DEVELOPMENT OF THE AUDI POWER UNIT FOR FORMULA 1: “SIGNIFICANT MILESTONES AND GOALS ACHIEVED”

- Adam Baker, CEO of Audi Formula Racing GmbH, and CTO Stefan Dreyer in a double interview
- Complete F1 Power Unit runs on the test bench and has already covered simulated race distances
- Development at the Neuburg site with 22 state-of-the-art test benches

Neuburg a. d. Donau/Hinwil, June 28, 2024 – Work on the Power Unit for Audi’s Formula 1 entry has been underway for more than two years. The specially created Audi Formula Racing GmbH (AFR) in Neuburg a. d. Donau is responsible for the development of the F1 hybrid drive (“Power Unit”) and has successfully completed the set-up phase. Together with the Hinwil facility, the team from Neuburg will form the future factory team with which Audi will compete in the top class in 2026. The Audi F1 Power Unit “Made in Germany” is making great progress behind closed doors. AFR CEO Adam Baker and AFR CTO Stefan Dreyer provide an insight into the current status.

Work on the development of the Audi Power Unit for Formula 1 has been underway at the Neuburg facility since spring 2022. What has been achieved so far?

Baker: After just two years, our Power Unit, consisting of a combustion engine, electric motor, battery and control electronics, is running dynamically on the test bench. Successfully marrying the various components into a single unit is the result of hard work and great teamwork. The Audi Power Unit has already covered simulated race distances on the test bench. We gained a lot of testing time with the individual components in 2023 and were able to incorporate the experience gained into the next construction stages in parallel. Significant milestones and goals have been achieved, which gives the entire team a good feeling.

Dreyer: We implemented a very ambitious modernization and expansion of our test facility. Today, we have 22 state-of-the-art test benches at the site. Our new development tools are state-of-the-art and have enabled us to achieve a steep learning curve. By testing on the test bench under simulated racing conditions we gain important insights in this phase of the project. After the successful race distances with the Power Unit we will soon be doing the same with the entire drive system, which means the combination of Power Unit and transmission. At the same time, we are going full throttle with performance development in order to achieve the goals we have set ourselves.

On which tracks has the Audi Power Unit already been driven?

Dreyer: We run the Power Unit on the test bench with different layouts from the current F1 calendar, depending on the purpose of the test. For example, Las Vegas is interesting for our development team in terms of overall energy management. Several alternating fast and slow corners and almost two

kilometers of full throttle driving on the Las Vegas Strip provide the perfect development environment for fine-tuning the combustion engine and the ERS (Energy Recovery System) components.

Baker: Hearing the Audi Power Unit being simulated today on tracks like Spielberg, Singapore or Las Vegas, not only gives everyone involved goosebumps, but also gives us the feeling that we are a big step closer to our first race in 2026.

How has the development department set itself up for this challenging project?

Dreyer: It was particularly important to establish a broad base in all areas, to create a good foundation for the development of the individual components – combustion engine, electric motor, battery, control electronics, software – to coordinate them with each other at an early stage. Our experience from previous motorsport projects with high-voltage technology, Le Mans, Formula E, but also from the current Dakar project, has helped us a lot. We have already proven in the past that we can develop conventional, hybridized and purely electric drivetrains. Nevertheless, the challenge in Formula 1 is a completely different one in terms of cutting-edge technology and competition. This also applies to our partners and suppliers – we are experiencing a very strong commitment from all sides.

Even though the construction in Neuburg has been completed, is the intensity still increasing?

Baker: There have been special milestones almost every month since the start of the project in spring 2022, for example the start of construction for our infrastructure expansion, the start of testing for the single-cylinder, the first test bench run of the electric motor and the V6 engine and the first race distances with the complete Power Unit. The fact that our entire team can fully concentrate on the development of the Power Unit for 2026 is an advantage for Audi. The remaining time until 2026 is all about achieving our development goals in terms of maximum overall vehicle performance with full focus. It will remain exciting until the first race – and after that, of course, too.

Dreyer: Intensity is a good keyword for our performance development. The regulations allow a total of three test benches for single-cylinder tests, for example, which are not limited by the FIA in terms of operating times. We use this maximum number at the facility as intensively as possible for the development of combustion processes for internal combustion engines. So far, we have achieved all the targets we set ourselves for performance and efficiency in this phase. In addition, our fuel development has been running since 2022 with a strong partner who has many years of experience in Formula 1. This is a really decisive factor for our project, as the new fuel for 2026 will have even greater competitive relevance.

A cost cap has also been in place for the development of the Power Unit since this year. How can we imagine day-to-day business under the FIA's cost cap?

Baker: Like all other Formula 1 teams and Power Unit manufacturers, we were faced with the challenge of setting ourselves up accordingly. It's all about cost-cap efficiency and cost-cap conformity. One advantage was that we were able to start on a blank sheet of paper, so to speak, creating our own company, Audi Formula Racing GmbH, for the project. We had a clear picture of structures, systems, processes and the right mindset right from the start. The topic of finance has a direct impact on performance due to the cost cap. There has never been such a direct link between operational efficiency and sporting success in Formula 1. The fact that we can operate at the limit of the cost cap with PU development puts us on a par with our competitors.

How important was it to be able to fall back on an existing infrastructure at the Neuburg site?

Dreyer: The infrastructure created by Audi for motorsport in 2014 has been a very good basis. It has put us in a position to start Power Unit development in 2022. To adapt this infrastructure to the Formula 1 use case, we built a new building for additional test benches, state-of-the-art workshops and laboratories in parallel with our development activities. That enables us to continue development at full throttle.

For the first time in recent years, an F1 Power Unit is being developed in Germany again. Was it difficult to recruit employees for the Neuburg site?

Baker: The local proximity to our parent company Audi in Ingolstadt is a great advantage for us in many ways. There are many technical experts in the region, especially for the development of drivetrain components. The other F1 Power Unit manufacturers are based in the UK, France, Italy and Japan. If you want to bring in employees from competitors, they usually have to move to another country – that's a challenge, but it's no greater for us than for anyone else. People not only have to be prepared to change employer, but also the country. The fact that we were successful in recruiting experienced engineers and technicians from all other Power Unit manufacturers shows that our project and the location are attractive – also for international experts and talents. We now have a broad mix in the team with employees from 23 countries.

Dreyer: Not only do we have a broad international base, but we have also strengthened our existing motorsport expertise at Audi Sport with external F1 expertise. This has helped to accelerate our learning curve considerably. Everyone is giving the project maximum speed and is eagerly looking forward to entering Formula 1. Motivation is extremely high, and we sense a strong team spirit.

Can you give us an outlook? What topics are Neuburg and Hinwil already working on together?

Dreyer: On the technical side, we are already working in a genuine factory team mode across both sites. The focus here is on integrating the Power Unit with important details such as thermal management. There is also close cooperation on the gearbox. We develop the internals in Neuburg, while the structural parts such as the gearbox housing and rear axle are produced in Hinwil. Testing of the complete drive, consisting of the Power Unit and transmission, then takes place on our powertrain test bench. This division is expedient in terms of performance and expertise**.**

Baker: We made an early start with the 2026 concept team in Hinwil back in January 2023. This work is now being intensified with the current chassis regulations. Our goal is clear: to fully exploit the advantages and possibilities of a factory team in terms of packaging and integration of the Power Unit.

Short biographies

Adam Baker was born in Australia in 1974 and has been a German citizen since 2018. He has worked as an engineer for various manufacturers and teams in several international racing series. Between 2002 and 2009, he worked for three customer teams and three factory teams in Formula 1, most recently at BMW as head of the race and test team responsible for the F1 drivetrain. From 2018, Baker was Safety Director at the FIA before being entrusted by Audi in 2021 with the task of setting up the overall technical, strategic, operational and financial concept for Audi's entry into Formula 1. As the managing director of Audi Formula Racing GmbH, he is responsible for the Neuburg facility and the drivetrain development of the F1 project taking place there.

Stefan Dreyer was born in Stuttgart in 1973 and completed his degree in mechanical engineering with a thesis at Audi. The father of two has always had a passion for motorsport. He began his career at Audi Sport as an engine engineer in the sports and special engines department in Ingolstadt and worked his way up to head of development for all motorsport projects. Dreyer was involved in the early planning of the F1 project. Under his leadership, the technical and sporting regulations were negotiated with the FIA, as a result laying a key foundation stone for Audi's entry into F1. As CTO of Audi Formula Racing GmbH in Neuburg, he is responsible for the technical development of Audi's power unit.

Communication Formula 1
Benedikt Still
Press spokesman Audi F1 Project
Phone: +49 841 89-89615
E-mail: benedikt.still@f1project.audi
www.audi-mediacenter.com

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In 2023, the Audi Group delivered around 1.9 million cars of the Audi brand, 13,560 vehicles of the Bentley brand, 10,112 cars of the Lamborghini brand and 58,224 motorcycles of the Ducati brand to customers. In the 2023 fiscal year, the Audi Group generated revenue of €69.9 billion and an operating profit of €6.3 billion. In 2023, an annual average of more than 87,000 people worked for the Audi Group worldwide, including around 53,000 at AUDI AG in Germany. With its attractive brands and a large number of new models, the company is systematically continuing on its path to becoming a provider of sustainable, fully connected premium mobility.

Audi will enter Formula 1 for the first time in 2026 with its own factory team and a hybrid drive system ("Power Unit") developed in Germany. The future team is based at two locations: Audi Formula Racing GmbH, which was founded specifically for the project, is developing the Power Unit in Neuburg an der Donau. Hinwil in Switzerland will be home to the development of the racing car as well as the planning and operating of the races. Formula 1 is regarded as the pinnacle of motorsport and, with its global reach, is one of the most important sports platforms in the world. Another decisive factor for the entry of Audi is the new FIA regulations, which from 2026, will include novel fuels derived from synthetic and renewable biological sources and increase the electric share of the hybrid drive unit to almost 50 percent.