

# CASE STUDY

Akrapovic  
Ivančna Gorica, Slovenia  
Analysis of Tire Noise and Vibration

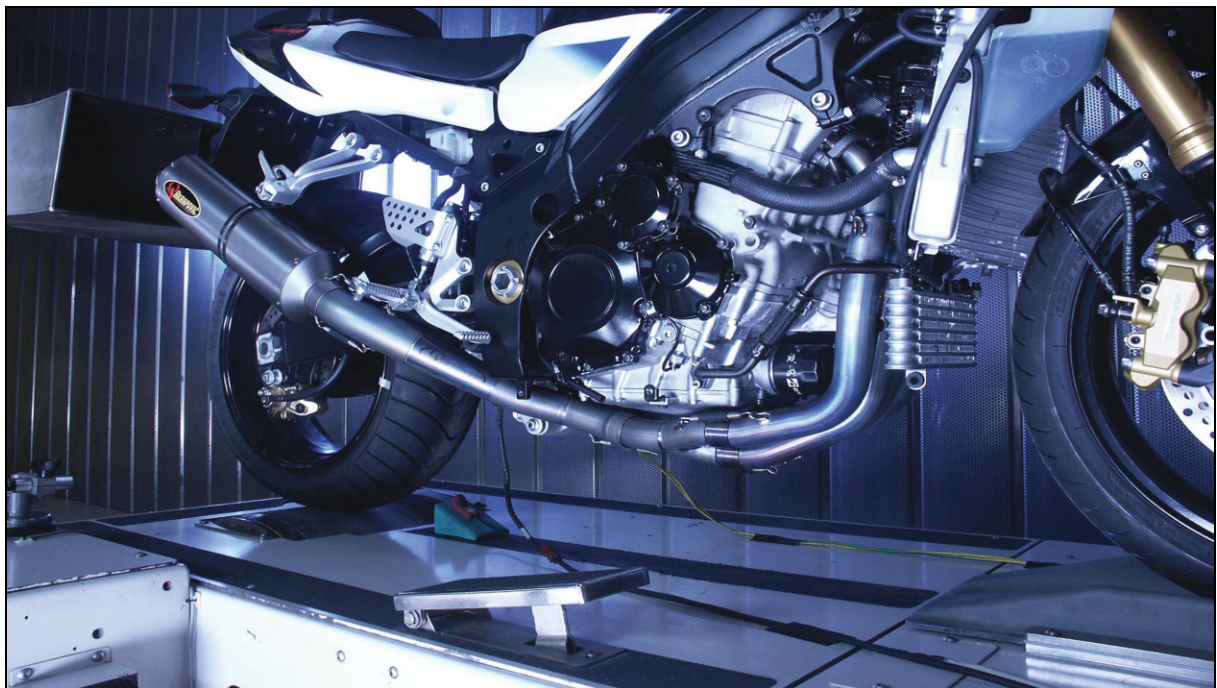
Europe  
Automotive

PULSE, Hand-held Analyzer Type 2250

*For former Roadracing Champion, Igor Akrapovic, it all started as a tuning shop for motorcycles. Today, only 17 years after its small scale opening, Akrapovic has become one of the world's best known manufacturers of top quality exhaust systems for high performance motorcycles. For more than ten years, product development at Akrapovic has used Brüel & Kjær's PULSE™ system, including Hand-held Analyzer Type 2250 for acoustic testing prior to certifying new exhaust systems at TÜV in Germany. The manufacturing facility of Akrapovic is located in Ivančna Gorica, east of Ljubljana, the capital of Slovenia. The facility covers an area of 7500m<sup>2</sup> and has approximately 400 employees.*

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**Fig. 1** Akrapovic manufactures a high-quality range of products for different types of high performance motorcycle



Photographs by kind permission of Akrapovic

## Acoustic Testing on Performance Exhaust Systems from Composite Materials

### A Lifelong Development

Igor Akrapovic was known, during his active career, as the man behind his own successes. His competitors were always curious to learn how he managed to get that extra horsepower and torque from his motorcycles. Igor's answer? He just showed them his back wheel at the next race. "It was my interest for motorcycle racing plus the high number of requests for tuning jobs that pushed me into the development and manufacturing of high quality exhaust systems," says Igor. "Doing tuning jobs for some of the world's major racing teams in the late 80s enabled us to

create a brand for ourselves and due to the lack of suitable suppliers for high-quality equipment, we saw a market and went for the business opportunity.”

At the beginning, Akrapovic focused on horsepower, torque and sound as the key issues for engine performance. “It’s a little different today where we need to take EU legislation<sup>1)</sup> (EU97/240EC) into account for pass-by noise measurements, and EU’s limitations for vehicle emission,” says Igor. “The real challenge is to find the extra horsepower below the 94 dB noise level for offroad and 105 dB for superbikes.”



### Range of Products

*“I wasn’t satisfied with the products on the market at that time and that’s why I founded Akrapovic in 1990,” says Igor*



Akrapovic manufactures a high-quality range of products for different types of high performance motorcycles for its three major markets – Europe, Japan and USA. “Among our Original Equipment customers we have BMW and KTM as major players but we do have a product mix, which satisfies the vast majority of the high performance motorcycle manufacturers worldwide,” says Igor. “We have a product split, in which 30% of our total production goes to the sports segment of road and offroad motorcycles and the rest addresses the after market.”

At the 2007 Frankfurt Auto Show, in cooperation with Porsche, Akrapovic launched its first exhaust system for cars – for the Porsche GT. “It was a big day for all of us,” says Igor. “It was a very exciting and challenging period and the success we earned only confirmed our decision to enter the market for quality exhaust systems for high performance sport cars.”

Akrapovic’s investments for handling new metal alloys (titanium/aluminium) reduced the weight of Porsche’s exhaust system by 45% while both durability and performance were improved. “This gives us a strong belief in our new product mix for the year to come,” says Igor.

### The Facility

*Akrapovic’s department for testing new material and prototyping*



At the beginning, all acoustic tests were carried out at TÜV in Germany. But due to the logistics, a wish for faster results and more flexibility within the development department, Akrapovic decided to purchase its first hand-held sound level meter from Brüel & Kjær in 1994.

“We have had this product for almost 15 years. It’s still accurate and we use it on a daily basis,” says Igor. “We are very pleased with it and we haven’t had any difficulties with our Brüel & Kjær equipment over the years.”

In 2001, Akrapovic opened its new test facility in a building next to the manufacturing halls. Besides a total new state-of-the-art test lab, the building also included office facilities for the development department.

*A motorcycle in the test-dyno with the microphone in position for acoustic measurement*

The lab facility operates three dyno benches for its test programs – two for motorcycles, both installed with PULSE Type 3560-B with two microphones per PULSE system. A new 4W dyno has just been installed for the new exhaust system for the high-performance testing program for sportscars.



“A new exhaust system is tested up to 200 times before we put it on the road for the first time,” explains Igor. “This test takes place in the dyno benches where we bring the motorcycle up to a speed of 120 km/h to measure the performance as well as the sound. This we do to form the platform for the benchmarking as well as for correlation testing to support the product development team. We have been part of 29 world championships and were awarded best brand of the

1) EU97/240C

year in 2006 and 2007,” says Igor. “Our know-how combined with our test facilities are some of the strongest assets that we have.”

### Diversification

Recently, Akrapovic started production of high pressure cast products in alloy titanium and aluminium – strong materials combined with low weight. “We couldn’t find the right quality in the current market and due to the requirements from Porsche we needed to do something,” explains Igor. “This is mainly so that we can become our own supplier but we also target the European Original Equipment Manufacturers. This is a very interesting market area since we are known for high quality exhaust systems.”

### Meeting Future Requirements

The huge success achieved by Akrapovic since the opening of its new facilities in 2001 has already resulted in the need for extra manufacturing space. “As it is today,” says Igor, “it is very difficult to handle enquiries from new customers and that’s an unfortunate situation for us as well as for those customers we have to turn down”.

“To ensure enough space for both manufacturing and prototyping, we plan to expand our manufacturing facilities from 7500 m<sup>2</sup> to 16000 m<sup>2</sup> in the near future,” says Igor. “In order to become more independent, we have made a layout for a test track for pass-by measurements, which will reduce the time for product development and make our development resources more flexible. Of course, we expect Brüel & Kjær to deliver a basic PULSE solution satisfying the new EU standards for road pass-by noise.”

*Brüel & Kjær's PULSE Front-end Type 3560-B for acoustic testing of high performance exhaust systems*



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