

“They were about 95% complete when I heard about the discussions at the FIA for a new 4WD class,” he recalls. “When I received the first draft of the R5 regulations a few weeks later, it was almost identical to what I’d drawn up! My version used a few more standard parts from the beginning to get the cost down, but pretty much everything else was the same.”

With R5 emerging as the way to go, Weng considered his options for building a car to the new regulations. This was in 2012 and the Mitsubishi Mirage/Space Star had just been launched. “The size was perfect and the low weight was fantastic,” he says.

In January 2013, the initial concept was finalized and drawings produced.

MAIN AND BELOW: The R5+ made its gravel testing debut in Rally North Wales in March 2015

PHOTOS: RALLYSPORT MEDIA





"We've spent a lot of money and an incredible number of hours to do it, but I'd do it all again tomorrow"

Tomas Weng, managing director, Mpart

R5 rally machines must begin life as a regular, road-registered car, so two months later Mpart took delivery of a Mirage base car for the prototype shell, which was completed in July. Soon after, the final R5 regulations were adopted by the FIA after Rally Finland, for which M-Sport entered a Fiesta R5, the first car to be homologated under the new formula. By September, the Mitsubishi's engine, suspension and transmission designs were complete.

"For the Group N cars, you basically had to follow the instructions on the homologation papers," says Weng. "You maybe had a bit of freedom on the engine. The big difference in this case is that we have done everything from scratch and it has made for a fantastically interesting project. We've spent a lot of money and an incredible number of hours to do it, but I'd do it all again tomorrow."

The testing burden was reduced – and Weng's peace of mind increased – by the extensive use of proven Evo X components. R5 machines may use production parts from the manufacturer's other vehicles – the Fiesta's radiator, for example, is from the Ford Edge. Mpart has stuck with what it knows.



The Mitsubishi R5+ on the Rototest dyno in Mpart's workshop in Örebro, Sweden

Damper development

➤ The Mitsubishi R5+'s suspension has been developed in partnership with Öhlins Racing, and in particular its subsidiary Öhlins Auto Norden, with which Mpart had an existing relationship. Öhlins had prior experience of R5 applications, having provided dampers for Citroën and Peugeot's offerings.

"Mpart did all the hard work on the suspension design but whenever they had questions, we had a discussion," says Kent Persson, rally team leader at Öhlins Racing. "We use an Öhlins internal solution in Excel and MATLAB to help create new setups. We input basic data on the car and it finds the damper curves for

each specific application. We combine that with knowledge from iterative dyno testing to create the damper setup for a specific application.

"Usually, we make several setting proposals for testing on the car and then make changes based on feedback from the customer," he continues. "You need physical testing with a

rally car, especially with one that will be sent to customers in several countries. You need a setup that works well on a large variety of roads."

Physical testing on the Mitsubishi R5+, which has high-end, three-way adjustable TPX44 dampers, has been supported by Öhlins Auto Norden.

"It's a little different in the Mitsubishi world compared with the others, because we already had a fantastic 4WD Group N/R4 rally car," he explains. "We knew already that those parts worked well, so we have used as many Evo X parts as possible to make it easier for us and the teams, and relatively cheap. These are proven components that we don't have to test again, and that includes the 4WD system and Sadev transmission."

For the rest, CAE was key.

"We spent a huge effort simulating all the parts on the computer before we built it," he continues. "It's the only way to do it – otherwise you would need to run thousands of kilometers of [durability] testing. Yes, the software is expensive, but in the end it's a drop in the ocean compared with physical testing. We use SolidWorks CAD with Simulation



ABOVE: TPX44 damper on an Instron dynamometer at Öhlins

Professional to test structural performance." Fellow Swedish company, Öhlins provided assistance on the suspension design and development (see sidebar, *Damper development*).

Like most of the car, the 1,620cc engine – a reduced-capacity version of the Evo X's unit – was developed in-house. Weng has had the use of an external engine dynamometer, but the final mapping was done on a Rototest dyno in the workshop. Its aerodynamics are the fruits of a handful of CFD runs, made possible on a tight budget by recent advances in computing power and internet connectivity.

"You do it here in the workshop, but you upload your model and use the power of a server somewhere else," he explains. "It's worked fantastically well and we are close to where we need to be. For the final adjustments you need a wind tunnel but in Sweden

RIGHT: This prototype bodyshell was completed in July 2013



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Private enterprise

➤ Unlike some of its R5 competition – which currently includes cars from M-Sport/Ford, Citroën, Peugeot and Škoda – Mpart's rally car doesn't have a manufacturer's millions underwriting its development and marketing, although the project was acknowledged by Mitsubishi in October 2014.

"Support from Mitsubishi was very limited, because I didn't ask for it!" laughs Tomas Weng. "Yes, there are areas where we have worked together but this is my project, my ideas. It has become a lot bigger than I originally planned because of the amazing interest from all over the world, but I'm following my own plan to do it right, to make the car cheap to run and easy to maintain."

the availability is limited and the costs are high." At the time of writing, he was still considering his options for the final aerodynamic tests.

The first running car – named Mitsubishi R5+, because it is not yet FIA-homologated – made its public debut in September 2014. Out of necessity in a Swedish winter, its first test kilometers were run on snow, from January 2015. In all, Mpart completed over 500km on snow over the course of four days of test sessions, revealing no major mechanical issues.

"When you find a good setup for snow, you can run on almost any surface, as you'll never have less grip than that!" Weng laughs. "That makes it a fantastic 'test bench' for us, and the tests can be done locally."

Nevertheless, it was important to test the R5+ on asphalt and gravel surfaces before the start of the 2015 rally season. That required trips in March to the Netherlands – where it ran as a course car on the asphalt Tank S Rally – and to the UK for Rally North Wales.

"We needed to be prepared for the start of the gravel season in Sweden, which started in April," he explains. "We needed to test on rougher roads than are available in the south of Sweden, but in any case it was a difficult time to test on tarmac or gravel in Sweden. We were at the end of winter and all the snow was melting, so it was wet and slippery

ABOVE: Stock Mitsubishi Mirages awaiting conversion
TOP RIGHT: The Tank S Rally in the Netherlands was used to test the car's performance on asphalt

everywhere. Of course, we were running the car in those rallies for promotional reasons, too, as well as to compare how fast it is compared with the other [R5] cars."

The Mitsubishi will run only in Sweden during 2015, as part of an extended test program for the car to ensure total reliability before deliveries abroad are considered. High demand for the machine – Mpart has more than 10 orders for the car from Swedish customers alone – means that eight of the company's current staff of 10 were flat-out building customer cars at the time of writing. As much as possible is made in-house, to keep costs down. Meanwhile, in April, the company began a project to double the size of its workshop in readiness to ramp up deliveries.

"We've had fantastic interest from all over the world but we need to do it right," Weng stresses. "We have included support in the price to Swedish customers and the teams know that we will use them as a kind of test fleet. We will give them 100% support to get the cars running. It's a good opportunity for me to learn and understand different types of drivers. Once we have this database, we'll be ready to send the cars out of Sweden, but that won't be before the end of this year." He adds that some of his manufacturer competition have fixed post-launch problems in the field, a luxury his much smaller company cannot afford. "We need to have a 100% race-ready rally car, nothing less."

In 2015, the Mitsubishi will run under individual homologations from national ASNs. Weng says he will assess an FIA homologation at the end of this year, but the priority for now remains a reliable car.

"There is huge interest from customers around the world and many of them don't want to run the car in FIA championships, they want to run it under national homologation," he observes. "Not many countries follow the FIA regulations [for this class], so there is a huge market for us even if we don't pursue FIA homologation." ◀