Clean Air innovation, accelerated℠
Whether it is the rugged rumble of a sports car or the harmonious, quiet sound of a limousine, each vehicle has its own signature sound. That sound plays an important role in the subjective impression a car makes on a consumer.

An industry leader in sound design and engineering, Tenneco helps develop innovative solutions to sound-design challenges and supports the brand-typical sound characteristics of many cars in the field today.

In our leading-edge sound studio at the European Engineering Centre in Edenkoben, Germany, Tenneco engineers work closely with customers to define and characterize their desired subjective sound profile.

The development process is streamlined thanks to the use of simulation and analysis programs. Prediction tools such as GT Power, P-Cat, Wave, Flow Master, ABAQUS, ACTRAN and Star-CD are used to reduce development time and costs, while Tenneco’s customized “GILLAUM” software, enables quick and reliable predictions of the specific exhaust system’s tailpipe noise. The foundation provided by the CAE design means that even early prototypes are representative of the production solution and only small refinements are necessary on the real application vehicle.

The validation and the subjective evaluation of the exhaust system takes place on one of Tenneco’s modern engine test benches or directly on the vehicle.

In line with the sound engineering development, the exhaust system is optimized for performance, weight and durability. CAE tools for each specific functional requirement are available, as well as state-of-the-art test facilities for durability and life time testing. To ensure an efficient and cost effective development cycle, all functional requirements are first reviewed in the concept phase.
FACTORS IMPACTING SOUND

- Number and arrangement of cylinders – a larger number of cylinders always results in a broader and fuller sound spectrum. The upcoming trends of downsizing and down speeding put in new challenges for the sound engineer.

- Noise signatures are required to clearly differentiate vehicles using the same baseline power train. The first step to creating a unique sound is the tuning of the exhaust line by modifying pipe lengths and muffler volumes, and by the use of resonators and of absorption material.

- In addition to this classical sound tuning, Tenneco has a patented approach for changing the manifold and downpipe design to achieve a rough and sportive sound color.

- Future power train technologies, like cylinder deactivation, require variable exhaust lines which can adjust the noise attenuation and sound characteristics to the drive condition of the engine. This demand is intensified by the variable power train technologies like hybrid drives or range extenders.

- The variability is created by the use of valves opening bypasses or controlling resonances. Tenneco offers a large variety of sound control elements from passively actuated SAM valves up to valve systems with fully active control.

- Muffler box internals – Valves are also used in the rear part of the muffler system to influence the sound characteristics. The SAM valve, developed by Tenneco, can be used both as a semi-active or active control mechanism.
Clean Air Engineering
Ride Performance Engineering
Clean Air Manufacturing
Ride Performance Manufacturing
Headquarters

THE ENGINE OF INNOVATION IN CLEAN AIR

At Tenneco, innovation is a hallmark of everything we do. In our advanced clean air technologies and solutions. In our unique, total-system integration expertise and approach. In our commitment to partnership and collaboration. We’re always looking beyond the technology horizon to foresee and develop the next-generation clean air solutions that accelerate our customers’ success and keep them moving toward the future.

From development through delivery and beyond—we help our partners drive transportation innovation, full speed ahead.

Partnership built on performance

At Tenneco, we don’t simply provide a product. We provide a partnership—taking into account customers’ entire systems, their unique needs and applications, technology requirements, market challenges and goals. With our advanced methods of sound design, we offer the partnership that drives the innovation that maximizes performance.

TENNECO IS EVERYWHERE OUR CUSTOMERS NEED US

Our reach is global, but our focus is local, helping customers in each region adapt our global capabilities and technologies for local applications.

- Nearly 25,000 employees worldwide
- 89 manufacturing facilities
- 14 state-of-the-art research and development centers
- 4 dedicated research and development centers for clean air engineering

Markets served:
- Light vehicle
- Commercial vehicle
  - On-road
  - Off-road
- Locomotive
- Marine
- Stationary
- Large engine
- Retrofit

PLEASE CONTACT OUR CLEAN AIR TEAMS AROUND THE WORLD …

North America
3901 Willis Road
Grass Lake, MI 49240
USA
+1 517-522-5525

Europe
Luitpoldstrasse 83
67483 Edenkoben
Germany
+49 6323 47-0

China
C-D, 17F
No. 686 Jiu Jiang Road
Huang Pu District
Shanghai 200001
P.R. China
+86 21-6957-3026

Japan
Nissiki Yokohama
Building 18F
1-1-8 Sakuragi-cho,
Naka-ku
Yokohama, 231-0062
Japan
+81-45-285-5211

South America
Praça Vereador Marcos
Portiolli Nr. 26
Santa Luzia
Cep.: 13807-900
Mogi Mirim – São Paulo
+55 19 3805-7000

www.tenneco.com

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